Bridge 2001

Digital Audio

Network Router

Technical

Manual

Wheatstone Corporation
July 2001

Bridge 2001 Digital Audio Network Router

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Attention!

Federal Communications Commission (FCC) Compliance Notice: Radio Frequency Notice

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment, generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This is Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take appropriate measures.

This equipment must be installed and wired properly in order to assure compliance with FCC regulations.

Caution! ***Any modifications not expressly approved in writing by Wheatstone Corporation could void the user's authority to operate this equipment.***

Bridge 2001

Technical Manual

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General Information

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General Information

Introduction

The Bridge 2001 Digital Audio Network Router rackmount unit occupies four 19” wide rack (total height 7”) with 16” depth.

The 2001 is a unit that can take up to 512 discrete analog and digital audio inputs in Audio Engineering Society (AES) format, and switch them to any of 512 separate outputs. The unit’s backplane carries these signals via 32 16xTDM busses. Various input sources place the AES signals onto the TDM busses, while output cards can select any combination of signals to take off the TDMs to drive their output channels.

Systems can start small with a single cage and only a few cards; chassis can be stacked to form a larger central system. Cages can be separated by very long distances with many studios connected to your central rack room, providing shared resources yet still permitting independently functioning satellite studios, each with its own combination of analog and digital input and output cards and connector modules specifically selected to suit a large variety of gear. Individual 2001 switches may be connected together to form a “Multi-Tiered” switch. This switch is arranged in a star topology, with a central Hub switch connected to up to 14 satellite switches. This system allows as many as 7168 channels of data comprising a maximum of 2048 input signals and 2048 outputs to be switched.

Power Supply

The 2001 is powered by an SPS-180, SPS-400 or SPS-40 power supply installed in a Wheatstone Model PSR rackmount unit. The PSR unit occupies two 19" wide rack spaces (total height 3-1/2") and houses up to four SPS-180 or up to two SPS-400 or SPS-40 power supply units. Do not mount heat generating devices in the same rack cabinet.

If failsafe redundant supplies have been ordered, you will be installing two SPS-180, SPS-400, or SPS-40 units.

Avoid locating any high gain equipment (such as phono preamps, tape recorders, etc.) too near the rackmount supplies, to avoid magnetic interference into that equipment.

Front view of the PSR rackmount power supply

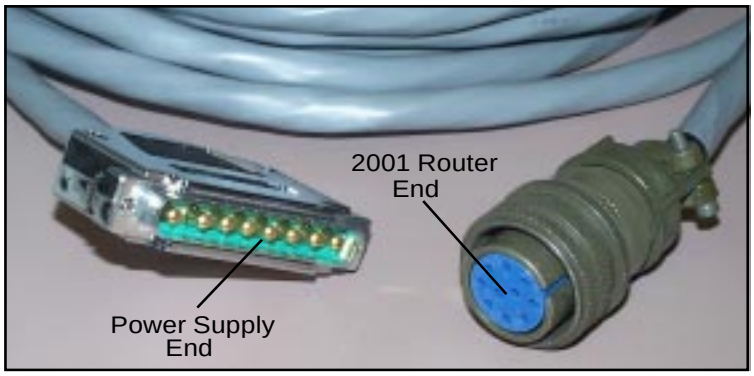
Rear view of the SPS-400 unit

Rear view of the SPS-40 unit

Rear view of the SPS-180 unit

This power supply contains high voltage circuits that are hazardous and potentially harmful. ***Under no circumstances should the metal cover be removed!*** If you have a problem with the power supply, the unit must be returned to Wheatstone Corporation for repair.

Once the supply is rackmounted, it should be connected to the 2001 using the factory supplied cable(s). If the 2001 router is powered by the SPS-180 or SPS-400 unit, the power supply cable plugs into the power supply connector, located on the rear PWIH(PWI)-2001 module in the extreme left-hand slot (looking at the rear of the chassis). If you are using two supplies (failsafe option), one supply will connect to each 2001 connector; otherwise only one connector will be used (it does not matter which one). When the 2001 is powered by the SPS-40 unit, there is an additional rear PWI-40 module that is mounted next to the PWIH(PWI)-2001 module. One power supply cable plugs into either one of the PWIH(PWI)-2001 module's power connectors and the second cable plugs into



PS Cable Pinout

Power Supply End 8-pin Connector *Male*				2001 Router End 10-pin Connector *Female*
	PIN		PIN	
VIO	1	Phantom	E	VIO
GRN	2	Digital Ground	D	GRN
BRN	3	Digital Ground	F	BRN
YEL	4	Digital+	H	YEL
ORG	5	Digital+	G	ORG
BLK	6	Analog Ground	A	BLK
BLU	7	-V in	C	BLU
RED	8	+V in	B	RED

either one of the PWI-40 module's power connectors. If you are using two power supplies (failsafe option) the second power supply will be plugged into the remaining power connectors on the rear PWIH(PWI)-2001 and PWI-40 modules.

Note that the power supply cable's 10-pin female connector has to be rotated until its locating pins match the male mating connector on the rear of the 2001 chassis. Do not force a connector on; it attaches easily when properly aligned. Connect the cable(s) first to the 2001, then to the rear of the rackmount power supply.

Note that each power supply is fitted with a 3-wire grounded AC cord that should be plugged into a "clean" AC power source. This source should be a separate feed from those powering lighting, air-conditioning, or any other non-audio machinery. The third pin ground wire of the AC source should be tied to the central system ground point.

The power feed recommended in the text is often installed and referred to in studios as an "isolated AC ground" outlet. It is usually orange in color.

Failsafe Dual Redundant Supply

Wheatstone failsafe power supply systems use two SPS-180, SPS-400 or SPS-40 rackmount power supplies for each piece of powered equipment. Though either is capable of running a full load on its own, in failsafe operation both units run in tandem: if one fails, the other takes over, assuring uninterrupted operation.

In order for failsafe systems to perform as designed, always have BOTH rackmount supplies powered up and connected to their associated equipment.

Energizing

Assuming the 2001 and its PSR power supply are correctly rackmounted, you may now energize the PSR rackmount power supply by plugging it into the AC mains.

Note: To de-energize the 2001, unplug the rackmount power supply's AC cord from the AC mains. ***Never de-energize the 2001 by disconnecting the cable that connects the router and power supply together.***

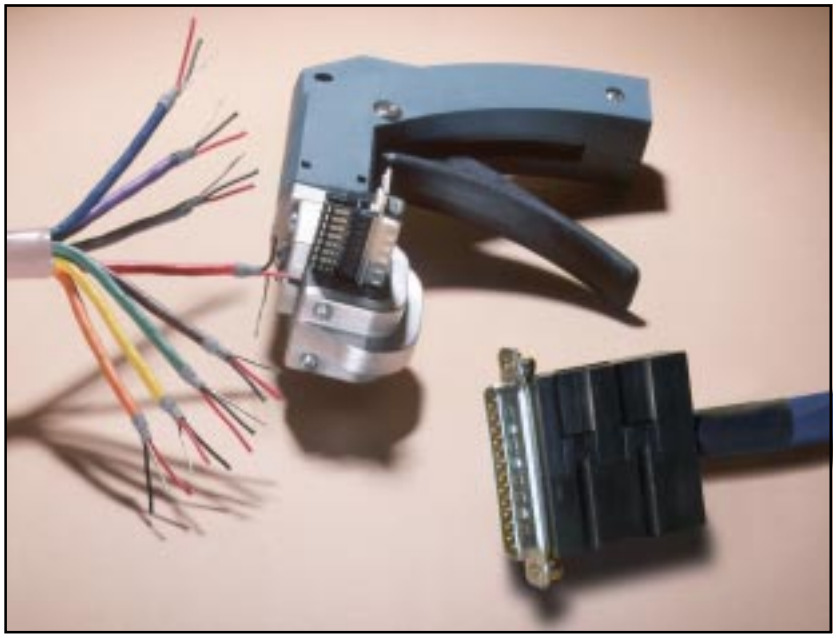
Once you have verified proper power-up, unplug the rackmount power supplies to de-energize the system. You may now proceed to wire up audio and control connections.

I/O Connections

A family of I/O connector modules plug right into the cage rear to give you a choice of DB-25 or RJ-45 connections for analog or digital audio interface, or BNC connectors for use with 75 ohm digital audio equipment. RJ-45 connectors are also available for use with CAT-5 wiring systems. The DB-9 connectors are used for connections to the serial interface.

The Insulation Displacement Connector System

The DB-25 and DB-9 I/O wiring interface system is based on insulation displacement technology. A special AMP wiring tool is included with each system; it is auto-indexing, and allows individual wire connections to be positively made with a single squeeze of the tool's trigger. The trigger action is ratchet controlled, and will not release until a full connection is made. Once released, the multipin connector held in the tool's jaw automatically indexes to the next connector pin. The technology is such that no stripping, soldering or



The AMP tool insulation displacement connector system. Note the straight hood with self-locking tabs. The tool, multipin connectors (with gold plated pins) and latching hoods are supplied with each 2001 switcher.

tinning of wire ends is required; all that is needed is for the wires destined for the connector be snub cut and laid out in order (although tubing should be used on bare drain wires). An empty DB-25 or DB-9 connector is inserted into the tool, indexed to the first pin, and the wires are inserted one by one into the jaw and the trigger squeezed. In this way a single multipin connector can be completely wired up in a minute or two.

In the event of a wiring error, connector pins may easily be removed from the shell with the wire still attached, and inserted into the correct position. Observe the side of the connector, with the metal part down. You will see a row of "Vees"—simply press the top of the vee together

with a scribe or other sharp instrument; this will unlock the pin from the shell, and it can be removed and inserted into the correct position. Spread the vee apart to lock the pin in the new position. It should never be necessary to discard a connector due to a wiring error.

Note that mating hoods for each connector are also supplied with the console. These have locking screws that hold the connectors securely to the rear of the router mainframe.

Digital Audio Connections

CABLE - All AES/EBU input and output digital audio connections are balanced and should be made using a high quality digital audio cable. Be sure to select a digital audio cable with an integral drain wire of the same wire gauge (AWG) as the twisted pair as this facilitates an easier consistent termination process. Typical AES/EBU digital audio cable has a very low characteristic capacitance per ft (pF/ft), and a nominal impedance of 110Ω. High quality digital audio cable offers better signal transmission performance versus typical analog audio cable, especially over long cable runs. Check the cable manufacturer's data sheet to be sure the cable you plan to use will work in your application.

CONNECTORS - Typically, all AES/EBU connections are made with the supplied DB-25 male mating connectors. These crimp style connectors are the insulation displacement type and will accept wire gauge 24 - 22AWG. If an optional rear panel connector type (e.g. BNC, RJ-45, etc.) was specified and shipped with your system, please refer to the mating connector manufacturer's recommendations for termination instructions.

Unbalanced Analog Connections

ANALOG INPUTS — Wire to the router input end with typical shielded, two conductor cable (like Belden 9451), just as if you were connecting a balanced source. At the unbalanced source machine's output, connect the + output to the HI input wire and connect the source machine GND wire to LO, connect the shield at one end only .

Note: Unbalanced analog sources typically have -10dBv (316mV RMS) signal levels and will not match the 2001 nominal operating level of +4dBu (1.23V RMS). We highly recommended that you first externally balance any unbalanced sources you plan on connecting to the 2001. Many third party "match boxes" are commercially available for this.

ANALOG OUTPUTS — Use a balanced output circuit which behaves exactly like the secondary of a high-quality transformer, with no center tap—this output is both balanced and floating. For unbalanced operation, either the HI *or* LO side of the analog output must be strapped to ground of the unbalanced input, with the output taken from the other side. (Normally you would strap LO to ground, and use HI to feed your unbalanced equipment input.) Leave the SH floating at one end.

Unbalanced Digital Connections (SPDIF)

SPDIF INPUTS - The SPDIF (Sony/Phillips Digital Interface) or "consumer" digital audio interface is a two wire unbalanced signal typically on a single RCA style connector. Note that the SPDIF signal level of approximately 500mV and 75 ohm impedance does not correctly match the 2001 AES inputs. We highly recommend using a "balun" or format converter when interfacing "consumer" grade source devices to the 2001.

In cases where a consumer grade device must be interfaced and the appropriate matching device is not available, try wiring the SPDIF center conductor (HOT) to the HI input pin and SPDIF shell (ground) to the LO input. Connect SH at the 2001 router end only.

SPDIF OUTPUTS - The Bridge 2001 digital outputs are fixed, professional, AES-3 formatted outputs. SPDIF consumer format is not supported. Use an external format converter to connect the digital outputs to consumer gear.

Hardware

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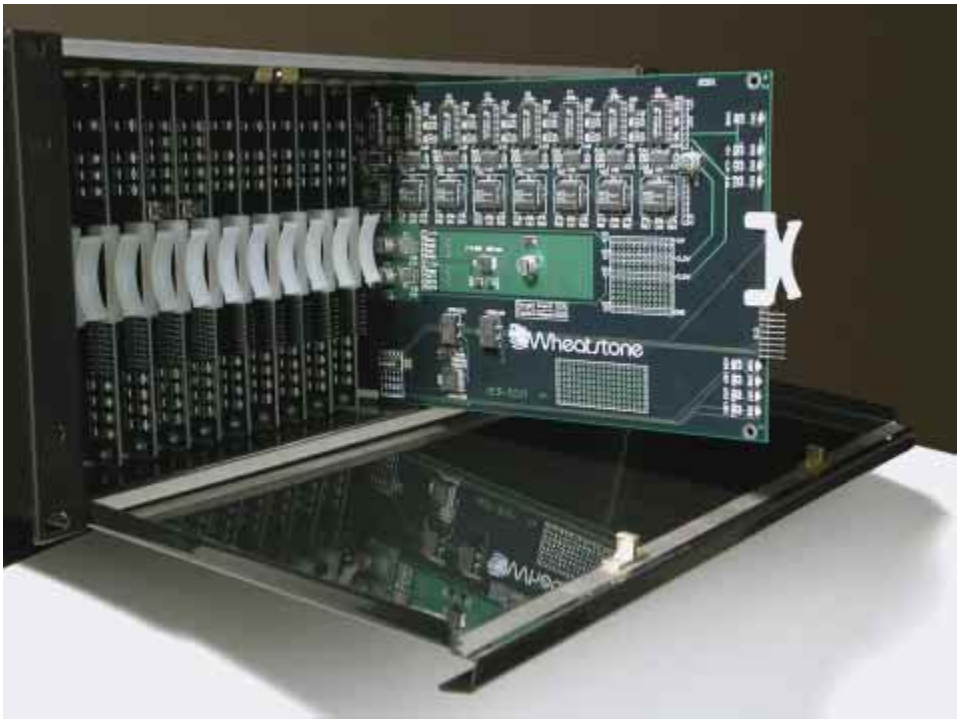


Hardware

Chassis / Backplane Overview

The 2001 chassis may be configured to suit a variety of I/O card complements including—analog or digital audio input and output cards, chassis expansion and audio network cards. A system may include a single cage, multiple co-located cages, or a central chassis connected to one or more satellite frames in a star configuration. All audio input and output signal connections are made via a family of I/O connector modules that plug into rear of the chassis. Power supply, serial control, audio network and ethernet connections are also made on the rear of the chassis.

The backplane itself is entirely connectorized and contains a minimal number of passive components. Further, the backplane assembly may be removed rather easily in the rare case that service is required.

Chassis Configuration Guidelines

While new 2001 systems are pre-configured to customer specifications at Wheatstone's factory, future expansion of a system may require some re-configuration of existing hardware to accommodate new resources.

Audio Slots

Audio I/O cards may be mounted in almost any slot, though there are some basic guidelines and considerations to take into account when filling a master or remote chassis. Room for future input and output expansion should be taken into consideration. Further, it is useful to group input and output cards by type (e.g. analog inputs, AES outputs, etc.) and to leave a few blank positions following each group.

Reserved Slots

The master chassis must have a host CPU card installed in slot 22. Systems requiring Audio Network cards must have them installed beginning at slot 1 of the master chassis.

Remote racks must also have an Audio Network card installed in slot 1.

Stacking cards used to expand the master chassis should be located as close to the ends of the chassis backplane as possible. One Stacking card per chassis is required.

Note: Stacked systems connect up to 4 co-located chassis into a larger virtual chassis (i.e. a single master chassis and up to three expansion racks).

Backplane Termination

The high frequency nature of the electrical signals on the backplane require that active terminator circuits be present at both ends of the chassis backplane. The backplane assembly has special terminator card slots at each end of its circuit board.

The master chassis has a terminator card installed at the far left end only. The right hand termination in a master chassis is performed by the host CPU circuit board, always installed in slot 22. Multiple CPU systems move right end termination off the CPU circuit card onto a special terminator board installed in slot 21.

All other frames require that terminator cards be installed in both the far left and far right terminator card slots.

Digital Input Card (AES-2024)

Overview

There are two versions of digital audio input cards for the 2001:

• AES-2024/8 card will accept up to 8, AES-3 formatted stereo sources (i.e. 16 mono *channels*);

• AES-2024/16 card will accept up to 16, AES-3 formatted stereo sources (i.e. 32 mono *channels*);

A *Signal Definitions* form in the supplied XPoint software allows the user to set attributes for the input channels including signal name, type, circuit #, etc. The 16 (32) input *channels* may be configured as mono *signals* (one channel), stereo *signals* (two channels), or 5.1 surround sound *signals* (six channels) wired in any combination. Signals may span across input cards (e.g. a surround sound *signal* may have 2 *channel*s on one input card, and 4 on a different input card).

Note: While it is possible to split the 8 (16) stereo AES inputs into 16 (32) mono channels, there are still only 8 (16) physical wires, each containing the 2-channel AES formatted data.

A dedicated sample rate converter for each input re-clocks the incoming audio data and phase locks it to the system's master sample rate clock. Embedded logic routes each channel of audio data into an available time slot of the input card's TDM bus. One TDM bus is allocated for each 8 input card, 2 TDM's are used by the 16 input card.

AES Input Interface

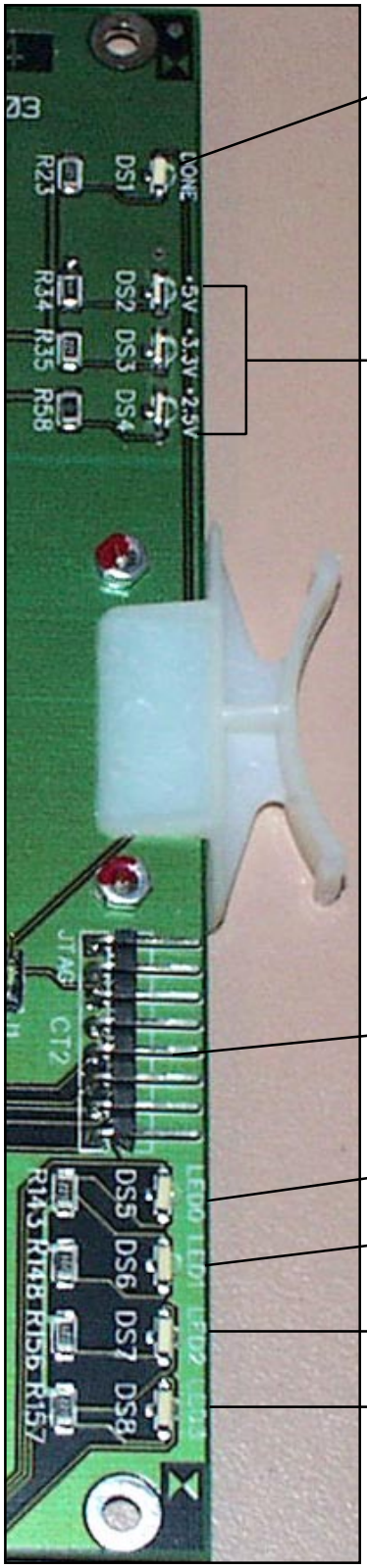
The balanced, digital audio inputs on the AES-2024 card are transformer coupled. AES receivers strip off the received sample rate clock and audio data for further processing by sample rate converters. The balanced interface operates at a nominal peak-peak input voltage of +5V with an input impedance of 110Ω and conforms to the AES-3 1992 electrical specification. Note that Channel Status data is not forwarded.

While unbalanced SPDIF formatted input signals may be connected to the HI and LO inputs of an AES input channel (leave the shield floating), it is recommended that a BALUN or other external matching device be inserted to convert the SPDIF impedance to 110Ω and signal level to at least 1V p-p. Note that the optional BNC rear panel input impedance is internally fixed at 75Ω.

Internal Programming Options

There are no internal programming options on the AES-2024 input card.

Digital Input Card Status LED's



DONE LED (DS1) - Normally OFF;
ON when programming the FPGA,
Flashes when system clock is missing.

POWER SUPPLY STATUS (DS2-DS4) - ON indicates power supply is OK.

JTAG HEADER - FPGA programming - factory use only.

AUXILIARY STATUS LED's

ACTIVITY LED (DS5) - flashes on messages.

RACK ID DIPSWITCH (DS6) - ON = when SW1 pos.1 is ON, otherwise OFF.

MUTE STATUS (DS7) - ON when the input channels are muted.

CFG STATUS (DS8) - ON when card is not configured.

Hook-Ups

All user wiring to the AES-2024 card takes place at the rear I/O connectors modules: DB, 2DB, 8BNC or 8RJ-45. The DB module has one female DB-25 connector and 2DB has two DB connectors for audio input connections. The BNC module contains eight BNC connectors for use with 75 ohm digital audio equipment, likewise the 8RJ-45 module contains eight RJ-45 connectors for use in balanced, unshielded twisted pair (UTP) wiring systems.

DB-25 (for AES-2024/8)—Digital Audio Connections

These include eight input sources. Pinout drawing on page 2-12 shows all wiring connections at a glance.

Pin 24 – HI Pin 12 – LO Pin 25 – SH	AES 1 In
Pin 1O – HI Pin 23 – LO Pin 11 – SH	AES 2 In
Pin 21 – HI Pin 9 – LO Pin 22 – SH	AES 3 In
Pin 7 – HI Pin 20 – LO Pin 8 – SH	AES 4 In
Pin 18 – HI Pin 6 – LO Pin 19 – SH	AES 5 In
Pin 4 – HI Pin 17 – LO Pin 5 – SH	AES 6 In
Pin 15 – HI Pin 3 – LO Pin 16 – SH	AES 7 In
Pin 1 – HI Pin 14 – LO Pin 2 – SH	AES 8 In

2DB-25 (for AES-2024/16)—Digital Audio Connections

Upper DB-25 include eight (1-8) input sources. Pinout drawing on page 2-12a shows all wiring connections at a glance.

Pin 24 – HI Pin 12 – LO Pin 25 – SH	AES 1 In
Pin 1O – HI Pin 23 – LO Pin 11 – SH	AES 2 In

Pin 21 – HI
Pin 9 – LO
Pin 22 – SH
AES 3 In

Pin 7 – HI
Pin 20 – LO
Pin 8 – SH
AES 4 In

Pin 18 – HI
Pin 6 – LO
Pin 19 – SH
AES 5 In

Pin 4 – HI
Pin 17 – LO
Pin 5 – SH
AES 6 In

Pin 15 – HI
Pin 3 – LO
Pin 16 – SH
AES 7 In

Pin 1 – HI
Pin 14 – LO
Pin 2 – SH
AES 8 In

Lower DB-25 include eight (9-16) input sources. Pinout drawing on page 2-12a shows all wiring connections at a glance.

Pin 24 – HI
Pin 12 – LO
Pin 25 – SH
AES 9 In

Pin 1O – HI
Pin 23 – LO
Pin 11 – SH
AES 10 In

Pin 21 – HI
Pin 9 – LO
Pin 22 – SH
AES 11 In

Pin 7 – HI
Pin 20 – LO
Pin 8 – SH
AES 12 In

Pin 18 – HI
Pin 6 – LO
Pin 19 – SH
AES 13 In

Pin 4 – HI
Pin 17 – LO
Pin 5 – SH
AES 14 In

Pin 15 – HI
Pin 3 – LO
Pin 16 – SH
AES 15 In

Pin 1 – HI
Pin 14 – LO
Pin 2 – SH
AES 16 In

8 BNC—Digital Audio Connections

This panel is used only for AES-2024/8 card. Pinout drawing on page 2-12b shows all wiring connections at a glance.

BNC 1 Pin 1 – HI BNC 1 Pin 2 – SH	AES 1 In
BNC 2 Pin 1 – HI BNC 2 Pin 2 – SH	AES 2 In
BNC 3 Pin 1 – HI BNC 3 Pin 2 – SH	AES 3 In
BNC 4 Pin 1 – HI BNC 4 Pin 2 – SH	AES 4 In
BNC 5 Pin 1 – HI BNC 5 Pin 2 – SH	AES 5 In
BNC 6 Pin 1 – HI BNC 6 Pin 2 – SH	AES 6 In
BNC 7 Pin 1 – HI BNC 7 Pin 2 – SH	AES 7 In
BNC 8 Pin 1 – HI BNC 8 Pin 2 – SH	AES 8 In

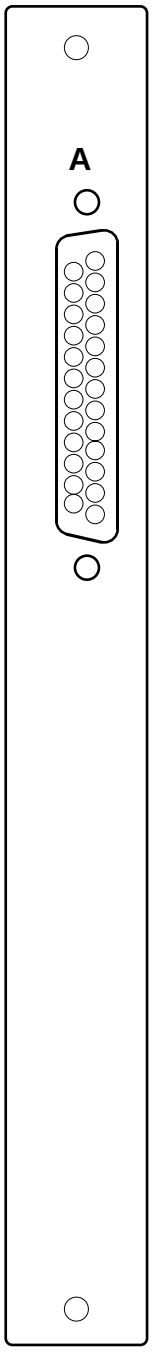
8 RJ-45—Digital Audio Connections

For AES-2024/8 digital input connections use RJ-45 #1-4 connectors, and for AES-2024/16 use RJ-45 #1-8 connectors. Pinout drawing on page 2-12c shows all wiring connections at a glance.

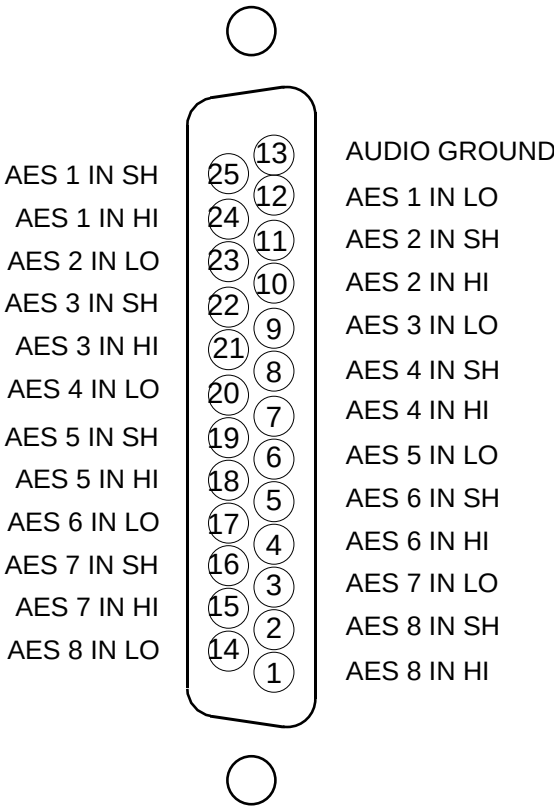
RJ-45#1 Pin 3 – HI RJ-45#1 Pin 6 – LO	AES 1 In
RJ-45#1 Pin 1 – HI RJ-45#1 Pin 2 – LO	AES 2 In
RJ-45#2 Pin 3 – HI RJ-45#2 Pin 6 – LO	AES 3 In
RJ-45#2 Pin 1 – HI RJ-45#2 Pin 2 – LO	AES 4 In
RJ-45#3 Pin 3 – HI RJ-45#3 Pin 6 – LO	AES 5 In
RJ-45#3 Pin 1 – HI RJ-45#3 Pin 2 – LO	AES 6 In
RJ-45#4 Pin 3 – HI RJ-45#4 Pin 6 – LO	AES 7 In
RJ-45#4 Pin 1 – HI RJ-45#4 Pin 2 – LO	AES 8 In
RJ-45#5 Pin 3 – HI RJ-45#5 Pin 6 – LO	AES 9 In
RJ-45#5 Pin 1 – HI RJ-45#5 Pin 2 – LO	AES 10 In

RJ-45#6 Pin 3 – HI RJ-45#6 Pin 6 – LO	AES 11 In
RJ-45#6 Pin 1 – HI RJ-45#6 Pin 2 – LO	AES 12 In
RJ-45#7 Pin 3 – HI RJ-45#7 Pin 6 – LO	AES 13 In
RJ-45#7 Pin 1 – HI RJ-45#7 Pin 2 – LO	AES 14 In
RJ-45#8 Pin 3 – HI RJ-45#8 Pin 6 – LO	AES 15 In
RJ-45#8 Pin 1 – HI RJ-45#8 Pin 2 – LO	AES 16 In

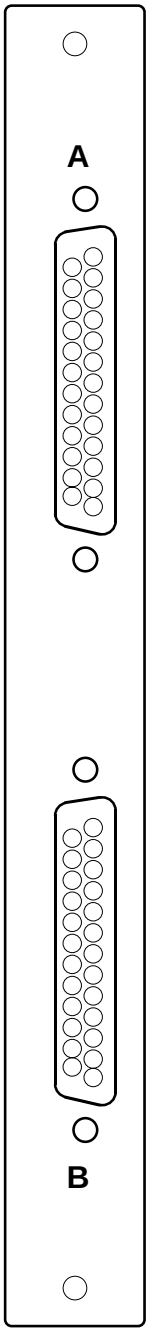
DB Panel
Digital Input Connections
for AES-2024/8



I/O PORTS
("A" DB-25)



2DB Panel
Digital Input Connections
for AES-2024/16



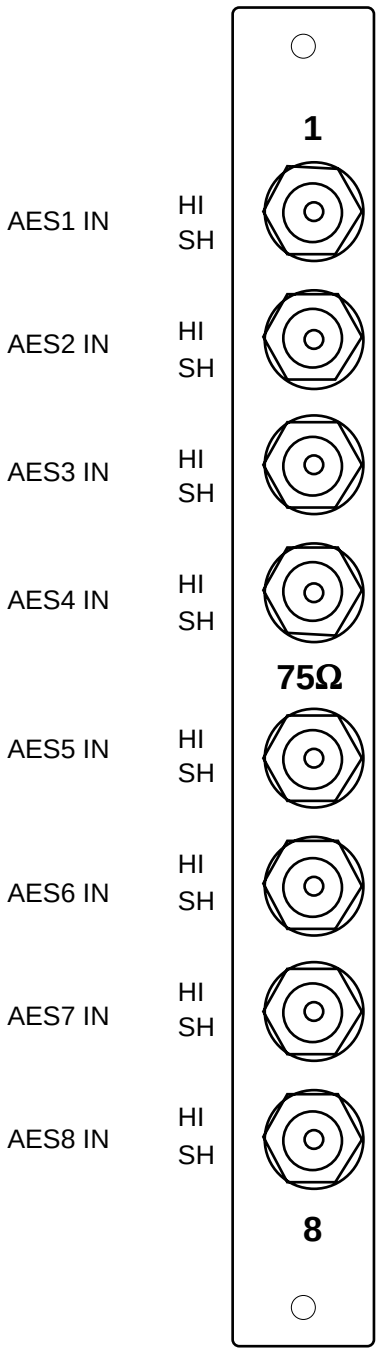
I/O PORTS (Upper "A" DB-25)

AES 1 IN SH	25	13 AUDIO GROUND
AES 1 IN HI	24	12 AES 1 IN LO
AES 2 IN LO	23	11 AES 2 IN SH
AES 3 IN SH	22	10 AES 2 IN HI
AES 3 IN HI	21	9 AES 3 IN LO
AES 4 IN LO	20	8 AES 4 IN SH
AES 5 IN SH	19	7 AES 4 IN HI
AES 5 IN HI	18	6 AES 5 IN LO
AES 6 IN LO	17	5 AES 6 IN SH
AES 7 IN SH	16	4 AES 6 IN HI
AES 7 IN HI	15	3 AES 7 IN LO
AES 8 IN LO	14	2 AES 8 IN SH
		1 AES 8 IN HI

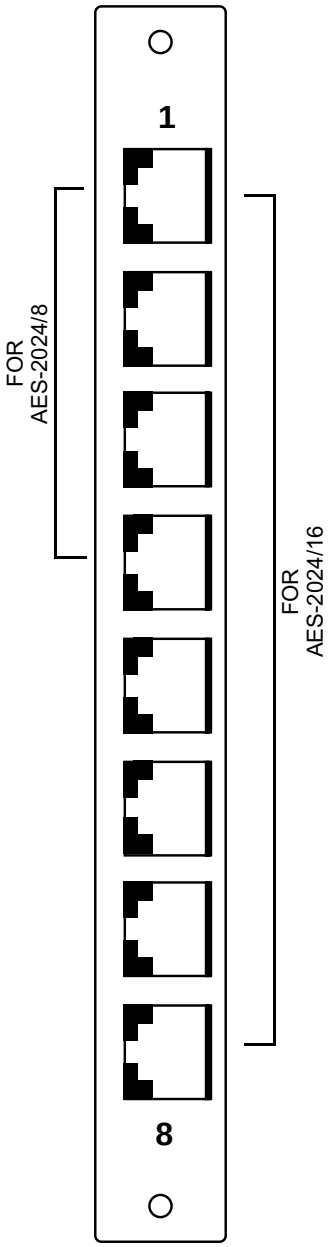
AES 9 IN SH	25	13 AUDIO GROUND
AES 9 IN HI	24	12 AES 9 IN LO
AES10 IN LO	23	11 AES10 IN SH
AES11 IN SH	22	10 AES10 IN HI
AES11 IN HI	21	9 AES11 IN LO
AES12 IN LO	20	8 AES12 IN SH
AES13 IN SH	19	7 AES12 IN HI
AES13 IN HI	18	6 AES13 IN LO
AES14 IN LO	17	5 AES14 IN SH
AES15 IN SH	16	4 AES14 IN HI
AES15 IN HI	15	3 AES15 IN LO
AES16 IN LO	14	2 AES16 IN SH
		1 AES16 IN HI

I/O PORTS (Lower "B" DB-25)

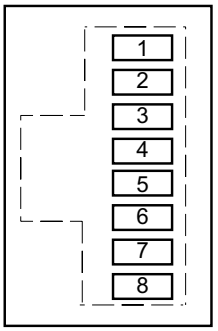
8 BNC Panel
Digital Input Connections
for AES-2024/8



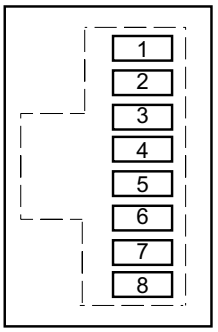
8RJ Panel
Digital Input Connections



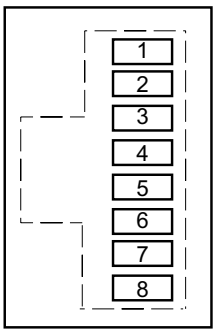
RJ-45 #1



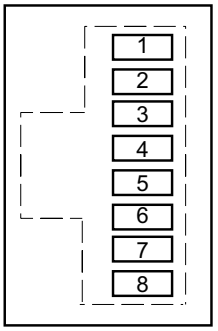
RJ-45 #2



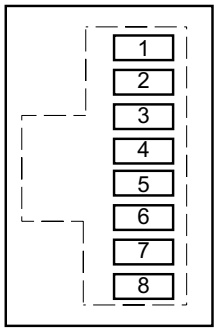
RJ-45 #3



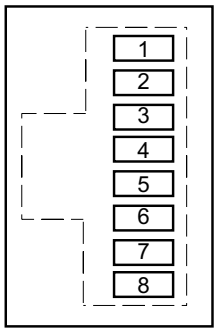
RJ-45 #4



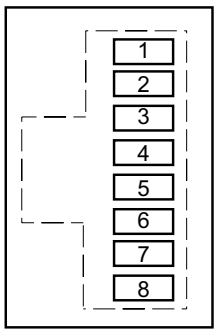
RJ-45 #5



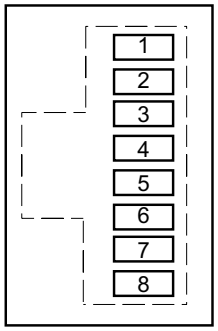
RJ-45 #6



RJ-45 #7



RJ-45 #8



Analog Input Card (ADI-2001)

Overview

The Analog input cards accept up to 8 stereo analog audio sources (i.e.16 mono *channels*). A *Signal Definitions* form in the supplied XPoint software allows the user to set attributes for the input channel hardware including signal name, type, circuit #, etc. The 16 input *channels* may be configured as mono *signals* (one channel), stereo *signals* (two channels), or 5.1 surround sound *signals* (six channels) in any combination. Signals may span across input cards (e.g. a surround sound *signal* may have 4 *channel*s on one input card, and 2 channels on a different input card).

The balanced, line level analog input signals are buffered and converted to the digital domain by 24bit A-D converters operating at the system's master sample rate. Embedded logic routes each channel of audio data into an available time slot of the input card's TDM bus. One TDM bus is allocated for each input card.

Analog Input Interface

The balanced analog input stages are direct coupled, unity gain circuits and operate at a nominal input level of +4dBu. The input impedance is 20kΩ. A +4dBu input signal will result in a -20dBFS digital output level at any of the selected AES outputs. The maximum analog input signal level is +24 dBu providing 20 dB of headroom above the nominal input level.

