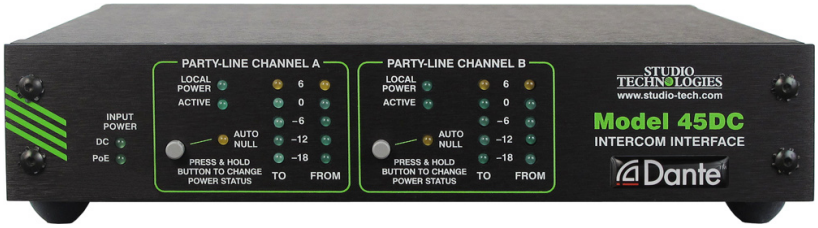
Model 45DC
INTERCOM INTERFACE



Key Features:

- Dante™ Audio-over-Ethernet technology
- Integrated party-line intercom power sources
- Analog hybrids with auto null capability
- Input and output level metering
- Excellent audio quality
- PoE and 12 Vdc powering
- Standard connectors
- Table-top, portable, or optional rack-mount use

Overview

The Model 45DC Dante™ to Dual Party-Line Intercom Interface is designed for applications that utilize single-channel analog party-line (PL) intercom technology. The unit provides two independent single-channel interfaces that each support one party-line audio channel. Single-channel party-line intercom systems are commonly used in theater, entertainment, and education applications where a simple, reliable, low-cost, and easy to use solution is desired. Analog party-line products from Clear-Com® and ASL are directly compatible with the Model 45DC. The Dante Audio-over-Ethernet media networking technology is used to transport the send and receive audio channels associated with each of the two party-line circuits. Two hybrid circuits with automatic nulling provide excellent audio quality and high return-loss. (These hybrid circuits are sometimes referred to as 2-wire to 4-wire converters.) The Model 45DC is directly compatible with the latest broadcast and audio equipment that uses Dante technology. An Ethernet connection is all that's required to make the Model 45DC part of a sophisticated, networked audio system.

A Model 45DC can interconnect with devices such as matrix intercom systems, DSP processors, and audio consoles. The Model 45DC is directly compatible with the RTS ADAM® OMNEO® matrix intercom network. Alternately, two Model 45DC units can interconnect by way of the associated Ethernet network. The Model 45DC can be powered by Power-over-Ethernet (PoE) or an external source of 12 Vdc. Two party-line power sources with impedance termination networks can be supplied by the Model 45DC, allowing connection of two sets of user beltpacks such as the Clear-Com RS-501 and RS-701. A Model 45DC can also connect with one or two existing powered and terminated intercom circuits. Audio level meters provide confirmation of system performance during setup and operation. Support for transporting call light signals between Model 45DC units is also provided.

Standard connectors are used for party-line intercom, Ethernet, and DC power interconnections. The Model 45DC's enclosure has a "1/2-rack" 1U form factor and weighs less than two pounds, making it well suited for use in portable applications. Alternately, using one of the optional rack-mount front panels, one or two Model 45DC units can be mounted in a single space (1U) of a standard 19-inch rack enclosure.

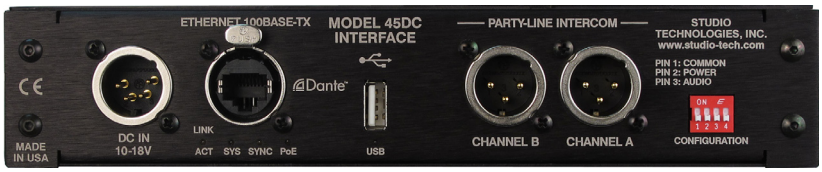
Applications

There are two main ways that the Model 45DC can be used in applications. The first is to add party-line intercom support for matrix intercom systems. The second is to link two stand-alone party-line intercom systems. Ports on matrix intercom systems that support Dante, such as the RTS ADAM with OMNEO, can be routed to the Model 45DC's Dante input (receiver) and output (transmitter) channels. The Model 45DC's circuitry will then convert these signals into two single-channel party-line intercom circuits. In this way adding party-line support to RTS + OMNEO is a simple task. The Model 45DC can also be used with matrix intercom systems that don't support Dante. An external analog-to-Dante interface can be used to convert analog intercom ports to Dante channels. Once in the digital domain, these Dante channels can be interconnected with the Model 45DC's audio input and output channels.

Two separate sets of party-line intercom circuits can easily be interconnected using two Model 45DC Interfaces. At each end a Model 45DC is connected to one or two party-line circuits as well as the Dante network. The Dante Controller application will then be used to route the audio channels between the two units. That's it — nothing else is required to achieve excellent performance.

The Model 45DC can also be used to "bridge" two single-channel party-line intercom circuits with one 2-channel party-line intercom circuit. This involves using a Model 45DC for the two single-channel circuits and one of the Studio Technologies Model 45DR Intercom Interface units for the 2-channel circuit. The Model 45DR is the "cousin" of the Model 45DC and supports one 2-channel

party-line intercom circuit rather than two single-channel circuits. These 2-channel circuits, typically supported by equipment from RTS, are commonly used in broadcast applications.



