Wheatstone Evolution Series
Digital Audio Network System

Technical Manual

Wheatstone Corporation
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Wheatstone Evolution Series Digital Audio Network System - 2nd Edition

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Wheatstone E-Series Digital Audio Network System Technical Manual

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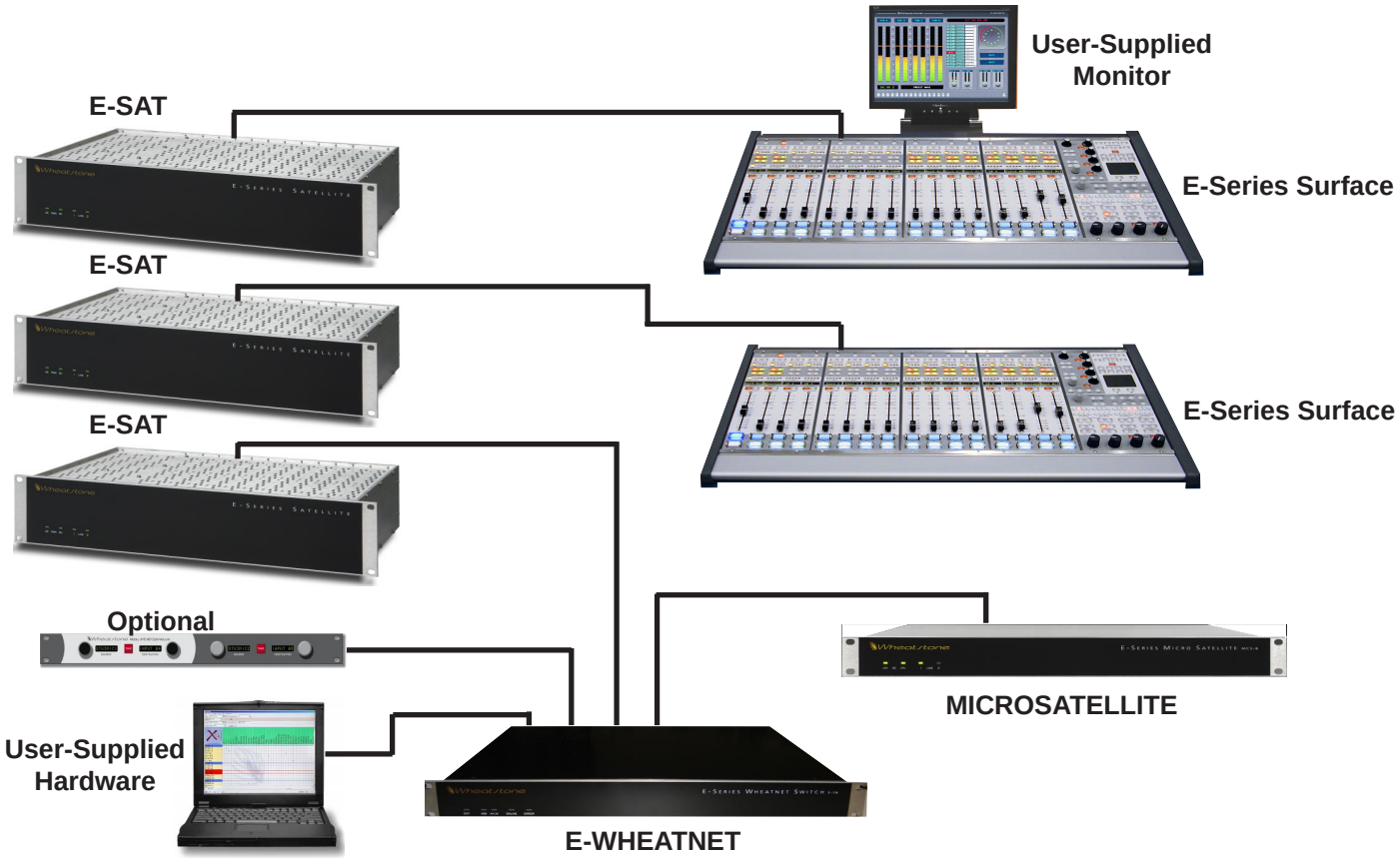
General Information

Chapter Contents

All devices in the system must be set to the same sample rate!



General Information

Introduction

The Wheatstone Evolution Series (E-Series) Digital Audio Network System is comprised of several components interconnected via CAT links to achieve a very cost effective networked audio system. Each studio operates independently, yet can share all sources and mixes through the S-16 (S-8) E-Series Wheatnet Switch—without traffic limitations, or machine control delays.

Start your system with a simple AES router with analog and/or digital inputs and outputs. From there you can add logic I/O cards and scheduling software to interface to your automation system. You can create a custom system that includes up to sixteen E-Series Satellite (E-SAT) cages and to up to twelve digital E-series control surfaces linked to the S-16 (S-8) E-Series Wheatnet Switch. Cages can be separated by distances up to 100m (328’) 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. We also provide a full complement of Ethernet protocol remote router control panels, as well as a complete family of plug-in modules that interface the routing system to existing Wheatstone digital and analog stand-alone consoles.

E-SAT - E-Series Satellite Digital Network Router

The E-SAT is a rackmount unit occupying two 19” wide rack spaces (total height 3 1/2”) with 16” depth.

The E-SAT accepts up to 16 discrete stereo analog or AES-3/SPDIF digital audio sources, and 16 stereo analog or digital outputs. Integral, high quality Sample Rate Converters (SRCs) on the digital inputs resolve sample rates up to 96kHz. The E-SAT may be fitted with up to 4 input cards, 4 output cards, and 2 logic cards. Hardware is described in the next chapter.

Stereo I/O may be split into independent mono signals.

Use crossover wire CAT5 or better for all AT and DSP links.

All audio input, output, and logic connections are made via DB-25 PCB-mounted connectors located on the rear of chassis. The factory supplied hand crimping tool is used for all DB-25 connections to and from the router (see instruction on page 1-24). There are also RJ-45 connectors for audio network and ethernet connections. Cage-to-cage network connections are made by UTP CAT5 crossover cables terminated with RJ-45 connectors.

Assuming the E-SAT is correctly rackmounted, you may now energize it by connecting the factory supplied power cord to the rackmount unit and then plugging it into the AC mains.

Front panel LED indicators AC LINE and DC PWR should light up to indicate the presence of their respective voltages.

The LINK1 and LINK2 LEDs indicate a good connection to the E-WHEATNET and optional MCS-8 (MCS-8 with Engine) MICROSAT or IOC.

Note: To de-energize the E-SAT, unplug its AC cord from the AC mains.

E-Series Micro Satellite Digital Network Router

MCS-8

The MCS-8 is a rackmount unit occupying one 19” wide rack space (total height 1 3/4”) with 16” depth.

The MCS-8 accepts up to 8 discrete stereo analog or AES-3/SPDIF digital audio sources, and 8 stereo analog or digital outputs. Integral, high quality SRCs on the digital inputs resolve sample rates up to 96kHz. The MCS-8 may be fitted with up to 2 input cards, and 2 output cards. It uses the same input/output card family as the E-SAT and is pre-configured at the factory. Hardware is described in the next chapter.

All audio input and output connections are made via DB-25 PCB-mounted connectors located on the rear of chassis. The factory supplied hand crimping tool is used for all DB-25 connections to and from the router (see instruction on page 1-24).

There are also two RJ-45 connectors for audio network (“AT LINK” RJ-45—see pages 1-8 and 1-10 for pinouts) and GPIO logic (LOGIC RJ-45) connections. See the following section (page 1-5a) for logic details.

Cage-to-cage network connections can be made by UTP CAT5 crossover cables terminated with RJ-45 connectors (see page 1-9 for pinouts).

Assuming the MCS-8 is correctly rackmounted, you may now energize it by connecting the factory supplied power cord to the rackmount unit and then plugging it into the AC mains.

Front panel LED indicators AC PWR and DC PWR should light up to indicate the presence of their respective voltages.

The LINK1 LED indicates a good connection to the S-16 E-WHEATNET. Use of the LINK2 LED is reserved.

Note: To de-energize the MCS-8, unplug its AC cord from the AC mains.

MCS-8E

The MCS-8E is a rackmount unit occupying one 19” wide rack space (total height 1 3/4”) with 16” depth.

The MCS-8E accepts up to 8 discrete stereo analog or AES-3/SPDIF digital audio sources, and 4 stereo analog or digital outputs. Integral, high quality SRCs on the digital inputs resolve sample rates up to 96kHz. The MCS-8E may be fitted with up to 2 input cards, and one output card. It uses the same input/output card family as the E-SAT and is pre-configured at the factory. Hardware is described in the next chapter.

This unit also has a mix engine DSP that combines 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. The DSP receives instructions from control surfaces in real time over a Mixer Transport using the “MIXER LINK” RJ-45 connector on the rear panel (see pages 2-28 and 2-29 for pinouts).

All audio input and output connections are made via DB-25 PCB-mounted connectors located on the rear of chassis. The factory supplied hand crimping tool is used for all DB-25 connections to and from the router (see instruction on page 1-24).

