Model 5312
Intercom Station

STUDIO TECHNOLOGIES INC.

Key Features

- Dante audio-over-Ethernet technology

- Excellent audio quality

- 12 independent talk and listen channels

- 5-pin female XLR headset connector

- ¼-inch gooseneck microphone connector

- Built-in speaker

- IFB (talent cue) functions

- Call send and receive functions

- Uses STcontroller for configuration

- Redundant Ethernet connections

- Universal AC mains powering

- Lightweight enclosure, single rack-space (1U) mounting

Overview

The Model 5312 Intercom Station provides 12 independent talk and listen channels that are compatible with Dante® audio-over-Ethernet networks. The rack-mounted 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 5312'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 5312 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 a Model 5312 user's ability to easily create monitor mixes from the 12 input audio channels. This makes the unit a viable choice for listen-only scenarios.

Over a standard Ethernet network, multiple Model 5312 units can be used in party-line (PL) intercom applications with help from external Dante-enabled audio devices such as the Studio Technologies' Dante Intercom Audio Engines. Model 5312 units can also be used "point-to-point" or interfaced with Dante-compatible matrix intercom systems. The Model 5312 includes two RJ45 jacks which allow interfacing with single or redundant Dante Ethernet networks. The unit features a "universal" AC mains input, allowing a source of 100-240 volts, 50/60 Hz to provide operating power.

The Model 5312 supports connection of a broadcast- or intercom-style headset that incorporates a dynamic or electret (DC powered) microphone. A 5-pin female XLR connector, located on the front panel, allows traditional "pro" headsets to be utilized. In addition, the Studio Technologies' GME-3-12 electret gooseneck microphone can be directly connected using the ¼-inch jack assembly that is also located on the front panel. A low-noise microphone

Model 5312 Intercom Station Front and Rear Views

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.

The Model 5312 includes a hot mic Dante transmitter (output) channel, a channel active channel, and four auxiliary Dante receiver (input) channels, with one of the latter able to be used as the unit's talk audio source. These resources were specifically included to allow two Model 5312 units to "work" together to support more than 12 talk channels. A graphics display and pushbutton switches on the unit's front panel allows users to select the active talk audio source. Choices include the headset mic, the gooseneck mic, and an auxiliary Dante receiver (input) channel.

All Model 5312 operating features are configured using the STcontroller software application. An extensive set of parameters allows the unit's functions to be tailored to meet the needs of 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 reviewing, revising, saving, and loading a unit's operating parameters.

The Model 5312's front panel includes 13 rotary controls (encoders), 12 of which are used to adjust the level of the Dante receiver (input) signal sources and create a monitor "mix." They are also used to fully mute an input as well as activating a channel "solo" listen function. Using RGB (red-green-blue) LEDs, the knob of each encoder is illuminated and can display if a channel is muted, can indicate if a signal is present on its associated audio input, and can light when an in-band (20 kHz tone) call signal is detected. A graphics display and five pushbutton switches on the Model 5312's front panel allows select operating features to be displayed and configured.

The user can monitor the mix of the Dante receiver (input) channels by means of the headset, a built-in speaker, or two Dante transmitter (output) channels. The 13th rotary encoder, located on the front panel, is used to control the overall audio level and on/off (mute) status of the signals being sent to the headset, speaker, and Dante monitor output channels.

Extensive configuration choices allow the operation of the 12 pushbutton switches and associated Dante transmitter (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. Buttons can also be configured to provide an "all-call" action associated with other buttons that are configured for talk or IFB functions.

As previously mentioned, the Model 5312 includes a Dante transmitter (output) channel called Hot MIc. When enabled, this allows an always-active, or an active when a talk channel is active, function associated with the selected talk audio source. The talk audio source will typically be a headset's microphone or a gooseneck microphone. The hot mic output function can be utilized by devices such as monitor loudspeakers, matrix intercom systems, or audio logging equipment.

A tally tone Dante transmitter (output) channel is also provided. This output provides an 18 kHz sine wave signal whenever one or more of the 12 talk button functions is active. This can be utilized by external systems that require a trigger signal for muting a loudspeaker system or to indicate that a audio source associated with the Model 5312 is active.

For performance confirmation the unit provides an integrated sidetone function, allowing audio coming from the active talk audio source to be routed to the headset output. An audible alert, using the internal speaker, can be generated in response to a high-frequency call signal. The Model 5312 includes two remote control inputs, accessible by way of a 3-conductor 3.5 mm TRS jack, which can be configured to mimic the action of two of the talk pushbutton switches.

