Model 348 Intercom Station

User Guide

Issue 2, August 2020

This User Guide is applicable for serial numbers
M348-00151 and later with main firmware version 1.05 and later
and STcontroller application version 2.06.00 and later.

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Revision History

Issue 2, August 2020:

• Corrects errors in Issue 1.

Issue 1, January 2020:

• Initial release of complete document.

Introduction

The Model 348 Intercom Station provides eight independent talk and listen channels that are compatible with Dante® audio-over-Ethernet networks. The desktop unit is designed to serve as an audio control center for production and support personnel in numerous applications including on-air television sports and news broadcasting, live events, theater, industrial, and corporate AV. The Model 348's channels can be part of virtual "party-lines" created with other compatible devices or be used directly in point-to-point intercom implementations. The range of resources makes it simple to use the Model 348 locally, or as part of a REMI or "At-Home" geographically diverse implementation. In addition to intercom applications, the unit can create multiple independent IFB (talent cue) channels. Other applications may benefit from the Model 348 user's ability to easily create monitor mixes from the eight input audio channels. This makes the unit a viable choice for listen-only scenarios.

Over a standard IP network, multiple Model 348 units can be used in party-line (PL) intercom applications with help from an external Dante-enabled audio matrix such as the Studio Technologies' Model 5422

Dante Intercom Audio Engine. Model 348 units can also be used "point-to-point" or interfaced with Dante-compatible matrix intercom systems. The Model 348 includes two Neutrik etherCON RJ45 connectors which allow interfacing with single or redundant Gigabit Ethernet networks. The primary network connection can provide power to the unit using a port on a Power-over-Ethernet (PoE) network switch. It can also be powered using a 12 Volt DC source that is connected using a broadcast-standard 4-pin XLR connector.

The Model 348 allows connection of broadcast- or intercom-style headsets that use a dynamic or electret (DC powered) microphone. The unit provides both 5-pin female XLR and 3.5 mm TRRS connectors which allow both traditional "pro" and contemporary gaming headsets to be utilized. In addition, the Studio Technologies' GME-3-12 electret gooseneck microphone can be directly connected using the ¼-inch jack located on the top of the unit's enclosure. A pushbutton switch allows users to directly select headset or gooseneck microphone operation. A low-noise microphone preamplifier and associated voltage-controlled-amplifier (VCA) dynamics controller (compressor) ensures excellent microphone audio quality while minimizing the chance of signal overload.

Figure 1. Model 348 Intercom Station front and back views

All Model 348 operating features are configured using the STcontroller software application. The extensive set of parameters allows the unit's functions to be tailored to meet the needs of many applications. STcontroller, compatible with version 7 and later of the Windows® operating system, is available, free of charge, from the Studio Technologies' website. It's a fast and simple means of configuring, revising, saving, and loading a unit's operating parameters.

The Model 348's front panel includes eight rotary controls ("encoders") which are used to adjust the level of the eight Dante monitor input signal sources. Using RGB (red-green-blue) LEDs, the knob of each encoder is illuminated and can display if a channel is muted, indicate if a signal is present on the associated audio input, and light when an in-band (20 kHz tone) call signal is detected. The user can monitor the Dante audio inputs by means of either a headset or a built-in speaker. A modern class-D amplifier integrated circuit drives the speaker efficiently while preserving audio fidelity. Two additional rotary encoders are used to control the master audio level and on or off (mute) status of the signals being sent to the headset and speaker outputs.

Extensive configuration choices allow the operation of the eight pushbutton switches and associated output channels to be optimized to meet the needs of specific applications. They can be independently configured for talk (intercom), IFB (talent cueing), call signal (20 kHz tone), and other related actions. The buttons can also be configured to provide "all-call" functions associated with talk and IFB functions. The Model 348's pushbutton switches are illuminated to display their operating status.

An audible alert, using the internal speaker, can be generated in response to a call signal.

For performance confirmation an integrated sidetone function allows audio coming from the headset's microphone to be returned to the headset output.

The Model 348's compact enclosure has overall dimensions of 6.5 inches wide (16.5 cm), 2.5 inches high (6.4 cm), and 4.6 inches deep (11.7 cm). Weighing 1.8 pounds (0.8 kg), the enclosure is made of steel to provide some "heft" to minimize the chance of inadvertent movement. The Model 348's main application firmware can be updated using the USB port on the back of the unit; the Dante firmware can be updated via an Ethernet connection.

Ethernet Data and PoE

The Model 348 connects to one or two local area networks (LANs) by way of two Gigabit ("GigE") twisted-pair Ethernet interfaces. The 1000BASE-T interconnections are made by way of Neutrik® etherCON RJ45 connectors. While compatible with standard RJ45 plugs, etherCON allows a ruggedized and locking interconnection for harsh or high-reliability environments. The two Ethernet interfaces can be configured, using the Dante Controller software applications, to serve in a switched or redundant mode.

The Model 348's operating power can be provided by way of the Primary Ethernet interface using the 802.3af Power-over-Ethernet (PoE) standard. PoE allows fast and efficient interconnection with the associated data network. Alternately, an external source of nominal 12 Volts DC can be connected to power the unit. If both are connected then PoE will be the active power source.

Dante Audio-over-Ethernet

Audio data is sent to and received from the Model 348 using the Dante audio-over-Ethernet media networking technology. As a Dante-compliant device, the Model 348's

11 Dante transmitter (audio output) channels and 16 Dante receiver (audio input) channels can be assigned (routed or "subscribed") using the Dante Controller software application. The Dante transmitter and receiver channels support 32 Dante flows, 16 in each direction. The digital audio's bit depth is up to 32 with a sample rate of 48 kHz. Bi-color LEDs, located on the unit's back panel, provide status indications of the Ethernet network and Dante interface performance.

The Model 348 is compliant with the AES67 interoperability standard. In addition, the unit is compatible with Audinate's® Dante Domain Manager™ (DDM) software application.

Audio Quality

The Model 348's audio performance is completely "pro." A low-noise, wide dynamic-range microphone preamplifier and associated voltage-controlled-amplifier (VCA) dynamics controller (compressor) ensure that headset and gooseneck microphone audio quality is preserved and minimizes the chance of signal overload. The output of the microphone pre-amp and compressor is routed to an analog-to-digital conversion (ADC) section that supports sampling rates of 48 kHz. The audio signal, now in the digital domain, routes through a 32-bit microprocessor and on to the Dante interface section where it is packetized and prepared for transport over Ethernet. A total of 11 Dante transmitter (output) channels are provided: one each associated with the unit's eight channels, two monitor output channels, and one "hot mic" output channel.

Audio input signals arrive via 16 Dante receiver channels and pass into the Model 348's 32-bit microprocessor. Eight channels are associated with the monitor section while the other eight are used as program sources for the IFB (talent cue) functions. All channel routing, headphone and monitor level control, IFB

creation, and sidetone functions are performed within the digital domain. This provides flexibility, allows precise level control, eliminating the need for analog audio signals from having to pass through the level controls. The audio signals destined for the headphone outputs are sent to a high-performance digital-to-analog converter and then on to robust driver circuitry.

Future Capabilities and Firmware Updating

The Model 348 was designed so that its capabilities and performance can be easily enhanced in the future. A USB connector, located on the unit's back panel, allows the application firmware (embedded software) to be updated using a USB flash drive. The Model 348 uses the Broadway™ integrated circuit from Audinate to implement the Dante interface. The firmware in this integrated circuit can be updated via an Ethernet connection, helping to ensure that its capabilities remain up to date.

Getting Started
What's Included

Included in the shipping carton are a Model 348 Announcer's Console and a printed copy of this guide. As a device that can be Power-over-Ethernet (PoE) powered, no external power source is provided. This is because in most applications an Ethernet switch with PoE capability will be utilized. It's also possible to connect an external source of 12 volts DC to power the Model 348. If this is the case then a power supply would need to be provided separately.

Connections

In this section signal interconnections will be made using the connectors located on the

back of the Model 348's enclosure. In addition, many applications will utilize the Studio Technologies' GME-3-12 gooseneck microphone which will be attached via the ¼-inch jack located on the top surface of the unit.

One or two Ethernet connections will be made using either standard RJ45 patch cables or etherCON protected RJ45 plugs. The Ethernet data connection associated with the primary RJ45 connector is compatible with Power-over-Ethernet (PoE). If desired, an Ethernet connection made to the secondary Ethernet connector can provide access to a Redundant Dante network. Or it can be utilized as an active "loop through" connection associated with the primary Ethernet connection. If PoE is not going to be utilized, or a redundant source of power is desired, a source of 12 volts DC can be connected by way of a 4-conductor XLR connector.

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 "computer" headset with a 3.5 mm 4-conductor TRRS plug can be used. An electret gooseneck microphone that has an integrated ¼-inch plug can be connected.

One or Two Ethernet Connections

One 1000BASE-T ("GigE") Ethernet connection is required for Model 348 operation. If available and connected to the primary RJ45 connector, this connection can provide both the Ethernet data interface and power for the Model 348's circuitry. A 10BASE-T connection is not sufficient. A 100BASE-TX connection may be adequate but not optimal.

A second 1000BASE-T ("GigE") connection can be made if Redundant Dante is desired. The Model 348's network configuration must be set for redundant for this functionality to be active. PoE is not supported on the secondary Ethernet connection. The secondary Ethernet port can also be used as a "loop through" port such

as would be provided by an Ethernet switch. This requires that the Model 348's network configuration is set for switched. Switched mode is the default setting but using the secondary port in this mode for applications other than troubleshooting is not recommended. It will function reliably but "daisy chaining" Ethernet signals can limit flexibility and present a failure point.

