
AMP1-DA/106

1RU Audio Speaker Monitor

User Guide

Part Number 821024, Revision C



VIDEO

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AMP1-DA/106 User Guide

Introduction

Overview

The AMP1-DA/106 audio monitor provides self-powered, full-fidelity stereo monitoring in the smallest rack space possible. All models contain four high performance transducers driven by three power amplifiers: two amplifier/driver combinations handle midrange and high frequency information in stereo, while the third center channel reproduces information below the 500 Hz crossover point.

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Safety Instructions

1. Read, keep, and follow all of these instructions; heed all warnings.
2. Do not use this equipment near water or moisture.
3. Use only a dry cloth to clean the equipment.
4. Do not block any ventilation openings. Install only in accordance with the instructions in the section entitled, "[Installation Recommendations](#)" on [page 3](#).
5. Do not install near any heat source such as a radiator, heat register, amplifier, or stove.
6. Do not attempt to plug the unit into a two-blade outlet (with only two prongs of equal width).

IMPORTANT: By design, these monitors will only plug into a three-prong outlet for your safety. If the plug does not fit into your outlet, contact an electrician to replace the obsolete outlet.

7. Protect the power cord from being walked on or pinched, particularly at plug's source on the equipment and at the socket.
8. Use only the attachments/accessories specified by the manufacturer.
9. Unplug the equipment during lightning storms or when unused for long periods of time.
10. Refer all servicing to qualified service personnel. Servicing will be required under all of the following conditions:
 - The equipment has been damaged in any way, such as when the power-supply cord or plug is damaged.
 - Liquid had been spilled or objects have fallen onto the equipment.
 - The equipment has been exposed to rain or moisture.
 - The equipment does not operate normally.
 - The equipment has been dropped.

Installation Recommendations

Mounting

The unit is designed to install into a standard 19" rack mounted at eye level for best visual observation of the monitor screens.

Heat Dissipation

The ambient temperature inside the mounting enclosure should not exceed 40° Celsius (104° Fahrenheit). Adjacent devices can be rack mounted (or stacked) in proximity to the unit if the above temperature is not exceeded. Allow a 1RU (1.75"/44.45mm) space above and below the unit for air circulation.

Important: To reduce noise, the monitor has no fans. As a result, the heat generated by the power amplifiers, power supplies, and other components is vented by slots in the side of the unit. Therefore, as a safety precaution, we advise you to be sure to allow proper ventilation on both sides of the unit.

Power

The unit comes with a standard 24VDC/3.0A internal power supply and connects an A/C mains power source (65W, 100 to 240 VAC, 50/60Hz) to the IEC connector provided on the rear panel of the unit.

Sympathetic Vibration

Sympathetic vibration from other equipment (cables, etc.) in the rack may be serious enough to interfere with the unit's sound quality out in the listening area. The use of thin card stock and/or felt or foam weather-stripping type materials between adjacent vibrating surfaces, or tying up loose cables, etc., may be required to stop vibrations external to the unit.

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Description

All AMP1-DA/106 model comes equipped with a stereo volume control, balance pot, power indication LED, and headphone output. Output limiter circuits are incorporated to protect the speakers, and extensive magnetic shielding allows placement immediately adjacent to video monitors without causing display interference.

It also features two selectable AES input sources on unbalanced BNC connectors and a stereo analog input source on two balanced XLR connectors. A toggle switch on the front panel allows selection of AES source 1 or 2 while another toggle switch selects between the selected AES digital source and the analog source inputs. A red LED indicates the presence and error status of the selected AES signal entering the unit.

Two high-resolution 106-segment tri-color LED bargraph level meters display the audio levels for the left and right selected sources. An additional pair of XLR connectors are provided on the rear panel for outputting an analog signal of the selected sources for connecting to downstream equipment.

Features

- 98 dB SPL at two feet
- Only one rack space high
- Thorough magnetic shielding for placement next to video monitors
- Two selectable AES/EBU inputs on unbalanced BNC connectors
- Analog stereo inputs on two balanced XLR connectors
- Analog output of selected input on two balanced XLR connectors
- AES input signal status indication LED
- AES source selection via front panel toggle switch
- Digital/analog source selection via front panel toggle switch
- Headphone output
- Power indication LED
- Two 106-segment high-resolution tri-color bargraph level meters:
 - Selectable input Reference Level (0, +4, +6, or +8 dBu)
 - Selectable Display Mode (VU Only, VU/PPM, or PPM Only)
 - Selectable Peak Hold (Manual, 3-Second, 10-Second, or Off)
 - Selectable PPM Ballistics (Type I, Type II, DIN 45406, or SSRT)
 - Selectable alternate Bargraph Scales (AES, Extended VU, Alternative AES, VU, BBC, NORDIC, and DIN)

Applications

The AMP1-DA/106 is ideally suited for use in VTR bays, mobile production vehicles, teleconferencing installations, multimedia

systems, satellite links and cable TV facilities, and on-air radio studios. Designed and manufactured in the U.S., the AMP1-DA/106 is backed by a strong warranty and a satisfaction guaranteed return policy.

