# Model 201
# Interpreter's Console

## User Guide

Issue Preliminary 4, September 2024

This User Guide is applicable for serial numbers
M201-00151 and later with Application Firmware version 1.00 and later
and STcontroller software application version 4.02.01 and later

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# Revision History

**Issue Preliminary 4, September 2024:**
• Miscellaneous improvements and clarifications.

**Issue Preliminary 3, December 2023:**
• Miscellaneous improvements and clarifications.

**Issue Preliminary 2, December 2023:**
• Miscellaneous improvements and clarifications.

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• Initial preliminary release.

# Introduction

The Model 201 Interpreter's Console is a complete solution for supporting applications that utilize specialized personnel who perform simultaneous language interpretation. Suitable for use in single- or multi-language situations, the Dante® audio-over-Ethernet-enabled unit includes a range of features not typically provided by "off-the-shelf" interpretation equipment. The Model 201 provides both the standard and advanced features required for successful deployment in local and off-site/remote applications.

The Model 201 includes the ability to create two independent interpretation audio channels. Configuration choices allow a variety of audio content to be included in the interpretation audio; content that can be automatically muted or dimmed (reduced in level) when interpretation is active. This is especially important for off-site or Internet streaming applications. A dual-channel (stereo) headphone output can be configured to meet the needs of the interpreter. This includes selecting the audio sources, channel routing, and sidetone (confidence) signal operation. A set of buttons and rotary controls allow the user to establish the operating condition they desire. A "mic mute" button allows the connected microphone to be momentarily muted.

The frequency response of the headphone output can be selected from four equalization (EQ) settings. A talkback function allows a separate audio path to be established from the interpreter to production personnel. A slow down function allows the interpreter to signal to the presenter (the "floor" source) that speaking more slowly is warranted.

The Model 201 is extremely simple to deploy, is "pro" quality throughout, and provides an intuitive user experience. The unit's audio quality is excellent, with low distortion, low noise, and ample headroom. Careful circuit design and rugged components ensure long, reliable operation. Only a Power-over-Ethernet (PoE) connection and a headset with attached microphone is required for operation. The Model 201 supports both professional intercom-style headsets that use a 5-pin XLR connector as well as "gaming" headsets that use a 4-conductor 3.5 mm TRRS plug. If desired, two "custom" WAV audio files can be loaded by way of a USB flash drive. These can be used for aural confirmation of the Model 201's two interpretation audio channels.



**Figure 1. Model 201 Interpreter's Console front and back views**

The Model 201 supports Dante audio-over-Ethernet digital media technology for integration into contemporary applications. In addition to supporting standard Dante, the unit is compatible with AES67 and the Dante Domain Manager™ (DDM) software application. Only a single 4-pair Ethernet cable is needed to support both bi-direction data and Model 201 DC power.

The Model 201's operating features are configured using the STcontroller software application. An extensive set of parameters allows the unit's functions to be tailored to meet the needs of a range of interpretation applications. The Model 201 is housed in a compact but rugged steel enclosure that's intended for table-top use. Its small size makes it ideal for applications in space-constrained locations.

While the Model 201 can be used by itself to create a simple, 1- or 2-language interpretation position, it can easily become part of a multi-language, feature-rich application. By utilizing Dante technology, one or more Model 201 units can integrate with other Studio Technologies' products to achieve a sophisticated voice interpretation system. Applicable companion

units include the Model 391 Dante Alerting Unit, Model 5205 Mic/Line to Dante Interface, Model 5412 Audio Interface, and Model 5421 Dante Intercom Audio Engine. Other Dante-compliant products, such as audio consoles or wireless microphone systems from other manufacturers, will also directly interface with the Model 201.

## Headphone Output Channels

The Model 201 provides a 2-channel (stereo) output that is routed to both the 5-pin female XLR and 4-conductor 3.5 mm TRRS headset interface connectors. Two pushbutton switches and three rotary controls on the unit's front panel allow users to select their desired headphone audio sources and adjust the signal levels. One pushbutton switch and two associated LED indicators allow direct selection of either the Floor or Relay Dante receiver (input) audio channels. Floor is the term in the interpretation world for the audio channel associated with the person whose spoken text is to be interpreted. It may also be considered to be the "original" audio source. Relay is the term used for an intermediate audio signal that would typically be supplied by another interpreter. (A "relay" language is usually selected as an interpretation technique to support multiple languages. For example, English might be selected as the relay language.) The selected audio signal, Floor or Relay, is referred to by the Model 201 as the Main audio source. It can be sent to the left only, right only, or both the left and right headphone output channels. A rotary control allows the level of the Main audio signal to be adjusted.

Two additional Dante receiver (input) audio channels, named Aux 1 and Aux 2, can be used to interface the Model 201 with signal sources such as audio consoles, media playback systems, or remotely located equipment. A rotary level control is used to adjust the level of both Aux 1 and Aux 2 as they are sent to the headphone output channels. Configuration choices in the STcontroller application allow the Aux 1 and Aux 2 signals to be independently routed to the left, right, or left and right headphone output channels. This allows a variety of signal sources to be effectively routed to the desired headphone outputs.

A separate rotary control is used to adjust the level of the Model 201's microphone preamplifier signal as it is sent to the headphone output. This is called the sidetone function and provides the interpreter with a confirmation audio signal. A configuration choice in the STcontroller application is used to select the routing of the sidetone audio as it is sent to the left and/or right headphone output channels. It can also be enabled.

A pushbutton switch allows selection of the desired headphone audio response. Four LED indicators display the currently selected EQ setting. Unlike most interpreter console products that provide analog rotary "tone" controls, the Model 201's headphone equalization functions are created within the digital domain. This has the advantage of being very "unit-to-unit" accurate, allowing, for example, EQ selection B on one Model 201 to be identical with EQ selection B on other Model 201 units.

The headphone output channels can be selected to operate from among four EQ choices: Flat and three equalized (modified response) settings. Flat provides an unmodified version of the selected audio signals as they are sent to the headphone output channels. EQ selection A causes the low-frequency contents to be removed from the headphone output channels. EQ selection B implements a boost to the high-frequency range that can enhance understanding of voice signals. EQ selection C combines the low-frequency roll off of EQ selection A along with the high-frequency boost of EQ selection B. These four choices will allow an interpreter to optimize the headphone output signals to best support their work.

## Interpret Channels

The Model 201 provides two Dante transmitter (output) channels that are intended for use in interpretation applications. This allows a Model 201 to support one or two independent languages or audio paths. Two pushbutton switches, one associated with each interpret channel, operate in a latching (push on/push off) manner. LED status indicators within the switches display the current status of the interpret channels. When an interrupt channel is active an 18 kHz sine-wave tone can also be added (summed) with the microphone signal. This is provided especially for remote applications that require an indication ("tally") that an interpretation function is active.

The STcontroller application allows selection of the button color and whether a button is lit when the function is off. In addition, a configuration selection determines if only one, or both, of the interpretation output channels can be active at any one time. A separate pushbutton switch on the Model 201's front

panel allows momentary muting of the microphone signal when an interpret channel is active. This provides a "cough" function for the interpreter, allowing them to temporarily mute their microphone signal as needed.

One or two audio sources can be assigned to each interpret channel. These are called the Feedthrough Sources and can be independently selected for each channel from the choices of Floor, Relay, Aux 1, or Aux 2. The choice of None is also available. When an interpret channel is not active (the connected microphone is not actively being routed to an interrupt channel) the selected audio sources will be "fed through" to the interpret Dante transmitter (output) channel. When the interpret channel is active (the connected microphone is routed to an interrupt channel) an STcontroller configuration selection determines what happens to the feedthrough audio sources. They can remain at full level, be muted, or be reduced (dimmed) in level by a fix amount. This set of resources allows the interpret channels to be configured for local use or to meet the needs required by a variety of streaming and broadcast applications.

Experienced users may recognize the feedthrough function as being essentially the same as a broadcast IFB (interrupted foldback) function. This can be important for contemporary interpretation applications but is normally not provided by interpretation equipment.

A VOX (voice operated) function allows the one or two feedthrough sources to be attenuated or muted in response to an interpret audio source to be present. Also, a button configuration allows implementation of a 2-channel (stereo) interpret function. This can be especially useful in streaming applications where the feedthrough source consists of two discrete channels, typically a 2-channel (stereo) audio pair.

## Talkback

The Model 201 provides a talkback function, allowing an interpreter to easily communicate with production personnel. On the unit's front panel is a pushbutton switch and LED indicator dedicated to the talkback function. An independent Dante transmitter (output) audio channel is provided for the talkback function. This signal can be routed (subscribed) to the Dante input on an amplified speaker, an audio console, or even to equipment at a remote location. Whenever the

talkback function is active, audio is not routed to either of the interpret Dante transmitter (output) channels.

The STcontroller application allows the operation of the talkback function to be configured to meet the needs of many applications. The function can be disabled (off) as well as selected for one of four operating modes. The pushbutton switch can operate in a momentary or latching (push on/push off) manner along with the ability to add an 18 kHz sine-wave tone in addition to the microphone signal. This tone would be appropriate when the Model 201 is used in a distributed networked audio environment where both talkback audio and a talkback function active indication (tally) is warranted.

## Slow Down Function

On the Model 201's front panel are a pushbutton switch and associated status LED that are utilized by the slow down function. This function is provided such that an interpreter can alert the event speaker (the person being interpreted) to speak more slowly and allow the interpreter to catch up with the speaker's voice content. Technically, when the Model 201's slow down function is activated, a high-frequency (18 kHz) sine-wave signal is sent out a Dante transmitter (output) channel. This Dante output channel would typically be routed to the receiver (input) channel on a Dante-enabled device, such as a Studio Technologies' Model 391 Dante Alerting Unit or a Model 392 Visual Indicator Unit. The high-frequency signal can activate the designated device and provide the speaker with a slow down indication. The Model 391 or Model 392 would typically be located at the speaker's lectern where its visual indicator could be readily observed. A configuration choice within the STcontroller application allows the Model 201's slow down function to be active for 1, 2, 3, 4, or 5 seconds after the slow down button is momentarily pressed. A selection also allows the function to be disabled.

The name slow down can at first view be misleading. The slow down function actually requires a system implementation, consisting of a Model 201, a Dante network, and a means of displaying a slow down request. Activating the Model 201's slow down function simply provides an 18 kHz sine-wave tone on the Slow Down/Hot Mic Dante transmitter (output) channel. This Dante channel would be subscribed (routed) to the input on a display device such as the Studio Technologies' Models 391 or 392.

## Hot Mic Output

A special microphone output function is provided for use in installer-implemented applications. Called the hot mic output, it can be configured from among three choices. One choice provides a traditional "hot mic" output with its source being the output of the microphone preamplifier. Microphone audio is always present with no user action preventing it from being provided on the Dante transmitter (output) channel. Two other choices allow the microphone audio signal to be present when an interpret channel is enabled. The hot mic audio signal shares the same Dante transmitter (output) channel that is used for the slow down function.