The Ethernet connections are made by way of two Neutrik etherCON protected RJ45 connectors that are located on the back of the Model 348's enclosure. These allow connection by way of cable-mounted etherCON connectors or standard RJ45 plugs. The Model 348's Ethernet interface supports auto MDI/MDI-X so that a crossover cable is not required. The Model 348's primary Ethernet connection does not enumerate itself as a specific PoE class. As such, a PoE power-sourcing-equipment (PSE) port will consider the device as a class 0 device which could use up to 12.94 watts of power.

External 12 Volts DC Input

An external source of 12 volts DC can be connected to the Model 348 by way of the 4-pin male XLR connector which is located on the back panel. While the requirement for the external source is nominally 12 volts, correct operation will take place over a 10 to 18 volt range. The Model 348 requires a maximum of 600 milliamperes (0.6 amperes) at 12 volts DC for correct operation. The DC source should be terminated to a 4-pin female XLR connector with pin 1 negative (–) and pin 4 positive (+).

If an external power source is required, the PS-DC-02 power supply, available as an option from Studio Technologies, is directly compatible with the Model 348. Its AC mains input allows connection to 100-240 volts, 50/60 Hz with an output of 12 volts DC, 1.5 amperes maximum. Its DC output is terminated on a 4-pin female XLR connector.

As previously discussed in this guide, an Ethernet connection that provides power-over-Ethernet (PoE) can serve as the Model 348's power source. Alternately, an external 12 volts DC source can be connected. For redundancy, both PoE and the external source can be connected at the same time. If both PoE and an external 12 volts DC source are connected, power will be drawn only from the PoE supply. If the PoE source becomes inoperative the 12 volts DC source will provide the Model 348's power. No interruption in operation will occur during a power source transition.

Headset Connections

The Model 348 allows two different types of headsets to be connected. A 5-pin female XLR connector, located on the Model 348's back panel, allows connection of a standard broadcast- or intercom-style communications headset. A 3.5 mm 4-conductor TRRS jack, also located on the back panel, allows a computer gaming headset to be directly connected. The Model 348'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 348 provides a 5-pin female XLR connector that interfaces with the microphone and headphone 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 microphone input connections are compatible with most unbalanced 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 348's mic in –/shield connection. No support is provided for microphones that require P12 or P48 phantom power.
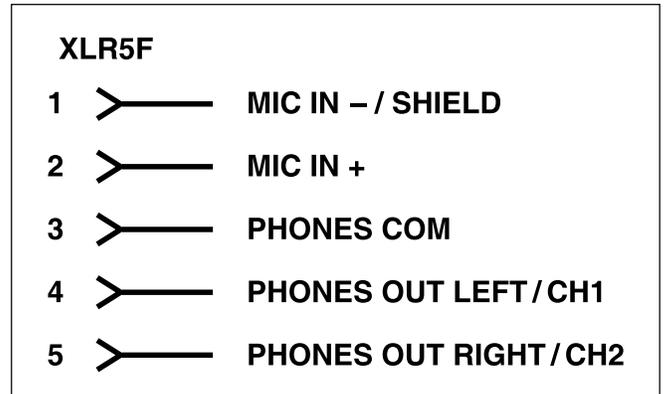
```
XLR5F

1  >————  MIC IN – / SHIELD

2  >————  MIC IN +

3  >————  PHONES COM

4  >————  PHONES OUT LEFT / CH1

5  >————  PHONES OUT RIGHT / CH2
```

Figure 2. Headset A connection pinout chart

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. Software-based configuration choices, discussed later in this guide, can 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 348'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. Configuration choices, discussed later in this guide, can be used to create a monaural output.

It's possible that some Beyerdynamic headset interconnecting cable assemblies terminate the earpiece's left and right connections opposite from what the Model 348 and other broadcast equipment require. These cables 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 a headset's connector such that the left earpiece connects to pin 4 and the right earpiece to pin 5.

If a separate microphone and pair of stereo or monaural headphones need to be connected an adapter cable assembly must be fabricated. It would consist of a 5-pin male XLR connector wired to both a 3-pin female XLR connector for the microphone and a ¼-inch or 3.5 mm TRS jack for the headphones. In this scenario the microphone would, in most cases, be a dynamic type as the Model 348 provides only low-voltage DC electret power. Phantom-powered (P12 or P48) microphones would not be compatible. Most hand-held or "stick" microphones are dynamic and should function correctly.

Headset B

The Model 348 also allows direct connection of gaming headsets that are ubiquitous in the personal computer world. The 3.5 mm 4-conductor 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 are readily available, typically described as personal computer or gaming headsets. The microphones used in these headsets are electret type which require a low-voltage DC source for operation. The Model 348 is able to provide this power and requires only that the appropriate setting in the STcontroller personal computer software application be selected. Refer to Figure 3 for a detailed description of the compatible TRRS plug.
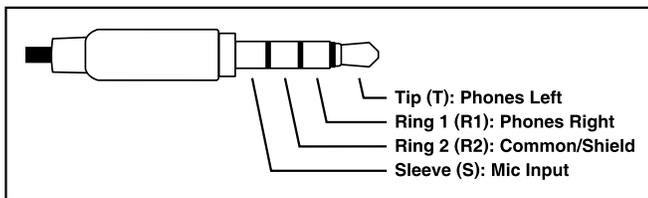

Figure 3. Headset B (TRRS) connection pinout chart

Tip (T): Phones Left
Ring 1 (R1): Phones Right
Ring 2 (R2): Common/Shield
Sleeve (S): Mic Input

Gooseneck Microphone

A threaded combination bushing/3-conductor 1/4-inch jack is incorporated into the top panel of the unit. This allows direct connection of the Studio Technologies' GME-3-12 Gooseneck Microphone. This unidirectional, electret microphone was designed specifically to maximize performance in intercom and related applications. The RTS/Telex/Bosch MCP-90-series is also directly compatible and will perform well. The two main requirements for the gooseneck microphone are that it contain an electret microphone and the interconnection be in the form of a ¼-inch 3-conductor plug with integrated threads that have a pitch 7/16-20 UNF.

The 3-conductor ¼-inch jack associated with the Model 348's bushing has a tip connection that is used for both microphone audio as well as for supplying the low-voltage DC needed for powering the electret microphone. The ring connection is used for the microphone low signal and the sleeve connection is chassis ground. Within the Model 348's circuitry the ring and sleeve connections are connected together as well as being "tied" (connected) to the chassis.

The Model 348's gooseneck bushing includes a hex head socket set screw with a thread pitch of 4-40. This allows the gooseneck microphone to be secured into the bushing by simply tightening the set screw against the microphone using a 5/64 hex driver. In many cases, especially in applications where the Model 348 will be moved from venue-to-venue, it will not be optimal for the hex screw to be utilized. This is because the gooseneck microphone may need to be removed and stored for transit. In this case the set screw should be removed and stored.

Dante Configuration

For audio to correctly pass to and from the Model 348 requires, as a minimum, that several Dante-related parameters be configured. These configuration settings will be stored in non-volatile memory within the Model 348's circuitry. Configuration will typically be done with the Dante Controller software application which is available for download free of charge at www.audinate.com. Versions of Dante Controller are available to support Windows and OS X® operating systems. The Model 348 uses the Broadway integrated circuit to implement the Dante functionality. The Model 348 is compatible with the Dante Domain Manager (DDM) software application.

Audio Routing

The Model 348's 11 Dante transmitter (Tx) channels must be assigned to the desired receiver channels on associated equipment. This will route the Model 348's eight talkback, two monitor, and one hot mic output channels to the devices that will be "listening" to them. Within Dante Controller a "subscription" is the term used for routing a transmitter flow (a group of output channels) to a receiver flow (a group of input channels).

The number of transmitter flows associated with a Broadway integrated circuit and, as such, the Model 348, is 16 so no limitation can exist. These flows can either be unicast, multicast, or a combination of the two. (Note that in the AES67 mode the transmitter (output) channels will function in multicast; unicast is not supported.)

Using Dante Controller the desired audio sources need to be routed to the 16 receiver (Rx) channels associated with the Model 348's Dante audio inputs. The exact number utilized will depend on the specific application. The first eight receiver channels are automatically assigned to the rotary encoders and can be used for listening to the associated intercom channels or as general-purpose audio channel monitoring. The second set of eight receiver channels are associated with the IFB (talent cueing) functions. They will be utilized only with channels that have their IFB function enabled.

Unit and Channel Names

The Model 348 has a default Dante device name of **ST-M348-** along with a unique suffix. The suffix identifies the specific Model 348 that is being configured. The suffix's actual alpha and/or numeric characters relate to the MAC address of the unit's Broadway integrated circuit. The 16 Dante receiver (Rx) audio input channels have default names of **Ch 1 – Ch 8** and **IFB Pgm 1 – IFB Pgm 8**. The 11 Dante transmitter (Tx) audio output channels have default names of **Ch 1 – Ch 8**, **Mon A**, **Mon B**, and **Hot Mic**. Using Dante Controller the default device name and channel names can be revised as appropriate for the specific application.

Device Configuration

The Model 348 only supports an audio sample rate of 48 kHz with no pull-up/pull-down values available. Encoding choices are *PCM 24*, *PCM 16*, and *PCM 32* but in virtually all cases the default selection of *PCM 24* would be appropriate. Clocking and Device Latency can be adjusted if required but the default values are typically correct.

Network Configuration – Dante Redundancy

The Model 348 allows connection of two Ethernet signals. Two RJ45 jacks are located on the unit's back panel and are labeled Primary-PoE and Secondary. In the network configuration Dante Redundancy section of Dante Controller how these ports function can be selected. The choices are *Switched* or *Redundant*.

