Model 362 Listen-Only Beltpack

User Guide

Issue 1, September 2016

This User Guide is applicable for serial numbers
M362-00151 and later with application firmware 1.1 and later
and Dante® firmware 2.1.1 (Ultimo 3.10.1.12) and later

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Revision History

Issue 1, September 2016:

1. Initial release.

Introduction

The Model 362 Listen-Only Beltpack is a self-contained 2-channel user device that supports headphone monitoring of two audio channels associated with the Dante audio-over-Ethernet media networking technology. Each Model 362 is intended to be used by one user, providing them with the form factor, reliability, and features needed to be effective in a variety of applications. It's expected that most applications will use multiple Model 362 units to support the individual audio monitoring needs of a group of users.

The Model 362 offers the Dante connectivity, configuration flexibility, and essential user controls in a compact, portable package. Built tough for both studio and field deployment the unit is optimized for use in broadcast sports and live entertainment events, news-gathering, and streaming broadcast applications. Leveraging the capabilities of Dante with Studio Technologies' expertise in creating excellent professional audio and broadcast products, the Model 362 allows simple deployment, application-tailored configuration choices, and reliable operation, while maintaining "pro" audio quality and an intuitive user experience. With only a Power-over-Ethernet (PoE) connection and a pair of headphones or an earpiece, a complete broadcast talent cue ("IFB") or audio monitoring location can be created.

Applications

A wide range audio-monitoring applications can be supported, including sports and entertainment TV and radio events, web streaming broadcasts, corporate and government AV installations, and post-production facilities. The Model 362 can be used with other high-performance Dante-enabled products from Studio Technologies. These include a range of broadcast-oriented products that include party-line intercom and IFB interfaces, 2- and 4-channel intercom beltpacks, on-air beltpacks, and announcer's consoles. And, of course, the Model 362 is interoperable with products from literally hundreds of other manufacturers.

Setup and Operation

Setup and operation of the Model 362 is fast and simple. An etherCON® RJ45 jack is used to interconnect with a standard twisted-pair Ethernet cable associated with a port on a PoE-enabled network switch. This connection provides both power and bidirectional digital audio. Both ¼-inch and 3.5 mm 3-conductor ("stereo") headphone jacks allow connection of a wide range of

Figure 1. Model 362 Listen-Only Beltpack top and bottom views

stereo headphones, single- or dual-ear broadcast headsets, and stereo or monaural earpieces or earbuds. As a final step the Dante Controller personal computer application will be used to select (route) two audio sources to the Model 362's inputs.

Two "push-in/push-out" rotary potentiometers ("pots") make it easy for the user to set and maintain the desired level on the 2-channel headphone output. Four LEDs provide a clear and complete indication of the unit's operating status. The Model 362's enclosure is made from an aluminum alloy which offers both ruggedness and light weight. A stainless steel "belt clip," located on the back of the unit, allows direct attachment to a user's clothing.

Dante Audio-over-Ethernet

Audio data is sent to the Model 362 using the Dante audio-over-Ethernet media networking technology. As a Dante-compliant device, the Model 362's two input (Dante receiver) audio channels can be assigned (routed) from source devices using the Dante Controller software application. The Model 362 is compatible with Dante digital audio sources that have a sampling rate of 44.1, 48, 88.2, or 96 kHz and a bit depth of up to 24. Two bi-color LEDs provide an indication of the Dante connection status.

Audio Quality

The Model 362's performance is completely "pro" with audio quality that's more typical of high-end studio equipment. Audio input signals arrive via the Dante receiver channels and pass into the Model 362's processor which allows signal routing and headphone level control to be performed within the digital domain. This provides

flexibility, allows precise control, and keeps the two level potentiometers from directly handling analog audio signals. The audio channels destined for the two headphone output channels are sent to a high-performance digital-to-analog converter and then on to robust output driver circuitry. High signal levels can be provided to a variety of headphones, headsets, and earpieces.