## Confirmation Messages

An application may benefit from utilizing the Model 201's ability to store and playback WAV audio files. Two audio files, each up to 40 seconds in length, can be created in the high-quality 16-bit monaural WAV format and then loaded into a Model 201 using a standard USB flash drive. It's expected that these confirmation messages will provide identification information regarding the specific interpretation channels. This can prove useful during system setup and operation. They can be especially helpful when multiple Model 201 units are utilized in a single application. The ability to provide a unique aural confirmation signal for each channel may be extremely helpful to production personnel. For example, by using the confirmation messages the operator of an audio console could readily identify specific interpretation channels and confirm that they are ready for use.

The on/off status of each confirmation message is controlled using either a front-panel button-press sequence or the STcontroller application. When enabled, a confirmation message will play continually, repeating each time the end of the file is reached. The confirmation messages can find use locally and in remote interpretation applications, ensuring that the correct interpretation audio signal is being provided. No longer will "silent" audio channels be designated for interpretation, with technical personnel hoping that they will function correctly when they become active.

## Setup and Operation

Setting up, configuring, and operating a Model 201 is simple. An RJ45 jack is used to interconnect a unit with a twisted-pair Ethernet port associated with a PoE-enabled network switch. This connection provides both bidirectional digital audio and power. A dual-channel or single-channel (dual- or single-ear) headset can be connected using a cable-mounted 5-pin male XLR connector. Alternately, a gaming or computer headset with a 4-conductor 3.5 mm TRRS plug can be used.

One or two "custom" audio files can be created and loaded into the Model 201. They utilize the common WAV file format supported by many personal computer applications. The STcontroller software application is used to configure the wide range of Model 201 operating parameters. This allows the unit's performance to be optimized to meet the needs of specific applications.

The user is presented with seven pushbutton switches and three push-in/push-out rotary potentiometers. All user controls are clearly labeled and simple to operate. LEDs provide status indications of the Model 201's various functions.

## Ethernet Data and PoE

The Model 201 connects to a local area network (LAN) by way of a 100 Mb/s twisted-pair Ethernet interface. The unit's physical 100BASE-TX interconnection is made by way of a Neutrik® etherCON® RJ45 jack. While compatible with standard RJ45 plugs, an etherCON CAT5-compatible plug allows a ruggedized and locking interconnection for harsh or high-reliability environments. The Model 201'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 201's PoE interface enumerates (reports) to the associated power sourcing equipment (PSE) that it's a class 1 (very low power) device.

## Dante Audio-over-Ethernet

Audio data is sent to and received from the Model 201 using the Dante audio-over-Ethernet media networking technology. As a Dante-compliant device, the Model 201's four Dante transmitter (output) channels and four Dante receiver (input) channels can be assigned (routed or subscribed) to other devices using the Dante Controller software application. The Dante transmitter (output) and receiver (input) channels are limited to supporting four Dante flows, two in each direction. The digital audio's bit depth is up to 32 with a sampling rate of 48 kHz. On the Model 201's back

panel, two bi-color LEDs provide an indication of the Dante connection status. An additional LED displays the status of the associated Ethernet connection.

The Model 201 is compatible with the AES67 interoperability standard. When configured in Dante Controller to support AES67, the unit's four transmitter (output) channels will function only in multicast; unicast is not supported. In addition, the Model 201 is compatible with the Dante Domain Manager (DDM) software application.

## Audio Quality

The Model 201 provides excellent audio performance. A low-noise, wide dynamic-range microphone preamplifier and associated voltage-controlled-amplifier (VCA) dynamics controller (compressor) ensures that headset microphone audio quality is preserved while minimizing the chance of signal overload. The output of the microphone preamp and compressor is routed to an analog-to-digital conversion (ADC) section that supports a sampling rate of 48 kHz with a bit depth of up to 32.

As previously discussed, the Model 201 can store and replay two audio files. These uncompressed PCM audio signals utilize the high-quality 16-bit, monaural, WAV format. Front-panel buttons or the STcontroller application can be used to control the playback status of the confirmation messages.

Up to four audio sources can arrive in the Model 201 by way of Dante receiver (input) channels. The supported sampling rate is 48 kHz with a bit depth of up to 32. These signals pass into the Model 201's 32-bit microcontroller integrated circuit and then, following the unit's configuration and operator action, can be routed to the headset output channels. The four sources can also be used by the interpret channels as feedthrough sources.

Depending on the unit's configuration and operating state, the audio content of the interpret Dante transmitter (output) channels can consist of headset microphone audio only or a combination of headset microphone and Dante receiver (input) sources. It's also possible to select the stored WAV files as the source for the interpret output channels. The selected interpret audio signals remain in the digital domain and are routed through the 32-bit logic circuitry and on to the Dante interface section where they are packetized and prepared for transport over Ethernet.

## Configuration Flexibility

The Model 201 can easily be configured to meet the needs of specific applications and user preferences. All configuration choices are performed using the STcontroller software application. Versions of STcontroller are available to support the WinOS® and macOS® operating systems. Selectable configurable parameters include microphone power and preamplifier gain, headphone operation, button LED indicator intensity and color, and overall system operation. In addition, operation of the two interpret channels can be independently configured.

Of special interest is the configuration choice that allows selection of how the pushbutton switch LEDs will light under various operating conditions. This capability is provided to assist users who have trouble observing the differences between colors, typically issues differentiating between red and green. This "color blindness" condition is not uncommon in men and can make effective use of some electronic equipment difficult. The Model 201's ability to control the talk pushbutton switches' colors can also be useful for supporting international applications where compliance to specific regulatory requirements is required. This may dictate which LED color is associated with a function being "on" and which color is associated with a function being "off."

## Future Capabilities and Firmware Updating

The Model 201 was designed so that its capabilities and performance can be enhanced in the future. The unit implements a USB host function which allows the application firmware (embedded software) to be updated using a standard USB flash drive. And, as previously discussed, the USB receptacle is also used to load the two confirmation message WAV audio files. The Model 201 uses the Audinate UltimoX4™ integrated circuit to implement its Dante interface. The firmware in this integrated circuit can be updated via the Ethernet connection, helping to ensure that the unit's capabilities remain up to date.

# Getting Started
## What's Included

Included in the shipping carton is a Model 201 Interpreter's Console unit along with instructions on how to obtain an electronic copy of this guide. As the

Model 201 is Power-over-Ethernet (PoE) powered, no external power source is provided.

## Connections

In this section, signal interconnections will be made using the connectors located on the back panel of the Model 201. An Ethernet connection will be made using either a standard RJ45 patch cable or an etherCON CAT5-compatible protected RJ45 plug. The unit's Ethernet interface requires connection of a signal that supports Power-over-Ethernet (PoE). A dual-channel or single-channel (dual- or single-ear) headset will be connected using a cable-mounted 5-pin male XLR connector. Alternately, a headset with a 4-conductor 3.5 mm TRRS plug can be used. (The headset's plug needs to follow the CTIA™/AHJ configuration standard.)

### Ethernet Connection

A 100BASE-TX Ethernet (100 Mb/s) connection that also supports Power-over-Ethernet (PoE) is required for Model 201 operation. This single connection will provide both the Ethernet data interface and power for the Model 201's circuitry. The Ethernet connection is made by way a Neutrik etherCON CAT5-compatible protected RJ45 jack that is located on the back of the Model 201's enclosure. This ruggedized and locking RJ45 jack allows connection of an Ethernet signal by way of either a standard RJ45 plug or a cable-mounted etherCON CAT5-compatible plug. The Model 201's Ethernet interface supports auto MDI/MDI-X such that a crossover cable is never required. The Model 201's Ethernet connection enumerates itself as a class 1 device. As such, a PoE power-sourcing-equipment (PSE) port is required to supply a modest 3.84 watts maximum of power.

### Headset Connections

The Model 201 allows two different types of headsets to be connected. A 5-pin female XLR connector is provided to support connection of a standard broadcast- or intercom-style communications headset. A 4-conductor 3.5 mm TRRS jack allows a computer or gaming headset to be directly connected. The Model 201's two headset connectors are electrically wired in parallel. As such, only one type of headset should be connected at one time.

### *Headset A*

The Model 201 provides a 5-pin female XLR connector that interfaces with the microphone and headphone
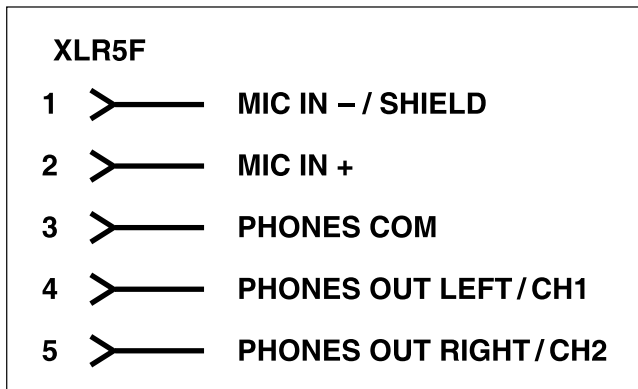


**Figure 2. Headset A 5-pin female XLR connection pinout diagram**

connections of a single- or dual-ear intercom- or broadcast-style headset. The connector is labeled Headset A. Refer to Figure 2 for connection details. The connector's microphone input connections are compatible with most headsets that include dynamic or electret (low-voltage DC-powered) microphones. A balanced dynamic microphone should, in most cases, also function correctly if its signal – (low) is connected to Model 201's mic in –/shield connection. No support is provided for microphones that require P12 or P48 phantom power.

To allow users of stereo (dual-earpiece or "double-muff") headsets to hear a monaural version of the two headphone output channels does not require special wiring of the 5-pin male XLR mating connector. The headset's left headphone channel should always be wired to pin 4 and the right headphone channel to pin 5. STcontroller configuration choices, discussed later, can then be used to create the desired monaural output. It's important not to connect together (short) pins 4 and 5 of the headset's connector as damage to the Model 201's output circuitry could result.

A monaural (single-earpiece or "single-muff") headset should be wired such that its headphone is wired only to pin 4; pin 5 should be remain unused. STcontroller configuration choices, discussed later, can be used to create a monaural output.

It's possible that some beyerdynamic headset inter-connecting cable assemblies terminate the earpiece's left and right connections opposite from what the Model 201 and other equipment requires. These cable assemblies may terminate the left earpiece to pin 5 of the 5-pin male XLR connector and the right earpiece to pin 4. If this condition is present, it will

require reversing or "flipping" the two wires in the cable assembly's connector such that the left earpiece connects to pin 4 and the right earpiece to pin 5.

If a separate microphone and a pair of headphones need to be connected to the Model 201 an adapter cable assembly must be fabricated. It would consist of a 5-pin male XLR connector wired to two connectors: a 3-pin female XLR connector for the microphone and a 3-conductor ¼-inch or 3.5 mm TRS jack for the headphones. In this scenario, the microphone would typically be a dynamic type as the Model 201 is only able to provide a low-voltage DC "electret" power source. Most hand-held or "stick" microphones are dynamic and should function correctly. Phantom-powered (P12 or P48) condenser microphones would not be compatible.

