grass valley

2020ADC

4-CHANNEL AUDIO A-D CONVERTER

Instruction Manual

SOFTWARE VERSION 2.0

071802402
MAY 2007

THOMSON
images & beyond

KEMA

Affiliate with the N.V. KEMA in The Netherlands

CERTIFICATE

Certificate Number: 510040.001

The Quality System of:

Grass Valley, Inc.

400 Providence Mine Road
Nevada City, CA 95945
United States

15655 SW Greystone Ct.
Beaverton, OR 97006
United States

10 Presidential Way
3rd Floor, Suite 300
Woburn, MA 01801
United States

Nederland B.V.
4800 RP BREDA
The Netherlands

Weiterstadt, Germany
Brunnenweg 9
D-64331 Weiterstadt
Germany

Rennes, France
Rue du Clos Courtel
Cesson-Sevigne, Cedex
France

Technopole Brest Iroise
CS 73808
29238 Brest Cedex 3
France

17 rue du Petit Albi-BP 8244
95801 Cergy Pontoise
Cergy, France

2300 South Decker Lake Blvd.
Salt Lake City, UT 84119
United States

7140 Baymeadows Way
Suite 101
Jacksonville, FL 32256
United States

Including its implementation, meets the requirements of the standard:

ISO 9001:2000

Scope:
The design, manufacture and support of video hardware and software products and related systems.

This Certificate is valid until: June 14, 2009
This Certificate is valid as of: August 30, 2006
Certified for the first time: June 14, 2000

H. Pierre Sallé
President
KEMA-Registered Quality

The method of operation for quality certification is defined in the KEMA General Terms And Conditions For Quality And Environmental Management Systems Certifications. Integral publication of this certificate is allowed.

KEMA-Registered Quality, Inc.
4377 County Line Road
Chalfont, PA 18914
Ph: (215)997-4519
Fax: (215)997-3809

CRT 001 073004

Accredited By:
ANAB

ANAB ACCREDITED

grass valley

2020ADC

4-CHANNEL AUDIO A-D CONVERTER

Instruction Manual

SOFTWARE VERSION 2.0

071802402
MAY 2007

THOMSON
images & beyond

Contacting Grass Valley

International Support Centers	**France 24 x 7**	+800 8080 2020 or +33 1 48 25 20 20 +800 8080 2020 or +33 1 48 25 20 20	**United States/Canada 24 x 7**	+1 800 547 8949 or +1 530 478 4148
Local Support Centers (available during normal business hours)	**Asia**	**Hong Kong, Taiwan, Korea, Macau:** +852 2531 3058 **Indian Subcontinent:** +91 22 24933476 **Southeast Asia/Malaysia:** +603 7805 3884 **Southeast Asia/Singapore:** +65 6379 1313 **China:** +861 0660 159 450 **Japan:** +81 3 5484 6868		
	Australia and New Zealand: +61 1300 721 495		**Central/South America:** +55 11 5509 3443	
	Middle East: +971 4 299 64 40 **Near East and Africa:** +800 8080 2020 or +33 1 48 25 20 20			
	Europe	**Belarus, Russia, Tadzikistan, Ukraine, Uzbekistan:** +7 095 2580924 225 **Switzerland:** +41 1 487 80 02 **S. Europe/Italy-Roma:** +39 06 87 20 35 28 **-Milan:** +39 02 48 41 46 58 **S. Europe/Spain:** +34 91 512 03 50 **Benelux/Belgium:** +32 (0) 2 334 90 30 **Benelux/Netherlands:** +31 (0) 35 62 38 42 1 **N. Europe:** +45 45 96 88 70 **Germany, Austria, Eastern Europe:** +49 6150 104 444 **UK, Ireland, Israel:** +44 118 923 0499		

Grass Valley Web Site

The www.thomsongrassvalley.com web site offers the following:

Online User Documentation — Current versions of product catalogs, brochures, data sheets, ordering guides, planning guides, manuals, and release notes in .pdf format can be downloaded.

FAQ Database — Solutions to problems and troubleshooting efforts can be found by searching our Frequently Asked Questions (FAQ) database.

Software Downloads — Download software updates, drivers, and patches.

grass valley

END-OF-LIFE PRODUCT RECYCLING NOTICE

Grass Valley's innovation and excellence in product design also extends to the programs we've established to manage the recycling of our products. Grass Valley has developed a comprehensive end-of-life product take back program for recycle or disposal of end-of-life products. Our program meets the requirements of the European Union's WEEE Directive, the United States Environmental Protection Agency, and U.S. state and local agencies.

Grass Valley's end-of-life product take back program assures proper disposal by use of Best Available Technology. This program accepts any Grass Valley branded equipment. Upon request, a Certificate of Recycling or a Certificate of Destruction, depending on the ultimate disposition of the product, can be sent to the requester.

Grass Valley will be responsible for all costs associated with recycling and disposal, including freight. However, you are responsible for the removal of the equipment from your facility and packing the equipment to make it ready for pickup.

For further information on the Grass Valley product take back system please contact Grass Valley at + 800 80 80 20 20 or +33 1 48 25 20 20 from most other countries. In the U.S. and Canada please call 800-547-8949 or 530-478-4148, and ask to be connected to the EH&S Department. Additional information concerning the program can be found at: www.thomsongrassvalley.com/environment

THOMSON images & beyond

Contents

Preface

About This Manual

This manual describes the features of a specific 2000 Series module in the Kameleon Media Processing System. As part of this module family, it is subject to Safety and Regulatory Compliance described in the 2000 Series frame and power supply documentation (see the *2000 Series Frames Instruction Manual*).

2020ADC 4-Channel Audio Analog to Digital Converter

Introduction

The 2020ADC converts four channels of analog audio to two balanced or unbalanced digital audio outputs. All signals are connected via the corresponding passive rear module in the back of the 2000 frame. The four channels of analog audio enter via plug-in terminal blocks. A 48 kHz AES/EBU reference, connected to the loop-through input BNCs, is required to lock the module. Digital outputs are available through 75 ohm BNCs (unbalanced) or plug-in terminal blocks (balanced).

The 2020ADC can modify the incoming gain of each analog channel and provides a choice of output modes.

The 2020ADC features:

- AES/EBU loop-through reference input,
- 48 kHz sampling rate,
- 24-bit quantization,
- Conversion of four channels of analog audio,
- Two 75 ohm (unbalanced) or 110 ohm (balanced) outputs,
- Choice of output modes include normal, channel swap, phase invert, channel summing and tone,
- Independent input level control from +12 dBu to +28 dBu,
- Remote control and monitoring, and
- Remote control lockout via onboard jumper.

Installation

Installation of the 2020ADC module is a process of:

- Placing the passive rear module in a rear frame slot,
- Placing the media module in the corresponding front slot, and
- Cabling and terminating signal ports.

The 2020ADC module can be plugged in and removed from a 2000 Series frame with power on. When power is applied to the module, LED indicators reflect the initialization process (see *Power Up* on page 14).