Configuration Flexibility

Several configuration choices are available, allowing the Model 362 to meet the needs of specific applications and user preferences. Four DIP switches, located under the belt clip, facilitate selection of key parameters. Two of the switches are used to select the headphone output mode and another switch selects the headphone output minimum level. The headphone output mode can be configured from among four choices. The level/level mode is provided for broadcast applications where two channels of talent cueing ("IFB") need to be independently sent to the left and right headphone output channels. In on-air sports events it's typical for program audio with director interrupt to be sent to the left headphone output while program-only audio is sent to the right headphone output. Independent channel level control is provided by the two potentiometers. The level/balance mode is intended for applications where a stereo signal is being routed to the Model 362's Dante inputs. In this mode the user is provided with one potentiometer to control the overall level of both headphone output channels and a second potentiometer to control the left/right level balance.

The dual-channel monaural mode allows the two Dante input audio channels to be summed (mixed together) and sent to both the left and right headphone output channels. And lastly, a unique single-channel monaural mode is provided for on-air talent cue applications where a single-channel earpiece or earbud is being used. The two Dante audio input channels are mixed and sent only to the left channel of the headphone output. No audio signal is present on the headphone output's right channel.

Ethernet Data and PoE

The Model 362 connects to an Ethernet data network using a standard 100 Mb/s twisted-pair Ethernet interface. The physical interconnection is made by way of a Neutrik® etherCON RJ45 connector. While compatible with standard RJ45 plugs, etherCON allows a ruggedized and locking interconnection for harsh or high-reliability environments. An LED displays the status of the network connection.

The Model 362's operating power is provided by way of the Ethernet interface using the 802.3af Power-over-Ethernet (PoE) standard. This allows fast and efficient interconnection with the associated data network. To support PoE power management, the Model 362's PoE interface reports to the power sourcing equipment (PSE) that it's a class 1 (very low power) device. If a PoE-enabled Ethernet port can't be provided by the associated Ethernet switch a low-cost PoE midspan power injector can be utilized.

Future Capabilities and Firmware Updating

The Model 362 uses Audinate's Ultimo™ integrated circuit to implement the Dante interface. The firmware in this integrated circuit can be updated via the Ethernet connection, helping to ensure that its capabilities remain up to date.

Getting Started

What's Included

Included in the shipping carton are a Model 362 Listen-Only Beltpack and a printed copy of this guide. As a device that is Power-over-Ethernet (PoE) powered, no external power source is provided. Should a PoE midspan power injector be required it must be purchased separately.

Connections

In this section signal interconnections will be made using the three connectors located on the bottom of the Model 362's enclosure. An Ethernet data connection with Power-over-Ethernet (PoE) capability will be made using either a standard RJ45 patch cable or an etherCON protected RJ45 plug. A set of headphones, a headset, or an earpiece will be connected by way of a ¼-inch or 3.5 mm 2- or 3-conductor plug.

Ethernet Connection with PoE

A 100BASE-TX Ethernet connection that supports Power-over-Ethernet (PoE) is required for Model 362 operation. This one connection will provide both the Ethernet data interface and power for the Model

362's circuitry. A 10BASE-T connection is not sufficient and a 1000BASE-T ("GigE") connection is not supported unless it can automatically "fall back" to 100BASE-TX operation. The Model 362 supports Ethernet switch power management, enumerating itself as a PoE class 1 device.

The Ethernet connection is made by way of a Neutrik etherCON protected RJ45 connector that is located on the bottom of the Model 362's enclosure. This allows connection by way of a cable-mounted etherCON connector or a standard RJ45 plug. The Model 362's Ethernet interface supports auto MDI/MDI-X so that a "crossover" or "reversing" cable will never be required.

Ethernet Connection without PoE

As previously discussed in this guide, the Model 362 was designed such that the Ethernet connection will provide both data and Power-over-Ethernet (PoE) power. There may be situations where the associated Ethernet switch does not provide PoE power. In such cases an external PoE midspan power injector can be used. If the selected midspan power injector is 802.3af-compatible it should function correctly. Midspan units are available from a variety of sources, including many online retailers.

