

GRACE DESIGN



m201

microphone preamplifier
optional A/D converter module

Welcome

Thank you for purchasing the Grace Design m201 microphone preamplifier. With the combination of unmatched sonic performance, powerful features, and solid reliability, the m201 is a powerful recording tool designed to help you make the best recordings of your career.

We have designed the m201 to be as easy and intuitive to use as possible. However, we strongly recommend that you read this product manual thoroughly to familiarize yourself with the unique features and capabilities of the m201.

Also, please do not hesitate to contact us directly if you have any questions, comments, or concerns with your new m201 microphone preamplifier. Thanks for reading and happy recording!!

-The Grace Design Team

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Important Safety Information

GENERAL

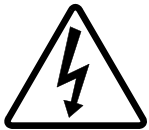
- Indoor use only
- Ordinary Protection: This equipment should not be exposed to dripping or splashing.
- Avoid placing objects filled with liquids, such as vases or glasses, on this equipment.
- Class I Equipment (grounded type)
- Electrical rating: 100-120/220/230-240V~ 50-60Hz 30W
- Mains supply voltage fluctuations are not to exceed $\pm 10\%$ of the nominal supply voltage.
- Pollution Degree 2
- Installation (Overvoltage) Category II for transient overvoltages.
- Maximum Relative Humidity: $< 80\%$
- Operation temperature range: $10\text{ }^{\circ}\text{C}$ to $40\text{ }^{\circ}\text{C}$
- Storage and transportation temperature range $-40\text{ }^{\circ}\text{C}$ to $70\text{ }^{\circ}\text{C}$
- Maximum altitude: 3000m (9843 ft)
- Equipment suitable for continuous operation
- Weight: preamplifier - 7.5kg (16.5lbs)

SAFETY MARKING SYMBOLS



CAUTION: READ ACCOMPANYING DOCUMENTS

This symbol, located on the equipment and in this manual, refers to important instructions. Read this manual thoroughly before operating this equipment.



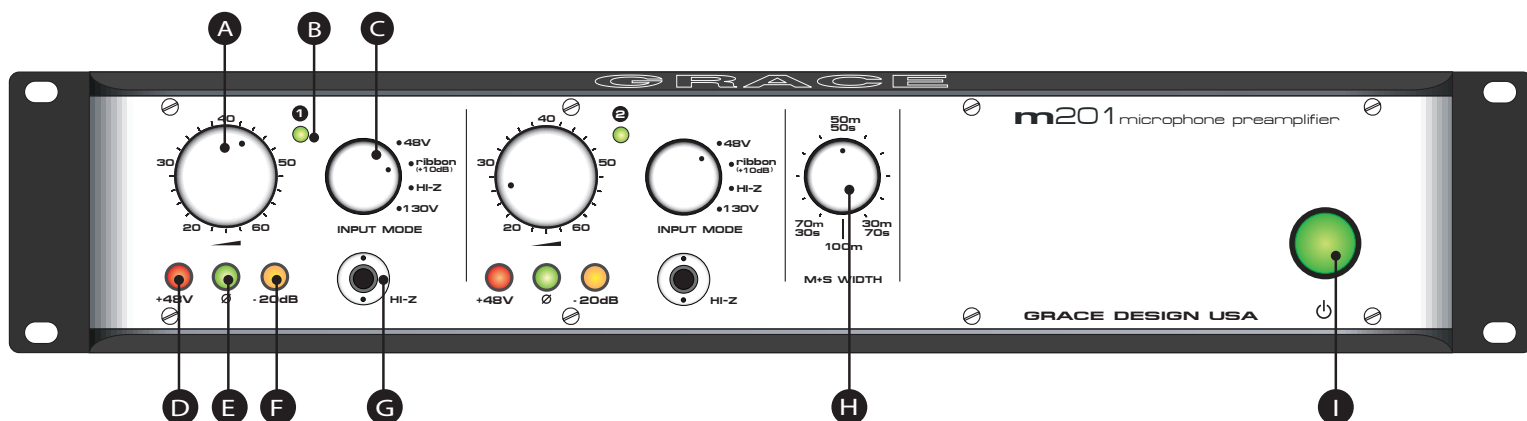
WARNING: ELECTRICAL SHOCK HAZARD

This symbol, located on the equipment and in this manual, indicates the potential for electrical shock hazard.

SERVICE INFORMATION

The Grace Design m201 contains no user serviceable components. Contact Grace Design for repair and upgrade information. In the event that your Grace Design m201 needs to be returned to the factory, contact us for a return authorization number.

Front Panel Controls



A 24 position gold contact gain switch

Each gain control has 24 positions and adjusts the voltage gain from 18dB to 64dB in 2dB steps. In ribbon mode the gain range is 28dB to 74dB in 2dB steps.

B bi-color LED peak indicator

The LED peak indicator, which monitors the output signal level, turns green at -14dB and switches to red at +16dB (12dB before clipping). The threshold level for peak indication is adjustable on each channel (see the calibration section of this manual).

C input mode switch

The input mode switch is used to select between the various types of inputs available with the m201, including standard 48V, ribbon mic mode, HI-Z, or the optional 130V DPA™ inputs. Refer to the m201 block diagram at the end of this manual for signal routing details.

D 48V phantom power switch

The phantom power switch (labeled +48V) connects the +48V power supply to pins 2 and 3 on the XLR input connector. This switch illuminates red. It should be noted that the LED in this switch actually monitors the phantom power voltage at the input. With no microphone connected, the LED will continue to illuminate for approximately 10 seconds after the phantom power is turned off as the filter capacitors discharge. As well, even if the phantom power is switched off, the LED will illuminate if voltage is being fed from an external source. (i.e. when using a direct split in a remote recording application.) Also, the +48V switch is used to activate the +130V DPA™ mic power if this option is installed.

E polarity reversal switch

The polarity reverse switch reverses the absolute phase

of the music signal at the input of the preamplifier. The switch illuminates green and provides power for a sealed gold contact relay located on the preamplifier circuit board. This eliminates signal wiring to the front panel and switch contact performance problems. The polarity reverse function is active for all input connectors.