Reference Notes:

0dBu = .7746 V RMS, +4dBu = 1.23V RMS

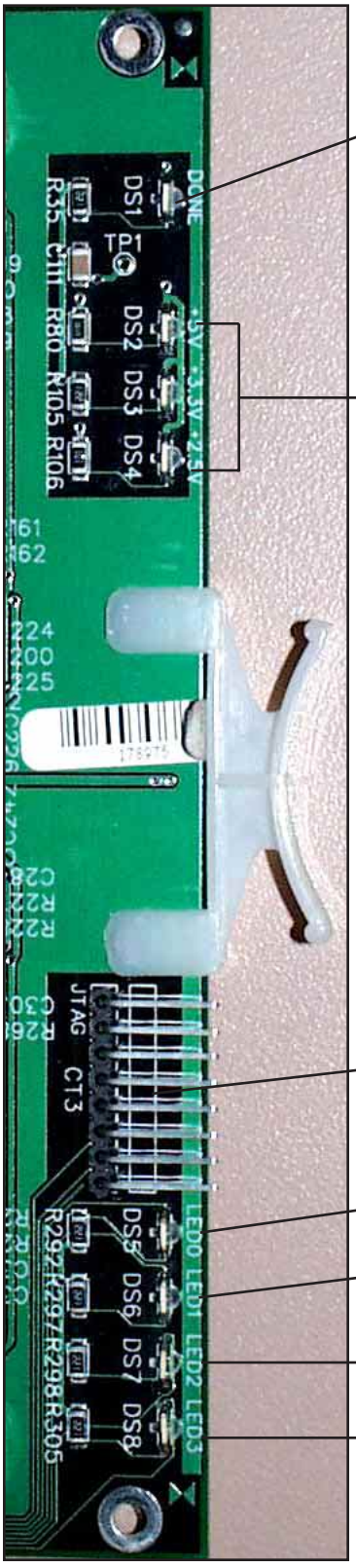
dBFS = dB Full Scale Digital

-20dBFS = +4dBu

Internal Programming Options

There are no internal programming options on the ADI-2001 card.

Analog Input Card Status LED's



DONE LED (DS1) - Normally OFF;
ON when programming the FPGA ,
Flashes when system clock is missing.

POWER SUPPLY STATUS (DS2-DS4) - ON indicates power supply is OK.

JTAG HEADER - FPGA programming - factory use only.

<u>AUXILIARY STATUS LED's</u>

ACTIVITY LED (DS5) - flashes on messages.

RACK ID DIPSWITCH (DS6) - ON = when SW1 pos.1 is ON, otherwise OFF.

MUTE STATUS (DS7) - ON when the input channels are muted.

CFG STATUS (DS8) - ON when card is not configured.

Hook-Ups

All user wiring to the ADI-2001 card takes place at the rear I/O connectors modules: 2DB or 8RJ-45. The 2DB module has two female DB-25 connectors for audio input connections. The 8RJ-45 module contains eight RJ-45 connectors for use in balanced, unshielded twisted pair (UTP) wiring systems.

Upper DB-25—Analog Audio Connections

These include four (1-4) input sources. Pinout drawing on page 2-17 shows all wiring connections at a glance.

Pin 24 – HI Pin 12 – LO Pin 25 – SH	Channel 1 (Stereo 1 Lt) In
Pin 10 – HI Pin 23 – LO Pin 11 – SH	Channel 2 (Stereo 1 Rt) In
Pin 21 – HI Pin 9 – LO Pin 22 - SH	Channel 3 (Stereo 2 Lt) In
Pin 7 – HI Pin 20 – LO Pin 8 – SH	Channel 4 (Stereo 2 Rt) In
Pin 18 – HI Pin 6 – LO Pin 19 – SH	Channel 5 (Stereo 3 Lt) In
Pin 4 – HI Pin 17 – LO Pin 5 – SH	Channel 6 (Stereo 3 Rt) In
Pin 15 – HI Pin 3 – LO Pin 16 – SH	Channel 7 (Stereo 4 Lt) In
Pin 1 – HI Pin 14 – LO Pin 2 – SH	Channel 8 (Stereo 4 Rt) In

Lower DB-25—Analog Audio Connections

These include four (5-8) input sources. Pinout drawing on page 2-17 shows all wiring connections at a glance.

Pin 24 – HI Pin 12 – LO Pin 25 – SH	Channel 9 (Stereo 5 Lt) In
Pin 10 – HI Pin 23 – LO Pin 11 – SH	Channel 10 (Stereo 5 Rt) In
Pin 21 – HI Pin 9 – LO Pin 22 - SH	Channel 11 (Stereo 6 Lt) In

Pin 7 – HI
Pin 20 – LO
Pin 8 – SH
Channel 12 (Stereo 6 Rt) In

Pin 18 – HI
Pin 6 – LO
Pin 19 – SH
Channel 13 (Stereo 7 Lt) In

Pin 4 – HI
Pin 17 – LO
Pin 5 – SH
Channel 14 (Stereo 7 Rt) In

Pin 15 – HI
Pin 3 – LO
Pin 16 – SH
Channel 15 (Stereo 8 Lt) In

Pin 1 – HI
Pin 14 – LO
Pin 2 – SH
Channel 16 (Stereo 8 Rt) In

8 RJ-45—Analog Audio Connections

Pinout drawing on pages 2-18 shows all wiring connections at a glance.

RJ-45#1 Pin 3 – HI
RJ-45#1 Pin 6 – LO
Channel 1 (Stereo1 Lt) In

RJ-45#1 Pin 1 – HI
RJ-45#1 Pin 2 – LO
Channel 2 (Stereo 1 Rt) In

RJ-45#2 Pin 3 – HI
RJ-45#2 Pin 6 – LO
Channel 3 (Stereo 2 Lt) In

RJ-45#2 Pin 1 – HI
RJ-45#2 Pin 2 – LO
Channel 4 (Stereo 2 Rt) In

RJ-45#3 Pin 3 – HI
RJ-45#3 Pin 6 – LO
Channel 5 (Stereo 3 Lt) In

RJ-45#3 Pin 1 – HI
RJ-45#3 Pin 2 – LO
Channel 6 (Stereo 3 Rt) In

RJ-45#4 Pin 3 – HI
RJ-45#4 Pin 6 – LO
Channel 7 (Stereo 4 Lt) In

RJ-45#4 Pin 1 – HI
RJ-45#4 Pin 2 – LO
Channel 8 (Stereo 4 Rt) In

RJ-45#5 Pin 3 – HI
RJ-45#5 Pin 6 – LO
Channel 9 (Stereo 5 Lt) In

RJ-45#5 Pin 1 – HI
RJ-45#5 Pin 2 – LO
Channel 10 (Stereo 5 Rt) In

RJ-45#6 Pin 3 – HI
RJ-45#6 Pin 6 – LO
Channel 11 (Stero 6 Lt) In

RJ-45#6 Pin 1 – HI
RJ-45#6 Pin 2 – LO
Channel 12 (Stereo 6 Rt) In

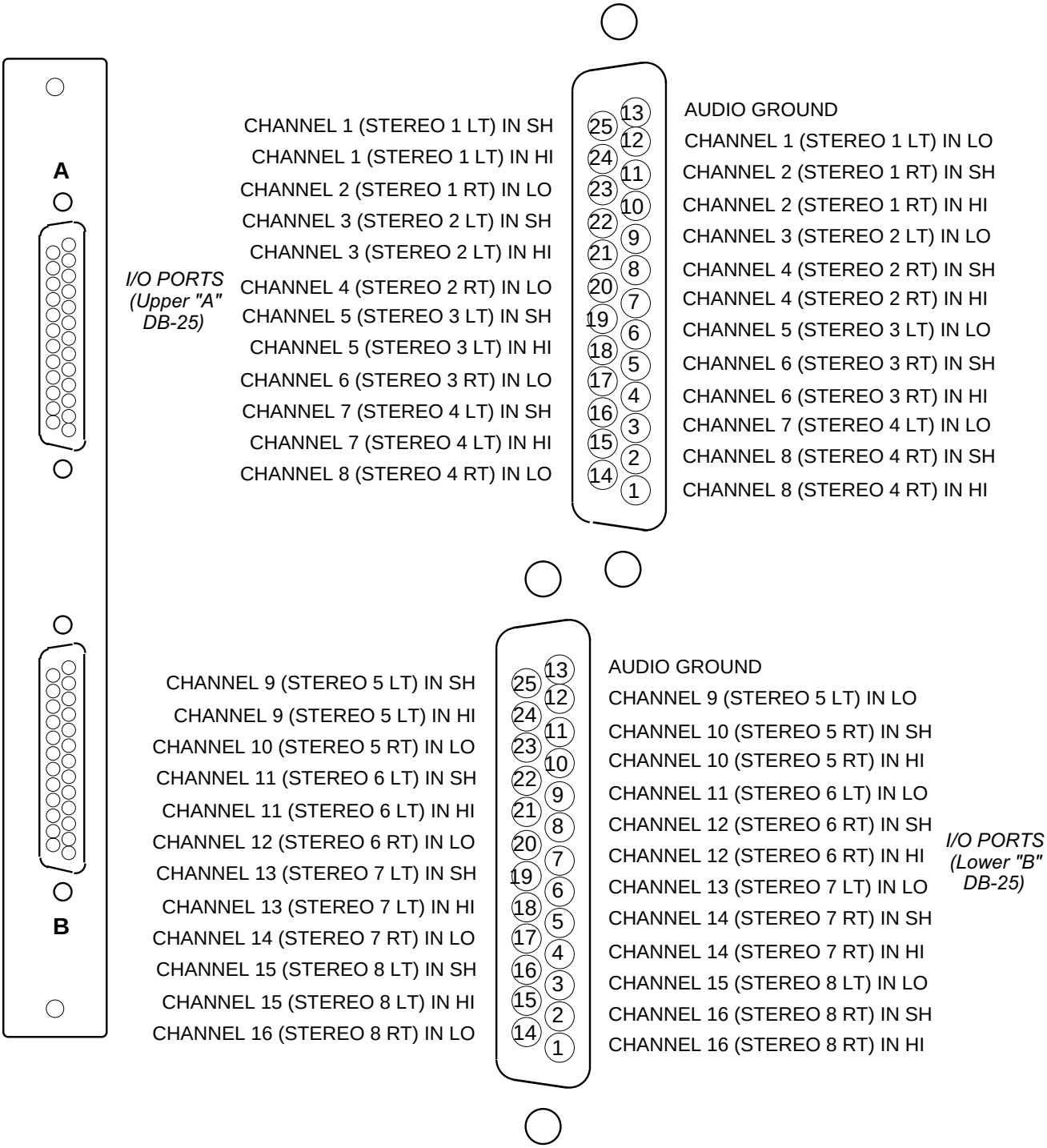
RJ-45#7 Pin 3 – HI
RJ-45#7 Pin 6 – LO
Channel 13 (Stereo 7 Lt) In

RJ-45#7 Pin 1 – HI
RJ-45#7 Pin 2 – LO
Channel 14 (Stereo 7 Rt) In

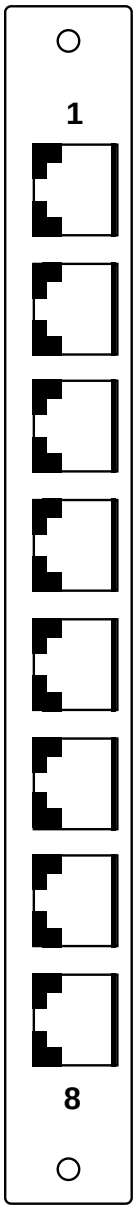
RJ-45#8 Pin 3 – HI
RJ-45#8 Pin 6 – LO
Channel 15 (Stereo 8 Lt) In

RJ-45#8 Pin 1 – HI
RJ-45#8 Pin 2 – LO
Channel 16 (Stereo 8 Rt) In

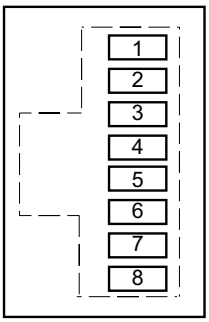
2DB Panel
Analog Input Connections



8RJ Panel
Analog Input Connections

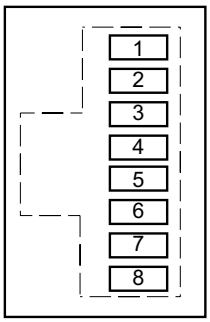


RJ-45 #1



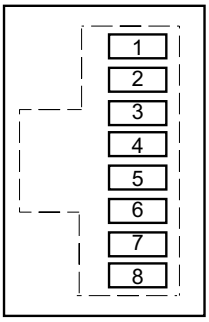
CHANNEL 2 (STEREO 1 RT) IN HI
CHANNEL 2 (STEREO 1 RT) IN LO
CHANNEL 1 (STEREO 1 LT) IN HI
CHANNEL 1(STEREO 1 LT) IN LO

RJ-45 #5



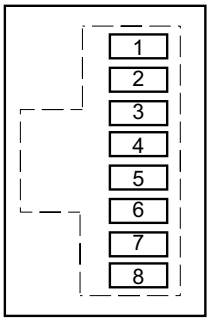
CHANNEL 10 (STEREO 5 RT) OUT HI
CHANNEL 10 (STEREO 5 RT) OUT LO
CHANNEL 9 (STEREO 5 LT) OUT HI
CHANNEL 9 (STEREO 5 LT) IN LO

RJ-45 #2



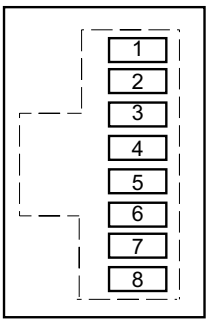
CHANNEL 4 (STEREO 2 RT) IN HI
CHANNEL 4 (STEREO 2 RT) IN LO
CHANNEL 3 (STEREO 2 LT) IN HI
CHANNEL 3 (STEREO 2 LT) IN LO

RJ-45 #6



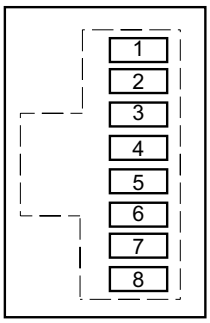
CHANNEL 12 (STEREO 6 RT) IN HI
CHANNEL 12 (STEREO 6 RT) IN LO
CHANNEL 11 (STEREO 6 LT) IN HI
CHANNEL 11 (STEREO 6 LT) IN LO

RJ-45 #3



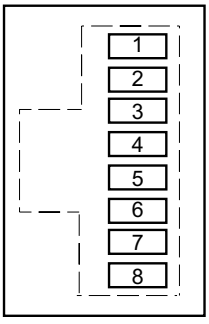
CHANNEL 6 (STEREO 3 RT) IN HI
CHANNEL 6 (STEREO 3 RT) IN LO
CHANNEL 5 (STEREO 3 LT) IN HI
CHANNEL 5 (STEREO 3 LT) IN LO

RJ-45 #7



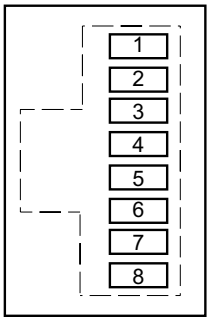
CHANNEL 14 (STEREO 7 RT) IN HI
CHANNEL 14 (STEREO 7 RT) IN LO
CHANNEL 13 (STEREO 7 LT) IN HI
CHANNEL 13 (STEREO 7 LT) IN LO

RJ-45 #4



CHANNEL 8 (STEREO 4 RT) IN HI
CHANNEL 8 (STEREO 4 RT) IN LO
CHANNEL 7 (STEREO 4 LT) IN HI
CHANNEL 7 (STEREO 4 LT) IN LO

RJ-45 #8



CHANNEL 16 (STEREO 8 RT) IN HI
CHANNEL 16 (STEREO 8 RT) IN LO
CHANNEL 15 (STEREO 8 LT) IN HI
CHANNEL 15 (STEREO 8 LT) IN LO

Digital Output Card (DO-2001)

Overview

Each Digital Output card provides 8 physical AES-3 formatted outputs. The eight physical AES outputs are divided into 16 channels or circuits in software to allow the greatest routing flexibility. A *Signal Definitions* form in the supplied XPoint software allows the user to set attributes for the output channels including signal name, type, circuit #, etc. The 8 AES outputs are configured in software to be any combination of mono, stereo or 5.1 *output signals*. For example, the card is normally configured as 8 stereo outputs, but might also be configured as, 4 stereo outputs and 8 mono outputs. Many combinations are possible up to the card's 16 channel limit. 5.1 signals may span across two DO-2001 output cards.

Each output card listens for connection commands from the CPU card, and then uses this information to connect the appropriate sources to their selected output channels. The selected audio data is fed to AES transmitters which format the 24 bit audio data according to the AES-3 standard.

Note: While it is possible to split the 8 stereo AES outputs into 16 mono channels, there are still only 8 physical wires, each containing the 2-channel AES formatted data.

AES Output Interface

The balanced digital audio outputs on the DO-2001 card are transformer coupled and exhibit a nominal output impedance of 110Ω. This interface operates at a nominal output voltage of +5V p-p and conforms to the AES-3 1992 electrical specification. The DO-2001 output cards operate at unity gain and transmit 24bit audio data word lengths at the system sample rate. Output sample rate is set to 44.1 kHz or 48 kHz via certain settings on the CPU-2001 card. Optionally, the CPU's *External AES Sync* input may be used to slave the system to a user provided 44.1 kHz or 48 kHz reference rate. Please refer to the CPU-2001 hardware section for details on external synchronization.

The digital output signal reference level is -20dBFS. A +4dBu analog input signal yields a -20dBFS digital output signal. Channel Status implementation complies with rules for "Standard implementation" as described in the AES-3 1992 specification.

AES Channel Status Implementation

The following embedded channel status information is transmitted at the AES digital outputs along with the audio data.

Note: Channel Status bits are identically set for channels 1 and 2.

CHANNEL STATUS:	PROFESSIONAL
DATA USE:	AUDIO (normal mode)
EMPHASIS:	NO EMPHASIS
SOURCE Fs LOCK:	LOCKED
SAMPLE FREQUENCY:	44.1 kHz or 48 kHz*
CHANNEL MODE:	STEREO
USER BITS MODE:	NONE
AUX BITS USE:	24 BIT - main audio
AUDIO WORD LENGTH:	24 BIT
REFERENCE SIGNAL:	NOT A REFERENCE SIGNAL
ORIGIN:	NOT INDICATED
DESTINATION:	NOT INDICATED
SAMPLE #:	Ø
TIME OF DAY:	ØØ : ØØ : ØØ
BLOCK CRC:	IS VALID

* The Sample Rate frequency reported in the channel status block depends upon a dipswitch setting on the DO-2001 circuit board. DipSW2 - pos.3: OFF = 48 kHz, ON = 44.1 kHz.

NOTE: When changing the audio sample rate of the Bridge 2001 Digital Audio Network Router, changes must be made in the following places: DO-2001 Digital Output Card, CPU-2001 Host CPU, OAN-2001 Audio Network Card, CEX-2001 Stacking Card, and QAT-2001 Quad Audio Network Card. See the appropriate manual sections for details.

Internal Programming Options

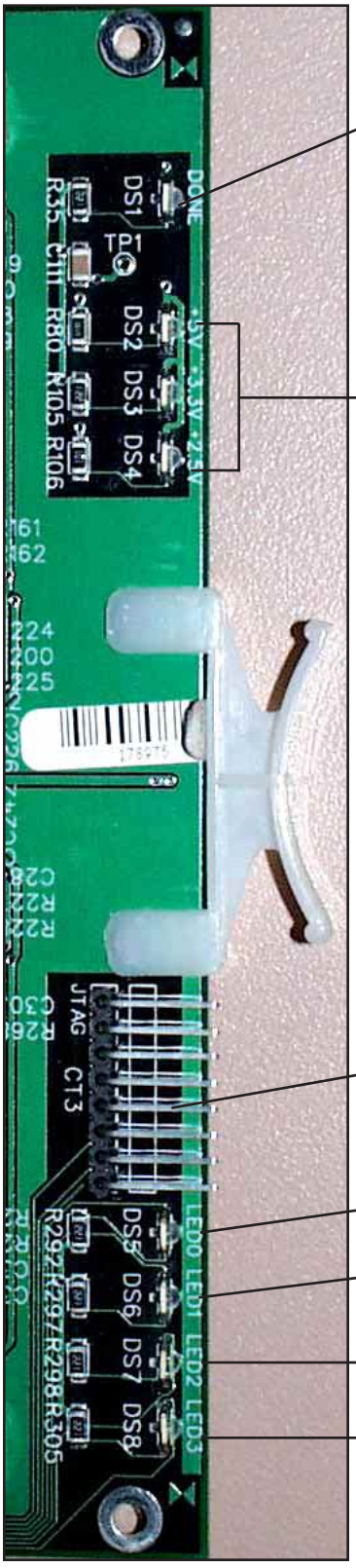
DO-2001PCB SW2

POSITION	FUNCTION	ON	OFF
1	UNUSED	N/A	N/A
2	UNUSED	N/A	N/A
3	CHANNEL STATUS Fs	44.1 kHz	48 kHz
4	CHANNEL STATUS IMPLEMENTATION	MINIMUM	STANDARD

Internal programming is made via PCB mounted dipswitch SW2.

Note: Dipswitch SW2 position 3 sets the <u>reported</u> output sample rate frequency transmitted in a channel status block. This dipswitch does <u>not</u> change the physical sample rate.

Digital Output Card Status LED's



DONE LED (DS1) - Normally OFF;
ON when programming the FPGA ,
Flashes when system clock is missing.

POWER SUPPLY STATUS (DS2-DS4) - ON indicates power supply is OK.

JTAG HEADER - FPGA programming - factory use only.

AUXILIARY STATUS LED's

ACTIVITY LED (DS5) - flashes on messages.

RACK ID DIPSWITCH (DS6) - ON = when SW1 pos.1 is ON, otherwise OFF.

MUTE STATUS (DS7) - ON when the output channels are muted.

CFG STATUS (DS8) - ON when card is not configured.

Hook-Ups

All user wiring from the DO-2001 card takes place at the rear I/O connectors modules: DB and 8 BNC. The DB module has one female DB-25 connector for digital audio output connections. The 8 BNC module contains eight BNC connectors for use with 75 ohm digital audio equipment.

DB-25—Digital Audio Connections

These include eight outputs. Pinout drawing on page 2-24 shows all wiring connections at a glance.

Pin 24 – HI Pin 12 – LO Pin 25 – SH	AES 1 Out
Pin 1O – HI Pin 23 – LO Pin 11 – SH	AES 2 Out
Pin 21 – HI Pin 9 – LO Pin 22 – SH	AES 3 Out
Pin 7 – HI Pin 20 – LO Pin 8 – SH	AES 4 Out
Pin 18 – HI Pin 6 – LO Pin 19 – SH	AES 5 Out
Pin 4 – HI Pin 17 – LO Pin 5 – SH	AES 6 Out
Pin 15 – HI Pin 3 – LO Pin 16 – SH	AES 7 Out
Pin 1 – HI Pin 14 – LO Pin 2 – SH	AES 8 Out

8 BNC—Digital Audio Connections

Pinout drawing on page 2-25 shows all wiring connections at a glance.

BNC 1 Pin 1 – HI BNC 1 Pin 2 – SH	AES 1 Out
BNC 2 Pin 1 – HI BNC 2 Pin 2 – SH	AES 2 Out
BNC 3 Pin 1 – HI BNC 3 Pin 2 – SH	AES 3 Out

BNC 4 Pin 1 – HI
BNC 4 Pin 2 – SH] AES 4 Out

BNC 5 Pin 1 – HI
BNC 5 Pin 2 – SH] AES 5 Out

BNC 6 Pin 1 – HI
BNC 6 Pin 2 – SH] AES 6 Out

BNC 7 Pin 1 – HI
BNC 7 Pin 2 – SH] AES 7 Out

BNC 8 Pin 1 – HI
BNC 8 Pin 2 – SH] AES 8 Out

8 RJ-45—Digital Audio Connections

For digital output connections use RJ-45 #1-4 connectors. Pinout drawing on page 2-26 shows all wiring connections at a glance.

RJ-45#1 Pin 3 – HI
RJ-45#1 Pin 6 – LO] AES 1 Out

RJ-45#1 Pin 1 – HI
RJ-45#1 Pin 2 – LO] AES 2 Out

RJ-45#2 Pin 3 – HI
RJ-45#2 Pin 6 – LO] AES 3 Out

RJ-45#2 Pin 1 – HI
RJ-45#2 Pin 2 – LO] AES 4 Out

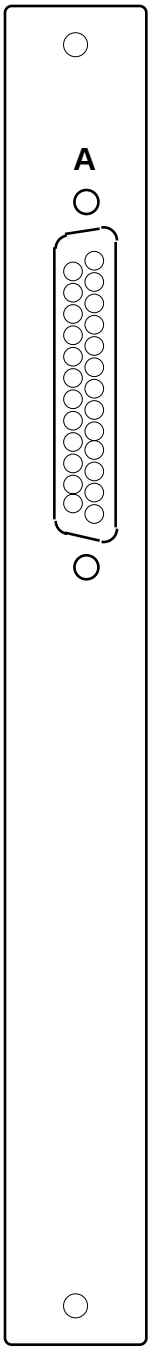
RJ-45#3 Pin 3 – HI
RJ-45#3 Pin 6 – LO] AES 5 Out

RJ-45#3 Pin 1 – HI
RJ-45#3 Pin 2 – LO] AES 6 Out

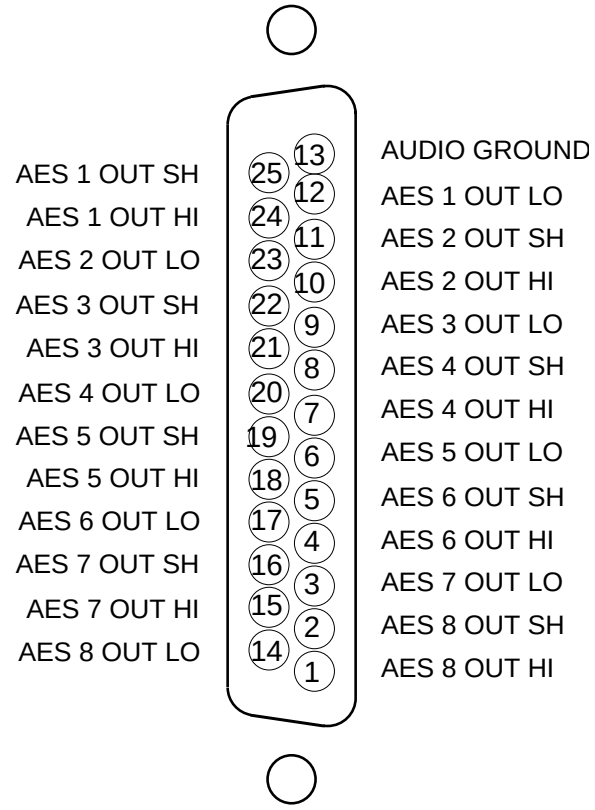
RJ-45#4 Pin 3 – HI
RJ-45#4 Pin 6 – LO] AES 7 Out

RJ-45#4 Pin 1 – HI
RJ-45#4 Pin 2 – LO] AES 8 Out

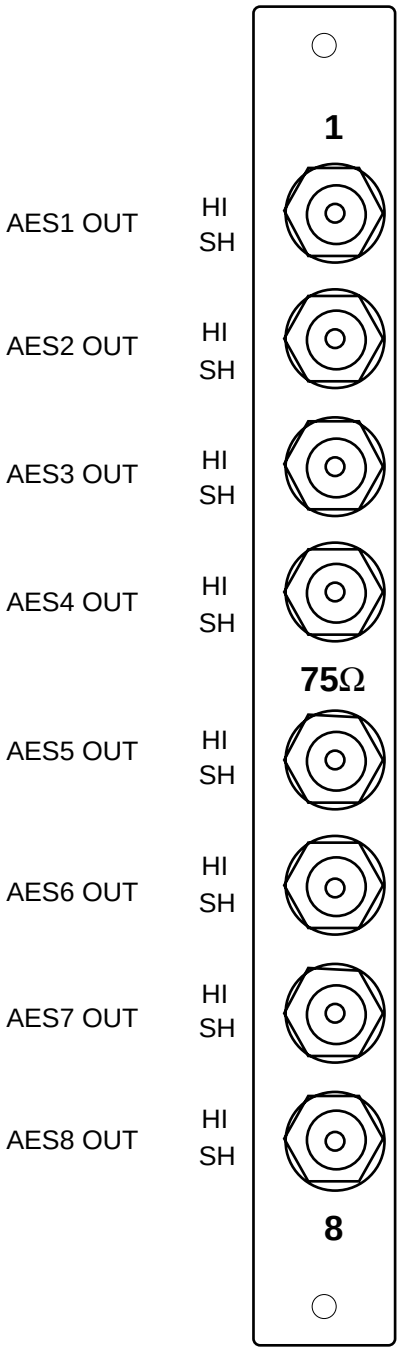
DB Panel
Digital Output Connections



I/O PORTS
("A" DB-25)

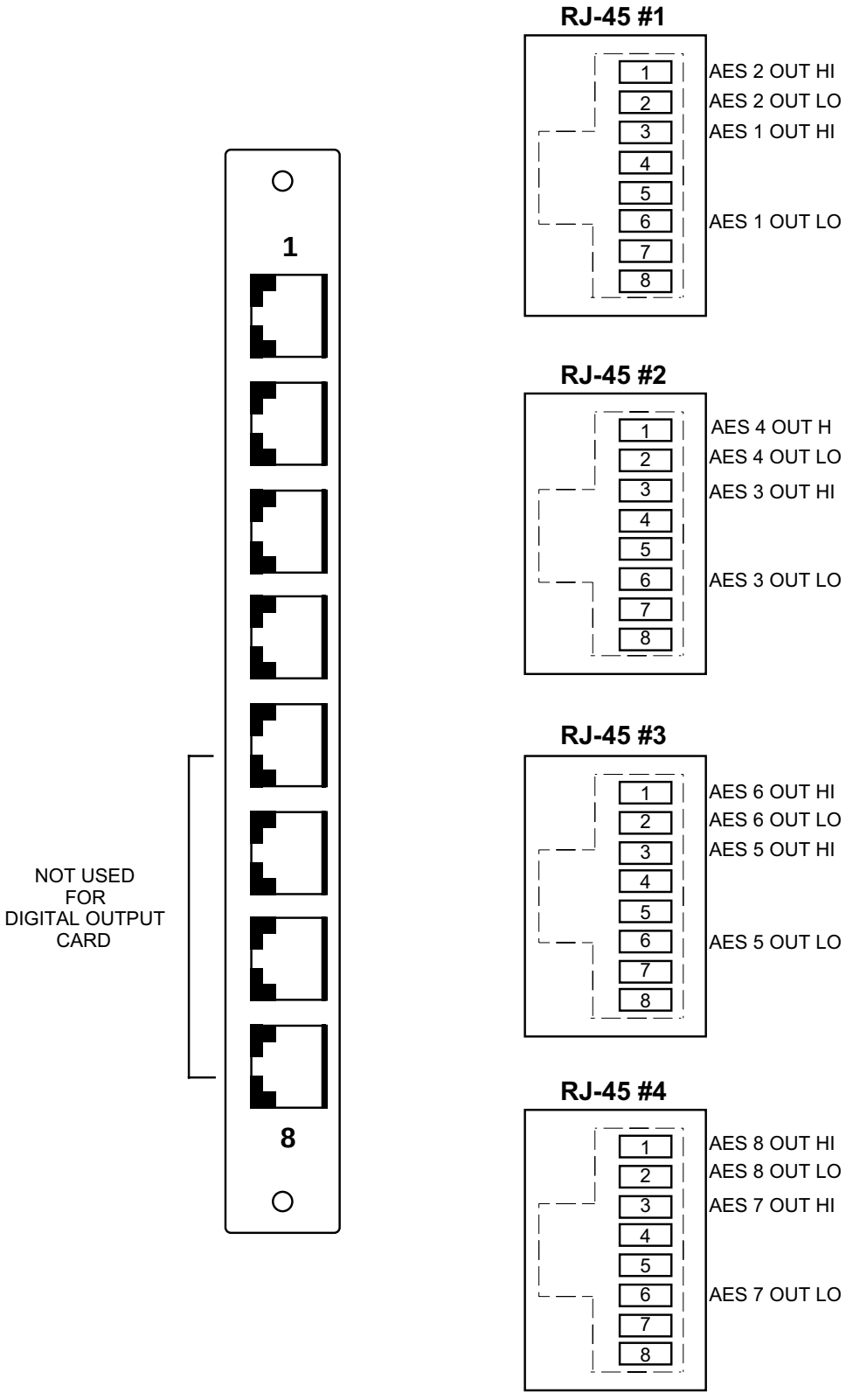


8 BNC Panel
Digital Output Connections



use for 75 ohm AES-3 Id based systems

8RJ Panel
Digital Output Connections



Analog Output Card (AO-2001)

Overview

Each Analog Output card provides 16 physical monaural *output channels* . These output channels are configured in software to be any combination of mono, stereo or 5.1 *output signals*. A *Signal Definitions* form in the supplied XPoint software allows the user to set attributes for the output channels including signal name, type, circuit #, etc. For example, the card may be configured as 8 stereo outputs, or, 4 stereo outputs and 8 mono outputs. Many combinations are possible up to the card's 16 channel limit. Note that 5.1 signals may span across two AO-2001 output cards.

Each output card listens for connection commands from the CPU card and then uses this information to connect the appropriate sources to their selected output channels. The selected audio data is fed to 24 bit, two-channel digital-to-analog converters. D-A converter outputs are buffered by integrated differential output drivers.

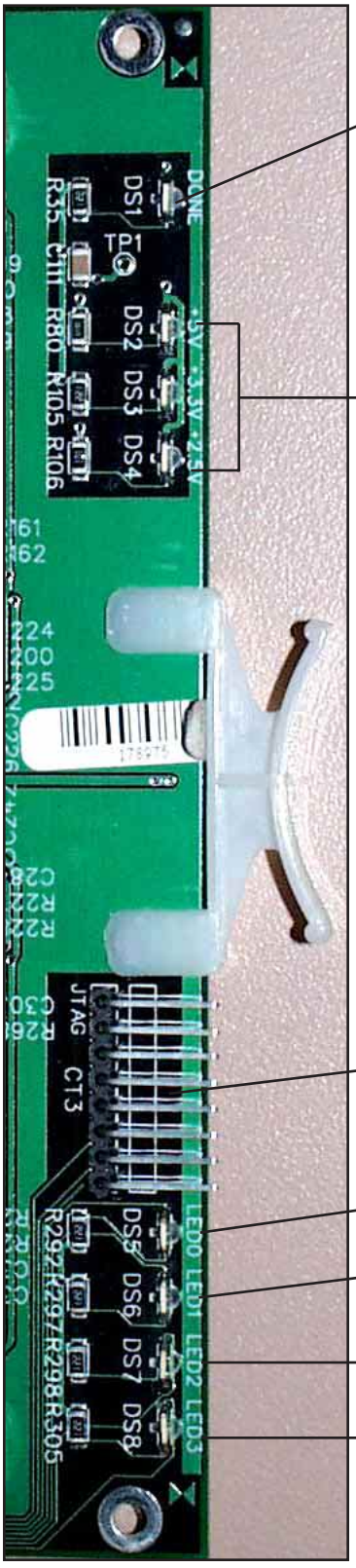
Analog Output Interface

Each balanced, unity gain output will drive loads up to 600Ω and behaves much like a transformer in that either side of the balanced output may be grounded. The analog outputs are direct coupled with an output impedance of 50Ω and a nominal output signal level of +4dBu yielded from an analog input signal of +4dBu (-20dBFs digital) .

Internal Programming Options

There are no internal programming options on the AO-2001 card.

Analog Output Card Status LED's



DONE LED (DS1) - Normally OFF;
ON when programming the FPGA ,
Flashes when system clock is missing.

POWER SUPPLY STATUS (DS2-DS4) - ON indicates power supply is OK.

JTAG HEADER - FPGA programming - factory use only.

<u>AUXILIARY STATUS LED's</u>

ACTIVITY LED (DS5) - flashes on messages.

RACK ID DIPSWITCH (DS6) - ON = when SW1 pos.1 is ON, otherwise OFF.

MUTE STATUS (DS7) - ON when the output channels are muted.

CFG STATUS (DS8) - ON when card is not configured.

Hook-Ups

All user wiring from the AO-2001 card takes place at the rear I/O connectors modules (2DB and 8RJ). The 2DB module has two DB-25 connectors and 8RJ has eight RJ-45 connectors for audio output connections.

Upper DB-25—Analog Audio Connections

These include four (1-4) outputs. Pinout drawing on page 2-31 shows all wiring connections at a glance.

Pin 24 – HI Pin 12 – LO Pin 25 – SH	Channel 1 (Stereo 1 Lt) Out
Pin 10 – HI Pin 23 – LO Pin 11 – SH	Channel 2 (Stereo 1 Rt) Out
Pin 21 – HI Pin 9 – LO Pin 22 - SH	Channel 3 (Stereo 2 Lt) Out
Pin 7 – HI Pin 20 – LO Pin 8 – SH	Channel 4 (Stereo 2 Rt) Out
Pin 18 – HI Pin 6 – LO Pin 19 – SH	Channel 5 (Stereo 3 Lt) Out
Pin 4 – HI Pin 17 – LO Pin 5 – SH	Channel 6 (Stereo 3 Rt) Out
Pin 15 – HI Pin 3 – LO Pin 16 – SH	Channel 7 (Stereo 4 Lt) Out
Pin 1 – HI Pin 14 – LO Pin 2 – SH	Channel 8 (Stereo 4 Rt) Out

Lower DB-25—Analog Audio Connections

These include four (5-8) outputs. Pinout drawing on pages 2-31 shows all wiring connections at a glance.

