EQUIPMENT MANUAL,
ENCODER: 1000-1134, 1000-1149

©2010 Arbitron Inc.

For Arbitron Encoder Models:
1000-1134-xx  1U SGE Digital Encoder
1000-1149-xx  1U SGE Digital Encoder, Time Decode Option

Document #:  1050-1474
Date:        July 2010
Revision:    D
Equipment Manual
Document # 1050-1474
Rev. D

Arbitron Encoder Models: 1000-1134-xx 1000-1149-xx

© 2010 Arbitron Inc. All rights reserved. This document may not be reproduced, in whole or part, without the express written consent of Arbitron Inc. This document and the information contained within is intended for Arbitron Inc. employees, customers, or authorized recipients only; its use, in whole or part, for any other purpose without express written permission from Arbitron Inc. is prohibited. Arbitron Inc. Encoder Models 1000-1134-xx, and 1000-1149-xx are covered by one or more U.S. Patent Numbers and their corresponding international patents, and other patents may be pending. This document includes proprietary and technical information which is the intellectual property of Arbitron Inc. ARBITRON and any other Arbitron product or service name or slogan contained in this document are trademarks of Arbitron Inc., registered in the U.S. and other countries. Patents: http://www.arbitron.com/home/patents.htm
Table of Contents

1. CONTACTS ...........................................................................................................................................6

1.1. UNITED STATES .................................................................................................................................6
1.2. OUTSIDE THE UNITED STATES ...........................................................................................................6
1.3. LEGAL................................................................................................................................................6

2. DISCLAIMER AND LIMITATION OF LIABILITY ..............................................................................7

3. WARNINGS .........................................................................................................................................8

4. INTRODUCTION/OVERVIEW ........................................................................................................9

4.1. SUGGESTED PLACEMENT IN AUDIO CHAIN ......................................................................................9

5. INSTALLATION .....................................................................................................................................10

6. OPERATIONS .......................................................................................................................................13

6.1. INITIATING ENCODING .....................................................................................................................13
6.2. IMMEDIATELY AFTER PLACING THE ENCODER ON-AIR ...............................................................14
6.3. BYPASS FEATURES ...........................................................................................................................14
6.4. USING THE LCD MENU ....................................................................................................................15
6.5. ENCODER OVERHEAT BEHAVIOR .....................................................................................................15

7. AUDIO INPUT SPECIFICATIONS .......................................................................................................16

8. DIGITAL SGE SPECIFICATIONS .......................................................................................................16

8.1. DIGITAL I/O INTERFACE, XLR ........................................................................................................16
8.2. DIGITAL I/O INTERFACE, BNC .......................................................................................................18
8.3. ALARM (RELAY) SPECIFICATIONS ...................................................................................................19
8.4. POWER SPECIFICATIONS .................................................................................................................19

9. GENERAL SPECIFICATIONS .............................................................................................................20

9.1. PHYSICAL SPECIFICATIONS ...........................................................................................................20
9.2. ENVIRONMENTAL SPECIFICATIONS ...........................................................................................20
9.3. DATE/TIME CLOCK ACCURACY .......................................................................................................20

APPENDIX A USING THE OPTIONAL TIME DECODER MODULE .....................................................21
Table of Figures

Figure 1: Front Panel of an Arbitron Non-RoHS Compliant Digital SGE ................................. 9
Figure 2: Placement of Arbitron SGE within the Audio Chain .............................................. 10
Figure 3: Rear Panel of Arbitron Non-RoHS Compliant Digital SGE
(with Time Decoder options installed) .................................................................................. 11
Figure 4: XLR Connection Pinouts ....................................................................................... 11
Figure 5: BNC Connectors .................................................................................................... 12
Figure 6: DB9 Pinouts for Remote Bypass Monitoring ............................................................ 13
Figure 7: Rear Panel of Arbitron Non-RoHS Compliant Digital SGE with Time Decoder Option
.............................................................................................................................................. 24
Table of Tables

Table 1: DB9 Pinouts for Remote Monitoring of Encode/Bypass Status................................. 12
Table 2: Encoder Overheat Behavior....................................................................................... 16
1. CONTACTS

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

1.1. UNITED STATES

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

For Radio:
- Email: EncodingOperations@arbitron.com
- Call: 410.312.8123

For Other Media:
- Email: USEncoding@arbitron.com
- Call: 410.312.8199

For any URGENT Encoding Equipment Issues, please contact our 24/7 Encoding Issues Hotline: 866.767.7212

Arbitron Inc.
Encoding Operations
9705 Patuxent Woods Drive
Columbia, MD 21046-1572

1.2. OUTSIDE THE UNITED STATES

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

Email: ProductsSupportEngineer@arbitron.com

Arbitron Inc.
Products Support Engineering
9705 Patuxent Woods Drive
Columbia, MD 21046-1572