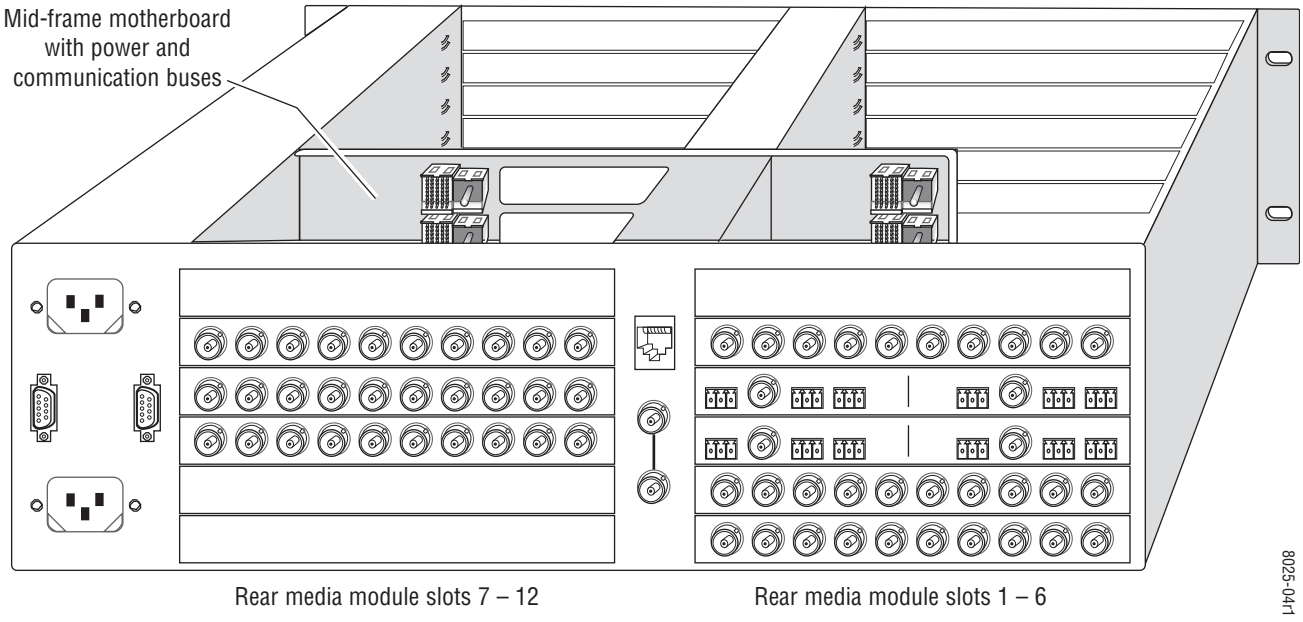
Module Placement in the 2000 Frame

There are twelve slot locations in both the front and rear of a 3RU frame to accommodate 2000 Series modules. The 2020ADC consists of a two module set with a front media module and a passive rear module that can be plugged into any of the 12 frame slots. Each 2020ADC front media module plugs into the front of the 2000 frame mid-plane. The passive rear module plugs into the corresponding rear slot to provide the input and output interface connectors.

To install a 2020ADC module set in the frame:

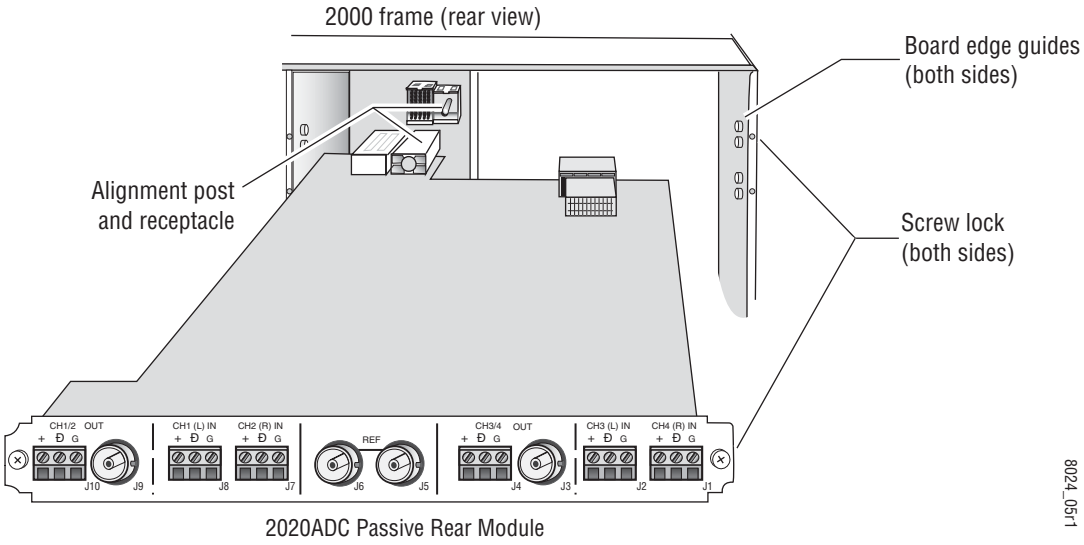
1. Locate a vacant slot in the rear of the 3 RU frame (Figure 1).

Figure 1. 3 RU Frame, Rear View



2. Insert the passive rear module into the vacant rear slot of the frame as illustrated in Figure 2.

Figure 2. Installing Passive Rear Module

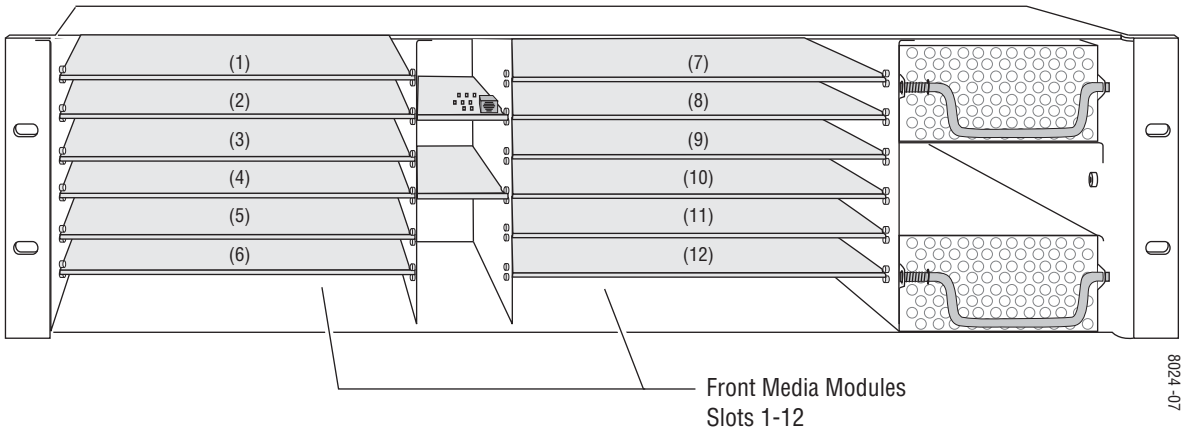


3. Verify that the module connector seats properly against the midplane.

4. Using a crossblade screwdriver, tighten the two screw locks to secure the module in the frame.

5. Locate the corresponding front slot in the frame. The 3 RU frame front view is illustrated in Figure 3.

Figure 3. 2000 Series 3 RU Frame, Front Slots

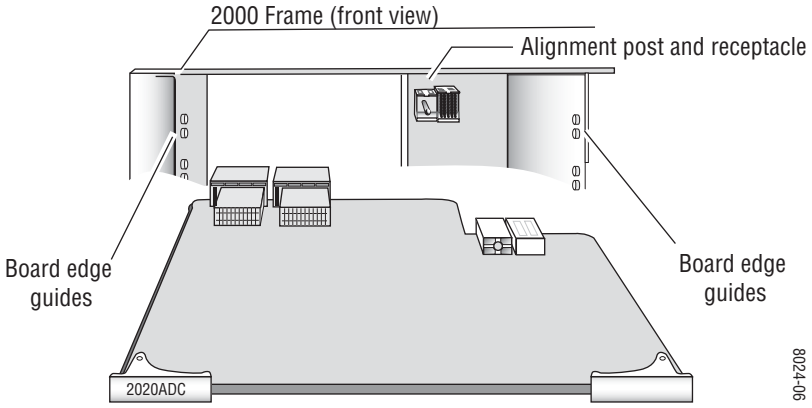


6. With the component side up, insert the front media module in the corresponding front slot (see Figure 4).

7. Verify that the module connector seats properly against the midplane and rear module connector.

8. Press firmly on both ejector tabs to seat the module.

Figure 4. Installing Front Media Module



Cabling

All cabling to the 2020ADC module is done on the corresponding passive rear module at the back of the 2000 frame. Refer to Figure 5 on page 13 for an illustration of the rear connections referenced in the steps below.