Pin 24 – HI Pin 12 – LO Pin 25 – SH	Channel 9 (Stereo 5 Lt) Out
Pin 10 – HI Pin 23 – LO Pin 11 – SH	Channel 10 (Stereo 5 Rt) Out
Pin 21 – HI Pin 9 – LO Pin 22 - SH	Channel 11 (Stereo 6 Lt) Out

Pin 7 – HI
Pin 20 – LO
Pin 8 – SH
] Channel 12 (Stereo 6 Rt) Out

Pin 18 – HI
Pin 6 – LO
Pin 19 – SH
] Channel 13 (Stereo 7 Lt) Out

Pin 4 – HI
Pin 17 – LO
Pin 5 – SH
] Channel 14 (Stereo 7 Rt) Out

Pin 15 – HI
Pin 3 – LO
Pin 16 – SH
] Channel 15 (Stereo 8 Lt) Out

Pin 1 – HI
Pin 14 – LO
Pin 2 – SH
] Channel 16 (Stereo 8 Rt) Out

8 RJ-45—Analog Audio Connections

Pinout drawing on pages 2-32 shows all wiring connections at a glance.

RJ-45#1 Pin 3 – HI
RJ-45#1 Pin 6 – LO
] Channel 1 (Stereo1 Lt) Out

RJ-45#1 Pin 1 – HI
RJ-45#1 Pin 2 – LO
] Channel 2 (Stereo 1 Rt) Out

RJ-45#2 Pin 3 – HI
RJ-45#2 Pin 6 – LO
] Channel 3 (Stereo 2 Lt) Out

RJ-45#2 Pin 1 – HI
RJ-45#2 Pin 2 – LO
] Channel 4 (Stereo 2 Rt) Out

RJ-45#3 Pin 3 – HI
RJ-45#3 Pin 6 – LO
] Channel 5 (Stereo 3 Lt) Out

RJ-45#3 Pin 1 – HI
RJ-45#3 Pin 2 – LO
] Channel 6 (Stereo 3 Rt) Out

RJ-45#4 Pin 3 – HI
RJ-45#4 Pin 6 – LO
] Channel 7 (Stereo 4 Lt) Out

RJ-45#4 Pin 1 – HI
RJ-45#4 Pin 2 – LO
] Channel 8 (Stereo 4 Rt) Out

RJ-45#5 Pin 3 – HI
RJ-45#5 Pin 6 – LO
] Channel 9 (Stereo 5 Lt) Out

RJ-45#5 Pin 1 – HI
RJ-45#5 Pin 2 – LO
] Channel 10 (Stereo 5 Rt) Out

RJ-45#6 Pin 3 – HI
RJ-45#6 Pin 6 – LO
] Channel 11 (Stero 6 Lt) Out

RJ-45#6 Pin 1 – HI
RJ-45#6 Pin 2 – LO
] Channel 12 (Stereo 6 Rt) Out

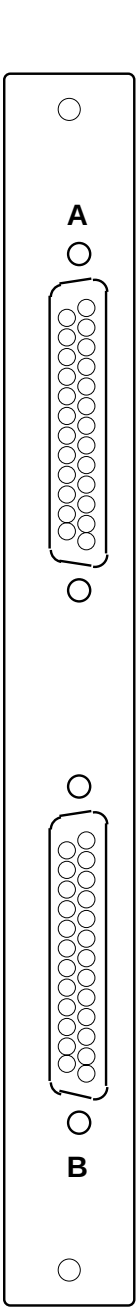
RJ-45#7 Pin 3 – HI
RJ-45#7 Pin 6 – LO
] Channel 13 (Stereo 7 Lt) Out

RJ-45#7 Pin 1 – HI
RJ-45#7 Pin 2 – LO
] Channel 14 (Stereo 7 Rt) Out

RJ-45#8 Pin 3 – HI
RJ-45#8 Pin 6 – LO
] Channel 15 (Stereo 8 Lt) Out

RJ-45#8 Pin 1 – HI
RJ-45#8 Pin 2 – LO
] Channel 16 (Stereo 8 Rt) Out

2DB Panel
Analog Output Connections



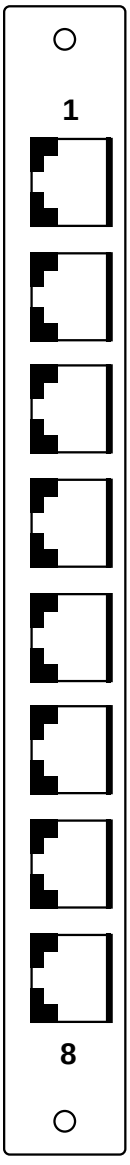
I/O PORTS (Upper "A" DB-25)

CHANNEL 1 (STEREO 1 LT) OUT SH	25	13 AUDIO GROUND
CHANNEL 1 (STEREO 1 LT) OUT HI	24	12 CHANNEL 1 (STEREO 1 LT) OUT LO
CHANNEL 2 (STEREO 1 RT) OUT LO	23	11 CHANNEL 2 (STEREO 1 RT) OUT SH
CHANNEL 3 (STEREO 2 LT) OUT SH	22	10 CHANNEL 2 (STEREO 1 RT) OUT HI
CHANNEL 3 (STEREO 2 LT) OUT HI	21	9 CHANNEL 3 (STEREO 2 LT) OUT LO
CHANNEL 4 (STEREO 2 RT) OUT LO	20	8 CHANNEL 4 (STEREO 2 RT) OUT SH
CHANNEL 5 (STEREO 3 LT) OUT SH	19	7 CHANNEL 4 (STEREO 2 RT) OUT HI
CHANNEL 5 (STEREO 3 LT) OUT HI	18	6 CHANNEL 5 (STEREO 3 LT) OUT LO
CHANNEL 6 (STEREO 3 RT) OUT LO	17	5 CHANNEL 6 (STEREO 3 RT) OUT SH
CHANNEL 7 (STEREO 4 LT) OUT SH	16	4 CHANNEL 6 (STEREO 3 RT) OUT HI
CHANNEL 7 (STEREO 4 LT) OUT HI	15	3 CHANNEL 7 (STEREO 4 LT) OUT LO
CHANNEL 8 (STEREO 4 RT) OUT LO	14	2 CHANNEL 8 (STEREO 4 RT) OUT SH
		1 CHANNEL 8 (STEREO 4 RT) OUT HI

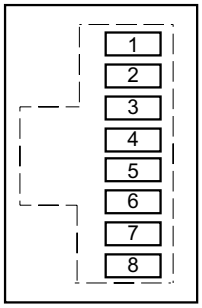
CHANNEL 9 (STEREO 5 LT) OUT SH	25	13 AUDIO GROUND
CHANNEL 9 (STEREO 5 LT) OUT HI	24	12 CHANNEL 9 (STEREO 5 LT) OUT LO
CHANNEL 10 (STEREO 5 RT) OUT LO	23	11 CHANNEL 10 (STEREO 5 RT) OUT SH
CHANNEL 11 (STEREO 6 LT) OUT SH	22	10 CHANNEL 10 (STEREO 5 RT) OUT HI
CHANNEL 11 (STEREO 6 LT) OUT HI	21	9 CHANNEL 11 (STEREO 6 LT) OUT LO
CHANNEL 12 (STEREO 6 RT) OUT LO	20	8 CHANNEL 12 (STEREO 6 RT) OUT SH
CHANNEL 13 (STEREO 7 LT) OUT SH	19	7 CHANNEL 12 (STEREO 6 RT) OUT HI
CHANNEL 13 (STEREO 7 LT) OUT HI	18	6 CHANNEL 13 (STEREO 7 LT) OUT LO
CHANNEL 14 (STEREO 7 RT) OUT LO	17	5 CHANNEL 14 (STEREO 7 RT) OUT SH
CHANNEL 15 (STEREO 8 LT) OUT SH	16	4 CHANNEL 14 (STEREO 7 RT) OUT HI
CHANNEL 15 (STEREO 8 LT) OUT HI	15	3 CHANNEL 15 (STEREO 8 LT) OUT LO
CHANNEL 16 (STEREO 8 RT) OUT LO	14	2 CHANNEL 16 (STEREO 8 RT) OUT SH
		1 CHANNEL 16 (STEREO 8 RT) OUT HI

I/O PORTS (Lower "B" DB-25)

8RJ Panel
Analog Output Connections

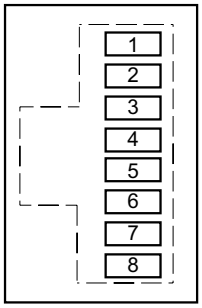


RJ-45 #1



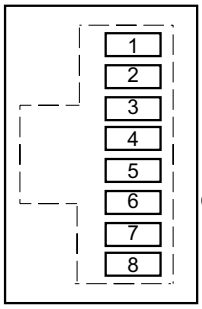
CHANNEL 2 (STEREO 1 RT) OUT HI
CHANNEL 2 (STEREO 1 RT) OUT LO
CHANNEL 1 (STEREO 1 LT) OUT HI
CHANNEL 1 (STEREO 1 LT) OUT LO

RJ-45 #5



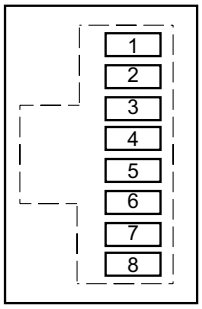
CHANNEL 10 (STEREO 5 RT) OUT HI
CHANNEL 10 (STEREO 5 RT) OUT LO
CHANNEL 9 (STEREO 5 LT) OUT HI
CHANNEL 9 (STEREO 5 LT) OUTLO

RJ-45 #2



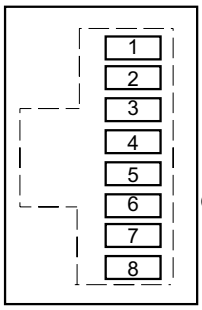
CHANNEL 4 (STEREO 2 RT) OUT HI
CHANNEL 4 (STEREO 2 RT) OUT LO
CHANNEL 3 (STEREO 2 LT) OUT HI
CHANNEL 3 (STEREO 2 LT) OUT LO

RJ-45 #6



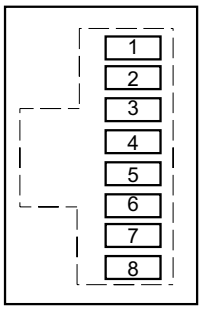
CHANNEL 12 (STEREO 6 RT) OUT HI
CHANNEL 12 (STEREO 6 RT) OUT LO
CHANNEL 11 (STEREO 6 LT) OUT HI
CHANNEL 11 (STEREO 6 LT) OUT LO

RJ-45 #3



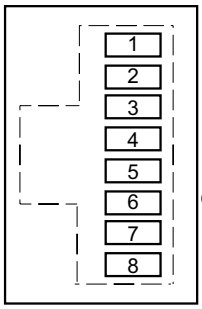
CHANNEL 6 (STEREO 3 RT) OUT HI
CHANNEL 6 (STEREO 3 RT) OUT LO
CHANNEL 5 (STEREO 3 LT) OUT HI
CHANNEL 5 (STEREO 3 LT) OUT LO

RJ-45 #7



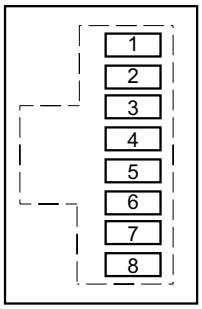
CHANNEL 14 (STEREO 7 RT) OUT HI
CHANNEL 14 (STEREO 7 RT) OUT LO
CHANNEL 13 (STEREO 7 LT) OUT HI
CHANNEL 13 (STEREO 7 LT) OUT LO

RJ-45 #4



CHANNEL 8 (STEREO 4 RT) OUT HI
CHANNEL 8 (STEREO 4 RT) OUT LO
CHANNEL 7 (STEREO 4 LT) OUT HI
CHANNEL 7 (STEREO 4 LT) OUT LO

RJ-45 #8



CHANNEL 16 (STEREO 8 RT) OUT HI
CHANNEL 16 (STEREO 8 RT) OUT LO
CHANNEL 15 (STEREO 8 LT) OUT HI
CHANNEL 15 (STEREO 8 LT) OUT LO

Host CPU (CPU-2001)

Overview

The host CPU card used in the Bridge 2001 incorporates a PC/104 computer mounted on a backplane interface card (the HC-2001 PCB). The host computer utilizes RAM, a flash disk (which emulates a standard IDE hard drive) and an Ethernet port. There is no hard disk drive. Keyboard, floppy controller and video ports are for factory use only. The host CPU board must only be present in the "master chassis" of a single tier switch.

The purpose of the CPU card is to provide control of the 2001 system including the master chassis and any other chassis connected via Stacking or Audio Network cards. The CPU communicates to the XPoint Configuration PC and XY Controller GUI's via TCP/IP over Ethernet, via a backplane command bus to the other cards in its switch, and via RS-485 serial links to existing XY Controllers and Wheatstone consoles. The CPU also phase locks the crosspoint switch and attached remote racks to an on board crystal oscillator or an external AES "black" reference source.

Hardware and software configuration as well as real time crosspoint information is saved in non-volatile storage on the CPU card and is restored at power up or reset. This configuration information provides details to the host application running on the CPU such as the specific audio hardware available, serial port allocation, I/O signal names, etc. and may be modified via the Configuration GUI. Switching information is dynamically controlled via both hardware based XY Controllers and PC based XY GUI's. Network IP address configuration of the CPU is handled by the provided DOS utility application *Networkconfig.exe*. System configuration is discussed in detail in the following sections.

Multi CPU / Failover CPU Systems

Multiple CPU's may optionally be present in large "Multi-Tier" configurations. For the sake of clarity, a single CPU system is assumed in this discussion. Please consult the factory for multi-cpu system details. SEE APPENDIX "2" FOR DETAILS ON FAILOVER CPU OPERATION.

CPU-2001 BIOS Settings/Format

BIOS Setup and formatting of the Host CPU is completed prior to the testing of your 2001 Switch at the Wheatstone factory. There are no user adjustable settings. Please contact customer support with questions regarding the PC/104 SBC BIOS settings or flash disk formatting.

Ethernet IP Addressing

Wheatstone 2001 digital audio network routers ship with the host CPU IP address set for 192.168.1.160 and the personal computer's NIC set for 192.168.1.212. Stand-alone systems (not interfaced to a station's existing network) require no IP address changes.

Before the switch will be recognized on your network, you will most likely need to re-configure the host CPU and XPoint PC's IP addresses. To change the host CPU IP address, a utility application, NETWORKCONFIG.EXE, supplied on the XPoint CD-ROM must be run. See the Appendix 1 for detailed information.

Ethernet Interface Wiring

Stand-alone systems are defined as a host rack connected to a XPoint configuration PC and not interfaced to a station's existing network. Stand-alone systems are "point to point" configurations and are connected by a CAT-5 crossover cable.

Networked systems are defined as a host rack connected directly to an existing Ethernet network hub. Networked systems are connected to the network hub via a straight (pin to pin) CAT-5 cable. Typical CAT-5 cable pin-outs are included in the "Hook Ups" section near the end of this CHAPTER.

Internal Programming Options

All internal programming options are made via PCB mounted dipswitches and jumpers. Dipswitches and jumpers setting shown in the table below:

CPU (HC-2001A PCB)

NAME	REF.DES.	DEFAULT
RACK-ID	SW7	0000 (ALL OFF)
48H_44.1L	J6	OPEN
AUTODETECT	SW8 pos1	ON
CPU_RESET	SW5	OPEN
MSR_SELECT	SW9	OPEN
485_A_TERM	SW1, SW2	BIAS TERMINATION
485_B_TERM	SW3, SW4	BIAS TERMINATION
RS-232 GND	J1	OPEN for 485
AGND to DGND	J4	OPEN

Switch Settings

DIPSW1-SW4 RS-485 Termination

These four, 4-position dipswitches configure the 485 port termination as follows:

SW1-SW4

POSITION	FUNCTION	BIASED TERM	PASSIVE TERM	UNTERMINATED
1 - TX10Ω	ON=10Ω BYPASS	OFF*	ON	OFF
2 - TX+	ON=750Ω PULLUP	ON*	OFF	OFF
3 - TX-	ON=750Ω PULLDOWN	ON*	OFF	OFF
4 - 120Ω	ON=120Ω PARALLEL	ON*	ON	OFF

Choices are Unterminated, Normal Termination, or BIAS Termination on the transmit and receive lines. SW1 and SW2 are for Port A, and SW3 and SW4 are for Port B. SW1 and SW3 are for the RS-485 transmitter's termination on the CPU; SW2 and SW4 are for receiver terminations.

An RS-485 bus may only be BIAS TERMINATED at one end. All applicable Bridge 2001 OAN and CPU cards are set for BIAS TERMINATION by default. All peripheral devices are set for NO TERMINATION by default. Set the TERMINATION to ON for the last controller or console only, in a RS-485 chain.

SW5 - CPU Reset

This momentary pushbutton switch allows CPU to be reset without power down of system. Holding for two seconds will cause the FPGA to be reprogrammed also.

DIPSW6 - Utility Switches

Pos.1 - DIP4 - not used

Pos.2 - DIP5 - not used

Pos.3 - C6 - not used

Pos.4 - C7 - not used

DIPSW7 - Rack ID

Default is all OFF (Rack ID 1, binary ØØØØ) for a master rack CPU.

Note: Rack ID numbers are coded in binary.

Rack ID 1 equals binary Ø, Rack ID 2 equals binary 1, etc.

Rack ID's are set at the factory. Incorrect setting of these switches can cause system malfunction.

DIPSW8

Pos.1 - Autodetect - default is "ON"

Autodetect will sense the presence of an external AES input clock and slave the system to this AES reference. If the AES reference fails (wire breaks,

etc.) the system will revert to onboard crystal reference until AES input returns. Autodetect disabled forces system to ignore AES reference and always use the onboard crystal and bypass PLL.

Pos.2 - not used

Pos.3 - not used

Pos.4 - not used

SW9 - Master Select

This momentary pushbutton switch may be used to command transfer of CPU mastering from one CPU to other in a dual CPU system.

Jumper Settings

J1 - RS-232 GND - default is "OPEN"

J1 is inserted if Port A is to be used as a RS-232 port rather than RS-485. The jumper shorts DB-9 connector Pin 8 to ground which must be used for the RS-232 ground reference.

J2 - not used

J3 - not used

J4 - AGND to DGND - default is "CLOSED"

J4 connects Audio Ground to Digital Ground.

J5 - FPGA PGM - momentary shorting will reprogram the FPGA.

J6 - 48 or 44.1kHz Sample Rate Select*

Selects 48kHz or 44.1 kHz as Master Fs; derived from onboard crystal oscillators.

J6 open - 48 kHz

J6 shunted - 44.1 kHz

*NOTE: When changing the audio sample rate of the Bridge 2001 Digital Audio Network Router, changes must be made in the following places: DO-2001 Digital Output Card, CPU-2001 Host CPU, OAN-2001 Audio Network Card, CEX-2001 Stacking Card, and QAT-2001 Quad Audio Network Card. See the appropriate manual sections for details.

Serial Interface Ports

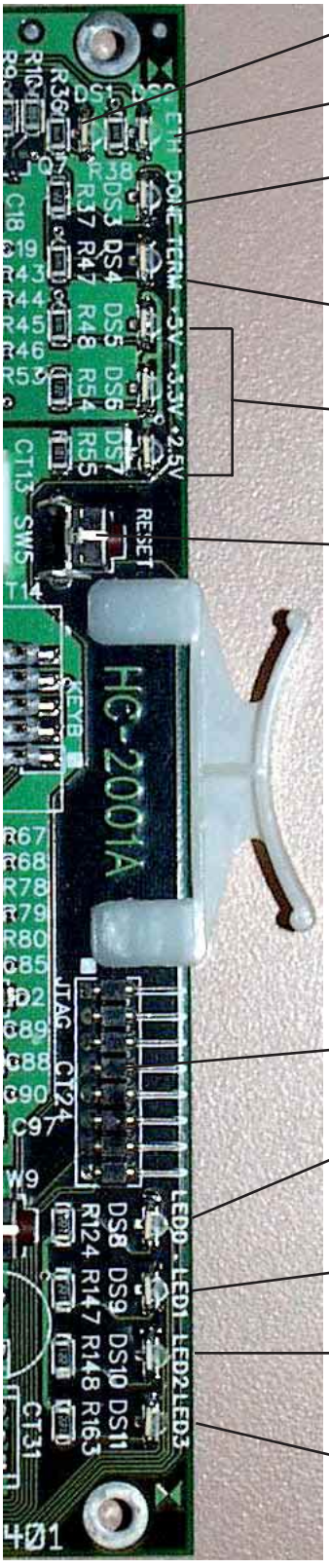
Serial ports A and B are typically used to connect remotely located XY controllers and Wheatstone consoles to the switch via 4-wire RS-485. These ports are configured from the Xpoint GUI and are setup at the factory as follows:

PORT A - RS-485, 38400 bps, XY controller port

PORT B - RS-485, 9600 bps, Console port

Note: Serial port A may be setup for RS-232 operation via jumper setting J1.

CPU Card Status LED's



ETHERNET ACTIVITY (DS1) - ON indicates TCP/IP activity.

ETHERNET LINK (DS2) - ON indicates Ethernet is link OK.

DONE LED (DS1) - Normally OFF; ON when programming the FPGA, Flashes when system clock is missing.

BACKPLANE TERM FAULT (DS4) - lights on termination fault.

POWER SUPPLY STATUS (DS5-DS7) - ON indicates power supply is OK.

RESET SWITCH (SW5) - momentary pushbutton. Hold for 2 seconds for complete reset of CPU and FPGA.

JTAG HEADER - FPGA programming - factory use only.

BACKPLANE RESPONSE (DS8) - lights if the CPU is not responding to backplane messages.

CLOCK PHASE (DS9) - ON indicates that the EXT AES ref is out of phase (unlocked).

BUFFER OVERFLOW (DS10) - ON indicates buffer problem. Contact support or reset system.

CLOCK MASTER (DS11) - ON indicates CPU is driving backplane clock.

Hook-Ups

All user wiring to and from CPU card takes place at the rear I/O connector module (PWIH-2001) that plugs into the extreme left-hand slot (if you are looking at the rear of the cage). There are three DB-9 female serial interface connectors, one RJ-45 Ethernet connector and two power supply connectors. Pinout drawing on page 2-40 shows all wiring connections at a glance.

LEFT "A" DB-9—SERIAL INTERFACE PORT 1 CONNECTIONS

PIN 5 – AES SYNC OUT SH
PIN 4 – AES SYNC OUT HI
PIN 9 – AES SYNC OUT LO
] NOT USED

PIN 3 – RX1 HI (RS-485)
PIN 8 – RX1 LO (RS-485) / GND (RS-232)
PIN 2 – TX (RS-232)
PIN 7 – RX (RS-232)
PIN 1 – TX1 HI (RS-485)
PIN 6 – TX1 LO (RS-485)

RIGHT "B" DB-9—SERIAL INTERFACE PORT 2 CONNECTIONS

PIN 5 – AES SYNC IN SH
PIN 4 – AES SYNC IN HI
PIN 9 – AES SYNC IN LO
] NOT USED

PIN 3 – RX2 HI (RS-485)
PIN 8 – RX2 LO (RS-485)
PIN 2 – N/C
PIN 7 – N/C
PIN 1 – TX2 HI (RS-485)
PIN 6 – TX2 LO (RS-485)

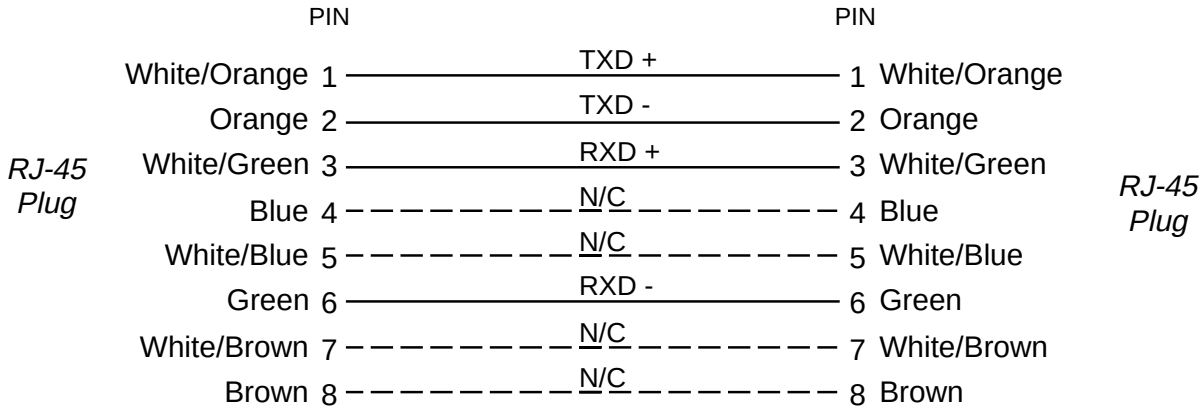
LOWER "C" DB-9—AES SYNC PORT CONNECTIONS

PIN 5 – AES SYNC IN SH
PIN 4 – AES SYNC IN HI
PIN 9 – AES SYNC IN LO
PIN 2 – AES SYNC OUT SH
PIN 1 – AES SYNC OUT HI
PIN 6 – AES SYNC OUT LO

RJ-45—ETHERNET CONNECTIONS

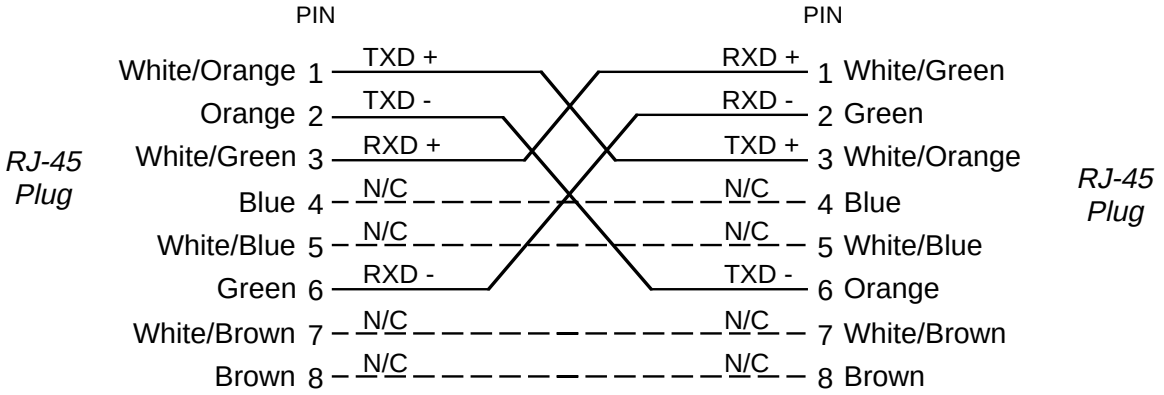
PIN 1 – TXD +
PIN 2 – TXD -
PIN 3 – RXD +
PIN 4 – N/C
PIN 5 – N/C
PIN 6 – RXD -
PIN 7 – LN LED
PIN 8 – LK LED

TYPICAL ETHERNET CABLE



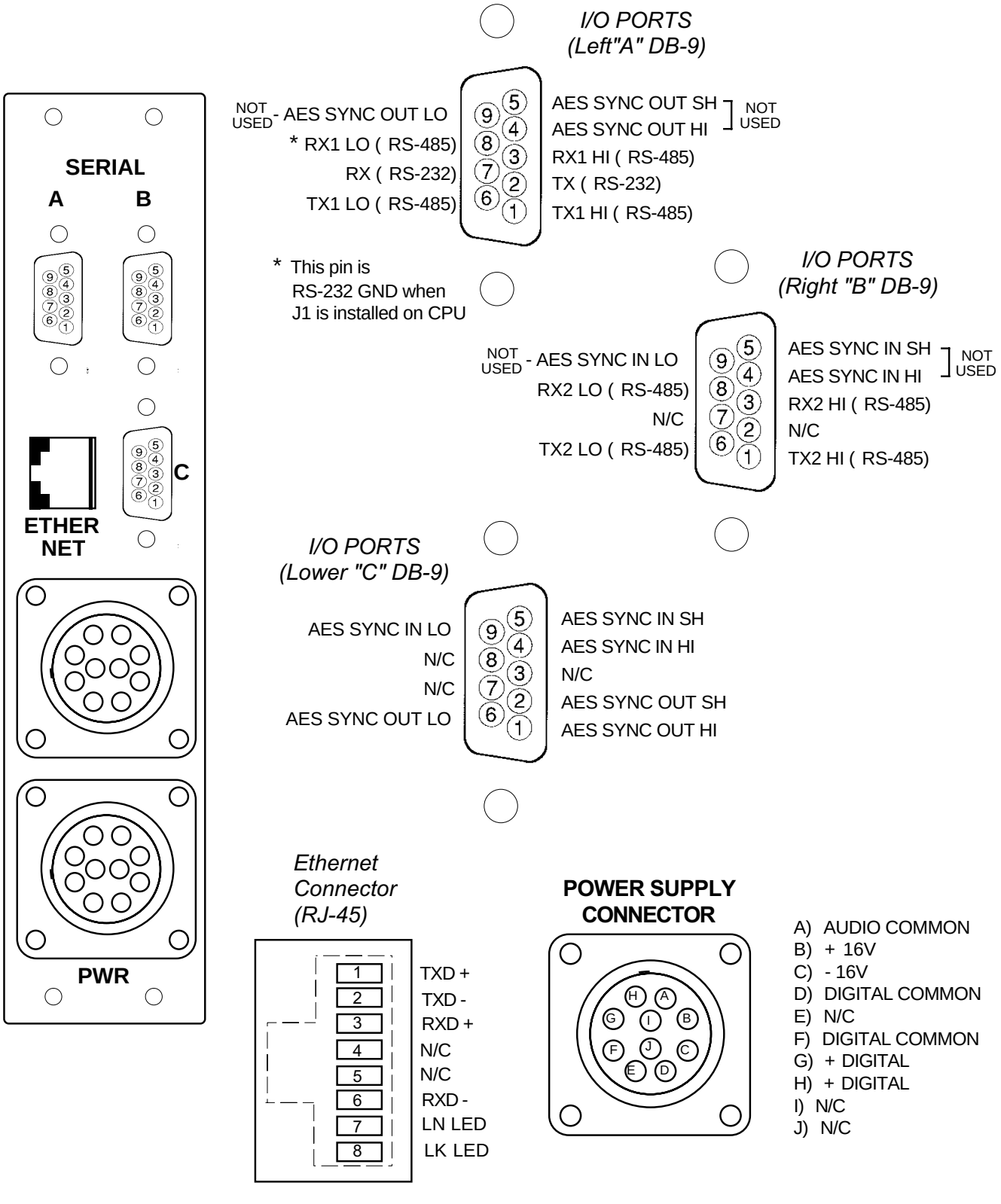
USED FOR CONNECTING THE HOST CPU MODULE TO YOUR NETWORK HUB.

TYPICAL CROSSOVER CABLE



USED FOR SIMPLE "POINT TO POINT" CONNECTIONS BETWEEN THE SUPPLIED XP CONFIGURATION PC'S NIC CARD AND THE HOST CPU MODULE.

PWIH Panel
I/O Connections



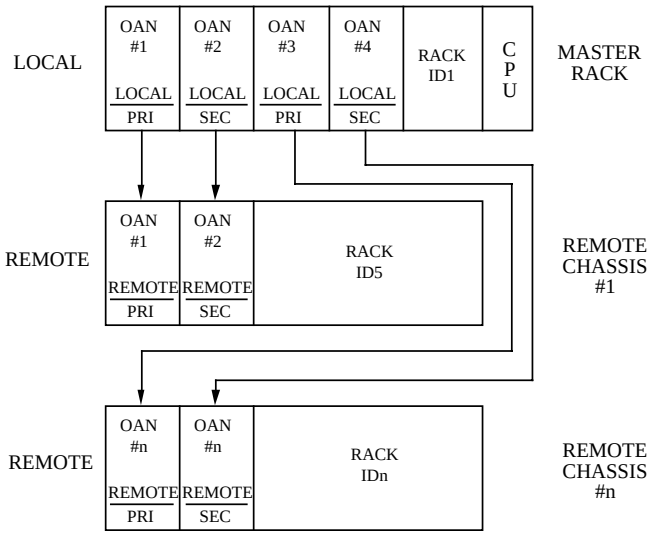
Audio Network Card (OAN-2001)

Overview

The Audio Network card is used to connect a master chassis to a remote chassis via a fiber optic link or CAT-5 cable. Audio Network cards must be installed in pairs (i.e. an Audio Network card in the master chassis communicates to a companion Audio Network card in the remote chassis). An Audio Network card selects up to 64 mono channels (32 stereo *signals*), in four blocks of 16 channels, for bi-directional transport to the companion Audio Network card. The companion Audio Network card in turn may place these channels onto the appropriate number of consecutive remote chassis TDMs (1-4, depending on the number of channels). The CPU card controls the configuration of the Audio Network cards (local channels being driven to the remote Audio Network card / TDMs being driven by the remote Audio Network card).

Between local and remote racks within a single tier, Audio Network cards are used to bring data in from and send data out to remote racks. No provision is made to configure Input and Output cards in a remote chassis to communicate directly with each other. The remote racks are similar to the local chassis; with up to 4 TDMs populated per Audio Network card. A remote chassis cannot be daisy chained to another remote chassis.

In a Multi-Tiered environment, Audio Network cards are used as the inter-connections between the Hub switch and up to 14 Satellite switches. These "inter-connect" Audio Network cards must all reside in the local racks of each tier. In addition, at least one of these inter-connecting Audio Network cards must reside in the master chassis of each satellite tier (in order to drive the clock).



Internal Programming Options

All internal programming are made via PCB mounted dipswitches. Dipswitch settings are shown in the table below:

OAN-2001 PCB

NAME	REF.DES.		
RACK-ID	SW7	see Breakout Table - DIPSW7 Rack ID	
LOCAL/REMOTE	SW5 pos. LOCAL/REMOTE	LOCAL=OFF	REMOTE=ON
SECONDARY/PRIMARY	SW5 pos. SECONDARY/PRIMARY	SECONDARY=OFF	PRIMARY=ON
SAMPLE RATE	SW5 pos. 48kHz / 44kHz	48kHz=OFF	44.1kHz=ON
MEDIA	SW5 pos. FIBER / CAT 5	FIBER=OFF	CAT5=ON
485_A_TERM	SW1, SW3	see Breakout Table - DIPSW1-4 485 Termination	
485_B_TERM	SW2, SW4	see Breakout Table - DIPSW1-4 485 Termination	
BPSCR	J1	ALWAYS SHORTED	ETHERNET MODE SETTING
CLOCK ENABLE	J3	OPEN=Y1&Y2 DISABLED	SHORT PINS 1&2=Y1 ENABLED SHORT PINS 2&3=Y2 ENABLED
SOCKETED CLOCK ENABLE	J5	GRN=DISABLED	SHORT PINS 1&2=Y3 ENABLED
RESET	J2, J4 = not installed	SHORT=RESET	

Switch Settings

DIPSW1-SW4 - 485 Termination

SW1-SW4

POSITION	FUNCTION	BIASED TERM	PASSIVE TERM	UNTERMINATED
1 - TX10Ω	ON=10Ω BYPASS	OFF*	ON	OFF
2 - TX+	ON=750Ω PULLUP	ON*	OFF	OFF
3 - TX-	ON=750Ω PULLDOWN	ON*	OFF	OFF
4 - 120Ω	ON=120Ω PARALLEL	ON*	ON	OFF

* Default

These four 4-position dipswitches configure the 485 port termination as follows:

Choices are Unterminated, Normal Termination, or BIAS Termination on the transmit and receive lines. SW1 and SW2 are for Port A, and SW3 and SW4 are for Port B. SW1 and SW3 are for the RS-485 transmitter's termination; SW2 and SW4 are for receiver terminations.

An RS-485 bus may only be BIAS TERMINATED at one end. All applicable Bridge 2001 OAN and CPU cards are set for BIAS TERMINATION by default. All peripheral devices are set for NO TERMINATION by default. Set the TERMINATION to ON for the last controller or console only, in a RS-485 chain.

applicable Bridge 2001 OAN and CPU cards are set for BIAS TERMINATION by default. All peripheral devices are set for NO TERMINATION by default. Set the TERMINATION to ON for the last controller or console only, in a RS-485 chain.

DIPSW5

Pos.1 - Local/Remote (Clock source)

The Local/Remote setting is required to configure OAN cards such that a Local card will operate from the backplane clock/sync references. A Remote card would likewise infer that clock/sync are to be extracted from Fiber/CAT5 and driven onto backplane.

• The system's master chassis must have only one LOCAL-PRIMARY OAN card connected to each companion remote chassis.

• Each remote chassis must have only one REMOTE-PRIMARY OAN card.

Pos.2 - Secondary/Primary

Some system configurations may have multiple OAN cards in each rack. The Primary setting is used to distinguish which OAN card will act as the Clock/Sync master in the Remote chassis. Additional OAN cards must be set to Secondary. Secondary cards will not transmit/receive control information since this would duplicate the Primary card.

• The system's master chassis must have only one LOCAL-PRIMARY OAN card connected to a companion remote chassis.

• Each remote chassis must have only one REMOTE-PRIMARY OAN card.

Pos.3 - 48kHz / 44.1kHz*

Selects the system's sample rate frequency; 48 or 44.1 kHz.

If Y1 and Y2 are populated with surface mount clock oscillators, and Y3 is not installed (default), then 3 pin jumper posts J3 must be used to select the correct frequency. A jumper shunt between the center pin and pin closest to Y1 selects Y1 (48 kHz) and likewise a shunt to pin closest to Y2 selects Y2 (44.1 kHz).