Party-Line Interfaces

The Model 45DC's two party-line intercom interfaces are optimized for connection with two single-channel party-line circuits and user devices such as those associated with equipment from Clear-Com. (While the Model 45DC will function in a limited manner with a 2-channel RTS TW circuit, the Model 45DR Intercom Interface is the much-preferred choice.) Each interface has a party-line active detection function to ensure that should a beltpack or active party-line circuit not be connected the Model 45DC's interface circuitry will remain stable. This unique feature makes certain that objectionable audio signals, including oscillations and "squeals," won't be sent to other Dante-enabled devices.

A significant capability of the Model 45DC's two party-line intercom interfaces is their ability to supply DC power and 200 ohm AC terminations to "create" two independent intercom circuits. The 28 Vdc output can power user devices such as beltpacks. With up to 150 milliamperes (mA) of current available, a typical entertainment application could connect up to three RS-501 or five RS-701 beltpacks to each of the Model 45DC's two interfaces. In many applications this can eliminate the need for an external intercom power supply, thereby reducing total system cost, weight, and required mounting space. The power supply outputs are monitored for over-current and short-circuit conditions. Under firmware (embedded software) control the outputs will automatically cycle off and on to help prevent damage to the circuitry and connected equipment.

Dante Audio-over-Ethernet

Audio data is sent to and from the Model 45DC using the Dante Audio-over-Ethernet media networking technology. Audio signals with a sample rate of 48 kHz and a bit depth of up to 24 are supported. Audio input (receiver) and output (transmitter) channels on associated Dante-enabled devices can be assigned to the Model 45DC using the Dante Controller software application. This makes selecting the way in which a Model 45DC fits into a specific application a simple matter.

Analog Hybrids with Auto Nulling

Two circuits referred to as "hybrids" interface the Dante input and output channels with the two party-line interface channels. The hybrids provide low noise and distortion, good frequency response, and high return-loss ("nulling"), even when presented with a wide range of party-line conditions. Unlike telephone-line ("POTS") oriented DSP-based hybrid circuits, the Model 45DC's analog circuitry maintains extended frequency response. With a passband of 100 Hz on the low end and 8 kHz on the high end, natural-sounding voice signals can be sent to and received from a party-line circuit.

The Model 45DC's sophisticated hybrid auto nulling function uses a combination of digital and analog circuitry under microprocessor control to achieve significant trans-hybrid loss. This return-loss "null" is achieved by making a series of firmware-directed adjustments to account for the resistive, inductive, and capacitive conditions that are present on the connected party-line cabling and user devices. Whenever one of the Model 45DC's auto null buttons is pressed digital circuitry adjusts the associated hybrid to achieve its maximum return-loss in less than 15 seconds. While the nulling process is automatic, it only takes place upon user request. The resulting null parameters are stored in non-volatile memory.

Pro Audio Quality

The Model 45DC's audio circuitry was designed in the spirit of professional audio equipment rather than that found in typical party-line intercom gear. High-performance components are used throughout, providing low-distortion, low-noise, and high headroom. Using passive and active filters the frequency response of the audio channels is limited to nominally 100 Hz to 8 kHz. This range was selected to provide excellent performance for human speech while maximizing the ability of the hybrid circuits to create substantial "nulls."

Audio Meters

The Model 45DC contains two sets of 5-segment LED level meters. Each set of two meters displays the level of the signals being sent to and received from a party-line interface channel. At the time of installation and setup the meters are invaluable in helping to confirm correct operation. During normal operation the meters offer rapid confirmation of audio signals flowing in to and out of the unit. Additional LED indicators are also provided on the front panel, offering a status indication of the party-line DC power sources, party-line activity status, and the auto null functions. Two other LEDs offer a direct indication of which source is powering the Model 45DC.

Call Light Support

Typical single-channel party-line intercom circuits provide a call light function by way of a DC voltage applied to the audio path. The Model 45DC can detect call light activity, convert it to a 20 kHz audio tone, and transport the tone over the Dante audio path. A Model 45DC unit at the "far end" will detect the tone and re-generate the call signal as a DC voltage on the audio path.

This allows full "end-to-end" call light support between two or more Model 45DC units. It also allows a Model 45DC to send and receive call light status with an interconnected Model 45DR Dante to 2-Channel Party-Line Intercom Interface. The Model 45DR is typically used with the RTS TW-series of party-line user beltpacks including the popular BP-325.

Ethernet Data, PoE, and DC Power Source

The Model 45DC connects to a data network using a standard 100 Mb/s twisted-pair Ethernet interface. The physical interconnection is made by way of a Neutrik® etherCON RJ45 connector. While compatible with standard RJ45 plugs, etherCON allows a ruggedized, locking interconnection for harsh or high-reliability environments. The Model 45DC's operating power can be provided by way of the Ethernet interface using the Power-over-Ethernet (PoE) standard. This allows fast and efficient interconnection with the associated data network. To support PoE power management, the Model 45DC's PoE interface reports to the power sourcing equipment (PSE) that it is a class 3 (medium power) device. The unit can also be powered using an external source of 12 Vdc.