Inputs

Connect the analog audio inputs to the four terminal blocks on the passive rear module as given in Table 1.

Table 1. Audio Input Connections

Audio Channel	Terminal Block
1 (Left)	J8, CH1 (L) IN
2 (Right)	J7, CH2 (R) IN
3 (Left)	J2, CH3 (L) IN
4 (Right)	J1, CH4 (R) IN

Outputs

Two 75 ohm unbalanced and two 110 ohm balanced outputs are provided on the passive rear module. Connect output destinations to either the balanced or unbalanced output connectors given in Table 2.

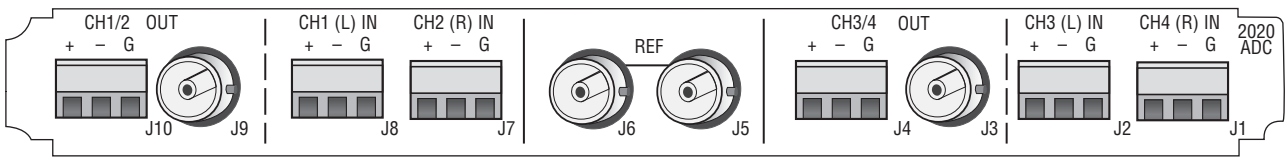
Table 2. Audio Output Connections

75 ohm Unbalanced Outputs		110 ohm Balanced Outputs	
Audio Channel	**BNC Connector**	**Audio Channel**	**Terminal Block**
1/2	J9, CH1/2 OUT	1/2	J10, CH1/2 OUT
3/4	J3, CH3/4 OUT	3/4	J4, CH3/4 OUT

Audio Reference Input

Connect a 48 kHz AES/EBU audio reference to the looping REF input at J5 or J6. Terminate the unused input with 75 ohm if not looping to another device.

Figure 5. 2020ADC Input/Output Connectors



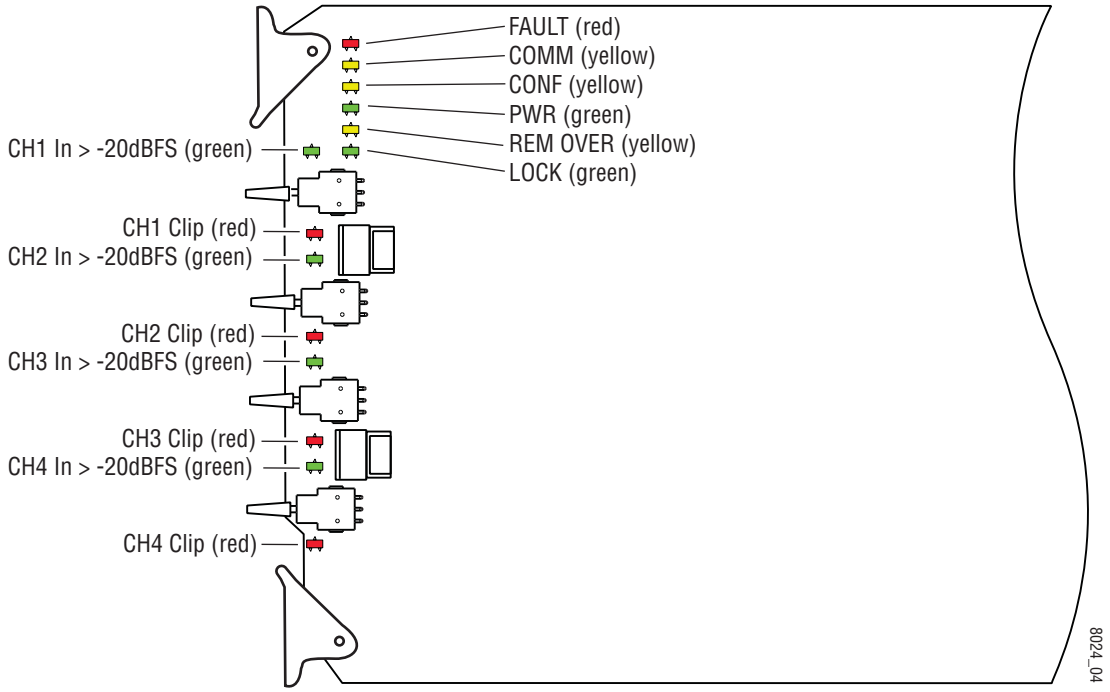
Power Up

The front LED indicators and configuration switches are illustrated in Figure 6. Upon power-up, the green PWR LED should light and the yellow CONF LED should illuminate for the duration of module initialization.

Operation Indicator LEDs

With factory default configuration and valid input and reference signals connected, the green PWR LED and the green LOCK LED should be on.

Figure 6. Operation Indicator LEDs



A red FAULT LED indicates an error situation and, with the other LEDs, can indicate the operational conditions presented in Table 3. The table describes signal output and LED indications for various input/reference combinations and user settings.

Table 3. Indicator LEDs and Conditions Indicated

LED	Indication	Condition
FAULT (red)	Off	Normal operation.
	On continuously	Module has detected an internal fault.
	Flashing	Reference input is faulty or not present.
COMM (yellow)	Off	No activity on frame communication bus.
	Long flash	Location Command received by the module from a remote control system.
	Short flash	Activity present on the frame communication bus.
CONF (yellow)	Off	Module is in normal operating mode.
	On continuously	Module is initializing, changing operating modes or updating firmware. Simultaneous CONF and FAULT LEDs on indicate FPGA load error.
	Flashing	Indicates rate of change of paddle-controlled analog setting.
PWR (green)	Off	No power to module or module's DC/DC converter failed.
	On continuously	Normal operation, module is powered.
REM OVER (yellow)	Off	Module configuration matches switch and jumper settings.
	On continuously	Module configuration may not match switch and jumper settings. Control has been remotely overridden.
LOCK (green)	Off	Module does not detect a valid AES in reference signal.
	On continuously	Valid AES in reference signal is present and module is locked to it.
20 dB CH1-4 (green)	Off	Channel level is less than -20 dBFS.
	On continuously	Channel level is greater than -20 dBFS.
	Flashing	Channel level is transitioning through -20 dBFS
CLIP CH1-4 (red)	Off	Channel digitized signal level is less than -0.5 dBFS.
	On continuously	Channel digitized signal level is greater than -0.5 dBFS.
	Flashing	Channel digitized signal level is transitioning through -0.5 dBFS.

Configuration

The 2020ADC can be configured locally using on-board switches and jumpers, or remotely using the 2000NET network interface. Configuration and adjustment items for the 2020ADC include:

- Input level (Ch 1 – Ch 4) – gain adjustment of analog input levels for full-scale digital outputs,
- Output mode – channel swapping, summing, and phase inversion, and
- Control mode – Local/remote or local control only (remote lockout).

