ADP-3GHD

Redundant ADD/DROP/PASS module
for SD/HD/3G-SDI

User manual

Rev. A

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Revision history

Current revision of this document is the uppermost in the table below.

Rev.	Repl.	Date	Sign	Change description
A	0	2015-05-11	MB	Cover page update; DoC removed; no changes to content
0	-	2011-10-19	AJM	Initial revision.

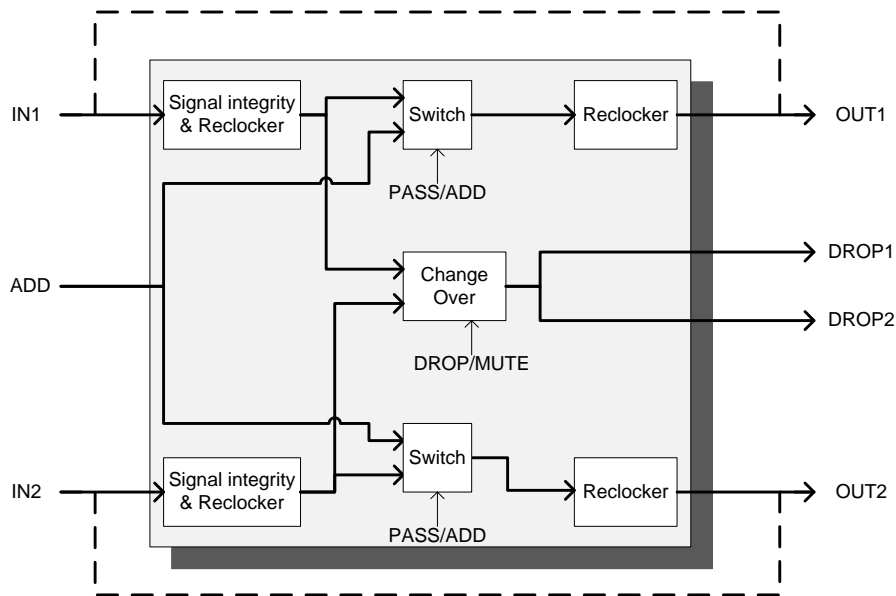# Contents

1 Product overview

Figure 1- ADP-3G block diagram

The Flashlink ADP-3GHD is a multi bit-rate ADD/DROP/PASS module providing high performance media distribution for various signal formats from 19.4Mbps up to 2970Mbps. The unit can be operated as a redundant or dual ADP amplifier configured to do cable equalizing and reclocking of SMPTE 424M, SMPTE 292M and SMPTE 259M signal formats.

The four inputs typically provide automatic cable equalizing for up to 70 meters of cable (Belden 1694A at 2970Mbps), with reclockers on all outputs. The ADP-3GHD will detect 3GHD, HD and SD rates and automatically switch to the correct output slew-rate.

The reclockers support the bit-rates 270Mbps, 1483.5Mbps, 1485Mbps 2967Mbps and 2970Mbps. For other rates, the reclockers automatically switch to bypass mode, and the ADP-3GHD will work as a non-reclocking distribution amplifier with cable equalizers.

The ADP-3GHD also supports reclocking of DVB-ASI at 270Mbps, enabling all possible rates including empty transport streams with only K28.5 padding packets. All of the outputs are non-inverting and suitable for DVB-ASI.

In redundant operation the included intelligent change-over feature gives the ability to change between inputs based on input signal loss, loss of lock, EDH errors or a combination of the above.

There is also included a passive bypass function from both inputs to non-inverted outputs with less than 15 m loss of cable length (enables full redundancy in case of mains failure).

The ADP-3GHD is designed for all distribution purposes in studio, duplication and broadcast applications.

Please observe that ADP-3GHD can not be used with N-Box, Flashlink one module desktop box, due to mechanical issues.

