Model 394 GPI Interface

Key Features

- Transports two contact closures over Ethernet networks
- Uses Dante audio-over-Ethernet technology
- Generates 20 kHz sine wave tones
- Compatible with other Studio Technologies' products
- Provides LED Status Indicators
- Supports external contact inputs and integrated pushbutton switches
- Configured and monitored using STcontroller application
- Power-over-Ethernet (PoE) powered

Introduction

The Model 394 GPI Interface allows two contact closures associated with a piece of electronic equipment, or the status of two pushbutton switches, to be "extended" over an Ethernet network. The unit uses in-band 20 kHz sine wave audio tones and the Dante audio-over-network protocol to transport the status of its two GPI functions. Installation is simple and confirmation is easy using the STcontroller software application. The compact, lightweight unit uses the power-over-Ethernet (PoE) protocol for its operation power.

Applications

The Model 394 is designed for a variety of applications where the status of a contact closure or user-operated switch needs to be transported within a facility or over an Ethernet network. The contact will often originate from an electromechanical or solid-state relay associated with a piece of electronic equipment. It may also be provided by a mechanical switch that changes state in response to a particular situation or user action.

The Model 394's GPI functions can be used for broadcast or theater applications where an "on air" or "event in progress" status indication needs to be transported or distributed. It can also find use in industrial applications where the state of a contact closure needs to be transported within a geographically dispersed facility. As a Dante audio-over-Ethernet device, the status of a contact closure will be distributed over an entire associated Ethernet data network. This means that the state of the GPI functions will be available, whether in the same room or on the opposite sides of a university or business campus. And there's certainly no reason that the Model 394's two audio channels can't be transported literally around the world using audio transport facilities. (Conversion from Dante to the specific type of audio transport would, of course, be required.)

Features

The Model 394 allows two contact closure inputs to be connected. Two pushbutton switches, located on the unit's front panel, can also be used to control the state of the GPI functions. Bi-color LEDs are provided within the pushbutton switches to indicate the real-time status of the GPI functions. The STcontroller application supports configuration, monitoring, and control of a Model 394 using a personal computer running the Windows or macOS operating systems.

A unique Model 394 feature is its ability to pass Dante audio from input-to-output with the 20 kHz GPI status tones added as applicable. Multiple LEDs provide an indication of the unit's operating status. The unit's Ethernet connection is used to provide both data and power by way of the power-over-Ethernet (PoE) standard. The unit utilizes an extruded-aluminum enclosure that is both lightweight and extremely rugged.

Dante Audio-over-Ethernet

The Model 394 GPI Interface utilizes the capabilities of Dante audio-over-Ethernet media networking technology to transport status indications over standard Ethernet networks. As a Dante-compliant device, the Model 394's two Dante transmitter (output) channels can be assigned (routed) to destination devices using the Dante Controller software application.

The Model 394 transmits the status of a GPI signals using 20 kHz sine wave audio tones that have a sample rate of 48 kHz and a bit depth of up to 24. These tones are "in-band" (carried within the Dante audio path) and are routed (Dante subscribed) to Dante-compliant receiving devices using the Dante Controller application. In many applications, a Studio Technologies Model 395 GPO Interface will be used to receive these 20 kHz tones and convert them to contact closures. Other products from Studio Technologies are also compatible. For example, the Model 391 Dante Alerting Unit can receive a 20 kHz tone and trigger both audible and visual indicators. The Model 392 Visual Alerting Unit mounts in standard electrical boxes and will light its visual display in response to a 20 kHz tone signal.

Other products, such as the Studio Technologies Model 348 Intercom Station or selected units from the Model 370-series of intercom beltpacks, can have their call light functions triggered by reception of 20 kHz tones. Dante-compatible devices from other manufacturers should also interconnect successfully.

The Model 394 also provides a special "pass through" function. This allows full-bandwidth audio signals that arrive via Dante receiver (input) channels to be passed-through (directly routed at unity gain) to the unit's Dante transmitter (output) channels. The GPI function's 20 kHz sine wave tones are summed (added or combined) with the audio input signals, within the digital domain, and then output by way of the unit's Dante transmitter (output) channels.

Ethernet Data and PoE

The Model 394 connects to an Ethernet network using a 100 Mb/s twisted-pair (UTP) Ethernet interface. As with all Dante devices, the Model 394 is compatible with standard Ethernet networking equipment. The unit's physical network interconnection is made by way of RJ45 connector that supports Auto MDI/MDI-X. Two LEDs, associated with the RJ45 connector, display the status of the network connection.