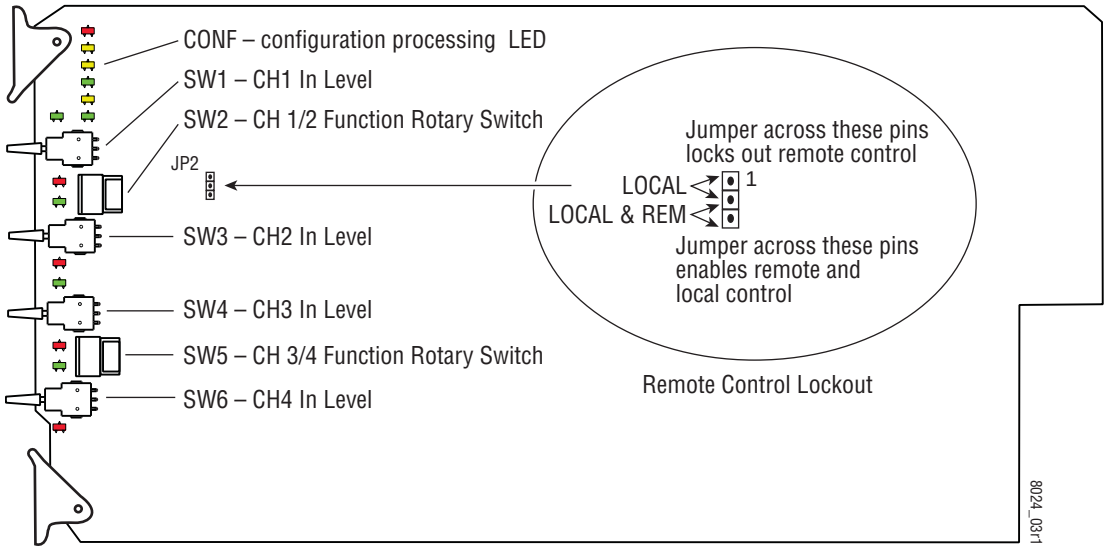
Local Onboard Module Configuration

The 2020ADC module can be configured locally using the jumper, the rotary switches and four paddle switches shown in Figure 7. The CONF LED indicates status of the configuration process.

These components perform the following:

- Jumper JP2 sets control mode for Local only or Remote and Local.
- Function (rotary) switches SW2 (CH1/2) and SW 5 (CH3/4) select the desired output configuration (0 through 9, A through F). Either function switch position 0 or F (Factory defaults) can be used to return the module configuration to the original factory default settings.
- Paddle Switches (CH 1 – 4) adjust the gain of each analog audio input channel for full-scale digital outputs.
- CONF (configuring) LED, when on, indicates the module is initializing or processing configuration information.

Figure 7. Module Configuration Switches and LEDs



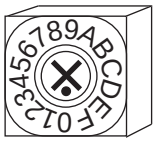
Input Level Adjustments

Four paddle switches (Ch 1 – Ch 4 In Level) are supplied on the front of the module to adjust gain to set the maximum signal level of the analog input for full-scale digital outputs (0 dBFS) on Channels 1 – 4. The paddle switches will adjust the gain by 0.1 dB increments. Coarse gain increments in 2 dB steps automatically through on-board circuitry when the appropriate gain is reached with the paddle switch.

Using Input Level Paddle Switches

Note The paddle switches increment gain by approximately 0.1 dB when held momentarily. Holding the switch to the left or right for about 1 second activates a continuous change mode that ramps the change rate from about 0.1 dB per second to 0.6 dB per second. The yellow CONF LED will flash slow (0.1 dB rate) or fast (0.6 dB rate) according to the change rate.

Default Position



Set the CH 1/2 and CH 3/4 Function Rotary Switch at the front of the module to the Default position marked 0 as shown at left. The Default position will put each channel output into a normal mode with no phase inversion, channel swapping or summing.

To correctly adjust the 2020ADC for your digital application, determine your maximum signal level (MSL). This is the level above which digital clipping occurs. This module has been set up at the factory with a maximum signal level default value of +24 dBu = 0 dBFS. There are three ways to adjust the paddle switches for the proper level:

- Apply the maximum signal level for your device to the analog input and monitor the AES output with a meter that indicates digital level in dBFS. Adjust the paddle switch for each channel until the meter indicates 0.0 dBFS.

Note Because the paddle switches have a resolution of 0.1 dB, you may not be able reach 0.0 dBFS exactly. Use the closest negative setting possible.

- Apply an input audio level that is -20 dB below the maximum level, (+4 dBu for the default, +24 dBu -20 dB=+4 dBu) and adjust the AES output as indicated on a digital audio meter to -20 dBFS.

Note If you have no meters calibrated in dBFS you can use the tone output position to compare with the output level. Tone output is position E on the Function Switch and outputs a 1 kHz tone at -20 dBFS. Note the internal tone level indication while monitoring the AES output and switch back to 0 or F position on the Function Switch, then adjust the gain paddle switch to the same level as the internal tone level.

- Apply the maximum signal level to the input and adjust the paddle switch for each channel until the clip LED comes on. This is -0.5 dBFS, and by tapping the paddle switch four more times you will be within 0.15 dB (worst case) of the correct setting.

Configuring Output Mode

The 2020ADC provides thirteen possible output configurations as shown in Table 4. The module can be configured using the rotary switches shown in Figure 7 on page 16. To make a configuration setting, rotate the switch for CH 1/2 and CH 3/4 to the desired output configuration. The 16-position rotary switch selects one of 13 possible output modes. Positions B and C are not used and positions 0 and F select the same mode—the factory default.

Table 4. 2020ADC Output Mode Configuration

Switch Position	Mode Description
0	Factory default – No phase inversion, channel swapping or summing
1	Channel swap – Left and Right
2	Both channels phase inverted
3	Left channel phase inverted
4	Right channel phase inverted
5	Right channel to both channel outputs
6	Left channel to both channel outputs
7	Left + Right to both channel outputs (-6dB mono sum)
8	Left - Right to both channel outputs
9	Left + Right to Left channel output and Left- Right to Right channel output
A	Left + Right to both channel outputs and both channels phase inverted
B	Not used (outputs AES silence)
C	Not used (outputs AES silence)
D	Tone 1 to all channels (AES silence)
E	Tone 2 to all channels (1 kHz, -20 dBFS)
F	Factory default – No phase inversion, channel swapping or summing

Table 5 provides the possible input conditions and the output condition that results.

Table 5. Possible Operating Conditions

Audio Input Condition	Reference Input Condition	Output Condition
Audio inputs present	Valid reference input present	AES/EBU serial digital output sampled at 48 kHz.
No audio input signal present	Valid reference input present	AES/EBU serial digital output sampled at 48 kHz. See S/N specification for level.
Audio inputs present	Reference not present	AES/EBU serial digital output sampled at approximately 47.992 kHz. Internal freerun clock rate.
Audio inputs present	Invalid reference input	Invalid AES/EBU serial digital output.

Remote Control Lockout

When a jumper is placed across pins 1 and 2 of jumper block JP7 (see Figure 7 on page 16), module output mode settings are adjustable from the local on-board switches only. To have both local and remote access, set the jumper across pins 2 and 3.

