

# Equipment Manual: Encoder 1000-1160

Date: June 2014  
Document #: 1050-1473  
Revision: F

For Nielsen Audio Encoder Model:  
1000-1160-xx 1U SGE Analog Encoder, ROHS Compliant

**Distribution of this document outside of Nielsen is subject to Non-Disclosure Agreement.**

## **NIELSEN CONFIDENTIAL AND PROPRIETARY INFORMATION**

Copyright © 2014 The Nielsen Company. All rights reserved. This equipment manual is intended for use only by authorized Nielsen customers. Should you receive a copy of this equipment manual in error, contact the Nielsen Legal department as indicated on page 8. This equipment manual may **not** be reproduced or referenced, in whole or part, without the express written consent of Nielsen. Posting to any website or FTP site requires the express written consent of Nielsen. This equipment manual and the information contained within is intended for Nielsen customers or authorized recipients only; any reference or its use, in whole or part, for any other purpose without express written permission from Nielsen is expressly prohibited. Nielsen Audio encoders are covered by one or more U.S. Patent Numbers and their corresponding international patents, and other patents may be pending. This equipment manual includes proprietary and technical information which is the intellectual property of Nielsen. Nielsen and the Nielsen logo are trademarks or registered trademarks of CZT/ACN Trademarks, L.L.C. Patents: <http://www.arbitron.com/home/patents.htm>

Any brand names, product names, or titles used or referenced herein are trademarks, trade names and/or copyrights of their respective holders. All images are used for purposes of demonstration only, and the entities associated with the products shown in those images are not affiliated with Nielsen in any way, nor have they provided endorsements of any kind. No permission is given to make use of any of the above, and such use may constitute an infringement of the holder's rights.

## ***Table of Contents***

<b>Nielsen Audio Trademarks Included</b>	<b>6</b>
<b>Contacts</b>	<b>8</b>
<b>Disclaimer and Limitation of Liability</b>	<b>9</b>
<b>Notices</b>	<b>10</b>
<b>1. Introduction</b>	<b>11</b>
1.1. Suggested Placement in Audio Chain	12
<b>2. Installation</b>	<b>13</b>
<b>3. Operations</b>	<b>17</b>
3.1. Initiating Encoding	17
3.2. Immediately After Placing the Encoder On-Air	17
3.3. Bypass Features	17
3.3.1. Power-Off Bypass	18
3.3.2. Master Bypass	18
3.3.3. Bypass Mode Remote Monitor	18
3.3.4. Bypass Mode Remote Control	19
3.4. Alarm Status Remote Monitoring	20
3.5. Theory of Operation for the Status and Control Relays	21
3.6. Using the LCD Menu	23
3.7. Encoder Overheat Behavior	24
<b>4. ELECTRICAL SPECIFICATIONS</b>	<b>25</b>
4.1. Analog Specifications	25
4.1.1. Frequency Response	25
4.1.2. Signal to Noise Ratio	25
4.1.3. Gain	25
4.1.4. Input Impedance User Selectable	25
4.1.5. Total Harmonic Distortion + Noise	25
4.1.6. Output Impedance	25
4.1.7. Differential Phase	25
4.1.8. Cross-Talk	25
4.1.9. Maximum Analog Input Level	25
4.1.10. Headroom	25
4.1.11. Common Mode Rejection Ratio	25
4.1.12. Maximum XLR Cable Length:	26
4.2. Alarm (relay) Specifications	26
4.2.1. Absolute Maximum Voltage Input	26
4.2.2. Absolute Maximum Current Input	26

4.3.	Power Specifications	26
4.3.1.	Voltage	26
4.3.2.	Current	26
4.3.3.	Frequency	26
4.3.4.	Connector Type	26
<b>5.</b>	<b>General Specifications</b>	<b>27</b>
5.1.	Physical Specifications	27
5.1.1.	Dimensions	27
5.1.2.	Weight	27
5.1.3.	BTU Output	27
5.2.	Environmental Specifications	27
5.2.1.	Temperature Ranges	27
5.3.	Date/Time Clock Accuracy	27
<b>Appendix A. Using the Optional Time Decoder Input</b>		<b>28</b>
<b>FCC Disclaimer</b>		<b>35</b>

## ***Tables***

<b>Table 1: DB9 Pinouts for Remote Monitoring of Encode/Bypass Status .....</b>	<b>15</b>
<b>Table 2: DB9 Pinouts for Remote Control of Encode/Bypass Status .....</b>	<b>19</b>
<b>Table 3: DB9 Pinouts for Remote Monitoring of Alarm Status .....</b>	<b>20</b>
<b>Table 4: Encoder Overheat Behavior .....</b>	<b>24</b>

## ***Figures***

<b>Figure 1: Front Panel of Nielsen Audio RoHS Compliant Analog SGE.....</b>	<b>11</b>
<b>Figure 2: Placement of Nielsen Audio SGE within the Audio Chain .....</b>	<b>12</b>
<b>Figure 3: Rear Panel of Nielsen Audio RoHS Compliant Analog SGE (with Time Decoder options installed).....</b>	<b>13</b>
<b>Figure 4: XLR Connection Pinouts .....</b>	<b>14</b>
<b>Figure 5: DB9 Pinouts for Remote Bypass Monitoring .....</b>	<b>15</b>
<b>Figure 6: DB9 Pinouts for Remote Bypass Control .....</b>	<b>19</b>
<b>Figure 7: DB9 Pinouts for Remote Alarm Status Monitoring.....</b>	<b>20</b>
<b>Figure 8: Status and Control Relay Connection Scheme.....</b>	<b>22</b>
<b>Figure 9: Rear Panel of Nielsen Audio RoHS Compliant Digital SGE with Time Decoder Option .....</b>	<b>29</b>

## Nielsen Audio Trademarks Included

Arbitron® and third-party trademarks that may appear in this document are included by reference and can be found at the following website: <http://www.arbitron.com/legal/trademark.htm#arb>

The following Arbitron® Trademarks are further included in this document by this list:

Mark	Type
ARB-TV™	TM
Arbitron iBoard™	TM
Arbitron Internet Board™	TM
Arbitron® Logo	®
Arbitrends <sup>SM</sup>	SM
Arbitron®	®
Arbitron Data Express <sup>SM</sup> (ADE)	SM
Arbitron eBook <sup>SM</sup>	SM
Arbitron Mobile™	TM
Arbitron Mobile Index™	TM
Arbitron Mobile Trends Panels™	TM
Arbitron On Demand™	TM
Arbitron PPM®	®
Custom Coverage <sup>SM</sup>	SM
Corporate Roll-Up <sup>SM</sup>	SM
Get-a-GRIP®	®
LocalMotion®	®
Management Reporter™	TM
Maximi\$er®	®
Maximi\$er® Plus	®
MaxQualitative <sup>SM</sup>	SM
MEDIAMASTER <sup>SM</sup>	SM
Media Professional® Logo	®
Media Professional <sup>SM</sup>	SM
Media Professional Plus <sup>SM</sup>	SM
MusicTester <sup>SM</sup>	SM
Next Generation Electronic Ratings <sup>SM</sup>	SM
PD Advantage®	®

Mark	Type
PD Advantage® Web	®
Portable People Meter™	TM
PPM®	®
PPM Analysis Tool <sup>SM</sup>	SM
PPM 360™	TM
PPM Weeklies <sup>SM</sup>	SM
PrintPlus®	®
PRINTSCAN <sup>SM</sup>	SM
PROSPECTOR <sup>SM</sup>	SM
QUALITAP <sup>SM</sup>	SM
QualiZip®	®
RADAR®	®
RADAR® Logo	®
Radio County Coverage™	TM
Report Designer <sup>SM</sup>	SM
Represent™	TM
Represent. Be Heard. Be Rewarded.™	TM
Represent your community™	TM
REQUESTOR™	TM
RetailDirect®	®
Retail Profiling System <sup>SM</sup>	SM
RETAIL SPENDING POWER <sup>SM</sup> (RSP)	SM
Schedule-It <sup>SM</sup>	SM
SmartPlus®	®
SmartReports <sup>SM</sup>	SM
SmartPlus Web™	TM
SuperPanel <sup>SM</sup>	SM
TapMedia®	®
TrafficLink®	®
You Can't Spell Radio Without R.O.I. <sup>SM</sup>	SM
You Count in the Ratings™	TM

## **Contacts**

If you need assistance or have any questions, please contact or call:

### **United States**

For any questions regarding this equipment manual, please contact Nielsen as indicated below:

#### **For Radio:**

- Email: [EncodingOperations@Nielsen.com](mailto:EncodingOperations@Nielsen.com)
- Call: 410.312.8123

#### **For Other Media:**

- Email: [USEncoding@Nielsen.com](mailto:USEncoding@Nielsen.com)
- Call: 410.312.8199

**For any URGENT Encoding Equipment Issues, please contact our 24/7 Encoding Issues Hotline: 800.537.4872**

Nielsen  
9705 Patuxent Woods Drive  
Columbia MD 21046-1572

### **Outside the United States**

For any questions regarding this equipment manual, please contact Nielsen as indicated below:

Email: [ProductSupportEngineering@nielsen.com](mailto:ProductSupportEngineering@nielsen.com)

Nielsen  
9705 Patuxent Woods Drive  
Columbia MD 21046-1572

### **Legal**

For any legal questions regarding this equipment manual, please contact Nielsen as indicated below:

Email: [James.Derry@Nielsen.com](mailto:James.Derry@Nielsen.com)

Nielsen  
c/o James Derry, Associate General Counsel and Chief Intellectual Property Officer  
9705 Patuxent Woods Drive  
Columbia MD 21046-1572

Phone inquiries should be directed to +1.410.312.8680



## ***Disclaimer and Limitation of Liability***

BY YOUR USE, RECEIPT, AND/OR INSTALLATION OF THE NIELSEN AUDIO ENCODER, YOU EXPRESSLY ACKNOWLEDGE AND AGREE TO THE FOREGOING:

**Disclaimer of Warranties.** YOU EXPRESSLY ACKNOWLEDGE AND AGREE THAT USE OF THE NIELSEN AUDIO ENCODER AND THIS EQUIPMENT MANUAL IS AT YOUR SOLE RISK AND THAT THE ENTIRE RISK AS TO SATISFACTORY QUALITY, PERFORMANCE, ACCURACY AND EFFORT IS WITH YOU. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, THE NIELSEN AUDIO ENCODER AND THIS EQUIPMENT MANUAL ARE PROVIDED ON AN "AS IS" AND "WHERE IS" BASIS, WITH ALL FAULTS AND WITHOUT ANY WARRANTIES, PROMISES, OR REPRESENTATIONS OF ANY KIND, AND NIELSEN HEREBY DISCLAIMS ALL PROMISES, REPRESENTATIONS, WARRANTIES AND CONDITIONS, EITHER EXPRESS, IMPLIED, OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES AND/OR CONDITIONS OF MERCHANTABILITY, OF SATISFACTORY QUALITY, OF FITNESS FOR A PARTICULAR PURPOSE, OF ACCURACY, OF QUIET ENJOYMENT, TITLE, AND NON-INFRINGEMENT. NIELSEN ALSO DISCLAIMS AND MAKES NO REPRESENTATIONS, WARRANTIES, OR PROMISES, EXPRESS OR IMPLIED, TO YOU AS TO THE SUCCESS OF YOUR EFFORTS PURSUANT TO THIS EQUIPMENT MANUAL, OR THE EXERCISE AND USE OF THE NIELSEN AUDIO ENCODER.