The Model 5312 is intended for rack (1U) mounting and has overall dimensions of 19.0 inches wide (16.5 cm), 1.72 inches high (4.4 cm), and 5.3 inches deep (13.5 cm). The enclosure is made of aluminum and weighs just 2.4 pounds (1.1 kg). The unit's firmware (embedded software) 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

The Model 5312 connects to one or two local area networks (LANs) by way of twisted-pair Ethernet interfaces. The unit's 1000BASE-T Gigabit Ethernet (GbE) interconnections are made by way of two RJ45 jacks. The Ethernet interfaces can be configured, using the Dante Controller software applications, to serve in switched or redundant modes.

Dante Audio-over-Ethernet

Audio data is sent to and received from the Model 5312 using the Dante audio-over-Ethernet media networking technology. As a Dante-compliant device, the Model 5312's 16 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 in each direction. The digital audio's bit depth is up to 32 with a sample rate of 48 kHz.

The Model 5312 is compliant with the AES67 interoperability standard. In addition, it's compatible with the Dante Domain Manager™ (DDM) software application from Audinate®. Bi-color LEDs, located on the unit's back panel, provide status indications of Ethernet network performance.

Audio Quality

The Model 5312'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. The now-digital talk audio signal routes through a 32-bit microcontroller integrated circuit and on to the Dante interface section where it is packetized and prepared for transport over Ethernet. A total of 16 Dante transmitter (output) channels are provided: one associated with each of the unit's 12 talk 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 5312's 32-bit microcontroller. Twelve input channels are associated with the monitor section while the other four serve as auxiliary channels. One or more of these latter channels can be used as program sources for the IFB (talent cue) functions or as a talk audio source. All channel routing, headphone, speaker, and monitor level control, IFB creation, and sidetone functionality are 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 outputs and the speaker are sent to high-performance digital-to-analog (DAC) converter circuitry and then on to robust driver circuitry.

Future Capabilities and Firmware Updating

The Model 5312 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) files to be updated using a USB flash drive. The Model 5312 uses the Brooklyn module from Audinate to implement its Dante interface. The firmware in this module can be updated via an Ethernet connection, helping to ensure that its capabilities remain up to date

Model 5312 Specifications

Applications: Dante-based broadcast, theater, industrial, and aerospace intercom; broadcast IFB (talent cue) master station; audio monitor mixer

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
Number of Dante Receiver (Input) Channels: 16
Number of Dante Transmitter (Output) Channels: 16
Number of Dante Flows: 32 receiver, 32 transmitter
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 (PRI) and secondary (SEC)
Type: 1000BASE-T Gigabit Ethernet (GbE) per IEEE 802.3ab (10 and 100 Mb/s not supported)

Microphone Input – Headset:
Compatibility: 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
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: 2.0 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

Dante Receivers (Inputs) – Monitor 1-12:
Frequency Response: not applicable, sources are Dante receivers (inputs) which pass data through to Dante transmitters (outputs)

Dante Receivers (Inputs) – Auxiliary 1-4:
Applications: configurable as IFB program audio sources and auxiliary talk input
Frequency Response (Call Detect Disabled): not applicable, sources are Dante receivers (inputs) which pass data through to Dante transmitters (outputs)
Frequency Response (Call Detect Enabled): 20 Hz to 12 kHz, +0/–3 dB, nominal
Level Trim: –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 ohms 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: 1.5-inch (37 mm) diameter
Maximum Power: 5 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%
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 two talk buttons
Type: active low, 1 mA maximum, input pulled up to 3.3 volts DC via 3.4 k ohm resistors

AC Mains Power Source: 100 to 240 V, 50/60 Hz; 30 W maximum

Connectors:
Headset: 5-pin female XLR
Gooseneck Microphone: 3-conductor ¼-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, RJ45 jacks
Remote Control Inputs: 3-conductor 3.5 mm TRS jack
USB: type A receptacle (used for updating main MCU, secondary MCU, and FPGA firmware)
AC Mains Input: 3-blade, IEC 320 C14-compatible (mates with IEC 320 C13)

Configuration: requires Studio Technologies' STcontroller software application

Software Updating: USB flash drive supports updating of main MCU, secondary MCU, and FPGA firmware (embedded software); Dante interface firmware updated via Ethernet interface

Environmental:
Operating Temperature: 0 to 50 degrees C (32 to 122 degrees F)
Storage Temperature: –40 to 70 degrees C (–40 to 158 degrees F)
Humidity: 5 to 95%, non-condensing
Altitude: not characterized

Dimensions (Overall):
19.0 inches wide (48.3 cm)
1.72 inches high (4.4 cm)
5.3 inches deep (13.5 cm)

Mounting: one space (1U) in a standard 19-inch rack

Weight: 2.4 pounds (1.1 kg)

Specifications and information subject to change without notice.