



Model 348 Intercom Station Featuring Dante® Technology

Key Features

- Dante audio-over-Ethernet technology
- Excellent audio quality
- Eight independent talk and listen channels
- 5-pin female XLR headset connector
- 3.5 mm 4-conductor TRRS CTIA headset connector
- 1/4" gooseneck microphone connector
- Built-in speaker
- IFB (talent cue) functions
- Call send and receive functions
- Support for Quindar tones
- Uses STcontroller for configuration
- Redundant Ethernet connections
- PoE and 12 Vdc powering



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, aerospace, 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 Dante receiver (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 external Dante-enabled audio devices such as the Studio Technologies' Model 5421 or Model 5422A Dante Intercom Audio Engines. 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 jacks which allow interfacing with single or redundant Dante Ethernet networks. The

primary network connection can provide power to the unit using standard Power-over-Ethernet (PoE). It can also be powered using a 12 volts DC source that is connected using a broadcast-standard 4-pin XLR connector.

The Model 348 supports connection of a broadcast- or intercom-style headset that use a dynamic or electret (DC powered) microphone. The unit provides both a 5-pin female XLR and a 3.5 mm TRRS connector allowing for a traditional "pro" or a contemporary gaming headset to be utilized. In addition, the Studio Technologies' GME-3-12 electret gooseneck microphone can be directly connected using the 1/4-inch jack located on the top of the unit's enclosure. A low-noise microphone preamplifier and associated voltage-controlled-amplifier (VCA) dynamics controller (compressor) ensures excellent headset and gooseneck microphone audio quality while minimizing the chance of signal overload.

A Dante receiver (input) channel can also be used as the talk audio source. This was specifically included to allow two Model 348 units to "work" together to support more than eight talk channels. A pushbutton switch allows users to directly select the active talk audio source. Choices include the headset mic, the gooseneck mic, or the Dante Aux In receiver (input) channel.

All Model 348 operating features are configured using the STcontroller software application. An extensive set of parameters allows a unit's functions to be tailored to meet the needs of

many applications. STcontroller is available, free of charge, from the Studio Technologies' website. Versions are available that are compatible with the Windows® and macOS® operating systems. STcontroller is 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 encoders (controls) 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 Dual Channel headset routing mode allows each rotary encoder to adjust the level of two input sources.

The user can monitor the Dante audio inputs by means of a headset, a built-in speaker, or two Dante transmitter (output) channels. Two additional rotary encoders are used to control the overall audio level and on or off (mute) status of the signals being sent to the headset and speaker outputs. A modern class-D amplifier integrated circuit drives the speaker efficiently while preserving audio fidelity.

Extensive configuration choices allow the operation of the eight pushbutton switches and associated output channels to be optimized to meet the needs of an extensive range of specialized applications. They can be independently configured for talk (intercom), IFB (talent cue), call signal (20 kHz tone), and other related actions. The buttons can also be configured to provide an "all-call" action associated with the talk and IFB functions.

A special button configuration mode supports the generation of talk channels that include Quindar Tones. These are short-duration "intro" and "outro" audio signals that were traditionally used in space programs to control the on and off status of transmitters. In recent years these tones have taken on the function of providing an audible indication of when Capsule Communicator (CapCom) transmissions are taking place. These ubiquitous "beeps" have become synonymous with ground-to-astronaut communications.

A hot mic Dante transmitter (output) channel is provided. When enabled, this allows an "always active" signal associated with the selected microphone (talk) audio source to be utilized by devices such as monitor loudspeakers or matrix intercom systems. A tally tone Dante transmitter (output) channel is also provided. This output provides an 18 kHz sine wave signal whenever any of the eight talkback button functions are active. This can be utilized by external systems that require a trigger signal for muting of a loudspeaker system or indicating that a microphone associated with the Model 348 is active.

For performance confirmation an integrated sidetone function allows audio coming from the active talk audio source to be returned to the headset output. An audible alert, using the internal speaker, can be generated in response to a call signal. Provision

has been made such that a technician can "customize" the Model 348's hardware. Option kits, purchased separately, can be added to support additional functions. These include adding two remote control inputs which can be configured to mimic the action of talk buttons.

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 receptacle 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 twisted-pair Ethernet interfaces. The 1000BASE-T Gigabit Ethernet (GigE) interconnections are made by way of Neutrik® etherCON RJ45 jacks. 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 Switched or Redundant modes.