Headphone Output

The Model 362 provides a 2-channel headphone output by way of both ¼-inch and 3.5 mm 3-conductor phone jacks. These jacks are electrically in common ("multed") with each other: tip-to-tip, ring-to-ring, sleeve-to-sleeve. Devices such as stereo headphones or stereo ("dual-muff") broadcast-style headsets can be directly connected using a 3-conductor ¼-inch or

3.5 mm plug. Following the usual convention the left channel should be terminated on the plug's tip lead, the right channel on the ring lead, and common on the sleeve lead.

It's also possible to use a monaural ("single-muff") headset or broadcast-type single earpiece. If a 3-conductor plug is to used by the device it should be wired such that audio positive is on the tip lead and audio common is on sleeve lead; the plug's ring lead should be left unconnected. But it's also very likely that the monaural device will be terminated on a 2-conductor ("tip and sleeve") plug. When this plug is inserted into one of the Model 362's headphone jacks the Model 362's right headphone output channel will be shorted to common since the output jack's ring lead will be shorted to its sleeve lead. This can lead to stress on the right channel headphone output circuitry as well as extra PoE current draw. To prevent this condition the headphone output mode configuration choice (switches SW1 and SW2) should be set for single-channel monaural. This disables the right headphone output channel and sends the audio signals only to the left output channel. As such a short-circuit condition presented to the ring lead on either of the output jacks will not result in an issue. Refer to the Configuration section later in this guide for details on setting the headphone output mode.

Dante Configuration

For audio sources to pass to the Model 362 requires that several Dante-related parameters be configured. These configuration settings will be stored in non-volatile memory within the Model 362's circuitry. Configuration will typically be done with the Dante Controller software application which

is available for download free of charge at www.audinate.com. Versions of Dante Controller are available to support Windows® and OS X® operating systems. The Model 362 uses the Ultimo 2-input/2-output integrated circuit to implement the Dante architecture although the two outputs will not be utilized.

The two Dante receiver (Rx) channels associated with the Model 362's audio inputs need to be routed to the desired source equipment's Dante transmitter channels. These two audio signals will be sent to the Model 362's 2-channel headphone output.

The Model 362 supports audio sample rates of 44.1, 48, 88.2, and 96 kHz. The unit is compatible with a limited set of pull-up/pull-down values. In most cases the default will be used and a pull-up or pull-down rate will not be selected. The Model 362 can serve as the clock master for a Dante network but in most cases it will be configured to "sync" to another device.

The Model 362 has a default Dante device name of **ST-M362** and a unique suffix. The suffix identifies the specific Model 362 that is being configured. The suffix's actual alpha and/or numeric characters relate to the MAC address of the unit's Ultimo integrated circuit. The two Dante receiver (Rx) channels have default names of **Ch1** and **Ch2**. Using Dante Controller the default device name and channel names can be revised as appropriate for the specific application.

Model 362 Configuration

The Model 362 provides four DIP switches which are used to configure two operating functions. These allow the unit to be optimized to match the needs of specific applications. Two of the switches allow

configuration of the headphone output mode. This offers four unique choices in how the incoming audio channels are impacted by the two rotary potentiometers and then routed to the two headphone output channels. Another switch selects the minimum level of the headphone output channels. Some applications may benefit from users never being able to fully mute the audio signals present on the headphone output channels. For example, in an on-air application it might be important for a user to always be able to hear producer or director instructions. Alternately, a configuration choice allows the headphone output channels to be fully muted when their associated level controls are placed in their fully clockwise position. The fourth switch is reserved for possible future use. Physically the switches are accessible from the back of the Model 362's enclosure through a rectangular opening that is located under the top of the belt clip.