2 Specifications

Electrical Outputs

Connectors	75 Ohm BNC
Output Return loss	- < -15dB, 5MHz -1.5GHz
	- < -10dB, 1.5GHz - 3GHz
Output signal level	800mV +/- 10%
Output signal rise / fall time 20% - 80%	- SD limit: [0.4ns – 1.5ns]; <0.5ns rise/fall var.
	- HD limit: < 270ps, <100ps rise/fall var.
	- 3G HD limit: <135ps, <50ps rise/fall var.
Amplitude overshoot	<10%
Polarity	- All outputs non-inverting
Output timing jitter	- SD: <0.2 UI
	- HD: <1 UI
	- 3G HD: <1UI
Output alignment jitter	- SD: <0.15 UI
	- HD: <0.15 UI
	- 3G HD: <0.2UI

Electrical Inputs

Connectors	75 Ohm BNC
Input Cable Eq. @270Mbps	>300m w/Belden 1694A, with BER < 10E-12
Input Cable Eq. @1485Mbps	>100m w/Belden 1694A, with BER < 10E-12
Input Cable Eq. @2970Mbps	>70m w/Belden 1694A, with BER < 10E-12
Input Return loss	- < -15dB, 5MHz -1.5GHz
	- < -10dB, 1.5GHz - 3GHz
Jitter tolerance	- SD limit:
	- 10Hz-1kHz: >1 UI
	- 10kHz – 5MHz: >0.2 UI
	- HD limit:
	- 10Hz-100kHz: >1 UI
	- 100kHz–10MHz: >0.2 UI
	- 3G HD limit:
	- 10Hz-100kHz: >2 UI
	- 100kHz–10MHz: >0.3 UI

Features

Reclocking:	Automatic SD/ HD detection
	Automatic output slew rate adjustment according to SMPTE 259M and SMPTE 292M/ SMPTE 424M
Supported clock rates:	270, 1483.5, 1485, 2967, 2970Mbps
Input equalizers:	Eq. bypass for non-video formats or low bit rates

Supported standards

SMPTE:	SMPTE 424M, SMPTE 292M, SMPTE 259M, SMPTE 305M, SMPTE 310M
DVB-ASI:	EN50083-9 (on non-inverting outputs)

General

DC power consumption:	+5V / < 4.5W

3 Configuration

The ADP-3GHD supports a number of different formats. The correct configuration can either be set with a DIP switch or with the GYDA system controller. The layout of ADP-3GHD is shown in the drawing below.
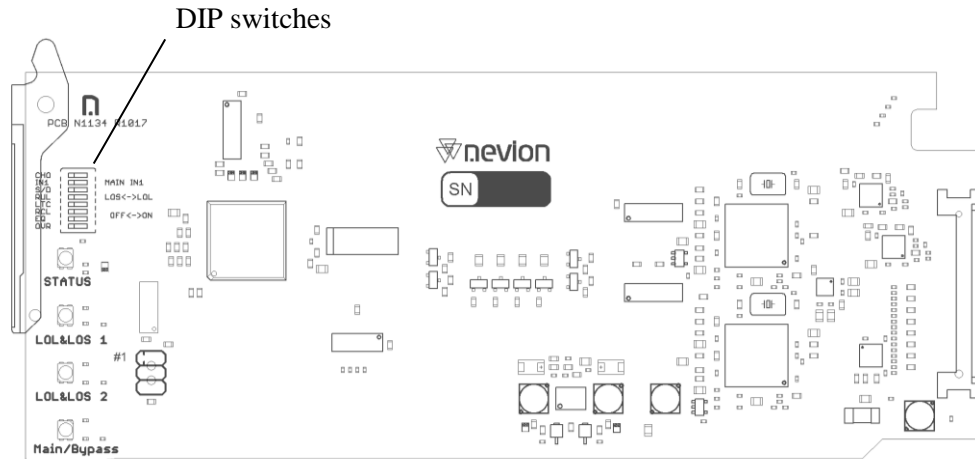

Figure 2 - ADP-3GHD module layout

DIP switch configuration must be set according to the table below:

Switch #	Label	Function DIP=OFF	Function DIP=ON	Comment
1	RED	Independent rings	Redundant ring	Card can work on either two independent rings or one ring with redundant paths/directions. Redundant mode implies CHO function on DROP outputs.
2	R1	Pass primary ring	Add to primary ring	Chooses which signal goes to the OUT port of the primary ring
3	R1	Drop from primary ring	No drop from primary ring	Enable DROP output for the primary ring.
4	R2	Pass secondary ring	Add to secondary ring	Only in use when switch #1 set OFF
5	R2	Drop from secondary ring	No drop from secondary ring	Only in use when switch #1 set OFF
6	RCL	Reclocker Bypass	Reclocker ON	Reclocker mode
7	EQ	Cable equalizer Bypass (Loss of signal will not work on this mode)	Cable Equalizer ON	Equalizer mode
8	OVR	Module controlled by Gyda system controller	Module controlled by DIP switches	Select GYDA config. Mode

Table 1: ADP-3GHD DIP switches

All DIP switches are off when pointing towards the release handle.