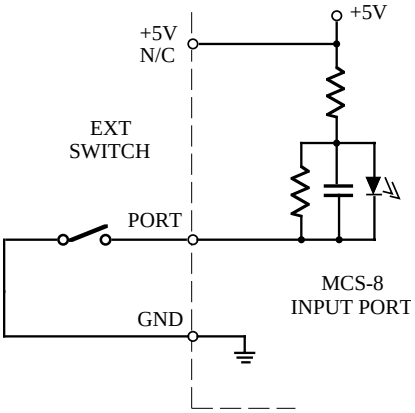
There are also two RJ-45 connectors for audio network (AT LINK RJ-45—see pages 1-8 and 1-10 for pinouts) and GPIO logic connections. See the following section (page 1-5a) for logic details.

Logic Connections

Input Ports

If a logic port is configured as an input (see settings for SW7 and SW8), the logic common setting for that port (SW4 and SW5) must be Common Plus. A simple closure between the logic port pin and GROUND (pin 1) is then all that is required to activate the input port.

SIMPLE INPUT EXAMPLE



Output Ports

If a logic port is configured as an output (see settings for SW7 and SW8), then the logic common setting for that port (SW4 and SW5) can be Common Plus or Common Ground, depending on the application. The logic port is configured as a FET output, with one side of the FET connected to the logic port pin and other side of the FET connected to GROUND (Common Ground, for an active low output) or 5V through an internal pullup resistor (Common Plus, for an active high output). Activating the logic output port simply creates a closure between the logic port pin and GROUND (Common Ground) or +5V (Common Plus).

"LOGIC" Connector

Pin 1 – GROUND
Pin 2 – LOGIC PORT 1
Pin 3 – LOGIC PORT 2
Pin 4 – LOGIC PORT 3
Pin 5 – LOGIC PORT 4
Pin 6 – LOGIC PORT 5
Pin 7 – LOGIC PORT 6
Pin 8 – +5V

Internal Programming Options

All internal programming options are made via PCB mounted switches.

Switch Settings

SW1 - AT Reset

Momentarily pressing the switch resets the AT board LAN chip, while pressing and holding the switch also resets the FPGA.

The recessed SW1 is accessible from the rear and is located next to the “AT LINK” / “LOGIC” RJ-45 connectors.

SW2 - DSP Reset

Momentarily pressing the switch resets the DSP board LAN chip, while pressing and holding the switch also resets the FPGA.

If loaded the recessed SW2 is accessible from the rear and is located next to the “MIXER LINK” RJ-45 connector.

Dipswitch SW4, SW5 - Logic Common Plus / Common Ground

Dipswitch SW7, SW8 - Logic IN /OUT

The SW4 and SW5 switches are used in setting up logic in conjunction with SW7 and SW8.

For Input Logic the corresponding switches should be set for Logic In and Common Plus.

For Output Logic Active Low the corresponding switches should be set for Logic Out and Common GND.

For Output Logic Active High (+5V) the corresponding switches should be set for Logic Out and Common Plus.

For corresponding switches follow the 1 - 6 markings on the board.

Common Plus/Common Ground can be configured for each port individually.

Dipswitch SW6

Pos. 1 - Sample Rate Select - 48kHz when ON, 44.1kHz when OFF.

Pos. 2 - Remote Rack -

ON - this is a remote rack, therefore it is connected to another rack and is designated as Rack 5 of the Tier in which the connected rack is located.

OFF - this is not a remote rack and will be configured as Rack 1.

Pos. 3 - Disables Remote Rack -

ON - a remote rack is not connected.

OFF - a remote rack is connected.

Pos. 4 - This switch is used in configuration and should be in the ON position.

SW9 and SW11 - Not Used

S-16 E-WHEATNET - E-Series Audio Routing Switch

S-16 E-WHEATNET is the high speed central network switch that connects up to sixteen studios from the technical operations center. S-16 E-WHEATNET is capable of simultaneously switching 64 bi-directional audio channels to 16 ports — that's 2048 traffic channels.

This unit occupies one 19" wide rack unit (height 1 3/4"), and is 13" deep.

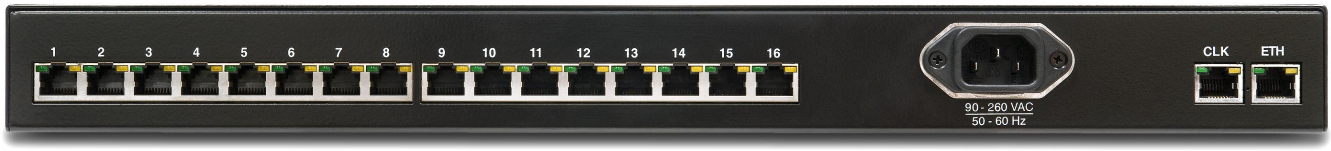
Front panel LED indicators display system status, sample rate, and external clock functions. No external PC is required for continuous operation.

The sixteen rear mounted RJ-45 audio network ports easily integrate multiple studio systems. Installation is simple: run one UTP CAT5 crossover cable to the E-WHEATNET from each of your studios or locally mounted I/O centers.

Another wiring option is to run a UTP CAT5 straight connection from the rack room to a small RJ-45 patch point block in each studio. The final connection to each E-SAT rack or control surface can then be made using an off the shelf crossover patch cable.

CAT5 Wiring Tip

Power up Sequence — When first powering the system it is best to apply power to the S-16 E-WHEATNET first, then E-SAT racks, and finally the surface. You may cycle power on surfaces or E-SAT as required after the S-16 E-WHEATNET is up and running.



I/O Connections

All audio network, master clock, and Ethernet connections are made via RJ-45 connectors mounted on the rear panel. The pinout drawings on page 1-10 summarize all wiring connections.

Audio Network

AT cards installed in E-SAT racks are connected to S-16 E-WHEATNET via CAT5 ***crossover*** cables. For typical CAT5 cable pinouts, see page 1-9.

"1"-"16" Connector

Pin 1 – TX +
Pin 2 – TX -
Pin 3 – RX +
Pin 6 – RX -

AES Clock Sync

The S-16 E-WHEATNET Network system's sample rate is normally derived from its own internal crystal oscillator. The AES Clock sync connector provides a means for synchronizing the Network system to an external AES-11 master clock signal in the rare case that plant wide synchronization is required. The fact that all digital inputs are fitted with high quality sample rate converters obviates the need for external sync in most cases.

"CLK" Connector

To sync your S-16 E-WHEATNET to an external AES Black clock source use the AES Sync IN port available on the "CLK" RJ-45 connector:

Pin 1 – AES SYNC OUT HI
Pin 2 – AES SYNC OUT LO
Pin 3 – AES SYNC IN HI
Pin 6 – AES SYNC IN LO

AES Clock is a standard AES-3 output without audio.

Valid sample rates are 44.1kHz and 48kHz. EXT sync must match the internal crystal setting. When sync is detected the front panel EXT LED will light. Use only a high grade Digital Audio Reference Signal (DARS) per the AES-11 specification.

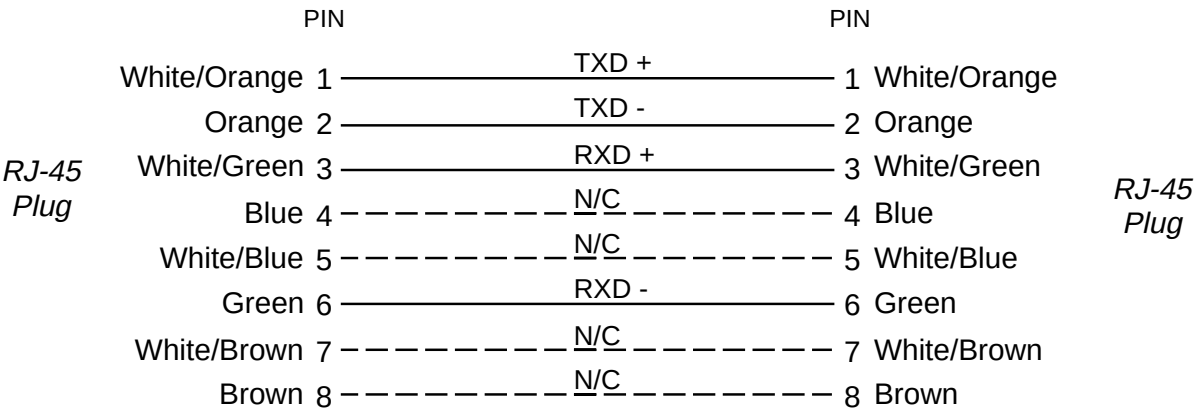
Ethernet Interface

Connect the S-16 E-WHEATNET to your Ethernet LAN with a straight (pin to pin) CAT5 cable. The LAN connection is for communicating with computers running Wheatstone software such as XPoint, PC-XYC, and Event Computer. If you are connecting directly between the computer and the S-16 E-WHEATNET with no network in between, use a crossover cable. Typical straight and crossover CAT5 cable pinouts are shown below.