F -20dB pad switch

The 20dB attenuator switch attenuates the input signal 20dB. The switch illuminates amber when engaged. Like the phase reverse switch, this switch controls a sealed gold contact relay on the preamplifier circuit board. With the -20 switch engaged, the effective gain range becomes -2dB to 44dB. The 20dB attenuator is active for 48V Phantom, ribbon and (optional) DPA inputs. It does not affect the HI-Z inputs.

G HI-Z input

This 1/4 inch TRS input is active when the input mode switch is in the HI-Z position. Suitable for any high impedance source such as: bass guitar, acoustic guitar, electric guitar, keyboards, etc... This input is can be used balanced with a TRS connector or unbalanced with a TS connector.

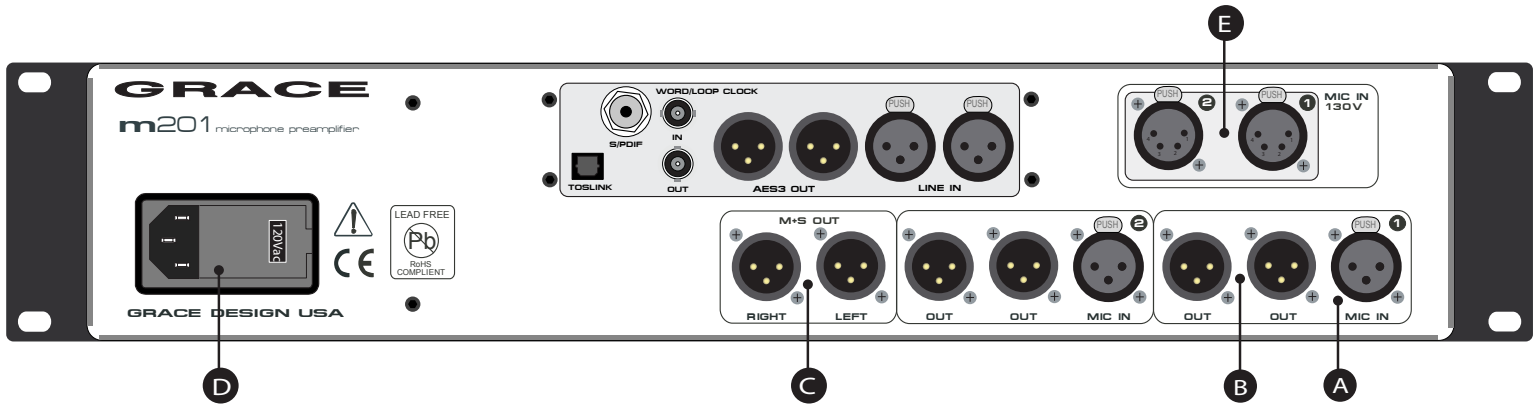
H M-S width control

This knob controls the ratio between the Mid and Side signals in an M-S recording setup. Please see the 'pre-amplifier operation' section of this manual for complete information regarding this feature.

I standby switch

Connects the mains voltage and turns on the m201. When depressed the pushbutton will illuminate green and the preamplifier will be on. When released the preamplifier will be in standby mode.

Rear Panel Connections



A XLR mic input connectors

Input connections are made via female XLR connectors with pin 2 positive, pin 3 negative and pin 1 ground. 48V phantom power is supplied on pins 2 and 3.

B XLR output connectors

Parallel XLR outputs are provided for sending line signals to two separate recording devices or mixers. Output connections are made via male XLR connectors with pin 2 positive, pin 3 negative and pin 1 ground.

C M-S XLR output connectors

XLR outputs are provided for sending M-S signals independently of the standard line outputs. Output connections are made via male XLR connectors with pin 2 positive, pin 3 negative and pin 1 ground.

D IEC AC power input

Accommodates the included 3 prong AC cable. Connect to grounded outlet only.

E 130V DPA microphone inputs (optional)

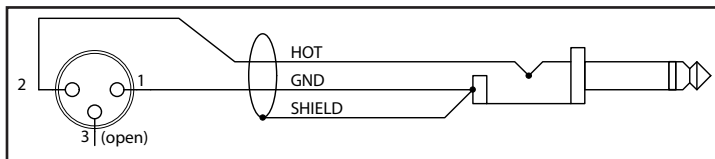
Accommodates 130V DPA® microphones via 4 pin XLR connectors.

F Optional A/D Converter module

Optional A/D converter module for the m201 includes separate balanced analog A/D line inputs, 2x AES3 outputs (single and dual wire), word clock/ loop sync in and out, S/PDIF out and TOSLINK optical out.

Audio Connections

Microphone input connections are made via female XLR connectors with pin 2 positive, pin 3 negative and pin 1 ground. 48V phantom power is supplied on pins 2 and 3. Output connections are made via male XLR connectors with pin 2 positive, pin 3 negative and pin 1 ground. If the output is to be used unbalanced, pin 1 should be connected to signal ground and pin 2 to signal hot. Due to the nature of the balanced output stage, pin 3 should be left open for unbalanced operation. See <figure 1> below. *Note: This will provide a signal of positive absolute polarity when the preamplifier is being used with a microphone which produces a positive voltage on pin 2 with positive air pressure on the front of the diaphragm. While a vast majority of microphones conform to this standard a few do not. Use the phase reverse switch to compensate if necessary.*



<figure 1> - Unbalanced output cable termination

To connect to the front panel HI-Z input, the input mode selector switch must be positioned in the “HI-Z” location, which changes the preamplifier input source from the mic input connector to the front panel TRS jack. The input impedance of the instrument input is 2M Ohm (balanced) and 1M Ohm (unbalanced), which is ideal for inserting high impedance sources such as guitars with passive pickups as well as any instrument with a high level output. Wiring of the HI-Z jack is Tip positive, Ring negative, and Sleeve ground. Please note that the gain range of the preamplifier when using the instrument input is -2dB to +48dB in 2dB steps.