Specifications

Table 1–1 Specifications for the AMP1-DA/106

Specification	Value
Inputs	2 XLR (Male) 2 BNC (Female)
Input Impedance	XLR (Analog): 40K Ω balanced BNC (Digital): 75 Ω unbalanced
Input Level for Maximum Output (Volume Full On)	0 dBv balanced
Input Overload	+26 dBv balanced
Peak Acoustic Output (@ 2 ft.)	98 dB SPL
Response, Sixth Octave	80 Hz - 16 kHz \pm 7 dB (-10 dB @ 50 Hz, 22 kHz)
Power Output	
RMS Each Side (4 Ω)	10 Ω transient / 5 Ω continuous
RMS Bass (4 Ω)	20 Ω transient / 10 Ω continuous
Distortion, Electrical:	Less than 0.15% at any level below limit threshold
Distortion, Acoustic	8% or less at worst case frequencies above 180 Hz including cabinet resonance; typically less than 2%
Hum and Noise	better than -68 dB below full output
Magnetic Shielding	Less than 1 Gauss any adjacent surface
Power Consumption (Average Maximum):	35 W
AC Mains Input:	100-240VAC, 50-60 Hz
Dimension (h x w x d)	1.75 x 19 x 12 inches (44.5 x 483 x 305mm)
Weight	14 lbs. (6.4 kg)

Table 1–1 Specifications for the AMP1-DA/106

Specification	Value
D to A Gain Calibration, (dB = dBFS)	+8 = -20, +4 = -20, +6 = -9, 0 = -18 (DIP selectable)
AES Sampling Rate	32-48 KHz, auto-select
D to A Converter	24-bit low jitter
Converted Analog Out (S/N)	>90 dB
Converted Analog Out (THD)	< 0.008%
AES Termination	Removable (DIP select)
Level Meter Type	106-seg tri-color LED bargraph
Bargraph Quantity	2 each, horizontal
LED Color	Tricolor (red, amber, green)
Metering Range	72 dB
Reference Level Select	0, +4, +6, or +8 dBv
Display Mode Select	VU Only, VU/PPM, or PPM Only
Peak Hold Select	Manual, 3-sec, 10-sec, or OFF
PPM Ballistics Select	Type I, Type II, DIN 4506, or SSRT
Calibration	Auto
Scale Select	AES, Extended VU, Alternate AES, VU, BBC, NORDIC, or DIN
Level Meter Type	106-segment LED Bar Graph Display
Level Calibration	0, +4, +6, +8 dBv (= '0'), Selectable
Frequency Response	20 Hz to 20 kHz (± 0.5 dB)
LED Color	Tricolor (red, amber, green)
Metering Scale	+16 to -56 dB
Midscale Resolution	0.5 dB
Display Modes	VU Only, VU-PPM Floating Seg., PPM Only, or PPM-PPM Floating Seg
Peak Hold	Manual, 3-sec, 10-sec, or Off
PPM Characteristics	Selectable
Bargraph Length	4.44" (112.8 mm)
LED Segment Size	0.028" x 0.140" (0.7 x 3.57 mm)
LED Segment Pitch	0.039" (1 mm)
Segment Brightness, (I f = 20 mA)	3.5 mc ² d
Segment Brightness Uniformity	<10% difference between segments

Table 1–1 Specifications for the AMP1-DA/106

Specification	Value
Adjacent Segment "Off" Brightness	<1% of brightness of active segment
Peak Emission Wavelength	green: 570 nm; red: 630 nm

Other Options

Wohler Technologies offers the broadest range of standard production audio monitor units. Standard-production models or special order custom features for the **AMP1-DA/106** units include the following functions (and combinations thereof):

- Separate channel volume controls
- Alternate level meter scales and color maps
- Multiple input and output connector type choices

Other custom options are available. Call your dealer or Wohler Technologies to discuss your specific needs. (Wohler's contact information is on page ii of this document.)

Note: Units are designed to meet, at time of manufacture, all currently applicable product safety and EMC requirements, such as those of CE. 0 dbV ref. 0.775V RMS. Features and specifications subject to improvement without notice.

Audio Amplifier and Speaker Configuration

Audio Amplifiers

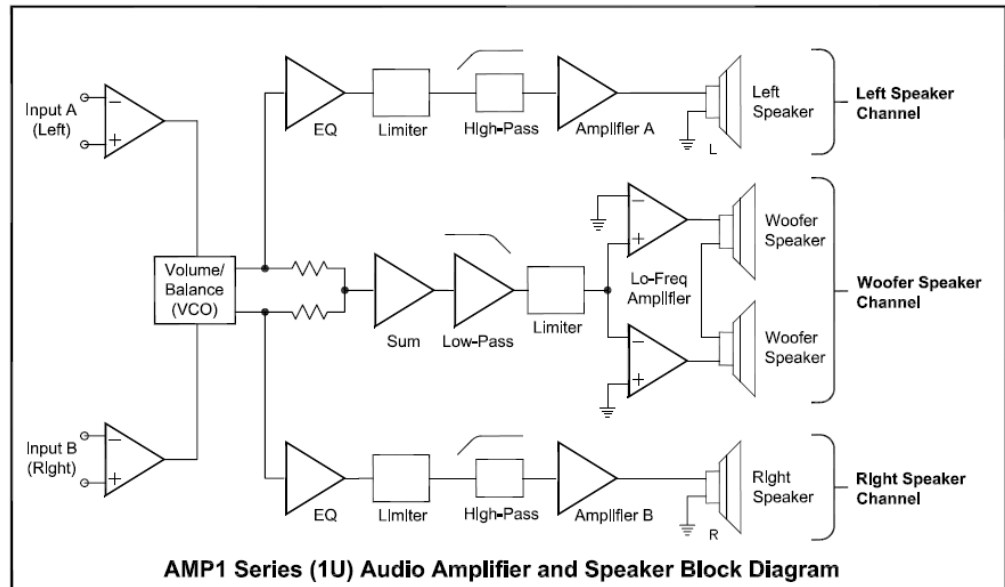
All AMP1-DA/106 units contain high performance speakers driven by three power amplifiers; two amplifier/driver combinations handle