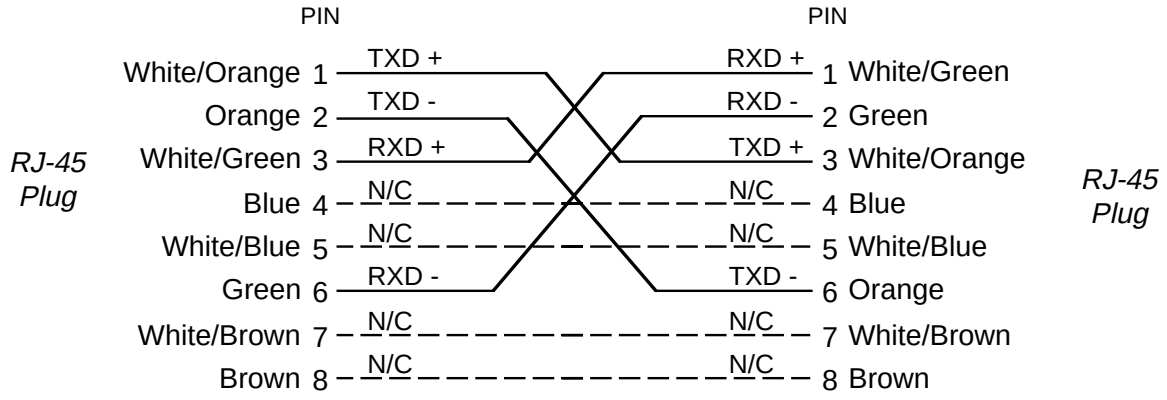
"ETH" Connector

Pin 1 – TXD +
Pin 2 – TXD -
Pin 3 – RXD +
Pin 6 – RXD -

Typical Ethernet Cable



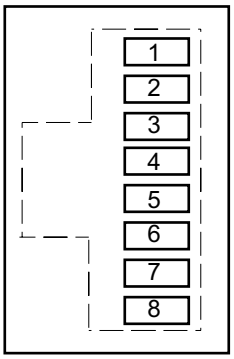
Typical Crossover Cable



RJ-45 Connections

Audio Network

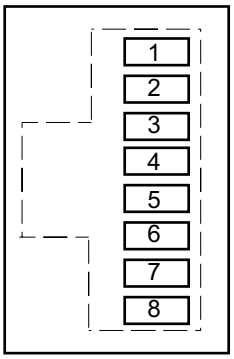
"1"-"16" RJ-45



TX +
TX -
RX +
RX -

AES Clock SYNC

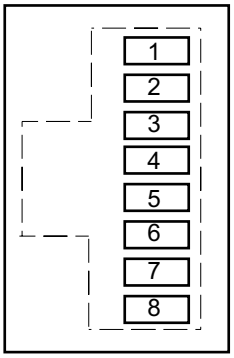
"CLK" RJ-45



AES SYNC OUT HI
AES SYNC OUT LO
AES SYNC IN HI
AES SYNC IN LO

Ethernet - RJ-45

"ETH" RJ-45



TXD +
TXD -
RXD +
RXD -

Front Panel LEDs

On the left-lower part of the front panel there are five LEDs, that function as follows.

EXT

The “EXT” LED lights up when an external AES reference clock source is connected to the S-16 E-WHEATNET.

48K or 44.1K Sample Rate

Indicates the internally selected system sample rate, “48K” or “44.1K”.

Note that all S-16 E-WHEATNET devices must operate at the same sample rate. Please consult the factory before changing sample rate.

All devices in the system must be set to the same sample rate!

On Line

The “ON LINE” LED lights when the S-16 E-WHEATNET CPU has booted and is ready for use.

Error

In the unlikely event of an S-16 E-WHEATNET CPU failure the “ERROR” LED will light up.

Internal Programming Options

All internal programming options are made via PCB mounted dipswitches and jumpers.

Switch Settings

SW1 - CPU Reset

This momentary pushbutton switch allows the CPU to be reset without powering down the system. Holding the button for two seconds will also cause the FPGA program to be reloaded, first breaking all audio crosspoints. Upon re-boot completion, the CPU will remake all system crosspoints.

The recessed SW1 is accessible from the rear and is located next to the ETHERNET port.

All devices in the system must be set to the same sample rate!

DIPSW2

Pos.1 (labeled DIPSWØ on the circuit board) - 48/44.1 Sample Rate - Off = 44.1K, On = 48K

Pos.2 - reserved - never ON

Pos.3 - reserved - never ON

Pos.4 - PRI/SEC select - OFF = Primary, ON = Redundant (not used)

Jumper Settings

J1 - CPU I/O PGRM

Momentary shorting will reload the CPU FPGA program.

J2 - PBRST

Factory Use Only

S-8 E-WHEATNET - E-Series Audio Routing Switch

S-8 E-WHEATNET is the high speed central network switch that connects up to eight studios from the technical operations center. E-WHEATNET is capable of simultaneously switching 64 bi-directional audio channels to 8 ports —that's 1024 traffic channels.

This unit occupies one 19" wide rack unit (height 1 3/4"), and is 13" deep.

Front panel LED indicators display system status, sample rate, and external clock functions. No external PC is required for continuous operation.

The eight rear mounted RJ-45 audio network ports easily integrate multiple studio systems. Installation is simple: run one UTP CAT5 cross-over cable to the S-8 E-WHEATNET from each of your studios or locally mounted I/O centers.

Another wiring option is to run a UTP CAT5 straight connection from the rack room to a small RJ-45 patch point block in each studio. The final connection to each E-SAT rack or control surface can then be made using an off the shelf crossover patch cable.

CAT5 Wiring Tip

Power up Sequence — When first powering the system it is best to apply power to the S-8 E-WHEATNET first, then E-SAT racks, and finally the surface. You may cycle power on surfaces or E-SAT as required after the S-8 E-WHEATNET is up and running.

I/O Connections

All audio network, master clock, and Ethernet connections are made via RJ-45 connectors mounted on the rear panel. The pinout drawings on page 1-16 summarize all wiring connections.

Audio Network

AT cards installed in E-SAT racks are connected to S-8 E-WHEATNET via CAT5 ***crossover*** cables. For typical CAT5 cable pinouts, see page 1-9.

"1"-"8" Connector

Pin 1 – TX +
Pin 2 – TX -
Pin 3 – RX +
Pin 6 – RX -

AES Clock Sync

The S-8 E-WHEATNET Network system's sample rate is normally derived from its own internal crystal oscillator. The AES Clock sync connector provides a means for synchronizing the Network system to an external AES-11 master clock signal in the rare case that plant wide synchronization is required. The fact that all digital inputs are fitted with high quality sample rate converters obviates the need for external sync in most cases.

"CLK" Connector

To sync your S-8 E-WHEATNET to an external AES Black clock source use the AES Sync IN port available on the "CLK" RJ-45 connector:

Pin 1 – AES SYNC OUT HI
Pin 2 – AES SYNC OUT LO
Pin 3 – AES SYNC IN HI
Pin 6 – AES SYNC IN LO

AES Clock is a standard AES-3 output without audio.

Valid sample rates are 44.1kHz and 48kHz. EXT sync must match the internal crystal setting. When sync is detected the front panel EXT LED will light. Use only a high grade Digital Audio Reference Signal (DARS) per the AES-11 specification.

Ethernet Interface

Connect S-8 E-WHEATNET to your Ethernet LAN with a straight (pin to pin) CAT5 cable. The LAN connection is for communicating with computers running Wheatstone software such as XPoint, PC-XYC, and Event Computer. If you are connecting directly between the computer and the S-8 E-WHEATNET with no network in between, use a crossover cable. Typical straight and crossover CAT5 cable pinouts are shown on page 1-9.

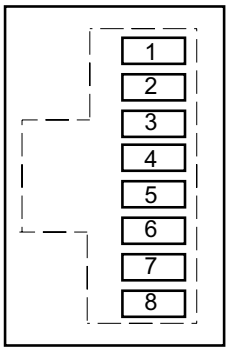
"ETH" Connector

Pin 1 – TXD +
Pin 2 – TXD -
Pin 3 – RXD +
Pin 6 – RXD -

RJ-45 Connections

Audio Network

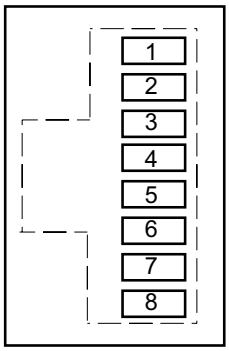
"1"-"8" RJ-45



TX +
TX -
RX +
RX -

AES Clock SYNC

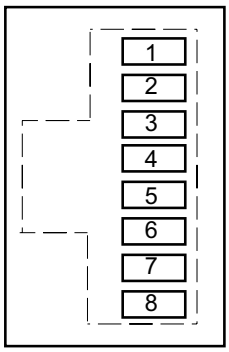
"CLK" RJ-45



AES SYNC OUT HI
AES SYNC OUT LO
AES SYNC IN HI
AES SYNC IN LO

Ethernet - RJ-45

"ETH" RJ-45



TXD +
TXD -
RXD +
RXD -

Front Panel LEDs

On the right-lower part of the front panel there are five LEDs, that function as follows.