1.3. LEGAL

James.Derry@arbitron.com

Arbitron Inc.
c/o James Derry, Sr. Attorney
9705 Patuxent Woods Drive
Columbia MD 21046-1572

Phone inquiries should be directed to +410 312 8680
2. DISCLAIMER AND LIMITATION OF LIABILITY

By your use, receipt, and/or installation of the Arbitron Inc. encoders, you expressly acknowledge and agree to the foregoing:

**Disclaimer of Warranties.** YOU EXPRESSLY ACKNOWLEDGE AND AGREE THAT USE OF ARBITRON INC. ENCODERS 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 ARBITRON INC. ENCODERS AND EQUIPMENT MANUALS ARE PROVIDED "AS IS", WITH ALL FAULTS AND WITHOUT WARRANTY OF ANY KIND, AND ARBITRON INC. HEREBY DISCLAIMS ALL 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, AND NON-INFRINGEMENT OF THIRD PARTY PATENT, COPYRIGHT, OR OTHER INTELLECTUAL PROPERTY RIGHTS.

**Limitation of Liability.** TO THE EXTENT NOT PROHIBITED BY LAW, IN NO EVENT SHALL ARBITRON INC. 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 ARBITRON INC. ENCODER, HOWEVER CAUSED, REGARDLESS OF THE THEORY OF LIABILITY (CONTRACT, TORT OR OTHERWISE) AND EVEN IF ARBITRON INC. HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL ARBITRON INC.'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.
3. **WARNINGS**

To reduce the risk of personal injury, electrical shock, fire, or damage to the Studio Grade Encoder, DO NOT expose this unit to rain or moisture. Due to the danger of personal injury, electrical shock, or damage to the instrument, ONLY Arbitron authorized service personnel shall gain access to the inside of the Studio Grade Encoder. DO NOT disconnect the earth ground from the power cord since this is a very important safety feature. The Studio Grade Encoder should be mounted securely in a rack. The sides must be free of obstructions to provide adequate air-flow through the instrument.

**CAUTION:** 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.

The Studio Grade 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 Arbitron authorized service personnel attempt to replace this part.

**CAUTION:** RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE BATTERY MANUFACTURER'S INSTRUCTIONS.
4. INTRODUCTION/OVERVIEW

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.

Arbitron provides a number of different interface models for the SGE. This manual references models that provide the interface to a digital (AES/EBU) audio chain using industry standard XLR or BNC connectors.

The Arbitron encoders listed on the title page of this manual have not 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 an Arbitron Non-RoHS Compliant Digital SGE](image)

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 Key Switch

4.1. SUGGESTED PLACEMENT IN AUDIO CHAIN

Arbitron Inc. 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 Arbitron encoder within the audio chain are the responsibility of each individual broadcast facility.
In AM radio stations, Arbitron 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, Arbitron 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 minimum average input level to the encoder is -20 dBFS (ten percent of Full Scale).

5. 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. Arbitron 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 key switch on the front panel is directed to the Bypass position. (As shown in Figure 1.)
4. To use the balanced XLR connectors, slide the Select switch on the rear panel to XLR. To use the unbalanced BNC connectors, slide the Select switch on the rear panel to BNC.
5. Balanced XLR 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 Arbitron Non-RoHS Compliant Digital SGE (with Time Decoder options installed)](image)

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

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

![Figure 4: XLR Connection Pinouts](image)

The unbalanced BNC connections, (input and output) are female BNC connectors, as shown in Figure 5.
6. **IF USING XLR:** Connect the male end of an XLR cable to the XLR connector marked 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.
   
   **IF USING BNC:** Connect the male end of a BNC cable to the BNC connector marked 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.

7. **IF USING XLR:** Connect the female end of an XLR cable to the connector marked 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.
   
   **IF USING BNC:** Connect the male end of a BNC cable to the BNC connector marked OUT on the back of the SGE. Connect the female end of this same cable to the input connector on the device to receive the encoded program material.

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>
<thead>
<tr>
<th>Pin</th>
<th>Status = ENCODE</th>
<th>Status = BYPASS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Open to pin 3</td>
<td>Shorted to pin 3</td>
</tr>
<tr>
<td>7</td>
<td>Shorted to pin 3</td>
<td>Open to pin 3</td>
</tr>
</tbody>
</table>

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

---

©2010 Arbitron Inc.
The pins are connected to an internal relay of the encoder. The relay contacts are rated at 0.3A max, 24VDC.

9. **If the optional Time Decoder Module is installed and 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 A, “Using the Optional Time Decoder Module.”

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 key switch set to Bypass; 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 6.3.2, “Master Bypass.”

12. To start encoding, see the instructions in Section 6.1.

### 6. OPERATIONS

#### 6.1. INITIATING_encoding

Once the encoder is connected as described in Section 5, follow these instructions to begin encoding:

1. Turn the keyed switch on the front of the encoder to Enable to enable encoding of the program material.
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.