midrange and high frequency information in the left and right (stereo) speaker channels, while the third amplifier channel sums the left and right channel information below the 500 Hz crossover point in the woofer (bass) speaker(s). Note that the woofer channel is not a dedicated LFE or center channel.

Speaker Configuration

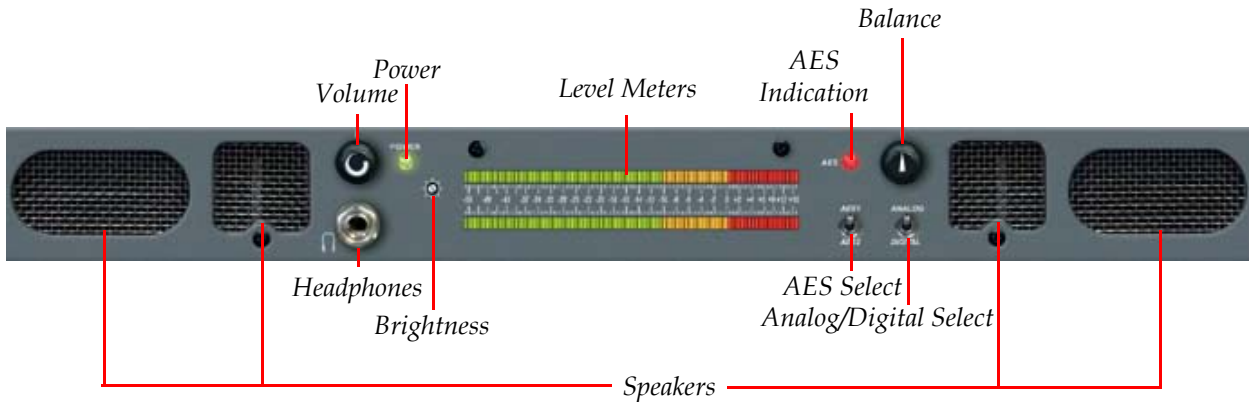
The 1RU rack size AMP1-DA/106 units are configured with two speakers (left and right) to reproduce mid- and high-range audio frequencies (in stereo), but feature two woofer speakers to reproduce the summed (combined) low-range audio frequencies from the left and right speaker input channels. It should be noted that both woofer speakers, which are wired in series, are driven from one woofer speaker channel, and are not stereo.