If Switched is selected (the factory default) then the Model 348 will be able to establish one connection with an Ethernet network. It doesn't matter which RJ45 is utilized, although for PoE powering the jack labeled Primary-PoE must be utilized. The other RJ45 connection can be used to interconnect with another piece of networked equipment. If the Model 348's network configuration is Switched ensure that only one of the RJ45 connections on the back panel is connected to the LAN associated with the Dante devices. If both of the Model 348's RJ45 connections are routed to ports on the same LAN this will typically "crash" the network! (Although some of the latest/most advanced Ethernet switches will automatically detect and prevent an issue from occurring.)

If Redundant is selected then Dante's redundant networking implementation will be enabled. In this case, separate network connections should be made to the Primary-PoE and Secondary RJ45 connectors. A personal computer that's running STcontroller will typically be associated with the network that is connected to the Primary-PoE RJ45 jack.

When the Model 348 has been configured for the Switched network mode one Dante IP address will be associated with the network connection that is made to either the Primary-PoE or the Secondary RJ45 connections. If the network configuration has been configured for Redundant then separate IP addresses and related network parameters will be assigned to the Primary-PoE and Secondary Ethernet ports.

Network Configuration – Addresses
By default, the Model 348's Dante IP address and related network parameters will be determined automatically using the DHCP or, if not available, link-local network protocols. If desired Dante Controller allows the IP address and related network parameters to be

manually set to a fixed (static) configuration. While this is a more-involved process than simply letting DHCP or link-local "do their thing," if fixed addressing is necessary then this capability is available. But in this case, it's highly recommended that every unit be physically marked, e.g., directly using a permanent marker or "console tape," with its specific static IP address. If knowledge of a Model 348's IP address has been misplaced there is no reset button or other method to easily restore the unit to a default IP setting.

Note that if the Model 348's network configuration has been set for Redundant then the Primary and Secondary Dante IP addresses and related parameters can be independently configured. This allows both to be automatic, both to be manually configured, or one to be automatic and the other to be manually configured.

AES67 Configuration – AES67 Mode
The Model 348 can be configured for AES67 operation. This requires the AES67 Mode to be set for Enabled. By default, AES67 mode is set for Disabled.

Model 348 Clocking Source
While technically the Model 348 can serve as a clock master for a Dante network (as can all Dante-enabled devices) in virtually all cases the unit will be configured to receive "sync" from another device. As such, the check box for Preferred Master associated with the Model 348 would not be enabled.

Model 348 Configuration
The STcontroller software application is used to configure the way in which the Model 348 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 (www.studio-tech.com/stcontroller-application/) and is compatible with personal computers running Windows operating systems that are version 7 and later. STcontroller versions 2.05.00 and later are required to fully support the Model 348. 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 348 units that are to be configured. Immediately after starting STcontroller the application will locate all the Studio Technologies' devices that it can control. The one or more Model 348 units to be configured will appear in the device list. Use the *Identify* command to allow easy recognition of a specific Model 348 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.

Parameters

The configurable functions include:

General menu page:

- Microphone Input – Headset Mic Power
- Microphone Input – Headset Mic Gain
- Microphone Input – Gooseneck Mic Gain
- Headset – Sidetone Level
- Headset – Dim
- Speaker – Source
- Speaker – Dim
- Dante Monitor Outputs – Mode
- Dante Monitor Outputs – Dim
- System – Level Control Position Display
- System – Signal Present Display

- System – LED Intensity
- System – Headset and Monitor Outputs Follow Mic Source
- System – Hot Mic
- System – Monitor A Call Tone Level
- System – Monitor B Call Tone Level

Channel Specific menu page (independent configuration settings for channels 1-8):

- Button Mode
- Button Function
- IFB Program Dim
- Headset Routing
- Monitor Routing
- Call Indication

Changes made using STcontroller will be immediately reflected in the unit's operation; no Model 348 reboot is required. Each time a change is made the eight buttons on the Model 348'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 – Headset Mic Power
Choices are *Enabled* and *Not Enabled* (box checked or not).

A headset can be connected by way of a 5-pin female XLR connector, labeled Headset A, or a 3.5 mm 4-conductor TRRS jack, labeled Headset B. Enable the headset microphone power check box if the connected headset has an electret microphone which requires a source of low-voltage DC for operation. In virtually all cases gaming or computer headsets that use a 3.5 mm TRRS plug will require microphone power. Most broadcast

headsets that terminate on a 5-pin male XLR connector will incorporate a dynamic (non-powered) microphone. In this case do not enable headset microphone power. The on/off status of the headset microphone power is displayed by way of an LED, red in color, that is located on the Model 348's back panel below the Headset A connector.

Note that the Model 348 cannot supply P12 or P48 phantom power that may be required by balanced condenser (capacitor) microphones. This should not pose an issue as phantom-powered microphones are essentially never associated with communications- or intercom-style headsets that would be used for Model 348 applications.

Microphone Input – Headset Mic Gain
Choices are *26 dB*, *32 dB*, *38 dB*, *44 dB*, and *50 dB*.

To match the requirements of a microphone associated with a headset, the gain of the microphone preamplifier can be selected from among five choices. The selected gain is applied no matter if the headset is connected using the Headset A or the Headset B connector. The compressor active LED, located below the Headset A connector, can act as a guide when setting the microphone 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 38 dB, it might be a good idea to change the setting to 44 dB. If the compressor LED is lit fully during normal talking and the gain is set for 44 dB or 50 dB, a change to one of the lower values might be warranted. There's no "hard and fast" rule as to which gain setting is appropriate. But unless otherwise indicated, 38 dB is typically a good initial choice for a headset that uses a dynamic microphone while 32 dB would be appropriate for a headset that includes an electret microphone.

Microphone Input – Gooseneck Mic Gain
Choices are *12 dB*, *18 dB*, *24 dB*, *30 dB*, and *36 dB*.

When the gooseneck microphone is selected as the Model 348's active microphone input source the gain of the microphone preamplifier will operate from among five configurable choices. The compressor active LED, located adjacent to the Headset A connector, can act as a guide when setting the gooseneck preamp gain. When a voice signal at a normal level is presented to the gooseneck microphone the compressor active LED should light intermittently. If, for example, the LED rarely lights and the gain is set to 18 dB, it might be a good idea to change the setting to 24 dB or 30 dB. If the compressor LED is lit fully during normal talking and the gain is set for 30 or 36 dB, a change to one of the lower values might be warranted.

Headset – Sidetone Level
Choices are *Off*, *Low*, *Medium Low*, *Medium*, *Medium High*, and *High*.

As a user confidence signal, audio from the selected microphone source can be routed to the left and right headphone channels of the headset interface. Sidetone audio can be present whenever an applicable button function is active on any or all of the unit's eight channels. An applicable function is one that uses either the headset or the gooseneck microphone. These include Talk, Talk with 18 kHz Tone, and IFB. There is no definitive sidetone level setting. One that provides the user with a sufficient amount of their own talk audio such that they are comfortable should be sufficient.

Headset – Dim
Choices are *0 dB*, *6 dB*, *12 dB*, and *18 dB*.

This headset dim function allows the output of the two headset output channels to be

"dimmed" (attenuated or reduced in level) in certain circumstances. The function is provided for special applications where the headset's left and right headphone outputs are connected to an external amplifier or set of amplified speakers. Normally when a talk function is active on one or a combination of the eight channels the level of the headset's headphone output channels would not change. As such, the default dim value has been selected to be 0 dB. But if an adapter cable was fabricated and the headset's headphone output channels were connected to audio playback devices that presented audio energy in the same physical vicinity as the active microphone then acoustic feedback is possible. To prevent this from happening selecting a dim configuration of 6, 12, or 18 dB might be desirable.

Speaker – Source
Choices are *Off*, *Monitor A*, and *Monitor B*.

The Model 348 includes an internal loudspeaker of which an audio source can be selected from the two audio "mix" buses that are named Monitor A or Monitor B. These buses contain audio content that is specified in the individual configuration choices for the eight audio input channels. The speaker can be designated to monitor either of these buses or to not be active.

Speaker – Dim
Choices are *0 dB*, *6 dB*, *12 dB*, and *18 dB*.

The output level of the Model 348's internal loudspeaker will be automatically "dimmed" (attenuated or reduced) whenever a talk or IFB function is active on any of the eight channels. This will help prevent audio from the loudspeaker from interfering with the operation of the selected microphone. Interference could be in the form of unwanted

audio content or even acoustical feedback. It's typical for a user who listens at a higher output level to select a dim value that provides more reduction. In almost all cases a selection of other than 0 dB (no dim) would be appropriate.

Dante Monitor Outputs – Mode
Choices are *Off*, *Pre-Fader*, and *Post-Fader*.

The Model 348 provides two Dante transmitter (output) channels, Monitor A and Monitor B, that are intended for use by other pieces of equipment such as amplified speakers, audio consoles, and matrix intercom systems. These two channels can be configured as a group to function from among three choices.

Off: In this mode the two Dante monitor output channels, Monitor A and Monitor B, will not have audio present on them. The Dante Controller software application will still indicate that the channels are present but no audio will be routed to them from the Model 348's circuitry.

Pre-Fader: In this mode the audio level and on/off status of Dante monitor output channels will not be impacted by the Model 348's monitor output rotary encoder. To clarify, neither level adjustment or on/off control will occur. This mode is appropriate when the monitor output channels are going to be utilized by devices that incorporate, if required, level control and/or signal muting capability.

Post-Fader: In this mode the audio level and on/off status of Dante output channels Monitor A and Monitor B will follow the action of the Model 348's monitor output rotary encoder. This mode is applicable if the device or devices utilizing the Dante monitor outputs require that the level of the source signals be adjusted and/or muted using the Model 348's resources.

Dante Monitor Outputs – Dim

Choices are *0 dB*, *6 dB*, *12 dB*, and *18 dB*.