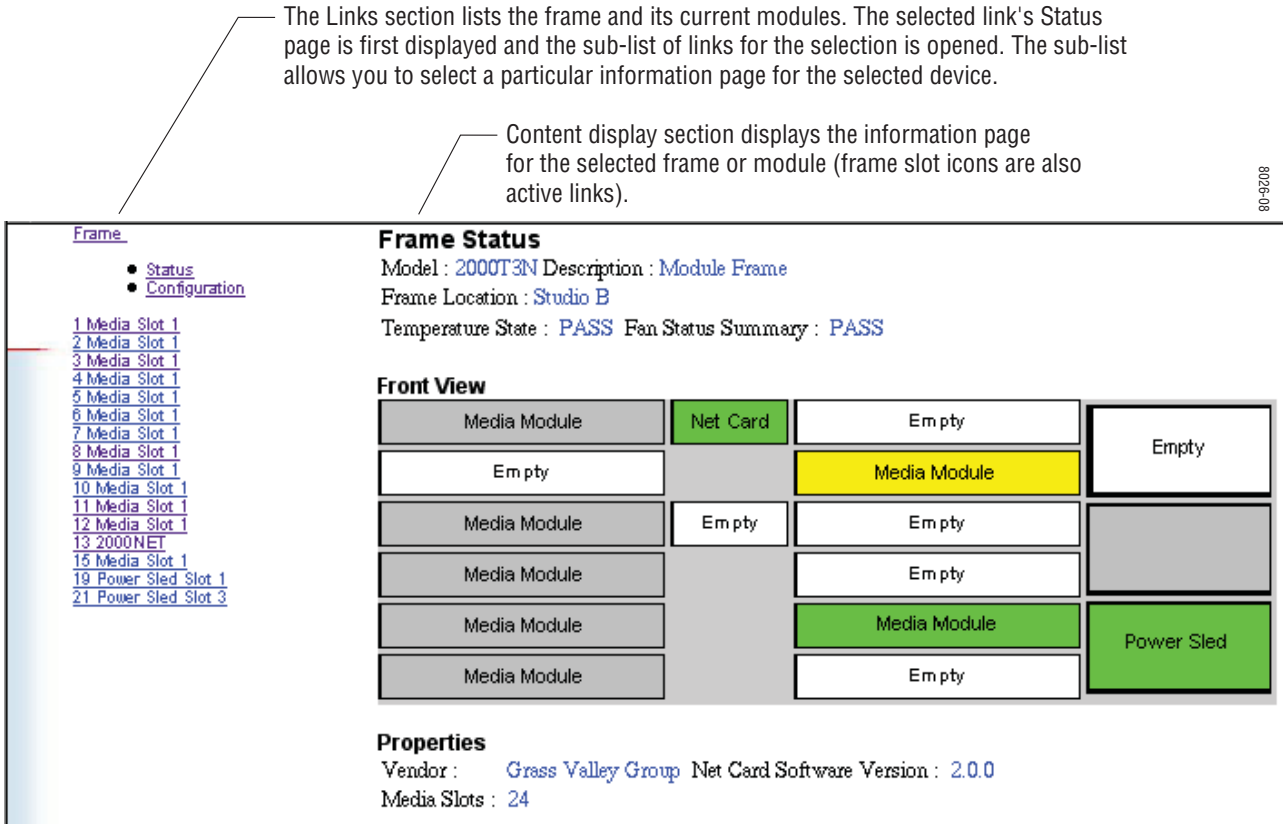
Remote Configuration and Monitoring

2020ADC configuration and monitoring can be performed remotely using the 2000NET interface (see Figure 8). This section describes the GUI access to the module configuration functions. Refer to the 2000NET Network Interface Module Instruction Manual for information on setting up and operating the 2000 frame network.

For remote access, make sure jumper block JP7 on the module is set for both Local and Remote access (Figure 7 on page 16).

Note The physical appearance of the menu displays shown in this manual represent the use of a particular platform, browser and version of 2000NET module software. They are provided for reference only. Displays will differ depending on the type of platform and browser you are using and the version of the 2000NET software installed in your system.

Figure 8. 2000NET GUI



The 2000 modules can be addressed by clicking on a specific module icon in the frame status display or on a module name or slot number in the link list on the left.

Module Configuration Displays

The 2000 GUI provides the following links and displays for the 2020ADC module (Figure 9):

- Module Configuration displays showing status and slot configuration information (location and user assigned names), and
- Signal Configuration displays.

The Module Configuration displays operate in the same manner for all remote controllable 2000 modules. Refer to the 2000NET manual for more information on these displays. Some functions listed may not be supported by a particular module. These will be indicated as not supported.

Figure 9. 2020ADC Display Links

Signal Configuration Displays

This section discusses the Signal Configuration Displays available to set and monitor the 2020ADC module parameters remotely.

Software Update Display

Remote software updating is not supported on the 2020ADC module. Software updating requires a cable assembly and kit available from Grass Valley Customer Service (8900-FLOAD-CBL). Refer to the 2000NET manual and the Thomson Grass Valley web site at http://www.thomsongrassvalley.com for complete details.

Ch 1/2 Control and Status

The **CH 1/2 CONTROL AND STATUS** display (Figure 10 on page 23) provides status reporting and controls for setting the following parameters on Ch 1/Ch 2 output of the 2020ADC module:

- Output mode, and
- Gain adjustment to set maximum signal level input to 0 dBFS digital output.

Set the **CH1/2 MODE** for the desired output of the module from the thirteen selections listed below in Table 6. After making the selection, click the **APPLY** button to activate it.

Table 6. Ch 1/2 Remote Control Output Configuration Modes

Mode Name	Mode Description
Default	Factory default with no phase inversion, channel swapping or summing.
L/R Swap	Swaps left and right channel outputs.
L/R Invert	Both left and right channel outputs phase inverted.
L Invert	Left channel output phase inverted.
R Invert	Right channel output phase inverted.
R Mono (R to L/R)	Right channel to both channel outputs.
L Mono (L to L/R)	Left channel to both channel outputs.
L plus R to L/R	Left plus right to both channel outputs.
L minus R to L/R	Left minus right to both channel outputs
L plus R, L minus R	Left plus right to left channel output and left minus right to right channel output.
(L plus R) Inv to L/R	Left plus right to both channel outputs with both channel outputs phase inverted.
AES Silence	AES silence on both left and right channel outputs.
1K@ -20dBFS	Tone to both channel outputs.

The following status items will be reported in this display:

- **CH 1 L CH AND CH 2 R CH > -20 DBFS** indicates whether the Ch 1 (left) and Ch 2 (right) digital output levels are greater than -20 dBFS (**TRUE**) or less than -20 dBFS (**FALSE**),
- **CH 1 L CH AND CH 2 R CH > -0.5 DBFS CLIP** indicates whether the digital output clipping levels for each channel are greater than -0.5 dBFS (**TRUE**) or less than -0.5 dBFS (**FALSE**), and
- **REFERENCE SIGNAL** indicates whether the module is **LOCKED** (valid AES reference signal is present and module is locked to it) or **UNLOCKED** (module does not detect a valid AES reference signal).

This display also provides gain adjustment to set the maximum signal level (MSL) of the analog inputs for full-scale digital outputs (0 dBFS). For an overview of how to adjust the gain, refer to *Input Level Adjustments* on page 17.

Adjust the gain in either **NUMERIC** or **SLIDERS** mode as shown in Figure 10 on page 23.

- In **NUMERIC** mode, the single arrows increment the numeric display value by 0.1 dB and the double arrow increments the value by 1.0 dB (10x).
- In **SLIDERS** mode, the gain range is distributed over the bar display which is divided into approximately 256 steps. The single arrow will increment the resulting value by 1x and the double arrow will increment by 10x. The returned bar position will be an approximate (rounded off) value.