**Limitation of Liability.** TO THE EXTENT NOT PROHIBITED BY LAW, IN NO EVENT SHALL NIELSEN BE LIABLE FOR PERSONAL INJURY, OR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES WHATSOEVER, INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS, LOSS OF DATA, BUSINESS INTERRUPTION OR ANY OTHER COMMERCIAL DAMAGES OR LOSSES, ARISING OUT OF OR RELATED TO YOUR USE OR INABILITY TO USE THE NIELSEN AUDIO ENCODER AND/OR THIS EQUIPMENT MANUAL, HOWEVER CAUSED, REGARDLESS OF THE THEORY OF LIABILITY (CONTRACT, TORT OR OTHERWISE) AND EVEN IF NIELSEN HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL NIELSEN'S TOTAL LIABILITY TO YOU FOR ALL DAMAGES (OTHER THAN AS MAY BE REQUIRED BY APPLICABLE LAW IN CASES INVOLVING PERSONAL INJURY) EXCEED THE AMOUNT OF ONE HUNDRED DOLLARS (\$100.00) IN THE AGGREGATE. IN ADDITION, NIELSEN SHALL NOT BE SUBJECT TO INJUNCTIVE RELIEF WITH RESPECT TO THIS EQUIPMENT MANUAL OR NIELSEN AUDIO ENCODER.

YOU EXPRESSLY AGREE THAT THE LIMITATIONS OF LIABILITY SET FORTH HEREIN WILL APPLY EVEN IF ANY LIMITED REMEDY SPECIFIED IN THIS EQUIPMENT MANUAL IS FOUND TO HAVE FAILED OF ITS ESSENTIAL PURPOSE.

## ***Notices***

### **To Ensure Proper Operation:**

DO NOT expose this unit to rain or moisture. ONLY Nielsen Audio authorized service personnel shall gain access to the inside of the Encoder. DO NOT disconnect the earth ground from the power cord since this is a very important safety feature. The Encoder should be mounted securely in a rack. The sides must be free of obstructions to provide adequate airflow through the instrument.

The Encoder contains a lithium battery backup to maintain its internal clock. Specialized tools are required to replace this part. Under no circumstances should anyone other than Nielsen Audio authorized service personnel attempt to replace this part.

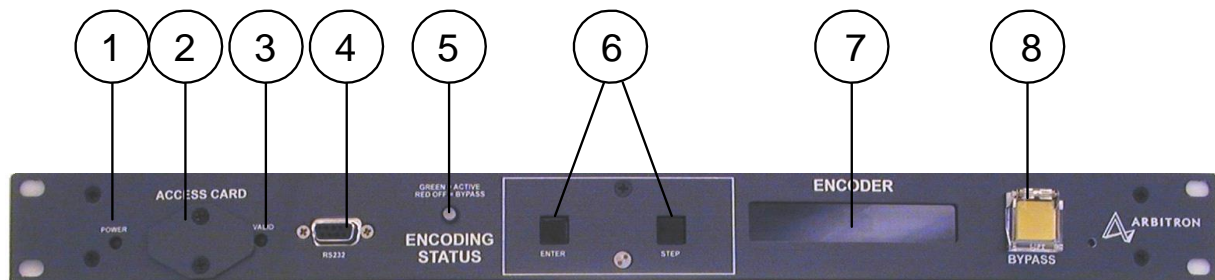
**FAILURE TO INSTALL THE ENCODER IN ACCORDANCE WITH THE SPECIFICATION IN THIS MANUAL AND/OR FAILURE TO MAINTAIN BROADCAST SIGNALS IN ACCORDANCE WITH GENERAL INDUSTRY STANDARDS AND SPECIFICATIONS MAY RESULT IN THE ENCODER NOT OPERATING PROPERLY.**

## 1. Introduction

The Studio Grade Encoder (SGE) is a device that inserts inaudible symbols into the audio stream of broadcasts according to the Critical Band Encoding Technology (CBET) algorithms. The symbols are easily received and recorded by a Portable People Meter (PPM) when exposed to the encoded broadcasts.

Nielsen Audio provides a number of different interface models for the SGE. This manual references models that provide the interface to an analog audio chain using industry standard XLR connectors.

The Nielsen Audio Encoder listed on the title page of this manual has been designed to meet the requirements of the European Union's directive 2002/95/EC, commonly known as RoHS (Restriction of Hazardous Substances) Compliance. This directive restricts the use of certain hazardous substances in electrical and electronic equipment. RoHS seeks to reduce the amount of hazardous materials entering electronic products.



**Figure 1: Front Panel of Nielsen Audio RoHS Compliant Analog SGE**

The front panel of the SGE is pictured in Figure 1, and the front panel features are described below;

1. LED for power status
2. Smart Media Memory Card Interface dust cover. Behind this cover is the Smart Media Memory Card Interface, which is used for software upgrades.
3. LED for Smart Media Status (Green indicates a valid card is detected)
4. Service Port
5. LED for Encoding Status
6. Two switch controls (primarily for LCD menu screen controls)
7. LCD (Displays operation status)
8. Enable/Bypass dual action push button

## 1.1. Suggested Placement in Audio Chain

Nielsen Audio has worked closely with numerous broadcast entities, including radio, TV and cable, and has developed recommendations for the Encoder's optimal operation within your audio chain. Ultimately, however, decisions regarding placement of the Nielsen Audio Encoder within the audio chain are the responsibility of each individual broadcast facility.

In AM radio stations, Nielsen Audio recommends that the Encoder is installed after the final audio processor (i.e. Orban Optimod, Telos Systems' Omnia, or others) to take advantage of the more consistent audio leveling found at this point in the broadcast chain. In FM stations, Nielsen Audio recommends that the Encoder be installed after a pre-processor and before the final audio processor (i.e. Orban Optimod, Telos Systems' Omnia, or others). This is because the Encoder cannot operate on composite audio format output typical of stereo generators. When placing the Encoder after the audio processor in the signal stream, you should be aware that the signal will undergo an increase in amplitude roughly equal to 4% modulation. Figure 2 depicts an example of the Encoder placed in the program audio chain.

The Encoder operates optimally in an audio stream running a nominal (average) +4 dBu level. **The minimum average input signal level to the Encoder is 0 dBu.** The Encoder accommodates 20 dBu headroom.