The configuration switches are connected to the Model 362's logic circuitry which responds to changes by way of the application firmware; no audio passes directly through the switches. Changes made to a switch will immediately be reflected in the unit's operation.
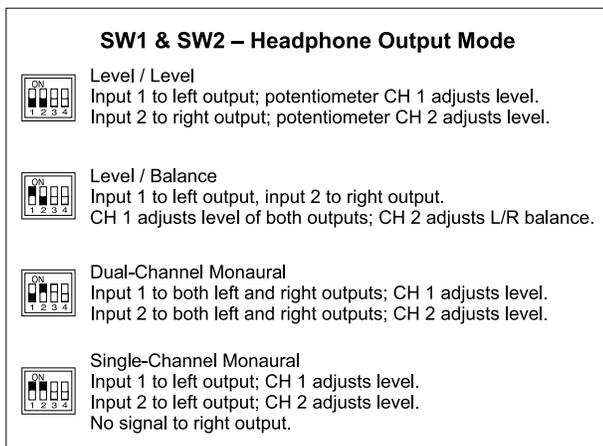
Accessing the Configuration Switches

To access the four configuration switches requires that the belt clip be rotated. Normally the belt clip is secured to the back of the enclosure using one rivet (non-removable) and one machine screw that has a thread pitch of 6-32. To allow the belt clip to rotate, remove the machine screw using a #1 Phillips head screw driver. The belt clip should now be able to rotate in either direction. Save the screw so that it can be re-installed once the desired

configuration choices have been made. Note that the threaded fastener within the back of the Model 362's chassis has an internal locking mechanism (a plastic bushing) that prevents the belt clip's 6-32 machine screw from vibrating loose. As such no additional method of thread locking, such as a lock washer or chemical compound, is necessary.

Headphone Output Mode

Switches SW1 and SW2 allow selection from four headphone output operating modes. Each mode is distinct and careful selection will help optimize the Model 362's operation for a range of applications.

SW1 & SW2 – Headphone Output Mode

Level / Level
Input 1 to left output; potentiometer CH 1 adjusts level.
Input 2 to right output; potentiometer CH 2 adjusts level.

Level / Balance
Input 1 to left output, input 2 to right output.
CH 1 adjusts level of both outputs; CH 2 adjusts L/R balance.

Dual-Channel Monaural
Input 1 to both left and right outputs; CH 1 adjusts level.
Input 2 to both left and right outputs; CH 2 adjusts level.

Single-Channel Monaural
Input 1 to left output; CH 1 adjusts level.
Input 2 to left output; CH 2 adjusts level.
No signal to right output.

Figure 2. Headphone output mode configuration switches

Level/Level

The level/level mode is provided for on-air applications where two independent audio sources need to be routed to separate headphone output channels. Dante audio input channel 1 will be routed to the left headphone output channel and top-panel potentiometer Ch 1 will adjust its level. Dante audio input channel 2 will be routed to the right headphone output channel and potentiometer Ch 2 will adjust its level.

Level/Balance

The level/balance mode is provided for stereo applications such as live music events or radio broadcasts. In these applications it's typical to want the user to have a single control to simultaneously adjust the level of both channels; a separate control will be used to adjust the left/right level balance.

When set for the level/balance mode Dante input channel 1 will be routed to the headphone left output channel and Dante input channel 2 will be routed to the right output channel. Potentiometer Ch 1 will adjust the overall level on both headphone output channels. Potentiometer Ch 2 will adjust the level balance between the left and right output channels.

Dual-Channel Monaural

The dual-channel monaural mode can be useful in applications where the same audio signals need to be provided to the user on both the left and right headphone output channels. In this mode Dante audio inputs 1 and 2 are routed to both the left and right channels of the headphone output. Potentiometer Ch 1 adjusts the level of input 1 and potentiometer Ch 2 adjusts the level of input 2.

Single-Channel Monaural

The single-channel monaural mode is specifically provided for applications where a 2-conductor 1/4-inch or 3.5 mm plug is being used with the connected headphones, headset, or a broadcast-style earpiece. In this mode Dante audio inputs 1 and 2 are mixed together and routed to the left channel of the headphone output; no audio signal is routed to the right channel of the headphone output. Potentiometer Ch 1

adjusts the level of input 1 and potentiometer Ch 2 adjusts the level of input 2.