When a talk or IFB function is active the Model 348 will invoke a dim (attenuation) function. This is designed to help achieve maximum intelligibility and minimize the chance of acoustic feedback when loudspeakers are associated with either or both Dante monitor outputs Monitor A or Monitor B. A dim setting of 0 dB means that the signal level on the Dante monitor outputs will remain unchanged. (The signal will be attenuated by 0 dB which is no attenuation!)

System – Level Control Position Display

Choices are *Off* and *On*.

For user assistance the orange LEDs contained within the eight pushbutton switches can be utilized in a "bar graph" format to give a general indication of the settings of the ten rotary encoders. If enabled, whenever the setting of a rotary encoder is changed the LEDs eight buttons will momentarily light. In most cases it would be advantageous to enable this function.

System – Signal Present Display

Choices are *Off* and *On*.

The top surface of the ten rotary encoders can light as an indication of the level of the audio associated with a specific encoder and related function. This is accomplished by the incorporation of RGB (red-green-blue) LEDs located within each rotary encoder. The knob will light green when signal levels are in the normal range, yellow when the signal level is greater than normal, and red when the signal level is at risk of degrading audio performance. Note that even if the Signal Present Display function is disabled (Off) the rotary encoders will still display their normal and muted state using LED illumination.

System – LED Intensity

Choices are *Low* and *High*.

The eight pushbutton switches, ten rotary encoders, and mic source selection function have LED indicators associated with them. The LED intensity configuration choice allows the overall intensity of these LEDs to be selected. Typically, deciding which choice, low or high, is optimal will depend on the amount of ambient light present where the Model 348 is located.

System – Headset and Monitor Outputs Follow Mic Source

Choices are *Off* and *On*.

This function allows the muted/unmuted state of the headset's headphone outputs, the Dante monitor outputs (when configured for post-fader), and the speaker output to automatically be determined by the user's choice of which microphone is active. This is a sophisticated function that can prove useful for users who are frequently switching between the headset microphone and the gooseneck microphone. When the function is enabled, whenever the microphone source selection changes from gooseneck to headset the Dante monitor output channels (only when configured for post-fader) and the speaker will mute. And whenever the microphone source selection changes from headset to gooseneck the headset's headphone outputs will mute. This helps to ensure that unwanted audio isn't present as a specific microphone source is selected.

System – Hot Mic

Choices are *Off* and *On*.

A Dante transmitter (output) channel is available which provides a hot mic (always active) function. This can be very useful but has the potential for abuse. This configuration choice ensures that a hot mic signal is only available when an application warrants it.

Note that even if the hot mic output is disabled the channel will appear in the Dante Controller. But in this case no signal would be present on the channel.

System – Monitor A Call Tone Level
Choices are *Off*, *Low*, *Medium*, and *High*.

The Model 348 is capable of generating an audible alerting signal when a call signal is detected on a channel that is assigned to the Monitor A audio bus. This signal consists of repeating sequences of three short bursts of sine wave audio that are output by way of the speaker. The level range can be selected from among three choices as well as being selected for off (muted).

System – Monitor B Call Tone Level
Choices are *Off*, *Low*, *Medium*, and *High*.

The Model 348 is capable of generating an audible alerting signal when a call signal is detected on a channel that is assigned to the Monitor B audio bus. This signal consists of repeating sequences of three short bursts of sine wave audio that are output by way of the speaker. The level range can be selected from among three choices as well as being selected for off (muted).

Channel Specific Menu Page
The following configuration selections apply individually to Channels 1-8. They are available in each Channel Specific menu tab:

Button Mode
Choices are *Momentary*, *Latching*, and *Hybrid*.

The manner in which a button functions can be configured from among three choices.

Momentary: If this mode is selected a button's function will normally be inactive and the LEDs associated with the button will not be lit. Whenever a button is pressed the associated function will become active and its green LED will light.

Latching: If this mode is selected the button's function will alternate between its active and inactive states whenever the button is pressed. The button's green LED will be lit whenever the associated function is active. Upon Model 348 power up the button will be in its inactive state and its LEDs will not be lit.

Hybrid: This mode is a combination of the Momentary and Latching modes. It's similar to the way in which pushbutton switches often function on user stations associated with broadcast or production intercom systems. If the button is pressed and held the associated function will be active. It will stay active until the button is released. If the button is momentarily "tapped" the status of the function will change, either from inactive-to-active or from active-to-inactive. The button's green LED will be lit whenever the function is active. Upon Model 348 power up the button will be in its inactive state and its LEDs will not be lit.

Button Function
Choices are *Talk*, *Talk with 18 kHz Tone*, *All Talk*, *Call*, *IFB*, *All IFB*, *18 kHz Tone*, *20 kHz Tone*, and *Disabled*.

Talk: In this mode whenever the function is active microphone audio will be sent out the associated Dante audio output (transmitter) channel. This mode will typically be used as part of an intercom or stage announce (SA) implementation. The sidetone function will be active whenever the talk function is active.

Talk with 18 kHz Tone: This mode is similar to the Talk mode except that an 18 kHz sine wave tone is added (summed) with the microphone audio. It is intended for use in REMI/At-Home applications where a "pilot tone" needs to be sent along with talk audio. This is specifically provided for use with the tone-activated ("TOX") IFB function in the Studio Technologies' Model 5422 Dante Intercom Audio Engine product or the talent cue (IFB) function

in the Models 232, 234, and 236 Announcer's Consoles. The sidetone function will be active whenever the Talk with 18 kHz Tone function is active.

All Talk: In this mode the associated button will activate all Model 348 channels that are configured for Talk or Talk with 18 kHz Tone.

Call: In this mode pressing the associated button will cause a 20 kHz sine wave call tone to be sent out any Model 348 channels that are both configured for the Talk or the Talk with 18 kHz Tone modes and are currently active.

IFB: In this mode the Model 348 channel will be used to create a broadcast-type interrupted foldback (IFB) or talent cue source. When the function is not active audio from the corresponding Dante IFB program audio input channel will be routed to the corresponding Dante output channel. When the function is active the microphone (interrupt) audio will be combined with the IFB program audio source. The IFB program audio source will be attenuated, fully muted, or not changed, following the IFB Program Dim Level configuration. The sidetone function will be active whenever the IFB function is active

All IFB: In this mode pressing the associated button will cause all the channels configured for IFB to become active. Note that an audio source routed to the associated IFB program input will be continually routed to the channel's associated audio output. This would typically be the non-interrupt audio source. This is provided such that a timing match can be made between the IFB and non-interrupt output channels.

18 kHz Tone: In this mode an 18 kHz sine wave tone will be sent out the associated Dante output (transmitter) channel. This function can be useful for triggering other functions associated with devices such as the Model 5422 Dante Intercom Audio Engine.

20 kHz Tone: In this mode a 20 kHz sine wave tone will be sent out the associated Dante output (transmitter) channel. This function can be useful for triggering other functions associated with devices such as the Model 5422 Dante Intercom Audio Engine.

Disabled: In this mode the button will not perform a function. Pressing it will cause the button's red LED to flash, indicating that it has been disabled.

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

This value determines the amount of attenuation that will be applied to the Dante program audio input (receive) source when the IFB function is active for this channel. 0 dB will configure the channel to have no change in program audio level. The talk audio will simply be added (summed) with the program audio. When Full Mute is selected the IFB program audio source level will fully attenuate and be replaced by the talk (interrupt) audio. In most broadcast applications the default value of 15 dB will be appropriate.

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

The Dante input (receiver) audio associated with a Model 348 channel can be monitored using the headset's headphone outputs. The destination channel(s) can be configured as desired.

Off: In this mode the input audio will not be sent to either the left or right headphone output channels.

Left: In this mode the input audio will be sent to only the left headphone output channel.

Right: In this mode the input audio will be sent to only the right headphone output channel.

Left and Right: In this mode the input audio will be sent to both the left and right headphone output channels.

Monitor Routing

Choices are *Off*, *Monitor A*, *Monitor B*, and *Monitor A and B*.

The Dante input (receiver) audio associated with a Model 348 channel can be monitored using the Dante monitor output channels. The destination channel(s) can be configured as desired.

Off: In this mode the input audio will not be sent to either of the monitor output channels.

Monitor A: In this mode the input audio will be sent only to the Monitor A output channel.

Monitor B: In this mode the input audio will be sent only to the Monitor B output channel.

Monitor A and B: In this mode the input audio will be sent to both the Monitor A and the Monitor B output channels.

Call Indication

Choices are *Off*, *Visual Only,* and *Visual and Audible*.

A visual and audible indication can be provided whenever a call signal has been detected on a Model 348 input channel. The visual indication is provided by the LED indicators associated with each rotary encoder. The audible indication is provided by way of the Model 348's internal loudspeaker and, if configured appropriately, Dante monitor outputs.

Off: In this mode no visual or audible indication in response to a call signal will be generated.

Visual Only: In this mode when a call signal is detected in an input channel the LED in the associated rotary encoder will flash orange.

Visual and Audible: In this mode when a call signal is detected the LEDs in the associated rotary encoder will flash orange and sequences of audio tones will be output by way of the monitor loudspeaker. The audio tones will also be sent to the Monitor A and/or Monitor B Dante output if the channel's audio input has been so configured.

Operation

At this point all connections and configuration steps should have been completed and everything should be ready for Model 348 operation to commence. In most cases an Ethernet connection with Power-over-Ethernet (PoE) capability will have been made to the primary Ethernet connector. Alternately, a source of 12 volts DC may have been connected to provide power for the Model 348. A stereo or monaural headset will typically be interfaced using either the Headset A or Headset B connector. A GME-3-12 gooseneck microphone may have been installed into the bushing/connector assembly on the top of the Model 348's enclosure.