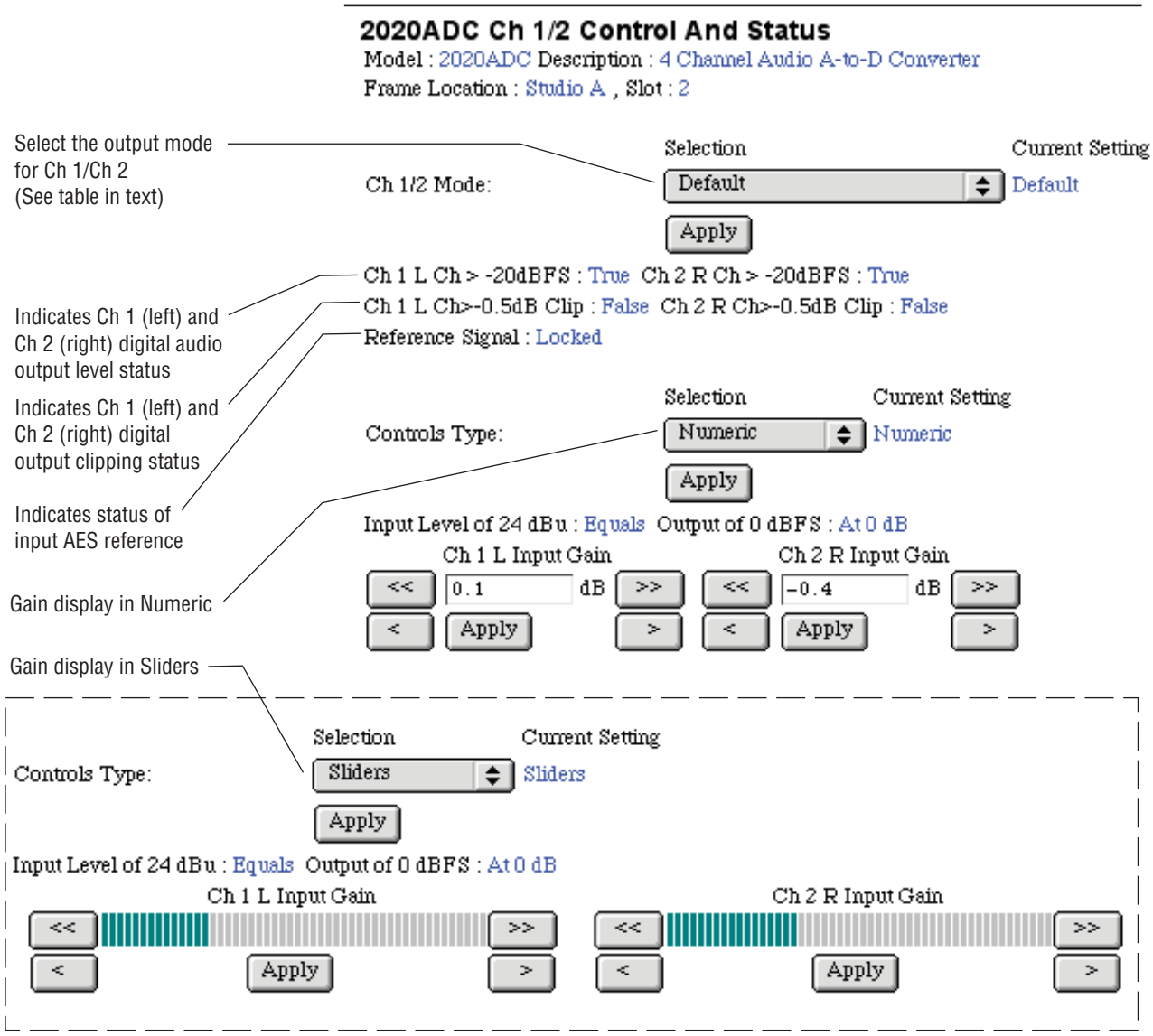
Note In **NUMERIC** mode only, values selected with the single or double arrow keys will be enabled immediately. All other display entries, including typed in values, require pressing **APPLY** before the selection is enabled.

This module has been set up at the factory with a maximum signal level (MSL) default value of +24 dBu = 0 dBFS. The remote controls will allow a gain adjustment range from -4 dB to +12 dB. The MSL can vary from +28 dBu to +12 dBu.

- If you know your input MSL, you can enter a value into the display to make it equal to +24 dBu. For example, if you know your MSL is +24 dBU, enter 0 into the display. If your MSL is +28 dBu, enter -4 to bring it to the +24 default. If it is a lower value, such as +18, enter +6 to bring it up to the default value.
- If you don't know your exact maximum signal level, you may use the display >-20 dBFS and Clip status items to approximate the proper levels.

  Adjust the gain of each channel in the display until the maximum signal level is clipping (**CH 1 L CH >0.5 DB** and **CH 2 R CH >0.5 DBFS CLIP** values read **TRUE**). Then lower the gain just until the Clip values change to **FALSE** and the >-20 dBFS values for Ch 1/Ch 2 read **TRUE**.

Figure 10. 2020ADC Ch1/2 Control and Status Display



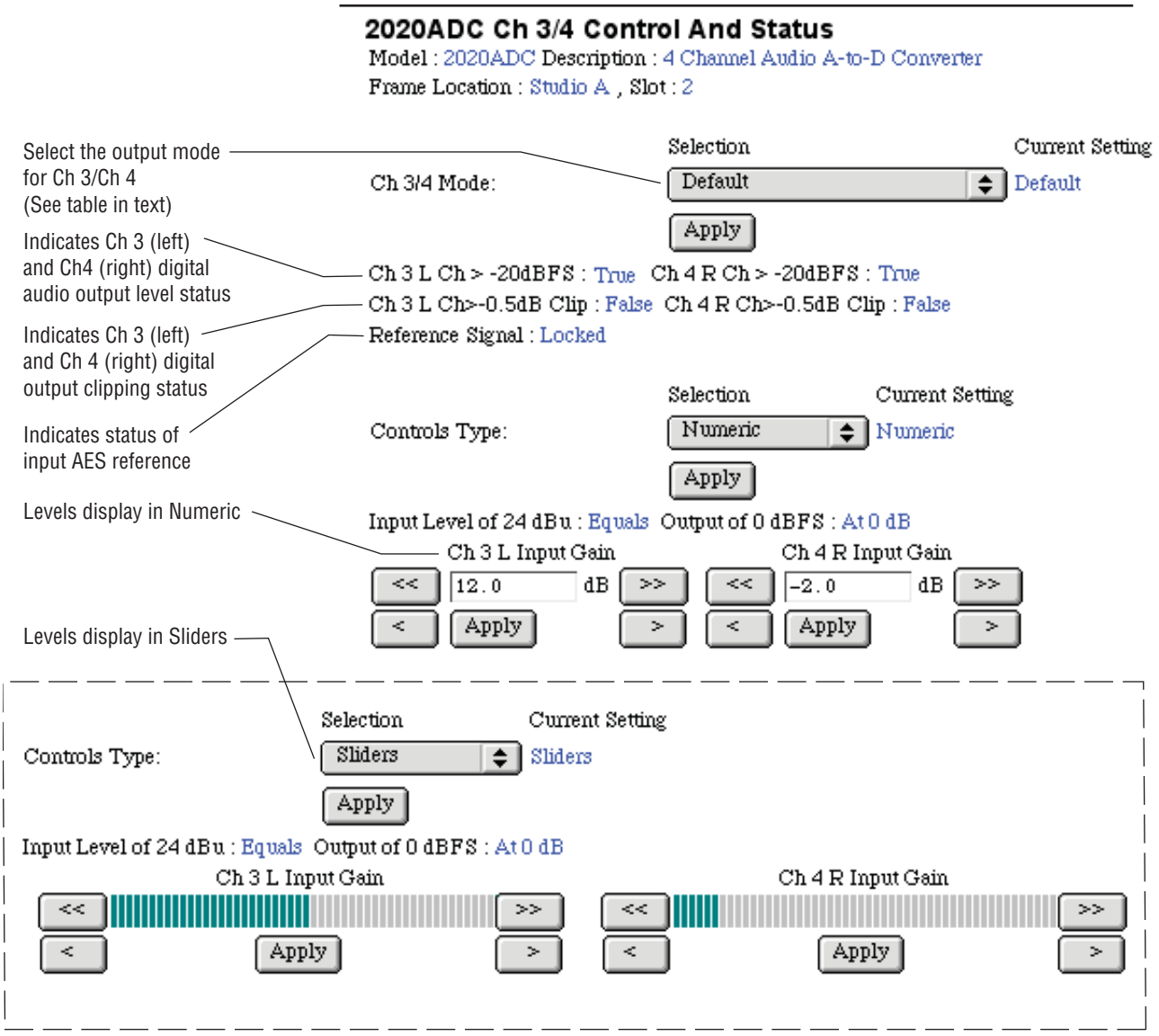
Ch 3/4 Control and Status

The **CH 3/4 CONTROL AND STATUS** display (Figure 11) provides controls for setting the following parameters on Ch 3/Ch 4 output of the 2020ADC module:

- Output mode, and
- Gain adjustment to set maximum signal level input to 0 dBFS digital output.