Headphone Minimum Level

Switch SW3 is used to configure the headphone output's minimum level. In the –40 dB setting the minimum headphone output level is approximately 40 dB below maximum; the headphone output channels will never fully mute. This ensures that audio signals, when present on the inputs, will always be present on the headphone output channel. In most on-air broadcast applications this is the appropriate setting, ensuring that some level of signal is always present.

When full mute is selected moving either potentiometer to its fully counterclockwise position will cause its associated headphone channel (or channels) to fully mute. If a potentiometer is set to serve as a balance control, moving Ch 2 it to either its fully counterclockwise or fully clockwise position will cause the associated headphone channel to fully mute. Selecting the full mute mode may be appropriate for applications where minimizing the chance of audio "leakage" is important. This could occur when the connected headphones or headset are at times placed on a desk or tabletop, leaving audio emanating from them to travel in "free space" to an "open" microphone.

SW3 – Headphone Minimum Level

–40 dB

Full mute
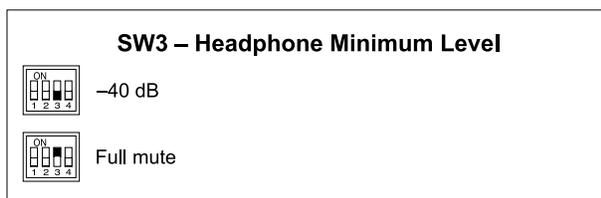
Figure 3. Headphone minimum level configuration switch

Operation

At this point everything should be ready and Model 362 operation can commence. An Ethernet connection with Power-over-Ethernet (PoE) capability should have been made. Alternately, a midspan power injector, in "series" with the Ethernet connection, should have been put into place. A pair of headphones, a headset, an earbud, or an earpiece should have been connected.

The Model 362's Dante configuration settings should have been selected using the Dante Controller software application. In this way the unit's two audio input channels (Dante receiver channels) should have been routed from transmitter channels on associated equipment. The Model 362's configuration switches should have been set to meet the needs of the specific application.

Initial Operation

The Model 362 will start to function as soon as a Power-over-Ethernet (PoE) power source is connected. However, it may take 20 to 30 seconds for full operation to commence. Upon initial power up the three status LEDs, located on the bottom panel below the RJ45 jack, will begin to light as network and Dante connections are established. The green power LED on the top panel will light in a special sequence to display the major and minor version numbers of the application firmware (embedded software). Once that has completed the power LED will light green. After the power-up sequence has completed and the Dante connection has been established full operation will begin.

Ethernet and Dante Status LEDs

Three status LEDs are located below the etherCON RJ45 connector on the Model 362's bottom panel. The LINK ACT LED will light green whenever an active connection to a 100 Mb/s Ethernet network has been established. It will flash in response to Ethernet data packet activity. The SYS and SYNC LEDs display the operating status of the Dante interface and associated network. The SYS LED will light red upon Model 362 power up to indicate that the Dante interface is not ready. After a short interval it will light green to indicate that it is ready to pass data with another Dante device. The SYNC LED will light red when the Model 362 is not synchronized with a Dante network. It will light solid green when the Model 362 is synchronized with a Dante network and an external clock source (timing reference) is being received. It will slowly flash green when the Model 362 is serving as the clock master as part of the Dante network. It's possible that up to 30 seconds may be required for the SYNC LED to reach its final state.

How to Identify a Specific Model 362

The Dante Controller software application offers an identify command that can be used to help locate a specific Model 362. When identify is selected it will send a command to a single Model 362 unit. On that specific unit the green power LED, located on the unit's top panel, will flash on and off approximately eight times. In addition, the SYS and SYNC status LEDs, located directly below the etherCON RJ45 connector on the bottom panel, will slowly flash green. After a few seconds the LED identification

patterns will cease and normal Model 362 power LED and Dante status LED operation will resume.