Using the Studio Technologies' STcontroller software application the Model 348's operating configuration should have been selected to meet the needs of the specific application. An extensive range of configurable parameters are available, making the way in which a specific Model 348 operates be quite unique.

Using the Dante Controller software application the Model 348's network interface and audio channel configuration should have been made. In this way, the operational characteristics of the unit's two Ethernet interfaces will have been selected. In addition, some or all of the eleven Dante audio output channels (Dante transmitter channels) and sixteen Dante audio input channels (Dante receiver channels) will have been routed, by way of Dante "subscriptions," to the receiver and transmitter channels on associated Dante-enabled equipment.

Eight of the Dante audio output channels are associated with the functioning of the eight pushbutton switches. Two additional Dante audio output channels are specified as monitor outputs. And the final Dante output channel provides a Hot Mic output function. Eight of the Dante audio input channels are assigned to the monitor section. Each of these inputs has an associated rotary encoder to adjust its signal level. Eight more of the Dante audio input channels serve as IFB program inputs. These are used in conjunction with the eight pushbutton switches when they are configured for IFB operation.

Initial Operation

The Model 348 will start to function as soon as a Power-over-Ethernet (PoE) or a 12 volts DC power source is connected. However, it may take up to 30 or 40 seconds for full operation to commence. Upon initial power up the various status LEDs, located on the back panel, and the mic source, rotary encoder, and pushbutton LEDs on front panel will light as the internal processors, Ethernet network, and Dante connections begin to function. The various LEDs will then become operational, displaying the status of their associated functions.

Power Status LEDs

An LED labeled PoE is located below the primary Ethernet connector on the Model 348's back panel. It will light green if an Ethernet signal that is providing PoE power is connected. An LED labeled DC is located below the 4-pin XLR connector that is provided for connection to a DC power source. It will light green if a source of 10 to 18 volts DC is connected. If both the PoE and DC LEDs are lit then the PoE Ethernet connection will be providing power to operate the Model 348. The DC power supply will be ready as a "hot standby" should the PoE source fail.

Ethernet Status LEDs

A total of four Ethernet status LEDs are located below the two etherCON RJ45 connectors on the Model 348's back panel. A LINK ACT LED will light green whenever an active connection to an Ethernet network has been established. It will flash in response to Ethernet data packet activity on that interface. A GbE LED will light orange when a Gigabit Ethernet connection is present on that interface.

Dante Status LEDs

The SYS and SYNC LEDs, also located on the back panel, display the operating status of the Dante interface and its associated network activity. After lighting red and green as part of the power-up sequence the SYS LED will light red 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 also be part of the power-up sequence and will light red when the Model 348 is not synchronized with a Dante network. It will light solid green when the Model 348 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 348 is part of a Dante network and is serving as the clock master. It's possible that up to 30 or 40 seconds may be required for the SYNC LED to reach its final state.

How to Identify a Specific Model 348

Functions within the Dante Controller and STcontroller software applications allow specific Model 348 units to be identified. Each application provides an "eyeball" icon that when clicked will activate the Identify function. When Identify is selected it will send a command to a specific Model 348 unit. On that unit the red LEDs associated with the eight

pushbutton switches will "flash" in a unique sequence four times; the actual on/off status of the buttons will not change. In addition, the LINK ACT and GbE status LEDs, located directly below the two RJ45 connectors on the back panel, will slowly flash. After a few seconds the LED identification patterns will cease and normal Model 348 pushbutton LED, and Ethernet status LED operation will resume.

Headset Microphone Power Status LED

An LED indicator is located on the back panel adjacent to the Headset A connector. It is labeled MIC PWR and will light red whenever the headset's microphone electret power source is active and providing low-voltage DC power to the microphone connections on the Headset A and Headset B connectors.

Compressor Active LED and Mic Preamp Gain

An LED indicator, orange in color, is located on the back panel adjacent to the Headset A connector. It is labeled COMP and displays the status of the microphone audio compressor function. This function controls the dynamic range of the audio signal associated with the selected microphone input source. (This will be either the headset's microphone or the gooseneck microphone.) The compressor LED will light whenever the input level from the active microphone, along with the configured microphone preamplifier gain, is such that the dynamic range of the signal is being actively controlled. It's perfectly acceptable for this LED to light intermittently whenever a user is talking at a normal voice level into an associated microphone. But 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. Conversely, if the COMP LED

almost never lights when normal talking is taking place it's possible that changing the 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 the main or talkback functions are active.

LED Intensity

On the Model 348's front panel there are LED indicators associated with the eight channel pushbutton switches, the mic source status display, and the ten rotary encoders. Using the STcontroller application the intensity of these LEDs, as a group, can be configured from among two choices, low or high. If during operation the LED intensity isn't perceived to be optimal the configuration choice in STcontroller should be checked and revised if necessary. In most cases the default intensity, high, will be applicable. However, the low LED intensity configuration choice may be superior in applications where the ambient light in the Model 348's location is also low.

Mic Source Selection

A small, round pushbutton switch located on the upper-left side of the front panel is used to select which microphone source is active. This audio source will be used as needed by the Model 348's talk, sidetone, and IFB functions. The mic source choices are Headset and Gooseneck. Two green LEDs, adjacent to the pushbutton switch, indicate which microphone source is currently active. A Model 348 power-down/power-up cycle will return the microphone source to its last selection.

A system configuration choice in STcontroller allows the microphone source selection to impact the on/off status of the headset's headphone outputs and the monitor output channels. Named Follow Mic Source, this selection is provided to assist users who frequently change between using the headset's microphone and the gooseneck microphone. The

default configuration is for this feature to be disabled (Off). When this configuration choice is enabled (On) and Gooseneck is selected as the microphone source the headset's headphone outputs will mute. When the headset's microphone is selected as the source the monitor outputs and associated loudspeaker will also mute. In both cases the mute state that was automatically enabled can be overridden by pressing the knob on the applicable rotary encoder.

Each microphone source, headset and gooseneck, has an independent preamplifier gain configuration parameter which is accessible by way of the STcontroller software application. If switching between the two microphone sources results in a greatly different overall microphone audio levels then the configuration choice for the microphone preamplifier gains should be reviewed and revised as appropriate.

Hot Mic Output

A Dante output channel has been designated as a hot mic output. This output can be enabled or disabled using the STcontroller software application. The default setting is Disabled. When enabled the selected microphone source, headset or gooseneck, will be permanently connected to the Hot Mic Dante output channel. No pushbutton or rotary encoder operation is required for the audio associated with the selected microphone source to be active on the Hot Mic Dante output. This can be a useful feature but it's important that user be made aware that there is no means of turning off ("muting") this output. They must assume that other personnel will be continually monitoring audio associated with their selected microphone.

Button Action

The action of each of the eight pushbutton switches can be individually configured using STcontroller. There are three button action choices available and a description of them follows:

Momentary

If this mode is selected the pushbutton's associated function will become active whenever the button is pressed and held. When the function is active the pushbutton's green LEDs will be lit.

Latching

If this mode is selected the function associated with the button will alternate between its active and inactive states whenever the pushbutton is momentarily pressed ("tapped"). The pushbutton's green LEDs will be lit whenever the function is active. Upon Model 348 power up the button's associated function will be in its inactive state.

Hybrid

This mode is a combination of the momentary and latching actions. If the pushbutton is pressed and held the associated function will become active until the pushbutton is released. If the pushbutton is momentarily pressed ("tapped") the function will change state. The pushbutton's green LEDs will be lit whenever the function is active. Upon Model 348 power up the pushbutton's associated function will be in its inactive state.

Button Function

The button function configuration is used to select the overall manner in which a specific pushbutton channel operates. Each pushbutton can be independently configured from among nine choices. A careful study of how each of these choice's function will highlight the variety of applications a Model 348 can support. While the product's title includes the text "Intercom Station," that far from covers all the applications in which the unit can provide value.

Talk

When a button function has been configured for Talk and the pushbutton is pressed or the

function is active then audio from the selected microphone source will be connected to the associated Dante output channel. The LED in the pushbutton switch will light green whenever the function is active. When the pushbutton is not pressed nor currently active no audio will be present on the associated Dante output channel. The associated Dante IFB program input channel will not be utilized.

Talk with 18 kHz Tone

When a button function has been configured for Talk with 18 kHz Tone and the pushbutton is pressed or the function is active then audio from the selected microphone source, mixed with an 18 kHz sine wave tone at a level of –20 dBFS, will be connected to the associated Dante output channel. The LED in the pushbutton switch will light green whenever the function is active. When the pushbutton is not pressed nor the function is active no audio (voice or tone) will be present on the associated Dante output channel. The associated Dante IFB program input channel will not be utilized.

All Talk

When a button function has been configured for All Talk and the pushbutton is pressed or the function is active then all other buttons that are configured for Talk or Talk with 18 kHz will become active. The LED in the pushbuttons configured for All Talk will light green whenever the function is active. The associated Dante output channel will not be utilized, nor will the associated Dante IFB program input channel.

Call

When a button function has been configured for Call and the pushbutton is pressed or the function is active then all other pushbuttons that are both configured for Talk or Talk with 18 kHz and are active will have a 20 kHz sine wave tone at a level of –20 dBFS added to

their associated Dante output channels. The LED in the pushbutton configured for Call will light orange whenever the function is active. The buttons that are configured for Talk or Talk with 18 kHz that are active will flash orange. The associated Dante output channel will not be utilized, nor will the associated Dante IFB program input channel.