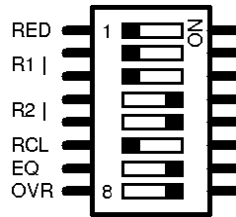## 3.1 Configuration Examples

Typical configurations for ADP-3GHD:

Figure 3 - Independent mode. Add to ring 1. Pass and drop ring 2. ADD1 to OUT 1. IN2 to OUT2 and DROP 2. With equalization, without reclocking.
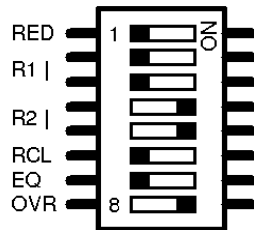

Figure 4 - Independent mode. Add to ring 1. Pass and drop ring 2. ADD1 to OUT 1. IN2 to OUT2 and DROP 2. Transparent mode without equalization and reclocking.
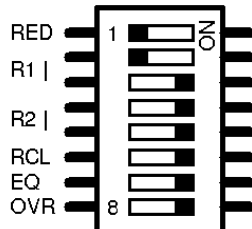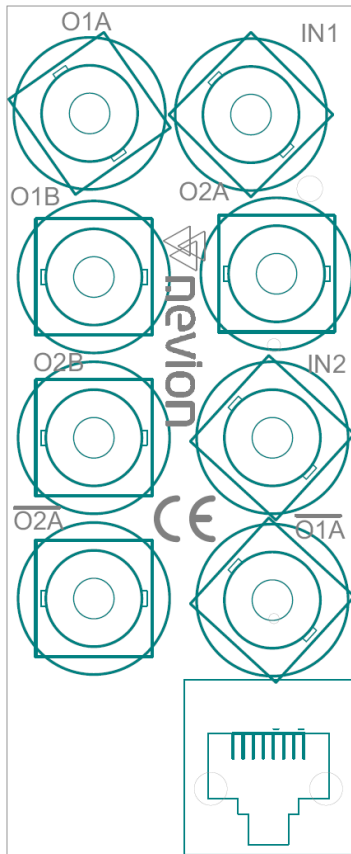

Figure 5 - Independent mode, pass ring 1, pass and drop ring 2. IN1 to OUT1, IN2 to OUT2 and DROP 2. DROP 1 muted.

4 Connections

The ADP-3GHD has two backplane options, DA-3GHD-2x4-C3 and DA-3GHD-2x4-C4. The connector placement of the two are equal, but the –C4 backplanes features passive byass between IN1 and O1A, and IN2 and O2A. This module is mounted at the rear of the sub-rack.

Backplane names	Redundant mode	Dual mode
IN1	IN1	IN1
O1A	OUT1	OUT1
O1B	DROP	DROP1
$\overline{\text{O1A}}$	ADD	ADD1
IN2	IN2	IN2
O2A	OUT2	OUT2
O2B	DROP	DROP2
$\overline{\text{O2A}}$	Not in use	ADD2

Figure 6 - Backplane connection view and signal mapping table

Unused inputs and outputs should be terminated with 75 ohm to meet the specifications.