The clock oscillator on the Audio Network card must match the system's master clock frequency. If the system audio sample rate is 48 kHz, then the clock reference must be 24.576 MHz and likewise for 44.1 kHz, a 22.5792 MHz clock is necessary. If only Y3, a DIP socketed clock is populated and not Y1 or Y2, then the appropriate matching clock frequency must be installed in Y3.

*NOTE: When changing the audio sample rate of the Bridge 2001 Digital Audio Network Router, changes must be made in the following places: DO-2001 Digital Output Card, CPU-2001 Host CPU, OAN-2001 Audio Network Card, CEX-2001 Stacking Card, and QAT-2001 Quad Audio Network Card. See the appropriate manual sections for details.

Pos.4 - Fiber/CAT5

Selects whether the audio network connection to the companion Audio Network card will be made through either optical fiber or copper CAT-5 cable.

DIPSW7 - Rack ID

If the OAN card is a **Remote-Primary** Audio Network Card, this OAN card must supply the Rack ID to its backplane from the 4 bit onboard switch. Remote Rack ID's must be 5 or higher.

SW7 RACK ID

	RACK ID	SW7			
		RACK ID8	RACK ID4	RACK ID2	RACK ID1
MASTER CPU	1	OFF	OFF	OFF	OFF
RESERVED FOR STACKING	2	OFF	OFF	OFF	ON
	3	OFF	OFF	ON	OFF
	4	OFF	OFF	ON	ON
USED FOR AUDIO NETWORK CHASSIS	5	OFF	ON	OFF	OFF
	6	OFF	ON	OFF	ON
	7	OFF	ON	ON	OFF
	8	OFF	ON	ON	ON
	9	ON	OFF	OFF	OFF
	10	ON	OFF	OFF	ON
	11	ON	OFF	ON	OFF
	12	ON	OFF	ON	ON
	13	ON	ON	OFF	OFF
	14	ON	ON	OFF	ON
	15	ON	ON	ON	OFF
	16	ON	ON	ON	ON

• Each remote chassis must have only one REMOTE-PRIMARY OAN card.

Note: Rack ID numbers are coded in binary: Rack ID 1 equals binary Ø, Rack ID 2 equals binary 1, etc.

Rack ID's are set at the factory. Incorrect setting of these switches can cause system malfunction.

Jumper Settings

J1 - Ethernet Mode Setting

Always shorted.

J2 - Reset

Momentary shorting does a complete reset.

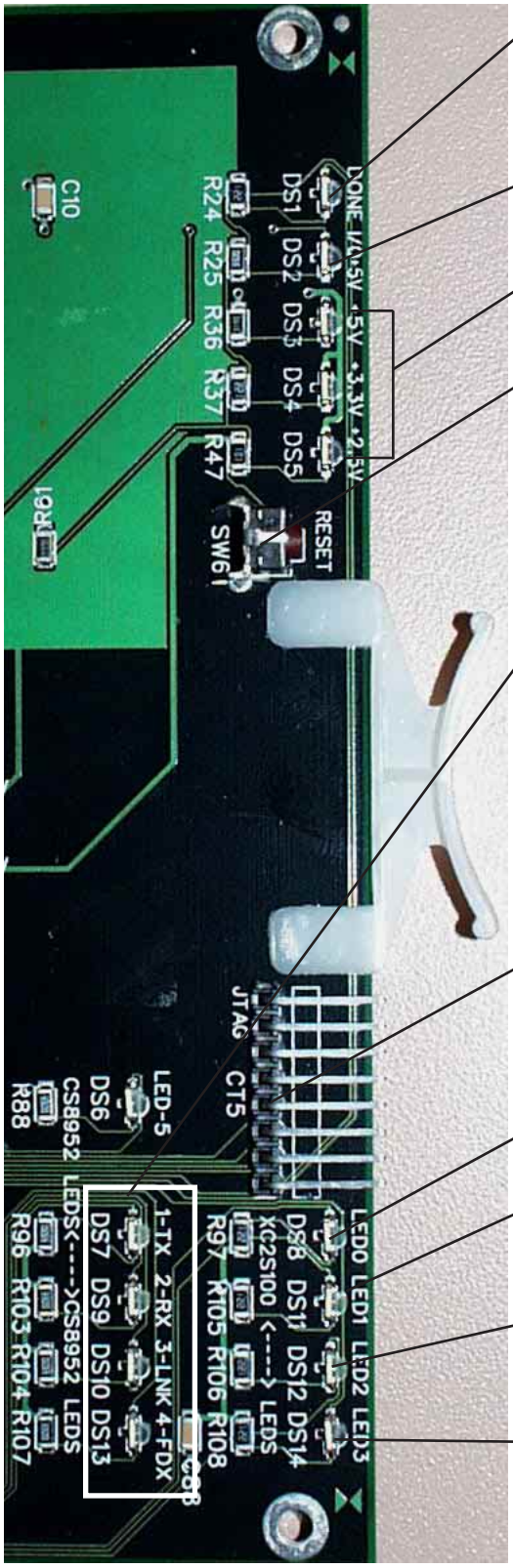
J3, J5 - Clock Selection

OAN cards are designed to have two clock options - surface mounted crystals, or a socketed crystal. Surface mount crystals can be used without crystal in socket - just short the pins closest to the desired crystal (J3) to enable it. Or insert the desired crystal into the socket and enable it by shorting the enable line (J5) to the crystal.

If Y1 and Y2 are populated with surface mount clock oscillators, and Y3 is not installed (default), then 3 pin jumper posts J1 must be used to select the correct frequency. A jumper shunt between the center pin and pin closest to Y1 selects Y1 (48 kHz) and likewise a shunt to pin closest to Y2 selects Y2 (44.1 kHz).

J4 - Reset - not used

OAN Card Status LED's



DONE LED (DS1) - Normally OFF;
ON when programming the FPGA,
Flashes when system clock is missing.

I/O INTERFACE (DS2) - lights when the rear panel card is powered.

POWER SUPPLY STATUS (DS3-DS5) -
ON indicates power supply is OK.

RESET SWITCH (SW6) - momentary pushbutton.
Resets the OAN card.

<u>LINK STATUS LED's</u>

TX STATUS (DS7) - ON indicates that the data transmission link is OK.

RX STATUS (DS9) - ON indicates that the data receive link is OK.

LINK STATUS (DS10) - ON indicates that a hardware link is established.

FULL DUPLEX (DS13) -ON indicates that the link is in full duplex mode.

JTAG HEADER - FPGA programming - factory use only.

<u>AUXILIARY STATUS LED's</u>

ACTIVITY LED (DS8) - flashes on messages.

CLOCK MASTER (DS11) - ON indicates that this OAN card supplies the backplane clock.

COMM ERROR (DS12) - Normally OFF.
ON for errors.

CFG/BUFFER ERROR (DS14) - Normally OFF.
Flashes when the card is not configured.
Once configured, the LED indicates buffer errors.

Hook-Ups

All user wiring to and from OAN-2001 Card takes place at the rear I/O connector module (ONI-2001). CAT5 or multi-mode optical fiber Audio Network connections to companion OAN cards are made via RJ-45 or SC type optical connectors. There are also two female DB-9 serial port connectors for use as RS-485/RS232 communication links to Wheatstone consoles and XY controllers. Pinout drawing on page 2-49 shows all wiring connections at a glance.

Upper "A" DB-9—Serial Interface Port 1 Connector

Pin 3 – RX1 HI (RS-485)
Pin 8 – RX1 LO (RS-485)
Pin 1 – TX1 HI (RS-485)
Pin 6 – TX1 LO (RS-485)

Pin 2 – TX1 (RS-232)
Pin 7 – RX1 (RS-232)
Pin 5 - GND

Lower "B" DB-9—Serial Interface Port 2 Connector

Pin 3 – RX2 HI (RS-485)
Pin 8 – RX2 LO (RS-485)
Pin 1 – TX2 HI (RS-485)
Pin 6 – TX2 LO (RS-485)

Pin 2 – TX2 (RS-232)
Pin 7 – RX2 (RS-232)
Pin 5 - GND

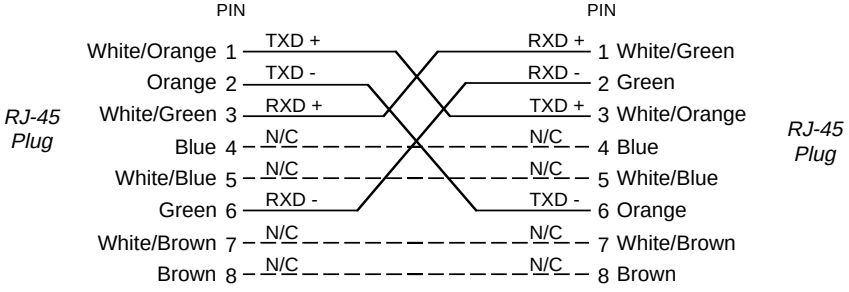
RJ-45—CAT5 Audio Network Connector

Pin 1 – TXD +
Pin 2 – TXD -
Pin 3 – RXD +

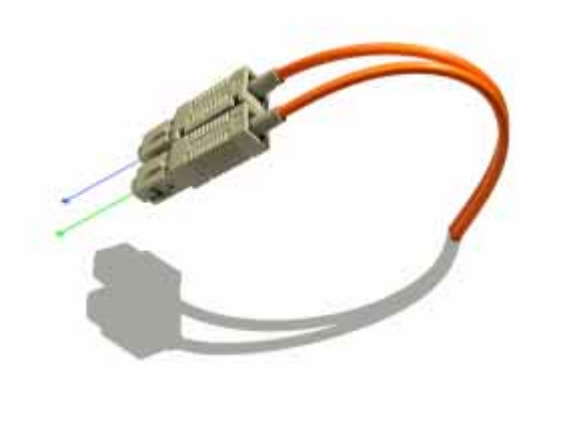
Pin 4 – N/C
Pin 5 – N/C
Pin 6 – RXD -

Pin 7 – N/C
Pin 8 – N/C

CAT5 Crossover Cable for OAN to OAN Connections



Optical Fiber Interface



Connector Type

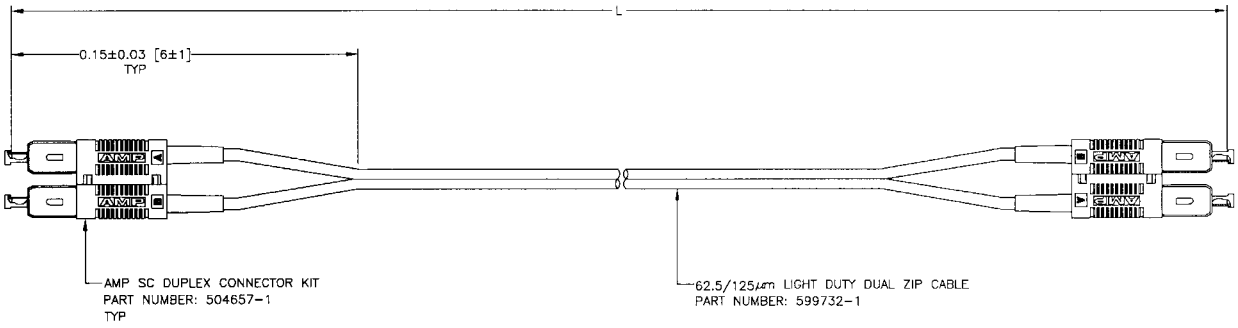
The OAN audio network card provides a *SC Duplex* style connector for interfacing optical fiber. The SC (subscription channel) connector is a low insertion loss, locking mechanism with excellent strain relief characteristics. The following AMP® part number may be used to reference the physical characteristics of the required mating connector.

AMP SC Duplex connector Kit Part Number: 504657-1

Optical Fiber

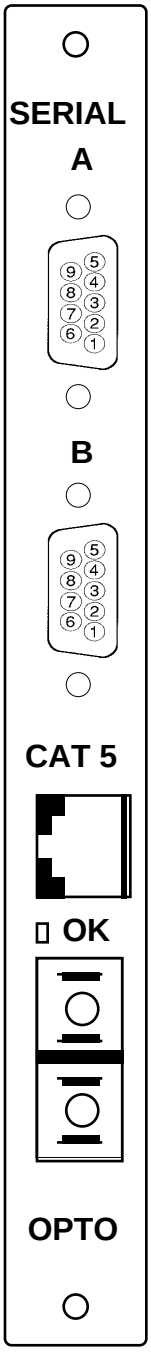
The typical optical fiber cable required in this application is a multimode, glass core cable, with a core/cladding size of *62.5/125 µm*, suitable for low-to-moderate-speed data links (≤100Mbps). The full-duplex nature of the audio network interface requires one fiber for transmit, and one for receive; hence dual zip cables are recommended.

Optical fiber cables are manufactured with a variety of jacket materials, which directly affect cable cost, including Thermoplastic Elastomer (TPE), Kynar® and Teflon® FEP. Physical properties of the jacket material determine a cable's resistance to abrasions, flame retardancy, etc. *Check local codes to be sure the cable you plan on using is compliant in your application.*



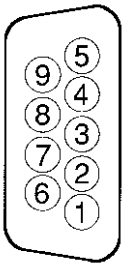
DIMENSIONS IN [ ] ARE IN INCHES.

ONI Panel
I/O Connections



I/O PORTS (Upper "A" DB-9)

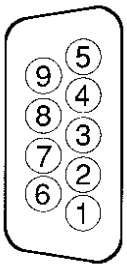
N/C
RX1 LO (RS-485)
RX1 (RS-232)
TX1 LO (RS-485)



GND
N/C
RX1 HI (RS-485)
TX1 (RS-232)
TX1 HI (RS-485)

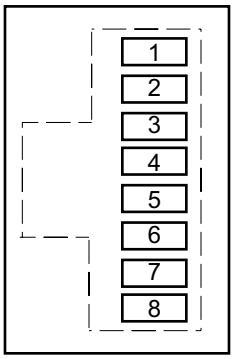
I/O PORTS (Lower "B" DB-9)

N/C
RX2 LO (RS-485)
RX2 (RS-232)
TX2 LO (RS-485)



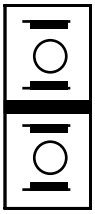
GND
N/C
RX2 HI (RS-485)
TX2 (RS-232)
TX2 HI (RS-485)

Audio Network Connector (RJ-45)



TXD +
TXD -
RXD +
N/C
N/C
RXD -
N/C
N/C

Audio Network (SC Connector)



TX

RX

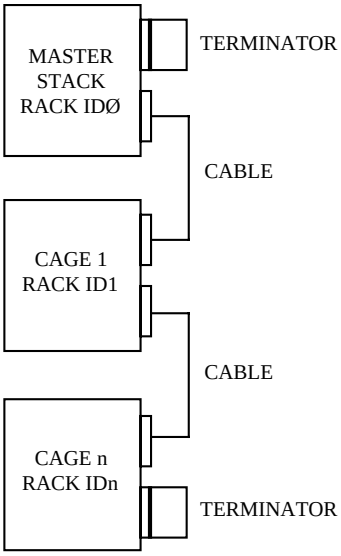
Stacking Card (CEX-2001)

Overview

The Stacking card is used to connect up to 4 co-located racks into a larger virtual chassis. The stacking approach is most useful when configuring medium to large *centrally* located systems which employ a large number of analog or digital audio I/O cards. Stacked racks allow full *physical* access to all 32 TDM busses by expanding the number of available slots. Remember, a single chassis has 22 slots which can accommodate a maximum of 20 I/O cards, whereas a four rack stacked system for example has 88 slots. Only one chassis (the master chassis) may have an active CPU card.

Configuring the Virtual Chassis

Each stacked chassis must have a single CEX-2001 chassis expansion card installed in Slot 1. Each CEX-2001 card is chained together using the provided high density multipin cables, similar to that used in SCSI interfaces (pinouts are NOT identical to SCSI). A cable from Rack1 connects to Rack 2, Rack 2 to Rack 3, etc. The supplied termination plugs must be fitted to the unused connectors at both ends of the chain.



TDM Assignment

When configuring stacked systems, attention must be given to the number of TDM busses allocated to the master chassis and each expansion rack. The number of TDM busses in a rack determines the number of input cards allowed in a rack. Each input card uses one TDM bus.

The 4 position dipswitch SW3 allows the user to allocate TDM busses in groups of 8, with each switch position allocating 8 TDM busses. The first position of SW3 on the CEX-2001 in the master chassis must always be ON, and conversely the first position of SW3 on the remaining CEX-2001 cards installed in the expansion racks must always be OFF. How you set the remaining 3 positions of dipswitch SW3 on *each* CEX-2001 card determines how many TDM busses are available to each rack. For example, assume a 2 rack system: switch ON SW3, positions 1 & 2 on the master rack CEX-2001 and SW3, positions 3 & 4 on the second rack's CEX-2001 card. The master rack and the expansion rack now each drive 16 TDM's, giving each rack the ability to house up to 16 input cards each.

CEX-2001 Rack ID

The CEX -2001 Rack ID numbering scheme differs significantly from the methods used on OAN-2001 and CPU-2001 circuit boards. Stacked racks have Rack ID's of 1 through 4 inclusive. The Rack ID numbers for stacked frames are a by-product of the TDM assignment dipswitch setting described in the previous section. Each position, 1-4, of the four position dipswitch SW3 also corresponds to Rack ID's 1-4. The Master rack is always Rack ID 1. The Rack ID of a stacked expansion rack is always equal to the ***first position*** of SW3 that was turned ***ON*** to assign TDM's on the rack's CEX-2001 circuit board . Using the previous two rack TDM Assignment example, the master Rack ID is 1 and the *second Rack ID is **3***.

CEX-2001 Configuration Rules

- Dipswitch SW3 serves a dual function, TDM assign plus Rack ID.
- Rack ID in the XP GUI is equal to the 1st SW3 position thrown on a CEX card.
- The Master rack CEX card always has SW3-1 ON, all others have SW3-1 OFF.
- Each rack must drive at least 8 TDM's, but not more than 24 TDM's.

Internal Programming Options

All internal programming choices are made via PCB mounted dipswitches. Dipswitch functions are shown in the table below.

CEX-2001 PCB

NAME	REF.DES.	DEFAULT
DRIVERS / RACK-ID	SW3	0000
CRYSTAL SELECT	J1	OPEN=SOCKET SHORT L/R=L/R CRYSTAL
RESET	J2	

Switch Settings

DIPSW1

This four position dipswitch, SW1, is not used.

SW2 - Reset

Momentary pushbutton resets the stacking card.

DIPSW3 - TDM ASSIGN/RACK ID

SW3 settings are unique for each CEX-2001 card installed. SW3 assigns TDM busses to its rack and supplies the chassis' Rack ID to the system software and XPoint GUI. Please refer to the "Configuring the Virtual Chassis" section earlier in this chapter for details.

Jumper Settings

J1 - Crystal Select

Stacking cards are designed to have two clock options - surface mounted crystals, or a socketed crystal. Surface mount crystals can be used without crystal in socket - just short the pins closest to the desired crystal to enable it. Or insert the desired crystal into the socket and enable it by shorting the enable line to the crystal.

If Y1 and Y2 are populated with surface mount clock oscillators, and Y3 is not installed (default), then 3 pin jumper posts J1 must be used to select the correct frequency. A jumper shunt between the center pin and pin closest to Y1 selects Y1 (48 kHz) and likewise a shunt to pin closest to Y2 selects Y2 (44.1 kHz).

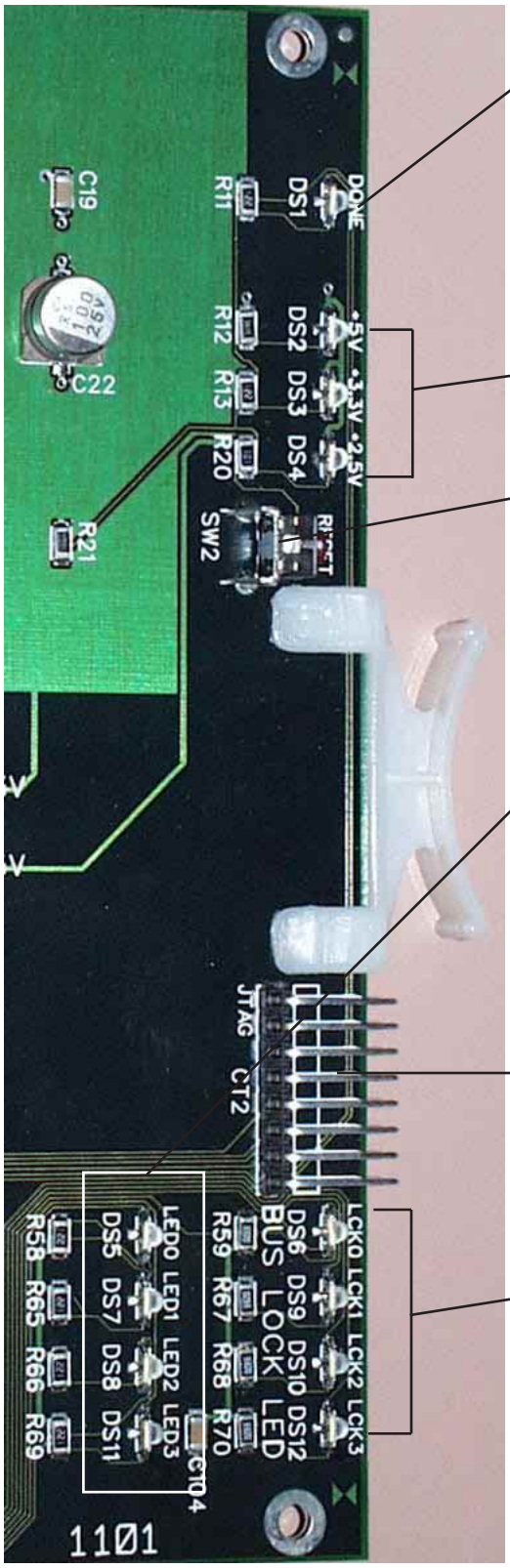
The clock oscillator on the Stacking card must match the system's master clock frequency. If the system audio sample rate is 48 kHz, then the clock reference must be 24.576 MHz and likewise for 44.1 kHz, a 22.5792 MHz clock is necessary. If only Y3, a DIP socketed clock is populated and not Y1 or Y2, then the appropriate matching clock frequency must be installed in Y3.

NOTE: When changing the audio sample rate of the Bridge 2001 Digital Audio Network Router, changes must be made in the following places: DO-2001 Digital Output Card, CPU-2001 Host CPU, OAN-2001 Audio Network Card, CEX-2001 Stacking Card, and QAT-2001 Quad Audio Network Card. See the appropriate manual sections for details.

J2 - Reset

Momentary shorting of this jumper will reset the card and program the FPGA.

Stacking Card Status LED's



DONE LED (DS1) - Normally OFF;
ON when programming the FPGA ,
Flashes when system clock is missing.

POWER SUPPLY STATUS (DS2-DS4) -
ON indicates power supply is OK.

RESET SWITCH (SW2) - momentary pushbutton.
Resets the OAN card.

AUXILIARY STATUS LED's

ACTIVITY LED (DS5) - flashes on messages.

BUS 0 LOCK STATUS (DS7) - ON when Bus 0 not locked.

(DS8) - not used, always OFF.

CFG STATUS (DS11) - ON when card is not configurated.

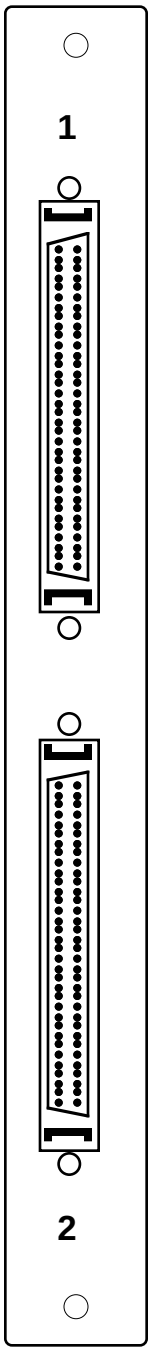
JTAG HEADER - FPGA programming - factory use only.

BUS LOCK LED's

LED's (DS6, DS9, DS10, DS12) ON indicates unallocated TDM busses- all four LED's should be OFF when operational.

Hook-Ups

All user wiring to and from Stacking Card takes place at the rear I/O connectors module (CEI-2001). There are two specially wired high density SCSI type connectors for looping the Stacking cards together.



Logic Input/Output Card (LIO-2001)

Overview

The LIO-2001 is a programmable hardware GPI with a feature set designed for broadcast studio control applications. Twelve independent, opto-isolated solid state relay inputs and outputs may be programmed through the XPoint GUI software to function as routable logic or trigger ports.

Routable logic allows the user to make logic signal crosspoints in the same way audio crosspoints are made. For instance, a closure on logic input port 1 can be cross connected to logic output port 1. Later, the same closure on input port 1 can be routed to logic output port 2, 3 or 4 etc. as required. The *output* ports may be programmed to follow the input port state or to invert it. Defining this behavior is useful when configuring the hardware for normally closed applications. Input and output ports may be configured as logic I/O only or may be "attached" to an audio signal. Routable logic signals may be included as part of a Salvo.

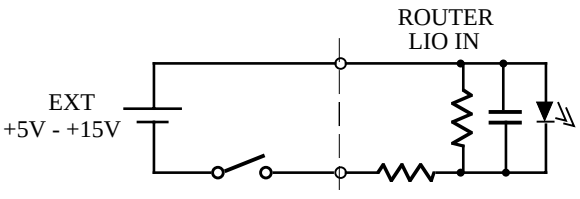
Trigger ports allow the user to program a logic *input* to fire a predefined Salvo or to make a temporary audio connection. Salvos make or break multiple audio and/or logic crosspoints, while temporary audio connections are useful for IFB or EAS applications. When an input port is defined as a trigger port, the corresponding output port is automatically allocated for tally back. Tally back outputs provide a momentary closure whenever the corresponding input is activated. Note that trigger ports serve one, predefined function and are not routable.

See Configuring Logic I/O section in the Software Setup guide.

Input Ports

Each of the twelve LH1522AB solid state relay input ports are configured as a floating photodiode, (i.e. + input is the opto's anode, - input is the opto's cathode). A 475 ohm current limiting resistor in series with each negative input supports an external supply voltage range of +5Vdc to +15Vdc. For external supply voltages between +15Vdc and +24Vdc, install a current limiting resistor of 220 ohms in series with each + input connection. Maximum forward photodiode current is 50mA.

SIMPLE INPUT EXAMPLE

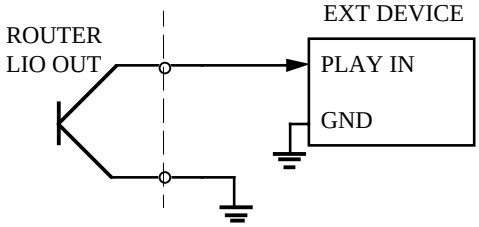


When interfacing to a logic input port, we recommend the positive side be connected to a fixed, positive dc voltage and the negative side switched to ground to activate the logic input.

Output Ports

Each of the twelve LH1522AB solid state relay outputs may be configured in software to function as normally open or normally closed circuits when cross connected to an input. Routable output ports can be programmed to default to the ON, OFF or CURRENT states when disconnected from an input port.

SIMPLE OUTPUT EXAMPLE

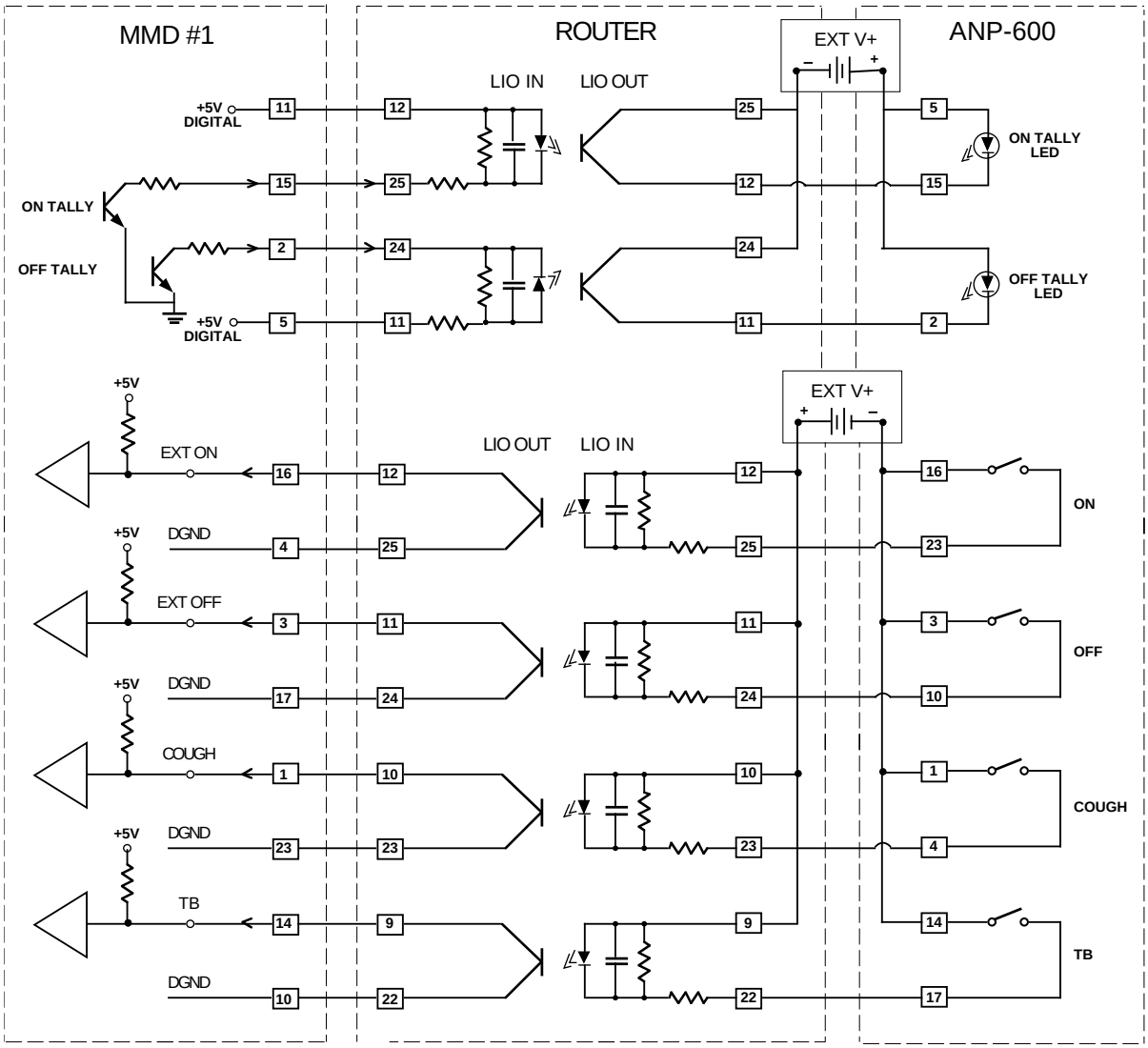


All outputs feature linear ac/dc operation, current limiting and a low on resistance, typically 10 ohms.

Normal Operating Load Limits: 120mA, ±100V

Safety Note: *The LIO-2001 is **NOT** designed to safely switch AC mains power*.

Typical Input/Output Circuit



Software Programming

For details on programming the LIO-2001, please refer to the “Logic I/O Control” chapter in the XPoint Software Setup Guide later in this manual.

Internal Programming Options

There are no user programming options on the LIO-2001 card.

Jumper / Dipswitch Settings

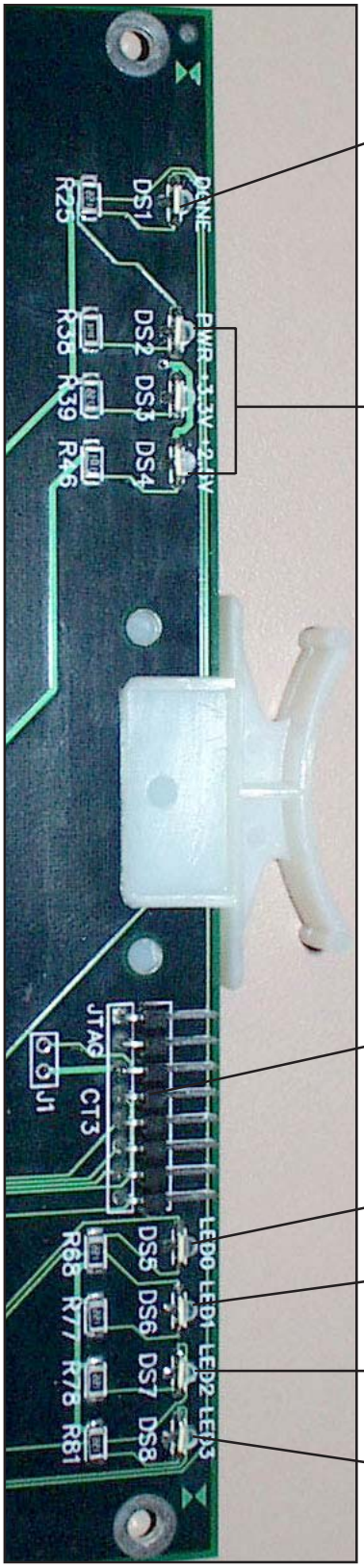
J1 - Not installed.

J2 - Default IN - FPGA reset enable.

J3 - Not installed.

SW1-4 - Not used.

Logic Input/Output Card Status LED's



DONE LED (DS1) - Normally OFF;
ON when programming the FPGA,
Flashes when system clock is missing.

POWER SUPPLY STATUS (DS2-DS4) - ON indicates power supply is OK.

JTAG HEADER - FPGA programming - factory use only.

AUXILIARY STATUS LED's

SYS ACTIVITY LED (DS5) - Flashes on config messages.

INPUT PORT ACTIVITY (DS6) - Flashes on logic input message.

OUTPUT PORT ACTIVITY (DS7) - Flashes on logic output message.

CFG STATUS (DS8) - ON when card is not configured.

Hook-Ups

All user wiring to the LIO-2001 card takes place at the 2DB rear I/O connector module. The 2DB module has two female DB-25 connectors for logic input and output connections.

Upper DB-25—Logic Input Connections

These include 12 input sources. Pinout drawing on page 2-61 shows all wiring connections at a glance.

Pin 12 – Logic 1 In +
Pin 25 – Logic 1 In -

Pin 11 – Logic 2 In +
Pin 24 – Logic 2 In -

Pin 10 – Logic 3 In +
Pin 23 – Logic 3 In -

Pin 9 – Logic 4 In +
Pin 22 – Logic 4 In -

Pin 8 – Logic 5 In +
Pin 21 – Logic 5 In -

Pin 7 – Logic 6 In +
Pin 20 – Logic 6 In -

Pin 6 – Logic 7 In +
Pin 19 – Logic 7 In -

Pin 5 – Logic 8 In +
Pin 18 – Logic 8 In -

Pin 4 – Logic 9 In +
Pin 17 – Logic 9 In -

Pin 3 – Logic 10 In +
Pin 16 – Logic 10 In -

Pin 2 – Logic 11 In +
Pin 15 – Logic 11 In -

Pin 1 – Logic 12 In +
Pin 14 – Logic 12 In -

Lower DB-25—Logic Output Connections

These include 12 output sources. Pinout drawing on page 2-61 shows all wiring connections at a glance.