IFB

When a button function has been configured for IFB a broadcast-type interrupted foldback (IFB), also referred to an interruptible foldback or a talent cue signal, will be created. When the pushbutton is not pressed or active the associated Dante IFB program input source will be connected to the associated Dante output channel. The Dante IFB program input source is connected to the Dante output channel at unity level (no gain or attenuation will be applied to the signal). When the pushbutton is pressed or the function is active then two things will occur. The first is that the Dante IFB program input source will be acted on following the configuration for the IFB program dim value. This will result in the signal level either staying the same, dropping in level (being attenuated) by one of four values, or completely muting. The second action is that the selected microphone source will be added (summed) with the Dante IFB program input source and then routed to the associated Dante output channel. The pushbutton will light green when the function is active.

The IFB function creates a talent cueing signal that is sometimes referred to as Interrupt, Program with Interrupt, or Program + Interrupt. The selected microphone source (headset or gooseneck) serves as the interrupt source. The Dante IFB program input signal is considered to be the program audio source. Note that there is no means provided within the Model 348 to adjust the level of the IFB program input source. This should not be

considered an operational limitation as typically an audio console will provide the program audio source at a nominal line level. As such, any needed adjustment of the signal level can be performed on the console.

All IFB

When a button function has been configured for All IFB and the pushbutton is pressed or the function is active then all of the other buttons configured for IFB will become active. The LED in the pushbutton will light green whenever the function is active. The Dante IFB program audio input will continuously be connected to the associated Dante output channel. This is provided as a Program or Program Only audio signal for use in a dual-channel IFB implementation. Typically, the first channel of a dual-channel IFB signal or "feed" is referred to as Interrupt or Program with Interrupt while the second channel is referred to as Program or Program Only. Using this Dante input-to-output loop-through arrangement can be valuable as any latency (time delay) that occurs within the Model 348's IFB function will be matched in the All IFB signal path. In this way, the Model 348's audio latency will essentially be matched in the program with interrupt and program-only audio paths.

18 kHz Tone

When a button function has been configured for 18 kHz Tone the channel's operation is very simple. When the pushbutton is pressed or the function is active an 18 kHz sine wave tone at –20 dBFS is connected to the associated Dante output channel. No voice or IFB program audio is connected to the associated Dante output channel.

20 kHz Tone

When a button function has been configured for 20 kHz Tone the operation is very simple. When the pushbutton is pressed or the function is active a 20 kHz sine wave tone at –20 dBFS is connected to the associated Dante output channel. No voice or IFB program audio is connected to the Dante output channel.

Disabled

When a button function has been configured for Disabled no audio action will take place. If the pushbutton is pressed it will flash red to indicate that this specific button is disabled. No voice, tone, or IFB program audio is connected to the Dante output channel.

Using the Rotary Encoders

On the front panel of the Model 348 there are ten rotary encoders. Eight of the rotary encoders are located above the channel pushbutton switches. They are associated with the Dante audio input channels. A single rotary encoder is associated with the level of the headset's headphone outputs. And finally, a rotary encoder is associated with the monitor section, impacting the internal loudspeaker and, if configured for post-fader, the two Dante monitor output channels. Each rotary encoder has 24 steps ("clicks" or "detents") for each 360 degrees of rotation. Turning a rotary encoder knob clockwise by 1 and 1/3 rotations (32 steps or 480 degrees) is required to change from audio minimum to audio maximum. (As expected, the same action occurs in reverse: when rotating a rotary encoder counterclockwise by 32 steps the audio level will change from maximum to minimum.) Pressing on the top of a rotary encoder's knob will activate a momentary switch function that is used to mute the associate audio signal(s).

The top surface of each rotary encoder's knob is translucent and RGB (red-green-blue) LEDs within each rotary encoder can display a wide range of colors. A rotary encoder knob that is dimly lit with a dark blue color indicates that its associated function is active. This provides a physical identification of each rotary encoder's

location when a Model 348 is being used in an environment where the ambient light is very low or nonexistent. A rotary encoder knob that's lit dark blue could be considered as being in its default state. It's important to note that there could be a signal present on the associated Dante audio input but unless the Signal Present Display configuration has been enabled the rotary encoder's knob will remain dark blue.

A rotary encoder knob that is lit with a purple color indicates that its associated function has been muted. To mute or unmute a function simply requires that the associated rotary encoder knob be pressed and released ("tapped").

For user assistance, the LEDs associated with the eight channel pushbutton switches can be configured to indicate the approximate position of each of the rotary encoders. For this to be active the Level Control Position Display configuration within STcontroller must be On (it is by default). There are two means of observing the level setting associated with each rotary encoder. One is to press and hold a rotary encoder's knob. One or more of the eight pushbutton switches will light orange. If a function is muted (minimum level) then pushbutton 1 will flash orange. If a function is at full (maximum) level then pushbuttons 1 through 7 will light orange and pushbutton 8 will flash orange. The display of the level will continue until the rotary encoder's knob is no longer pressed. The second method of displaying a rotary encoder's level setting is to rotate an encoder knob at least one step in the clockwise or counterclockwise direction. The pushbutton switches will light orange to display the approximate level and then hold for approximately one second past when the last rotary encoder change is made.

As previously mentioned, 32 encoder steps (1 and 1/3 full rotations) are required to move between the minimum and maximum levels. Each pushbutton switch will light orange in

response to a rotary encoder being within a group of four steps. So pushbutton 1 will light when a rotary encoder has been set to steps 1-4, pushbuttons 1 and 2 will light when a rotary encoder has been set to steps 5-8, etc. Step 1 is considered to be mute and causes pushbutton switch 1 to flash orange. Step 32 is the maximum level and causes pushbuttons 1 through 7 to light orange and pushbutton 8 to flash orange.

The RGB (red-green-blue) LEDs within the rotary encoders can shine through the end of the associated knobs and provide a visual indication of the level of signal associated with the rotary encoders' functions. For the signal level to be displayed on the knob ends requires that the Signal Present Display configuration in STcontroller be selected for On. This is the default condition and is appropriate for most applications.

The rotary encoder knobs labeled 1 through 8 will light in response to the level of signals connected to the associated Dante inputs. As such, they are pre-encoder (also known as "pre-fader") which means that the LEDs will respond to input signal levels prior to any gain or loss that may be selected by adjusting the associated rotary encoder. A rotary encoder's knob will light green to indicate that a signal is present on the associated Dante input with a level of –40 dBFS to –16 dBFS. The knob will light yellow when the signal has a level of –15 dBFS to –5 dBFS. And the knob will light red when the signal has a level that meets or exceeds –5 dBFS.

The rotary encoder knob associated with the headset's headphone output and the rotary encoder knob associated with the monitor function will also light at the same level thresholds as the eight Dante inputs. But there's a major difference as their function's will be post-encoder (also known as "post-fader"). In this way, the level indication on

these two rotary encoder knobs will reflect the setting of their associated encoder. This will prove useful when adjusting the rotary encoders to achieve the desired level settings.

If a rotary encoder is placed in its mute state by pressing the rotary encoder's knob then the knob cap will light purple and the level display will not occur. Also, when mute is active any changes to a rotary encoder's position will not be recognized. To clarify, if a rotary encoder knob is lit purple then any rotations of the knob will not be recognized.

Headset Operation

A headset with either a 5-pin XLR plug (male) or a 4-pin 3.5 mm TRRS plug can be connected with one of the headset connectors on the Model 348's back panel. The connectors are labeled Headset A and Headset B.

Headset Microphone

On Headset A and Headset B the electrical connections for the microphone input and two headphone output channels are internally wired together ("multed" or connected in parallel). As such, only one headset should be connected at a time. If power for an electret microphone that's part of the connected headset is required it should have been selected in the STcontroller application. The red LED, label MIC PWR and located adjacent to the 5-pin XLR connector, will be lit to indicate that low-voltage DC has been applied to the microphone connections on both headset connectors A and B.

Headset Headphone Outputs

Settings within STcontroller select which of the eight Dante input channels are routed, by way of rotary encoders 1 through 8, to the headset's headphone left and right output channels. The rotary encoder labeled HEADSET on the front panel adjusts the level of both headphone output channels. As previously discussed, the

headset's headphone output can be muted by pressing the headset rotary encoder knob. The knob will light purple to indicate that both headphone output channels are muted. If the signal present function is enabled in STcontroller the rotary encoder's knob, when it is not muted, will light green, yellow, or red to indicate the overall headset headphone output channel level. (It will follow a monoaural version of the left and right headset headphone outputs.) It's acceptable that the knob lights yellow on occasion but lighting red would indicate that either or both headphone output channels are at risk for signal clipping (distortion due to insufficient audio headroom to handle the signal level). This would indicate that distortion may be present due to insufficient audio headroom.

Sidetone

A sidetone function is available for assisting headset users in hearing audio from the currently active microphone. The sidetone function will be active whenever one or more buttons configured for Talk, Talk with 18 kHz, or IFB functions are active. Using STcontroller the sidetone level is configured from among five values as well as mute. By default, sidetone is enabled at a configured level of medium. Once configured in STcontroller the sidetone level is fixed and cannot be changed by the user. This is implemented in this manner such that a user will always be provided with a reference level as to how much microphone audio signal is being sent out the Dante output channels.

Headset Headphone Output Dim

Following an STcontroller configuration setting the headset's headphone output level can reduce in level ("dim" or be attenuated) when one or more of the eight button functions are active. Enabling the headphone dim configuration is provided for the rare situation where the headset's headphone output channels are being used as line-level analog

outputs. This could be useful, for example, when connecting to the analog inputs on ampli-fied loudspeakers. If a headset is being used and the headset dim function is enabled then it's probably incorrectly configured and needs to be revised in STcontroller.