Power Connections



A standard three prong AC power cable is included with the m201. For safety, the power supply cord must be connected to a grounded outlet.



The Disconnect Device for the m201 is the Mains plug or the Appliance Coupler on the power supply cord. The Disconnect Device must remain accessible and operable

AC input voltage settings can be adjusted for 100V, 120V, 220V and 240V operation at 50-60Hz. If your line Voltage is 230VAC then use the 240V setting. From the rear of the m201, open the trap door next to the IEC power inlet with a small screwdriver. Carefully pull the voltage select cam straight out and then insert with the desired voltage

showing. Do not try to rotate the cam while it is in the power input module. Replace the fuses with the proper value selected from <figure 2> below. Be sure to use a time delay fuse with a 250V rating.

CAM SETTING	LINE VOLTAGE	FUSE VALUE
100V~	100V~	250V~ T 500mA L
120V~	120V~	250V~ T 500mA L
220V~	220V~	250V~ T 315mA L
240V~	230V~	250V~ T 315mA L
240V~	240V~	250V~T 315mA L

<figure 2 - fuse value table>

CHECK LINE VOLTAGE SETTINGS

Your m201 has been set from the factory to operate at the voltage required for your part of the world. However, it's important to double-check this in order to ensure no damage will come to the unit if power is applied while the setting is incorrect.

Preamplifier Operation

TURNING THE POWER ON

The power switch is located on the m201 front panel. Pushing the power switch in turns the mains power on (switch illuminates green). Pushing the power switch again turns the mains power off.

USING THE INPUT MODE SELECTOR SWITCH

The input mode switch to the right of the gain control provides a convenient way for the user to select between the various types of inputs the m201 can accommodate. The following is an overview of the four settings:

48V This setting should be selected for all general recording applications with most microphone types. In this position, the main XLR mic inputs are feeding the preamplifier and the dual XLR outputs are active. Proceed with the 'setting the gain' discussion below.

HI-Z This setting is used to select the front panel mounted 1/4" instrument DI inputs. These inputs can accommodate a wide variety of high impedance input sources, including bass guitar, keyboards, electric guitars etc... In this mode, the rear panel XLR inputs are not active, while the dual balanced XLR outputs carry the amplified signal from the DI inputs. There is no 48V phantom available on this input. The phase reverse switch is active, and the gain range of this input is -2dB to +44dB (20dB less than the 48V input), so therefore the -20dB pad is not available. This connector is balanced with the Tip positive, Ring negative and Sleeve ground.

ribbon This setting puts the m201 into 'ribbon mic mode', which is described in detail below. Use this input for ribbon microphones or any application where an additional 10dB of gain may be required. In this position, the main XLR mic inputs are feeding the preamplifier and the dual XLR outputs are active.

130V This setting activates the optional 130V input module for DPA microphones. If the 130V input option is present, this selection will deactivate the standard XLR inputs and enable the dedicated 4 pin 130V XLR inputs. In this mode, the 48V pushbutton switch will turn on the 130V power supply. Phase reverse and -20dB pad are available in this mode. The dual balanced XLR outputs carry the output signal.

SETTING THE GAIN

First, turn the gain control fully counter-clockwise and check that the 48V phantom power is off. Connect a microphone and then turn on the phantom power if required. When sending a signal to a recorder, converter or interface that has fixed input levels, simply increase the gain until the optimum recording level is reached. If the peak indicator flashes red excessively with the gain control in the fully counterclockwise position, engage the -20dB attenuator.

When sending a signal to a tape recorder with an input attenuator (i.e. the record level control on a DAT or CDR recorder) use the following procedure: With the sound source present, turn the gain control clockwise until the peak LED begins flashing red, then reduce the gain until the red stops flashing. Since red indicates a peak level which is 12dB before preamplifier clipping (6dB in unbalanced mode), it is OK for it to come on periodically during recording. If peak indicator flashes red excessively with the gain control in the fully counterclockwise position, engage the -20dB attenuator. Now adjust the recorder input control for the optimum recording level.

Ribbon Mic Mode

Selecting the ribbon mic position on the input mode switch optimizes the channel for ribbon microphones by boosting the gain by 10dB while disabling 48V phantom power and optimizing the mic input impedance. Before activating ribbon mic mode, make sure the channel's gain is fully down (counter-clockwise) and 48V phantom power is off. Now simply select 'ribbon' input mode and turn the gain control upwards until the proper recording level is achieved.

If you press the 48V phantom switch while the ribbon switch is engaged, the mic power will not turn on. However, if the 48V phantom switch remains depressed and the input mode switch becomes inadvertently changed to '48V', 48V phantom will consequently be activated, which can potentially harm a ribbon your microphone if it is still connected to the input. If the 48V phantom power switch is turned off and then the ribbon mode is selected, the preamplifier will wait until the phantom power voltage