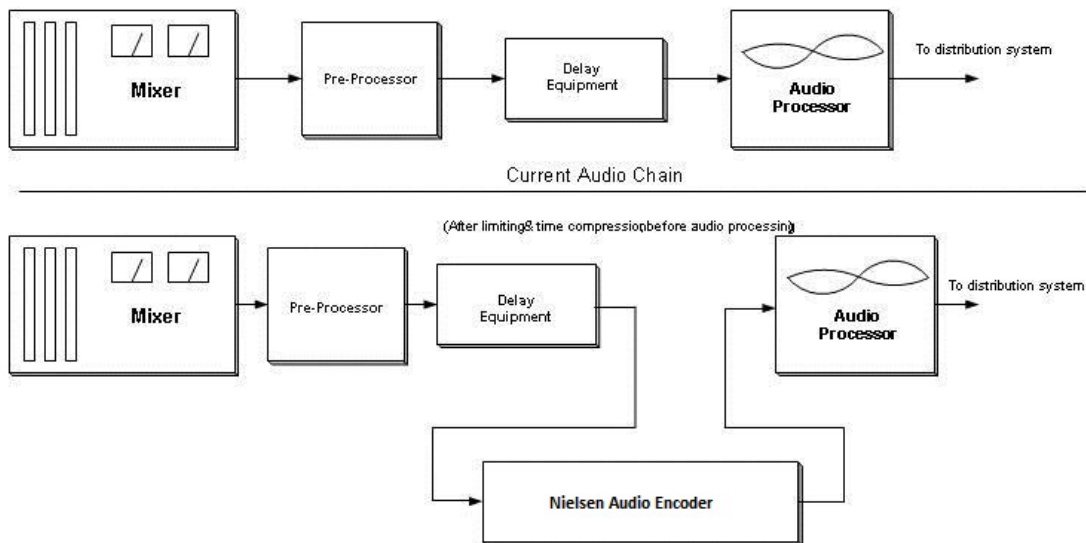


Figure 2: Placement of Nielsen Audio SGE within the Audio Chain

## 2. Installation

Follow these steps to add the SGE to your equipment chain. Throughout the installation process, ensure that all plugs are firmly attached to their corresponding sockets.

1. Place the SGE into a 19" rack in an indoor climate controlled environment. Nielsen Audio recommends allowing ½" of rack space above and below the Encoder to allow for adequate ventilation and reduce the chances of overheating. DO NOT block or otherwise impede airflow through the sides of the instrument.
2. Secure the SGE using screws in each of the four front panel corners.
3. Confirm that the Enable/Bypass push button on the front panel is in the 'out' position to put the Encoder into bypass mode. (See Figure 1)
4. If 600 ohm input termination is desired, slide switch S1 on the back of the Encoder to 600. If a 10k ohm input (bridging) impedance is desired, slide switch S1 to H1.
5. Inputs on the SGE are female; thus, the mating XLR cable is required to be male. The gender for output connections is the reverse of input, as shown in Figure 3.



**Figure 3: Rear Panel of Nielsen Audio RoHS Compliant Analog SGE  
(with Time Decoder options installed)**

Balanced XLR pinouts for the Nielsen Audio SGE are as follows (See Figure 4):

- Pin 1- Shell or ground
- Pin 2- High
- Pin 3- Low



**Figure 4: XLR Connection Pinouts**

**6. FOR STEREO INSTALLATION:**

- Connect the male ends of two XLR cables to the connectors marked A IN and B IN on the back of the SGE. Connect the female ends of these same two cables to the output connectors on the device currently outputting the program material to be encoded.
- Connect the female ends of two XLR cables to the connectors marked A OUT and B OUT on the back of the SGE. Connect the male ends of these same two cables to the input connectors on the device to receive the encoded program material.

7. FOR MONO INSTALLATION:

- Connect the male end of an XLR cable to the connector marked A IN on the back of the SGE. Connect the female end of this same cable to the output connector on the device currently outputting the program material to be encoded.
- Connect the female end of an XLR cable to the connector marked A OUT on the back of the SGE. Connect the male end of this same cable to the input connector on the device to receive the encoded program material.
- When using the Encoder for a mono signal, **do not use an A input and a B output**—use the A input and output connectors only. **The B output will not be encoded even though the B output may have audio present.**

8. **Optional:** To allow remote monitoring of this Encoder’s bypass and encode modes, use a DB9 cable to connect a remote bypass device to the male DB9 connector at the back of the Encoder labeled BYPASS MONITOR. The pinouts on this connector are detailed below:

Pin 3 – Common connection

Pin 4 – Bypass mode (pins 3+4 shorted, 3+7 open)

Pin 7 – Encode mode (pins 3+7 shorted, 3+4 open)

**Table 1: DB9 Pinouts for Remote Monitoring of Encode/Bypass Status**

	Status = ENCODE	Status = BYPASS
Pin 4	Open to pin 3	Shorted to pin 3
Pin 7	Shorted to pin 3	Open to pin 3



**Figure 5: DB9 Pinouts for Remote Bypass Monitoring**

The pins are connected to an internal relay of the Encoder. The relay contacts are rated at 0.3A max, 24VDC.

This outlet also provides access to a bypass mode remote control functionality and an alarm status remote monitoring functionality. For more information on these features, see Section 3.3.4 and Section 3.4.

9. **If the optional Time Decoder Input is enabled:** To ensure that the Encoder will synchronize to the station clock upon boot-up, one of the supported time code sources must be properly connected to the SGE time code input. For more information, see Appendix "Using the Optional Time Decoder Input."
10. Connect the power cord to the SGE to the same plug strip that supplies power to the instruments that will be connected to the input and output connectors of the SGE. The SGE will turn on when power is supplied via the power cord.
11. The SGE is shipped with the Enable/Bypass push button on the front panel set in the 'out' position to put the Encoder into bypass mode. At initial power-on, the LCD will display "Bypass Mode Encoder Disabled". When in bypass mode, the Encoder does not encode incoming signals, but allows them to pass through to the output unchanged. For more information, see Section 3.3.2
12. To start encoding, see the instructions in Section 3.1



## 3. Operations

### 3.1. Initiating Encoding

Once the Encoder is connected as described in Section 2, follow these instructions to begin encoding:

1. Push the Enable/Bypass push button on the front panel to the 'in' position to enable Encoding mode.
2. The LCD will then display "Encoding:" and a station specific message (station information).
3. The Encoding Status LED will display an unblinking green light to indicate normal operation, and the relays will switch from bypass mode to encoding mode. An audible click may be heard.

The SGE can be removed from the signal path and put into Bypass mode by pushing the Enable/Bypass push button on the front panel to the 'out' position. This connects the input connectors directly to their respective output connectors. See Section 3.3.2 for more information.