Headset Headphone Output Automatic Mute

As previously discussed in this guide a setting in STcontroller allows the headset's headphone output channels to automatically mute when the microphone source is selected for Goose-neck. (By default, this function is not enabled.) This can be useful for users who frequently change from using a headset and associated microphone to using a gooseneck. The un-needed output, either the headset's headphone outputs or internal speaker/post-fader monitor output channels, will automatically mute as the microphone source is switched. It's simple to observe this action by noting that the headset rotary encoder's knob will turn purple when the gooseneck microphone is selected as the source. (Conversely, the monitor rotary encod-er knob will turn purple when the microphone source is selected for Headset.) The muting of the headset's headphone outputs can be temporarily overridden by simply pressing the headset rotary encoder knob.

Monitor Output

The Model 348's monitor section consists of a rotary encoder, two Dante audio output channels, and an internal loudspeaker. These resources allow a wide range of listening sce-narios to be implemented.

Monitor Sources and Rotary Encoders

Settings within STcontroller select which of the eight Dante input channels are routed, by way of the eight rotary encoders, to the two moni-tor output channels. Mixing (summing) of the selected sources creates the two monitor audio signal buses. The rotary encoder, labeled Mon-itor, on the right side of the front panel, adjusts

the level of both the internal loudspeaker and, if configured for post-fader (level following the setting of the rotary encoder), the Dante moni-tor output channels.

As previously discussed, the loudspeaker and post-fader monitor output channels can be muted by pressing the monitor rotary encod-er's knob. The knob will light purple to indicate that mute is active. If the signal present func-tion is enabled in STcontroller the rotary encod-er's knob, when it is not muted, will light green, yellow, or red to indicate the overall monitor output level. (It will respond to a monoaural version of the two monitor channels.) During normal operation it's acceptable that the knob lights yellow on occasion. But frequently light-ing red would indicate that the level of either or both monitor output channels is too high and presents a risk that signal clipping will occur.

Dante Monitor Output Channels

As previously discussed, two Dante audio output channels are associated with the Model 348's monitor section. Several configuration settings in STcontroller impact the way in which the monitor output channels function. Eight in-dependent configuration choices select which of the eight Dante audio inputs are routed to either or both of the monitor output channels. Another configuration setting determines if the level of the monitor output channels will be impacted by the monitor rotary encoder. The Dante monitor outputs can be configured for post-fader making their signal level respond to the setting of the Model 348's monitor rotary encoder. If configured for pre-fader the level of the monitor output channels will not be im-pacted by the action of the rotary encoder. This is provided for applications where the monitor output channels will be routed to devices that include level control capability. Such devices would include audio consoles, matrix intercom systems, and amplified loudspeakers that con-tain integrated level controls.

Another STcontroller configuration setting allows the monitor output channels to be automatically dimmed (attenuated) when any of the functions associated with the eight pushbutton switches are active. This can help to ensure that audio signals being reproduced by externally connected amplified speakers don't interfere with audio that's being picked up by selected microphone.

Loudspeaker Output

The Model 348 contains a small loudspeaker which is located on the right side of the front panel. A configuration setting in STcontroller selects the audio source or sources that are to be sent to the loudspeaker. The choices are Monitor A or Monitor B. Another configuration selection allows the loudspeaker level to automatically be dimmed (attenuated) when any of the functions associated with the eight pushbutton switches are active. This can help to ensure that audio signals being reproduced by the loudspeaker don't interfere with audio being picked up by the selected microphone. Use the monitor rotary encoder knob to adjust the level of the loudspeaker. Push the rotary encoder's knob to mute or unmute the loudspeaker (and post-fader monitor outputs) as desired.

Monitor Output Automatic Mute

As previously discussed twice in this guide, a configuration setting in STcontroller allows the loudspeaker and post-fader monitor output channels to automatically mute when the microphone source is selected for Headset (by default, this function is not enabled). This can be useful for user's who frequently change from using a headset and associated microphone to using a gooseneck microphone and internal loudspeaker and/or monitor output channels. The unneeded output, either the headset's headphone outputs or the internal loudspeaker/post-fader monitor output channels, will automatically mute as

the microphone source is switched. It's simple to observe this action by noting that the monitor rotary encoder's knob will light purple when the microphone source is selected for Headset. The muting of the loudspeaker speaker and post-fader monitor output channels can be temporarily overridden by pressing the monitor rotary encoder knob.

Call Indication

The Model 348 can be configured to respond to call signals that are present in any of the eight Dante input channels. A 20 kHz tone that's in-band (part of the audio content in a channel) will be detected as a call signal. Any channel that is configured for Talk or Talk with 18 kHz Tone will respond to a call signal using either a visual-only indication or by way of both a visual and an audible (audio tone) indication. The visual indication is displayed by the associated rotary encoder knob's flashing orange. The audible indication is created by sending a continuous 3-burst sequence of 524 Hz sine wave tone to both the Dante monitor output channels and the internal loudspeaker. Using STcontroller there are individual configuration choices that allow the overall level of the call tones to be independently selected for Monitor A and Monitor B.

Technical Notes

IP Address Assignment

By default, each of the Model 348's Ethernet interfaces will attempt to automatically obtain an IP address and associated settings using DHCP (Dynamic Host Configuration Protocol). If a DHCP server is not detected an IP address will automatically be assigned using the link-local protocol. This protocol is known in the Microsoft® world as Automatic Private IP Addressing (APIPA). It is also sometimes referred to as auto-IP (PIPPA). Link-local will randomly

assign a unique IP address in the IPv4 range of 169.254.0.1 to 169.254.255.254. In this way, multiple Dante-enabled devices can be connected together and automatically function, whether or not a DHCP server is active on the LAN. Even two Dante-enabled devices that are directly interconnected using an RJ45 patch cord should correctly acquire IP addresses and be able to communicate with each other.

As previously discussed in this guide, the Model 348's IP address(es) and related network parameters can be manually set for a fixed (static) configuration using the Dante Controller software application. In the unfortunate event that a specific Model 348'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 348. 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 (voice-over-internet-protocol quality of service) capability is recommended. This can typically be implemented on virtually all contemporary managed Ethernet switches. There are even specialized switches that are optimized for entertainment-associated applications. Refer to the Audinate website (www.audinate.com) for details on how to optimize a network for Dante applications.

Button Labeling

The Model 348 provides eight pushbutton switches that are associated with the eight talk functions. The button covers are clear with a white translucent lens underneath. As of the time of writing this guide the factory doesn't have a recommended method as to how to install custom labels underneath the button caps. We have observed units where this has been successfully implemented but exactly how it was executed is not known. It's possible that a button cap can be removed using a gentle prying force on its bottom edge using a straight-blade screwdriver. An Xcelite® "greenie" screwdriver, ubiquitous to the audio and broadcast industry, might be appropriate. Once a cap is removed a custom label could be inserted between it and the translucent lens. Then the cap could be "snapped" back onto the body of the switch.

Additional Connector Location

A spare connector location, labeled A, is provided on the Model 348's back panel. From the factory it contains a blank plate that can be removed and replaced with a variety of "XLR-style" connectors. The spare connector location is specifically included so that a Model 348 can be customized to meet the many specific needs that arise in broadcast and related audio applications. Expected uses for this location include adding a 6- or 7-pin XLR connector to allow direct connection of a broadcast headset. Other uses include adding a ¼-inch 3-conductor "stereo" headphone output or creating a "mult" function for the DC input connection. A number of interface cable assemblies, along with some special function kits, are available from Studio Technologies. Please refer to the website for details on what is available.

The spare connector location is compatible with the Neutrik DL-series of connectors. For flexibility XLR versions are available that provide from three to seven contacts. For example, a compatible 3-pin female connector would be Neutrik part number NC3FD-L-1. Another female connector with the unique Switchcraft® 6-pin arrangement, the NC6FDS-L-1, is often used to support headsets. Other connectors, such as the etherCON protected RJ45 and 3-conductor ¼-inch jack, can be also be installed. The 4-40 thread pitch hardware that secures the blank plate to the Model 348's back panel is also intended to be used to secure the selected connector.

The Model 348's enclosure must be disassembled prior to installing a connector in the spare location. Six 4-40 flathead machine screws, one on each side of the enclosure, two on the bottom front of the enclosure, and two on the back panel, must be removed (the machine screw directly above the Headset B connector should not be removed). These screws function best when a #1 Phillips-head screwdriver is utilized. Once the six screws are removed the cover can then be carefully separated from the chassis. The cover will remain attached by means of a flexible cable assembly. This "flex-cable" assembly links the main printed circuit board assembly with the button and rotary encoder board assembly. Ensure that the flex cable is not damaged while the Model 348 is being customized.

If a connector is added to the Model 348's spare connector location adding a label to it can be helpful. For a good look it is recommended that a Brother® P-Touch ¼-inch (6 mm) label be created. Tape material that prints white text on a black background would be effective for use with the Model 348. The Brother label cassette number TX-3151, white on black, is appropriate for use with many of their printers.

Application Firmware Version Display

The STcontroller software application is used to display the version numbers of the Model 348's three firmware (embedded software) components. These are the main firmware, the secondary firmware, and the FPGA firmware. The main firmware is used by the main microcontroller integrated circuit to implement most of the Model 348's general operating actions. The secondary firmware is used by a second, less-sophisticated microcontroller integrated circuit that controls and reports on the actions of the rotary encoders, the pushbutton switches, and the LEDs associated with them. The FPGA firmware is used by the field-programmable-gate-array integrated circuit in which all audio processing is performed.

To observe the firmware version numbers, begin by connecting the Model 348 unit to a network. Connect an external source of 12 volts DC if a PoE Ethernet connection has not been made. The unit will power up and begin to function. Start STcontroller, review the list of identified devices, and select the specific Model 348 from which you want to determine its application firmware versions. Then select **Version** under the **Device** tab. A dialog will then display that will provide a host of useful information. This will include the firmware versions as well as details on the Dante interface firmware.