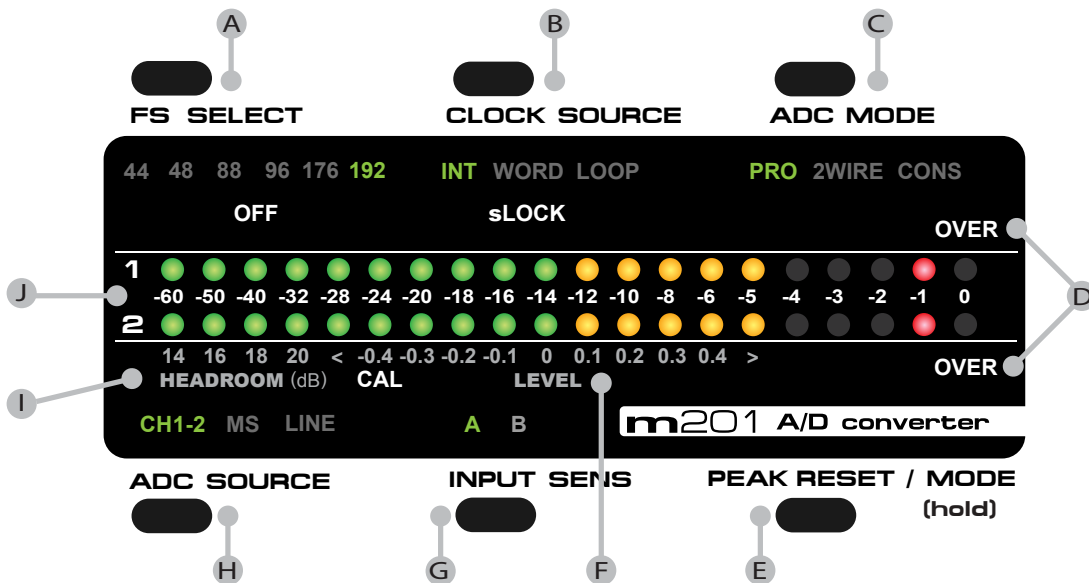
has completely discharged and then the ribbon mode will activate automatically. An additional benefit of the ribbon mic mode is that the input DC blocking capacitors are relay bypassed to further simplify the m201's signal path. Incidentally, the ribbon mode works very well with many lower output dynamic microphones as well as ribbon types.

M-S recording with the m201

In M-S mode the m201 accepts the Mid signal in channel 1 and the Side signal in channel 2. The LEFT channel output connector provides the “sum” of the inputs and the RIGHT channel output connector provides the “difference” of the inputs. In M-S mode, the M-S width control adjust the ratio of Mid signal to Side signal in the dedicated M-S outputs. The LEFT and RIGHT M-S outputs are always active which allows the user to record the discreet Mid and Side signals from the preamplifier Channel 1 and 2 outputs while also recording (or monitoring) the stereo composite from the M-S LEFT and RIGHT outputs.

Note: For more information on M-S recording we would highly recommend the AES paper written by Wes Dooley and Don Streicher called “M-S Stereo: A Powerful Technique for Working in Stereo.” This paper (No. 1792) is available from the Audio Engineering Society web page (www.aes.org).

The Optional A/D Converter Features



- A FS SELECT this switch is used to toggle through the available ADC sampling rates
 - B CLOCK SOURCE this switch is used to select the ADC clock source
 - C ADC MODE this switch is used to select single or dual wire AES, and switch between either professional or consumer format
 - D OVER lights illuminate when the ADC has been overloaded, and remain lit until the PEAK RESET switch is pushed
 - E PEAK RESET / MODE This switch is used to clear peaks on the 20 segment led meter and to select how the meters display peak information.
 - F INPUT SENSITIVITY CALIBRATION SCALE
 - G INPUT SENS selects between the two programmable ADC input sensitivity settings.
 - H ADC SOURCE selects the input source which feeds the ADC module
 - I ADC headroom indicator
 - J 20 segment LED level meter
-

Operating The A/D Converter Module

If you have purchased the optional A/D (analog to digital) converter module for your m201, the following section will help you become familiar with its features and its operation. The m201 A/D card is available installed on new m201's from the factory, or as an upgrade to your existing m201. If you need more information about upgrading your m201 with the A/D module, please feel free to call us at 303.443.7454.

INPUT SOURCE SELECT The m201 A/D can receive signals from 3 different inputs: channels 1&2 from the mic preamplifier section, the M-S matrix outputs, or the external balanced line inputs (located on the back panel of the A/D module). The A/D source select switch (lower left) is used to toggle between the three input source options, which are illuminated green directly above in the bezel. Simply push the button to select the input source you require.

FS SELECT The m201 A/D converter can operate at sampling rates of 44.1, 48,88.2, 96, 176.4, and 192kHz. Whether operating on the internal crystal or an external clock source, you must select the appropriate sampling rate you wish to record at. The top left switch above the A/D bezel labeled FS SELECT is used to toggle between

all the available sampling rates. Simply push the button to select the sampling rate you require. The selected rate will be illuminated green below. Selecting “OFF” puts the A/D converter circuitry in low power standby mode with all oscillators off.

CLOCK SOURCE The m201 A/D can be run from the internal crystal, an external word clock source, or from Digidesign™ loopsync*. The top middle switch, labeled CLOCK SOURCE, is used to select between these options. The selected clock source will be illuminated green below the switch.

A/D MODE The m201 A/D is capable of transmitting AES/EBU digital audio in single or dual wire modes, and in either professional or consumer format. The upper left switch selects between these various formats. The selected format will be illuminated green below the switch.

PEAK RESET / MODE High resolution 20 segment metering is included with the m201 A/D option. When A/D input signals hit or exceed absolute zero (0dBfs), the over indicator lights (‘over’ placed above and below ‘0’ on the meter) will illuminate red and remain lit until the peak reset switch is pushed.

Peak signal levels are indicated by the highest level LED remaining lit. The peak indicators can be programmed to remain lit indefinitely until the reset switch is pressed (infinite); stay lit for 4 seconds (delay); or not stay lit at all (off). These three modes are selected by simply pressing and holding the PEAK RESET / MODE switch for approximately 3 seconds, which toggles through the three available modes.

A/D Converter Sensitivity

The m201 A/D converter features two independent A/D sensitivity configurations. The front panel interface allows the user to easily switch between these two calibrated settings. Each of the two input sensitivity ranges (A) and (B) can be configured for one of four standard A/D sensitivities. The following sections detail the operation and calibration of this feature.

SELECTING THE A/D SENSITIVITY From the m201 front panel interface, pressing and releasing the INPUT SENS push button toggles the selected A/D input sensitivity. The currently selected range (A) or (B) is illuminated.

CALIBRATING THE A/D SENSITIVITY The m201 ships with the following two default sensitivity calibrations: **(A)+22dBu = 0dBFS** (18dB Headroom) **(B)+18dBu = 0dBFS** (14dB Headroom). Internal trim controls allow you to reconfigure either (or both) of the sensitivity levels. Four standard sensitivities are supported in the m201 A/D converter: **+18dBu = 0dBFS** (14dB Headroom) **+20dBu = 0dBFS** (16dB Headroom) **+22dBu = 0dBFS** (18dB Headroom) **+24dBu = 0dBFS** (20dB Headroom).