### 3.2. Immediately After Placing the Encoder On-Air

**IMPORTANT:** Before the installation of this Encoder is considered complete, Nielsen Audio requires that a quality analysis check be performed on the encoded audio. The time required per Encoder is minimal. Please call your Nielsen Audio contact to arrange this test.

### 3.3. Bypass Features

In bypass mode, signals input to the SGE pass through the device unchanged. The SGE provides bypass modes for different circumstances as described in the three sections below.

### 3.3.1. Power-Off Bypass

If there is no power applied to the SGE, an internal relay automatically routes the audio input connectors directly to their respective output connectors, and all input signals pass through the SGE unchanged.

### 3.3.2. Master Bypass

While the SGE is powered, pushing the front panel Bypass/Enable push button to the 'out' position causes the SGE to bypass encoding. This effectively routes the audio input connectors to their corresponding output connectors.

Certain software diagnostic fault detections (including a high temperature warning) can cause the unit to place itself in bypass mode automatically. In this case, the LCD displays a message describing the nature of the problem, and the Encoding Status LED on the front panel will change depending on the nature of the problem.

When the SGE is in bypass mode with no errors, the Encoding Status LED on the front panel remains dark, and the LCD displays "Bypass Mode Encoder Disabled."

### 3.3.3. Bypass Mode Remote Monitor

In addition to providing status information via the front panel LCD display and encoding status LED indicator, the Encoder provides a means to enable remote monitoring of its status. This is provided via the DB9 connector on the rear panel of the Encoder. The 3-wire connection will allow another device to monitor both bypass mode conditions (power off, Enable/Bypass push button position, error condition) and encoding conditions (normal power-up, bypass mode, enable mode). See Step 8 in Section 2 for pin-out information.

### 3.3.4. Bypass Mode Remote Control

The Encoder provides the means to remotely control whether it is in bypass or enable mode. This is provided via the DB9 connector on the rear panel labeled BYPASS MONITOR—the same connector that provides the remote monitor capability. (See Step 8 in Section 2) To use this feature, connect a 5-20V DC positive terminal to pin 1 and a negative terminal to pin 6 of the rear panel DB9 connector. **Do not exceed 24V across pins 1 and 6.**

The pinouts that support the bypass remote control are detailed below.

**Table 2: DB9 Pinouts for Remote Control of Encode/Bypass Status**

	<b>BYPASS</b>	<b>ENABLE</b>
<b>Pin 1</b>	DC (5-20V) positive	DC (0 V) positive
<b>Pin 6</b>	DC negative	DC negative



**Figure 6: DB9 Pinouts for Remote Bypass Control**

### 3.4. Alarm Status Remote Monitoring

The Encoder provides the means to remotely monitor its error status. This is provided via the DB9 connector on the rear panel labeled BYPASS MONITOR—the same connector that provides the remote monitor capability. (Step 8 in Section 2)

The pinouts that support remote alarm status monitoring are detailed below.

**Table 3: DB9 Pinouts for Remote Monitoring of Alarm Status**

	Status = NORMAL	Status = ALARM
Pin 5	Open to pin 8	Shorted to pin 8
Pin 9	Shorted to pin 8	Open to pin 8



**Figure 7: DB9 Pinouts for Remote Alarm Status Monitoring**

The pins are connected to an internal relay of the Encoder. The relay contacts are rated at 0.3A max, 24VDC.

The alarm/status relay connections are set by the following conditions:

- Encoder bypassed (from power loss, front panel switch, or remote control)
- Encoder over-temp
- Encoder license expired
- Time Board Error
- Encoder fatal system error (e.g. boot failure, DSP failure, FPGA failure, etc.)
- Other conditions as set by updated software features

### 3.5. Theory of Operation for the Status and Control Relays

The SGE remote status and control relays all operate as described below and illustrated in Figure 9. This includes:

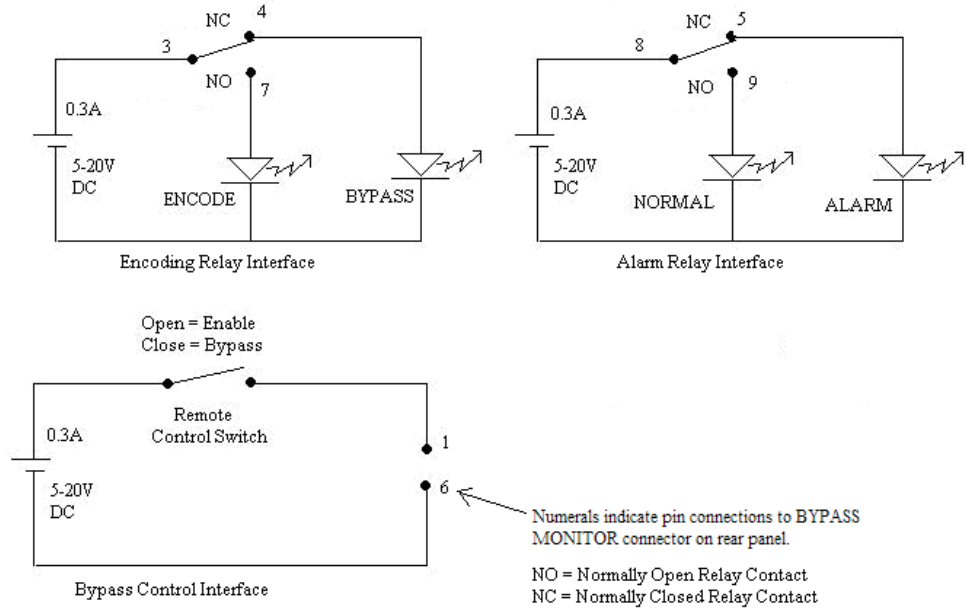
- The remote bypass monitoring relay (Step 8 in Section 2)
- The remote bypass control relay (Section 3.3.4)
- The remote alarm/status monitoring relay (Section 3.4)

Within the Encoder, the alarm and encoding relays receive signals from the microcontroller and the contacts close or open, indicating appropriate condition at the pins of the DB9 interface.