EXT

The “EXT” LED lights up when an external AES reference clock source is connected to the S-8 E-WHEATNET.

48K or 44.1K Sample Rate

Indicates the internally selected system sample rate, “48K” or “44.1K”.

Note that all S-8 E-WHEATNET devices must operate at the same sample rate. Please consult the factory before changing sample rate.

All devices in the system must be set to the same sample rate!

On Line

The “ON LINE” LED lights when the S-8 E-WHEATNET CPU has booted and is ready for use.

Error

In the unlikely event of a S-8 E-WHEATNET CPU failure the “ERROR” LED will light up.

Internal Programming Options

All internal programming options are made via PCB mounted dipswitches and jumpers.

Switch Settings

SW1 - CPU Reset

This momentary pushbutton switch allows the CPU to be reset without powering down the system. Holding the button for two seconds will also cause the FPGA program to be reloaded, first breaking all audio crosspoints. Upon re-boot completion, the CPU will remake all system crosspoints.

The recessed SW1 is accessible from the rear and is located next to the ETHERNET port.

All devices in the system must be set to the same sample rate!

DIPSW3

Pos.1 (labeled DIPSWØ on the circuit board) - 48/44.1 Sample Rate - Off = 44.1K, On = 48K

Pos.2 - reserved - never ON

Pos.3 - reserved - never ON

Pos.4 - PRI/SEC select - OFF = Primary, ON = Redundant (not used)

Jumper Settings

J1 - CPU I/O PGRM

Momentary shorting will reload the CPU FPGA program.

J2 - PBRST

Factory Use Only

E-Series Control Surfaces

Designed to integrate flawlessly with the E-series Satellite digital audio network router, the E-series control surfaces allow you to easily create large- or small- platform-based systems that are exceptionally user-friendly and flexible. They will handle your most demanding requirements, and be able to change with your varying needs as they arise. You can select any combination of input signals in the entire E-Series system and create a multitude of mixes from them. Onboard routing control allows all these mixes to be directed to any destination in your facility. Powerful built-in equalization and gain reduction circuits let you tame and sweeten any signal you come across. An RJ-45 Audio Transport “MIXER” connector on the rear of the control surface serves as the link between the surface and the network system. Operation of the control surfaces is covered in the specified separate Technical Manual.

Ethernet-Based Controllers

A family of Ethernet-based controllers provides an integrated way of switching Digital Audio Router sources to destinations connected to the console. Rackmount and modular versions of the Ethernet based controllers are available. Mount the Ethernet based controller modules into existing Audioarts's stand-alone analog or digital mixing consoles. Choose from eight or sixteen button source selectors, dual source select panels, or single and dual X-Y panels.

A/D SERIES MODULE
Hot Button x 16
HBX16-8

A/D SERIES MODULE
Hot Button x 8
HBX8-8

A/D SERIES MODULE
Dual Hot Button x 8
HBX8-8D

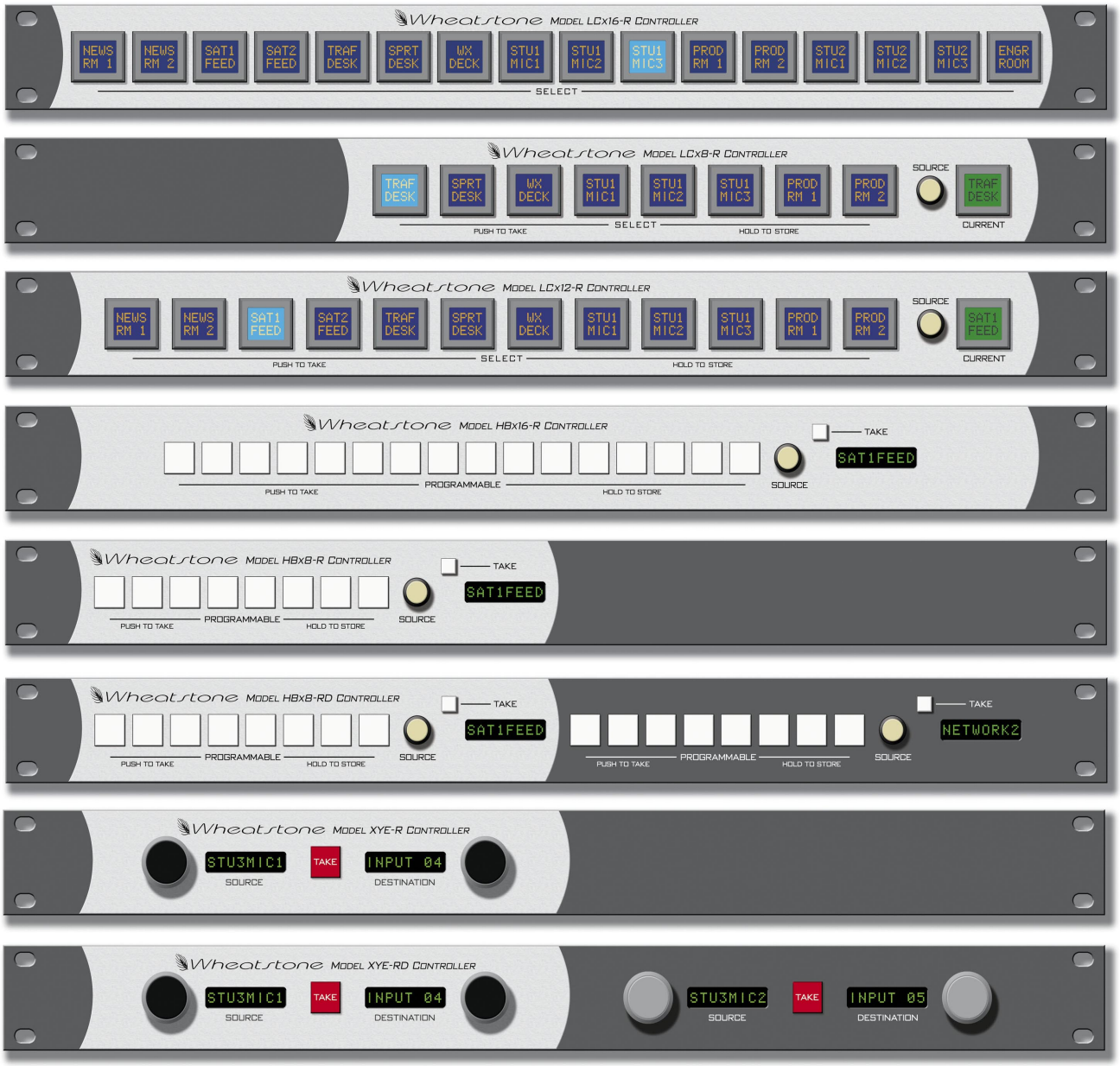
A/D SERIES MODULE
LCD Switch x 12
LCX12-8

A/D SERIES MODULE
LCD Switch x 8
LCX8-8

A/D SERIES MODULE
XY Controller
XYE-8

A/D SERIES MODULE
Dual XY Controller
XYE-8D

AUDIOARTS MODULE
Hot Button x 8
HBX8-55/90



All X-Y crosspoint controllers have similar functions. First, select a DESTINATION (console fader, recorder, etc.) by turning the DESTINATION knob. By turning the SOURCE knob, the available inputs are displayed in the 8-character display window and the TAKE button lights. When the desired input source is scrolled into the display window, pressing the TAKE button will execute the take command on the downstroke. The TAKE button light goes off and the desired input source is selected. Note that if the TAKE button is not pressed in a timeout period of 6-8 seconds, the display will revert to its previous setting.

Some controllers have PROGRAMMABLE buttons to program input sources. To program the desired input source for a selected button, press the button and hold it for a few seconds. The display window will displayed <STORED>, and the desired input source will be stored for this button.

When the SOURCE knob is scrolled to a programmed input source, the associated button lights to indicate the correspondence between the source and button.

The Ethernet-Based Controllers connect to your LAN via standard UTP CAT5 “straight” cables terminated with RJ-45 connectors.

Audio Connections

All audio connections to the E-SAT and MICROSAT are made through multipin DB-25 connectors located on the rear of the chassis.

The factory supplied hand crimping tool is used for all DB-25 style wiring connections (see instruction on the page 1-24).

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 and consistent termination process. Typical AES/EBU digital audio cable has a very low characteristic capacitance per ft (pF/ft), and a nominal impedance of 110 ohm. 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 will accept wire gauge 22 - 28AWG.

Unbalanced Analog Connections

ANALOG INPUTS — Wire to the switcher 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 the balanced end only.

Note: Unbalanced analog sources typically have -10dBv (316mV RMS) signal levels and will not match the E-SAT and MICROSAT 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 E-SAT and MICROSAT. Many third party "match boxes" are commercially available for this.