5 Operation

The status of the module can be easily monitored visually by the LEDs at the front of the module. The LEDs are visible through the front panel as shown in 11 below.
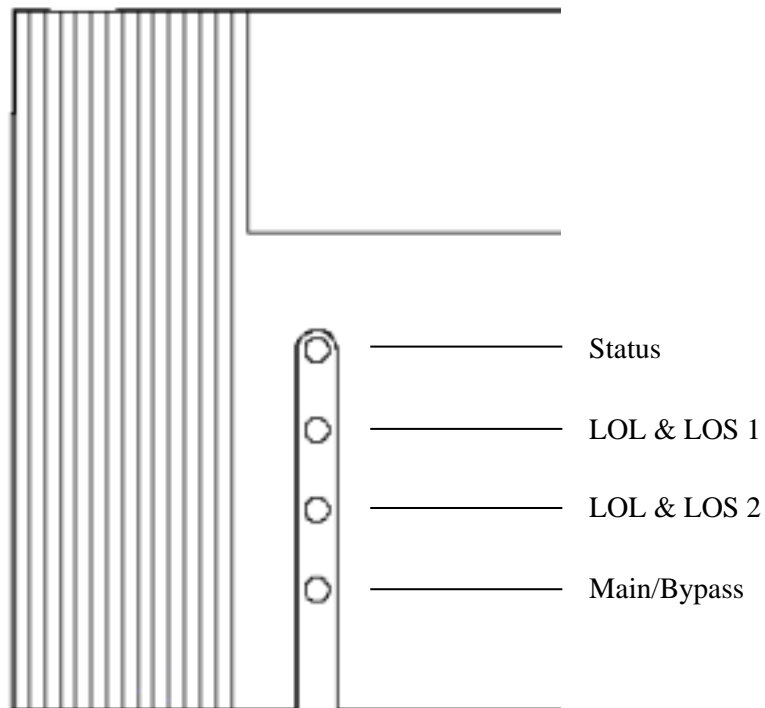
Figure 7 - indicator overview (Text not printed on the front panel).

The functions of the different LEDs are described in table below.

Diode \ state	Red LED	Yellow LED	Green LED	No light
Status	Module is faulty		Module is OK Module has power	Module has no power
LOL & LOS 1 (Input 1)	No Reclocker Lock & Loss Of Signal	No Reclocker lock & Signal present	Reclocker in lock & Signal present	
LOL & LOS 2 (Input 2)	No Reclocker Lock & Loss Of Signal	No Reclocker lock & Signal present	Reclocker in lock & Signal present	
Main/Bypass	No stable input	Bypass selected by CHO	Main selected by CHO	Not in redundant mode

Table 2. LED status description

GPI name (setup1/ setup2)	Function (setup1/ setup2)	Pin #	Mode	Direction	Electrical Maximums for GPI outputs:
Status	General error status for the module.	Pin 1	Inverted Open Collector (open is alarm)	Output	Max current: 100mA
LOS	Loss of signal or lock at main input	Pin 2	Open Collector	Output	Max voltage: 30V
DROP1	Signal present on Drop 1	Pin 3	Open Collector	Output	
DROP2	Signal present on Drop 2	Pin 4	Open Collector	Output	Max power: 200mW
Reset	Reset selected input to main	Pin 5	TTL, 0V = active level	Input	
Set	Set selected input to standby	Pin 6	TTL, 0V = active level	Input	
	Not used	Pin 7			
Ground	0 volt pin	Pin 8	0V.		

Table 3 - Description of GPI interface
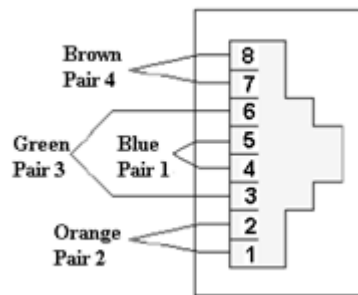
Figure 8 - GPI Interface