Figure 1–1 Audio Amplifier and Speaker Configuration Diagram



Front Panel Controls

Figure 1–2 AMP1-DA/106 Front Panel

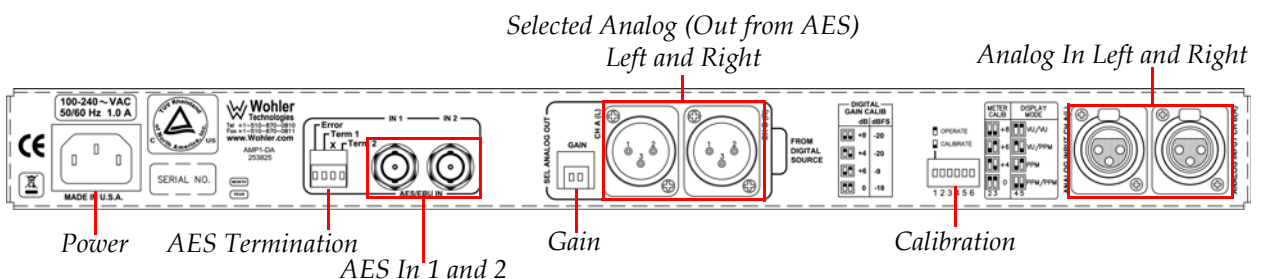


- **Speakers:** The AMP1-DA/106 speaker system is comprised of two mid-range tweeter speakers (left and right) and two woofer speakers (left and right). The two mid-range speakers reproduce, in stereo, only the mid and high frequencies, while the two woofer speakers monorally reproduce the low frequencies.
- **Headphone Jack:** This jack accepts a standard 1/4" stereo (ring/tip/sleeve) phone plug. Select the headphone audio sources as you would for the internal speakers. When you plug in headphones, the internal speakers will mute.
- **Bar Graph Brightness:** This control is recessed into the front panel and can be accessed using a small flathead screwdriver. Turning the trim pot clockwise will simultaneously increase the relative brightness of the LED segments in both bargraphs.
- **Audio Level Meters:** Audio levels for the selected input sources are displayed via these two 106-segment tri-color (green, amber, red) LED bargraph display level meters. These two bargraph displays feature an Auto-Calibration feature and are user adjustable for Display Mode and Reference Level via a rear panel DIP module. Peak Hold, PPM Ballistics, and Alternative Scales can be set via an internal DIP module. See pages 18 and 19 for more information regarding these DIP switch module locations and settings.
- **Digital Source Select Switch:** This switch selects between the two **AES/EBU In (In 1 or In 2)** source inputs. Note that for the selected AES source to be monitored, the **Analog/Digital Source Select** switch must be set to **Digital**.

- **Analog/Digital Source Select Switch:** When this toggle switch is set to analog, the unit will monitor the analog input signals from the **Analog In** XLR connectors on the rear panel. When this toggle switch is set to **Digital**, the unit will monitor the selected **AES/EBU In** input (**In 1** or **In 2**) on the rear panel.
- **Volume Control:** This controls the loudness of the audio reproduced by the internal speakers or connected headphone. Clock-wise rotation of this control increases the loudness of the monitored audio.
- **Power LED:** This LED glows green to indicate the unit is connected to operational mains power.
- **AES/EBU Signal Status Indication LED:** This LED indicates the status of the currently selected AES digital signal (**AES 1** or **AES 2**) regardless of any other monitor selection settings. This LED glows green as long as a valid AES digital datastream is being received. It will glow red to indicate errors in the reception of the AES signal. There are two DIP switch selectable modes of fault detection that will create a red LED error indication.
- **Balance Control:** This adjusts the volume balance between the left and right speakers.

Rear Panel Connectors

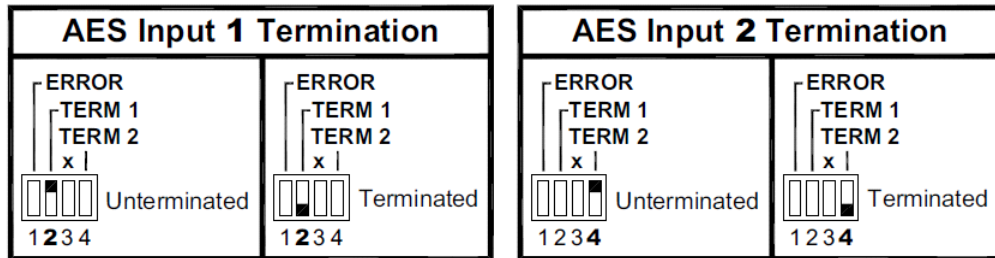
Figure 1–3 AMP1-DA/106 Rear Panel



- **Power:** Attach a standard IEC-320 power cord between this connector and mains power (100 - 250VAC, 50/60 Hz). The front panel Power LED will glow green to indicate operating voltages are present.

- **AES/EBU Input Termination and AES Error Fault Type DIP Switches:**
 - **AES Input Termination:** In the event that either of the AES input channels is connected to downstream equipment, set the appropriate switch to the up position (unterminated). If *no* downstream equipment is connected, then set to the down position (terminated). See [Figure 1-4](#) below termination settings.

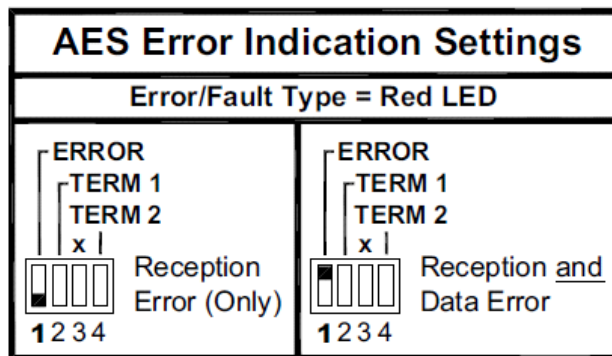
Figure 1-4 AES In 1 and 2 Termination Settings



Note: Position 3 of DIP switch is not functional

- **AES Error Fault Type:** Two selectable DIP switch modes of fault detection create a red error indication in the AES/EBU Signal Status Indication LED when the unit detects:
 - 1) *Reception Errors:* Errors in reception of data or no data stream at all (1 = down) or,
 - 2) *Reception and Data Errors:* Errors in reception and data errors identified by the sending device (possibly invalid) (1 = up). See [Figure 1-5](#) below for error settings.





Figure 1-5 AES Error Indication Settings



Note: Position 3 of DIP switch is not functional

- **AES/EBU In (In 1 and In 2):** These two female BNC input connectors (**In 1** and **In 2**) accept standard AES/EBU signals. These connectors are configured for unbalanced, 75 Ω connections. Only one of the two AES/EBU inputs may be monitored at a time. Use the **Digital Source Select Switch** on the front panel to select between AES/EBU inputs **In 1** and **In 2**. Note that the unit will monitor the selected AES/EBU channel *only* when the **Analog/Digital Source Select** switch on the front panel is set to **Digital**.
- **AES/EBU Input Level Gain Calibration DIP Switch:** Set the **Input Level Gain Calibration**, the analog level that corresponds to a given digital input value with this DIP switch. The factory setting is +4 dB (analog) = -20 dBFS (digital). See the silk-screened chart on the rear panel or [Figure 1-6 on page 13](#) for settings.