The voltage applied at the remote control interface pins (1 and 6) is sent to an optically isolated translator which is fed to the Encoder controller input similar to the front panel switch signal.

The Encoder begins to encode only if the remote bypass control pins AND the front panel bypass switch are in enable modes. Otherwise, the Encoder remains in bypass mode.

The Encoder controller de-energizes the bypass relays and connects the corresponding input and output connector through the Normally Closed (NC) path of the relay.



**Figure 8: Status and Control Relay Connection Scheme**

### 3.6. Using the LCD Menu

The SGE displays status and error messages on the front panel LCD.

Whenever the Encoder displays a message and remains in encode mode, pushing the Step and Enter buttons simultaneously will clear the LCD message.

When the Encoder is in enable mode and is operating normally, it displays a default message of "Encoding:" and a station specific message (station information).

Whenever an error occurs, a message describing the problem appears on the LCD.

When the Encoder is in push-button bypass mode, it displays "Bypass Mode Encoder Disabled." At this time pressing the front panel STEP button repeatedly will display the following series of status messages:

1. Host firmware version and build number, displayed as "Host: V:XXXX B:XXXX"
2. DSP firmware version and build number, displayed as "DSP: V:XXXX B:XXXX"
3. FPGA firmware version and build number, displayed as "FPGA: V:XXXX B:XXXX"
4. Amps information, provided for Nielsen Audio internal use only.
5. Time board status message (e.g., "No Time Board Expected").
6. Two numbers displayed as "XXXXXXXXXX XXXXXX" The first number is provided for Nielsen Audio internal use only. The second number is the Encoder serial number.
7. Internal temperature of the unit in degrees Celsius, displayed as "Temperature XX C"
8. Sample rate information.
9. Configuration information, for example: "ON Modes: STEREO OE W P NETTS" For Nielsen Audio internal use only.
10. Alarm level information, for Nielsen Audio internal use only.
11. Alarm minutes information, for Nielsen Audio internal use only.

At any stage in the sequence of messages above, pressing the Enter button will cause the LCD to redisplay the default bypass message, "Bypass Mode Encoder Disabled."

### 3.7. Encoder Overheat Behavior

Nielsen Audio Encoders are designed to withstand heat at tolerances similar to those of other studio-grade broadcasting equipment. When properly installed in a climate-controlled environment as described in Section 2, the Encoder should experience no overheat issues. Should your Encoder LCD display an “Over Temp” alarm message, check that the Encoder has been properly installed.

The table below provides an overview of Encoder response to conditions of excessive heat.

**Table 4: Encoder Overheat Behavior**

Operational Ambient Temperature Range	Temperature Stage	Internal Temperature	Display Message	LED Status	Alarm Relay Status	Encoding Status	How is the error cleared?
0°C-45°C	Normal	60°C or Below	“Encoding”	Solid Green	N/A	Encoding	N/A
	Over Temperature	<p>Overtemp alarm is triggered:</p> <p>If internal temperature is 61°C at initial boot.</p> <p>Once the encoder reaches 65°C steady state.</p>	“Over Temp Encoder Disabled”	Solid Red	<p>For RoHS Units, Asserted.</p> <p>For non-RoHS Units, N/A.</p>	Not Encoding (Bypass)	Automatic. Error will clear as soon as the internal temperature drops below 61°C



## 4. ELECTRICAL SPECIFICATIONS

### 4.1. Analog Specifications

#### 4.1.1. Frequency Response

20Hz-20kHz, +/- 0.2dB

#### 4.1.2. Signal to Noise Ratio

Typically -80 dBu over a 20Hz-20kHz bandwidth

#### 4.1.3. Gain

+0.4dB over 20Hz-20kHz

#### 4.1.4. Input Impedance User Selectable

600 $\Omega$ , balanced terminated ("600") or

10k $\Omega$ , balanced bridging ("HI")

#### 4.1.5. Total Harmonic Distortion + Noise

Better than 0.01% over 20Hz-20kHz

#### 4.1.6. Output Impedance

50 $\Omega$  balanced

#### 4.1.7. Differential Phase

Less than +/-1 degrees over 20Hz-20kHz

#### 4.1.8. Cross-Talk

Better than -90 dB over 20Hz-20kHz

#### 4.1.9. Maximum Analog Input Level

20dBu (21.9V p-p) over 20Hz-20kHz

#### 4.1.10. Headroom

20dB, referenced to 0dBu

#### 4.1.11. Common Mode Rejection Ratio

Better than -70dB referenced to a 20dBu

Common mode input at 60Hz

**4.1.12. Maximum XLR Cable Length:**  
10 meters

**4.2. Alarm (relay) Specifications**

**4.2.1. Absolute Maximum Voltage Input**  
24 VDC or 24 VAC

**4.2.2. Absolute Maximum Current Input**  
300 mA

**4.3. Power Specifications**

**4.3.1. Voltage**  
100 – 240 VAC

**4.3.2. Current**  
1.4 amps maximum

**4.3.3. Frequency**  
50/60 Hz

**4.3.4. Connector Type**  
IEC

## 5. General Specifications

### 5.1. Physical Specifications

#### 5.1.1. Dimensions

48 x 19 x 4.5 cm (L x D X H)

#### 5.1.2. Weight

3.5 kg

#### 5.1.3. BTU Output

40.12 BTUs/hour, assuming operating at 120V, 11.8 W.

### 5.2. Environmental Specifications

#### 5.2.1. Temperature Ranges

Operating: 0-45° C/32-115° F Ambient

Storage: 0-70° C/32-158° F Ambient

Internal: 0-69° C/32-156° F (indicated on LCD Display in degrees Celsius)

### 5.3. Date/Time Clock Accuracy

±1.71 Minutes per year at 0 - 40° C/32-104° F

## Appendix A. Using the Optional Time Decoder Input

### Using the Optional Time Decoder Input

The SGE's internal clock, just like any other clock, can drift. Many encoder models use an optional Time Decoder Input to reduce the overall clock drift to match that of the station clock.

If the Time Decoder Input is enabled, to ensure that the encoder will synchronize to the station clock upon boot-up one of the supported time code sources must be properly connected to the time code input *prior to applying power to the encoder*. To support the time decoder functionality, the correct encoder software and the appropriate encoder configuration must be installed on the SGE.