The procedure for setting parameters on Ch 3/4 are the same as those for Ch 1/2. Refer to *Ch 1/2 Control and Status* on page 21 for a description of setting these values.

Figure 11. 202ADC Ch 3/4 Control and Status Display

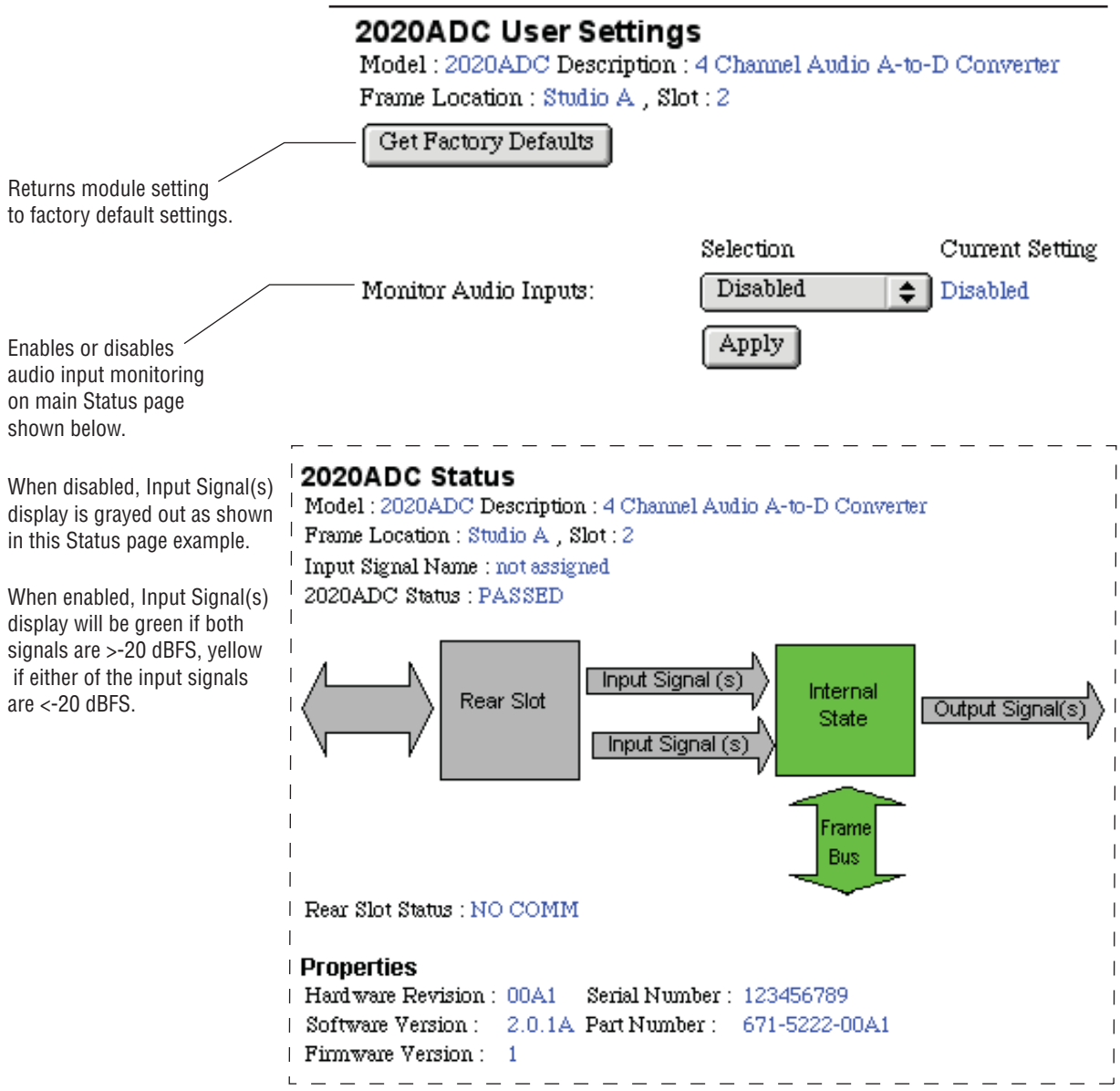


User Settings

The **USER SETTINGS** menu allows you select the following parameters shown in Figure 12:

- **GET FACTORY DEFAULT** (Operation output mode to default, all audio levels to 0 dB, and Monitor Audio Input mode to **DISABLED**).
- Set **MONITOR AUDIO INPUTS** (**ENABLED** or **DISABLED**) to interact with the main Status page to indicate the status of the audio inputs as shown below.

Figure 12. 2020ADC User Settings Display



Specifications

Table 7. 2020ADC Specifications

Parameter	Value
Analog Inputs	
Number of inputs	4 channels (2 stereo pairs)
Connector type	Plug-in terminal block
Input impedance	> 22 k ohm
Input level range (for full-scale output)	+12 to +28 dBu
Common Mode Rejection	> 65 dB at 50/60 Hz; > 45 dB to 20 kHz
Differential DC	0.25 V maximum
Common Mode Input Voltage	20 V maximum
AES Reference Input	
Signal type	AES-3id-1995, transformer coupled
Number of inputs	One loop-through (BNC)
Input return loss	>15 dB (100 kHz-10 MHz)
Impedance	>10 k ¾
Sampling rate	48 kHz
Outputs	
Number of outputs	Two – 110 ¾ balanced and two – 75 ¾ unbalanced
Signal type	AES3 -1992 (110 ohm) and AES-3id -1992 (75 ohm)
Signal level	+12 to +28 dBu input range adjustable to 0.0 dBFS
Connector types	75 ohm BNC and plug-in terminal block
Output return loss	>15 dB
Performance (@ +28 dBU input and full-scale output)	
Quantization	24-bit
Signal-to-noise ratio	>105 dB “A” weighted, 20 Hz to 20 kHz
THD+Noise	<0.005%
Interchannel crosstalk	<-95 dB, 20 Hz - 20 kHz
Intermodulation distortion	<-100 dB
Frequency response	± 0.05 dB relative to 1 kHz, 20 Hz to 20 kHz
DC offset	<±1 mV
Electrical length (delay)	925 µS
Environmental	
Frame temperature range	0 to 45° C
Operating humidity range	0 to 90% non-condensing
Non-operating temperature	-10 to 70° C
Mechanical	
Frame type	2000 Series
Power Requirements	
Supply voltage	+24 V
Power consumption	<9 Watts

Service

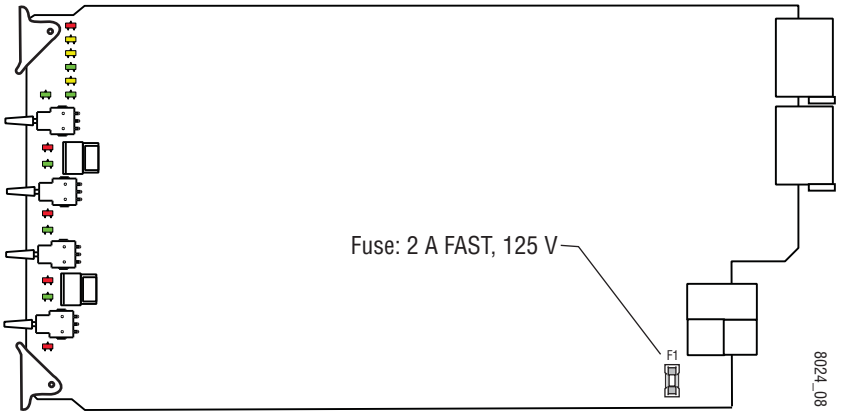
The 2020ADC modules make extensive use of surface-mount technology and programmed parts to achieve compact size and adherence to demanding technical specifications. Circuit modules should not be serviced in the field unless as directed otherwise by Customer service.