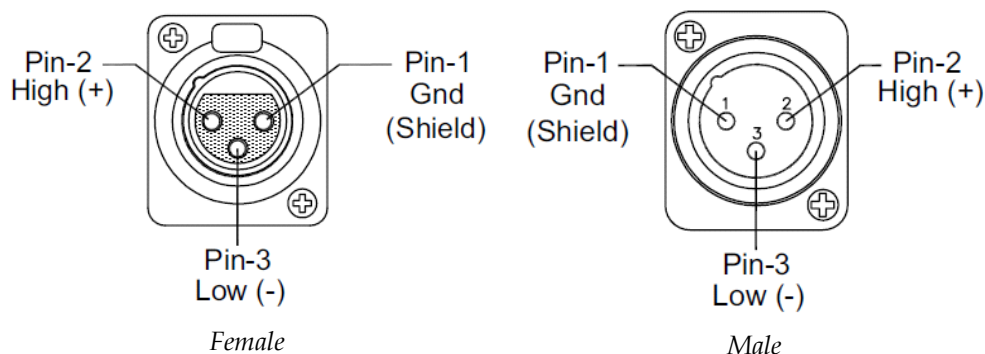
Figure 1-6 AES D/A Conversion Gain Calibration Settings

AES D/A Conversion Gain Calibration Settings	
	0 dB = -18 dBFS
	+4 dB = -20 dBFS
	+6 dB = -9 dBFS
	+8 dB = -20 dBFS

1 2

- **Selected Analog Out (Left and Right):** These two 3-pin male XLR connectors (**CH.A(L)** and **CH.B(R)**) are analog outputs of the selected digital source as selected for the left and right speakers and level meters. Both connectors are low impedance. The output is not affected by the volume/balance controls or headphone mute. See [Figure 1-7](#) below for pin-out information.

Figure 1–7 XLR (Male and Female) Pin-Outs)



- **Level Meter Calibration, Display Mode, and Reference Level DIP Switch:** This DIP switch sets the Line Level (Auto) Calibration feature, the Display Mode, and the Reference Level for the Audio Level Meters.






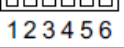



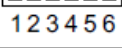
Note: An internal DIP switch sets the Peak Hold, PPM Ballistics, and Alternative Scales. See page 19 for information on setting these parameters.

- **Analog In (Right and Left):** These two 3-pin female XLR connectors (**CH.A(L)** and **CH.B(R)**) accept standard analog audio signals and are configured for balanced, 40k Ω connections. The unit will monitor signals input on these two connectors when the **Analog/Digital Source Select** switch on the front panel is set to **Analog**. For XLR pinout information see .

Rear Panel 6-Position DIP Settings for the Level Meters

This 6-position DIP switch sets the Line Level Calibration, Reference Level, and PPM/VU Display Mode.

Figure 1–8 AMP1-DA/106 Rear Panel DIP Switch Settings

AMP Series Level Meter Rear Panel DIP Switch Settings		
Meter Calibration	Reference Level	Display Mode
<p>1 x</p>  <p>Calibrate</p>  <p>Operate</p> <p>1 2 3 4 5 6</p>	<p>2 3 x</p>  <p>+8 dB</p>  <p>+6 dB</p>  <p>+4 dB</p>  <p>0 dB</p> <p>1 2 3 4 5 6</p>	<p>4 5 x</p>  <p>VU Only</p>  <p>VU-PPM Floating Segment</p>  <p>PPM Only</p>  <p>PPM-PPM Floating Segment</p> <p>1 2 3 4 5 6</p>

Note: Position-6 of DIP switch is NOT used.

Note: For more accurate indication of signal levels, meters are tuned to effect a “rounding” function, which occurs between the thresholds of any two bargraph segments. This means the level meter zero LED segment will turn on at one-half the smallest spacing between LED segments (mid-scale resolution) *before* that segment's scale indication.

Line Level (Auto) Calibration

The unit is calibrated at the factory. To recalibrate:

1. Turn on the power.
2. Apply the desired reference level (nominal 0) signal to all channels.
3. Make sure the Reference Level DIP sections (2 and 3) are set to the nearest level of the input signal being applied for calibration (i.e., 0, +4, +6 or +8). The user should make sure that the signal applied to all four channels is within +/- 4 dB of the reference level selected by DIP switch sections 2 and 3.
4. Place DIP section 1 in the down position.
5. Wait 10 seconds. The unit will remove the previous calibration and the *new* calibration will be applied.
6. Place DIP section 1 in the up position and return unit to service.

7. Only one auto-calibration attempt may be made for each cycling of AC power to the unit. Once the Line Level Calibration DIP switch has been placed in the **CAL** position, it is necessary to cycle the power before that DIP switch will be functional again, even if a calibration attempt was unsuccessful. If one wishes to calibrate again, turn off the power to the unit and repeat steps 1 through 6.