---

©2010 Arbitron Inc.
The SGE can be removed from the signal path by turning the key switch to Bypass. This connects the input connectors directly to their respective output connectors. See Section 6.3.2 for more information.

6.2. IMMEDIATELY AFTER PLACING THE ENCODER ON-AIR

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

6.3. 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.

6.3.1. 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.

6.3.2. Master Bypass

While the SGE is powered, turning the keyed front panel switch to Bypass causes the SGE to bypass encoding. This effectively routes the audio input connectors to their corresponding output connectors. If the key for this switch has been provided with your unit, it should be removed and kept in a secure location.

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.”

6.3.3. 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, keyed Bypass switch position, error condition) and encoding conditions (normal power-up, bypass mode, enable mode). See Step 8 in Section 5 for pin-out information.
6.4. 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 keyed 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 Arbitron 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 Arbitron 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 Arbitron internal use only.
10. Alarm level information, for Arbitron internal use only.
11. Alarm minutes information, for Arbitron 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.”

6.5. Encoder Overheat Behavior

Arbitron 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 5, 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 2: Encoder Overheat Behavior

<table>
<thead>
<tr>
<th>Operational Ambient Temperature Range</th>
<th>Temperature Stage</th>
<th>Internal Temperature</th>
<th>Display Message</th>
<th>LED Status</th>
<th>Alarm Relay Status</th>
<th>Encoding Status</th>
<th>How is the error cleared?</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°C-45°C</td>
<td>Normal</td>
<td>60°C or Below</td>
<td>“Encoding”</td>
<td>Solid Green</td>
<td>N/A</td>
<td>Encoding</td>
<td>N/A</td>
</tr>
<tr>
<td>Over Temperature</td>
<td></td>
<td></td>
<td></td>
<td>Solid Red</td>
<td>For RoHS Units, Asserted.</td>
<td>Not Encoding (Bypass)</td>
<td>Automatic. Error will clear as soon as the internal temperature drops below 61°C</td>
</tr>
</tbody>
</table>

#### 7. AUDIO INPUT SPECIFICATIONS

The minimum average input level to the encoder is -20 dBFS (ten percent of Full Scale).

#### 8. DIGITAL SGE SPECIFICATIONS

##### 8.1. DIGITAL I/O INTERFACE, XLR

**8.1.1. Input Data Format and Transmission Standards**

AES3-1992 (ANSI S4.40-1992) standard of the Audio Engineering Society, also called “AES/EBU”

**8.1.2. Connectors**

XLR (IEC 268-12)

Input: female pins and male shell

Output: male pins and female shell

Pin 1: case ground, pin 2: high, pin 3: low
8.1.3. **Input Characteristics**

110 $\Omega$, ±10%, balanced, transformer isolated.

8.1.4. **Minimum Input Working Voltage**

±0.2Vp-p

8.1.5. **Maximum Input Working Voltage**

±7Vp-p

8.1.6. **Maximum Absolute Input Voltage**

±12Vp-p

8.1.7. **Sampling Frequency of Data**

48 KHz, 44.1 KHz, 32 KHz (set by Arbitron)

8.1.8. **Range of Input Frequency**

0.1-6 MHz

8.1.9. **Output Characteristics**

Transformer isolated, short-circuit protected

8.1.10. **Minimum Output Voltage into 110$\Omega$**

2 Vp-p

8.1.11. **Maximum Rise/Fall Time**

20 nsec

8.1.12. **Output Jitter**

<20 nsec

8.1.13. **Input to Output Delay**

≤ 105 uSec @ 48 KHz

≤ 114 uSec @ 44.1 KHz

≤ 157 uSec @ 32 KHz

8.1.14. **Maximum Cable Length**

10 meters
8.2. **Digital I/O Interface, BNC**

8.2.1. **Input Data Format**
AES3-1992 (ANSI S4.40-1992) standard of the Audio Engineering Society, also called “AES/EBU”

8.2.2. **Transmission Standard**
ANSI/SMPTE 276M-1995 of the Society of Motion Picture and Television Engineers

8.2.3. **Connectors**
BNC female, input and output

8.2.4. **Input Characteristics**
75Ω, ±10%, unbalanced, transformer isolated

8.2.5. **Minimum Input Working Voltage**
±0.1 Vp-p

8.2.6. **Maximum Input Working Voltage**
±1.1 Vp-p

8.2.7. **Maximum Absolute Input Voltage**
±5 Vp-p

8.2.8. **Sampling Frequency of Data**
48 KHz, 44.1 KHz, 32 KHz (set by Arbitron)