Pin 12 – Logic 1 Out +
Pin 25 – Logic 1 Out -

Pin 11 – Logic 2 Out +
Pin 24 – Logic 2 Out -

Pin 10 – Logic 3 Out +
Pin 23 – Logic 3 Out -

Pin 9 – Logic 4 Out +
Pin 22 – Logic 4 Out -

Pin 8 – Logic 5 Out +
Pin 21 – Logic 5 Out -

Pin 7 – Logic 6 Out +
Pin 20 – Logic 6 Out -

Pin 6 – Logic 7 Out +
Pin 19 – Logic 7 Out -

Pin 5 – Logic 8 Out +
Pin 18 – Logic 8 Out -

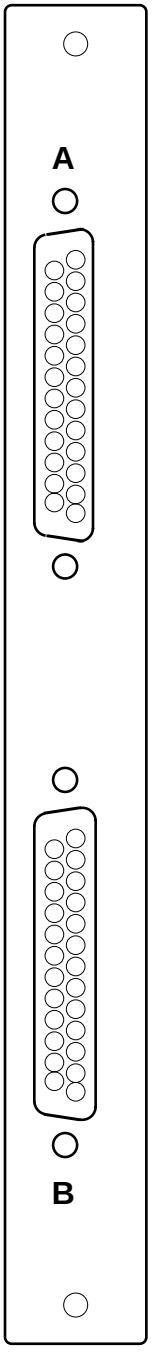
Pin 4 – Logic 9 Out +
Pin 17 – Logic 9 Out -

Pin 3 – Logic 10 Out +
Pin 16 – Logic 10 Out -

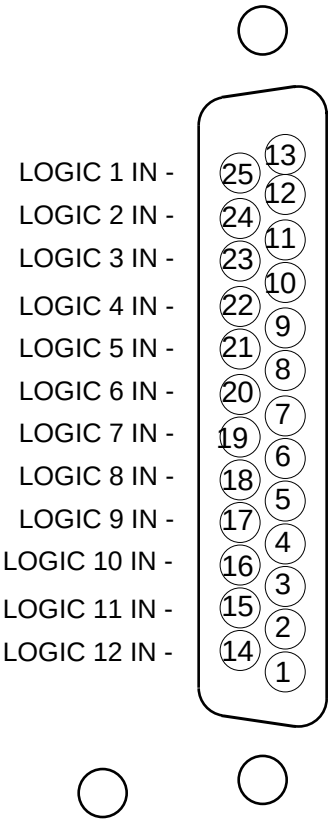
Pin 2 – Logic 11 Out +
Pin 15 – Logic 11 Out -

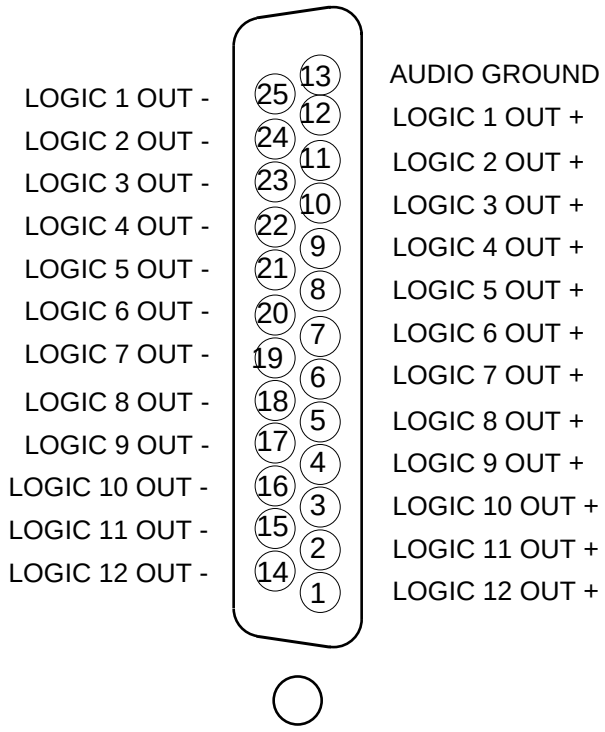
Pin 1 – Logic 12 Out +
Pin 14 – Logic 12 Out -

2DB Panel
Logic I/O Connections



LOGIC IN PORTS
(Upper "A" DB-25)





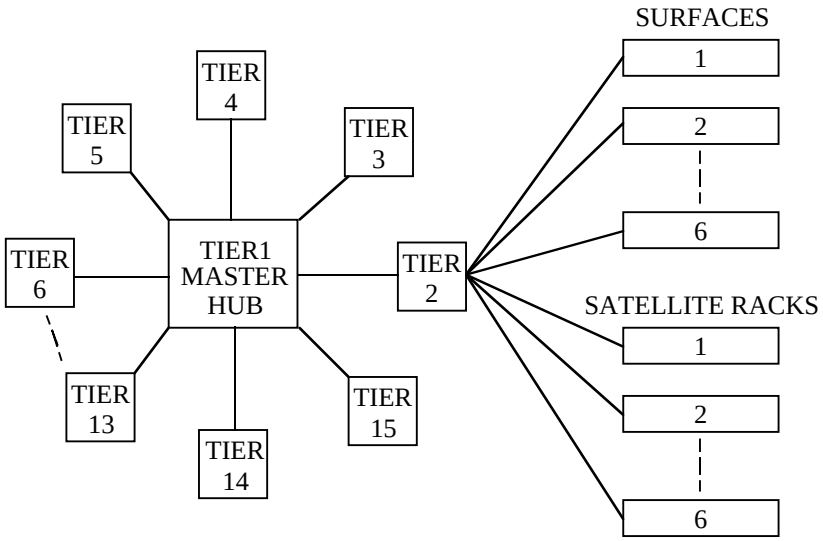
LOGIC OUT PORTS
(Lower "B" DB-25)

Quad Audio Network Card (QAT-2001)

Overview

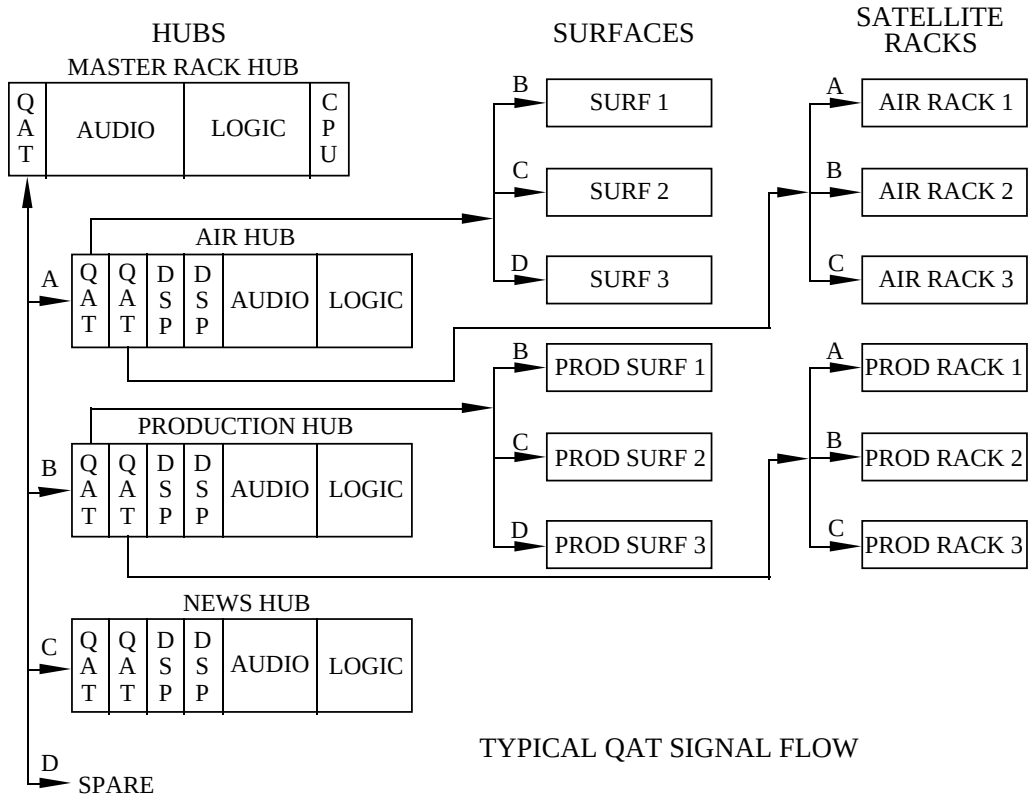
The Quad Audio Network card provides a robust and deterministic link between multiple audio racks or control surfaces via fiber optic or CAT-5 cable. The 4 ports, A,B,C & D, may be independently configured in hardware for either audio or control surface connections. Ports configured for Audio Transport are called "AT" links, while ports configured for control surface use are called "MT" or Mixer Transport links. Wheatstone's XPoint software is used to map the QAT ports to specific control surfaces and audio racks.

In a Multi-Tiered system, QAT cards are used as the "spoke" connections between the Hub switch and up to 14 Remote Tiers. Control surfaces and Satellite cages may then be connected to the master racks of the remote Tiers through additional QAT cards.



Audio transport links must be installed in pairs (i.e. a QAT Network port in the master chassis communicates to a companion QAT port or OAN card in the remote chassis). Each QAT port transceives up to 64 mono channels (32 stereo *signals*). Each AT port must be configured as Local or Remote, and Primary or Secondary. All Local/Primary ports transmit the sample rate clock while all Remote/Primary ports receive the sample rate clock and drive it onto its local backplane.

In systems incorporating control surfaces and DSP, each control surface link is made to a QAT port co-located with its corresponding DSP cards. These “MT” ports carry all fader, switch, logic, LCD meter, source and destination information to and from the control surface and the companion DSP cards located in the Remote Tier racks. Local/Remote and Primary/ Secondary settings do NOT apply to ports configured as Mixer Transport links.



TYPICAL QAT SIGNAL FLOW

While the QAT provides a tremendous amount of flexibility and routing power, please note the following design aspects:

- There is no audio data on an MT link.
- Control surfaces may not be daisy chained together off a single MT port.
- Audio cards in a remote chassis do not communicate directly with each other.
- In a single Tier configuration, a remote chassis cannot be daisy chained to another remote chassis.

Internal Programming Options

All internal programming are made via PCB mounted dipswitches. Dipswitch settings are shown in the table below:

QAT-2001 PCB

NAME	REF.DES.	
RACK-ID	SW6	see Breakout Table - DIPSW6 Rack ID
LOCAL/REMOTE	SW9 (Ports A B C D)	LOCAL=ON REMOTE=OFF
PRIMARY/SECONDARY	SW8 (Ports A B C D)	PRIMARY=ON SECONDARY=OFF
MEDIA	SW7 (Ports A B C D)	CAT5=ON FIBER=OFF
AUDIO/CONSOLE	SW10 (Ports A B C D)	AUDIO=ON CONSOLE=OFF
SAMPLE RATE	J3	48kHz=OPEN 44.1kHz=SHORT
485_A_TERM	SW4, SW5	see Breakout Table - DIPSW 1, 2, 4 &5 485 Termination
485_B_TERM	SW1, SW2	see Breakout Table - DIPSW1, 2, 4 &5 485 Termination
RESET	J1, J2 = not installed	SHORT=RESET

Switch Settings

DIPSW1, SW2, SW4 & SW5 - 485 Termination

These four 4-position dipswitches configure the 485 port termination as follows:

SW1-SW4

POSITION	FUNCTION	BIASED TERM	PASSIVE TERM	UNTERMINATED
1 - TX10Ω	ON=10Ω BYPASS	OFF*	ON	OFF
2 - TX+	ON=750Ω PULLUP	ON*	OFF	OFF
3 - TX-	ON=750Ω PULLDOWN	ON*	OFF	OFF
4 - 120Ω	ON=120Ω PARALLEL	ON*	ON	OFF

* Default

Choices are Unterminated, Normal Termination, or BIAS Termination on the transmit and receive lines. SW4 and SW5 are for Port A, and SW1 and SW2 are for Port B. SW2 and SW5 are for the RS-485 transmitter's termination; SW1 and SW4 are for receiver terminations.

An RS-485 bus may only be BIAS TERMINATED at one end. All applicable Bridge 2001 QAT and CPU cards are set for BIAS TERMINATION by default. All peripheral devices are set for NO TERMINATION by default. Set the TERMINATION to ON for the last controller or console only, in a RS-485 chain.

DIPSW7 - Fiber/CAT5 Ports A-B-C-D

Selects whether the audio network or control surface connection will be made through optical fiber or copper CAT-5 cable.

DIPSW8 - Primary/Secondary Ports A-B-C-D

Some system configurations may have multiple QAT cards in each rack. The Primary setting is used to distinguish which QAT port will act as the Clock/Sync master in the Remote chassis. All other AT ports in the Remote rack must be set to Secondary.

• The system's master chassis must have only one LOCAL-PRIMARY QAT port connected to each companion Remote chassis.

• Each Remote chassis must have only one REMOTE-PRIMARY QAT port.

DIPSW9 - Local/Remote (Clock Source) Ports A-B-C-D

The Local/Remote setting is required to configure QAT ports such that a Local card will operate from the backplane clock/sync references. A Remote Primary port would likewise infer that clock/sync are to be extracted from Fiber/CAT5 and driven onto backplane. Local/Remote does not apply when the port type is set to CONSOLE.

• The system's master chassis must have only one LOCAL-PRIMARY QAT port connected to each companion Remote chassis.

• Each Remote chassis must have only one REMOTE-PRIMARY QAT port.

DIPSW10 - Audio/Console (Port Type) Ports A-B-C-D

Selects the type of equipment connected to each of the 4 QAT ports.

• Select AUDIO to connect a remote or master cage to the port.

• Select CONSOLE to connect a control surface to the port.

SW3 - Reset

Momentary switch resets the LAN chip, press and hold also resets the FPGA.

DIPSW6 - Rack ID

If the QAT card is a **Remote-Primary** Audio Network Card, this QAT card must supply the Rack ID to its backplane from the 4 bit onboard switch. Remote Rack ID's must be 5 or higher.

SW6 RACK ID

	RACK ID	SW7			
		RACK ID8	RACK ID4	RACK ID2	RACK ID1
MASTER CPU	1	OFF	OFF	OFF	OFF
RESERVED FOR STACKING	2	OFF	OFF	OFF	ON
	3	OFF	OFF	ON	OFF
	4	OFF	OFF	ON	ON
USED FOR AUDIO NETWORK CHASSIS	5	OFF	ON	OFF	OFF
	6	OFF	ON	OFF	ON
	7	OFF	ON	ON	OFF
	8	OFF	ON	ON	ON
	9	ON	OFF	OFF	OFF
	10	ON	OFF	OFF	ON
	11	ON	OFF	ON	OFF
	12	ON	OFF	ON	ON
	13	ON	ON	OFF	OFF
	14	ON	ON	OFF	ON
	15	ON	ON	ON	OFF
	16	ON	ON	ON	ON

• Each remote chassis must have only one REMOTE-PRIMARY QAT card.

Note: Rack ID numbers are coded in binary: Rack ID 1 equals binary Ø, Rack ID 2 equals binary 1, etc.

Rack ID's are set at the factory. Incorrect setting of these switches can cause system malfunction.

Jumper Settings

J1 - Factory Use Only - Reset

Momentary shorting does a complete reset.

J2 - Factory Use Only- Watchdog Disable

Normally installed; Remove to disable watchdog reset.

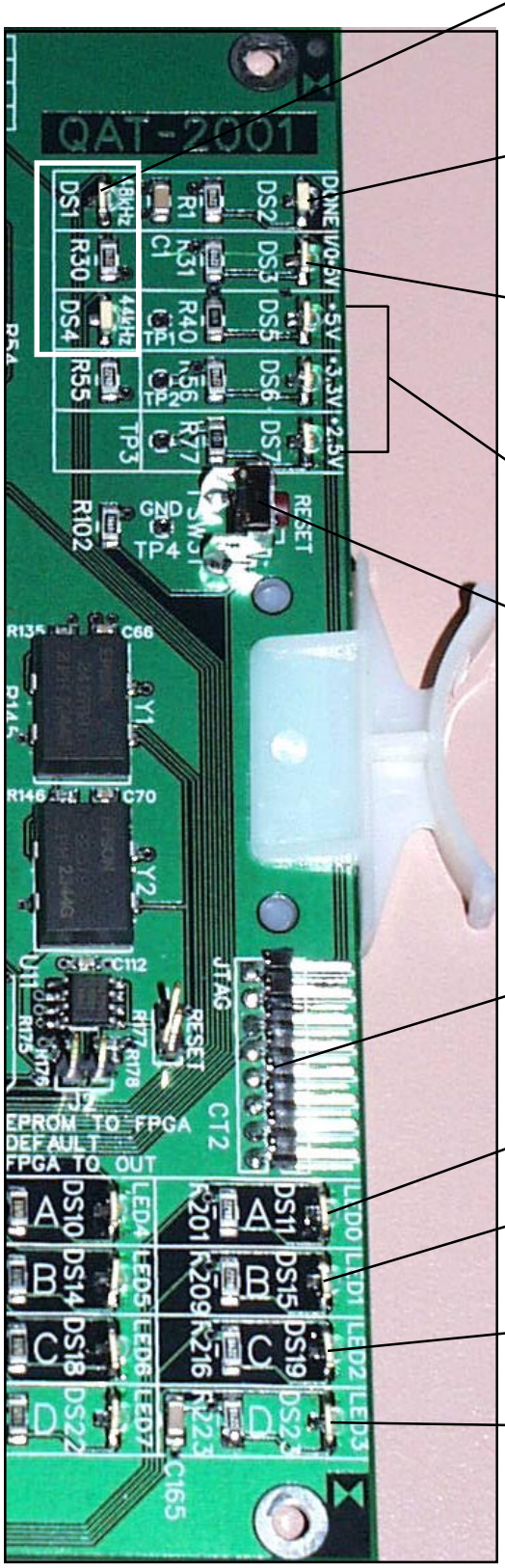
J3 - Sample Rate Select - 48kHz / 44.1kHz*

Selects the system's sample rate frequency; 48kHz or 44.1 kHz.

An open jumper selects 48 kHz, and a shunt selects 44.1 kHz.

*NOTE: When changing the audio sample rate of the Bridge 2001 Digital Audio Network Router, changes must be made in the following places: DO-2001 Digital Output Card, CPU-2001 Host CPU, OAN-2001 Audio Network Card, CEX-2001 Stacking Card, and QAT-2001 Quad Audio Network Card. See the appropriate manual sections for details.

QAT Card Status LED's



SAMPLE RATE STATUS -
DS1 - ON indicates that the rate is 48 kHz
DS4 - ON indicates that the rate is 44.1 kHz

DONE LED (DS2) - Normally OFF;
ON when programming the FPGA,
Flashes when system clock is missing.

FIBER INTERFACE (DS3) - lights when Fiber rear panel card is powered.

POWER SUPPLY STATUS (DS5-DS7) -
ON indicates power supply is OK.

RESET SWITCH (SW3) - momentary pushbutton.
Resets the QAT card.

JTAG HEADER - FPGA programming - factory use only.

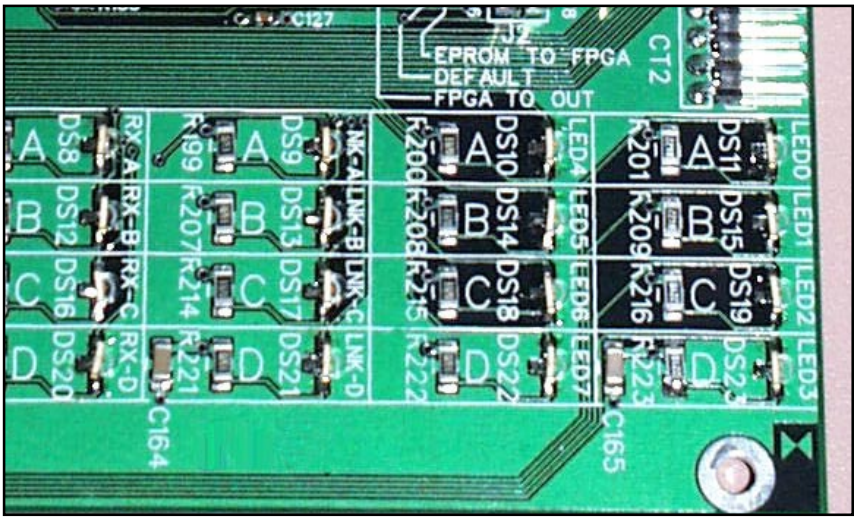
<u>AUXILIARY STATUS LED's</u>

FLOW CONTROL (DS11) - Normally flashes; Stuck ON indicates problem.

SURF MSG (DS15) - Normally Flashes; Stuck ON indicates surf coefficent comm problem.

SURF CTL MSG (DS19)- Normally Flashes; Stuck ON indicates surf control message problem.

SURF COMM ERROR (DS22) - Normally Flashes; Stuck indicates surface comm problem.



LINK STATUS LED's

RX STATUS (DS8,12,16,20) - ON indicates that the data A, B, C or D receive link is OK.

LINK STATUS (DS9,13,17,21) - ON indicates that a hardware A, B, C or D link is established.

ACTIVITY LED (DS10) - Flashes on port messages.

CLOCK MASTER (DS14) - ON indicates that this QAT card supplies the backplane clock.

COMM ERROR (DS18) - Normally OFF; ON for errors.

CFG/BUFFER ERROR (DS23) - Normally OFF; Flashes when the card is not configured. Once configured, DS23 indicates buffer errors.

Hook-Ups

All user wiring to and from QAT-2001 Card takes place at the two rear I/O connector modules: The QCT-2001 is used for CAT5 connections made via four RJ-45 connectors. The QOT-2001 is used for multi-mode optical fiber connections made via four SC type optical connectors (optical fiber interface described on the page 2-48). There are also female DB-9 serial port connectors (two on the QCT-2001 panel and one on the QOT-2001 panel) for use as RS-485/RS-232 communication links to Wheatstone consoles and XY controllers. Pinout drawings on pages 2-70 and 2-71 shows all wiring connections at a glance.

Upper "A" DB-9—Serial Interface Port 1 Connector

Pin 3 – RX1 HI (RS-485)
Pin 8 – RX1 LO (RS-485)
Pin 1 – TX1 HI (RS-485)
Pin 6 – TX1 LO (RS-485)

Pin 2 – TX1 (RS-232)
Pin 7 – RX1 (RS-232)
Pin 5 - GND

*Lower "B" DB-9—Serial Interface Port 2 Connector

(*not available on the optional fiber optic rear panel)

Pin 3 – RX2 HI (RS-485)
Pin 8 – RX2 LO (RS-485)
Pin 1 – TX2 HI (RS-485)
Pin 6 – TX2 LO (RS-485)

Pin 2 – TX2 (RS-232)
Pin 7 – RX2 (RS-232)
Pin 5 - GND

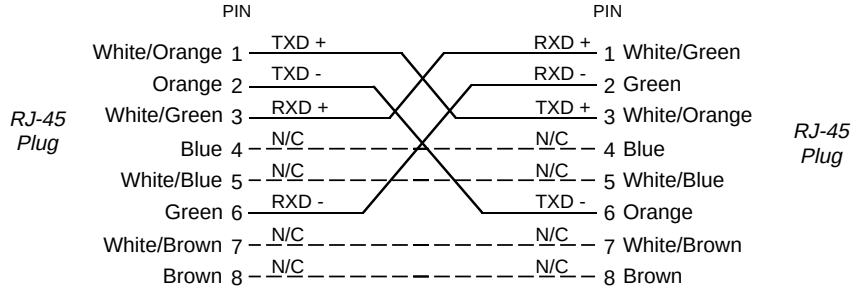
"A", "B", "C", "D" RJ-45—CAT5 Audio Network Connectors

Pin 1 – TXD +
Pin 2 – TXD -
Pin 3 – RXD +

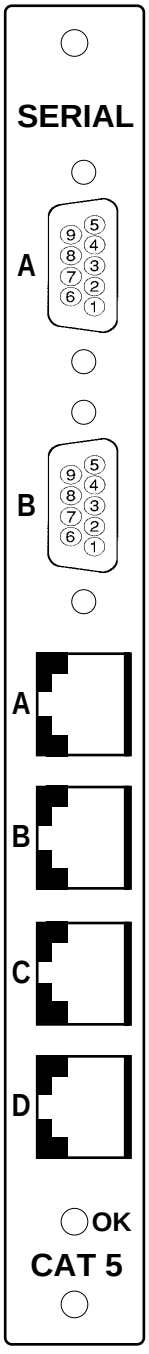
Pin 4 – N/C
Pin 5 – N/C
Pin 6 – RXD -

Pin 7 – N/C
Pin 8 – N/C

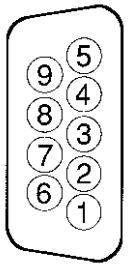
CAT5 Crossover Cable for QAT to QAT Connections



QCT Panel
I/O Connections

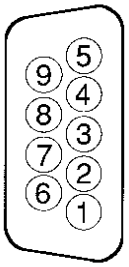


I/O PORTS (Upper "A" DB-9)



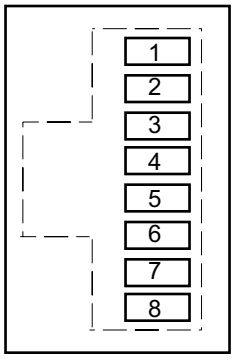
N/C	GND
RX1 LO (RS-485)	N/C
RX1 (RS-232)	RX1 HI (RS-485)
TX1 LO (RS-485)	TX1 (RS-232)
	TX1 HI (RS-485)

I/O PORTS (Lower "B" DB-9)



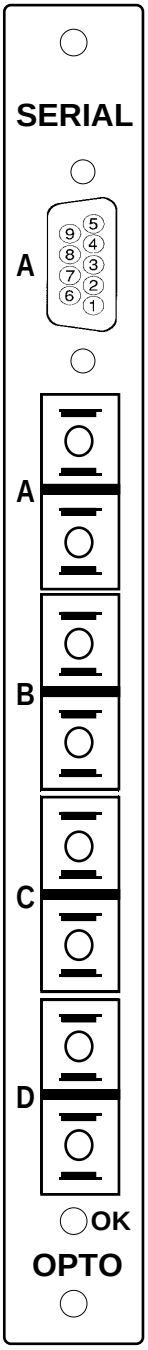
N/C	GND
RX2 LO (RS-485)	N/C
RX2 (RS-232)	RX2 HI (RS-485)
TX2 LO (RS-485)	TX2 (RS-232)
	TX2 HI (RS-485)

Audio Network Connector (RJ-45 "A", "B", "C" & "D")

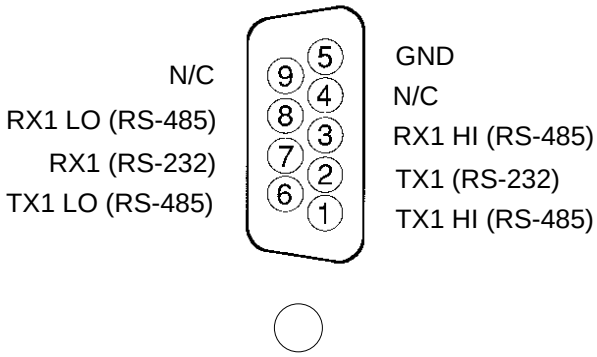


1	TXD +
2	TXD ·
3	RXD +
4	N/C
5	N/C
6	RXD ·
7	N/C
8	N/C

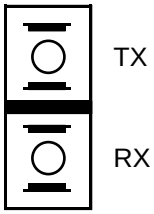
QOT Panel
I/O Connections



I/O PORTS
(Upper "A"
DB-9)



Audio Network
(SC Connector
"A", "B", "C" & "D")



Digital Signal Processor Card (DSP-2001)

Overview

The DSP-2001 card is the digital signal processing card used by the Bridge System to mix and condition input signals. DSP cards in a given system are physically identical. Their fuctionality is determined by input and mix software which is loaded into each DSP card's memory on *surface* powerup. Wheatstone's XPoint software is used to map each DSP card to specific control surfaces and audio racks.

DSP cards are installed in pairs for radio style control surfaces, with one DSP card acting as an input signal conditioner and the other as a mix engine. Larger production and television surfaces with 5.1 surround capabilities have a dedicated Master Mix engine along with multiple Mix and Input DSP cards. The exact number of DSP cards requisite in large systems is a function of the number of input channels and mix bus requirements.

Each input fader has a dedicated DSP channel which is responsible for gain, mode, phase, EQ, dynamics and metering. Likewise, each output mix has a dedicated DSP channel responsible for summing, gain, mode, metering and EQ/Dynamics on 5.1 Master mix outputs. DSP cards receive instructions from control surfaces in real time over a Mixer Transport or "MT" link. The mix engine DSP's combine all of the console audio signals as directed by a console's faders, knobs and switches to produce the various Program, Aux Send, Mix Minus and Monitor output mixes.

Racks may be fitted with one or more backup or "self healing" DSP cards. If a hardware problem disables a primary DSP card, the affected surface will load the appropriate code into one of the backup DSP cards and continue to function. Replacing the faulty primary DSP card will return the surface to normal operation, freeing the backup card for future use. Warning messages present on the surface and in the XPoint GUI indicate that a card has failed and requires attention.

Internal Programming Options

All internal programming are made via PCB mounted switches.

Switch Settings

SW1 - DSP Reset Switch

Momentary press and hold resets the DSP and reloads software from surface.

DIPSW2 -

Not used

Jumper Settings

J1 - Factory Use Only - Watchdog Reset

Momentary shorting does a complete reset.

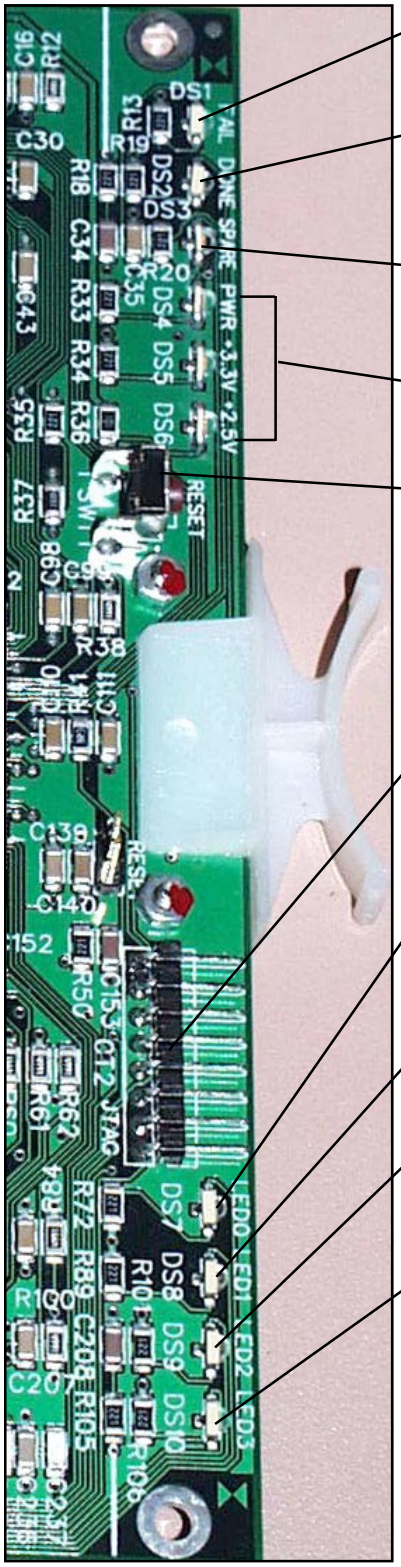
J2 - Factory Use Only - Watchdog Reset

Momentary shorting does a complete reset.

J3 - Factory Use Only- Watchdog Disable

Normally installed; Remove to disable watchdog reset.

DSP Card Status LED's



FAIL (DS1) - Normally OFF;
Lights to indicate card failure.

DONE LED (DS2) - Normally OFF;
ON when programming the FPGA,
Flashes when system clock is missing.

ERROR (DS3) - Normally OFF;
Lights to indicate clock error.

POWER SUPPLY STATUS (DS4-DS6) - ON indicates power supply is OK.

RESET SWITCH (SW1) - momentary pushbutton. Hold for 2 seconds for complete reset of CPU and FPGA.

JTAG HEADER - FPGA programming - factory use only.

BACKPLANE RESPONSE (DS7) - lights as the card responds to backplane messages.

MESSAGE (DS8) - ON indicates that messages are being received from control surface.

SYNCH (DS9) - ON indicates clock SYNCH signal.

CONFIGURATION (DS10) - ON indicates card needs configuration from HOST.

NOTE: Normal operation is (3) power status LEDs always ON, all other LEDs OFF, except DS7 lights once every ≈ 40 seconds and DS8 flickers in response to control changes on the control surface.

Microphone Card (MIC-2001)

Overview

The Microphone input/output cards accept 8 mono microphone input audio sources and provides 8 mono direct output channels. A *Signal Definitions* form in the supplied XPoint software allows the user to set attributes for the input and output channels hardware including signal name, type, circuit #, etc.

The balanced, mic level input signals are amplified by a remote controlled dual stage preamplifier. Each preamplified microphone signal is fed to a balanced, line level direct output. The preamplified microphone signal is also converted to the digital domain by 24bit A-D converters operating at the system's master sample rate. Embedded logic routes each channel of audio data into an available time slot of the card's TDM bus. One TDM bus is allocated for each card.

Analog Input Interface

The MIC-2001 uses an electronically balanced, monolithic preamplifier capable of a wide range of input signals. While all microphone inputs employ high frequency filtering components, be sure to install a high quality microphone cable to help eliminate unwanted EMI and RFI artifacts.

Preamp specifications:

Nominal Mic Level = - 50dBm (2mV RMS), 150 ohms

Max input level = -10dBu

Headroom = 20dB

Gain Max = 84dB

Gain Range = +20 to +80dB

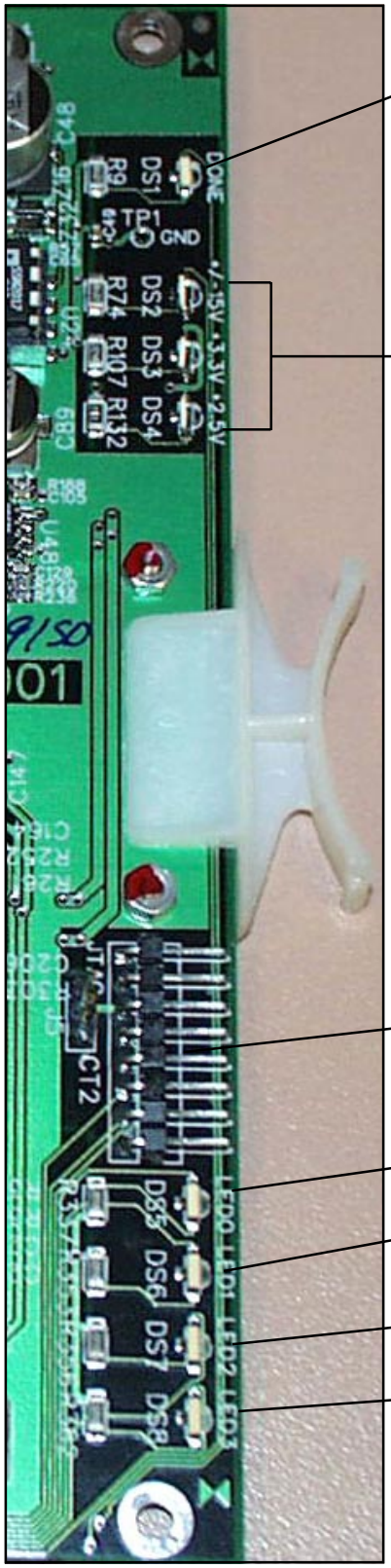
Phantom Power = 32V

Direct Output Level = 10dB steps

Internal Programming Options

There are no internal programming options on the MIC-2001 card.

Microphone Card Status LED's



DONE LED (DS1) - Normally OFF;
ON when programming the FPGA,
Flashes when system clock is missing.

POWER SUPPLY STATUS (DS2-DS4) - ON indicates power supply is OK.

JTAG HEADER - FPGA programming - factory use only.

AUXILIARY STATUS LED's

ACTIVITY LED (DS5) - flashes on messages.

DS6 - NOT USED

MUTE STATUS (DS7) - ON when the input channels are muted.

CFG STATUS (DS8) - ON when card is not configured.

Hook-Ups

All user wiring to the MIC-2001 card takes place at the rear I/O connectors modules: 2DB or 8RJ-45. The 2DB module has two female DB-25 connectors for audio input/output connections. The 8RJ-45 module contains eight RJ-45 connectors for use in balanced, unshielded twisted pair (UTP) wiring systems.

Upper DB-25—Analog Audio Input Connections

These include eight mic input sources. Pinout drawing on page 2-79 shows all wiring connections at a glance.

Pin 24 – HI Pin 12 – LO Pin 25 – SH	Mic 1 In
Pin 10 – HI Pin 23 – LO Pin 11 – SH	Mic 2 In
Pin 21 – HI Pin 9 – LO Pin 22 - SH	Mic 3 In
Pin 7 – HI Pin 20 – LO Pin 8 – SH	Mic 4 In
Pin 18 – HI Pin 6 – LO Pin 19 – SH	Mic 5 In
Pin 4 – HI Pin 17 – LO Pin 5 – SH	Mic 6 In
Pin 15 – HI Pin 3 – LO Pin 16 – SH	Mic 7 In
Pin 1 – HI Pin 14 – LO Pin 2 – SH	Mic 8 In

Lower DB-25—Analog Audio Output Connections

These include eight direct output sources. Pinout drawing on page 2-79 shows all wiring connections at a glance.

Pin 24 – HI Pin 12 – LO Pin 25 – SH	Direct 1 Out
Pin 10 – HI Pin 23 – LO Pin 11 – SH	Direct 2 Out
Pin 21 – HI Pin 9 – LO Pin 22 - SH	Direct 3 Out

Pin 7 – HI
Pin 20 – LO
Pin 8 – SH
Direct 4 Out

Pin 18 – HI
Pin 6 – LO
Pin 19 – SH
Direct 5 Out

Pin 4 – HI
Pin 17 – LO
Pin 5 – SH
Direct 6 Out

Pin 15 – HI
Pin 3 – LO
Pin 16 – SH
Direct 7 Out

Pin 1 – HI
Pin 14 – LO
Pin 2 – SH
Direct 8 Out

8 RJ-45—Analog Audio Connections

For analog input connections use 1-4 connectors, and for direct output use 5-8 connectors. Pinout drawing on page 2-80 shows all wiring connections at a glance.