Reference Level

DIP switch sections 2 and 3 determine the Reference Level, which adjusts the level of the input signal and the resultant level displayed on the LED bargraphs. Factory setting is +4 dB. See [Figure 1-8 on page 14](#) for settings.

Bargraph Display Mode

DIP switch sections 4 and 5 determine how peak levels are displayed for the associated meters on the front panel. There are four possible settings:

- VU Only,
- VU-PPM Floating Segment,
- PPM Only, and
- PPM-PPM Floating Segment.

The VU Only selection has a VU floating segment when a Peak Hold value is selected using the Internal 10-Position DIP Switch Module. The factory default setting is VU-PPM Floating Segment. See [Figure 1-8 on page 14](#) for settings.

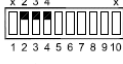
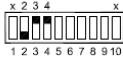
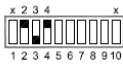
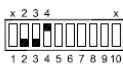


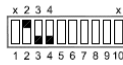
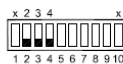


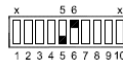
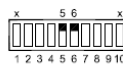
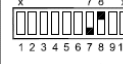
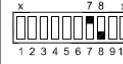
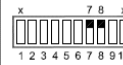
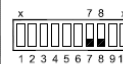
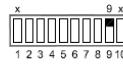
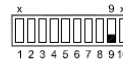
Rear Panel 10-Position DIP Settings for the Level Meters

This 10-position DIP switch is accessed by removing the top cover of the AMP unit and is located on the PCB (the same PCB on which the 6-

Rear Panel 10-Position DIP Settings for the Level Meters

position rear panel DIP switch is located). See page*** for a diagram of the PCB and the DIP switch location.

Figure 1–9 Internal 10-Position DIP Switch Settings

AMP Series 26- and 53-Segment Level Meter Internal 10-Position DIP Switch Settings		
Scale Selection	Peak Hold (Bargraph Display)	PPM Ballistics (Bargraph Display)
 Do Not Use  Extended VU Scale (Standard Analog)  VU Scale  BBC Scale	 NORDIC Scale  DIN Scale  Do Not Use  Custom Scale (See Note 3)	 Peak Hold - Manual (See Note 2)  Peak Hold - 3 Second  Peak Hold - 10 Second  Peak Hold - Off
 IEC268-10, Type 1  IEC268-10, Type 2  DIN 45406  Single Sample Rise Time (SSRT)		
Phase Correlation Display (53-Segment Meters Only)		
 PC Off  PC On		

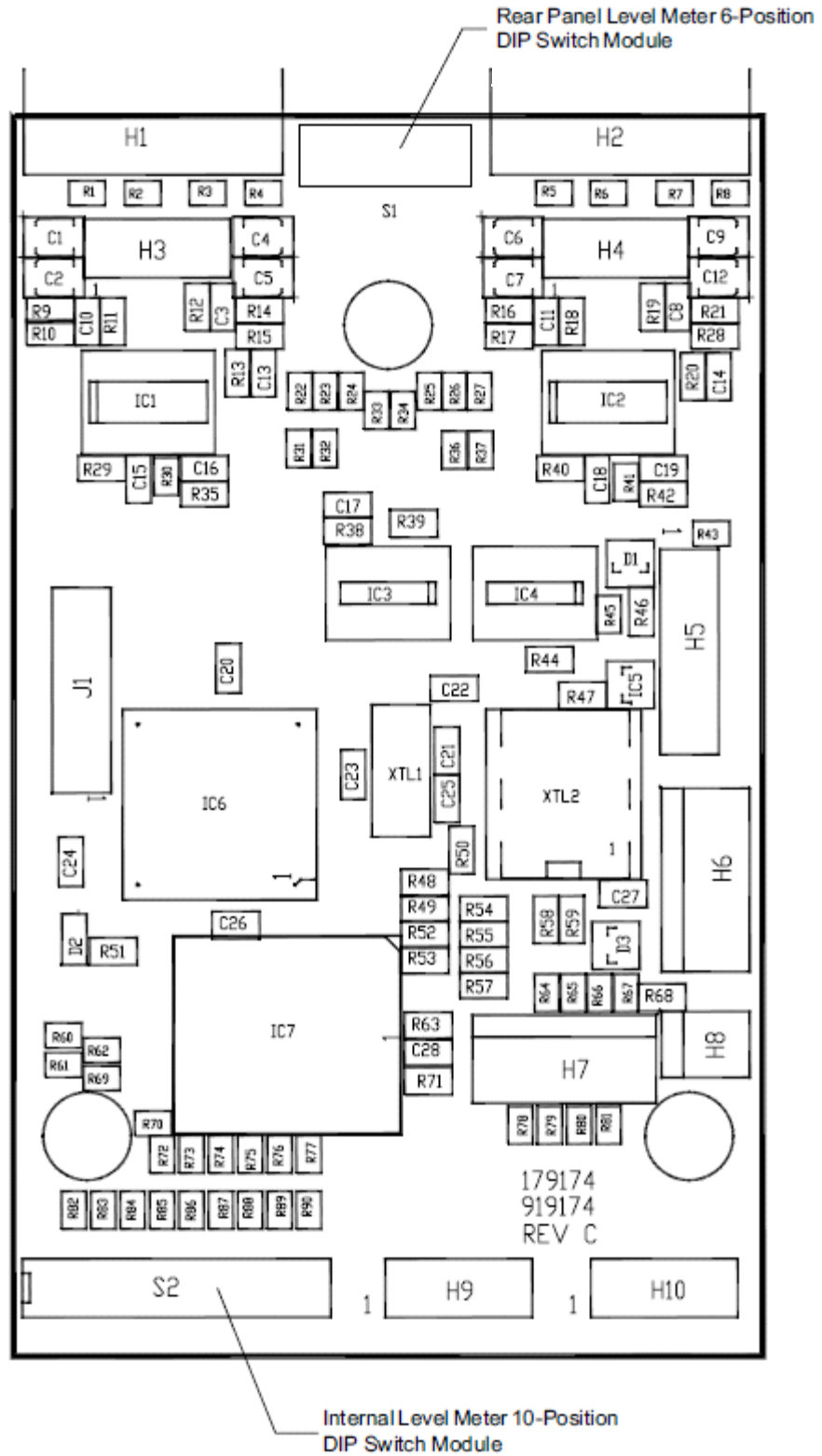
Switch positions 1 and 10 are not used and should be left at the factory set position.