The front panel interface features a calibration mode that allows precise adjustment of the A/D sensitivity. To recalibrate one or both of the input sensitivity configurations, simply do the following:

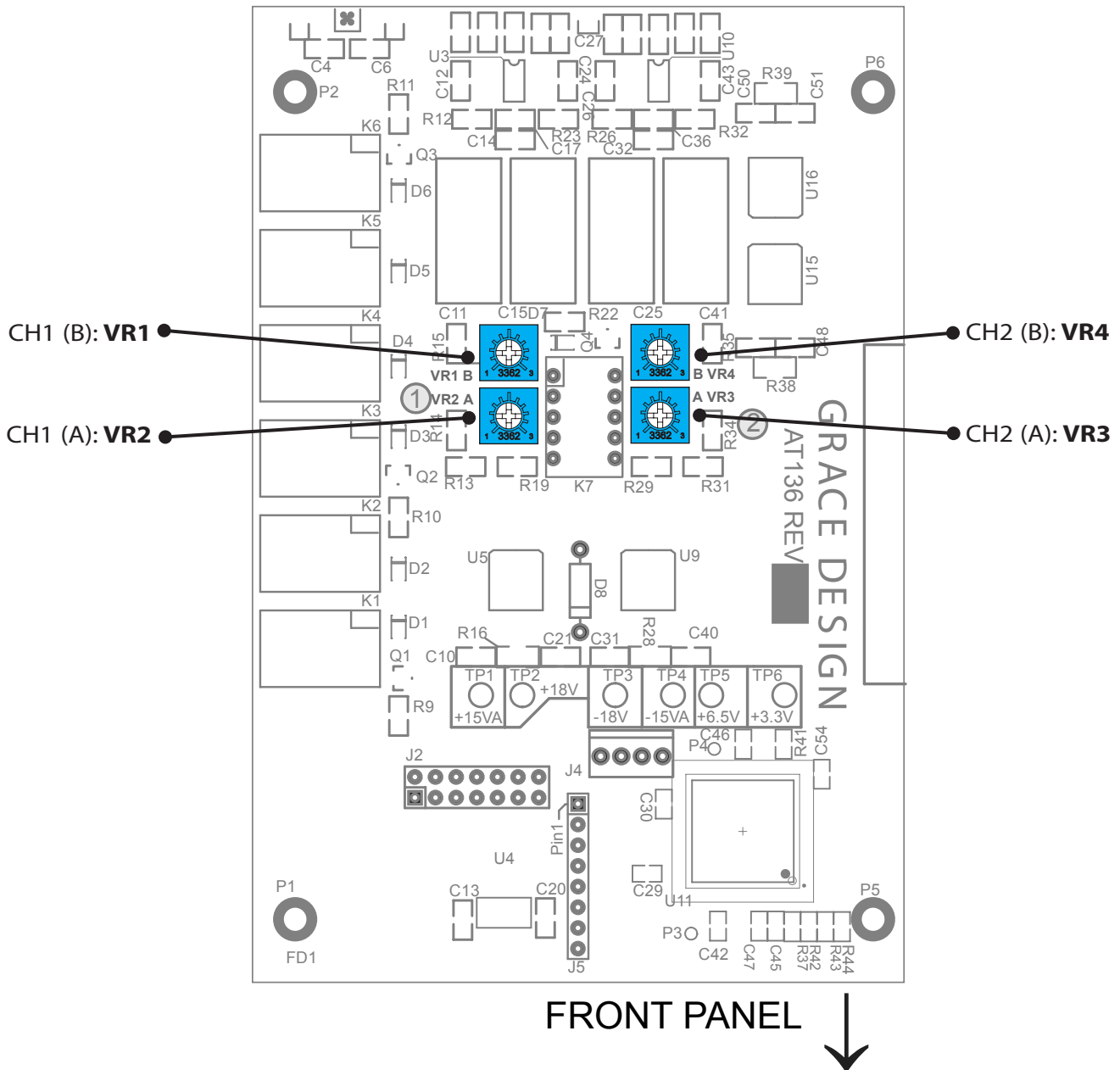
- 1) Disconnect AC power from the m201.
- 2) Remove the 8 top cover screws using a #2 Phillips screwdriver. Lift the top cover off the unit and set it aside.
- 3) Reconnect AC power to the m201 and turn it on.
- 4) Connect a signal generator to the A/D LINE inputs. Set the signal generator output to +4dBu @ 1kHz (1.29V rms).
- 5) Turn on the m201 A/D converter and select LINE as the A/D input source.
- 6) To enter CAL mode, press and hold the INPUT SENS button for approximately 3 seconds. The normal operation displays will extinguish and the CAL indicator will begin flashing indicating CAL mode is active. The current input sensitivity range (A) or (B) will be illuminated along with that range's current sensitivity calibration (shown as "dB Headroom" in the bottom left of the meter display).
- 7) Press and release the INPUT SENS button to select the range (A) or (B) that you wish to calibrate.
- 8) Press and release the A/D SOURCE button to scroll through the 4 available sensitivities until the desired setting is illuminated.

In calibration mode, the digital audio meter is configured such that the "0" position is the target sensitivity level. The meter then indicates the current signal level versus this target sensitivity. The meter will display a window centered around the target sensitivity with a +/- 0.4dB width (in 0.1dB increments). When the sensitivity adjustment on the A/D converter is calibrated for the selected setting, only the "0" LED will be illuminated. If the signal level is high, the 0 indicator will be illuminated along with the error (in 0.1dB increments) to the right of 0. If the signal level is low, the 0 indicator will be illuminated along with the error (in -0.1dB increments) to the left of 0.