### Headset B

The Model 201 also allows direct connection of a computer or gaming headset that is ubiquitous in the personal computer world. The 4-conductor 3.5 mm TRRS jack, labeled Headset B, is compatible with the CTIA™/AHJ configuration standard which has the headphone left channel on the tip connection, the headphone right channel on the ring 1 connection, common on the ring 2 connection, and the microphone on the sleeve connection.

Compatible headsets should be readily available at a variety of price points and offer a wide range of audio quality. The microphones used in these headsets are typically electret type which require a low-voltage DC source for operation. The Model 201 is able to provide this power and requires only that the appropriate setting in the STcontroller software application be selected. Refer to Figure 3 for a detailed description of a compatible plug.
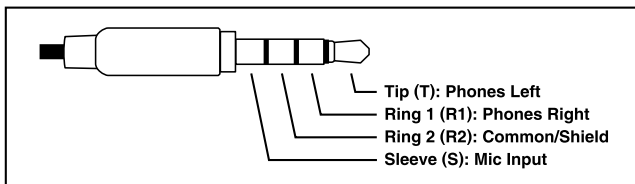


**Figure 3. Headset B 4-conductor 3.5 mm TRRS connection pinout diagram**

# Dante Configuration

For audio to pass to and from the Model 201 requires configuration of several Dante-related parameters. These configuration settings are stored in non-volatile memory within the Model 201's circuitry. Dante parameter configuration will typically be done with the Dante Controller software application, available for download free of charge at getdante.com. Versions of Dante Controller are available to support the Windows® and macOS® operating systems.

The Model 201's Dante interface is compatible with the Dante Domain Manager (DDM) software application. Refer to the DDM documentation, also available from Audinate, for details on which Model 201 and related parameters may need to be configured.

## Audio Routing

The Model 201 has four transmitter (output) and four receiver (input) channels that are associated with the unit's Dante interface. The transmitter (output) channels must be subscribed (routed) to the desired Dante receiver (input) channels. This achieves routing of the Model 201's audio output channels to the device (or devices) that will be "listening" to them. In addition, the unit's four Dante receiver (input) channels can be subscribed (routed) with the devices that supply the desired Dante transmitter (output) channels. These four audio input channels can provide the floor, relay, and auxiliary signals needed to support specific applications. Note that within Dante Controller a "subscription" is the term used for routing a transmitter flow (a group of up to four output channels) to a receiver flow (a group of input channels).

As previously noted, the Model 201 uses an UltimoX4 integrated circuit to implement its Dante functionality. The number of flows associated with this integrated circuit is four; two transmitter (output) and two receiver (input). (A flow can be unicast, multicast, or a combination of the two.) With only two flows in each direction, it's possible that a flow limitation condition could occur. If the Model 201's Dante transmitter (output) channels need to be subscribed (routed) to more than two flows (typically two devices) it's possible that an intermediary device, such as the Studio Technologies' Model 5421 or 5422A Dante Intercom Audio Engine using their Pass Thru configuration, can be used to "repeat" the signals and gain many additional flows.

Note that when the AES67 mode has been enabled in the Dante Controller application, the Model 201's Dante transmitter (output) channels will only function in multicast; unicast is not supported.

## Unit and Channel Names

The Model 201 has a default Dante device name of **ST-M201-** and a unique suffix. The suffix identifies the specific Model 201 that is being configured. The suffix's actual alpha and/or numeric characters relate to the MAC address of the unit's UltimoX4 integrated circuit. The four Dante transmitter (output) channels have default names of **Interpret1**, **Interpret2**, **Talkback**, and **SlowDown/HotMic**. The four Dante receiver (input) channels have default names of **Floor, Relay**, **Aux1**, and **Aux2**. Using Dante Controller, the default device and channel names can be revised as appropriate for the specific application.

## Device Configuration

The Model 201 supports an audio sample rate of 48 kHz with no pull-up/down options available. The unit's digital audio data is in the form of pulse-code modulation (PCM) samples. Encoding choices within Dante Controller are *PCM 16*, *PCM 24*, and *PCM 32*, but in most cases the selection of *PCM 24* would be appropriate. Clocking and device latency parameters can be adjusted within Dante Controller, if required, but the default values are typically correct.

## Network Configuration

Typically, the Model 201's Dante IP address and related network parameters will be determined automatically using DHCP or, if that's not available, the link-local network protocol. If desired, Dante Controller allows IP address and related network parameters to be manually set to a fixed or 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.

## AES67 Configuration – AES67 Mode

Dante Controller allows a Model 201 to be configured for AES67 operation. This requires that the AES67 mode be set for *Enabled*. As previously noted, if AES67 mode is Enabled then the Dante transmitter (output) channels will use multicast.

## Model 201 Clocking Source

While technically the Model 201 can serve as a Leader clock for a Dante network (as can all Dante-enabled devices), in most cases, the unit will be configured to receive its timing reference ("sync") from another Dante device. As such, the Dante Controller check box for the Preferred Leader that is associated with the Model 201 would typically not be enabled.

# Model 201 Configuration

The STcontroller software application is used to configure the way in which the Model 201 functions. No DIP switch settings or other local actions are used to configure the unit. This makes it imperative that STcontroller be available for convenient use on a personal computer that's connected to the related LAN.

## Installing STcontroller

STcontroller is available free of charge on the Studio Technologies' website (studio-tech.com). Versions are available that are compatible with personal computers running selected versions of the Windows and macOS operating systems. If required, download and install STcontroller onto a designated personal computer. This personal computer must be on the same local area network (LAN) and subnet as the Model 201 units that are to be configured. Immediately after starting the STcontroller application, it will locate all the Studio Technologies' devices that it can control. The one or more Model 201 units to be configured will appear in the device list.

Use the *Identify* command to allow easy recognition of a specific Model 201 unit. Double-clicking on a device name will cause the associated configuration menu to appear. Review the current configuration and make any changes that are desired.

Changes made using STcontroller will be immediately reflected in the unit's operation; no Model 201 reboot is required. Each time a change is made, three push-button switches on the Model 201's front panel will flash orange in a distinctive pattern to indicate that a command from STcontroller has been received.

## General Menu Page

The following configuration selections are available in the General menu selections tab.
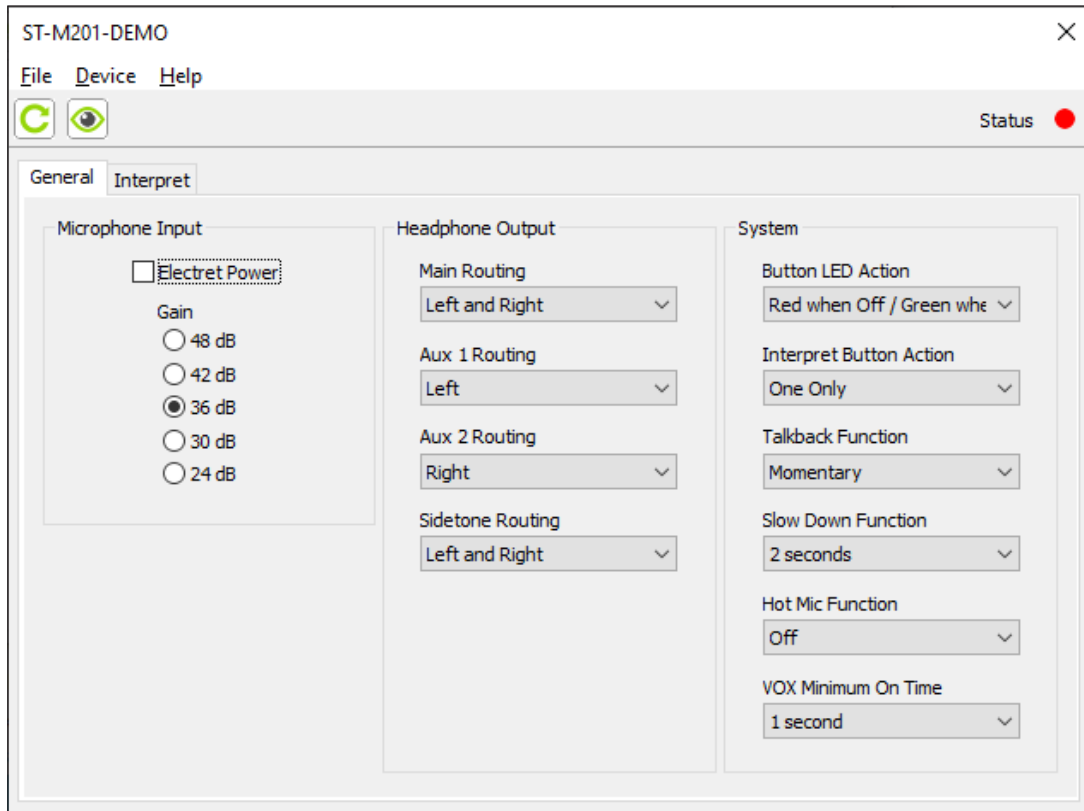


### Microphone Input – Electret Power

Choices are *Off* (select box not checked) and *On* (select box checked).

Enable the Electret Power check box if the connected headset has an electret microphone which requires a source of low-voltage DC power for operation. The on/off status of microphone power is displayed by way of an LED that is located on the Model 201's back panel adjacent to the Headset A connector. It lights red and is labeled Mic Pwr.

In virtually all cases, a gaming or computer headset that uses a 4-conductor 3.5 mm TRRS plug will have an electret microphone element which will require microphone power. If the associated headset has a dynamic (non-powered) microphone do not enable the Electret Power select box. Most broadcast or intercom headsets that terminate on a 5-pin male XLR connector will have a dynamic microphone element and will not require microphone power.

Note that the Model 201 cannot supply P12 or P48 phantom power that may be required to support balanced condenser (capacitor) microphones. In almost all cases, this should not pose an issue as phantom-powered microphones are essentially never associated with headsets that would be used for Model 201 applications.

### Microphone Input – Gain

Choices are *24 dB*, *30 dB*, *36 dB*, *42 dB*, and *48 dB*.

The gain of the Model 201's microphone preamplifier can be selected from among five choices. The compressor active LED, labeled Comp and located adjacent to the headset A connector, can act as a guide when setting the preamplifier gain. When a voice signal at a normal level is present on the connected headset's microphone, the compressor active LED should light intermittently. If, for example, it rarely lights and the gain is set to 36 dB, it might be a good idea to change the setting to 42 dB. If the compressor LED is lit fully during normal talking and the gain is set for 42 dB or 48 dB, a change to one of the lower gain settings might be warranted. There's no "hard and fast" rule about which microphone preamplifier gain setting is appropriate. But unless otherwise indicated,

30 dB is typically a good initial choice for a headset that includes an electret microphone. For headsets that use a dynamic microphone, 42 dB would typically be a good initial preamplifier gain choice.