Headphone Listen Level

Two rotary potentiometers ("pots"), located on the Model 362's top panel, allow adjustment of the level of the two audio input signals as they are sent to the 2-channel headphone output. How the pots function will depend on how the headphone output has been configured. Four modes are available and allow unique output performance. In the level/level mode the pot labeled Ch 1 will control the level of Dante input 1 as it is being sent to the left channel of the headphone output. The pot labeled Ch 2 will control the level of Dante input 2 as it is sent to the right output. In the level/balance mode potentiometer Ch 1 will adjust the level of both the left and right headphone outputs. Potentiometer Ch 2 will control the left/right level balance of the headphone output.

When dual-channel monaural mode has been selected potentiometer Ch 1 will adjust the level of Dante input 1 as it is routed to both the left and right headphone output channels. Potentiometer Ch 2 will adjust the level of Dante input 2 as it is sent to both the left and right headphone outputs. When the Model 362 has been configured for the single-channel monaural mode potentiometer Ch 1 adjusts the level of Dante input 1 as it is routed to the left channel of the headphone output. Potentiometer Ch 2 will adjust the level of Dante input 2 as it is also routed only to the left headphone output channel. In this mode no signal will be present on the right channel of the headphone output.

The two pots are "push-in/push-out" type which allow their associated knobs to be in their "out" position to be adjusted and their "in" position when protection from an unwanted change is desired. Users should find the headphone output audio quality to be excellent, with high maximum output level and low distortion. Analog audio signals do not pass directly through the level pots. The position of the pots is recognized by the Model 362's processor which then adjusts the signal level within the digital domain.

Technical Notes

IP Address Assignment

By default the Model 362's Ethernet interface will attempt to automatically obtain an IP address and associated settings using DHCP (Dynamic Host Configuration Protocol). If a DHCP server is not detected an IP address will automatically be assigned using the link-local protocol. This protocol is known in the Microsoft® world as Automatic Private IP Addressing (APIPA). It is also sometimes referred to as auto-IP (PIPPA). Link-local will randomly assign a unique IP address in the IPv4 range of 169.254.0.1 to 169.254.255.254. In this way multiple Dante-enabled devices can be connected together and automatically function, whether or not a DHCP server is active on the LAN. Even two Dante-enabled devices that are directly inter-connected using an RJ45 patch cord will, in most cases, correctly acquire IP addresses and be able to communicate with each other.

An exception does arise when trying to directly interconnect two Dante-enabled devices that each use the Ultimo integrated

circuit to implement Dante. The Model 362 uses the Ultimo "chip" and, as such, a direct one-to-one interconnection to another Ultimo-based product is not supported. An Ethernet switch linking the two units is required to successfully interconnect two Ultimo-based devices. The technical reason that a switch is required relates to the need for a slight latency (delay) in the data flow; an Ethernet switch will provide this.

Using the Dante Controller software application the Model 362's IP address and related network parameters can be set for a fixed (static) configuration. While this is a more involved process than simply letting DHCP or link-local "do their thing," if fixed addressing is necessary then this capability is available. But in this case it's highly recommended that every unit be physically marked, e.g., directly labeled using a permanent marker or "console tape," with its specific static IP address. If knowledge of a Model 362's IP address has been misplaced there is no reset button or other method to easily restore the unit to a default IP setting.

In the unfortunate event that a device's IP address is "lost," the Address Resolution Protocol (ARP) networking command can be used to "probe" devices on a network for this information. For example, in Windows OS the **arp –a** command can be used to display a list of LAN information that includes MAC addresses and corresponding IP addresses. The simplest means of identifying an unknown IP address is to create a "mini" LAN with a small PoE-enabled Ethernet switch connecting a personal computer to the Model 362. Then by using the appropriate ARP command the required "clues" can be obtained.