On the m201 A/D module, trim pots are used to adjust the (A) and (B) ranges for each channel. Each of these are labeled on the A/D module circuit board <figure 3>.

- 9) Locate the appropriate trimmer for the channel you wish to adjust. If the current signal level is high, you need to decrease the A/D sensitivity. Using a non conductive tool, turn the appropriate trim pot counter-clockwise to reduce the level until only the "0" is illuminated on the m201 meter. If the current signal level is low, you need to increase the A/D sensitivity by turning the appropriate trim pot clockwise to increase the level until only the "0" is illuminated on the LED level meter.

- 10) Once all desired calibration adjustments have been made, press and hold the INPUT SENS button for approximately 3 seconds. This will exit CAL mode and return the A/D to normal operation. The new settings are now stored until future changes are made.
- 11) Power down the unit, disconnect the AC power and reinstall the top cover.



<figure 3 - A/D sensitivity trim pot locations>

Maintenance

The model m201 was designed to be maintenance free for many years. It is highly unlikely that your unit will require service. However, there are two adjustments that may need to be made from time to time. These procedures should be made only by a qualified service technician or at the Grace Design factory.

PEAK LED ADJUSTMENT PROCEDURE

The peak LED threshold levels may be adjusted to a user defined operating level. This circuit is set at the factory with the green threshold at -14dBu and the red threshold at +16dBu. The relationship between the two thresholds is fixed. The procedure for adjusting the green / red threshold follows:

EQUIPMENT NEEDED

- Sine wave audio signal generator or oscillator output from a mixing console.
- Audio level meter or an RMS Volt meter with dBu or dBm scales
- Plastic alignment tool or small screwdriver
- Appropriate interconnect cables
- #2 phillips head screwdriver

PROCEDURE

- 1) With the power off, remove the eight phillips head screws from the top cover and remove it from the m201
- 2) Set all of the gain controls to the 30dB position
- 3) Connect the audio generator to the input of channel 1
- 4) Set the generator output level to approximately -20dBu @1KHz.
- 5) If the generator has an unbalanced output, refer to figure 2 below for termination information
- 6) Connect the level meter to the output of channel 1.
- 7) If the level meter has an unbalanced input, refer to <figure 1> for unbalanced output termination information.
- 8) Apply power to the generator, preamplifier, then the level meter.
- 9) Adjust the generator output level so that the preamplifier output level is at the desired red threshold. If the proper level can't be reached, adjust the preamplifier gain control.
- 10) Locate VR2A (VR2B for channel 2) (see <figure 3>) on the channel 1 audio circuit board and adjust until the peak LED is between green and red. The color should appear amber when the setting is correct. Repeat this procedure for channel 2.
- 11) If it is desired to calibrate the peak indicator to a specific converter/recorder input level, simply connect the output of the preamplifier to the converter/recorder. Adjust the signal generator so that the desired peak level is indicated on the recorder and then adjust VR1 until the peak LED is between green and red.

INPUT OFFSET ADJUSTMENT

The input amplifiers in the m201 are ultra-precision laser trimmed devices which have a very low input offset. However, even the smallest differential offset at the input can result in an audible “click” when the gain control is turned. It should be noted that this type of click will be audible when no signal is present. With no signal present there is no signal amplitude to be changed unless input offset is present. This procedure nulls the input offset and minimizes the clicking sound with no signal present. In contrast, there will almost always be an audible click if turning the gain control while a signal is present. This is because the gain control, being a stepped control, will make an instantaneous change in amplitude when turned, which creates a transient signal.

EQUIPMENT NEEDED

- DC Volt meter with at least 1mV sensitivity
- Plastic alignment tool or a small screwdriver
- #2 phillips head screwdriver

PROCEDURE

- 1) Remove the 8 phillips head screws from the top lid but leave the lid in place.
 - 2) Set all of the preamplifier gain controls to maximum.
 - 3) Turn on the m201 preamplifier and allow to warm up for at least 45 minutes. (go get a nice cup of coffee and do some stretches)
 - 4) Remove the top lid and locate the DC offset test points TP1A and TP2A (**see figure 4 next page**). Place the Volt meter probes into these holes.
 - 5) Locate DC offset potentiometer VR1A (VR1B for channel 2) and rotate it for a reading of 0.000VDC +/- 0.003V.
 - 6) The input offset does drift with temperature and having the lid off will allow the circuitry to cool. It is advisable to replace the lid and let the preamplifier warm up again (about 20 minutes) and then re-check your adjustments.
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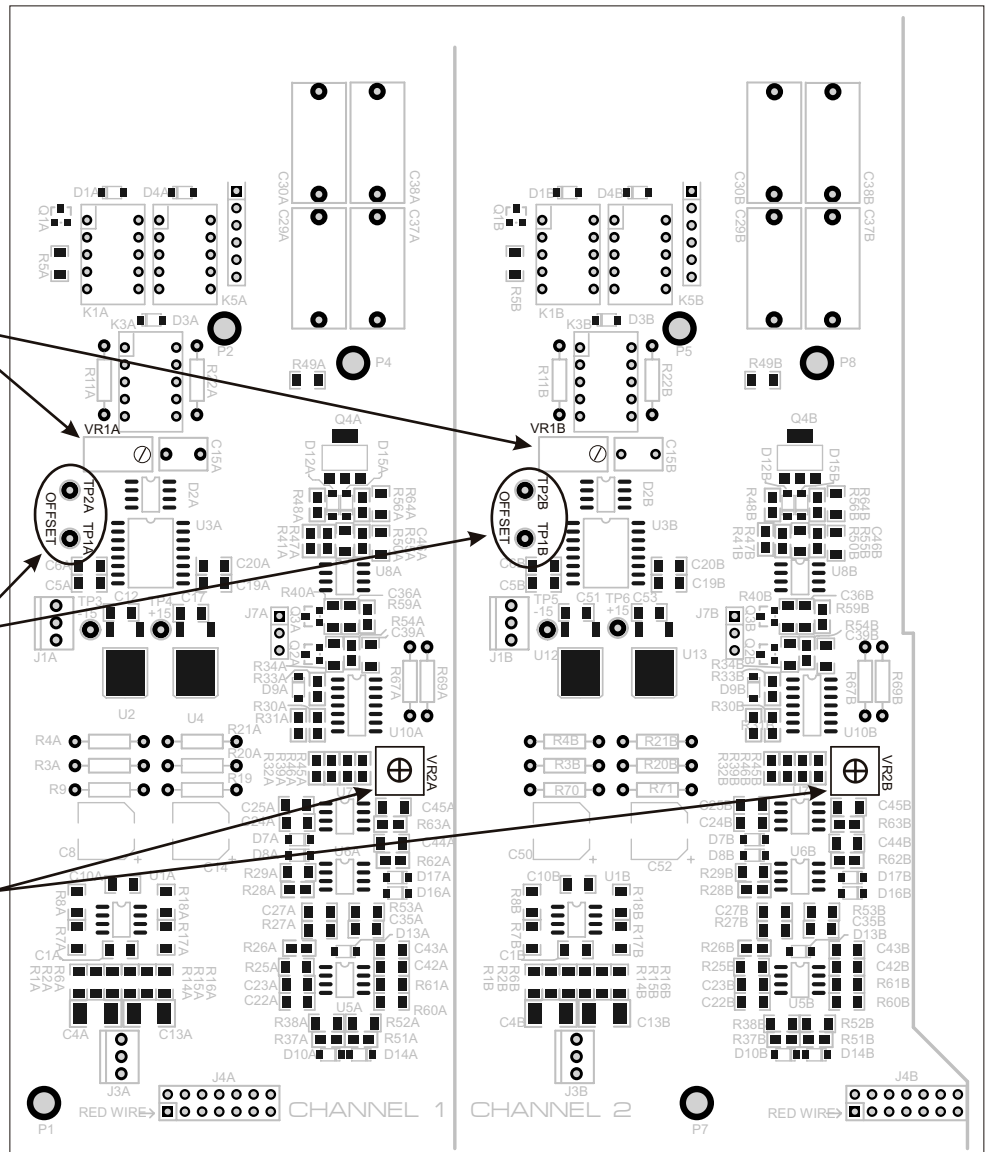
Cleaning