## Headphone Output – Main Routing

Choices are *Left*, *Right*, and *Left and Right*.

The rotary control on the left side of the Model 201's front panel is labeled Main and is used to adjust the level of the main audio source as it is sent to the headset's headphone output. (The main audio source is user-selected to be either the Dante Floor or the Dante Relay receiver (input) channel.) There are three choices as to which channel or channels are selected for the destination.

**Left:** When this choice is selected, the selected main audio source is routed to the left channel of the headset's headphone output.

**Right:** When this choice is selected, the selected main audio source is routed to the right channel of the headset's headphone output.

**Left and Right:** When this choice is selected, the selected main audio source is routed to both the left and right channels of the headset's headphone output.

## Headphone Output – Aux 1 Routing

Choices are *Off*, *Left*, *Right*, and *Left and Right*.

The rotary control near the center of the Model 201's front panel is labeled Aux and is used to adjust the level of both the Dante auxiliary audio sources as they are sent to the headset's headphone output. (If desired, either or both of the auxiliary audio sources can be utilized for a specific application.) There are four choices as to which channel or channels are selected for the destination.

**Off:** When this choice is selected, any audio signal associated with Aux 1 will be not used.

**Left:** When this choice is selected, the Aux 1 audio source is routed to the left channel of the headset's headphone output.

**Right:** When this choice is selected, the Aux 1 audio source is routed to the right channel of the headset's headphone output.

**Left and Right:** When this choice is selected, the Aux 1 audio source is routed to both the left and right channels of the headset's headphone output.

## Headphone Output – Aux 2 Routing

Choices are *Off*, *Left*, *Right*, and *Left and Right*.

The rotary control near the center of the Model 201's front panel is labeled Aux and is used to adjust the level of both Dante auxiliary audio sources as they are sent to the headset's headphone output. (If desired, either or both of the auxiliary audio sources can be utilized for a specific application.) There are four choices as to the channel or channels that are selected for the destination.

**Off:** When this choice is selected, any audio signal associated with Aux 2 will be not used.

**Left:** When this choice is selected, the Aux 2 audio source is routed to the left channel of the headset's headphone output.

**Right:** When this choice is selected, the Aux 2 audio source is routed to the right channel of the headset's headphone output.

**Left and Right:** When this choice is selected, the Aux 2 audio source is routed to both the left and right channels of the headset's headphone output.

## Headphone Output – Sidetone Routing

Choices are *Off*, *Left*, *Right*, and *Left and Right*

The rotary control on the right side of the Model 201's front panel is labeled Sidetone and is used to adjust the level of the sidetone audio source as it is sent to the headset's headphone output. (The sidetone audio source is always the output of the microphone preamplifier and is active whenever one of the interpret functions or the talkback function is active.) The sidetone function provides a microphone configuration signal to assist users during Model 201 operation. There are four sidetone routing choices.

**Off:** If sidetone audio is not desired, then this choice should be selected.

**Left:** When this choice is selected, sidetone audio is routed to the left channel of the headset's headphone output.

**Right:** When this choice is selected, sidetone audio is routed to the right channel of the headset's headphone output.

**Left and Right:** When this choice is selected, sidetone audio is routed to both the left and right channels of the headset's headphone output.

## System – Button LED Action

Choices are *Red when Off / Green when On*, *Green when Off / Red when On*, Unlit *when Off / Green when On*, and *Unlit when Off / Red when On*.

The button LED action mode configures the manner in which the red and green LEDs contained within the two interpret and one mic mute pushbutton switches' function. Understanding how each mode impacts Model 201 operation will help ensure that desired operation is obtained and that maximum usability occurs.

**Red when Off / Green when On:** When selected for this mode, the three pushbutton switches will light red when their associated function is in its off state. Specifically, when an interpret channel is not active, its pushbutton switch will light red. When an interpret function is active, its associated button will light green. When the headset's microphone is not active, the mic mute pushbutton switch will light red. When the microphone is active, the button will light green.

**Green when Off / Red when On:** When selected for this mode, the three pushbutton switches will light green when their associated function is in its off state. Specifically, when an interpret channel is not active, its pushbutton switch will light green. When an interpret function is active, its associated button will light red. When the headset's microphone is not active, the mic mute pushbutton switch will light green. When the microphone is active, the button will light red.

**Unlit when Off / Green when On:** When selected for this mode, the three pushbutton switches will not light when their associated function is in its off state. Specifically, when an interpret channel is not active, its pushbutton switch will not light. When an interpret function is active, its associated button will light green. When the headset's microphone is not active, the mic mute pushbutton switch will not light. When the microphone is active, the button will light green.

**Unlit when Off / Red when On:** When selected for this mode, the three pushbutton switches will not light when their associated function is in its off state.

Specifically, when an interpret channel is not active, its pushbutton switch will not light. When an interpret function is active, its associated button will light red. When the headset's microphone is not active, the mic mute pushbutton switch will not light. When the microphone is active, the button will light red.

## System – Interpret Button Action

Choices are *One Only*, *Independent*, and *Button 1 Controls Both*.

The interpret button action mode determines the relationship between the two interpret functions.

**One Only:** When this mode is selected, either interpret 1 or interpret 2 can be active at any one time. However, they both cannot be active at the same time. This is provided to help ensure that each interpret channel will only have its desired audio content.

**Independent**: When selected this mode, it's possible to enable both interpret 1 and interpret 2 at the same time.

**Button 1 Controls Both**: When this mode Is selected, button 1 enables or disables both the interpret 1 and interpret 2 functions. This is provided so that the Model 201 can create a 2-channel (stereo) interpretation function. As an example, the feedthrough source for interpret 1 can be the left channel of the designated program source while the feedthrough source for interpret 2 can be the right channel of the same program source. Button 1 will activate interpretation for both channels which will operate in tandem. Button 2 will not serve any function when selected for this mode.

## System – Talkback Function

Choices are *Off*, *Momentary*, *Latching, Momentary with 18 kHz Tone*, and *Latching with 18 kHz Tone*.

The Model 201 provides a talkback function, allowing a user to send headset microphone audio out a separate Dante transmitter (output) channel. Whenever the talkback function is active, an interpret function that is active will be forced to its off state. Two settings allow an 18 kHz sine-wave tone to be included with the microphone audio. This will provide a talkback active (tally) function for signaling other equipment.

**Off:** When this mode is selected, the talkback function will be disabled.

**Momentary:** When this mode is selected, the talkback function will be active whenever the talkback pushbutton switch is pressed and held. Releasing the button will cause the talkback function to return to its off state.

**Latching:** Selecting this mode will cause the talkback function to become active whenever the talkback pushbutton switch is momentarily pressed ("tapped"). The talkback function will remain active until the button is again momentarily pressed.

**Momentary with 18 kHz Tone:** When this mode is selected, the talkback function will be active whenever the talkback pushbutton switch is pressed and held. Releasing the button will cause the talkback function to return to its off state. The talkback output signal will be a combination (sum) of audio from the output of the microphone preamplifier and an 18 kHz sine-wave tone (at –20 dBFS) that is routed to the talkback Dante transmitter (output) channel.

**Latching with 18 kHz Tone:** Selecting this mode will cause the talkback function to become active whenever the talkback pushbutton switch is momentarily pressed (tapped). The talkback function will remain active until the button is again momentarily pressed. The talkback output signal will be a combination (sum) of audio from the output of the microphone preamplifier and an 18 kHz sine-wave tone (at –20 dBFS) that is routed to the talkback Dante transmitter (output) channel.

## System – Slow Down Function

Choices are *Off*, *1 second*, *2 seconds*, *3 seconds*, *4 seconds*, and *5 seconds*.

The Model 201 provides a Dante transmitter (output) channel that will contain an 18 kHz sine wave tone whenever the slow down function is active. (This Dante channel is shared with the hot mic function.) This function allows a user to signal to a related party that slowing down of speech would be helpful, for example, when an interpreter wants to request that a person on the floor microphone speak more slowly. A visual indicator, such as the Studio Technologies' Model 391 Dante Alerting Unit, would typically be placed at a speaker's podium. The Model 391 would respond to the 18 kHz slow down tone and light an LED indicator.

Selecting *Off* will disable the slow down function. Selecting one of the other five choices will determine the minimum length of time that an 18 kHz tone will be sent. For example, selecting 2 seconds would cause a momentary press (tap) of the slow down pushbutton switch to initiate an 18 kHz tone to be present on the Dante transmitter (output) channel for 2 seconds. By selecting the appropriate length of time, the person at the floor microphone will assuredly be alerted that a slow down request is active.

## System – Hot Mic Function

Choices are *Off*, *Always On*, *Follows Interpret 1 Button*, and *Follows Interpret 2 Button.*

The Model 201 can provide three types of hot mic (always active) audio output. The function can also be disabled when the *Off* choice is selected. The source of the hot mic audio signal is always the output of the microphone preamplifier.

Note that the SlowDown/HotMic Dante transmitter (output) channel is shared by both the hot mic and the slow down functions. This means that this Dante channel will contain both microphone audio and 18 kHz sine wave tone. Typical applications that use this Dante channel will not need to separate the mic audio from the 18 kHz slow down tone. A display device, such as the Studio Technologies Model 391 Dante Alerting Unit, often will contain internal high-pass filtering. This allows it to ignore voice audio content. Someone monitoring voice audio will, in most cases, not be able to hear an 18 kHz tone. For those with excellent hearing, an audio console's low-pass filter can be used to remove the high-frequency content.

**Off:** When selected for *Off*, the hot mic function is disabled and microphone audio will never be present on the SlowDown/HotMic Dante transmitter (output) channel.

**Always On:** When selected for *Always On*, audio from the output of the microphone preamplifier will always be present on the SlowDown/HotMic Dante transmitter (output) channel. No action by a Model 201 user will change this condition. The always on function can be useful in specialized applications where audio from the connected microphone needs to be monitored or utilized, no matter the status of the interpret or talkback functions. It will also not be impacted by the status of the mic mute button.

**Follows Interpret 1 Button:** When selected for *Follows Interpret 1 Button*, audio from the output of the microphone preamplifier will be present on the SlowDown/HotMic Dante transmitter (output) channel when the interpret 1 button has been enabled. This function can be useful in specialized applications where audio from the connected microphone, without feedthrough audio being present, is desired when the interpret 1 function is active. The mic mute button will impact microphone audio.

**Follows Interpret 2 Button:** When selected for *Follows Interpret 2 Button*, audio from the output of the microphone preamplifier will be present on the SlowDown/HotMic Dante transmitter (output) channel when the interpret 2 button has been enabled. This function can be useful in specialized applications where audio from the connected microphone, without feedthrough audio being present, is desired when the interpret 2 function is active. The mic mute button will impact microphone audio.