The time code source must meet the following requirements:

- The RoHS Compliant 1U analog encoder supports the following timecode formats: IRIG-B (un-modulated), SMPTE 12M-1 (30 FPS), EBU (complying with SMPTE 12M-1 at 25 FPS), ESE TC89, or ESE TC90.
- The allowable working limit voltages for the time code source signals are:
  - **BNC Input:** logic 'high': Minimum 3.0 Vp, Maximum 5.0 Vp.  
logic 'low': Minimum 0.0 Vp, Maximum 0.4 Vp.
  - **Push-Tab Inputs:** Minimum 300 mV p-p, Maximum 7 V p-p.  
(For either differential or non-differential input signal)

**ABSOLUTE MAXIMUM INPUT SHOULD NOT EXCEED 11 Vp-p. Exceeding this level risks damage to the unit.**

If the Time Decoder Input is not used or does not have a valid time code connected, then the encoder will use its internal real time clock, but the encoder internal real time clock will not be synchronized to the station clock.

### Connecting an External Time Source

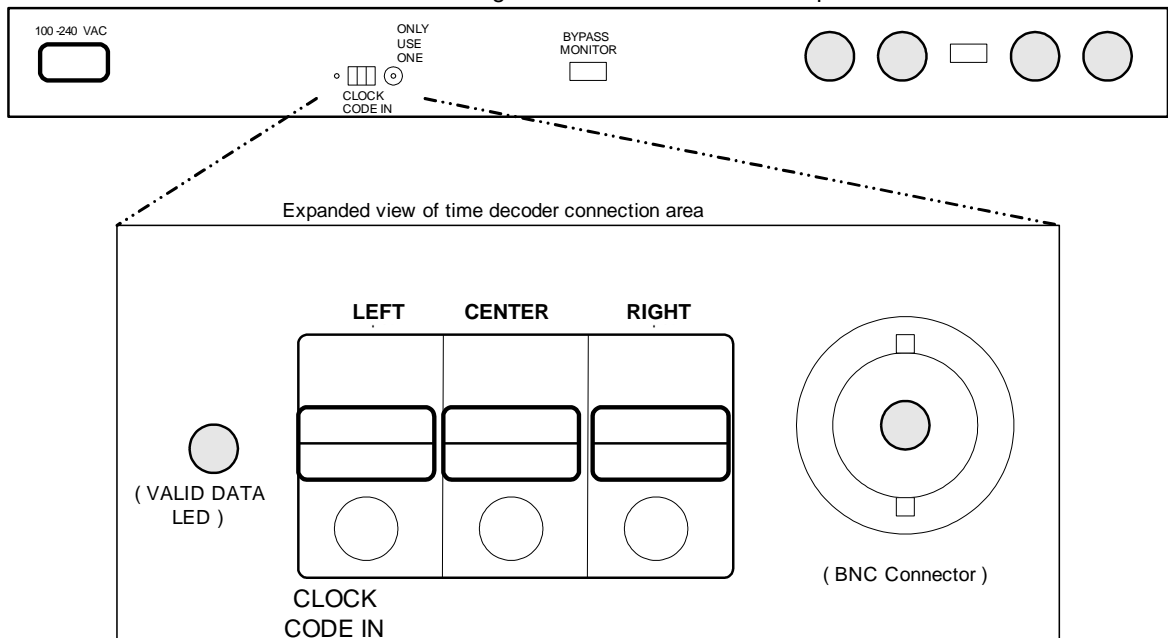
If you have determined that the SGE time decoder is enabled, follow these instructions to connect one of the supported time sources to the encoder. Use Figure 9 for reference. The encoder can accommodate time sources that use either a single-ended coaxial connector or bare wires to be inserted into push-tab inputs. *Do **not** connect time code signals to both the BNC inputs and the push-tab inputs at the same time.*

**If the time code source supplies a single-ended coaxial connector:**

Connect the time code source (station clock) to the BNC input at the rear of the encoder.

**If the time code source supplies bare wires for connections:**

1. The ends of the connecting wires should be stripped bare before insertion into the push-tabs. The recommended stripping length is 5mm.
2. If using the push-tab connections and the time code source is a differential source, insert one of the signal inputs into the left push-tab and insert the opposite polarity signal into the right push-tab. Connect the shield/common/ground wire to the center push-tab.
3. If the time code source is not a differential source, connect the ground/common input signal to the center push-tab and connect the signal input to the left push-tab.



**Figure 9: Rear Panel of Nielsen Audio RoHS Compliant Digital SGE with Time Decoder Option**

## Confirming Whether the SGE Time Decoder is Enabled

To verify that the SGE Time Decoder Input is enabled, once power is applied to the SGE, follow these steps:

1. Switch the encoder to Bypass and press the Step button until one of the following messages is displayed:
  - No time board expected
  - No master clock signal
  - No time code present
  - >15 min. between clocks
2. If the message displayed is “No time board expected,” then the Time Decoder Input is not enabled.
3. If any of the other messages listed in Step 1 appears, then the Time Decoder Input is enabled.

If the SGE is enabled and external time source is not disabled or not connected, the encoder will encode normally, but will not synchronize its internal time clock with station time.

## Operation of the Time Decoder

The SGE uses the Time Decoder Input to reduce the overall clock drift to match that of the station clock. The SGE synchronizes its internal clock with the Time Decoder Input at three different times. The synchronization process is the same at each of these times, but the maximum clock drift the encoder firmware detects without generating an error differs as described below:

When the encoder first boots up, it synchronizes its internal clock with the Time Decoder Input using **a maximum allowed clock drift** of 15 minutes. Once a successful synchronization has occurred, in future synchronization events the maximum clock drift used to synchronize the internal clock will be 15 seconds.

The encoder re-synchronizes the clock at the following times:

- When Enable/Bypass push button at the front of the encoder is pushed to switch the encoder from bypass to enable mode.
- At 02:20:30 UTC on the encoder’s internal clock (unless the encoder is in bypass mode due to an over temperature condition or license expiration)

Should the internal clock fall out of synchronization, the maximum allowed clock drift value used for synchronization will be reset to 15 minutes until synchronization is successful, at which point the maximum allowed clock drift value goes back to 15 seconds.