Your m201 preamplifier chassis is constructed out of high quality stainless steel. Under normal circumstances, virtually no maintenance is required to keep the unit looking shiny and new. However, if your unit becomes smudged or dirty, here are some cleaning tips: We recommend using either Pledge furniture polish or Zep brand stainless steel cleaner (available at the hardware store). Apply cleaner to a clean, dry, lint free cloth and gently wipe all stainless surfaces, taking care not to allow the cleaning product to build up around the panel switches or knobs.

OFFSET TRIM POTS:
 CH1> VR1A
 CH2> VR1B

OFFSET TEST POINTS:
 CH1> TP1A-TP2A
 CH2> TP1B-TP2B

PEAK LED CAL POTS:
 CH1> VR2A
 CH2> VR2B



FRONT PANEL ↓

<figure 4 - offset test point and peak LED adjust trim pots>

Specifications

preamplifier specifications (without A/D converter)

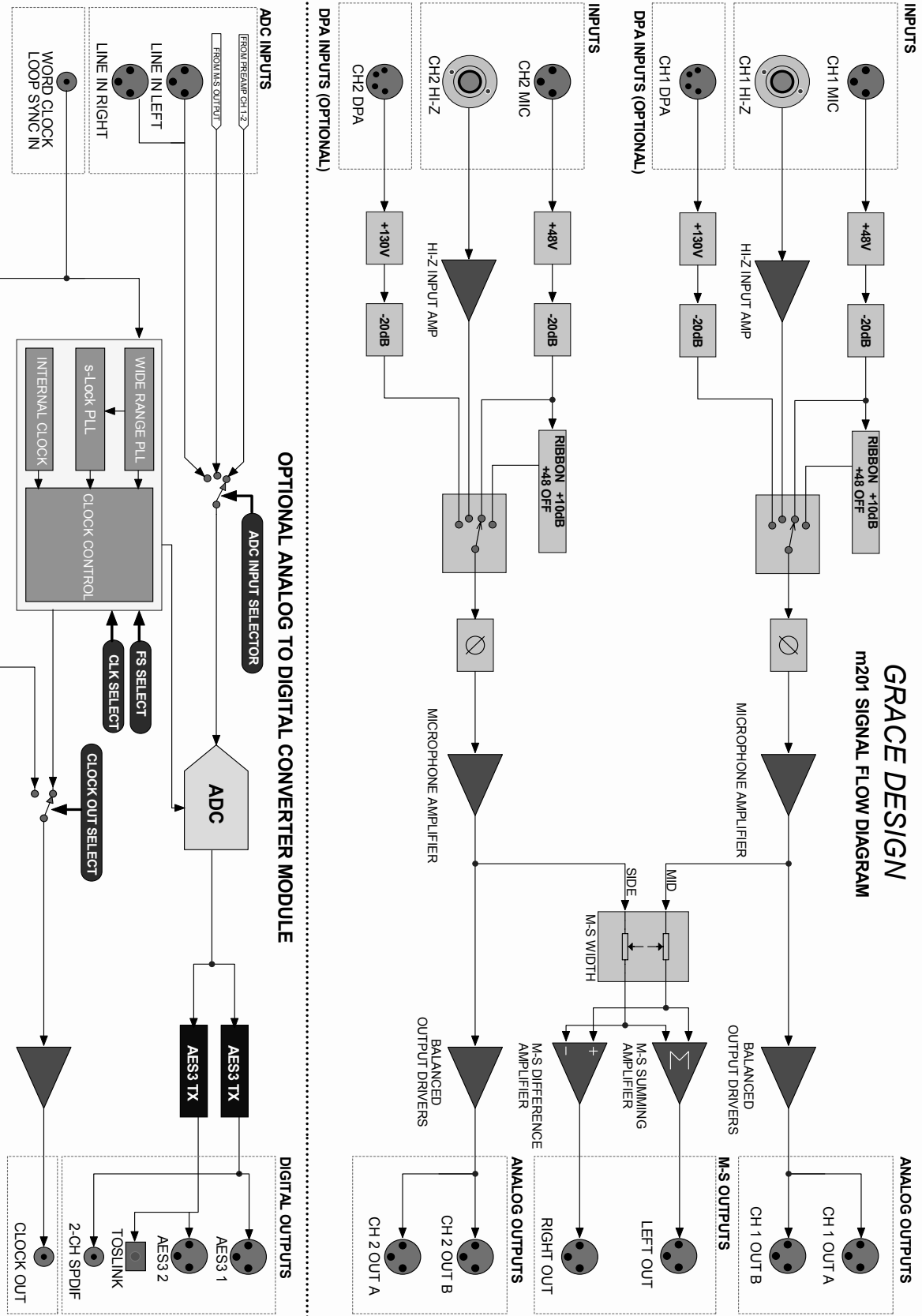
Frequency Response	
@ 40dB gain \pm 0.2dB (50 Ω source)	18Hz-65kHz
@ 40dB gain \pm 3dB (50 Ω source)	4.5Hz-350kHz
THD+N	
@ 20dB gain +25dBu out, 1kHz	<.0008%
@ 40dB gain +25dBu out, 1kHz	<.0009%
@ 60dB gain +25dBu out, 1kHz	<.0070%
Intermodulation Distortion	
@ 40dB gain +25dBu out	
SMPTE/DIN 1:1 (50Hz, 7kHz)	<.0020%
SMPTE/DIN 4:1 (50Hz, 7kHz)	<.0030%
Noise - Referred to Input	
@ 60dB gain 50 Ω source	-130dB
@ 60dB gain 150 Ω source	-127dB
@ 60dB gain 600 Ω source	-123dB
Phase Deviation	
100Hz-20kHz @40dB gain	<3°
Crosstalk	
Any Channel @ 40dB gain 1kHz	-125dB
Any Channel @ 40dB gain 10kHz	-115dB
CMRR	
@ 60dB gain, 3.5Vcm, 1kHz	>70dB
@ 60dB gain, 3.5Vcm, 10kHz	>70dB
Maximum Output Level	
1kHz, 100K Ω load	+28dBu
Impedance	
Input	8100 Ω
Input, ribbon mode	20k Ω
Output	190 Ω
Peak Led Meter	
Green threshold	-14dBu
Red threshold	+16dBu
Weight and Dimensions	
dimensions	2U, 19" rack mount x 10" deep
weight	16.5lbs (7.5kg)
Power Consumption	
100/120/230/240V~ 50-60Hz	20 Watts Max