RJ-45#1 Pin 3 – HI
RJ-45#1 Pin 6 – LO
Mic 1 In

RJ-45#1 Pin 1 – HI
RJ-45#1 Pin 2 – LO
Mic 2 In

RJ-45#2 Pin 3 – HI
RJ-45#2 Pin 6 – LO
Mic 3 In

RJ-45#2 Pin 1 – HI
RJ-45#2 Pin 2 – LO
Mic 4 In

RJ-45#3 Pin 3 – HI
RJ-45#3 Pin 6 – LO
Mic 5 In

RJ-45#3 Pin 1 – HI
RJ-45#3 Pin 2 – LO
Mic 6 In

RJ-45#4 Pin 3 – HI
RJ-45#4 Pin 6 – LO
Mic 7 In

RJ-45#4 Pin 1 – HI
RJ-45#4 Pin 2 – LO
Mic 8 In

RJ-45#5 Pin 3 – HI
RJ-45#5 Pin 6 – LO
Direct 1 Out

RJ-45#5 Pin 1 – HI
RJ-45#5 Pin 2 – LO
Direct 2 Out

RJ-45#6 Pin 3 – HI
RJ-45#6 Pin 6 – LO
Direct 3 Out

RJ-45#6 Pin 1 – HI
RJ-45#6 Pin 2 – LO
Direct 4 Out

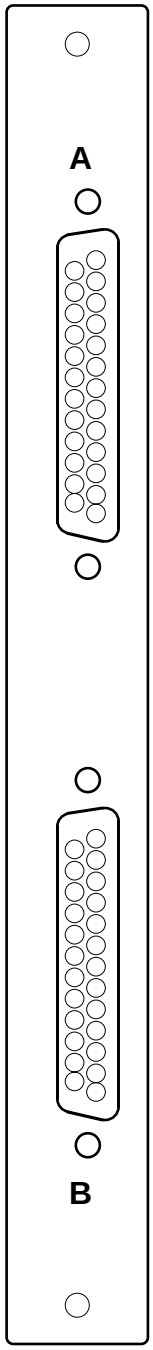
RJ-45#7 Pin 3 – HI
RJ-45#7 Pin 6 – LO
Direct 5 Out

RJ-45#7 Pin 1 – HI
RJ-45#7 Pin 2 – LO
Direct 6 Out

RJ-45#8 Pin 3 – HI
RJ-45#8 Pin 6 – LO
Direct 7 Out

RJ-45#8 Pin 1 – HI
RJ-45#8 Pin 2 – LO
Direct 8 Out

2DB Panel
Mic Analog Input/Output Connections



INPUT PORTS
(Upper "A" DB-25)

MIC 1 IN SH	25	13
MIC 1 IN HI	24	12
MIC 2 IN LO	23	11
MIC 3 IN SH	22	10
MIC 3 IN HI	21	9
MIC 4 IN LO	20	8
MIC 5 IN SH	19	7
MIC 5 IN HI	18	6
MIC 6 IN LO	17	5
MIC 7 IN SH	16	4
MIC 7 IN HI	15	3
MIC 8 IN LO	14	2
		1

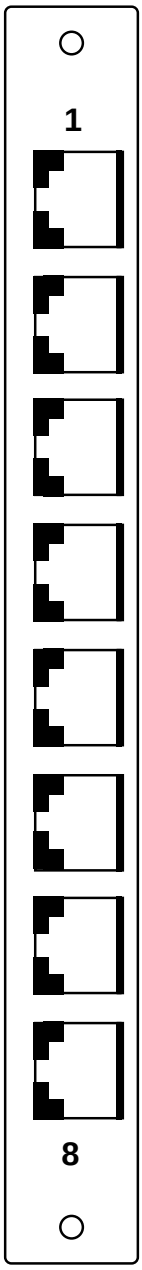
AUDIO GROUND	13
MIC 1 IN LO	12
MIC 2 IN SH	11
MIC 2 IN HI	10
MIC 3 IN LO	9
MIC 4 IN SH	8
MIC 4 IN HI	7
MIC 5 IN LO	6
MIC 6 IN SH	5
MIC 6 IN HI	4
MIC 7 IN LO	3
MIC 8 IN SH	2
MIC 8 IN HI	1

OUTPUT PORTS
(Lower "B" DB-25)

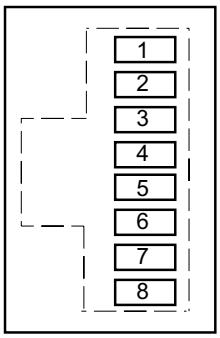
DIRECT 1 OUT SH	25	13
DIRECT 1 OUT HI	24	12
DIRECT 2 OUT LO	23	11
DIRECT 3 OUT SH	22	10
DIRECT 3 OUT HI	21	9
DIRECT 4 OUT LO	20	8
DIRECT 5 OUT SH	19	7
DIRECT 5 OUT HI	18	6
DIRECT 6 OUT LO	17	5
DIRECT 7 OUT SH	16	4
DIRECT 7 OUT HI	15	3
DIRECT 8 OUT IN LO	14	2
		1

AUDIO GROUND	13
DIRECT 1 OUT LO	12
DIRECT 2 OUT SH	11
DIRECT 2 OUT HI	10
DIRECT 3 OUT LO	9
DIRECT 4 OUT SH	8
DIRECT 4 OUT HI	7
DIRECT 5 OUT LO	6
DIRECT 6 OUT SH	5
DIRECT 6 OUT HI	4
DIRECT 7 OUT LO	3
DIRECT 8 OUT SH	2
DIRECT 8 OUT HI	1

8RJ Panel
Mic Analog Input/Output
Connections

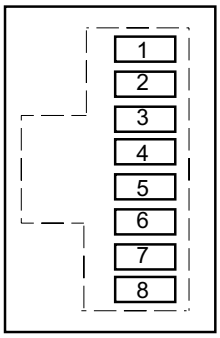


RJ-45 #1



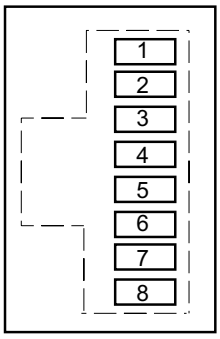
MIC 2 IN HI
MIC 2 IN LO
MIC 1 IN HI
MIC 1 IN LO

RJ-45 #2



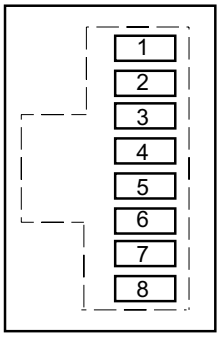
MIC 4 IN HI
MIC 4 IN LO
MIC 3 IN HI
MIC 3 IN LO

RJ-45 #3



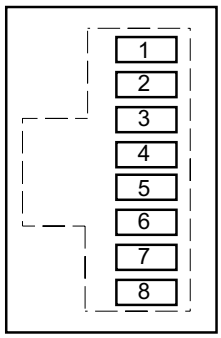
MIC 6 IN HI
MIC 6 IN LO
MIC 5 IN HI
MIC 5 IN LO

RJ-45 #4



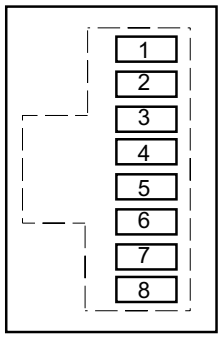
MIC 8 IN HI
MIC 8 IN LO
MIC 7 IN HI
MIC 7 IN LO

RJ-45 #5



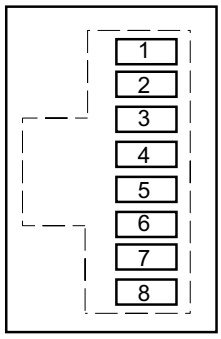
DIRECT 2 OUT HI
DIRECT 2 OUT LO
DIRECT 1 OUT HI
DIRECT 1 OUT LO

RJ-45 #6



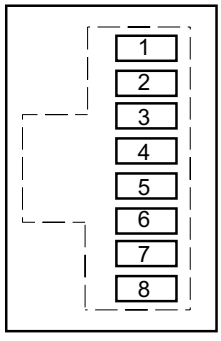
DIRECT 4 OUT HI
DIRECT 4 OUT LO
DIRECT 3 OUT HI
DIRECT 3 OUT LO

RJ-45 #7



DIRECT 6 OUT HI
DIRECT 6 OUT LO
DIRECT 5 OUT HI
DIRECT 5 OUT LO

RJ-45 #8



DIRECT 8 OUT HI
DIRECT 8 OUT LO
DIRECT 7 OUT HI
DIRECT 7 OUT LO

Controller Devices

Chapter Contents

Controller Devices

The 2001 audio network router has provisions for two levels of software control and also two dedicated hardware controllers.

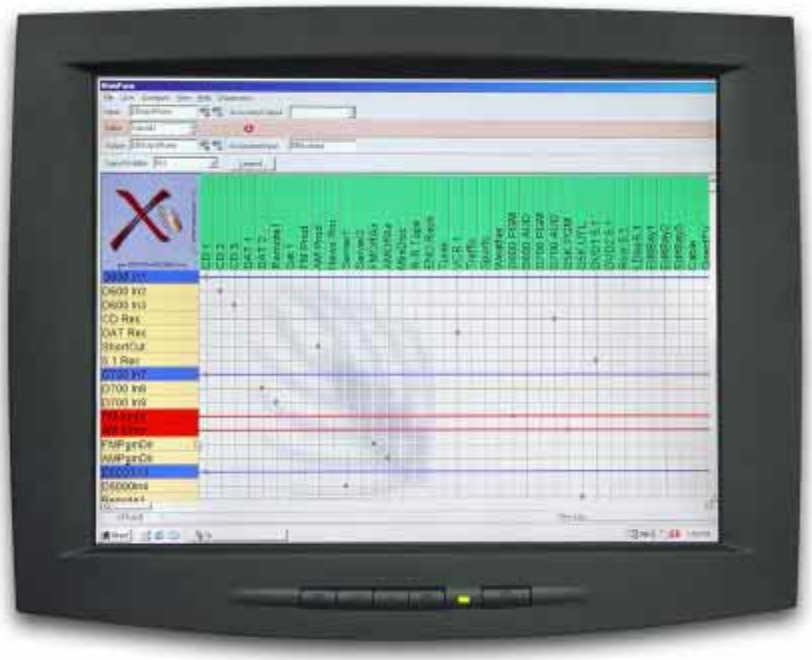
Software configuration and control of the system is handled by the XPoint Configuration GUI described below. The XPoint Configuration GUI may also be installed on multiple networked PC's in a "controller only mode". This XY Controller GUI eliminates the need for new wiring and hardware in certain locations and provides multi-user access to "mapped" system resources.

Two dedicated hardware controllers are also available. The single space XY Rack controller provides a simple user interface and may be rack mounted in a studio, talent location, edit booth, etc. A smaller console mounted version of this controller is designed for installation in Wheatstone consoles.

XP Configuration GUI

The supplied Windows™ application, XPoint, is a password protected graphical user interface (GUI) which allows the user to configure, monitor and control the 2001 digital audio network router. The XP GUI communicates using TCP/IP over Ethernet to the 2001 host CPU card. Once the system is configured the XP program does not have to be continuously running.

The primary function of the XPoint GUI, running in administration mode, is to provide the engineer or administrator with a means to define the configuration of the hardware installed in the system. Configuration menus allow the engineer access to hardware definitions for audio i/o cards, XY rack controllers, serial port use, i/o signal names, etc. The administrator also has



Please see the "XPoint Software Setup Guide" (Chapter 4) for detailed software information.

control over programmable features such as Salvo creation, crosspoint locking and mapping signal visibility to XY controllers. Further, certain levels of system diagnostics may be accessed.

The XP GUI also provides birds eye view of the current connection status of the entire network router via a crosspoint grid display of the available sources (inputs) and destinations (outputs). This GUI is also used to associate human readable names with each of the signal sources and destinations.

The XPoint application program is supplied to the end user pre-installed and configured on a Windows™ based PC. An installation CD ROM is also supplied.

XY Controller GUI

The XPoint application running in XY Controller mode is also known as a "Crosspoint GUI". Like the Configuration GUI, this device communicates to the 2001 over Ethernet. However, it uses a UDP broadcast interface, which allows multiple XYC GUI's to communicate to the switch simultaneously. The number of XYC GUI's that can run simultaneously is only limited by the LAN configuration (theoretically millions could exist on the same LAN, but 250 is a more practical limit).

Its main purpose is to provide an alternative, software based method of controlling the Bridge 2001 utilizing a station's existing network infrastructure. Multiple, simultaneous users may connect signal sources to destinations and monitor the status of audio resources throughout a facility. A signal visibility feature allows users to only "see" the resources on the router that pertain to their activities.

XY Rack Controller

The XY Rack Controller is a single rack unit device that can control the connection of two signals. The operator dials in a Source (input signal) and a Destination (output signal), then presses a TAKE button to connect or disconnect. Once communications have been established the CPU or OAN card then directs the selected devices to connect or disconnect (if possible), and updates the crosspoint state presented to the Configuration GUI, XYC GUI, and other hardware XY Controllers.

Additionally, the operator may dial in a SALVO, which automatically makes a pre-configured number of connections. A SALVO is somewhat analogous to a "macro" in that several crosspoints are automatically effected from a single user action.

This device communicates serially with the CPU or OAN card via a RS-485 interface bus. Up to 32 hardware based XY controllers may be daisy chained together within a single cable run. Up to 64 hardware based XY controllers may be installed in a system. On power up, the unit momentarily displays both the firmware revision number and its address.

Wheatstone Console XY Controller

Identical in function to the XY Rack Controller, the console XY controller is packaged to mount in a Wheatstone console meterbridge or, as an XY-4/8 module, in the console mainframe. This provides an integrated way of switching router sources to destinations connected to the console. It is important to note that when mounted in a console, the XY controller is really an independent sub-system which receives only power from the console's mainframe. The console mounted "XYC" RS-485 DB-9's (for meterbridge mounted controller) or DB-25's (for XY-4/8 module) connect to the XY controller electronics only.

XY Controller Settings

Setting an XY Controller Termination

Termination should be active *only* on the last controller in a chain.

XY Rack - install jumpers J1 and J2 on the XYR-1 pc board.

XY Meterbridge Mounted - install jumpers J2 and J3 on the XYC-600 pc board.

XY-4/8 Module - turn on positions 2, 3 and 4 of dipswitch SW3 (pos1 - not used) located on the XYC-700 pc board.

Setting an XY Controller Address

All hardware XY controllers have a unique address from 1 to 64 that identifies their presence to the system. This address is set via a pair of four position dipswitches mounted on the controller's printed circuit card. XY controller addresses are binary coded with each dipswitch carrying a specific numerical weight (e.g. 1, 2, 4, 8, 16, 32). To set an address, simply turn ON the address dip switches until the total weights add up to the desired decimal address. You can verify the address setting by powering up the XY controller and watching for the address number in the controller's displays. Addressing is set at the factory and generally will not need to be changed in the field. Below are the tables of switch positions and their weights.

XY RACK

DIPSWITCH #	SW4				SW3			
POSITION	1	2	3	4	1	2	3	4
WEIGHT	1	2	4	8	16	32	N/A	N/A

XYD-600 METERBRIDGE-MOUNTED CONTROLLER

DIPSWITCH #	SW2				SW1			
POSITION	1	2	3	4	1	2	3	4
WEIGHT	1	2	4	8	16	32	N/A	N/A

XY-4/8 MODULE

DIPSWITCH #	SW1				SW2			
POSITION	1	2	3	4	1	2	3	4
WEIGHT	1	2	4	8	16	32	N/A	N/A

XY Controller Signal Visibility

Once addressed, the XY controllers have the ability to "see" any or all of the sources, destinations and Salvos' available to the system. This function is called *signal visibility* and is setup through the XPoint Configuration GUI. Please refer to the XPoint software documentation for details on mapping resources to specific XY Controllers.

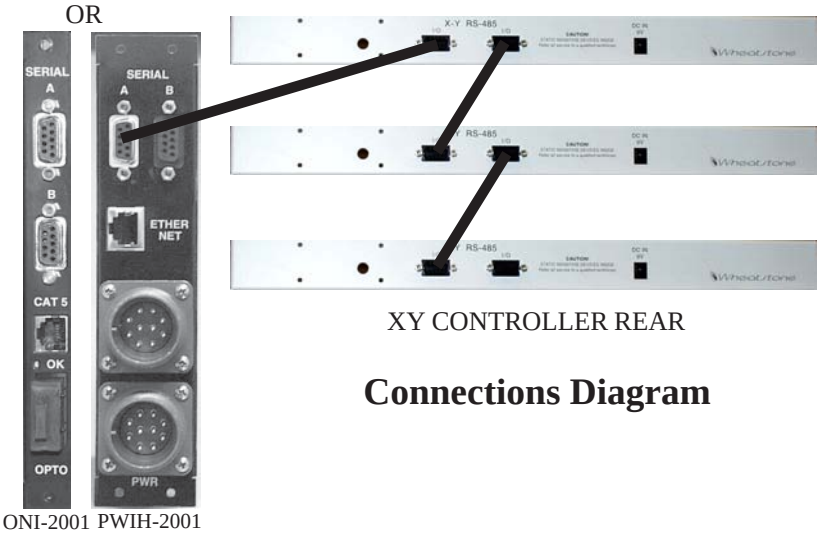
XY Controller RS-485 Connections

Overview

The XY Rack and console mount controllers communicate with the 2001 switcher via a RS-485 serial interface bus. The cable should be a low capacitance computer communications cable and is terminated with DB-9 male connectors on the both ends.

Typically, one end of the cable plugs into the Serial Port A DB-9 female connector on the rear PWIH (CPU rear) or ONI panel (OAN rear), and the second end connects to either one of the two DB-9 female I/O connectors on the rear of the XY Rack Controller or bottom of the console meterbridge (for console mounted XY controllers).

If there is more than one XY Controller, another cable goes between the second I/O DB-9 connector on XY Controller #1 and the first DB-9 I/O connector on the XY Controller #2, and so on (see diagram below). Up to 32 XY Rack or XY Console controllers may be daisy chained in this fashion on a single cable run. Up to 64 XY controllers may be present in a system.



ONI-2001 PWIH-2001
REAR PANELS

XY CONTROLLER REAR

Connections Diagram

Serial Port Options

All RS-485 communications ports in the Bridge 2001 are software configured to be XY Controller, Wheatstone Console or Virtual Serial ports. By default, all "Port A " DB-9's are configured to be XY Controller ports and all "Port B" DB-9's are configured to be Wheatstone console ports. When installing multi-chassis systems, the end user may find it advantageous to utilize the serial ports on OAN cards installed in remote frames in an effort to reduce long cable runs. Please refer to the "XPoint Software Setup Guide" section of this manual for details on configuring serial ports.

Serial Port Note: XY controllers **MUST** be connected to serial ports configured as XY controllers. Wheatstone consoles **MUST** be connected to serial ports configured as Console ports.

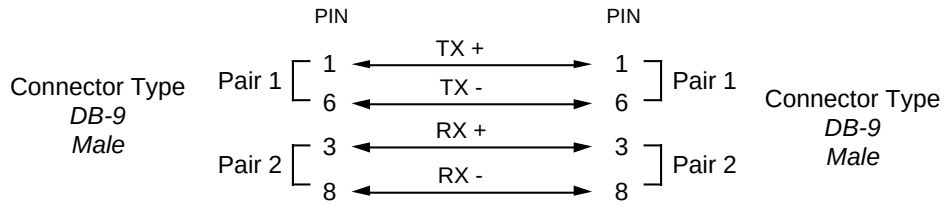
Cable Wiring

XY Controller RS-485 cables are simple pin to pin cables. It is important to use a high quality dual twisted pair cable suitable for extended distance data transmission. A cable with an impedance of 125 ohms and nominal capacitance of 12.8 pF/ft @1 MHz is recommended. See cable specifications and pinouts for details.

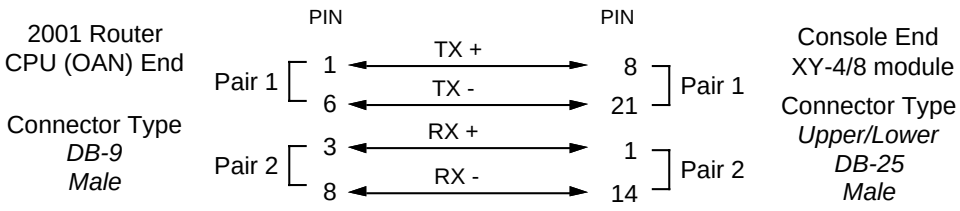
Typical RS-485 Cable Specifications

Conductors	4 conductor plus shield (2 twisted pairs)
Conductor Gauge	24 AWG (7 x 32 AWG) TC
Nom. Capacitance	12.8 pF/ft *41.9 pF/m* @1 MHz
Impedance	125 ohms, Nominal

XY Controller RS-485 Cable Pinouts



OR



Wheatstone Console Interface

The Bridge 2001 has a powerful level of integration designed into the system which allows the user to map specific Wheatstone console input channel alpha-numeric displays, to router destinations. The XPoint Configuration GUI is used to configure the available console input channels and to map switcher destinations to their input displays. Please refer to the System Configuration section in the "XPoint Software Setup Guide" chapter of this manual for details.

Once the Bridge outputs have been "mapped" to console inputs, the console's input channel displays will show the name of the router source currently connected to it. Whenever the channel strip's input source is changed, either locally or remotely, its display will update with the new source name. A/B input source mapping is supported. Further, when a "mapped" input channel on a console is turned ON *and* assigned to the PGM output bus, all XY GUI's and hardware controllers are updated to show that the channel input (i.e. router destination) is LOCKED . This ensures that a "live" source is not accidentally knocked off air or a recording interrupted. Wheatstone D-700 consoles also have the unique ability to recall router sources when a console preset is taken.

Wheatstone console CPU modules connect to the 2001 Switch software via a dedicated RS-485 serial interface bus. Note that this bus is separate from, and in addition to, the XY controller bus.

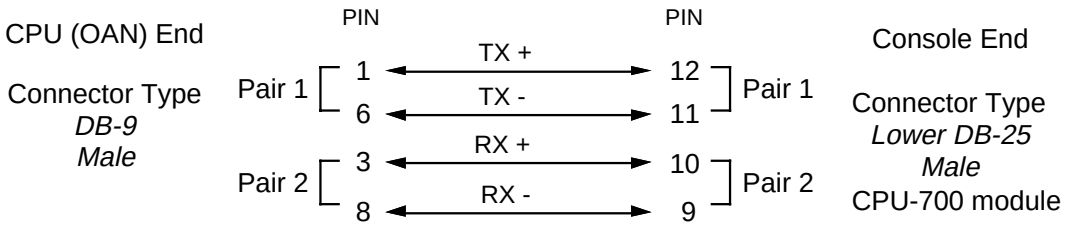
Wheatstone Console RS-485 Connections

Cables that are used for connecting a 2001 switcher RS-485 serial port to a Wheatstone console serial port are very similar to XY Controller RS-485 cables. The only difference is the connector type and pin out required for the console end of the cable. Use the same type of low capacitance computer communications cable recommended for the XY controllers.

Connect the DB-9 end of the cable to the serial Port B DB-9 connector on the rear PWIH (CPU rear) or ONI panel (OAN rear). Connect the DB-25 male end to the console's CPU module. Locate the female LDB-25 connector (Lower DB-25) mounted directly beneath the CPU module on the console mainframe's bottom panel. It will be labelled with the physical mainframe slot number. The console's CPU module is usually installed in slot 30 or 31, note that there is no LDB connector for slot 32 (or 24 in 24 position mainframes).

If there is more than one Wheatstone console, parallel the connections at the first console end of the cable and daisy chain the remaining consoles in a similar fashion. Be sure to terminate *only the last* console in the chain.

Console RS-485 Cable Pinouts



Console CPU Module Settings

Certain dipswitch settings must be made on the connected Wheatstone consoles in order for them to be recognized by the 2001 system software. These settings are console address, serial port mode and RS-485 termination.

Console Address

Each Wheatstone console connected to the system must have a unique numerical address (e.g. 1, 2, 3, etc.). The console address is set via a bank of four position dipswitches located on the CPU module. Refer to your console documentation for details or contact customer support.

RS-485 Select / Termination

The CPU module also has a pair of four position dipswitches that select the serial port mode and RS-485 termination. Locate the *RS-485/RS-232 Select* dipswitch and set it OFF for RS-485. If this is the ***last console*** in the chain, locate the *RS-485 Termination* dipswitch and switch the COM1 positions ON. Otherwise leave RS-485 Termination for COM1 OFF.

XPoint Software Setup Guide

Chapter Contents

Caution!

Configuring the Bridge 2001 Audio Network Router hardware is a detailed and complex process. Improper configuration changes may cause improper operation or disable previously operating functions. If done properly, configuration changes can be made while "on the air" without disruption, however it is always best to restrict configuration changes to time periods when an error could be tolerated. When in doubt, please, contact Wheatstone Technical Service to avoid any error in configuration changes.

Bridge 2001 Ethernet / IP Address Quick Start

Ethernet Cabling

• Use a CAT 5 *crossover* ethernet cable to connect a PC directly to the Bridge 2001.

• Use a standard CAT5 ethernet cable to connect the Bridge 2001 to your network hub.

Default IP Address

The Bridge 2001 router IP Address is set to 192.168.1.160 at the factory. In order to connect using the XPoint software, the PC must have a matching network prefix (i.e 192.168.1.xxx). If your PC's current IP address does not match you must choose one of the following options:

• change the IP address of the PC running the XPoint software.

or

• change the IP address of the Bridge 2001 router.

Changing your PC's IP Address

To set your PC's IP address you must access the TCP/IP Properties form for the network adapter. The exact procedure depends on the specific version of Windows™ you are running. Generally speaking:

• Navigate to the *Settings* • *Control Panel* • *Network configuration* form.

• Highlight the TCP/IP line item for your PC's ethernet adapter.

• Click the "Properties" button (the TCP/IP Properties form should open).

• Click "Specify an IP Address" (DHCP not supported).

• Enter an IP address in the range of 192.168.1.2 to 192.168.1.254 (excluding .160).

• Enter a Subnet Mask value of 255.255.255.0

When in doubt, check with your Windows ™ documentation or network administrator for specific details on altering the network adapter's TCP/IP properties.

Changing the Bridge 2001's IP Address

To change the Bridge 2001's IP address, refer to the Network Configuration Appendix in this manual. You will need the XPoint CD-ROM and a direct Ethernet connection between a PC and the router using a CAT5 *crossover* cable. Once connected proceed as follows:

• Locate and run the network configuration utility program on XPoint CD-ROM.

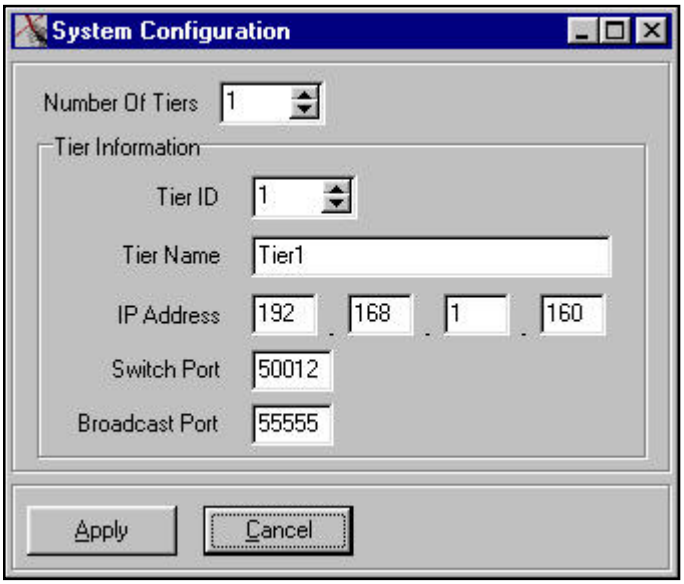
The filename is AdvXP_Network_Config.exe located in the Network 2.0 folder.

• Carefully follow the instructions in the Network Configuration Appendix 1.

• Re-boot the Bridge 2001 (Power down for 10 seconds, power up).

Configuring IP Address in XPoint Software

Next, start the XPoint application, log on as administrator (password=Admin), and navigate to the *Configure•System* menu item. The following form will appear.



Important Note!
This form tells the XPoint software where the Host CPU is located on the network. Run the Network_Config utility to modify the actual network settings of the Host CPU card located in the system's Master Rack - see Appendix 2.

Important:

• If you changed your PC's IP Address, enter the parameters exactly as displayed above.

• If you changed the Bridge 2001's IP Address, enter the parameters you entered using the Network Configuration Utility program.

If you are connected to the router, you should see a "Connecting to..." message in the status bar at the bottom of the screen.

Saving the Bridge 2001 Configuration

Once you connect for the first time be sure to save the configuration. Choose the *File• Save* main menu option from the toolbar. When you make subsequent changes (e.g. rename Sources or Destinations, add controllers, etc.) be sure to save them.

XPoint Software Setup Guide

Getting Started

All Wheatstone Bridge 2001 Audio Network Router hardware is pre-configured at the factory according to customer specifications. This approach greatly speeds the installation process getting you "online" faster. You may not need to make any software configuration changes.

After installation and cabling of all required hardware, the system administrator may use the XPoint software to customize the remainder of the configuration. Before you begin, be sure you have an ethernet connection between the XPoint computer and the Host CPU card. See the preceding CPU-2001 chapter for details.

The following sections will guide the user through all phases of the software configuration. The main items that may require attention are: any signal definition changes, source and destination signal naming, XY controller mapping and optional Wheatstone console input channel mapping.

GUI Log-In

Once the XPoint software has been installed and started, a "Log In" dialog box will be displayed on the screen. There are three possible password protected log in identities that a user may log in as:

Guest - Allows the user to view crosspoint status only. No switching of I/O signals.

XYC GUI - Allows the logged in user to select crosspoints only. Signal visibility must be setup by Administrator prior to logging in as an XYC GUI.

See the "*XY Controller GUI Configuration*" later in this section for details.

Administrator - allows logged in user complete access to hardware configuration, signal naming, I/O crosspoint switching and destination locking.

Passwords

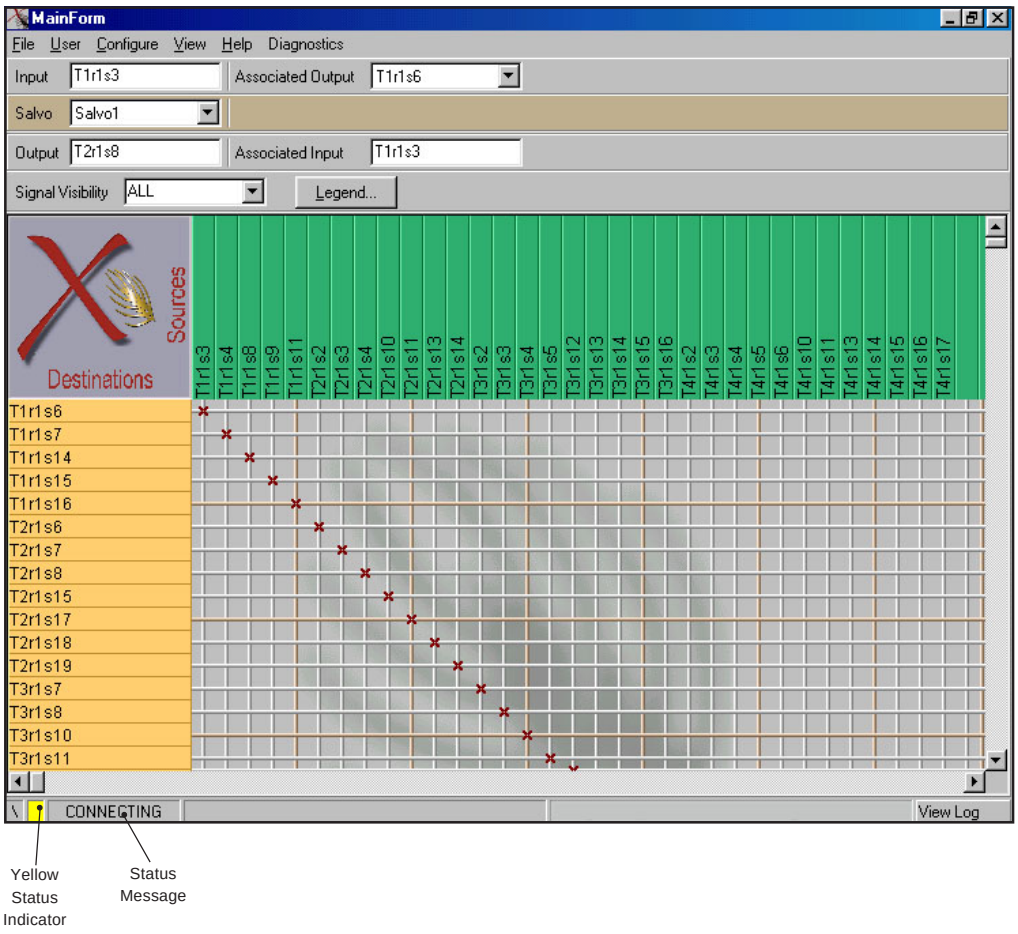
Default passwords are "Xyc" for XYC GUI and "Admin" for Administrator.

Once logged in as Administrator the GUI attempts to connect to the switch and uploads the current configuration and crosspoint status onto the PC. This may take 30 seconds or more, check the lower left hand corner of the screen for connection status.

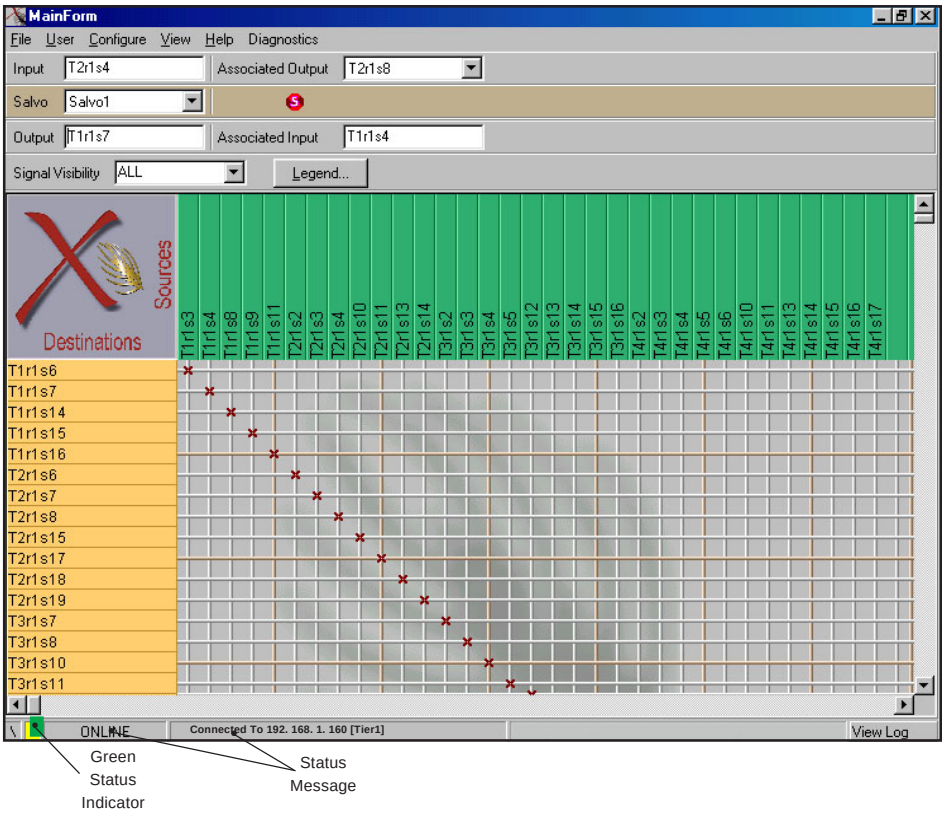
Connection Between the Configuration GUI and Master Rack

Depending on the state of the system when the current default configuration files were saved, the Configuration GUI may start in the OFF-LINE or ON-LINE mode. While off-line, the GUI does not communicate to the Host CPU in the master rack. This is useful to work through initial hardware and signal definitions, which may be downloaded later.

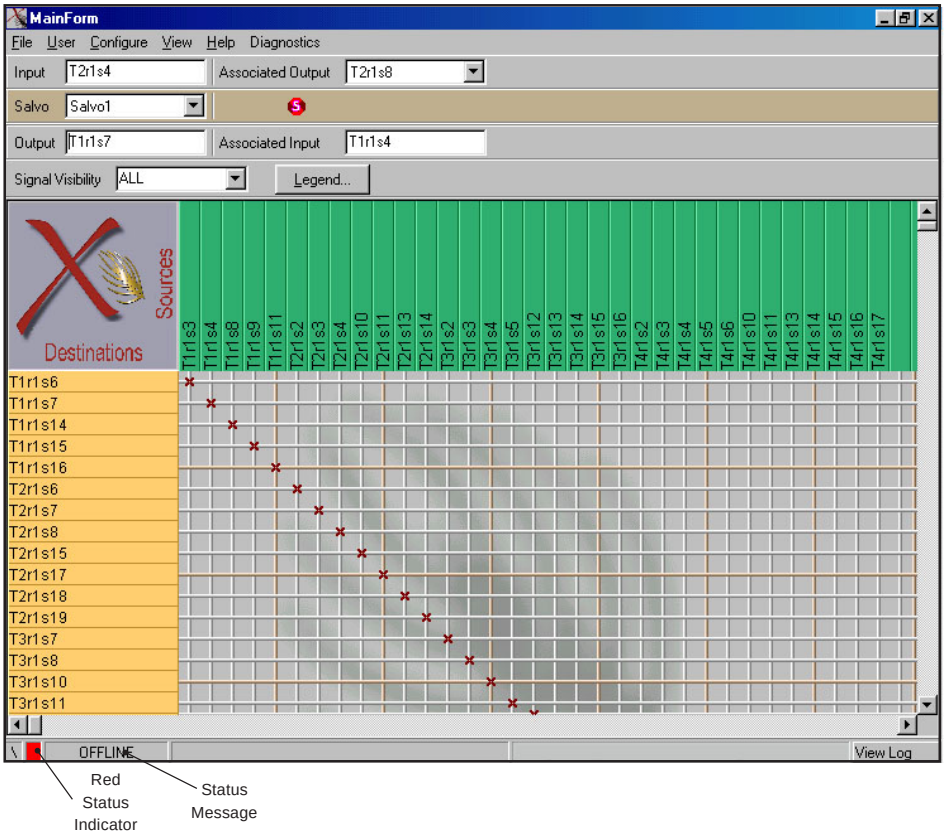
Assuming the default configuration files start the Configuration GUI in ON-LINE mode, a TCP connection to the Host CPU will be attempted, as indicated via the status message and yellow status indicator shown below:



When the GUI successfully communicates with the Host CPU software it will start receiving the configuration that the Host CPU had stored in its nonvolatile memory. While uploading this configuration information the yellow status indicator turns green and the status message changes from CONNECTING to something similar to the following (varies with tier name and IP/address): “Uploading Config From 192.168.1.160 [Tier 1]”.