ANALOG OUTPUTS — Use an electronically 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 the unbalanced 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. We highly recommend using a "balun" or

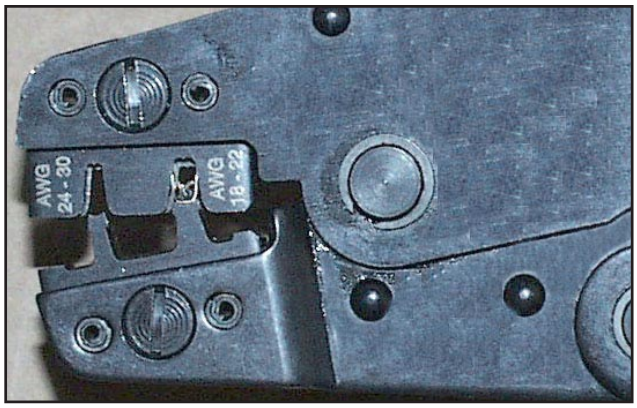
format converter when interfacing “consumer” grade source devices to the E-SAT.

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 E-SAT or MICROSAT end only. Keep cable lengths to a minimum.

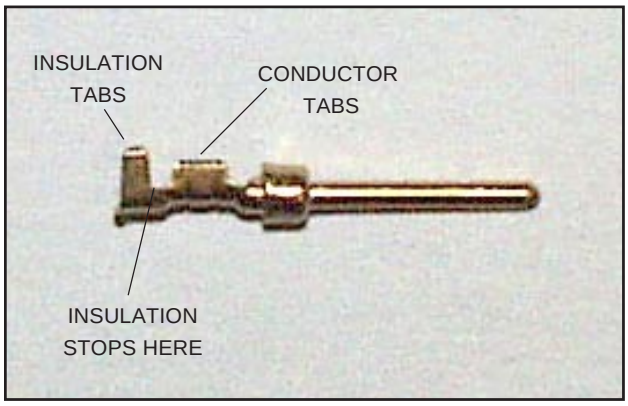
SPDIF OUTPUTS - The E-SAT and MICROSAT digital outputs are fixed, professional, AES-3 formatted outputs. SPDIF consumer format is not supported. Use of an external format converter may be required to connect the digital outputs to consumer gear.

HAND CRIMP TOOL WIRING INSTRUCTIONS

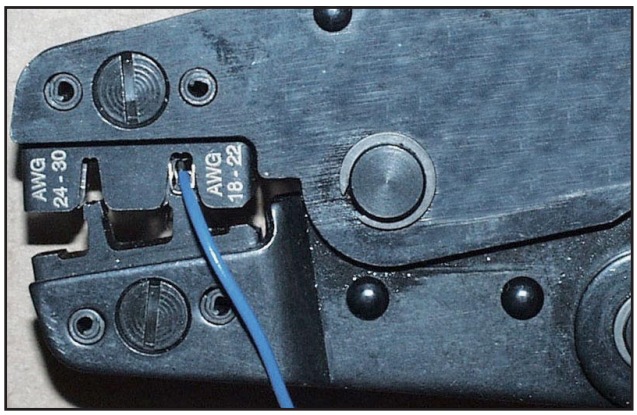
The supplied hand crimping tool (W/S#850067) is used for all I/O wiring connections to and from the console. It is to be used with the supplied pin (figure 1) intended for 22"-28" gauge wire.



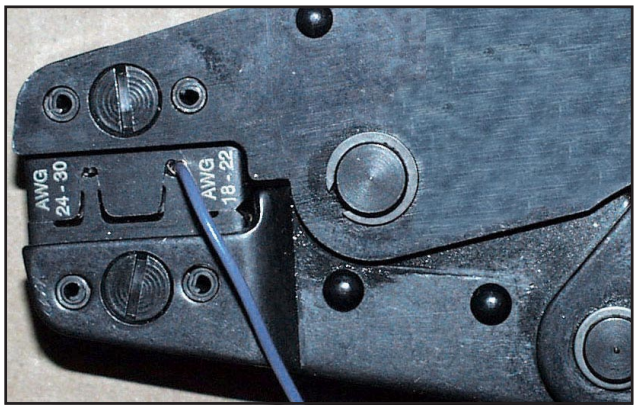
(2) The terminal conductor tabs (pointing UP) are placed in anvil 18-22; the terminal's insulation tabs extend in front towards the camera.



(1) Pin crimp terminal



(3) The stripped wire is placed into the terminal and crimped. Note the wire's insulation must stop just short of the conductor tabs (detail)



(4) Final step: jaws fully closed; the insulation tabs have been crimped.

1) Strip wire approximately 3/16" (insert in proper wire stripper, rotate one half turn, and pull insulation off wire).

2) Leaving wire aside for the moment, with crimping tool fully open (engraved side toward you) bring a terminal into position from the unmarked side of the tool. Place the conductor tabs (inner set as shown in figure 1) on the "18-22" or "24-30" (depending on the wire) anvil (slightly curved surface) so that the circular portion of the tabs rests in the curved surface of the anvil and the two tabs face up into the walls of the female jaw. The insulation tabs will be flush with the top of the tool (figure 2).

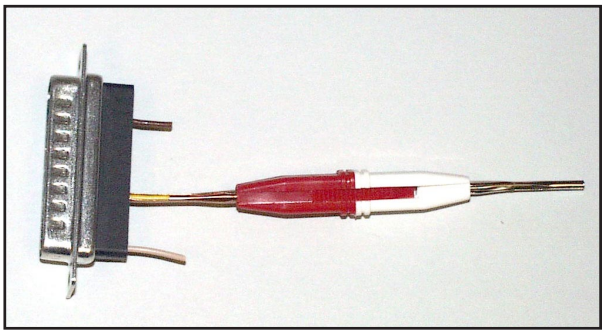
3) Close tool very slightly, only to the point of holding the terminal in position (figure 2).

4) Insert wire into terminal until wire insulation is stopped by conductor tabs (figure 3). CRIMP by squeezing handles until jaws are fully closed (figure 4).

5) If there is an insertion error or if a circuit change is needed, you'll need to use an extractor tool to remove terminals (see next page).

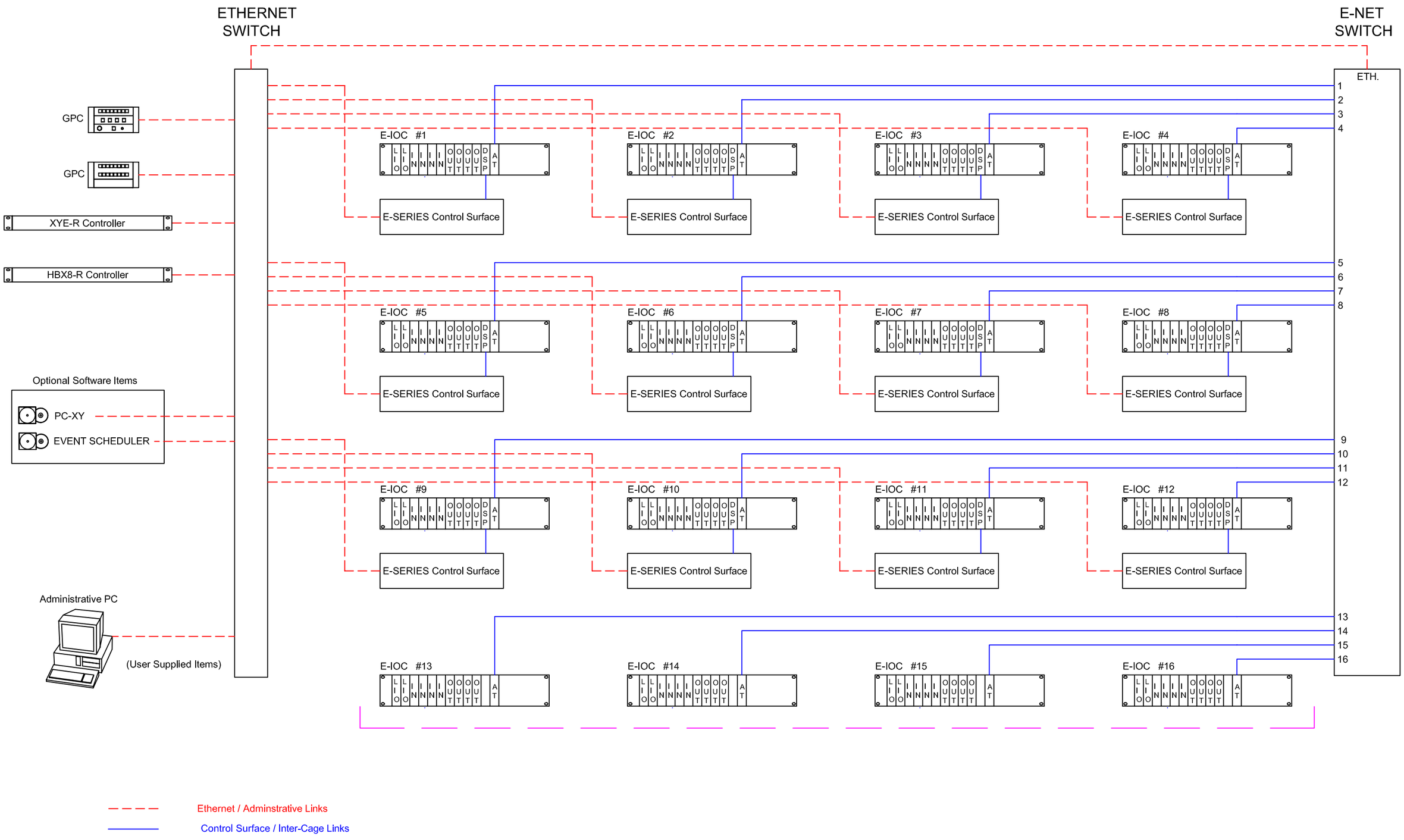
Note that metallized plastic hoods for each connector are also supplied with the router.