A/D module specifications (line input)

Dynamic range	
20Hz-20kHz	>115dB
"A" weighting	>117dB
THD+N	
1kHz, -1dBFS, 20Hz-22kHz	< 0.00026% (-112dB)
Frequency response	
	+/-0.2dB
44.1kHz Fs	5Hz-21kHz
48kHz Fs	5Hz-23kHz
88.2kHz Fs	5Hz-41kHz
96kHz Fs	5Hz-45kHz
176.4kHz Fs	5Hz-54kHz
192kHz Fs	5Hz-59kHz
Full scale input level	+16dB or +24dB (+/-2dB trim)
CMRR	
60Hz	>65dB
1kHz	>80dB
10kHz	>60dB
IMD SMPTE 4:1 60Hz, 7kHz, -3dBFS	<100dB (0.0008%)
Interchannel crosstalk	<120dB
Group delay	
44.1-48kHz	13/Fs
Sample rates, internal crystal (kHz)	
	44.1, 48, 88.2, 96, 176.4, 192
External Clock Lock Range	
Wide lock mode	40.1kHz-207kHz (+/-8% at each sample rate)
s-Lock™ mode	+/-250ppm (+350, -400ppm typical)
Intrinsic Jitter, 200Hz-20kHz BW	
Wide lock mode	< 60ps RMS
s-Lock™ mode	< 40ps RMS
Jitter Rejection Corner Frequency	
Wide lock mode, -3dB, 12dB/octave	800Hz
s-Lock™ mode, -3dB, 12dB/octave	10Hz
A/D sensitivity	
Range A	+22dBu = 0dBFS (18dB headroom*)
Range B	+18dBu = 0dBFS (14dB headroom*)

*can be calibrated for any setting between +18dBu = 0dBFS and +24dBu = 0dBFS

Signal Flow Diagram



Warranty Information

- ① Grace Design warrants all of our products to be free of defective parts and workmanship for a period of five years. This warranty period begins at the original date of purchase and is transferable to any person who may subsequently purchase the product during this time.
- ② This warranty excludes the following conditions: normal wear and tear, misuse, customer negligence, accidental damage, unauthorized repair or modification, cosmetic damage and damage incurred during shipment.
- ③ During the time of this warranty, Grace Design will repair or replace, at its option, any defective parts or repair defective workmanship without charge, provided the customer has appropriate proof of purchase and that the product has its original factory serial number.
- ④ In order for Grace Design to provide efficient and timely warranty service, it is important that you mail the completed warranty registration card enclosed with all of our products within 10 days of the original date of purchase. You may also register your product directly with Grace Design by telephone (303-443-7454 Monday-Friday 9:00am to 5:00pm MST), or you can register your product online at www.gracedesign.com.
- ⑤ This warranty is in lieu of all other warranties whether written, expressed, or implied, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.
- ⑥ In no event will Grace Design be liable for lost profits or any other incidental, consequential or Exemplary damages, even if Grace Design is aware of the possibility of such damages. In no event will Grace Design's liability exceed the purchase price of the product
- ⑦ This warranty gives the customer specific legal rights. The customer may also have other rights, which vary from state to state. Some states do not allow limitations on implied warranties or consequential damages, so some of the limitations of the above may not apply to a particular customer.