Once the configuration has been uploaded the GUI enters the ONLINE state as shown to the left:



To disconnect from the Host CPU and go to OFF-LINE mode, select the *View / Mode / Offline* menu option. The status indicator on the screen will then change as shown to the left:

To connect to the Host CPU while in OFFLINE mode, select the *View / Mode / Online* menu option. The status indicator on the screen will then change to CONNECTING as discussed above.

If the user made changes to a few crosspoints in OFFLINE mode and then goes to ONLINE mode, the message box pops-up:

Choose YES to save OFFLINE changes. The 2001 software checks the request for validity (input to output, output not already assigned, lock flag not set, etc.). If the request is valid, it is implemented, and Configuration GUI is updated. If not valid, the request is rejected with an appropriate reason message displayed.

System Configuration Menus

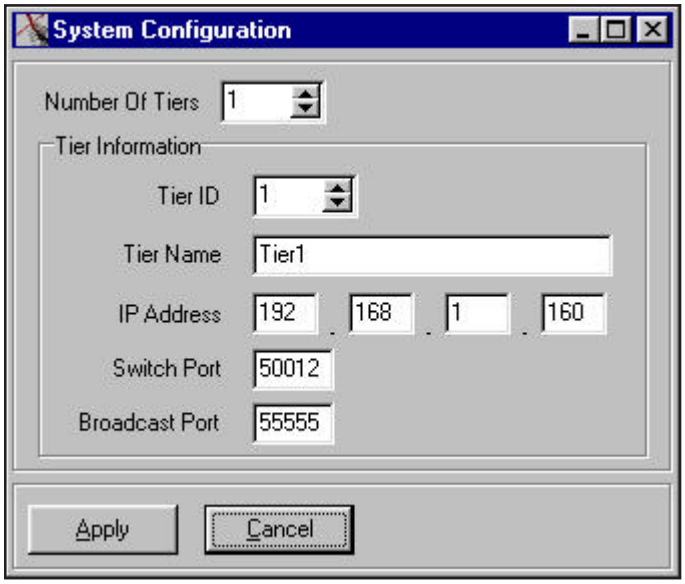
From the user point of view, configuration of the 2001 system is relatively simple, since the Configuration GUI does much of the actual underlying configuration assignment work automatically. This section will outline a general procedure for configuring a 2001 system.

Tier Configuration

Note that your system was pre-configured and this step is not necessary unless you have changed the IP address of a Host CPU-2001 card or are adding Tiers.

The Configuration GUI must be se tup with some information regarding the router's Host CPU network parameters. A user logged in as "Administrator" has access to these configuration menus.

First identify the Host CPU card(s) installed in rack(s) and attached to the Ethernet network. This is done by selecting the *Configure / System...* menu option and the following Tier Configuration form appears:



Important Note!
This form tells the XPoint software where the Host CPU is located on the network. Run the Network_Config utility to modify the actual network settings of the Host CPU card located in the system's Master Rack - see Appendix 2.

Select the Number of Tiers in the system. For each Tier ID, provide a Tier Name, the IP address, Switch Port and Broadcast Port used. The Number of Tiers, IP Address, Switch Port and Broadcast Port values *must* match the current settings of the Host CPU in order to connect.

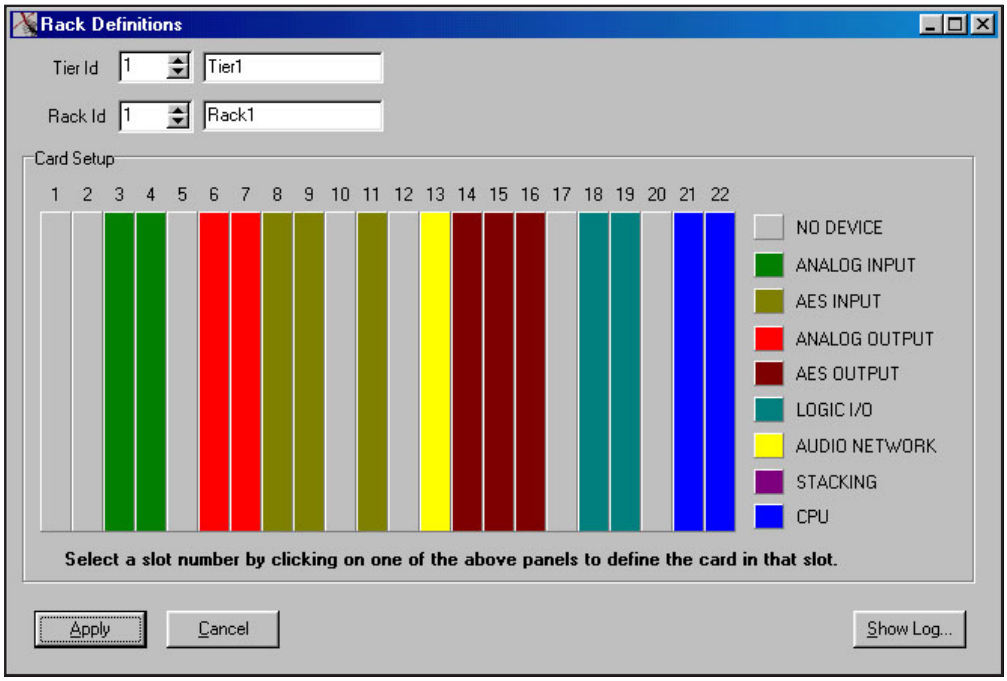
The Switch Port will normally be related to the tier using the formula 50NN2, where NN is the two digit tier ID (i.e. 01 for tier 1...15 for tier 15). After clicking the Apply button the GUI software will be in the "CONNECTING" state, as discussed in the next section. This completes the Tier Configuration process.

Rack Configuration

Note that your system was pre-configured and this step is not necessary unless you are changing or adding hardware located in one or more racks.

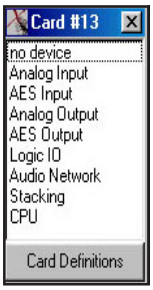
The first step in configuring the system should be to lay out the required hardware via the setup menus on the Configuration GUI. This should be done prior to actual hardware installation, as the GUI will provide verification of the proposed configuration, as well as a detailed listing of all hardware, including location, cabling, and jumpering requirements.

Start up the Configuration GUI and log in to the software as Administrator. Select the *Configure / Rack Defs...* menu option. The following form appears:



Rack ID Notes:
- The main rack is always Rack ID 1.
- In some stacked systems, physical Rack #2 may equal Rack ID 3 or 4.
- Audio Network satellite racks always begin at Rack ID 5.

Adding a Card to a Rack



- Use the Tier ID and Rack ID spin-edit fields to select a rack in the system.
- Click on the appropriate slot in the rack to add a piece of hardware. A pop-up menu will appear with a list of available cards (e.g. Analog Input, AES Output, etc.).
- Click on a card type to install it in the chosen slot.

Reminder!
Save your changes...
Use the *File• Save* menu option.
Then *File• Send Cfg To Switch.*

Card/Signal Definitions

Note that your system was pre-configured and this step is not necessary unless you are changing or adding hardware located in one or more racks. If you only need to change the signal Name, see "Signal Definition" later in this section.

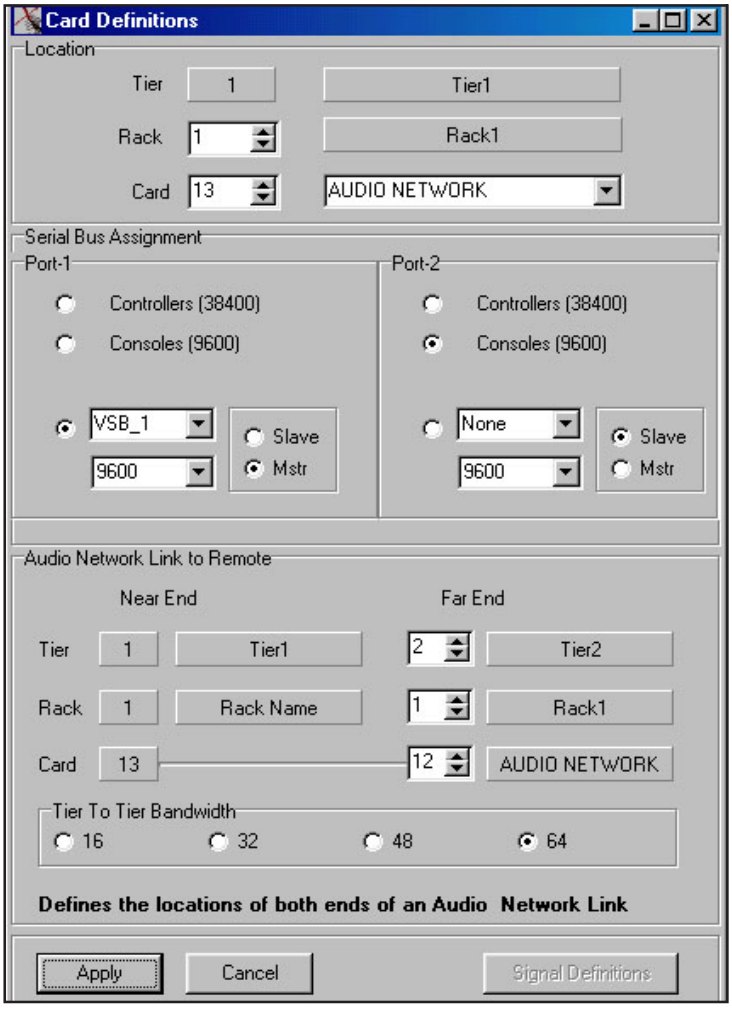
Most cards in the system have user configured parameters. The "Card Definitions" form allows the user to modify a card's current settings. To access this form, *left* click on an installed card then press the "Card Definitions" button on the bottom of the form.

Audio Network Card Definition

If the selected device is an Audio Network card the following form will appear:

The "Serial Bus Assignment" properties are used to define the configuration for the two serial ports supported by the Audio Network cards. Port-1 and Port-2 refer to the serial ports labelled as Port-A and Port-B on the ONI-2001 rear panel of the Audio Network card. When assigning a port to a Virtual Serial Bus (VSB) make sure to set the Master/Slave fields correctly depending on the types of devices connected to that port.

The "Audio Network Link to Remote" section is used to define the *partner* Audio Network card that is connected to this Audio Network card via a fiber or CAT-5 cable. Note that if the partner is in a different tier (multi-tier) the "Tier to Tier Bandwidth" field is visible. This field is used to control the bandwidth of the Audio Network link between tiers in a multi-tier environment. It determines the number of TDM's and Output Blocks that will be assigned to this Audio Network card by the software during the configuration process.



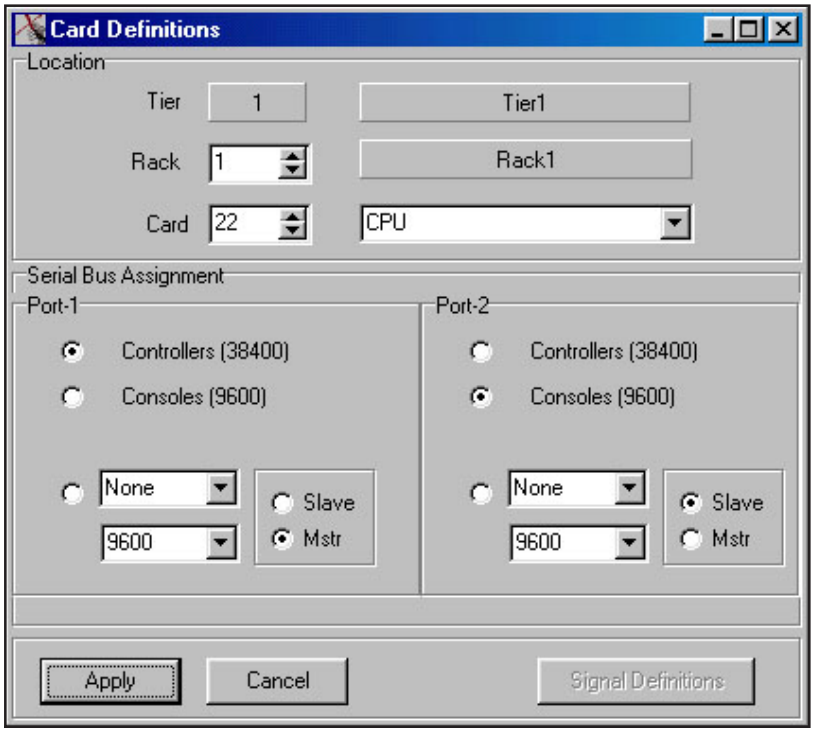
CPU Card Definition

If the selected card is a CPU card, the same form is presented but the section labelled "Audio Network Link to Remote" is not visible. The Tier, Rack and Card location is automatically filled in for the CPU just selected. To choose another CPU location use the "spin edit" fields (up/down arrows). Serial Port assignment works the same as on the Audio Network card. The default assignments for the two serial ports are :

Port 1 = Controllers (38400)

Port 2 = Consoles (9600)

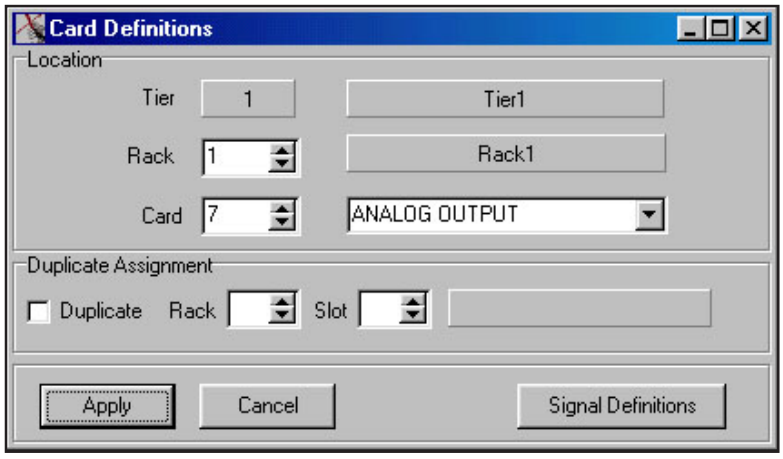
See the Host CPU section in the Hardware section of this manual for details on RS-485 serial communications wiring.



Output Card Definition

If the selected card is an output card the form at the right appears after *left* clicking on the output card in the RackDefs form:

Click on the button labelled "Card Definitions" to modify the output card parameters. The following form will appear:



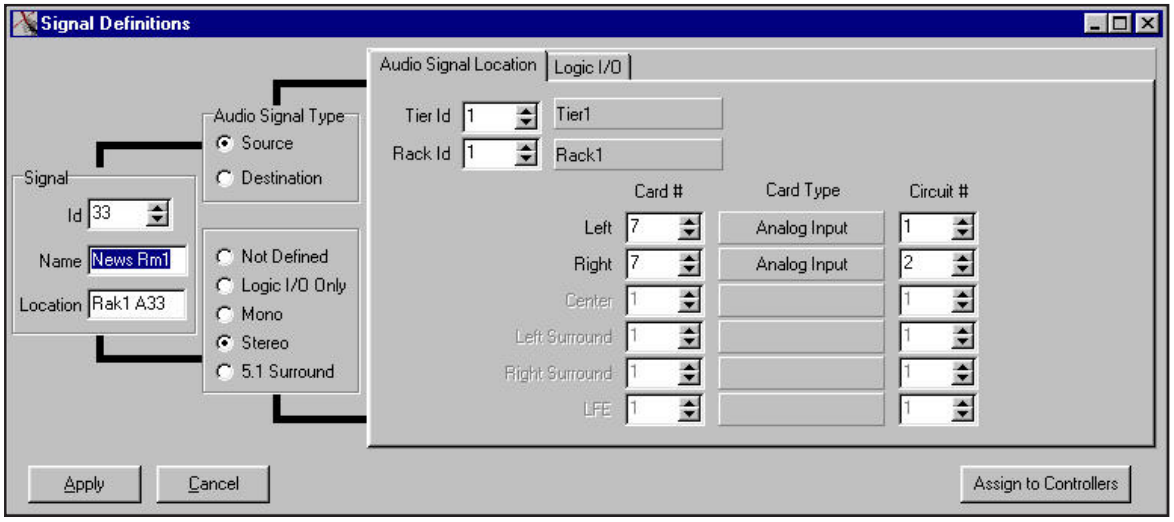
A duplicated output card will map the same output signals as the card it is duplicated from. The intent is that any signals routed to the original output card will automatically be routed to the duplicated output card, since both cards will recognize the command messages connecting their shared Output Block.

Input Card Definition

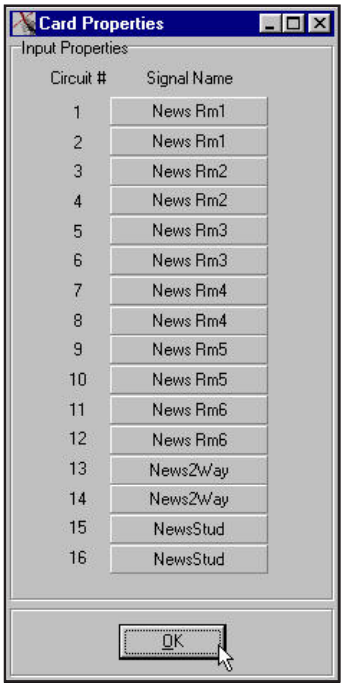
There are no user definable *hardware* parameters on analog or digital input cards. However, the form to the right appears after *left* clicking on an input card in the RackDefs form.

Click on the button labelled “Signal Definitions”. The *Signal Definitions* form opens allowing the user to assign existing signals to the selected input card, or to create new signals for assignment to the selected input card.

Please refer to the Signal Definitions section for details on configuring input signal names, types and logic port association.



Viewing Defined Source & Destination Signals



The “Card Properties” form provides a way to quickly determine which signals have been mapped to a particular input or output card and if any spare audio channels are available.

Select the *Configure / Rack Defs...* menu option to view a given rack. You may now query any input or output card by *right* clicking on its location. A form similar to the one on the right will be displayed showing all signal names associated with the card. Notice that there are 16 circuit numbers displayed, which correspond to the 16 physical audio channels available on the card. Mono signals will occupy 1 circuit, Stereo signals will occupy two circuits, 5.1 signals will occupy six circuits. Note that 5.1 signals may span across cards. The order of the signal components displayed (i.e. Left, Right, Center, etc.) always follows the configuration entered on the “ Signal Definitions ” form.

Configuration Rules and Recommendations

The following rules and recommendations should be considered when configuring the hardware (most are required to ensure proper clock connection between racks):

1. The first CPU in each tier must reside in Rack ID 1, Slot 22. A failover CPU may be placed anywhere else in Rack ID 1.

2. In any remote rack (Rack IDs greater than 4), the first Audio Network card connecting back to a local rack (Rack ID 4 or less) must be placed in Slot 1.

3. Remote racks may only be connected to local racks via Audio Network cards. Any number of Audio Network cards may be used, but they must all connect to local racks in the same tier (no cascaded remote tiers are allowed).

4. If there is more than one local rack within a tier, then all local racks must contain a Stacking card. In racks 2-4, these cards should reside in slot 1 or 22.

5. In a multi-tier configuration, Audio Network cards are used to connect each Satellite tier to the Hub tier. All these interconnecting cards must reside in local racks in each tier. In addition, one interconnecting Audio Network card in each Satellite tier should reside in Rack ID 1, Slot 1.

Completing the Configuration

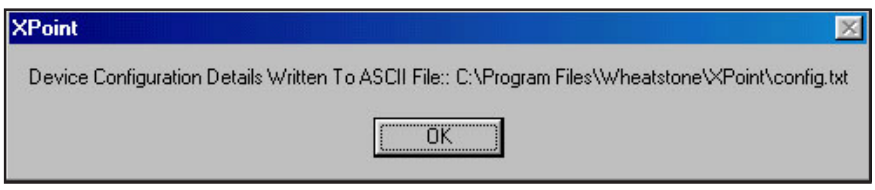
When all hardware has been added in this manner, press *Apply* on the menu. The GUI will validate and complete the configuration. If any warnings or invalid entries have been made, the Configuration GUI will prompt the operator for corrections.

Saving Your Configuration

At this time you should also save the configuration file to your default location: select *File /Save* from the Main Menu. Next, send this configuration for permanent storage on the Host CPU card by selecting the *File /Send Cfg To Switch* menu option.

Config.txt File

Once a final configuration has been made (*Apply* button clicked), an ASCII file, called “config.txt”, containing all of the configuration details is created in the default directory. Go to *File / Save* to select a default directory. A message box, similar to the one shown below, appears notifying the operator that this file has been created.



Using any text editor or word processor open this file to view the configuration listing. This document provides a listing of all configured hardware, including location, cabling, and jumpering details. A partial example of this listing is shown below:

```
Note: Slot/Rack ID's are 1-based.
Note: Slot ID #1 == Left-most slot in rack when looking at front of rack
Note: Do not map the serial ports of failover CPU's to devices. If a failover
 occurs, the CPU will use the same definitions used by the failed CPU.
-------------------------------------------------
-------------------------------------------------
-------------------------------------------------
Tier[1] Configuration::
Rack[1] used 9 of 32 TDM's
Rack[1] used 9 of 32 OB's              (OB - Output Block)

Rack[1] Slot[3]= Analog Input
                    Diagnostics Info:: TDM used by this card = 4
                    Diagnostics Info:: Proxy TDM ID used by this card = 4

Rack[1] Slot[4]= Analog Input
                    Diagnostics Info:: TDM used by this card = 3
                    Diagnostics Info:: Proxy TDM ID used by this card = 3

Rack[1] Slot[6]= Analog Output
                    Diagnostics Info:: OB used by this card = 4
                    Diagnostics Info:: Proxy Block ID used by this card = 4
                    Diagnostics Info:: hardwireTDM used by this card = -1

Rack[1] Slot[7]= Analog Output
                    Diagnostics Info:: OB used by this card = 3
                    Diagnostics Info:: Proxy Block ID used by this card = 3
                    Diagnostics Info:: hardwireTDM used by this card = -1

Rack[1] Slot[8]= AES Input
                    Diagnostics Info:: TDM used by this card = 2
                    Diagnostics Info:: Proxy TDM ID used by this card = 2

Rack[1] Slot[9]= AES Input
                    Diagnostics Info:: TDM used by this card = 1
                    Diagnostics Info:: Proxy TDM ID used by this card = 1
Rack[1] Slot[11]= AES Input
                    Diagnostics Info:: TDM used by this card = 0
                    Diagnostics Info:: Proxy TDM ID used by this card = 0

Rack[1] Slot[13]= Audio Network
                    multi-tier bandwidth = 64 Wires
                    Must Connect to::
                        Partner Tier ID* = 2
                        Partner Rack ID* = 1
                        Partner Slot ID* = 1
                    COM PORT 1::
                        VSB_1
                        Master
                        9600 (baud rate)
```

*Location of Partner Audio Network Card that is connected to this Audio Network Card via a fiber or CAT-5 cable.

COM PORT 2::
Console Bus
Slave
9600 (baud rate)
SW5-1 = OFF (Local)
SW5-2 = ON (Primary)
SW7[1,2,3,4] = 0000 (Rack ID) (0 = OFF, 1 = ON)
Set SW5-3 as follows:: OFF=48Khz , ON=44.1 khz
Set SW5-4 as follows:: OFF=fiber, ON=CAT5
Diagnostics Info:: TDM used by this card = 5
Diagnostics Info:: TDM used by this card = 6
Diagnostics Info:: TDM used by this card = 7
Diagnostics Info:: TDM used by this card = 8
Diagnostics Info:: OB used by this card = 5
Diagnostics Info:: OB used by this card = 6
Diagnostics Info:: OB used by this card = 7
Diagnostics Info:: OB used by this card = 8

Rack[1] Slot[14]= AES Output
Diagnostics Info:: OB used by this card = 2
Diagnostics Info:: Proxy Block ID used by this card = 2
Diagnostics Info:: hardwireTDM used by this card = -1

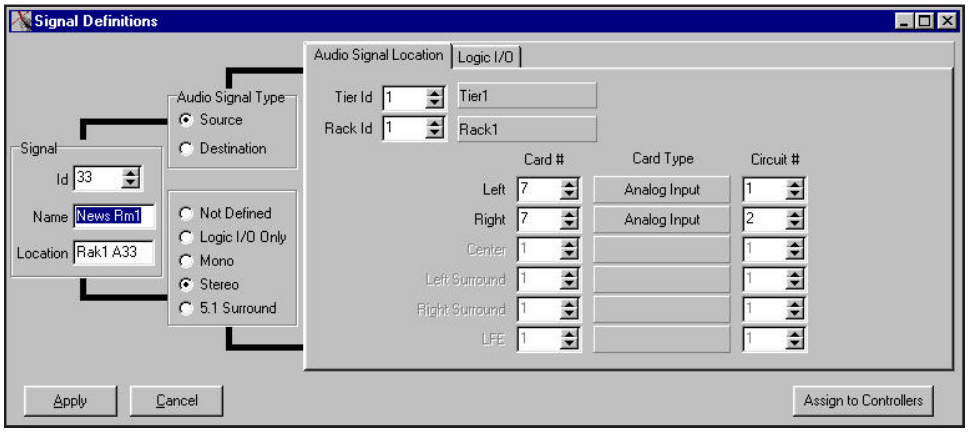
Rack[1] Slot[15]= AES Output
Diagnostics Info:: OB used by this card = 1
Diagnostics Info:: Proxy Block ID used by this card = 1
Diagnostics Info:: hardwireTDM used by this card = -1

Rack[1] Slot[16]= AES Output
Diagnostics Info:: OB used by this card = 0
Diagnostics Info:: Proxy Block ID used by this card = 0
Diagnostics Info:: hardwireTDM used by this card = -1

Rack[1] Slot[22]= CPU
SW7[1,2,3,4] = 0000 (Rack ID) (0 = OFF, 1 = ON)
COM PORT 1::
XY Controller Bus
Slave
38400 (baud rate)
COM PORT 2::
XY Controller Bus
Slave
38400 (baud rate)

Signal Definition

Up to 512 separate source and destination signals may be defined via the Configuration GUI (up to 2048 in multi-tier installations). To add or edit a signal from the GUI's main grid, *right* click on one of the Source or Destination signals and select "Modify Signal Definition". To define a signal while in the *Configure / System / Rack Defs* form, click on an input card and press the *Signal Definitions* button. In either case the following form will appear:



Each signal is automatically assigned a unique Signal ID number. For each Signal ID number the following parameters can be configured:

- *Signal Name:* Enter 8 Character name displayed on XY controllers and Xpoint GUI.
- *Location:* Enter optional 8 Character description of signal's location.
- *Audio Signal Type:* Choose Source or Destination.
- *Format:* Choose Logic I/O Only, Mono, Stereo, or 5.1 Surround.
- *Audio Signal Location Tab:* Defines the signal's physical location - Tier, Rack, Slot, Circuits.
- *Logic I/O Tab:* Maps up to six routable logic port signals to the current audio signal. Also used to define Logic I/O signals only. See the "*Configuring Logic I/O* " section for details.

Most of these parameters are self explanatory. When defining the audio signal location, remember that XPoint *circuits* are equivalent to a single audio channel. Every audio card has eight stereo channels (8x2 channels = 16 circuits).

Note that signals may be virtually mapped to locations that do not currently have appropriate hardware. These " virtual " signals exist in software, but may not be used until appropriate hardware is added to the defined locations. This feature allows a set of default signal names to be provided independent of hardware configuration.

Configuring Logic I/O

Overview

The LIO-2001 adds 12 programmable logic input and 12 output functions per card. The addition of logic I/O adds a powerful level of complexity to your Wheatstone router and care must be exercised during configuration to ensure the proper results. It is important to understand that there are two primary ways to configure the physical logic ports in software - routable logic or trigger ports. Which type you choose depends on the particular application.

Routable Logic

Routable logic allows the user to make logic signal crosspoints in the same way audio crosspoints are made. Routable logic may be configured as independent "LIO Only" signals (e.g. switch inputs and solid state relay outputs) or, up to six logic input or output signals may be mapped, or "piggybacked", onto audio signals.

Independent "LIO Only" logic signals may be cross connected just like audio signals. An external switch or relay closure wired to activate a logic input may be routed to control device A, B, C etc. as required. The duration of the solid state relay output follows the duration of the input signal thus allowing for latched or momentary applications. LIO Only Sources are typically cross connected to LIO Only Destinations, but mapped logic signals may be cross connected to independent logic signals as long as the assigned logic functions match.

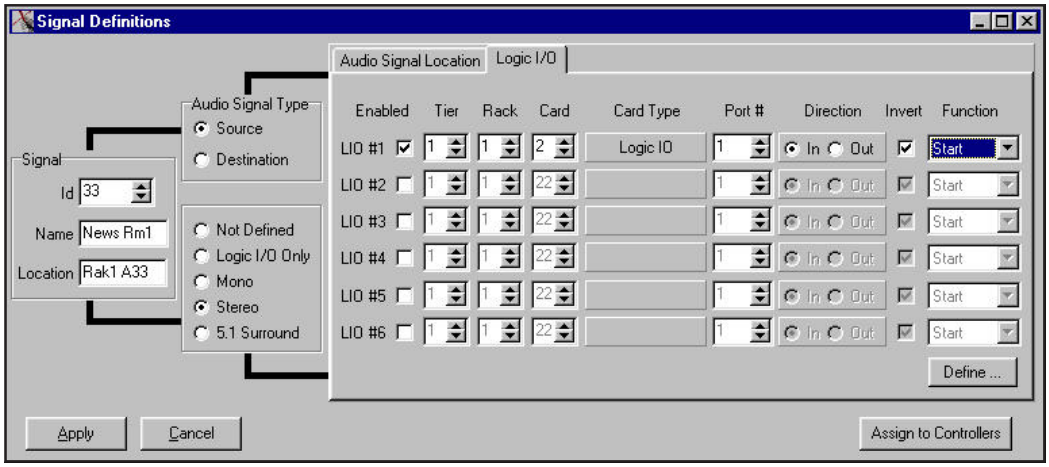
Mapped logic signals enable the user to automatically route up to six logic signals along with an audio source. When an audio source is routed to a destination, all logic mapped to the source device is automatically routed to the destination device. The mapped logic I/O configuration greatly simplifies the management of control signals in a variety of scenarios including multi-recorder control, backup automation switch-over and studio sharing applications.

Trigger Port Logic

Triggered port logic is a special class of logic I/O that uses a GPI or simple switch closure to fire a predefined Salvo or to make a temporary audio crosspoint. When a logic input port has been configured as a triggered port, the corresponding output port is dedicated as a tally-back function. Tally-back is provided as means of confirming that the salvo has fired or a temporary audio crosspoint has been made. Triggered port logic is configured using the LIO Card Definitions form. Please see *Configuring Triggered Port Logic* later in this section.

Routable Logic Signal Definitions

There are two types of *routable* logic signals - Logic I/O Only or Mapped Logic I/O. All routable logic signals must first be defined using the Signal Definitions form. To add a new routable logic signal *right* click on a source or destination signal, then click *Modify Signal Definition* to open the *Signal Definitions* form. The following form should appear; click on the *Logic I/O* tab to view the logic parameters:



As with audio Sources and Destinations, each signal is automatically assigned a unique Signal ID number. For each Signal ID number, the following parameters can be configured:

- *Signal Name:* Enter 8 Character name displayed on controllers and Xpoint GUI
- *Location:* Enter optional 8 Character description of signal's location
- *Audio Signal Type:* Source or Destination will already be selected
- *Format:* Choose Logic I/O Only, Mono, Stereo or 5.1 Surround
- *Audio Signal Location Tab:* Defines the audio signal's physical location - Tier, Rack, Slot, Circuits (*not used for Logic I/O Only signals*)
- *Logic I/O Tab:* Maps up to six routable logic port signals to the current signal.
  - *Enabled* -LIO#1 through #6, check to activate up to six LIO's
  - *Tier, Rack & Card* - identify physical location of logic card
  - *Port#* - choose one of 12 available physical ports
  - *Direction - In or Out* - selects input or output port type
  - *Invert* - flips the normalled port state (i.e. N.O. to N.C.)

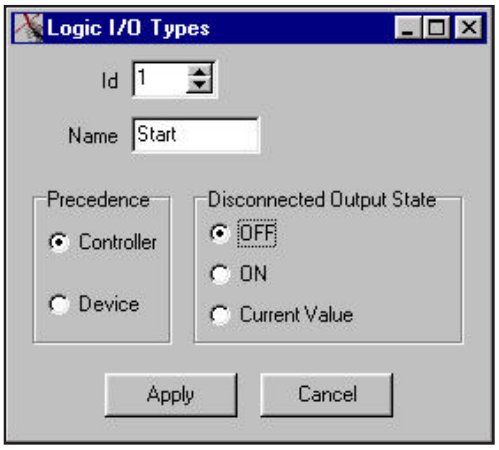
Example - To add a single logic input function to a Source signal:

- Click on the LIO#1 Enabled checkbox.
- Select the logic card's physical location in a rack.
- Choose one of the twelve available logic ports on the card.
- Pick a direction; control outputs *from* a device connect to the logic card *input* ports, control inputs *to* a device connect to logic card *output* ports.
- Invert - leave unchecked unless you need to change a port's normally open behavior.
- Function - Select a function name, e.g "Start". Note that both the Source and Destination signals must have the same function names enabled in order to complete the circuit. Please see *Defining Routable Logic Functions* below for more information.

Defining Routable Logic Functions

Mapped logic and Logic I/O Only signals rely on common function names as a way of "knowing" which physical logic inputs need to control which physical logic outputs. When you map logic signals to an audio signal or create "logic only" signals using the Signal Definitions form, you must provide a *unique* logic Function for each LIO# enabled. When you make a crosspoint between a source and destination, the software checks the list of logic functions associated with the source against the list of logic functions associated with the destination and cross connects any logic signals with the same "Logic I/O Type" name.

Logic functions are created from the *Logic I/O Types* form. Up to 50 logic functions may be defined. First, open the *Signal Definitions* form by *right* clicking on a source or destination signal in the GUI's main grid, then click on *Modify Signal Definitions.* Click on the *Logic I/O* tab, then click on the "*Define"* button in the lower right corner to open the *Logic I/O Types* form shown below:

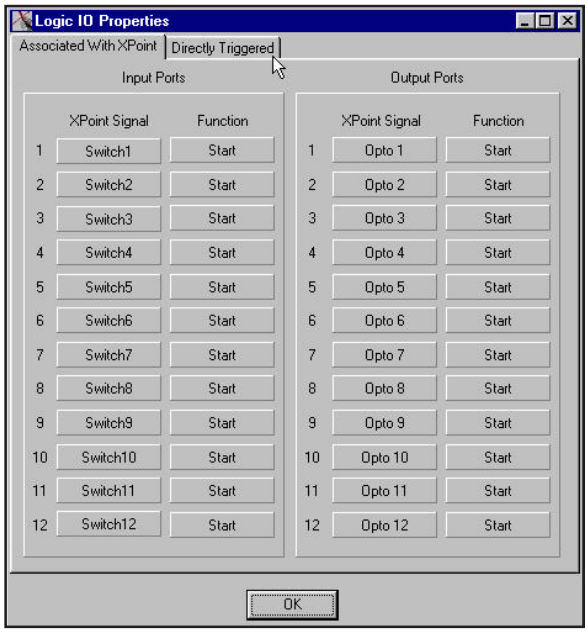


- *ID* - static value from 1 to 50 , cannot be changed. Use the up /down arrows to scroll to the desired function number.
- *Name* - Be sure to assign each function a unique name to avoid potential confusion when mapping logic functions. Names may be up to 8 characters long.
- *Precedence* - always set to "Controller" for logic card applications. "Device" setting is reserved for future use.
- *Disconnected Output State* - Choose the desired state to leave the output in when this function is disconnected. Choices are OFF (open), ON (closed) or Current Value (last known state).

Viewing Defined Logic Signals

The "Logic IO Properties" form provides a way to quickly determine which logic signals have been assigned to a particular logic card and if any spare logic ports are available.

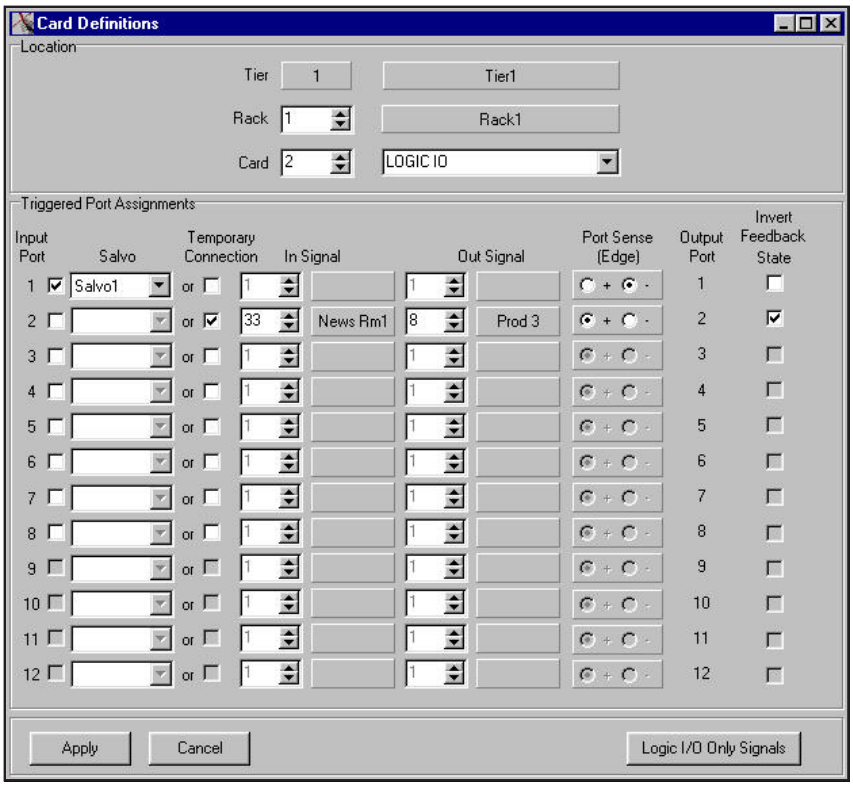
Select the *Configure / Rack Defs...* menu option to view a given rack. You may now query any logic card by *right* clicking on its location. A form similar to the one on the right will be displayed. The "Associated With Xpoint" tab displays all mapped and routable logic signals on the card. The "Directly Triggered" tab displays all of the Triggered Port assignments on the card.