**The SGE will not perform a check for a 15 minute discrepancy between 15 minutes before midnight and 15 minutes after midnight (both encoder and station time).**

When the encoder performs clock synchronization, the SGE will check for the presence of a Time Decoder Input to determine whether to synchronize its internal clock:

- If Time Decoder Input signal is **expected** and is **found**, then the encoder will synchronize its internal clock using the Time Decoder Input.
- If a Time Decoder Input signal is **expected** and is **not found**, then an error condition will be asserted, but the encoder will still encode, and use its internal clock as a time source.
- If Time Decoder Input signal is **not expected** and is **found**, then no error condition will be asserted, and the encoder will proceed to encode using its internal clock as a time source.
- If a Time Decoder Input signal is **not expected** and is **not found**, then no error condition will be asserted, and the encoder will proceed to encode using its internal clock as a time source.

When the encoder performs clock synchronization:

- If the station clock differs from its internal clock by **+/- the maximum clock drift** or more, the encoder will report an error, and will not synchronize its internal clock with the Time Decoder Input, but it will continue encoding. The SGE time stamp may not be in synchronization with the station time, and the encoding time stamp applied by the SGE may not be accurate.
- If the difference between the encoder time and the Time Decoder Input is **between 2 seconds and the maximum clock drift value**, the encoder will synchronize its internal clock with the time provided by the Time Decoder Input. Encoding proceeds normally.
- If the difference between the encoder time and the Time Decoder Input is less than 2 seconds, the encoder will not synchronize its clock or generate any messages. Encoding proceeds normally.

If an error is generated in the course of time synchronization, it will be indicated via the Encoding Status LED and an LCD message. The encoder will continue to encode. Pushing the Step and Enter buttons simultaneously will clear the LED and the LCD error message.

## LCD Messages Related to Time Update

If an error occurs when the encoder attempts to communicate with the Time Decoder Input or attempts to synchronize its internal clock, this is indicated via the Encoding Status LED and a message on the LCD.

The possible time-related messages are:

### No master clock signal

**Description:** The SGE cannot detect a signal from an external time source and so cannot synchronize its internal clock. The SGE is still encoding, but the clock synchronization was not performed, and the encoder time stamp accuracy is in doubt. If the encoder is in bypass mode, the Encoding Status LED will be flashing RED/OFF. If the encoder is in enable mode, the Encoding Status LED will be flashing RED/GREEN.

**Corrective Action:** Verify all time code wiring, power, and the time code source.

### No time code present

**Description:** The SGE cannot detect the Time Decoder Input and so cannot synchronize its internal clock. The SGE is still encoding, but the clock synchronization was not performed, and the encoder time stamp accuracy is in doubt.

**Corrective Action:** Verify all time code wiring, power, and time code source. If the encoder is in bypass mode, the Encoding Status LED will be flashing RED/OFF. If the encoder is in enable mode, the Encoding Status LED will be flashing RED/GREEN.

### FPGA LTC Reset Failed

**Description:** An internal failure has occurred while syncing the internal clock.

**Corrective Action:** This might be caused by a problem with the time input. Check that the connection is solid, and a valid time format is being used. If the problem persists, [contact Nielsen Audio](#).



#### >15 sec between clocks

**Description:** At the regular daily clock synchronization time (02:20:30 UTC), the SGE internal clock and the Time Decoder Input were found to be greater than 15 seconds apart. The SGE is still encoding, but the clock synchronization was not performed, and the encoder time stamp accuracy is in doubt. If the encoder is in bypass mode, the Encoding Status LED will be flashing RED/OFF. If the encoder is in enable mode, the Encoding Status LED will be flashing RED/GREEN.

**Corrective Action:** Verify the time code source; if the time code source is valid, [contact Nielsen Audio](#).

#### >15 min between clocks

**Description:** At power up time or when the encoder was switched from bypass to enable mode, the SGE internal clock and the Time Decoder Input were found to be greater than 15 minutes apart. The SGE is still encoding, but the clock synchronization was not performed, and the encoder time stamp accuracy is in doubt. If the encoder is in bypass mode, the Encoding Status LED will be flashing RED/OFF. If the encoder is in enable mode, the Encoding Status LED will be flashing RED/GREEN.

**Corrective Action:** Verify the time code source; if the time code source is valid, [contact Nielsen Audio](#).

#### Day Boundary Synch Skipped

**Description:** The encoder was switched from bypass to enable mode in the window between 11:45 PM and 12:15 AM (either encoder internal clock time or station time). During this window, the encoder does not check for 15- minute time synchronization as describe in Section “Operation of the Time Decoder”, and this message is normal. The Encoding Status LED will be flashing RED/GREEN.

**Corrective Action:** None required.

#### RTC time invalid

**Description:** A problem was detected when attempting to synchronize the SGE internal clock. The encoder will be in bypass mode, and the Encoding Status LED will be flashing RED/OFF.

**Corrective Action:** [contact Nielsen Audio](#).

### **No Time Board Expected**

**Description:** The time synchronization functionality is disabled.

**Corrective Action:** None, unless synchronizing with an external time source is desired. In which case, [contact Nielsen Audio](#).

### **Time Board time invalid**

#### **Time Correction Failed**

**Description:** Both of these messages indicate a problem was detected when attempting to synchronize the SGE internal clock. If the SGE is not in bypass mode it is still encoding, but the clock synchronization was not performed, and the encoder time stamp accuracy is in doubt. If the encoder is in bypass mode, the Encoding Status LED will be flashing RED/OFF. If the encoder is in enable mode, the Encoding Status LED will be flashing RED/GREEN.

**Corrective Action:** [contact Nielsen Audio](#).

### **Station Time OK Format EBU**

### **Station Time OK Format IRIG**

### **Station Time OK Format SMPTE**

### **Station Time OK Format ESETC89**

### **Station Time OK Format ESETC90**

**Description:** Any of these messages can appear when the encoder is synching its internal clock and are reports of normal behavior.

**Corrective Action:** None required.

## ***FCC Disclaimer***

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 Subpart B 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.