PIN EXTRACTOR INSTRUCTIONS



(5) Place extractor tip over pin terminal to be removed.

If you accidentally insert a crimp terminal pin into the wrong socket, you'll need to use the supplied pin extractor tool (W/S#850069) to remove terminal pin, and correct your mistake without having to sacrifice a connector. Place extractor tip (red side) over terminal pin to be removed (figure 5), and press it downwards motion until tip rests upon Housing. Then pull out the terminal pin from Housing. It should never be necessary to discard a connector due to a wiring error.



E-Series Digital Audio Network System Flow Diagram

Hardware

Chapter Contents

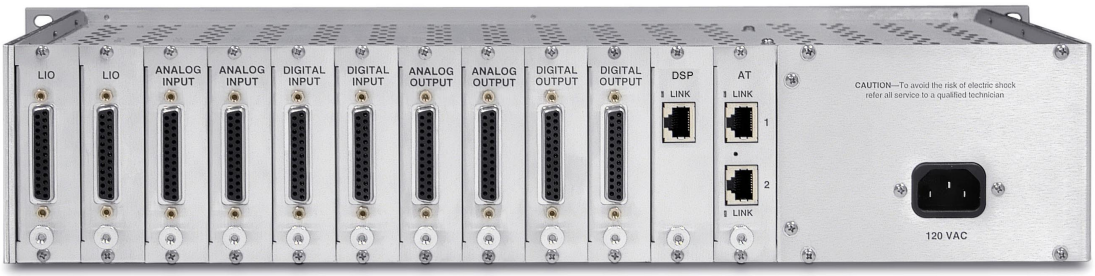
Dual Audio Network Card (AT-NC2)

Digital Signal Processor Card (DSP-NC)

Hardware

Overview

E-Satellite



The E-SAT may be configured in a variety of I/O card complements using various combinations of analog and digital audio input and output daughter cards. All audio input, output, and logic connections are made via multipin DB-25 connectors located on the cage rear and mounted on the daughter cards. The daughter cards plug into the E-SAT's backplane connectors.

MCS-8 Microsatellite

The MCS-8 unit may be fitted with up to 2 input card, and 2 output cards. It uses the same input/output card family as the E-SAT and is pre-configured at the factory.

Configuration Guidelines

While the E-SAT router is pre-configured at Wheatstone's factory, future expansion of a system may require some re-configuration of existing hardware to accommodate new resources.

Slots are numbered from 1 to 12, left to right, as viewed from the rear of the cage. Each slot is configured to support one type of card. Slots 1 and 2 may only contain universal GPI/GPO logic cards. Slots 3 through 6 may only contain audio input cards (analog or digital) and slots 7 through 10 may only contain audio output cards (analog or digital). Slot 11 may only contain a Digital Signal Processor Card, and slot 12 may only contain a Dual Audio Network Card.

There are 12 ports on each logic card. Each logic card port may be configured as an input or output via an internal dipswitch selection. Analog and digital input and output cards each handle four stereo inputs/ outputs. The E-SAT can support up to four input cards and four output cards, and digital and analog can be freely mixed. However, the card complement can not exceed 16 inputs or 16 outputs.

Audio I/O Expansion

The E-SAT supports a maximum of 16 stereo input channels and 16 stereo output channels.

• Power down by removing AC cord.

• Removing the rear panel with input/output card or blank rear panel - Remove the 2 - #4-40 x 3/16" Phillips head screws and pull the panel out carefully using the thumb nut.

• Installing an audio card - Care must be taken when plugging in the expansion card's 36 pin ribbon connector. Be sure to match the connector sockets to the motherboard header pins. Failure to do so will damage the expansion card, ribbon cable, and/or motherboard.

Digital Input Card (DI-NC4)

Overview

The DI-NC4 digital audio input cards for the E-SAT and MICROSAT accept up to 4 AES-3 formatted stereo sources (i.e. 8 mono *channels*). An *Audio Configuration* form in the supplied XPoint software allows the user to set attributes for the input channels including signal name, location, and Stereo/Mono. These signal attributes are pre-configured at the factory for stereo operation.

Note: While it is possible to split the 4 stereo AES inputs into 8 mono channels, there are still only 4 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. Source sample rates up to 96 kHz are supported.

AES Input Interface

The balanced digital audio inputs on the DI-NC4 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-to-peak input voltage of 5V with an input impedance of 110 Ohm 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 110 Ohm with a signal level of at least 1V p-p.

Hook-Ups

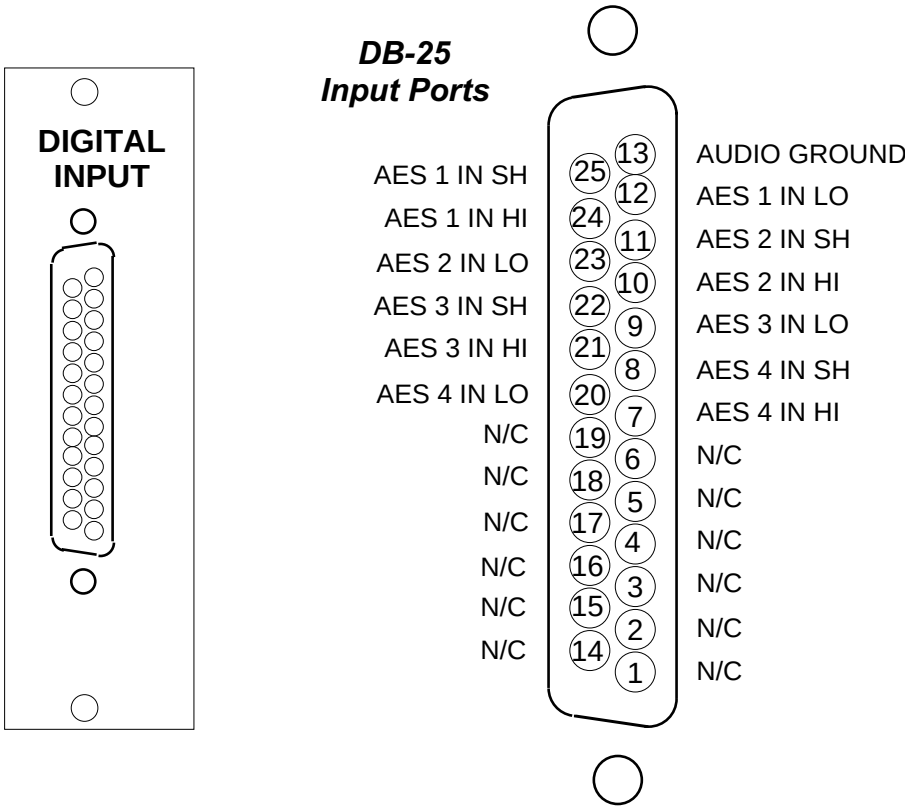
All user wiring to the DI-NC4 card takes place at the female DB-25 I/O connector on the cage rear.

DB-25—Digital Audio Connections

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

Pin 24 – HI Pin 12 – LO Pin 25 – SH	AES 1 In
Pin 10 – 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

DI-NC4 Panel
Digital Input Connections



Analog Input Card (AI-NC4)

Overview

The Analog input card accepts up to 4 stereo analog audio sources (i.e. 8 mono *channels*). An *Audio Configuration* form in the supplied XPoint software allows the user to set attributes for the input channel hardware, including signal name, location, and Stereo/Mono. The 8 input *channels* may be configured as mono *signals* (one channel) or stereo *signals* (two channels) in any combination.

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 20kOhm. 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 AI-NC4 card.

Hook-Ups

All user wiring to the AI-NC4 card takes place at the female DB-25 connector on the cage rear.

DB-25—Analog Audio Connections

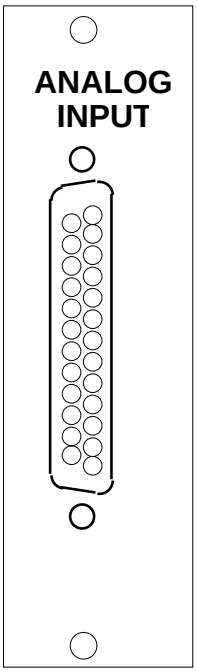
These include four (1-4) input sources. Pinout drawing on page 2-11 shows all wiring connections at a glance.