The Model 394's operating power is provided by way of the Ethernet interface using the IEEE® 802.3af Power-over-Ethernet (PoE) standard. This allows fast and efficient interconnection with an associated data network. To support PoE power management, the Model 394's PoE interface reports to the power sourcing equipment (PSE) that it's a class 2 (low power) device. If a PoE-enabled Ethernet port can't be provided by the associated Ethernet switch a low-cost PoE midspan power injector can be utilized.

Setup, Configuration, and Operation

Setup, configuration, and operation of the Model 394 is simple. An RJ45 jack, located on the unit's back panel, is used to interconnect, by way of a standard Ethernet patch cable, to a port on a PoE-enabled network switch. This connection provides both network data and power. Two contact closures can be connected to the Model 394's GPI inputs using a 4-position detachable screw terminal block. The two inputs are "pulled up" to 3.3 volts DC and respond to a closure (short) being present.

The STcontroller personal computer software application is used to configure several Model 394 operating parameters. STcontroller, with versions available that are compatible with the Windows and macOS operating systems, provides a fast and simple means of observing and revising the unit's operating parameters. In addition, STcontroller allows the status of the GPI inputs to be monitored using "virtual" LEDs. Two software-controlled pushbutton switches, provided by STcontroller, allow the status of the GPI functions to be controlled.

In many applications, external control closures will be connected by way of the unit's GPI inputs. However, two pushbutton switches, located on the front panel, also allow control of the GPI functions. These switches can be useful during installation and troubleshooting situations. They can also be utilized in selected applications, allowing operators to directly control the status of GPI functions. LEDs within the pushbutton switches provide status indications of the GPI functions, whether controlled by external contact closures, the front-panel pushbutton switches, or STcontroller. Other LEDs display the status of the network connection and operating power.

Future Capabilities and Firmware Updating

The Model 394 was designed so that its capabilities and performance can be 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. To implement its Dante capability the Model 394 uses Audinate's Ultimo™ integrated circuit. The firmware in this integrated circuit can be updated by way of the unit's Ethernet connection, helping to ensure that its Dante capabilities remain up to date.

Model 394 Specifications

Applications:
Purposes: transport of contact closure indication in broadcast, theater, industrial, and aerospace applications
Technology: utilizes Dante audio-over-Ethernet technology

Network Audio Technology:
Type: Dante audio-over-Ethernet
AES67-2018 Support: yes, selectable on/off
Dante Domain Manager (DDM) Support: yes
Bit Depth: up to 24 bits
Sample Rate: 48 kHz
Pull-Up/Down Support: no
Dante Channels: 2 receiver (input) and 2 transmitter (output)
Dante Flows: 2 receiver (input) and 2 transmitter (output)
Nominal Input and Output Level: –20 dBFS

Network Interface:
Type: 100BASE-TX, Fast Ethernet per IEEE® 802.3u (10BASE-T and 1000BASE-T (GbE) not supported)
Power-over-Ethernet (PoE): per IEEE 802.3af
Data Rate: 100 Mb/s (10 Mb/s and 1000 Mb/s not supported)

Pass-Through Inputs: 2
Applications: can be configured to digitally sum Dante receive (input) channel data with 20 kHz sine wave tones on Dante transmitter (output) channels
Type: unity gain, Dante receiver (input) to Dante transmitter (output)
Frequency Response: full Dante bandwidth

Tone Output – In-Band: 2
Type: Contained within the Dante transmitter (output) channels
Frequency & Type: 20 kHz, sine wave
Frequency Accuracy: <10 ppm
Distortion: <0.0001%
Level: –20 dBFS

Function Activation – GPI Inputs: 2
Type: active low, 3.3 mA maximum, input pulled up to 3.3 volts DC via 1.0 k ohm resistor

Function Activation – UDP Commands:
Source: Network commands received via Ethernet interface

Connectors:
GPI Inputs: 4-pin detachable terminal block (0.150-inch/3.81 mm centers)
Ethernet: RJ45 jack
Firmware Update: USB type A receptacle

Power Source:
Power-over-Ethernet (PoE): class 2 (low power, ≤6.49 watts) per IEEE 802.3af

Configuration: requires Studio Technologies STcontroller personal computer application

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

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

Dimensions (Overall):
4.1 inches wide (10.4 cm)
1.2 inches high (3.1 cm)
4.9 inches deep (12.5 cm)

Mounting Options: intended for tabletop applications

Weight: 0.55 pound (0.25 kg)

Specifications subject to change without notice.

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