6 Redundant ring setup
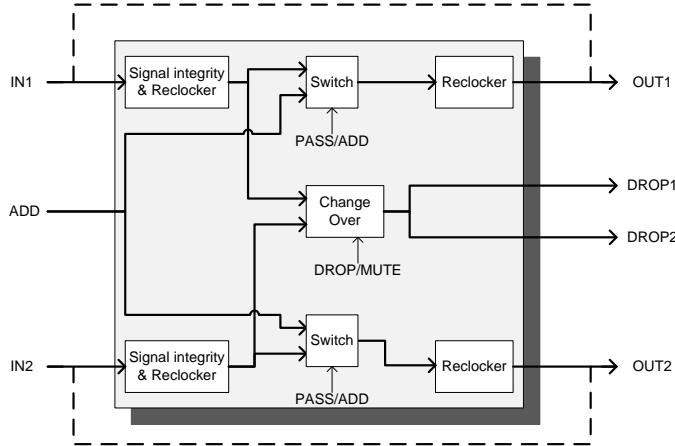
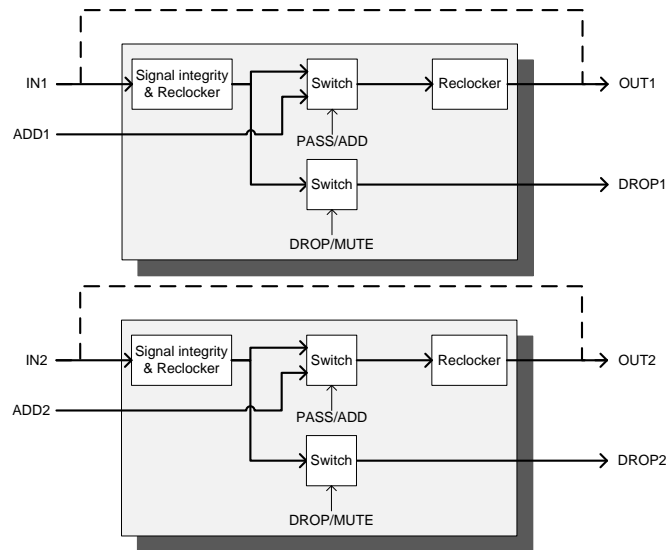**Figure 9 - Redundant block diagram**

When the card is set up for a single ring with redundancy, the basic functionality is as follows:

Mode	DROP1	DROP2	OUT1	OUT2
ADD	Muted	Muted	ADD1	ADD1
ADD+DROP	Best of IN1 and IN2	Best of IN1 and IN2	ADD1	ADD1
PASS	Muted	Muted	IN1	IN2
PASS+DROP	Best of IN1 and IN2	Best of IN1 and IN2	IN1	IN2

Table 4 – Redundant ring modes

7 Independent ring setup

Figure 10 - Independent block diagram

When the card is set up for dual rings without redundancy, the basic functionality is as follows:

Ring 1 Mode	DROP1	OUT1
ADD	Muted	ADD1
ADD+DROP	IN1	ADD1
PASS	Muted	IN1
PASS+DROP	IN1	IN1

Table 5 – Ring 1 operating modes

Ring 2 Mode	DROP2	OUT2
ADD	Muted	ADD2
ADD+DROP	IN2	ADD2
PASS	Muted	IN2
PASS+DROP	IN2	IN2

Table 6 - Ring 2 operating modes

8 Change over functionality

The change over functionality is only used when the card is set up for a redundant ring.

The card has a number of signal integrity analyzers and something called "triggers". A trigger is another way of controlling the change-over functionality. The regular change-over configuration is used for setting latch on/off, EQ or RCL control etc. In addition, the signal integrity analyzers can be used to control the decision of which signal to use on the DROP output. Thus, the trigger is a link from the analyzer to the change-over.

ADP-3GHD has four video analyzers.

Figure 11 - Video analyzer settings

Figure 9 shows the controls for these. The two inputs each have their analyzers, plus an extra "Stream 2" analyzer that is used when SMPTE 425M Level B mapping is used. These errors can be counted (or ignored) based on the settings in the configuration view:

EDH	No EDH packets (SD only)
VSTD	SMPTE 352 packets do not correspond to detected video standard (SD/HD only) Not supported for 3G.
FFCRC	Full Field CRC (SD only)
APCRC	Active Picture CRC (SD only)
LOCK	Analyzer chip is not locked to a bit stream (or stream 2 not present, for "Stream 2" analyzer)
CCS	Chroma channel ancillary data check sum error
YCS	Luma channel ancillary data check sum error
CCRC	Chroma channel video data check sum error
YCRC	Luma channel video data check sum error
LNUM	Line number error
SAV	Start of active video flags missing or misplaced
EAV	End of active video flags missing or misplaced

Errors are checked once per video field (LOCK errors are counted every 20ms when no video is present). If an error occurs, it is checked against the bit mask, and if selected for counting increments the error counter. An SNMP tool is recommended for tracking error counts over time, with selectable limits on error rate and max count before generating a warning.