Application Firmware Update Procedure

It's possible that updated versions of the three firmware (embedded software) files that are utilized by the Model 348's two microcontroller and one FPGA (field-programmable-gate-array) integrated circuit will be released to add features or correct issues. Refer to the Studio Technologies' website for the latest firmware files. The unit has the ability to load revised files into non-volatile memory by way of a standard

USB flash drive. The Model 348 implements a USB host function and provides access by way of a type A receptacle located on the back panel. The Model 348 updates its firmware using files named **M348.bin** for the main firmware, **M348sec.bin** for the secondary firmware, and **BWY.bit** for the FPGA firmware.

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, two, or all three of the firmware files can be automatically loaded at the same time. In the root directory, save the desired new firmware file(s), ensuring that the required name or names are specified. For the main firmware the file name must be **M348.bin**. For the secondary firmware the file name must be **M348sec.bin**. And for the FPGA firmware the file name must be **BWY.bit**. Studio Technologies will supply each firmware file inside a .zip archive file. While the firmware file inside of the zip file will adhere to the naming convention required by the Model 348, the name of the zip file itself will include the file's version number. For example, a file named **M348v1r05MCU.zip** would indicate that version 1.05 of the main MCU firmware (**M348.bin**) is contained within this zip file.

Once the USB flash drive is inserted into the USB interface, located on the back panel, the unit must be powered off and again powered on. At this point the file(s) will automatically load. The precise steps required will be highlighted in the next paragraphs of this guide.

To install one, two, or all three firmware files follow these steps:

1. Remove power from the Model 348. This will entail either removing the Ethernet connection from the RJ45 jack labeled Primary-PoE or removing the external source of 12 volts DC. (Both must be disconnected if for some reason dual-power has been implemented.)

2. Locate the USB connector on the Model 348's back panel, labeled Firmware Update. Directly below the USB connector is a small hole that provides visual access to a green LED indicator.

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

4. Apply power to the Model 348. Power can be provided by Power-over-Ethernet (PoE) associated with an Ethernet signal connected to Primary-PoE or from an external 12 volts DC source.

5. After a few seconds the Model 348 will run a "boot loader" program that will automatically load and save the new firmware file(s) that are present on the USB flash drive. The update process can range from approximately 15 seconds to approximately 45 seconds, depending on which combination of the three files are going to be updated. While the files are being loaded the green LED, located below the USB connector, will flash slowly. It's also possible that the ten knobs associated with the rotary encoders will light red to indicate that normal activity is not taking place. Once the entire loading process has completed the Model 348 will restart using the newly saved main firmware.

6. At this time the Model 348 is functioning with the newly loaded firmware and the USB flash drive can be removed. But to be conservative, remove the power source first and then remove the USB flash drive.

7. Confirm that the desired firmware has been loaded and that the Model 348's three firmware files are as you desire. This is accomplished using the STcontroller software application. (Use the **Version** selection under the **Device** tab.)

Note that upon power being applied to the Model 348 if the USB flash drive doesn't have

the correct file(s) in its root folder no harm will occur. Upon power up the green LED, located below the USB connector, will flash on and off rapidly for a few seconds to indicate that a valid file has not been found and then normal operation using the unit's existing application firmware will begin.

Broadway Firmware Update

As previously discussed in this guide, the Model 348 implements Dante connectivity using the Broadway integrated circuit from Audinate. The Dante Controller software application can be used to determine the version of the firmware (embedded software) that resides in Broadway. The STcontroller software application can also be used to identify the firmware version. (Use the **Version** selection under the **Device** tab.) The Dante Firmware Update Manager (FUM) application program has traditionally been used to update the Broadway firmware. The Dante Controller software application also includes an automated method of updating Broadway firmware. Both applications are available, free of charge, on the Audinate website (www.audinate.com).

Restoring Factory Defaults

A command in the STcontroller software application allows the Model 348's default configuration selections to be reset to the factory values. From STcontroller select the Model 348 for which you want to restore its defaults. Select the **Device** tab and then select the **Factory Defaults** feature. Then click on the **OK** box. Refer to Appendix A for a list of the Model 348's factory default values.

Specifications

Applications: Dante-based intercom, IFB (interrupted foldback) master station, audio monitor mixer, specialized tone generator

Power Sources:

Power-over-Ethernet (PoE): class 0 (classification unimplemented, ≤12.94 watts) per IEEE® 802.3af

External: 10 to 18 volts DC, 0.65 A maximum at 10 volts DC (can be powered by optional PS-DC-02)

Network Audio Technology:

Type: Dante audio-over-Ethernet

AES67-2013 Support: yes, selectable on/off

Dante Domain Manager (DDM) Support: yes

Ethernet Interface Configuration: Switched or Redundant

Bit Depth: 16, 24, or 32

Sample Rate: 48 kHz

Dante Receiver (Input) Channels: 16

Dante Transmitter (Output) Channels: 11

Dante Audio Flows: 32; 16 transmitter, 16 receiver

Internal Digital Audio Processing: 32-bit, fixed

Input-to-Output Audio Processing Latency: <200 uSec

Nominal Input and Output Level: –20 dBFS

Network Interfaces: 2, Primary-PoE and Secondary

Type: 1000BASE-T (Gigabit Ethernet ("GigE")) per IEEE 802.3ab (10 and 100 Mb/s not supported)

Power-over-Ethernet (PoE): per IEEE 802.3af (applicable to Primary-PoE network only)

Microphone Input – Headset:

Compatibility – Headset A: single- or dual-ear broadcast-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

Type: unbalanced

Impedance: 1 k ohms, nominal, microphone power off; 690 ohms, nominal, microphone power on

Gain: 26, 32, 38, 44, 50 dB, selectable

Frequency Response: –4 dB at 30 Hz, –2.6 dB at 40 Hz, –1.8 dB at 50 Hz, –2.4 dB at 10 kHz, –3.8 dB at 20 kHz

Distortion (THD+N): <0.09%, measured at –20 dBFS, 22 Hz to 22 kHz bandwidth, 38 dB of gain

Dynamic Range: >93 dB, A-weighted, 26 dB gain

Microphone Input – Gooseneck:

Compatibility: Studio Technologies' GME-3-12

Microphone Power: 5 volts DC via 4.99 k resistor

Impedance: 3.3 k ohms, nominal

Gain: 12, 18, 24, 30, 36 dB, selectable

Frequency Response: –3.0 dB at 40 Hz, –2.0 dB at 50 Hz, –2.0 dB at 16 kHz, –3.0 dB at 20 kHz

Distortion (THD+N): <0.04%, measured at –20 dBFS, 22 Hz to 22 kHz bandwidth, 36 dB of gain

Dynamic Range: >97 dB, A-weighted, 12 dB gain

Compressor:

Application: applies to headset and gooseneck microphone audio

Threshold: 1 dB above nominal Dante output level (–19 dBFS)

Slope: 2:1

Status LED: compressor active

Dante Receivers (Inputs) – Monitor 1-8:

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

Dante Receivers (Inputs) – IFB Program 1-8:

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

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

Speaker Monitor Output:

Type: single-channel (monaural)

Speaker: 1.3-inch (32 mm) diameter

Maximum Power: 4 watts RMS, nominal

Frequency Response: 150 Hz to 20 kHz, ±3 dB

18 kHz and 20 kHz Tone Outputs:

Type: sine wave

Level: –20 dBFS

Frequency Accuracy: <10 ppm

Distortion: <0.0001%

Call Function:

Receive Frequency: 20 kHz, ±800 Hz, within audio channel

Receive Level: –27 dBFS minimum

Send Frequency: 20 kHz

Send Level: –20 dBFS

Audible Alert: 3-burst sequence, 524 Hz, sine wave, selectable level range

Connectors:

Headset A: 5-pin female XLR

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

Gooseneck Microphone: ¼-inch 3-conductor with 7/16-20 UNF threaded bushing; 4-40 hex head socket set screw allows microphone to be secured into bushing

Ethernet: 2, Neutrik NE8FBH etherCON RJ45 receptacles

External DC: 4-pin male XLR (pin 1 negative, pin 4 positive)

USB: type A receptacle (used only for updating firmware)

Configuration: requires Studio Technologies' STcontroller software application, version 2.06.00 and later

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: 0 to 95%, non-condensing

Altitude: not characterized

Spare Connector Location: 1

Allows a Studio Technologies' cable assembly or option module to be installed. Also compatible with Neutrik NC*D-L-1 connectors (*=3F, 3M, 5M, 6F, 6FS, etc.).

Dimensions (Overall):

6.5 inches wide (16.5 cm)
2.9 inches high (7.4 cm)
4.9 inches deep (12.5 cm)

Deployment: intended for tabletop applications

Weight: 2.1 pounds (0.95 kg)

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

Appendix A

STcontroller default Model 348 configuration values:

General Menu Page:

Microphone Input – Headset Mic Power: Off

Microphone Input – Headset Mic Gain: 38 dB

Microphone Input – Gooseneck Mic Gain: 24 dB

Headset – Sidetone Level: Medium

Headset – Dim: 0 dB

Speaker – Source: Monitor A

Speaker – Dim: 6 dB

Dante Monitor Outputs – Mode: Off

Dante Monitor Outputs – Dim: 0 dB

System – Level Control Position Display: On

System – Signal Present Display: On

System – LED Intensity: High

System – Headset and Monitor Outputs Follow Mic Source: Off

System – Hot Mic: Off

System – Monitor A Call Tone Level: Off

System – Monitor B Call Tone Level: Off

Channel Specific Menu Page (all parameters identical for Channels 1-8):

Button Mode: Hybrid

Button Function: Talk

IFB Program Dim: 15 dB

Headset Routing: Left and Right

Monitor Routing: Monitor A

Call Indication: Visual Only