Troubleshooting

If your module is not operating correctly, proceed as follows:

- Check frame and module power. If power is not present, check the fuse on the +24 V input to the module as illustrated in Figure 13.
- Check for presence and quality of input signals.
- Verify that source equipment is operating correctly.
- Check cable connections.

Figure 13. Location of Module Fuse



Refer to Figure 6 for the location of PWR LED and Table 3 on page 15 for proper LED indications.

If the module is still not operating correctly, replace it with a known good spare and return the faulty module to a designated Grass Valley repair depot. Call your Grass Valley representative for depot location.

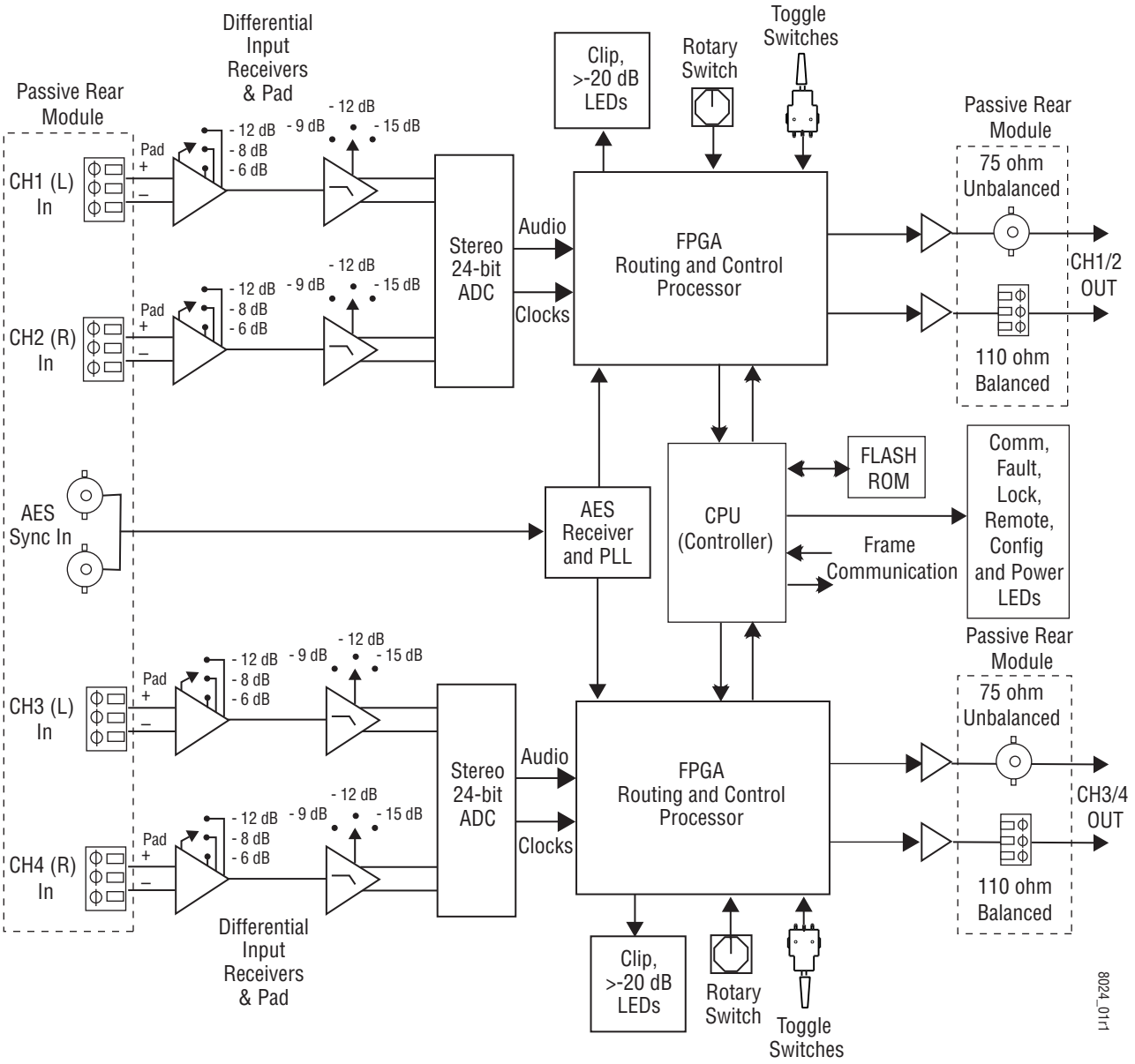
Refer to the *Contacting Grass Valley* at the front of this document for the Grass Valley Customer Support Information number.

Functional Description

The 2020ADC converts four channels of analog audio to two 48 KHz AES/EBU signals. Refer to the block diagram in Figure 14 while reading the following functional description.

Note As both signal channels are identical, only one channel description is provided.

Figure 14. 2020ADC Block Diagram



Differential Input, Analog Gain and A/D Converters

The analog input is applied to a differential amplifier stage. This converts the signal to single-ended and applies it to the coarse gain stage. Coarse gain control pre-conditions the incoming signal before it is applied to the A/D converters. It is adjusted automatically on the module in 2 dB increments in conjunction with the front paddle switches.

The fine gain control is by two center-off paddle switches on the front of the module. They provide a 6 dB range of fine gain adjustment in approximately 0.1 dB increments. The control takes approximately 6 to 10 seconds to transition from minimum to maximum.

The signal is converted back to a differential signal and applied to the 24-bit A/D converter, then to the Routing and Control FPGA (Field Programmable Gate Array).

Digital Reference Input

The digital reference is applied via the loop-through input to the AES receiver and phase-locked loop. This provides clock and data to the Control and Routing FPGA and the A/D converters.

Routing and Control FPGA

The signals from the A/D converters are applied to the Routing and Control FPGA. The incoming signal processing and level is determined by the setting of one of 16 possible mode commands from a four-bit rotary encoder switch and four signals from the level paddle switches. After processing, the signals are embedded into an AES stream and applied to the Output Drivers.

The Routing and Control section also drives the front panel LEDs and interfaces to the Controller section.

Controller

The Controller interfaces with the Routing and Control FPGA, the EEPROM and the 2000 Frame Bus. The Controller also provides the FPGA code that is downloaded to the FPGA during boot-up.

The Controller section handles local control and monitoring, as well as remote control and monitoring via the frame bus (when an 8900NET module is installed in the frame). Module settings are stored in the EEPROM for power up recall.

Power Supply

Power is fed from +24 V rails of the frame's switching power supply. Each stage of the module receives its own, separate, highly regulated and filtered power source. Two-stage regulation is used in the analog section of the ADC to reduce switching noise.

Index

P

R

S

T

U

W