The Peak Hold - Manual setting allows the bargraph display meters to indefinitely maintain the peak hold value until it is reset by the operator, either by pressing a reset button (a special option specified at time of order) or by removing power and then reapplying power

to the unit (unplug/replug power cord). Contact Wohler Technologies for more information about this feature.

Contact Wohler Technologies for information about custom scales.

Figure 1-10 DIP Switch Locations



PPM Characteristics (Ballistics)

The PPM characteristics determine the Integration Time (rise time) and Return Time (fall time) of the level meter. The Integration Time is the time it takes for the lighted segments of the level meter, after application of a 5 KHz tone at a certain reference level, to rise within a specified number of dB of that level. Return Time is the time it takes for the lighted segments of the level meter to fall a certain number of dB after removal of a 5 KHz tone of a certain reference level. The PPM characteristics available for selection using DIP switch sections 7 and 8 of the 10-position Internal DIP Switch are shown in [Table 1-2](#) below.

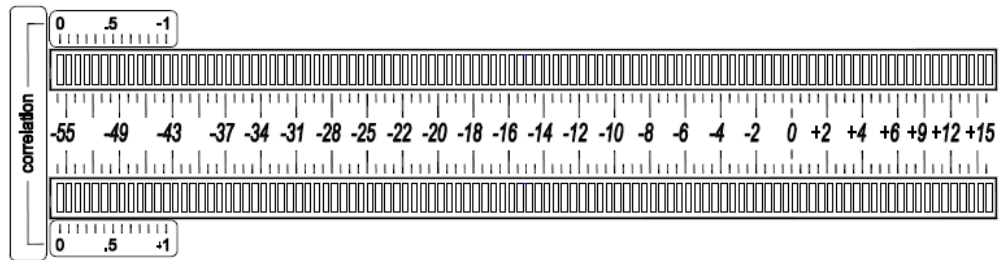
Table 1-2 PMP Characteristics

Type	Rise and Fall Times
IEC268-10, Type 1	Integration (Rise) Time is 5 ms (-2 dB). Return (Fall) Time is 1.7 seconds (20 dB).
IEC268-10, Type 2	Integration (Rise) Time is 10 ms (-2 dB). Return (Fall) Time is 2.8 seconds (24 dB).
DIN 4506	Integration (Rise) Time is 5 ms (-2 dB). Return (Fall) Time is 1.5 seconds (20 dB).
Single Sample	Integration (Rise) Time is a single sample. Return (Fall) Time is 1.5 seconds (20 dB).

Phase Correlation

Since it is sometimes helpful to observe phase relationships between two signals being monitored, you can enable a Phase Correlation feature within the lower section of the existing bar graph pair in the AMP1-DA/106 units. Set the internal 10-position DIP switch located on the PCB. The labels for this feature ([Figure 1-11 on page 18](#)) can be specified at the time of order or requested from Wohler for application to existing units.