8.2.9. **Range of Input Frequency**
0.1-6 MHz

8.2.10. **Output Characteristics**
Unbalanced, DC offset <=50 mV

8.2.11. **Output Voltage into 75Ω**
1 Vp-p ±10%

8.2.12. **Range of Rise/Fall Time**
30 –44 nsec
8.2.13. Output Jitter
<20 nsec

8.2.14. Input to Output Delay
\[ \leq 105 \text{ uSec} @ 48 \text{ KHz} \]
\[ \leq 114 \text{ uSec} @ 44.1 \text{ KHz} \]
\[ \leq 157 \text{ uSec} @ 32 \text{ KHz} \]

8.2.15. Maximum Cable Length
10 meters

8.3. **Alarm (Relay) Specifications**

8.3.1. Absolute Maximum Voltage Input
24 VDC or 24 VAC

8.3.2. Absolute Maximum Current Input
300 mA

8.4. **Power Specifications**

8.4.1. Voltage
100 – 240 VAC

8.4.2. Current
1.4 Amps maximum

8.4.3. Frequency
50/60 Hz

8.4.4. Connector Type
IEC
9. **GENERAL SPECIFICATIONS**

9.1. **PHYSICAL SPECIFICATIONS**

9.1.1. **Dimensions**
48 x 18.5 x 4.5 cm (L x D X H)

9.1.2. **Weight**
3.5 kg

9.1.3. **BTU Output**
40.12 BTUs/hour, assuming operating at 120V, 11.8 W.

9.2. **ENVIRONMENTAL SPECIFICATIONS**

9.2.1. **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)

9.3. **DATE/TIME CLOCK ACCURACY**

±1.71 Minutes per year at 0 - 40 °C/32-104 °F
Appendix A
Using the Optional Time Decoder Module
| Arbitron Encoder Models: | 1000-1134-xx | 1000-1149-xx |
A. Using the Optional Time Decoder Module

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

If the Time Decoder Module is installed and 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 non-RoHS Compliant 1U analog encoders support the following timecode formats:
  - IRIG-B (un-modulated), SMPTE, EBU, DQS, ESE TC76, ESE TC89, ESE TC90, NMEA, or NPR.
- 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 Module is not present, 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.

A.1. 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 7 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.

![Diagram of time decoder connection area]

Figure 7: Rear Panel of Arbitron Non-RoHS Compliant Digital SGE with Time Decoder Option

### A.2. Confirming Whether the SGE Time Decoder is Enabled

To verify that the SGE Time Decoder Module is present and 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 Module is not enabled.
3. If any of the other messages listed in Step 1 appears, then the Time Decoder Module 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.

### A.3. Operation of the Time Decoder Module

The SGE uses the Time Decoder Module to reduce the overall clock drift to match that of the station clock. The SGE synchronizes its internal clock with the Time Decoder Module 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 Module 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 the key switch at the front of the encoder is switched from Bypass to Enable.
- At 02:20:30 UTC on the encoder’s internal clock (if the encoder is not in Bypass mode)

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 Module to determine whether to synchronize its internal clock:

- If Time Decoder Module is expected and is found, then the encoder will synchronize its internal clock using the Time Decoder Module.
- If a Time Decoder Module 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 Module 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 Module 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 Module, 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 Module 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 Module. Encoding proceeds normally.
- If the difference between the encoder time and the Time Decoder Module 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.
A.4. LCD Messages Related to Time Update

If an error occurs when the encoder attempts to communicate with the Time Decoder Module 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 Module 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.

- **Lost RS-232 communication**
  
  This message may be caused by two different circumstances:

  - **Description (1):** The SGE is in enable mode and cannot communicate with the Time Decoder Module 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. The Encoding Status LED will be flashing RED/GREEN.

    **Corrective Action:** If an external Arbitron Time Code Module is used, verify all RS-232 wiring. This applies only to early model 1000-1118 encoders; for other encoder models, contact Arbitron.

  - **Description (2):** The SGE is in bypass mode and is not performing its regular clock synchronization. The Encoding Status LED will be flashing RED/OFF.

    **Corrective Action:** None required. When the encoder is switched back to enable mode it should resume the regular daily clock synchronization schedule.

- **>15 sec between clocks**
  
  **Description:** At the regular daily clock synchronization time (02:20:30 UTC), the SGE internal clock and the Time Decoder Module 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 Arbitron.
• > 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 Module 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 Arbitron.

• 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 A.3, 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 Arbitron.

• No Time Board Expected
  **Description:** The interface to the Time Decoder Module is disabled.

  **Corrective Action:** None, unless synchronizing with an external time source is desired. In which case, contact Arbitron.

• 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 Arbitron.
Arbitron Encoder Models: 1000-1134-xx  1000-1149-xx

- Station Time OK Format DQS
- Station Time OK Format EBU
- Station Time OK Format NPR
- Station Time OK Format IRIG
- Station Time OK Format NMEA
- Station Time OK Format ESE76
- 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.

©2010 Arbitron Inc.