The Model 348's operating power can be provided by way of the Primary-PoE 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 12 Dante transmitter (output) audio channels and 16 Dante receiver (input) audio 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 preamp and compressor is routed to an analog-to-digital conversion (ADC) section that supports a sampling rate of 48 kHz. A Dante receiver (input) channel can be used as an alternate talk source. The selected talk audio signal routes through a 32-bit microcontroller and on to the Dante interface section where it is packetized and prepared for transport over Ethernet. A total of 12 Dante transmitter (output) channels are provided: one each associated with the unit's eight channels, two monitor output channels, one hot mic output channel, and one tally tone channel.

Audio input signals arrive via 16 Dante receiver (input) channels and pass into the Model 348's 32-bit microcontroller. Eight input channels are associated with the monitor section while the other eight inputs are used as program sources for the IFB (talent cue) functions. A special Headset Routing configuration allows all 16 Dante receiver (input) channels to be monitored as pairs. One of the latter input sources can also serve as a talk audio source. All channel routing, headphone and monitor level control,

IFB creation, and sidetone functionality is performed within the digital domain. This provides flexibility, allows precise level control, and eliminates the need for analog audio signals from having to pass through electromechanical level controls. The audio signals destined for the headphone and speaker outputs are sent to high-performance digital-to-analog converter circuitry 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 receptacle 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 its 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.

Model 348 Specifications

Applications: Dante-based intercom, broadcast IFB (talent cue) master station, audio monitor mixer, aerospace (including capsule communicator (CapCom)), and specialized tone generation

Power Sources:

Power-over-Ethernet (PoE): class 3 mid-power, ≤12.94 watts per IEEE® 802.3af
DC Input: 10 to 18 volts DC, 1.1 A maximum at 12 volts DC (can be powered by optional PS-DC-02)

Network Audio Technology:

Type: Dante audio-over-Ethernet
AES67-2018 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: 12
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 interface 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
Microphone Power: 3.3 volts DC via 2.00 k resistor, selectable on/off
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: 3.3 volts DC via 2.49 k resistor
Impedance: 3.3 k ohms, nominal
Gain: 12, 18, 24, 30, 36, 42 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 transmitter (output) level (-19 dBFS) (-13 dBFS when gooseneck mic gain selected for 42 dB)
Slope: 2:1
Status LED: compressor active

Dante Receivers (Inputs) – Monitor 1-8:

Frequency Response: not applicable, sources are Dante receivers which pass data through to Dante transmitters

Dante Receivers (Inputs) – IFB Program 1-7, Aux In:

Frequency Response (Call Detect Disabled): Not applicable, sources are Dante receivers which pass data through to Dante transmitters

Frequency Response (Call Detect Enabled): 20 Hz to 12 kHz, +0/ -3 dB, nominal

Level Trim (Aux In): -12, -6, 0, 6, and 12 dB, adjustable

Dante Transmitters (Outputs) – Monitor Outputs 1-2:

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

Dante Transmitter (Output) – Tally Tone:

Frequency: 18 kHz sine wave

Level: -20 dBFS

Headset Headphone Output:

Type: 2-channel (stereo)

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

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

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

Distortion (THD+N): <0.02%

Dynamic Range: >93 dB

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

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

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

18 kHz and 20 kHz Tone Outputs:

Type: sine wave

Level: -20 dBFS

Frequency Accuracy: <10 ppm

Distortion: <0.0001%

Quindar Tones Support:

Intro: 2525 Hz sine wave

Outro: 2475 Hz sine wave

Duration: 250 milliseconds

Level: -28 dBFS

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

Remote Control Inputs: 2

Function: configurable, can mimic the action of the talkback buttons

Type: active low, 1 mA maximum, input pulled up to 3.3 volts DC via 3.4 k ohm resistors

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: 3-conductor 1/4-inch with 7/16-20 UNF threaded bushing; 4-40 UNC hex head socket set screw allows microphone to be secured into bushing

Ethernet: 2, Neutrik NE8FBH etherCON RJ45 jacks (compatible with etherCON CAT5 plugs)

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

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

Remote Control Inputs: 3-pin header located on the main "Broadway" circuit board

Headset Microphone Input: 3-pin header located on the analog circuit board

Headset Phones Output: 3-pin header located on the analog circuit board

Configuration: requires Studio Technologies' STcontroller software application

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

DC Power Supply Option: Studio Technologies' PS-DC-02 (100-240 V, 50/60 Hz; 12 Vdc, 1.5 A), purchased separately

Weight: 2.1 pounds (0.95 kg)

Specifications and information subject to change without notice.

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