## System – VOX Minimum On Time
Choices are *1 second*, *2 seconds*, *3 seconds*, *4 seconds*, *5 seconds*, and *6 seconds.*

This configuration choice allows selection of the minimum time required for the VOX (voice-operated) function to go from its active (on) state to its inactive (off) state. In essence, this parameter defines how "long" there must be silence in the interpret microphone audio signal before the VOX detection function changes to its disabled (off) state. The goal of this parameter is to ensure that the VOX function won't turn off during the time that valid interpretation is taking place. This can help ensure that the feedthrough source won't "modulate" in level when interpretation is actively taking place.

## Interpret Menu Page

The following configurations apply individually to interpret channels 1 and 2. Each configuration choice is available for the both channels although only channel 1 will be described.
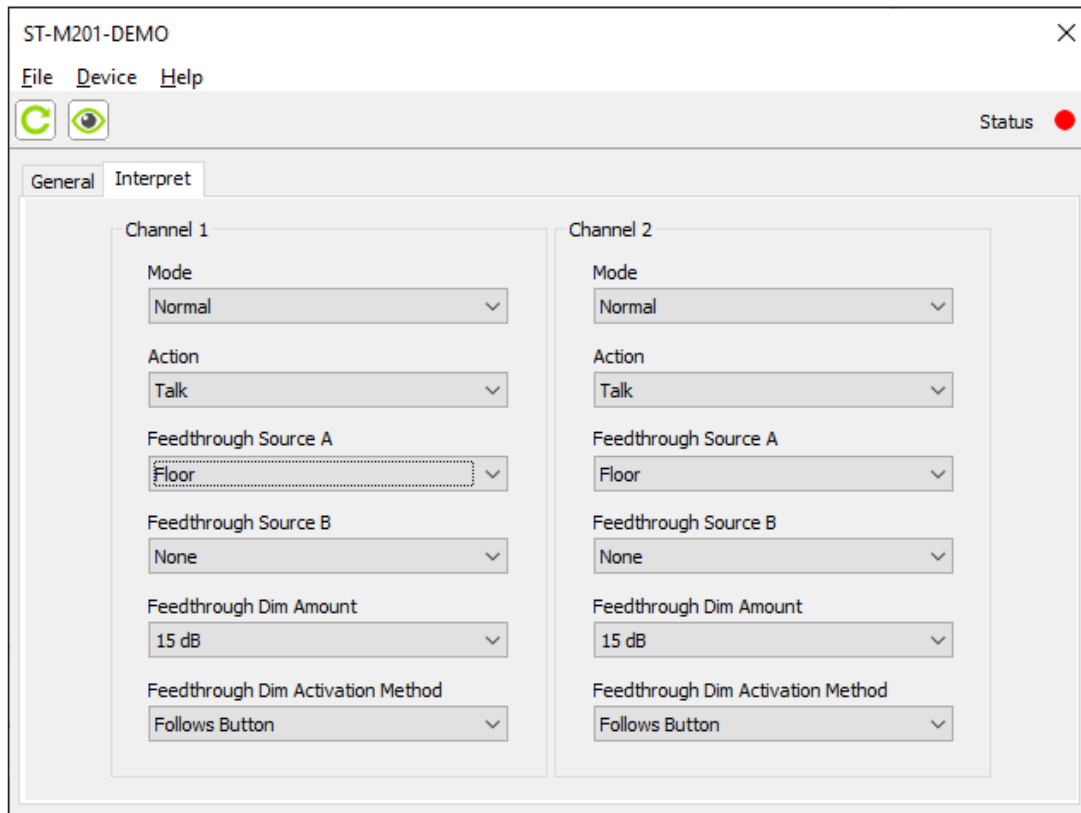


## Mode

Choices are *Normal* and *Play Message 1*.

This configuration choice displays the current mode and can be used to select the overall operation of interrupt channel 1. The two choices allow the channel to be used in a "live" interpretation application or to continuously play confirmation message 1 that is stored in the Model 201. Pushbutton switches on the Model 201 also allow the user to directly control this mode.

**Normal:** When this mode is displayed or selected, normal interpretation operation can take place. The pushbutton switch labeled Interpret 1 will be used to enable or disable interpret functionality. The configured feedthrough settings will be active.

**Play Message 1:** When this mode is selected, the audio source associated with confirmation message 1 will be routed to the interpret 1 Dante transmitter (output) channel and normal interpret operation will

cease. The audio signal associated with confirmation message 1 will play, repeating continuously. In this mode, the output of the microphone preamplifier will never be routed to the interpret 1 Dante transmitter (output) channel nor will feedthrough audio be utilized.

## Action

Choices are *Disabled*, *Talk*, and *Talk with 18kHz Tone*.

This configuration determines the action of interpret channel 1 when its pushbutton switch is used.

**Disabled:** In this mode, interpret 1 will never become active. Pressing the pushbutton switch associated with interpret 1 will not cause any action to occur. This setting can be useful if only one of the two interpret functions is going to be utilized.

**Talk:** If this mode is selected, when the interpret 1 function is active, audio from the output of the microphone preamplifier will be routed to the interpret 1 Dante transmitter (output) channel. The selected feedthrough configuration will be active.

**Talk with 18 kHz Tone:** If this mode is selected, when the interpret 1 function is active, a combination (sum) of audio from the output of the microphone preamplifier and an 18 kHz sine-wave tone (at –20 dBFS) will be routed to the interpret 1 Dante transmitter (output) channel. This method is provided to allow equipment "downstream" of the Model 201 to receive an indication that the interpretation function is active. Also, the selected feedthrough configuration will be active.

### Feedthrough Source A

Choices are *None*, *Floor*, *Relay*, *Aux 1*, and *Aux 2*.

This configuration choice selects which audio signal will be used as source A for the feedthrough function. (Sources A and B will be combined (summed) to create the overall feedthrough source for interpret 1.) The feedthrough function allows one or two audio sources to be routed to the interpret 1 Dante transmitter (output) channel. Selecting Floor will be typical for interpretation applications when audio from a presenter, generally a podium microphone, would be routed to the interpret 1 Dante transmitter (output) channel.

### Feedthrough Source B

Choices are *None*, *Floor*, *Relay*, *Aux 1*, and *Aux 2*.

This configuration choice selects which audio signal will be used as source B for the feedthrough function. (Sources A and B will be combined (summed) to create the overall feedthrough source for interpret 1.) Some applications may require that a second audio source be routed to interpret 1 Dante transmitter (output) channel and it would typically be Aux 1 or Aux 2.

### Feedthrough Dim Amount

Choices are *0 dB*, *5 dB*, *10 dB*, 15 dB, *20 dB*, and *Full Mute*.

This configuration selection determines what will happens to the level of the selected feedthrough source(s) when the dim function is active. Depending on the unit's configuration, dim can be active when the interpret 1 button is pressed or the button is pressed and the VOX function detects voice activity.

**0 dB:** Selecting this choice would cause no level change to take place when dim is active.

**5 dB, 10 dB, 15 dB, 20 dB:** Selecting one of these four numeric dB values will cause the feedthrough

source(s) to be attenuated (reduced in level) by the selected amount when the dim function is active.

**Full Mute:** Selecting this choice will cause the feedthrough audio source(s) to be fully attenuated (muted) when the dim function is active.

### Feedthrough Dim Activation Method

Choices are *Follows Button* and *Follows Button then VOX*.

This configuration selection determines what method is used to activate the dim function. When *Follows Button* is selected, dim is activated whenever an interpret 1 button is active. When *Follows Button then VOX* is selected, two conditions must be present for the dim function to be active. First, the interpret button 1 must be active and then a voice signal must be detected. Once a voice signal is no longer present for the VOX minimum on time, or the interpret button is no longer active, the dim function will return to its off state.

# Confirmation Message Files

As previously discussed, two confirmation messages, each up to 40 seconds in length, can be stored in non-volatile memory within the Model 201. These are referred to as the confirmation message files and are in the 16-bit, 48 kHz sample rate, monaural WAV (.wav) format. Configuration choices determine when the confirmation messages will be played during Model 201 operation. The confirmation message files within the Model 201 can be easily updated by way of a standard USB flash drive. These files can contain whatever audio content is desired to best support various applications. Typically, the confirmation messages would be used to identify characteristics of interpretation channels. For example, spoken text "This is the English language channel.," "This is the French language channel.," etc. By using the common WAV file format to create and save the messages, the desired confirmation message files can be created outside of the Model 201 and then easily loaded into the unit.

### Creating Audio Files

Audio content can be captured or created using standard audio techniques. Typically voice messages will be utilized. To prepare this audio content for loading into the Model 201 requires that they be in the 16-bit, 48 kHz sample rate, monaural WAV (.wav) format. For compatibility with the Model 201, the names of

the two audio files must be **M201Message1.wav** and **M201Message2.wav**.

Studio Technologies has had good success using the open-source audio software from Audacity® to create compatible confirmation message files. This software is available free of charge at audacityteam.org. However, many other compatible audio recording and editing programs are available for use with various personal computer operating systems.

## Loading Audio Files

The Model 201 has the ability to load installer-created WAV les into non-volatile memory by way of a standard USB flash drive. The Model 201 implements a USB host function and provides access by way of a type A receptacle located on the unit's back panel. The Model 201 updates its confirmation message files using the names **M201Message1.wav** and **M201Message2.wav**.

The update process begins by preparing a USB flash drive. The flash drive doesn't have to be empty (blank) but must be in the personal-computer-standard FAT32 format. One or both of the confirmation message files can be automatically loaded into the Model 201 at the same time. In the flash drive's root directory, save the desired new file(s), ensuring that the required name(s) are specified. The file name for confirmation message file 1 must be **M201Message1.wav**. The file name for confirmation message file 2 must be **M201Message2. wav**. After copying les to the USB ash drive, be certain to use the OS system's eject command to ensure that they are correctly stored.

Once the USB flash drive is inserted into the USB receptacle, located on the Model 201's back panel, the unit must be powered off and again powered on. At this point, the confirmation message file(s) will automatically load. To install either or both confirmation message files follow these steps:

1. Remove power from the Model 201. This will entail removing the PoE Ethernet connection from the etherCON RJ45 jack that's located on the unit's back panel.

2. Locate the USB receptacle, labeled WAV Files & Firmware Update, on the Model 201's back panel. Directly adjacent to the USB receptacle is a small hole that provides visual access to a green LED indicator.

3. Insert the prepared USB flash drive into the USB receptacle.

4. Apply Power-over-Ethernet (PoE) power to the Model 201 by connecting the Ethernet interface cable to the unit's RJ45 jack.

5. After a few seconds the Model 201 will run a "boot loader" program that will automatically load and save the new confirmation message file(s) that are present on the USB flash drive. The update process can range from approximately 5 seconds to approximately 45 seconds. The actual time will depend on the file's size (up to 40 seconds of audio playback) and the number of WAV files (one or two) that are being loaded. While the file(s) are being loaded the green LED, located adjacent to the USB receptacle, will flash slowly. The Interpret 1 and Interpret 2 pushbutton switches on the front panel will indicate the status of the loading process. They will flash orange when the loading processing is taking place. They will light green if the one or two confirmation message les were successfully loaded. They will light red if the loading process was not successful. Once the file-loading process has completed, the Model 201 will restart.