For redundancy, both power sources can be connected simultaneously. An internal switch-mode power supply ensures that all Model 45DC features, including party-line intercom circuit power, are available when the unit is powered by either source. Four LEDs on the back panel display the status of the network connection, Dante interface, and PoE power source.

Simple Installation

The Model 45DC uses standard connectors to allow fast and convenient interconnections. An Ethernet signal is connected using a Neutrik etherCON RJ45. If Power-over-Ethernet (PoE) is available operation will commence immediately. An external 12 Vdc power source can also be connected by way of a 4-pin XLR. Party-line intercom connections are made using two 3-pin male XLR connectors. The Model 45DC is housed in a rugged yet lightweight aluminum enclosure that is designed to be "field tough." It can be used as a standalone portable unit, supporting what's known in the broadcast world as "throw-down" applications. Rack-mount options are also available allowing one or two units to be mounted in one space (1U) of a standard 19-inch rack enclosure.

Future Capabilities and Firmware Updating

The Model 45DC was designed so that its capabilities can be enhanced in the future. A USB connector, located on the Model 45DC's back panel, allows the application firmware (embedded software) to be updated using a USB flash drive. To implement the Dante interface the Model 45DC uses Audinate's Ultimo™ integrated circuit. The firmware in this integrated circuit can be updated via the Ethernet connection, helping to ensure that its capabilities remain up to date.

Specifications

Power Sources:
Power-over-Ethernet (PoE): class 3 (medium power) per IEEE 802.3af
External: 10 to 18 Vdc, 1.0 A max @ 12 Vdc

Network Audio Technology:
Type: Dante Audio-over-Ethernet
Bit Depth: up to 24
Sample Rate: 48 kHz
Number of Receiver (Input) Channels: 2
Number of Transmitter (Output) Channels: 2
Dante Audio Flows: 4; 2 receiver, 2 transmitter
Analog to Digital Equivalence: a +4 dBu input with 0 dB gain selected results in a Dante digital output level of –20 dBFS

Network Interface:
Type: twisted-pair Ethernet, Power-over-Ethernet (PoE) supported
Data Rate: 100 Mb/s (10 Mb/s Ethernet not supported)

General Audio:
Frequency Response (PL to Dante): –0.3 dB @ 100 Hz (–4.8 dB @ 20 Hz), –2 dB @ 8 kHz (–2.6 dB @ 10 kHz)
Frequency Response (Dante to PL): –3.3 dB @ 100 Hz (–19 dB @ 20 Hz), –3.9 dB @ 8 kHz (–5.8 dB @ 10 kHz)
Distortion (THD+N): <0.01%, measured at 1 kHz, Dante input to PL interface pin 3
Signal-to-Noise Ratio: >73 dB, A-weighted, measured at 1 kHz, Dante input to PL interface pin 3

Party-Line (PL) Intercom Interface: 2
Type: single-channel PL (pin 1 common; pin 2 DC; pin 3 unbalanced analog audio)
Compatibility: single-channel PL intercom systems such as those offered by Clear-Com® and ASL
Power Source, Pin 2: 28 Vdc, 150 mA maximum
Impedance, pin 3 – Local Power Not Enabled: >10 k ohms
Impedance, pin 3 – Local Power Enabled: 200 ohms
Analog Audio Level: –14 dBu, nominal, +7 dBu maximum
Call Light Signal Support: DC voltage on pin 3; detect @ ≥5 Vdc nominal; generate @ 16 Vdc nominal
Mic Kill Signal Support – Local Power Enabled: momentary break in DC voltage on pin 2

Party-Line (PL) Hybrids: 2
Topology: 3-section analog circuitry compensates for resistive, inductive, and capacitive loads
Nulling Method: automatic upon user initiation, processor implements digital control of analog circuitry; settings stored in non-volatile memory
Nulling Line Impedance Range: 120 to 350 ohms
Nulling Cable Length Range: 0 to 3500 feet
Trans-Hybrid Loss: >55 dB, typical at 800 Hz

Meters: 4
Function: displays level of audio input and output channels
Type: 5-segment LED, modified VU ballistics

Connectors:
Party-Line (PL) Intercom: two 3-pin male XLR
Ethernet: Neutrik etherCON RJ45
External DC: 4-pin male XLR
USB: type A receptacle

Dimensions – Overall:
8.7 inches wide (22.1 cm)
1.72 inches high (4.4 cm)
8.3 inches deep (21.1 cm)

Mounting Options: single- or dual-unit rack-mount front panels; uses one space (1U) in a standard 19-inch rack

Weight: 1.7 pounds (0.77 kg); rack-mount front panels add 0.2 pounds (0.09 kg)

Specifications subject to change without notice.

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