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

Mono Inputs

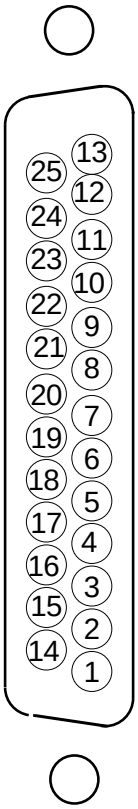
Mono analog sources can be wired in two ways. If you maintain the default stereo configuration, strap the mono source across both the left and right sides of the stereo input. But if you reconfigure the stereo input for two channel mono operation (please see the “Audio Configuration” section in the “XPoint Software Setup Guide”) you can then wire one mono source to the “left” input and a second mono source to the “right” input.

AI-NC4 Panel
Analog Input Connections



DB-25
Input Ports

CHANNEL 1 (STEREO 1 LT) IN SH	25
CHANNEL 1 (STEREO 1 LT) IN HI	24
CHANNEL 2 (STEREO 1 RT) IN LO	23
CHANNEL 3 (STEREO 2 LT) IN SH	22
CHANNEL 3 (STEREO 2 LT) IN HI	21
CHANNEL 4 (STEREO 2 RT) IN LO	20
CHANNEL 5 (STEREO 3 LT) IN SH	19
CHANNEL 5 (STEREO 3 LT) IN HI	18
CHANNEL 6 (STEREO 3 RT) IN LO	17
CHANNEL 7 (STEREO 4 LT) IN SH	16
CHANNEL 7 (STEREO 4 LT) IN HI	15
CHANNEL 8 (STEREO 4 RT) IN LO	14



13	AUDIO GROUND
12	CHANNEL 1 (STEREO 1 LT) IN LO
11	CHANNEL 2 (STEREO 1 RT) IN SH
10	CHANNEL 2 (STEREO 1 RT) IN HI
9	CHANNEL 3 (STEREO 2 LT) IN LO
8	CHANNEL 4 (STEREO 2 RT) IN SH
7	CHANNEL 4 (STEREO 2 RT) IN HI
6	CHANNEL 5 (STEREO 3 LT) IN LO
5	CHANNEL 6 (STEREO 3 RT) IN SH
4	CHANNEL 6 (STEREO 3 RT) IN HI
3	CHANNEL 7 (STEREO 4 LT) IN LO
2	CHANNEL 8 (STEREO 4 RT) IN SH
1	CHANNEL 8 (STEREO 4 RT) IN HI

Digital Output Card (DO-NC4)

Overview

Each Digital Output card provides 4 physical AES-3 formatted outputs. An *Audio Configuration* form in the supplied XPoint software allows the user to set attributes for the output channels, including signal name, location, and Stereo/Mono. The 4 AES outputs are configured in software at the factory to be stereo *destinations*.

Each output card listens for connection commands from the E-WHEATNET CPU, 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 4 stereo AES outputs into 8 mono channels, there are still only 4 physical wires, each containing the 2-channel AES formatted data.

AES Output Interface

The balanced digital audio outputs on the DO-NC4 card are transformer coupled and exhibit a nominal output impedance of 110 Ohm. This interface operates at a nominal output voltage of 5V p-p and conforms to the AES-3 1992 electrical specification. The DO-NC4 output cards operate at unity gain and transmit 24bit audio data word lengths at the system sample rate, which can be set to 44.1 kHz or 48 kHz. Optionally, the E-WHEATNET *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 E-WHEATNET 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

Internal Programming Options

There are no internal programming options on the DO-NC4 card.

Hook-Ups

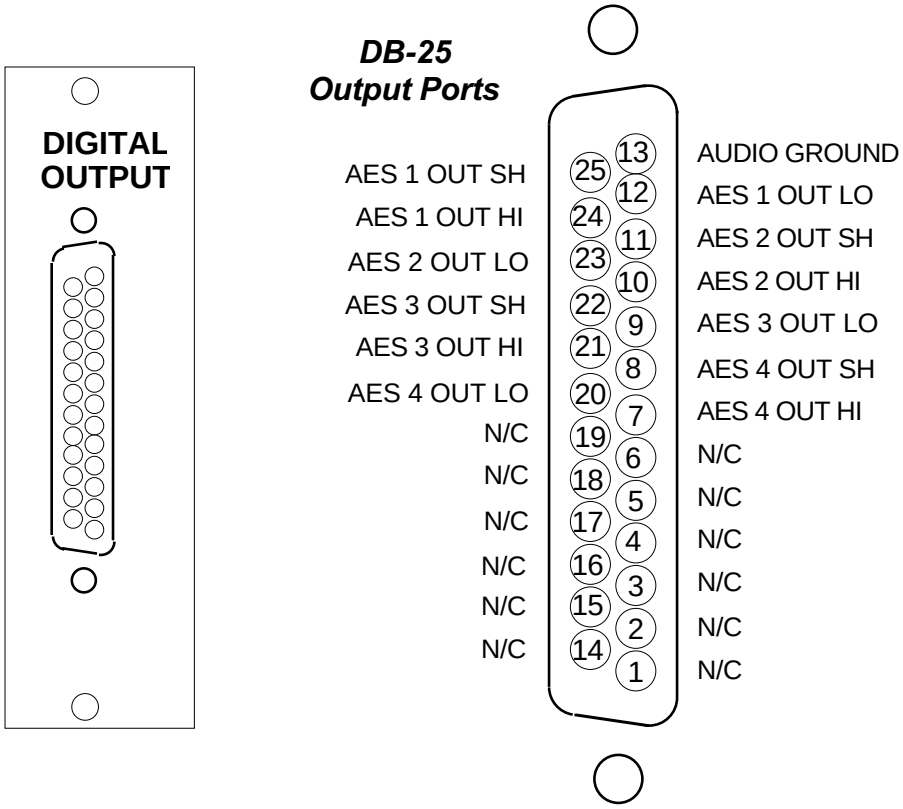
All user wiring from the DO-NC4 card takes place at the female DB-25 connector on the cage rear.

Digital Audio Connections

These include four outputs. Pinout drawing on page 2-13 shows all wiring connections at a glance.

Pin 24 – HI Pin 12 – LO Pin 25 – SH	AES 1 Out
Pin 10 – 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

DO-NC4 Panel
Digital Output Connections



Analog Output Card (AO-NC4)

Overview

Each Analog Output card provides 8 physical monaural *output channels*. These output channels are configured in software to be 4 stereo pairs. An *Audio Configuration* form in the supplied XPoint software allows the user to set attributes for the output channels, including signal name, location, and Stereo/Mono.

Each output card listens for connection commands from the CPU 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. The D-A converter outputs are buffered by integrated differential output drivers.

Analog Output Interface

Each balanced unity gain output will drive loads of 600 Ohm or above 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 50 Ohm and a nominal output signal level of +4dBu for an analog input signal of +4dBu (-20dBFs digital) .

Internal Programming Options

There are no internal programming options on the AO-NC4 card.

Hook-Ups

All user wiring from the AO-NC4 card takes place at the female DB-25 connector on the cage rear.

Analog Audio Connections

These include four outputs. Pinout drawing on page 2-17 shows all wiring connections at a glance.

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

Mono Outputs

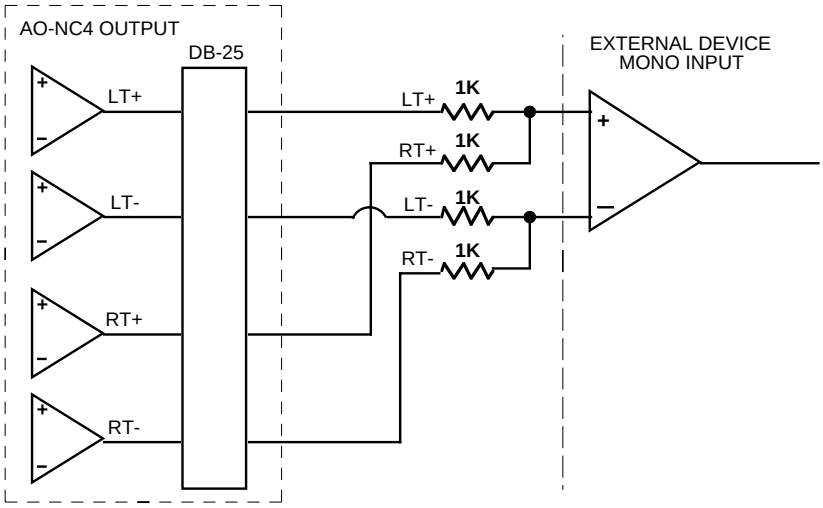
There are two ways to adapt the E-SAT and MICROSAT for mono operation. Externally sum a stereo output using 1kOhm resistors, or reconfigure the output in software for mono operation. Please see the “XPoint Audio Configuration” for details on configuring mono outputs.