Optimizing Network Performance

For best Dante audio-over-Ethernet performance a network that supports VoIP QoS capability is recommended. This can typically be implemented on virtually all contemporary managed Ethernet switches. There are even specialized switches that are optimized for entertainment-associated applications. Refer to the Audinate website (www.audinate.com) for details on optimizing networks for Dante applications.

Application Firmware Version Display

As part of the Model 362's power-up sequence the unit's application firmware (embedded software) version number will automatically be displayed. This is useful when working with factory personnel on application support and troubleshooting.

Upon application of PoE power the Model 362's green power LED, located on the unit's top panel, will light in a simple "code" to indicate the version number. It will first "flash" the major version number, briefly pause, then flash the minor version number. Once the version number has displayed a slight pause will take place and then the power LED will light sold green. As an example of what would be a typical firmware display, if the green power LED "flashes" once, turns off momentarily, then again "flashes" once it would indicate that application firmware version 1.1 is present in the Model 362.

Updating the Application Firmware

The Model 362 uses an NXP® Kinetis®-series microcontroller (MCU or processor) integrated circuit to run its application firmware (embedded software). The firmware is loaded into and stored in the MCU's non-volatile memory by way of a stand-alone hardware programmer unit that interfaces with a miniature header connector located on the unit's motherboard. This firmware programming is done at the factory at the time of manufacture using a Cyclone Universal, Cyclone Universal FX, or other compatible stand-alone programmer unit from P&E Micro (www.pemicro.com). There is no provision for easily field-updating the Model 362's application firmware. Unlike some of the other Studio Technologies' Dante-enabled products, the Model 362 does not have a USB interface for firmware updating. This capability was deemed unnecessary and impractical due, in part, to the Model 362's simple, well-defined functionality and compact size.

It's possible that updated versions of the Model 362's application firmware will be released. This could be due to software bug fixes or feature improvements. It's expected that in most cases Model 362 units would be returned to the factory should this firmware need to be loaded. This would be true unless a user, reseller, or distributor has access to an appropriate stand-alone programmer unit. For reference the Studio Technologies' website will make available a listing of the latest version of the Model 362's application firmware along with a text description file. Contact the factory for additional details.

Ultimo Firmware Update

As previously discussed in this guide, the Model 362 implements Dante connectivity using the 2-channel Ultimo integrated circuit from Audinate. The Dante Controller software application can be used to determine the version of the firmware (embedded software) residing in the Ultimo "chip." This firmware can be updated by way of the Model 362's Ethernet connection. The latest Dante firmware file will be available on the Studio Technologies website. The Dante Firmware Update Manager (FUM) application is used to install the firmware. This program is also available for download on the Studio Technologies website.

Specifications

Power Source:

Power-over-Ethernet (PoE): class 1 (very low power, ≤3.84 watts)

Network Audio Technology:

Type: Dante audio-over-Ethernet

Bit Depth: up to 24

Sample Rate: 44.1, 48, 88.2 and 96 kHz

Number of Receiver (Input) Channels: 2

Dante Audio Flows: 2 receiver

Network Interface:

Type: twisted-pair Ethernet, Power-over-Ethernet (PoE) supported

Data Rate: 100 Mb/s (10 Mb/s and 1000 Mb/s "GigE" Ethernet not supported)

Headphone Output:

Type: Dual-channel

Compatibility: intended for connection to mono or stereo headsets or earpieces with nominal impedance of 50 ohms or greater

Maximum Output Voltage: 3.8 Vrms, 1 kHz, 150 ohm load

Frequency Response: 20 Hz to 20 kHz, −2 dB

Distortion (THD+N): <0.002%

Dynamic Range: >100 dB

Connectors:

Headphone Output: ¼-inch and 3.5 mm 3-conductor jacks

Ethernet: Neutrik etherCON RJ45

Dimensions (Overall):

3.1 inches wide (7.9 cm)
1.6 inches high (4.0 cm)
4.0 inches deep (10.2 cm)

Mounting: intended for portable applications; contains integral belt clip

Weight: 0.5 pounds (0.2 kg)

Specifications and information contained in this User Guide subject to change without notice.