6. At this time, the Model 201 will be functioning with the newly loaded confirmation message file(s). The USB flash drive can now be removed from the USB receptacle. To be conservative, first remove the PoE Ethernet connection, then remove the USB flash drive, and then reconnect the PoE Ethernet connection.

7. Confirm that the desired confirmation message file(s) have been loaded into the Model 201. This will typically require listening to the two Interpret Dante transmitter (output) audio channels.

Note that upon power being applied to the Model 201, if the USB flash drive doesn't contain compatible confirmation message file(s) in its root folder no harm will occur. Upon power up, the green LED, located adjacent to USB receptacle, will flash on and off rapidly for a few seconds to indicate that no valid files have not been found. Once that has completed, normal Model 201 operation using the unit's existing confirmation message files will begin.

# Operation

At this point, all connections and configuration steps should have been completed and everything should be ready for Model 201 operation to commence. The unit should have been placed at the desired physical location. An Ethernet connection with Power-over-Ethernet (PoE) capability should have been made to the unit's etherCON RJ45 jack. A headset that includes a microphone should have been connected.

The Model 201's Dante configuration settings should have been selected using the Dante Controller software application. In this way, the unit's four Dante transmitter (output) channels and four Dante receiver (input) channels would have been routed, by way of Dante "subscriptions," to the desired receiver and transmitter channels on associated Dante-enabled equipment.

Using the Studio Technologies' STcontroller software application, the unit's configuration should have been selected to meet the needs of the specific application. If desired, one or two confirmation message files should have been created and loaded into the Model 201.

## Initial Operation

The Model 201 will begin to function as soon as a Power-over-Ethernet (PoE) source is connected. However, it will typically take 20 to 30 seconds for full operation to commence. Upon initial power up, the three status LEDs, located on the back panel below the etherCON RJ45 jack, will begin to light as network and Dante connections are established. The microphone compressor LED (labeled Comp), also located on the back panel, may momentarily flash orange. The green firmware update LED, located on the back panel adjacent to the USB receptacle, will slowly flash approximately five times as the internal processor becomes active.

The red and green LEDs within the mic mute and interpret pushbutton switches, and the green LEDs associated with other functions, will light in a short test sequence to indicate that they are functioning correctly and the application firmware (embedded software) has started. Then interpret pushbutton switches 1 and 2 will light sequentially to indicate that the unit is ready to load new confirmation message files and display their loading status. These files would be presented to the unit by way of WAV files on an attached

USB flash drive. Interpret button 1 is associated with confirmation message file 1. It will slowly flash orange three times and then light green if a new file 1 has been loaded or light red if a new file 1 was not loaded. The LED associated with button 1 will then remain lit and button 2 will indicate the outcome of the unit's attempt at loading a new confirmation message file 2. Button 2 will flash orange three times to indicate that the loading process is pending. The button will then light red if no file 2 was loaded or light green if a new file was loaded. After a brief pause, the LEDs in interpret buttons 1 and 2 will stop lighting.

Note that in most power-up sequences, new confirmation message audio files will not be loaded. The interpret button LEDs are simply used to display the status of the loading process. Their flashing orange and then lighting red doesn't indicate a problem. It just indicates that the file loading process was available but was not required.

Once the entire start-up sequence has completed and the Dante connection has been established, full operation will begin. The various LEDs will then become operational, displaying the status of their designated functions.

## How to Identify a Specific Model 201

Functions within the Dante Controller and STcontroller software applications allow a specific Model 201 unit to be identified. Each application provides an "eyeball" icon that when clicked will activate the Identify function. When this function is selected, a command will be sent to a specific Model 201 unit. On that unit the red LEDs associated with the mic mute and two interpret channel pushbutton switches will flash three times (but the actual on/off status of the buttons will not change). In addition, the Sys and Sync status LEDs, located directly below the etherCON RJ45 jack on the back panel, will slowly flash four times. After a few seconds the LED identification pattern will cease and normal Model 201 pushbutton switch LED and Dante status LED operation will resume.

## Ethernet and Dante Status LEDs

As previously discussed, there are three status LEDs located below the etherCON RJ45 jack on the Model 201's back panel. The Link Act LED will light green whenever an active connection to a 100 Mb/s Ethernet network has been established. It will then flash in

response to all Ethernet data packet activity. The Sys and Sync LEDs display the operating status of the Dante interface and its associated network activity. The Sys LED will light red during Model 201 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 201 is not synchronized with a Dante network. It will light green when the unit is synchronized with a Dante network and an external clock source (timing reference) is being received. It will slowly flash green when this specific Model 201 is part of a Dante network and is serving as the Leader clock. It's possible that up to 30 seconds may be required for the Sync LED to reach its final state.

## Compressor Active LED and Microphone Preamp Gain

An orange LED is located adjacent to the headset A connector on the Model 201's back panel. It is labeled Comp and displays the status of the headset microphone's audio compressor function. This function controls the dynamic range of the headset's microphone audio signal before it is sent out one of the two interpret, the talkback, or the hot mic/slow down Dante transmitter (output) channels. The compressor LED will light whenever the input level from the headset's microphone, along with the configured preamplifier gain, is such that the dynamic range of the signal is being actively controlled. It's perfectly acceptable for the Comp LED to light intermittently whenever a user is talking into the headset's microphone at a normal voice level. However, if the Comp LED lights solid while a user is talking at a normal voice level this will typically indicate that the microphone preamplifier gain setting should be reduced. (STcontroller would be used to configure the gain.) Conversely, if the Comp LED almost never lights when normal talking is taking place, it's possible that changing the preamplifier gain to a higher value would be beneficial. Note that due to the design of the circuitry the compressor active LED will function whether or not one of the interpret or talkback functions is active.

## Phones Output

The Model 201 provides a 2-channel (stereo) output that is accessible on both Headset A's 5-pin female XLR connector and Headset B's 4-conductor 3.5 mm TRRS jack. This function is referred to as the phones

output. Two pushbutton switches, three rotary controls, and six green LED indicators are provided for user support of the phones output. One switch allows selection of a listen source, labeled Main, that's either the floor or relay channel. The second pushbutton switch, labeled EQ Select, allows the frequency response of the headphone output to be adjusted. The three rotary controls, Main, Aux, and Sidetone, are located on the front panel and allow a user to create the desired mix of audio signals that are sent to the headphone output; no overall level control is provided. The six LEDs provide status indications, two associated with the Main audio source selection and four associated with the headphone output's EQ selection.

The rotary control on the left, labeled Main, adjusts the level of the source selected by the adjacent pushbutton switch. The momentary-action switch allows the main source to be either the Dante receiver (input) channel labeled Floor or the Dante receiver (input) channel labeled Relay. An LED is associated with each input and will light when its signal is active. The source selected as Main will be routed, by way of the rotary control, to both the left and right channels of the headset's headphone output. A power down/power up sequence will maintain the source that is selected as Main.

The Model 201 has two general-purpose audio inputs called Aux 1 and Aux 2. The STcontroller application is used to configure how the two aux inputs are going to be utilized. They can be independently routed to the left headphone output, the right headphone output, or both the left and right headphone output channels. They can also be disabled. If both aux inputs are routed to the same output channel (or channels) then they will be electronically combined (summed) in the digital domain. A rotary control in the center of the Model 201's front panel is used to adjust the level of the aux input signals that are routed to the headphone outputs.

The sidetone function allows a Model 201 user to hear themselves by way of the microphone's preamplifier output. This is provided as a user-confidence signal and is active whenever either or both of the interpret channels or the talkback function is active. A configuration choice in the STcontroller application allows the sidetone audio to be sent to the left headphone channel, the right headphone channel, or both the left and right headphone channels. In addition, the

sidetone function can be disabled. The rotary control on the right side of the Model 201's front panel is used to adjust the sidetone level as it is sent to the configured headphone output channels.

A pushbutton switch, labeled EQ Select, allows the user to select their preferred headphone audio performance. There are four choices available, each with an associated LED indicator. There is no exact science as to which EQ setting is best. The user should simply select the EQ mode that best allows them to aurally understand the source signals, i.e., the audio that is going to be interpreted.

Refer to Appendix B for a visual description of the EQ response curves. Selecting *Flat* will provide an even frequency response over the entire audio band. EQ selection *A* will remove (roll-off) the low-frequency content of a voice signal. EQ selection *B* will add a "boost" to the high-frequency content of the signal. EQ selection *C* will provide both the low-cut of selection *A* and the boost of selection *B*. The setting for both the Main audio source and the EQ choice will be stored in non-volatile memory that will survive a power cycle.

## Interpret Outputs

The Model 201 provides two interpret output channels. These are in the form of Dante transmitter (output) channels that are intended to be routed to wireless transmitters, audio consoles, Internet streaming interfaces, etc. The audio source for the two interpret outputs can be the microphone signal, the feedthrough sources, or the stored confirmation messages. Three pushbutton switches with integrated LED indicators are provided for control of the interpret outputs and the confirmation messages. Two of the buttons control the on/off status of the microphone audio being routed to the Dante channels. A third button, located on the left side of the Model 201's front panel, serves as a mic mute button. Simultaneously pressing and holding both an interpret button and the mic mute will cause the confirmation message to either begin playing or stop playing, depending on its present condition.

A number of configuration choices in the STcontroller application determine the overall Model 201 interpret operation. One configuration determines if only one or both interpret buttons can be enabled at any one time. By default, the choice *One Only* is selected. This allows either the interpret 1 or interpret 2 functions to be active at any one time. To change from one to the other requires first turning off the active function. Then the other interrupt function can be activated using its button. If the choice of *Both* is selected, then both the interpret 1 and interpret 2 functions can be active at the same time.

The mic mute button can be utilized whenever either or both of the interpret functions are active. Mic mute is a momentary function and allows microphone audio to be muted and prevented from being sent out the interpret Dante audio transmitter (output) channels. In the broadcast world, this would be considered to be a "cough" button.

Each of the two interpret channels can be configured to have an 18 kHz sine-wave tone added in with the microphone audio. This would create an in-band tally signal, especially useful for remote control applications. Each interpret channel can also be disabled if desired. Pressing the pushbutton switch associated with a channel set for disabled would cause its LED to ash ve times. This would acknowledge that the button was pressed but that no action was being taken.

An STcontroller configuration choice determines the operation of the LEDs within the interpret and mic mute buttons. This allows the color settings and on/off status to be selected to meet the needs of specific applications. Some applications may want the color green to display when an interpret function is active. Others may want the color red to display in this situation. In addition, the ability to have the LEDs not lit when a function is not active was specifically included for applications where discrimination between red and green may not be possible. (This addresses issues of "color blindness".)