Configuring Triggered Port Logic

Triggered logic ports enable the firing of salvos or temporary audio connections from a GPI or simple switch closure. When an input is configured to be a triggered port, its corresponding output is automatically assigned to be a Tally-back. Configuration of Triggered ports is done through the LIO *Card Definitions* form.

To open the LIO *Card Definitions* form, log on as Administrator and navigate to the Main Menu item Configure / Rack Defs. Select the Tier and Rack location and *left* click on the logic card to be configured . Click on the "Card Definitions" button at the bottom of the *Card Type* form. The following Card Definitions form should be visible:



The "Location" section at the top of the form indicates the physical location of the LIO-2001 logic card. The "Triggered Port Assignments" section allows up to 12 pairs of logic input/output ports to be configured. Logic ports on this card which have already been configured as routable logic will appear to be grayed out.

The following form description includes parameters that may be configured:

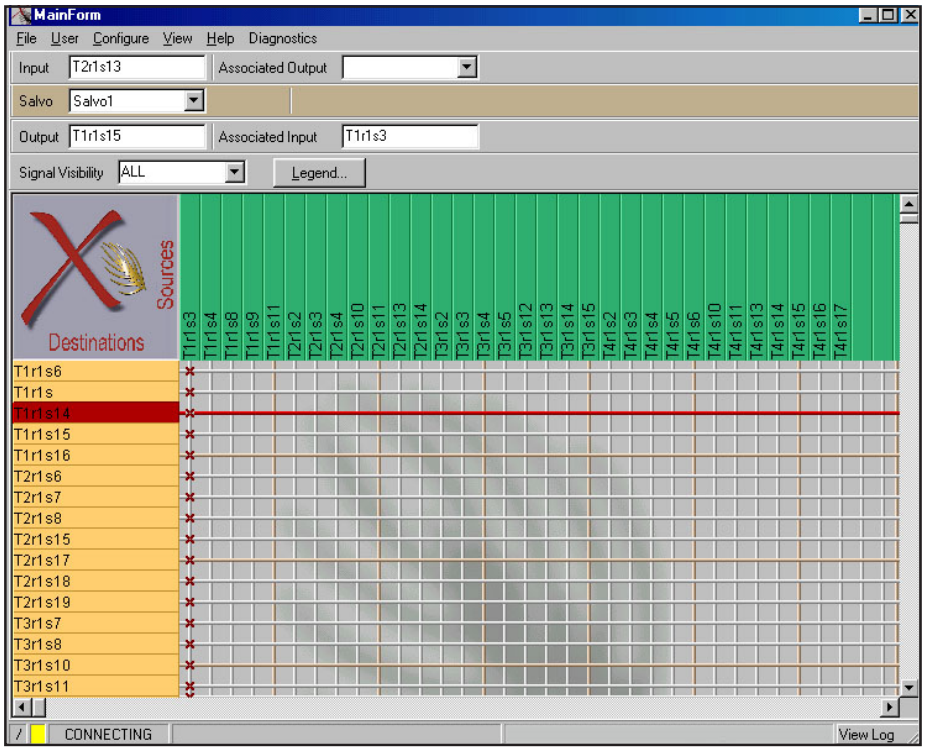
- *Input Port* - indicates which physical port is being configured.
- *Salvo* check boxes - assigns input port to fire a salvo.
- *Salvo* - use drop down list arrow to select a Salvo to be fired.
- *Temporary Connection* check boxes - assigns input port to temporarily connect a source to a destination (also temporarily disconnects the current source).
- *In Signal* - use the up/down scroll arrows to select the temporary source signal.
- *Out Signal* - use the up/down scroll arrows to select the effected destination.
- *Port Sense (Edge)* - choose "+" to trigger on a low-to-hi input transition, choose "-" to trigger on a hi-to-low input transition.
- *Output Port* - indicates which physical port is used for Tally-back.
- *Invert Feedback State* checkbox - flips the normally open behavior of the Tally-back output.

Once the Triggered Port Assignments have been defined, press the "Apply" button to complete the configuration. The " Logic I/O Only Signals " button is provided for convenience and opens the "Signal Definitions" form. This may be useful to quickly un-assign mapped logic ports, making them available for Triggered Port assignment.

Signal Locking

To lock a signal, *right* click on one of available output channels on the crosspoint grid and select “Lock Connection”:

That crosspoint output signal becomes locked as indicated by red line through the signal on the GUI display and shown on form below:



Salvo Definition

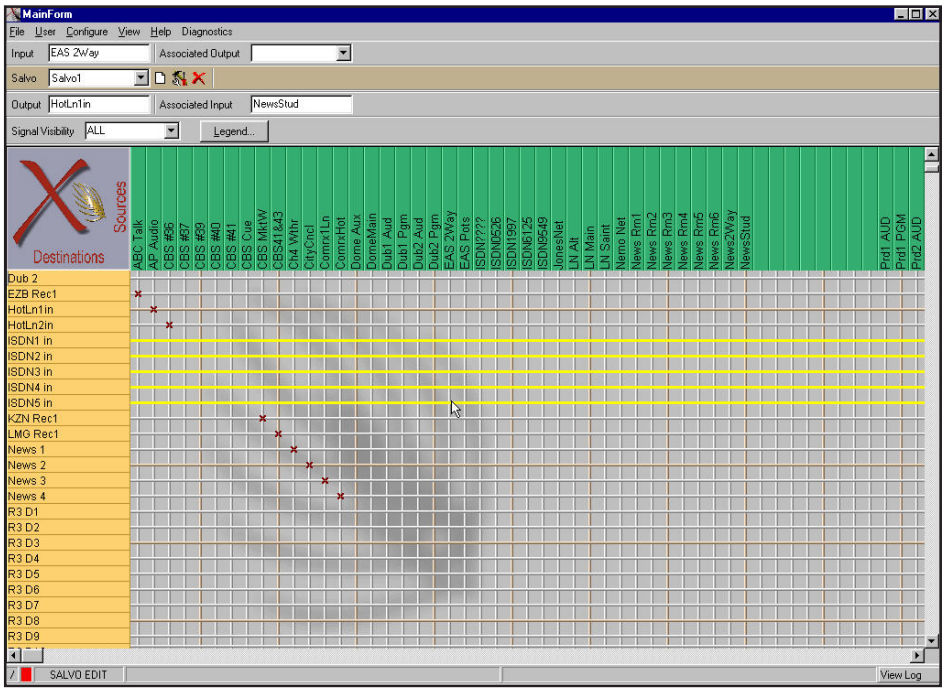
Macro control of the 2001 router is accomplished by creating and firing Salvos. A Salvo is simply a group of cross connects, disconnects and "do nothings" that occur when the selected Salvo is fired. Each Salvo has a unique name and can be programmed to be visible to any hardware XY controller or XYC GUI.

To define a Salvo, use the Configuration GUI and enter *Salvo Edit Mode* by selecting the *View / Salvo Edit...* menu. The operator may then choose to modify the grid connections in an existing Salvo, or use the Salvo toolbar icons to rename an existing Salvo or to create a new one. By making and breaking connections on the crosspoint grid, the operator builds up a Salvo definition. ***The order in which Salvo actions are created determines the "playback" order.*** It is important to disconnect a source routed to a destination signal that has logic attached *before* routing the source to a new destination to avoid illegal logic state conditions.

When completed, the operator leaves *Salvo Edit Mode*, at which point the newly defined Salvos are available for use. If the application is connected to a switch (ON-LINE mode) the new Salvo definitions are automatically sent to the switch. It is a good idea to save the newly created Salvos on the PC by choosing *File / Save...* from the main menu.

Note that clicking on the Delete Salvo icon in the Salvo Toolbar will initially delete all the connections defined in a Salvo; a subsequent click on this button will delete the Salvo from the Salvo list. This is a useful way to clear out an existing Salvo and then redefine the connections within that Salvo. To cancel changes made to a Salvo select*View /Cancel Salvo Edits* from the main menu.

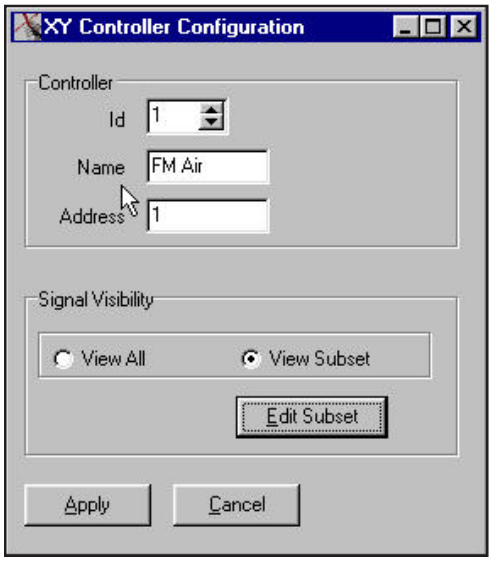
An example of Salvo Edit mode is shown below:



<-Salvo Tool Bar
• Rename Salvo
• New Salvo
• Clear/Delete Salvo

Caution!
A yellow line through a connection means the connection will be switched OFF when the Salvo is fired.

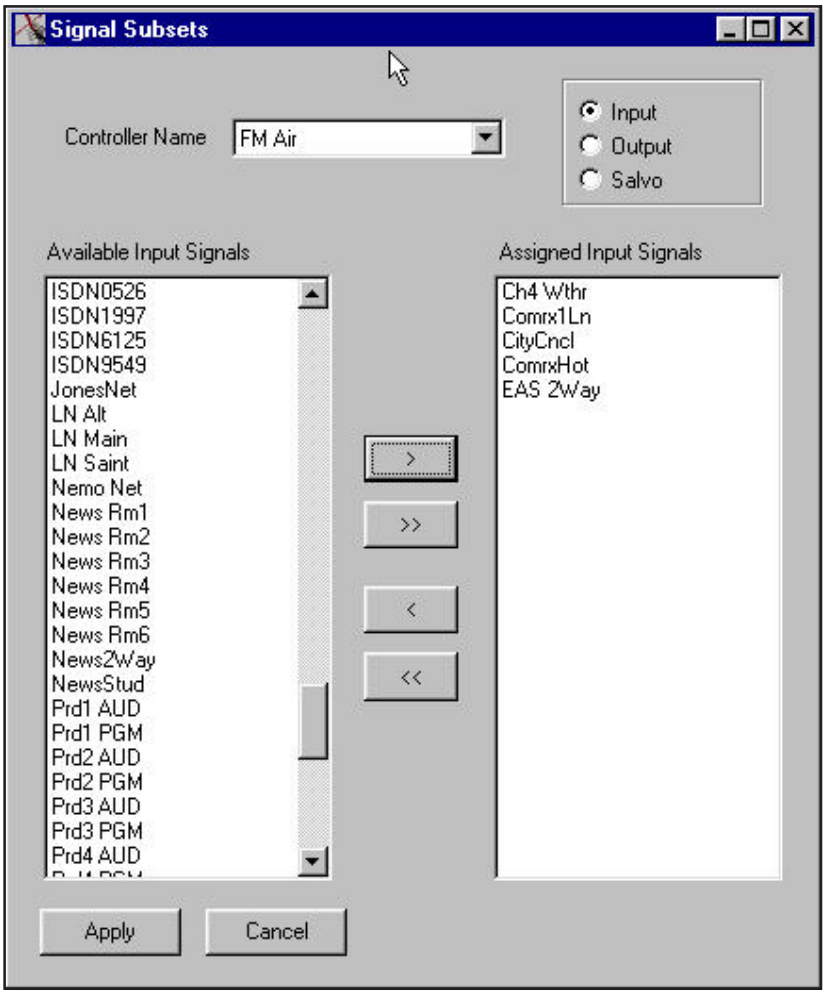
XY Rack or Console XY Controller Configuration



To configure a hardware based XY Controller, the operator must first log-in to the GUI as an Administrator. Next, select the *Configure / Controller Configuration* menu option, which will display the form at the right:

For each XY Controller in the system, provide a name, a unique RS-485 address between 1 and 64. *Note that the XY controller addresses were pre-configured in hardware at the factory and their unique address is momentarily displayed on power up. See the "Hardware" chapter for addressing details if necessary.*

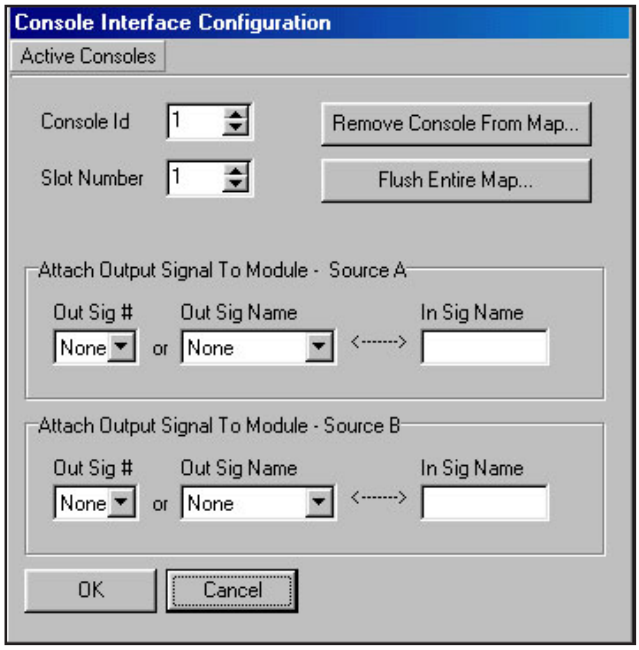
Also decide whether each controller will have access to the entire I/O signal space, *View All*, or just a subset, *View Subset*. If a subset is selected, the following form will be displayed:



The next step is to set the Input, Output and Salvo visibility options by choosing Input, Output, or Salvo. Next highlight the desired signal(s) or salvo(s) in the left column, then click on the single right arrow box (>) found between the columns. In order to make all signals or salvos visible click the double right arrow (>>) box found between the columns. The left arrow buttons are to remove signal(s) or salvo(s) from the visible list found in the right column.

Console Configuration

To map crosspoint output signals to console input channels the operator must first log in to the GUI as an Administrator. Then select the *Configure / Console* Interface menu option, which will display the following form:



Each module in a console is identified via the "Console Id" and "Slot Number" spin edit boxes. The user can select from any of the available router output signals and assign a signal to Source A and another signal to Source B of a console's input module. The input signal (if any) that is currently connected to the selected output signal is displayed in the "In Sig Name" text box. This is the name that will appear on the module's LED display once the map has been sent to the switch software. As the module's Source button is toggled between source A and source B, the LED names displayed on the module will toggle with it.

The *Active Consoles* menu item determines the range of console addresses the router will communicate with. Choices are First, Last and Default console ID's. The active console range should be set to the smallest number of consoles to avoid unnecessary system communication latency.

Special Functions - Console Locks

If a crosspoint output signal is mapped to a console module and that module is "ON AIR", that crosspoint output signal becomes console-locked, as indicated by a blue line through the signal on the GUI display. When a signal is console-locked its connection to a crosspoint input cannot be changed. To change this connection, take the module "OFF AIR" then choose a different source.

Whenever a signal is removed from the console map, any "ON-AIR" locks are automatically removed. This prevents a console-lock from being "stuck on" with no way to remove it.

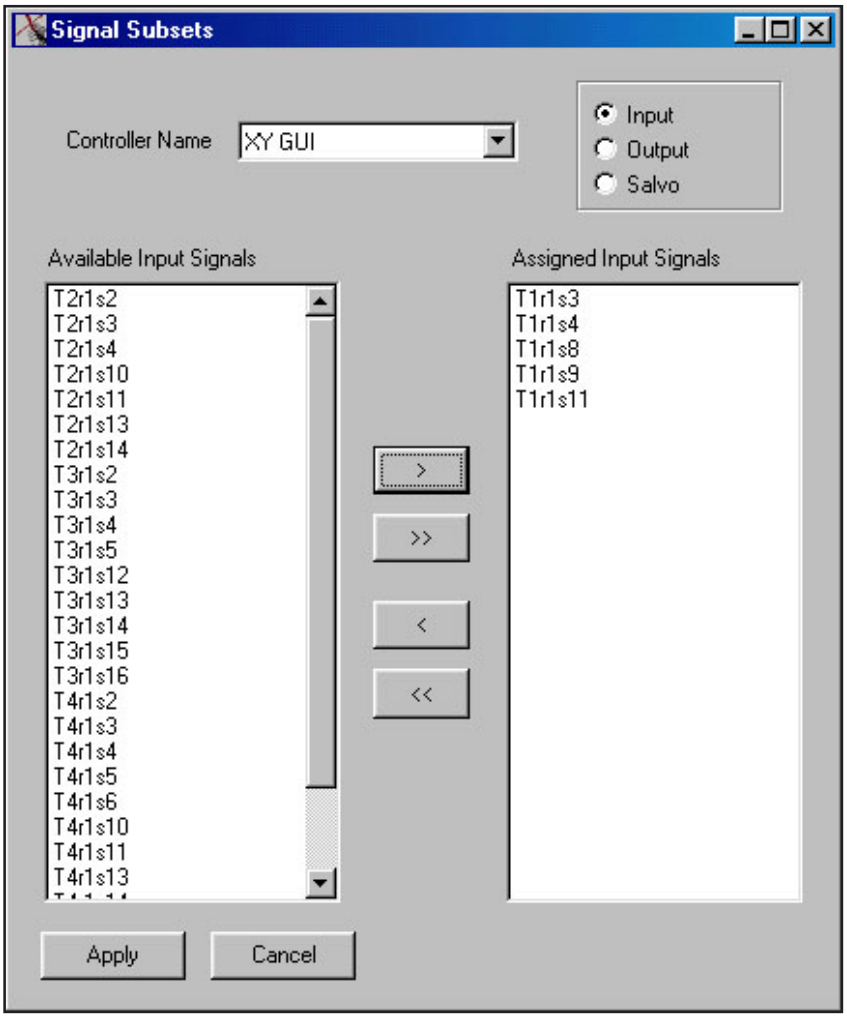
Console Presets

If a console has the ability to save a Preset, the switch software will save the current connection information for all output signals that are currently mapped to that console. The next time that console activates that preset the connections that existed at the time the preset was saved are restored. However, if a module is ON-AIR when the Preset is taken, that connection will not be made. This ensures that activating a preset will not disturb any ON-AIR signals.

If the user changes the crosspoint-output-signal-to-console mapping, the Presets for that console may be invalidated. The user should go through and re-save the presets on that console after changing the console map!

XY GUI Controller Configuration

In order to configure an XY GUI the operator must first log-in to the GUI as an administrator. Then select the *User / XY GUI* Setup menu option, which will display the following form:



The next step is to set the input, output, and salvo visibility options by choosing Input, Output, or Salvo. Next highlight the desired signal(s) or salvo(s) in the left column, then click on the single right arrow box (>) found between the columns. In order to make all signals or salvos visible click the double right arrow (>>) box found between the columns. The left arrow buttons are to remove signal(s) or salvo(s) from the visible list found in the right column. Clicking the *Apply* button will save the visibility options.

Main Menu Summary

The following is a summary of all the available menu choices when logged into XPoint as the Administrator.

File Menu

Open : Opens the *Load Configuration* form, load previously saved configuration elements for off-line viewing/editing or download to Host CPU.

Save : Opens the *Save Configuration* form, save any or all changes.

Send Cfg To Switch : Initiates download of currently loaded configuration to the Host CPU module. Use this to update the system hardware with config changes.

Exit : Exits the XPoint program.

User Menu

LogIn/LogOut : Opens the *XPoint Log-in* form if currently logged out.

Change Password : Allows the Administrator to change the XYC or Admin access level Log-in passwords.

XY GUI Setup : Used to configure source/destination signal visibility of *this* machine when logged in at the XYC access level.

Configure Menu

System : Configure TCP/IP network and Host port parameters.

Rack Defs : Define installed hardware parameters on a rack by rack basis. Allows user to "see", define and configure all installed cage hardware.

Controller Configuration : Used to define and configure hardware based XY controllers present in the system. Access XYC *Signal Visibility* editing here.

Console Interface : Used to define and configure optional Wheatstone console input channel display mapping.

View Menu

Mode-OffLine : Select OFF-LINE to edit configuration. Be sure to Save configuration prior to returning ON-LINE.

Mode-Online : Initiates network connection to Host CPU, Uploads Host configuration once connected. View real time status of all crosspoints.

Mode-Salvo Edit : Create, define and edit Salvos in this mode.

Zoom 1x-2x-3x : Zoom in and out of XPoint grid.

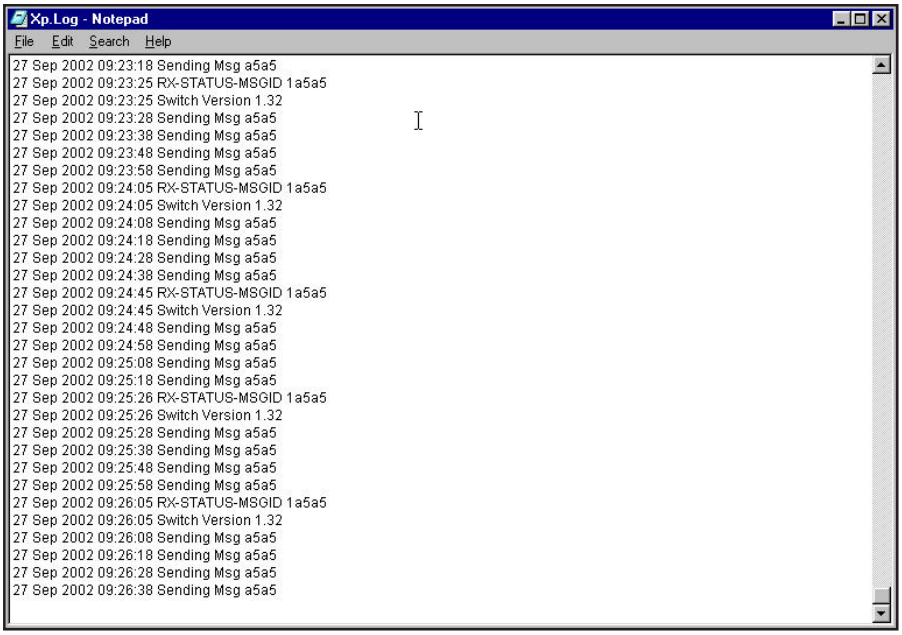
Help Menu

How To... : Opens help hints text file.

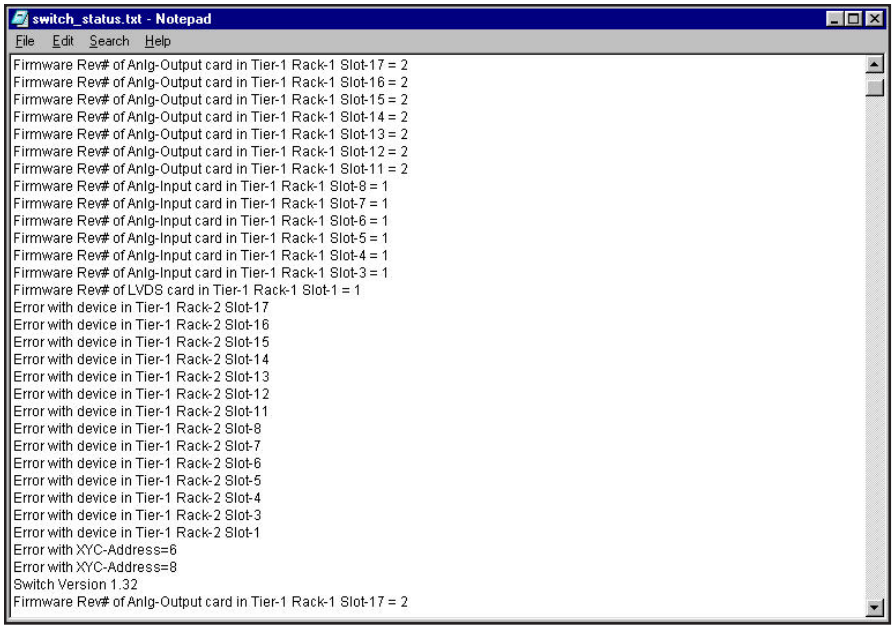
About : Shows XPoint software revision.

Diagnostics Menu

View App Log : Opens network communications activity log. Can save log to a file for technical support purposes.



View Switch Status : Lists all active installed hardware, card firmware revisions.



Reset Switch : Initiates a Host CPU reboot. Use this function with caution!

Glossary

The terminology used in this manual is defined as follows:

- ***Channel*** - A single, monaural audio stream. The 2001 can switch up to 512 discrete inputs to 512 discrete outputs (256 x 256 stereo) per tier.
- ***Signal*** - Information from a single audio source. A signal may take up one (mono), two (stereo), or six (5.1 surround sound) channels.
- ***TDM*** - Time Division Multiplex bus. The 2001 backplane consists of 32 16xTDM busses (hereafter referred to as "TDMs").
- ***TDM Slot*** - Each TDM bus has 16 multiplexed "slots" available, which can each carry one channel of audio data (i.e. single tier maximum of 512 mono TDM slots).
- ***Chassis or Rack*** - A single 2001 backplane.
- ***Local Rack*** - Rack ID 4 or less.
- ***Remote Rack*** - Rack IDs greater than 4.
- ***GUI*** *(pronounced "goo-eee")* - refers to the Windows XPoint program Graphical User Interface.
- ***XYC GUI*** - refers to the XPoint program running in XY controller mode.
- ***Master Rack*** - The first rack in a 2001 Switch, which must contain the controlling CPU for the switch.
- ***Slot*** - A position within a rack where a single card is located.
- ***Tier*** - A single 2001 switch, which may consist of multiple remote and local chassis that are controlled by a single CPU card in the master chassis.
- ***Multi-Tier*** - A grouping of 2001 switches connected in a "star" configuration. The CPU card in the Hub of the network computes how to connect signals between the individual tiers.
- ***Hub Tier*** - The central switch in a 2001 Multi-Tier environment - not to be confused with an Ethernet Hub.
- ***Satellite Tier*** - One of up to fourteen 2001 switches connected to the hub in Multi-Tier environment.
- ***Salvo*** - A logical grouping of connections that may be made by the operator via a single action (on the Configuration GUI, XYC GUI, or XY Controller).

The following terms apply to switch configuration:

- ***Switch ID*** - A unique identifier assigned to each 2001 switch. Used in multi-tier configurations (described below).
- ***Rack ID*** - The physical chassis ID number. The master chassis is always identified as Rack ID 1. Local chassis connected via Stacking must have IDs less than 5. The CPU card drives Rack ID onto the backplane. Stacking Cards have a dipswitch that identifies the card as Rack ID 1, 2, 3, or 4. A card with ID 2, 3, or 4 will drive that Rack ID onto the backplane. Audio Network cards also have a dipswitch that will drive the Rack ID when the card is configured for a remote rack. The Rack ID's for remote racks must be in the range of 5 - 16. Note that Rack ID's are zero based so that a dipswitch setting equal to ØØ is Rack ID 1, dipswitch setting of Ø1 equals Rack ID 2, etc.
- ***Slot ID*** - The physical slot number in each chassis (numbered from 1-22). Backplane wiring defines a card's slot ID. A CPU card must be in Rack ID 1, Slot ID 22.
- ***TDM ID*** - This indicates the TDM bus to be used. There are up to 32 TDMs in each chassis, labeled from 1-32.
- ***TDM Slot ID*** - Within each TDM there are up to 16 discrete channels which each take up one "slot" within the TDM bus. An Input card has 16 available channels that are mapped 1:1 to the available slots.
- ***Channel ID*** - Channel IDs within a chassis run from 0-511. Input Channel IDs are assigned consecutively across TDMs (i.e. TDM 0 has Channel IDs 1-16 on it, TDM 1 has Channel IDs 17-32, etc.). Output Channel IDs are assigned directly to the output devices.
- ***Signal Type*** - Each input and output in the 2001 is associated with a type of signal. These include mono, stereo, or surround sound. The importance of this information at configuration time is the number of channels each signal consumes. Mono signals use 1 channel; stereo use 2; and surround sound uses 6.

Appendices

Appendix 1

Contents

Configuring the 2001 Switch Network Parameters

Caution! Your system has been preconfigured at the factory for a default IP address of192.168.1.160. Incorrect use of this utility program can cause system malfunction. Check the IP address label inside the master rack before making changes. Please consult Wheatstone support if you are having trouble connecting your system to a network.

In order to communicate to the 2001 Switch, appropriate network parameters must be loaded. Since the GUI cannot communicate with the switch until these parameters are set, a special method for configuring the switch is necessary.

There are several constraints on the switch configuration that were made to simplify the installation, while still providing the flexibility to connect the switch to existing customer networks. Here are the list of constraints:

1. The switch and any attached GUIs must exist on the same subnet. The switch has no ability to route across subnets.

2. If dynamic address allocation is used on the network (e.g. DHCP), the switch must be given a "permanent" address allocation. In order to allow the switch to run on simple networks or at sites with little system admin support, dynamic address allocation schemes (such as DHCP or BOOTP) were not used to provide an IP address to the switch.

The following steps are required to provide the necessary configuration info to the switch (this only has to be done one time):

1. From any DOS or Windows PC on the same subnet that the switch will be on (in other words, with no routers between the PC and switch), run the **Network_Config.exe program.**

2. The first prompt is: ***Default Values**

Enter Number of Tiers [1].....: 1

Enter the total number of tiers in the system (1 for a single tier system).

3. **Enter Tier #1 address [192.168.0.160].....: 192.168.1.160**

Enter the IP address reserved for the specified switch on your network. This address must be unique within the network. Tier #1 is the hub of a multi-tier system.

4. **Enter Tier #1 TCP Port [50012].....: 50012**

This is the TCP port number to use for the command connection. It can be changed in the rare circumstance that it conflicts with another port in use on the GUI PC. The default can almost always be used.

5. Steps 3 and 4 are repeated for the number of tiers specified in step 2.

6. **Enter Network Mask [0xFFFFFF00].....: <u>FFFFFF00</u>**
0xFFFFFF00 = hexadecimal FFFFFF00 = 255.255.255.0 dotted decimal

Note: Do *<u>NOT</u>* enter the 0x base identifier.
Enter the network mask for your subnet. See your system administrator if you're unsure of the proper value. The default will work for most simple, localized networks.

7. **Enter GUI IP address [192.168.0.212].....: <u>192.168.1.212</u>**
Enter the IP address of the GUI used to communicate to the switch. This address must be on the same subnet as the switch. Once configured, it is not necessary to change this value if you run the GUI on a different machine.

8. **Enter XYC GUI UDP Port [55555].....: <u>55555</u>**
This is the UDP port number used to broadcast configuration and receive connections from XYC GUIs. It can be changed in the rare circumstance that it conflicts with another port in use on the GUI PC. The default can almost always be used.

9. The program then repeats the following prompt for each tier configured in step 2:

About to configure Tier #1...
1. Make sure this is the only tier currently connected to the local network!
2. Press <RETURN> when ready to proceed...

The configuration parameters for the specified tier are now UDP broadcast, and should be received by the switch (make sure only the appropriate tier is connected to the network turn off the power or disconnect the Ethernet cable on any other switches). If a debug terminal is attached to the switch, a confirmation message is printed. The process is repeated for each defined tier.

10. Reboot the CPUs for all the reconfigured switches, and the new network parameters should be in effect.

Note: If any spare CPU's are provided, the **Network_Config.exe** program must be run while the spare is active in order for it to receive the appropriate network parameters.

Appendix 2

Contents

Failover CPU Configuration and Operation

Overview

The Bridge 2001 may optionally incorporate a Failover CPU backup system. This system is designed to ease the transition back online in the event of a master CPU failure. Note that depending on the failure mode of the CPU the transition may or may not be fully automatic and may require intervention by the system engineer. Further, a PC running the configuration GUI in Administrator mode must be running at all times to ensure that the latest crosspoint connections are passed to the backup CPU.

Software Requirements

Both CPU -2001 cards installed in the master chassis must have the same switch software and FPGA revisions installed on them.

Hardware Requirements

Two CPU-2001 modules must be installed in the master chassis of the system. Special versions of the CPU-2001 cards which have the on-board backplane termination resistors removed must be installed for failover CPU operation. In addition a terminator card must be installed in Slot 21 at the right end of the master chassis. The primary CPU card will be installed in Slot 22, the backup CPU will be installed in slot 20.

Ethernet Connections

Both the primary and backup CPU cards must be connected via ethernet to the same network and subnet. The CAT-5 cables used will be the “straight” version wired as described in the CPU-2001 chapter of this manual.

Serial Ports

In some configurations, the RS-485 serial ports on both the primary and backup CPU’s may be parallel, however special attention must be given to termination to ensure that the RS-485 bus is not overloaded. Optionally, the user may elect to simply move the cables or A/B switch the RS-485 ports in use in the event of a primary CPU failure.

AES Sync

If you are synchronizing the Bridge 2001 to an external AES reference clock, be sure to make connections to both CPU’s AES SYNC inputs. Note that to ensure impedance matching , do not parallel the AES inputs or outputs, provide dedicated AES drivers/receivers.

Automatic Operation

In the unlikely event of a primary CPU failure the backup CPU is notified via backplane logic and immediately requests the latest configuration from the GUI. The GUI in turn will download the latest configuration including the real-time status of all crosspoint connections. System control is transferred to the Backup CPU upon completion of the configuration dump. Switch requests from hardware or software controllers which happen to occur during the transition time will be ignored and lost. Master clock backplane signals are automatically switched to the originate from the backup CPU oscillator (or optional AES sync) thereby providing continuous operation of audio.

Hot Swapping

CPU-2001 circuit boards configured for failover operation may be hot swapped.

Appendix 3

Contents

For the most part there are no user-replaceable parts in the 2001 Switch. A complete list of available components is shown on the next page. Contact Wheatstone technical support for further information.

Wheatstone Corporation (600 Industrial Drive, New Bern, North Carolina, USA 28562) may be reached by phone at 252-638-7000, fax 252-637-1285, electronic mail “email@wheatstone.com”.

REPLACEMENT PARTS — 2001 SWITCH

COMPONENT	DESCRIPTION	*WS P/N*
AES-2024/8	DIGITAL 8 INPUT CARD	***"008312"***
AES-2024/16	DIGITAL 16 INPUT CARD	***"008313"***
DO-2001	DIGITAL OUTPUT CARD	***"008304"***
ADI-2001	ANALOG INPUT CARD	***"008306"***
AO-2001	ANALOG OUTPUT CARD	***"008308"***
MIC-2001	ANALOG MIC INPUT/OUTPUT CARD	***"008316"***
HC-2001	HOST CONTROLLER CARD (CPU)	***"008302"***
OAN-2001	AUDIO NETWORK CARD	***"008307"***
CEX-2001	CAGE EXPANSION CARD (STACKING CARD)	***"008305"***
DSP-2001	DIGITAL SIGNAL PROCESSOR CARD FOR D-5.1 SYSTEM	***"008310"***
DSP-2001ND	DIGITAL SIGNAL PROCESSOR CARD FOR D-9, G-5, AND G-9 SYSTEMS	***"008315"***
LIO-2001	LOGIC INPUT/OUTPUT CARD	***"008311"***
QAT-2001	QUAD AUDIO NETWORK CARD	***"008314"***
2DB-2001	COMPLETE REAR MODULE WITH TWO DB-25 CONNECTORS	***"008340"***
DB-2001	COMPLETE REAR MODULE WITH ONE DB-25 CONNECTOR	***"008346"***
8BNC-2001	COMPLETE REAR MODULE WITH EIGHT BNC CONNECTORS	***"008345"***
8RJ-2001	COMPLETE REAR MODULE WITH EIGHT RJ-24 CONNECTORS	***"008344"***
ONI-2001	COMPLETE REAR MODULE FOR SERIAL INTERFACE CONNECTIONS	***"008343"***
PWIH-2001	COMPLETE REAR MODULE FOR SERIAL INTERFACE & POWER SUPPLY CONNECTIONS	***"008341"***
PWI-2001	COMPLETE REAR MODULE FOR POWER SUPPLY CONNECTIONS	***"008347"***
PWI-40	COMPLETE REAR MODULE FOR POWER SUPPLY CONNECTIONS	***"008383"***
CEI-2001	COMPLETE REAR MODULE FOR STACKING CARDS CONNECTIONS	***"008342"***
QCT-2001	COMPLETE REAR MODULE FOR SERIAL INTERFACE & CAT5 CONNECTIONS	***"008349"***
QOT-2001	COMPLETE REAR MODULE FOR SERIAL INTERFACE & OPTICAL FIBER CONNECTIONS	***"008387"***
SPS-180	POWER SUPPLY	***"007231"***
SPS-400	POWER SUPPLY	***"007233"***
SPS-40	POWER SUPPLY	***"007295"***
CABLE	POWER SUPPLY CABLE	***"007281"***
XPOINT SOFTWARE	XPOINT SOFTWARE CD	***"071796"***
MANUAL	OWNER'S MANUAL	***"008397"***
TECHNICAL DOCUMENTATION	TECHNICAL DRAWINGS BOOK	***"008399"***