The triggers are using the same information (and therefore have the same bit names as the analyzers), but have separate bit masks. This means that it is possible to count one set of error types, while using a different error type to control the change-over.

| Reclocker 1 | ⊙ Enable ○ Bypass | Autobypass: ○ On ⊙ Off |
| Reclocker 2 | ⊙ Enable ○ Bypass | Autobypass: ○ On ⊙ Off |

Channel 1 (A) trigger

⊙ Enable ○ Disable   Hold time: 4000   ms   ▼

Bit operator: ○ And ⊙ Or

		EDH	VSTD	FFCRC	APCRC
		☐	☑	☐	☐

LOCK	CCS	YCS	CCRC	YCRC	LNUM	SAV	EAV
☑	☑	☑	☑	☑	☑	☑	☑

Channel 1 (B) trigger

○ Enable ⊙ Disable   Hold time: 4000   ms   ▼

Bit operator: ○ And ⊙ Or

LOCK	CCS	YCS	CCRC	YCRC	LNUM	SAV	EAV
☑	☑	☑	☑	☑	☑	☑	☑

Channel 2 (A) trigger

⊙ Enable ○ Disable   Hold time: 4000   ms   ▼

Bit operator: ○ And ⊙ Or

		EDH	VSTD	FFCRC	APCRC
		☐	☑	☐	☐

LOCK	CCS	YCS	CCRC	YCRC	LNUM	SAV	EAV
☑	☑	☑	☑	☑	☑	☑	☑

Channel 2 (B) trigger

○ Enable ⊙ Disable   Hold time: 4000   ms   ▼

Bit operator: ○ And ⊙ Or

LOCK	CCS	YCS	CCRC	YCRC	LNUM	SAV	EAV
☑	☑	☑	☑	☑	☑	☑	☑

Channel 1	▼
Channel 1, 2nd stream (level B)	▼
Channel 2	▼
Channel 2, 2nd stream (level B)	▼

Figure 12 - Video error trigger settings

There is one trigger for each analyzer. Since there are triggers for both the main and standby input, an error condition on main input doesn't necessarily mean the change-over will switch, but for simplicity the following description assumes that the standby channel is always "good".

Each trigger has an adjustable time control, called "hold time". This is used for three situations:

a) a) Multiple bursts of error within timer duration triggers a switching to standby.

b) b) Single continuous error condition whose duration exceeds timer triggers a switching to standby.

c) c) Error free periods, whose duration exceeds timer, triggers a switching back to main.

The trigger also has a setting for "bit operator". It is possible to do a logical AND on the bits after applying the mask. Set to AND, all the individual error types that have been enabled must be occurring to count as an error condition. Set to OR, any enabled error type will suffice.

General environmental requirements for Nevion equipment

1. The equipment will meet the guaranteed performance specification under the following environmental conditions:
    -   Operating room temperature range: 0°C to 45°C
    -   Operating relative humidity range: <90% (non-condensing)

2. The equipment will operate without damage under the following environmental conditions:
    -   Temperature range: -10°C to 55°C
    -   Relative humidity range: <95% (non-condensing)

Product Warranty

The warranty terms and conditions for the product(s) covered by this manual follow the General Sales Conditions by Nevion, which are available on the company web site:

www.nevion.com

Appendix A Materials declaration and recycling information

A.1 Materials declaration

For product sold into China after 1st March 2007, we comply with the "Administrative Measure on the Control of Pollution by Electronic Information Products". In the first stage of this legislation, content of six hazardous materials has to be declared. The table below shows the required information.

組成名稱 Part Name	Toxic or hazardous substances and elements					
	鉛 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr(VI))	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
ADP-3GHD	O	O	O	O	O	O
O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.						
X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.						

This is indicated by the product marking:

A.2 Recycling information

Nevion provides assistance to customers and recyclers through our web site http://www.nevion.com/. Please contact Nevion's Customer Support for assistance with recycling if this site does not show the information you require.

Where it is not possible to return the product to Nevion or its agents for recycling, the following general information may be of assistance:

– Before attempting disassembly, ensure the product is completely disconnected from power and signal connections.
– All major parts are marked or labeled to show their material content.
– Depending on the date of manufacture, this product may contain lead in solder.
– Some circuit boards may contain battery-backed memory devices.