Figure 1–11 Phase Correlation

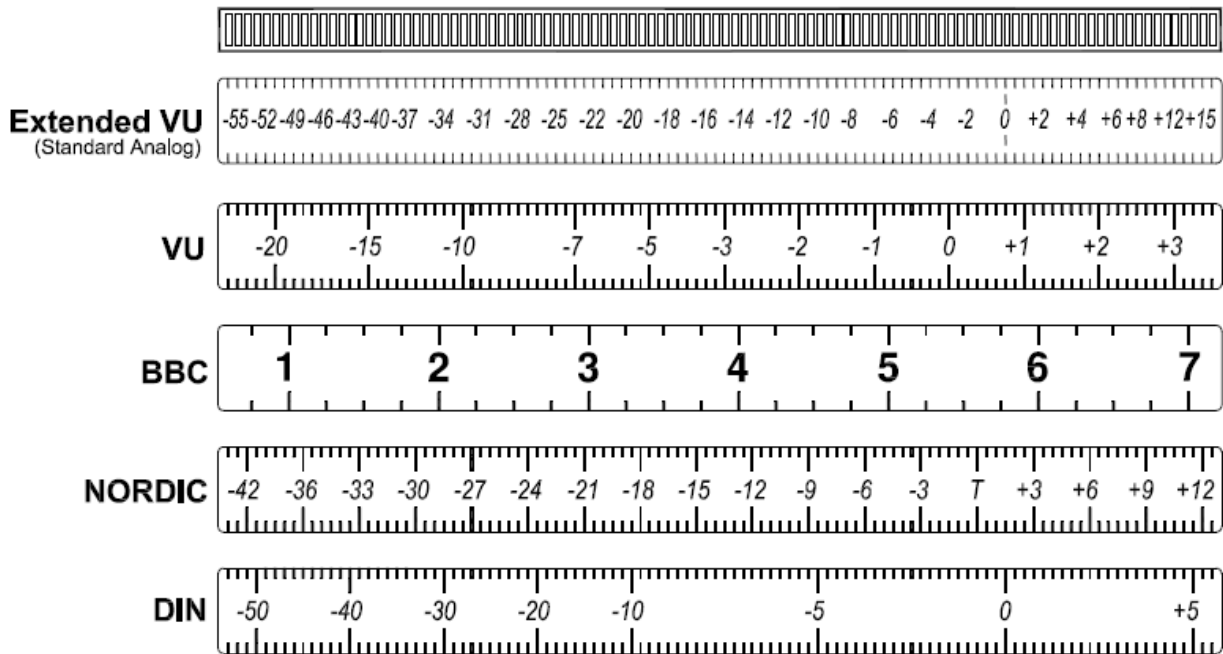


Positive amounts of correlation are indicated by an ascending amber bar in the lower (right channel) bar graph; negative correlation is shown when a red bar ascends in the top (left channel) bar graph. While the audio level in both channels is high enough, the Phase Correlation indication occupies the bottom 13 segments of both bargraphs of a 106-segment stereo pair. One additional segment above the active correlation region is always off, to serve as a marker. The correlation display is visible only so long as the VU audio level is above this blank segment (fourteenth segment up on the 106-segment bargraph).

Alternate Scales

The standard scale used on the AMP1-DA/106 unit is the Extended VU scale. However, if alternative scale characteristics are selected for the level meters by setting the Alternate Scale DIP switches, it is recommended that a label with the appropriate scale be applied to the front panel LED bargraph level meters. Alternate scales include the VU, BBC, Nordic, and DIN scales. See the diagram below for 106-segment alternate scale labels. Contact Wohler Technologies for more information about Alternate Scale labels.

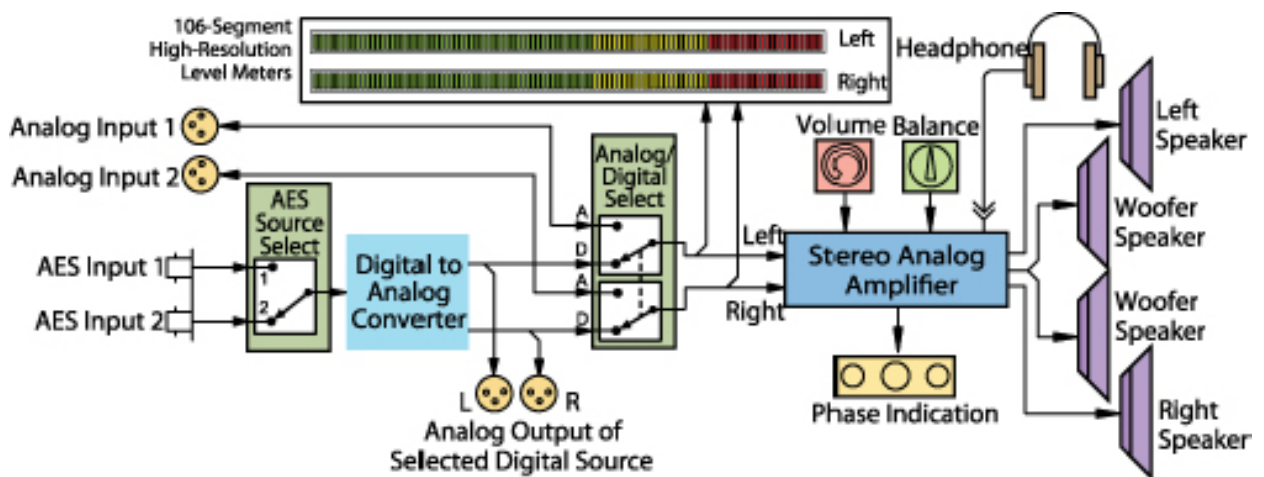
Figure 1–12 106-Segment Alternate Scales



Technical Functional Overview

Figure 1–13 below illustrates the overall functionality of the AMP1-DA/106.

Figure 1–13 AMP1-DA/106 Block Diagram



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