A feedthrough function is associated with each interpret function and allows one or two audio signals to pass through each interpret channel and on to its associated Dante transmitter (output). It's also possible to select no feedthrough source. The feedthrough sources and action are determined using configuration choices provided for each interpret channel. The audio sources, labeled A and B, have choices consisting of *Main*, *Floor*, *Aux 1*, and *Aux 2*. If two sources are selected, they will combine (sum) in the digital domain and will be sent out the Dante transmitter (output) channel whenever the interpret function is not active.

When the interpret function is active, the level of the feedthrough source will follow another STcontroller

configuration. This is called the Feedthrough Dim Amount. The choices include not performing any level change which would cause the microphone audio source to simply be summed (added) to the feedthrough source. The feedthrough source can also be configured to dim (reduce) in level by 5, 10, 15, or 20 dB when interrupt is active. Finally, the feedthrough source can be configured to fully mute when interpret is active.

Following an STcontroller configuration, the dim function can become active using two methods. One method enables the dim function whenever an interpret button is active. The other method requires both an interpret button being active as well as voice audio being present. Voice audio detection is performed using a VOX function that, in the digital domain, detects voice audio being output from the microphone preamplifier. The VOX function will disable detection when voice audio has not been present for a configured time interval.

The user can enable or disable playing of a confirmation message associated with each interpret channel. When confirmation message playback is active, the associated interpret pushbutton switch will light orange. To change the playback mode, either from off-to-on or from on-to-off, press and hold for a minimum of two seconds, both the mic mute and the interrupt button of the desired channel. Note that when enabled, the confirmation message will continue to play until it is turned off. A Model 201 power-down/power-up cycle will return to the previously selected confirmation message mode. The STcontroller software application also allows the confirmation message mode to be selected.

## Confirmation Messages

As previously discussed, the Model 201 allows two separate confirmation message files to be saved and played as desired. Up to 40 seconds in length, they are designed to identify the specific interpret channels on a Model 201. These confirmation messages are intended to be monitored, "downstream" of the Model 201, on audio equipment that is receiving the audio signals from the unit. This could be useful in a local facility, but especially valuable when the interpret audio channels are routed to remote locations, locations that could literally span the world. The confirmation messages are intended to be played during

set up and for channel confirmation. During actual interpretation work, the confirmation messages would not be active. In a permanent interpret application, it's not unreasonable to think that the confirmation message would play at all times that the Model 201 was not used as part of an event. This "always active" signal would ensure that the audio path intended for interpreter use was maintained at all times.

The confirmation message playback mode of each interpretation channel can be selected by the user using the Model 201's front-panel pushbutton switches or using the STcontroller software application. By default, normal operation will be selected and an interpret channel will function under user control, for example, providing the Model 201's microphone signal as desired. Pressing and holding for a minimum of two seconds both the mic mute and desired interpret button will "toggle" the playback mode. The STcontroller channel mode can also be selected to play the confirmation message. When selected to play a confirmation message, the audio file stored for that interpret channel will be continuously sent to the associated Dante transmitter (output) channel. The associated interpret button will light orange to indicate that confirmation message playback is active. The interpret button will be disabled from performing any operation except turning off confirmation message playback. A power-down/power-up sequence would maintain the confirmation message playback modes of the interpret channels.

The confirmation messages stored in a Model 201 can be created specifically for how each Model 201 unit is going to be utilized in an interpretation application. The content of the confirmation message files can be created using standard personal computer audio editing software and stored as 16-bit monophonic WAV files. In most cases, a confirmation message would consist of text information about the language to be present on that interpret channel.

## Talkback

A pushbutton switch is used to activate the talkback function. An associated green LED, located above the pushbutton switch, will light whenever the function is active. A configuration choice in the STcontroller application allows the talkback function to operate from among five choices. When *Off* is selected the talkback function cannot be enabled. Pressing the

button will cause the green LED to flash rapidly five times. This is an indication that the button press was recognized but that the function will not activate.

The talkback button can be configured for momentary operation. When the button is pressed and held, the talkback function will be active and the green LED will light. Microphone audio will be sent out the talkback Dante transmitter (output) channel. Depending on the configuration, an 18 kHz sine-wave tone may, or may not, be combined with the microphone signal. When the talkback function is active neither interpret 1 nor interpret 2 will be active. If one or both is active when the talkback function becomes active then their button LEDs will change color to indicate a state change. After the talkback function is no longer active, the interpret 1 and interpret 2 functions will return to their previous states.

The talkback button can also be configured for latching operation. This provides a push-to-activate/push-to-disable action. Upon Model 201 power up, the function will be inactive. When the talkback button is momentarily pressed (tapped) the talkback function will become active, microphone audio will be sent out the talkback Dante transmitter (output) channel, and the green LED will light. Depending on the unit's configuration, an 18 kHz sine-wave tone may, or may not, be combined with the microphone signal. Whenever the talkback function is active neither interpret 1 nor interpret 2 will be active. If one or both is active when the talkback function becomes active then their button LEDs will change color to indicate a state change. After talkback is no longer active, the interpret 1 and interpret 2 functions will return to their previous states.

## Slow Down

A pushbutton switch is used to activate the slow down function. An associated green LED, located above the pushbutton switch, will light whenever the slow down function is active. The slow down function simply sends an 18 kHz sine-wave tone out a Dante transmitter (output) channel. This tone will be used by another device to provide the presenter with a visual signal. A configuration choice in the STcontroller application allows the slow down function to operate from among six choices. When *Off* is selected, the slow down function cannot be enabled. Pressing the button will cause the green LED to flash rapidly five times. This is an indication that the button press was recognized but that the function will not activate.

Five additional configuration choices allow the minimum slow down function active time to be selected. The choices are 1, 2, 3, 4, or 5 seconds. Whenever the slow down button is momentarily pressed (tapped), the function will become active. It will stay active for at least the length of time that was selected in the function's configuration. This time "stretcher" action, implemented in the unit's processor, ensures that a slow down indication is sent to a display or other external device for a minimum amount of time. An example should be illustrative of how the function operates. If the configured time is 2 seconds, a momentary press (tap) of the slow down button will cause the function to be active for two seconds. This would be shown by the associated LED lighting for two seconds. (Note that this assumes that the button "tap" will last less than two seconds.) If the button is pressed and held for six seconds, the slow down function will be active for six seconds. Since a button press of six seconds is in excess of the configured seconds then "stretching" of the button press won't be part of the action. The function, and the associated LED, will remain lit until the button is no longer pressed. In this example, it will be six seconds.

The slow down function is independent from all other Model 201 functions. As such, when the slow down function is active it doesn't impact any other Model 201 functions.

## Hot Mic

The Model 201 can provide a hot mic output function that is configured, using STcontroller, to operate from among four modes. By default, hot mic is disabled and would not be of concern to the user. But when the hot mic function is configured for *Always Active*, microphone audio is sent out a Dante transmitter (output) audio channel at all times; no Model 201 button press or other function will mute the microphone audio as it is sent out the Dante transmitter (output) channel. Whatever signal enters the user's microphone will be present on the hot mic output channel. Even the mic mute function will not impact the hot mic output channel. For other applications, the hot mic function can also be configured so that microphone audio is present on the Dante transmitter (output) channel only when the interpret 1 or interpret 2 button is active. In these two cases, the microphone mute function would impact the hot mic output signal.

# Technical Notes

## IP Address Assignment

By default, the Model 201's Dante-associated 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.

An exception does arise when trying to directly interconnect two Dante-enabled devices that use Ultimo integrated circuits to implement Dante. The Model 201 uses an UltimoX4 "chip" and, as such, a direct one-to-one interconnection between it and another Ultimo-based product would typically not be supported. An Ethernet switch linking these units would be required to successfully interconnect the 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. This wouldn't typically prove to be an issue as the Model 201 uses Power-over-Ethernet (PoE) to provide its operating power. As such, in most cases a PoE-enabled Ethernet switch would be utilized to support Model 201 units.

Using the Dante Controller software application, the Model 201's IP address and related network parameters can be set for a manual (fixed or 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 using a permanent marker or "console tape," with its specific static IP address. If knowledge of a Model 201's IP address has been misplaced there is no reset button or other method to easily restore the unit to its default IP setting.

In the unfortunate event that a Model 201'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 201. 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. In applications that utilize multicast Ethernet traffic enabling IGMP snooping can be valuable. (Ensure that support for PTP timing messages is maintained.) These protocols can 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 (getdante.com) for details on optimizing networks for Dante applications.

## Application Firmware Version Display

A selection in the STcontroller software application allows the Model 201's application firmware version to be identified. This can be useful when working with factory personnel on application support and troubleshooting. To identify the firmware version, begin by connecting the Model 201 unit to the network (via Ethernet with PoE) and wait until the unit starts to function. Then, after starting STcontroller, review the list of identified devices and select the specific Model 201 for which you want to determine its application firmware version. Then select **Version** and Information under the **Device** tab. A page will then display that will provide lots of useful information, including the application firmware version and well as details on the Dante interface firmware.

## Application Firmware Update Procedure

It's possible that updated versions of the application firmware (embedded software) that is utilized by the Model 201's microcontroller (MCU) integrated circuit will be released to add features or correct issues. Refer to the Studio Technologies' website for the latest application firmware file. The unit has the ability to load a revised file into its MCU's non-volatile memory

by way of a USB interface. The Model 201 implements a USB host function, including an associated Type A receptacle, that directly supports connection of a USB flash drive. The Model 201's MCU updates its application firmware using a file named **M201XvXX.stm** where *X*s are decimal digits that represent the version number.

The update process begins by preparing a USB flash drive. The flash drive doesn't have to be empty (blank) but must be in the personal-computer-standard FAT32 format. The processor in the Model 201 is compatible with USB 2.0, USB 3.0, and USB 3.1-compliant flash drives. Save the new firmware file in the USB flash drive's root folder with a name of **M201vXrXX.stm** where *XrXX* is the actual version number. Studio Technologies will supply the application firmware file inside a .zip archive file. The firmware file inside of the zip file will adhere to the naming convention required by the Model 201. The name of the zip le itself will also include the file's version number.

Once the USB flash drive is inserted into the USB Type A receptacle, located on the back panel of the Model 201, the unit must be powered off and again powered on. At this point, the file from the USB flash drive will automatically load. To install the application firmware file, follow these steps:

1. Disconnect power from the Model 201. This will entail removing the Ethernet connection that is made to the unit's RJ45 jack.

2 Locate the USB receptacle on the back of the Model 201. Insert the prepared USB flash drive into it.

3. Apply power to the Model 201 by connecting an Ethernet signal that has Power-over-Ethernet (PoE) present on it.

4. After a few seconds the Model 201 will run a "boot loader" program that will automatically load the new application firmware file (**M201vXrXX.stm**). This loading process will take only a few seconds. During this time period the green LED that's located adjacent to the USB receptacle will flash slowly. Once the loading process has completed, taking approximately 10 seconds, the Model 201 will re-start using the newly loaded application firmware.

5. At this time the Model 201 will be functioning with the newly loaded application firmware and the USB flash drive can be removed. But to be conservative, remove the PoE Ethernet connection first and then remove the USB flash drive. Then restart the unit by re-connecting the Ethernet signal.

6. Using the STcontroller software application, confirm that the desired Model 201's application firmware version has been loaded.

Note that upon power being applied to the Model 201 if a connected USB flash drive doesn't have the correct file (**M201vXrXX.stm**) in its root folder no harm will occur. Upon power up the green LED adjacent to the USB receptacle will flash on and off rapidly for a few seconds to indicate this error condition. Afterwards normal operation using the unit's existing application firmware will begin.

## Ultimo Firmware Update

As previously discussed, the Model 201 implements its Dante connectivity using the UltimoX4 integrated circuit from Audinate. The Dante Controller software application can be used to determine the version of the firmware (embedded software) that resides in this integrated circuit. The firmware (embedded software) residing in the UltimoX4 can be updated using the Model 201's Ethernet port. Performing the update process is easily accomplished using an automated method called Dante Updater that's included as part of the Dante Controller application. This application is available, free of charge, from the Audinate website (getdante.com) The latest Model 201 firmware file, with a name in the form of **M201vXrXrX.dnt**, will always be available on the Studio Technologies' website, as well as being part of Audinate's product library database. The latter allows the Dante Updater software application that is included with Dante Controller to automatically query and, if required, update the Model 201's Dante interface.

## Restoring Factory Defaults

A command in the STcontroller software application allows the Model 201's default configuration settings to be reset to their factory values. From STcontroller select the Model 201 for which you want to restore its defaults. Select the **Device** tab and then the **Factory Defaults** selection. Then click on the **OK** box. Refer to Appendix A for a list of the Model 201's factory defaults.

Note that restoring the factory defaults will not alter the two stored confirmation message audio files.

# Specifications

**Applications:** Dante-based simultaneous interpretation

**Power Source:** Power-over-Ethernet (PoE), class 1 (very low power, ≤3.84 watts), per IEEE 802.3af

**General Audio:**

**Internal Digital Audio Processing:** 32-bit, fixed

**Nominal Digital Input and Output Level:** –20 dBFS

**Network Audio Technology:**

**Type:** Dante audio-over-Ethernet

**AES67-2018 Support:** yes

**Dante Domain Manager™ (DDM) Support:** yes

**Bit Depth:** 16, 24, or 32

**Sample Rate:** 48 kHz

**Nominal Level:** –20 dBFS

**Number of Transmitter (Output) Channels:** 4

**Number of Receiver (Input) Channels:** 4

**Dante Audio Flows**: 4; 2 transmitter, 2 receiver

**Network Interface:**

**Type:** 100BASE-TX, twisted-pair Ethernet with Power-over-Ethernet (PoE)

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

**Compatibility – Headset A:** single or dual-ear broadcast- or intercom-style with dynamic or electret (low-voltage DC-powered) microphone: pin 1 mic common; pin 2 mic; pin 3 phones common; pin 4 phones left; pin 5 phones right

**Compatibility – Headset B:** CTIA™/AHJ configuration (typically uses electret powered mic): tip phones left; ring 1 phones right; ring 2 common; sleeve mic

**Microphone Input:**

**Compatibility:** dynamic or electret (low-voltage DC-powered)

**Type:** unbalanced

**Electret Microphone Power:** 3.3 volts DC via 2 k resistor, selected on/off

**Impedance:** 1 k ohms, nominal, microphone power off; 680 ohms, nominal, microphone power on

**Gain:** 24, 30, 36, 42, 48 dB, selectable

**Frequency Response:** –3 dB at 40 Hz, –1 dB at 16 kHz

**Distortion (THD+N):** 0.022%, measured at –20 dBFS, 22 Hz to 22 kHz bandwidth, 24 dB of gain

**Noise Floor:** –95 dBFS, A-weighted, 24 dB of gain

**Dynamic Range:** >76 dB, A-weighted, measured at 24 dB of gain

**Microphone Compressor:**

**Threshold:** 3 dB above nominal Dante output level (–17 dBFS), ±1 dB

**Slope:** 2:1

**Status LED:** compressor active

**Headset Headphone Output:**

**Type:** 2-channel (stereo)

**Compatibility:** intended for connection to stereo (dual-channel) or monaural (single-channel) headsets with a nominal impedance of 50 ohms or greater

**Maximum Output Voltage:** 3.0 Vrms, 1 kHz, 150 ohm load

**Frequency Response**: 20 Hz to 20 kHz, +0/–1 dB

**Distortion (THD+N):** <0.02%

**Dynamic Range:** >93 dB

**Dim (Attenuation):** 0, 6, 12, 18 dB, configurable

**Confirmation Message Audio:**

**Number of Channels:** 2, field updatable using USB flash drive

**Source Type:** 16-bit monophonic, 48 kHz sample rate, WAV (.wav) files, stored in non-volatile memory

**Level:** –20 dBFS nominal

**Duration:** up to 40 seconds per WAV file

**Distortion:** <0.0001%

**Frequency Response:** 20 Hz to 20 kHz, +0/–0.7 dB

**Feedthrough Capability:**

**Number of Channels:** 2, individually configurable

**Sources:** 4 Dante receiver (input) channels (Floor, Relay, Aux 1, Aux 2), selectable

**Frequency Response:** 20 Hz to 20 kHz, +0/–0.7 dB

**Audio Attenuation (Dim):** 0, 5, 10, 15, 20 dB, Full Mute, configurable

**Voice Detect Operation (VOX):**
Audio Bandpass: 185 to 1300 Hz, –3 dB
Level Threshold: –44 dBFS at 400 Hz
Minimum On Time: 385 mSec

**VOX Minimum On Time:** 1 second, 2 seconds, 3 seconds, 4 seconds, 5 seconds, 6 seconds, selectable

**Connectors:**

**Headset A:** 5-pin female XLR

**Headset B:** 4-conductor 3.5 mm TRRS jack, per Japanese standard JEITA/EIAJ RC-5325A

**Ethernet:** Neutrik NE8FBH etherCON RJ45 jack (compatible with etherCON CAT5 plug)

**USB:** type A receptacle (used for updating main firmware and loading WAV audio files)

**Configuration:** Studio Technologies' STcontroller personal computer application

**Software Updating:** USB flash drive used for updating main firmware files; Dante Controller's Dante Updater application used for updating Dante interface firmware

**Environmental:**

**Operating Temperature:** 0 to 50 degrees C (32 to 122 degrees F)

**Storage Temperature:** –40 to 70 degrees C (–40 to 158 degrees F)

**Humidity:** 5 to 95%, non-condensing

**Altitude:** not characterized

**Dimensions:**

4.3 inches wide (10.9 cm)
2.1 inches high (5.4 cm)
5.1 inches deep (13.0 cm)

**Deployment:** intended for tabletop applications

**Weight:** 1.2 pounds (055 kg)

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

# Appendix A–STcontroller Default Configuration Values

**General Menu Page:**

Microphone Input – Electret Power: Off (box not checked)

Microphone Input – Gain: 36 dB

Headphone Output – Main Routing: Left and Right

Headphone Output – Aux 1 Routing: Left

Headphone Output – Aux 2 Routing: Right

Headphone Output – Sidetone Routing: Left and Right

System – Button LED Action: Red when Off / Green when On

System – Interpret Button Action: One Only

System – Talkback Function: Momentary

System – Slow Down Function: 2 seconds

System – Hot Mic Function: Off

System – VOX Minimum On Time: 1 second

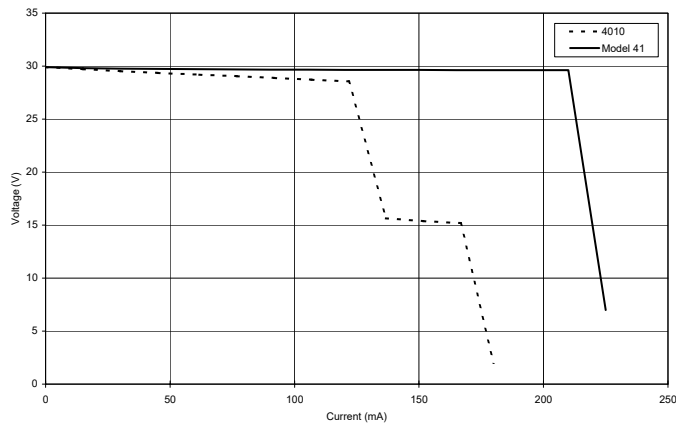**Interpret Menu Page (Identical for Channels 1 and 2):**

Mode: Normal

Action: Talk

Feedthrough Source A: Floor

Feedthrough Source B: None

Feedthrough Dim Amount: Full Mute

Feedthrough Dim Activation Method: Follows Button
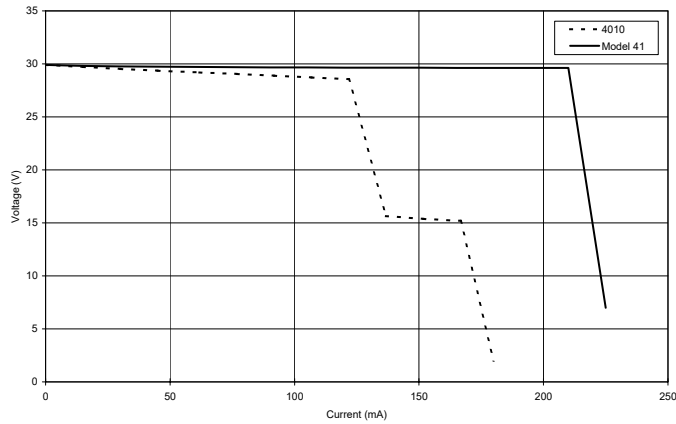
# Appendix B–Headphone EQ Response

Final data pending.
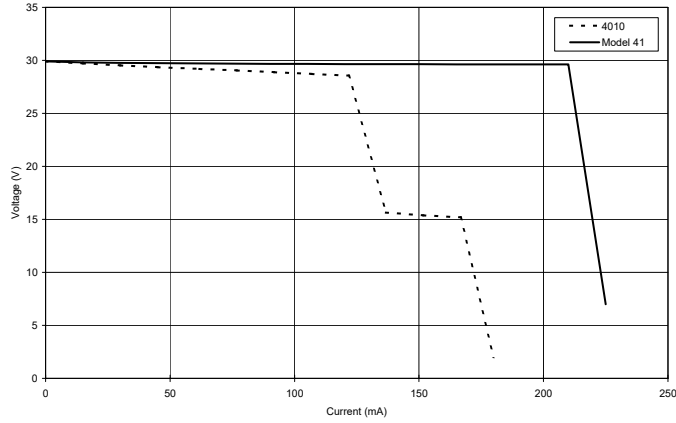


**EQ Select A**



**EQ Select B**



**EQ Select C**