Caution! If you route a stereo input to a software configured mono output, only one output channel will be present.

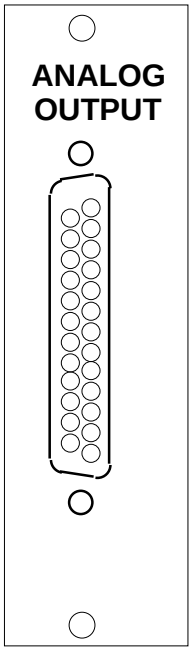
External Mono Summing

To sum an E-SAT or MICROSAT stereo analog output add a 1kOhm resistor in series with each leg of the balanced output. Add resistors as close as possible to the mono input.

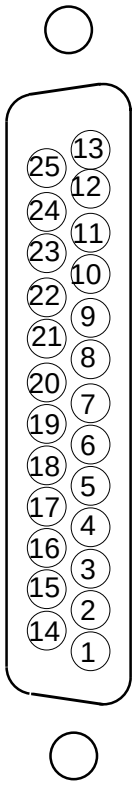
Example:



AO-NC4 Panel
Analog Output Connections



DB-25
Output Ports



CHANNEL 1 (STEREO 1 LT) OUT SH	AUDIO GROUND
CHANNEL 1 (STEREO 1 LT) OUT HI	CHANNEL 1 (STEREO 1 LT) OUT LO
CHANNEL 2 (STEREO 1 RT) OUT LO	CHANNEL 2 (STEREO 1 RT) OUT SH
CHANNEL 3 (STEREO 2 LT) OUT SH	CHANNEL 2 (STEREO 1 RT) OUT HI
CHANNEL 3 (STEREO 2 LT) OUT HI	CHANNEL 3 (STEREO 2 LT) OUT LO
CHANNEL 4 (STEREO 2 RT) OUT LO	CHANNEL 4 (STEREO 2 RT) OUT SH
CHANNEL 5 (STEREO 3 LT) OUT SH	CHANNEL 4 (STEREO 2 RT) OUT HI
CHANNEL 5 (STEREO 3 LT) OUT HI	CHANNEL 5 (STEREO 3 LT) OUT LO
CHANNEL 6 (STEREO 3 RT) OUT LO	CHANNEL 6 (STEREO 3 RT) OUT SH
CHANNEL 7 (STEREO 4 LT) OUT SH	CHANNEL 6 (STEREO 3 RT) OUT HI
CHANNEL 7 (STEREO 4 LT) OUT HI	CHANNEL 7 (STEREO 4 LT) OUT LO
CHANNEL 8 (STEREO 4 RT) OUT LO	CHANNEL 8 (STEREO 4 RT) OUT SH
	CHANNEL 8 (STEREO 4 RT) OUT HI

Logic Input/Output Card (LIO-NC4)

Overview

The LIO-NC4 is a programmable hardware interface with a feature set designed for broadcast studio control applications. Each Logic card provides twelve ports that may be programmed as inputs ***or*** outputs using SW1 -SW3 dipswitches. The twelve independent, opto-isolated solid state relay inputs/ outputs may be programmed through the XPoint *Logic Configuration* form to function as routable logic or triggered ports.

Default Setting
Card 1 is configured as inputs. Card 2 is configured as outputs.

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.

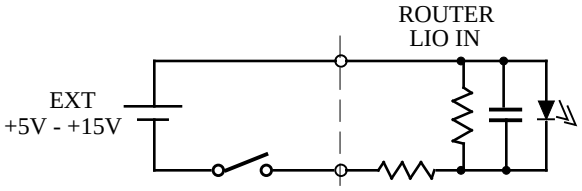
Triggered ports allow the user to program a logic *input* to fire a predefined Salvo or to make a temporary audio connection. Salvos make or break multiple audio and/or logic crosspoints, while temporary audio connections are useful for IFB or EAS applications. Note that triggered ports serve one, predefined function and are not routable.

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

Input Ports

Each of the twelve LH1522AB solid state relay input ports are configured as a floating photodiode, with the + input going to the opto's anode, and the - input to 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

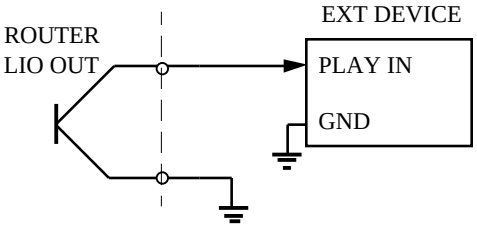
Each of the twelve LH1522AB solid state relay outputs may be configured in software to function as normally open or normally closed circuits when cross connected to an input.

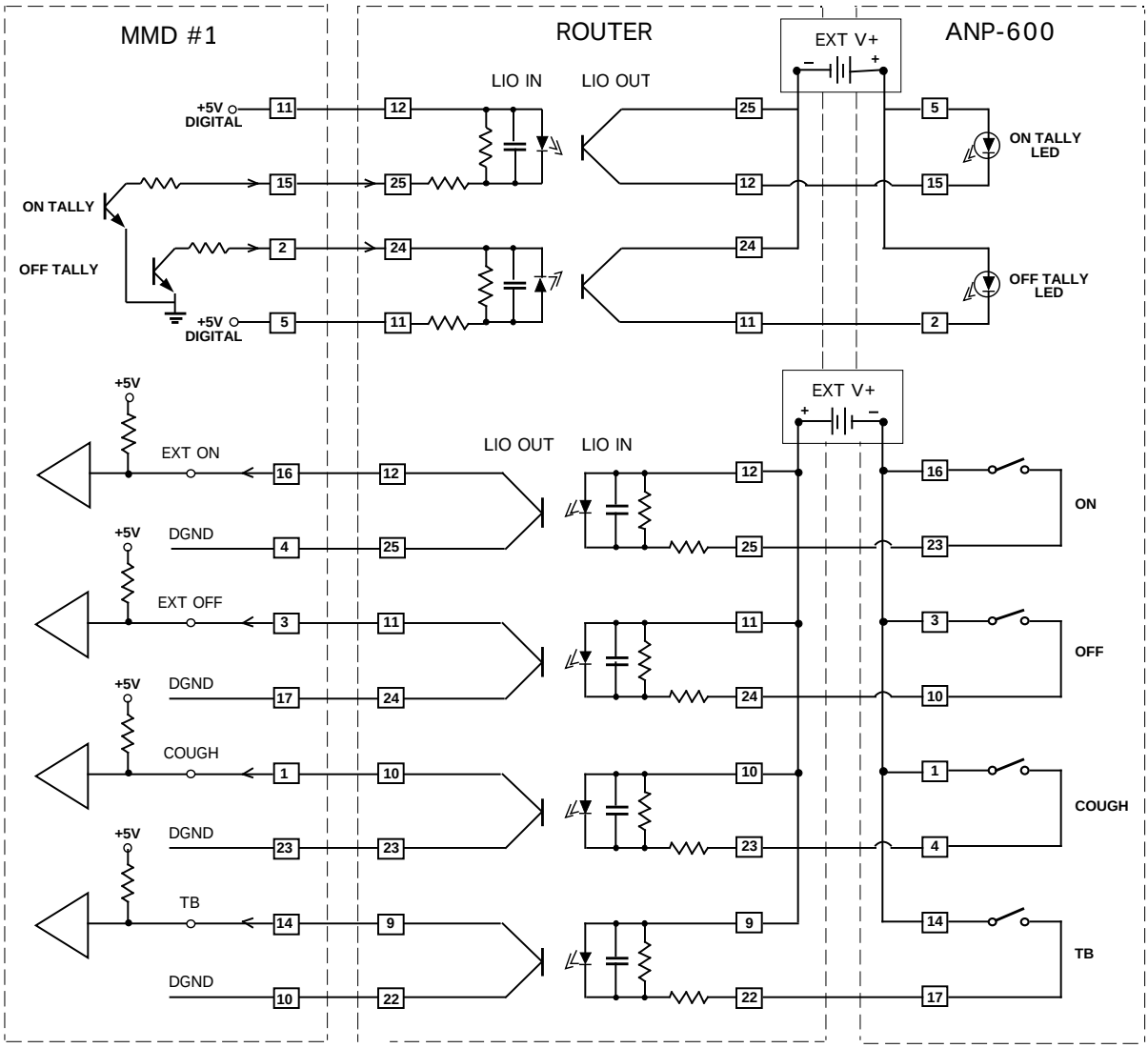
All outputs feature linear ac/dc operation, current limiting, and a low on resistance, typically 10 Ohms.

Normal Operating Load Limits: 120mA, ±100V

Safety Note: *The LIO-NC4 is **NOT** designed to safely switch AC mains power*.

SIMPLE OUTPUT EXAMPLE





Software Programming

For details on programming the LIO-NC4, please refer to "Configuring Logic I/O" in the XPoint Software Setup Guide later in this manual.

Internal Programming Options

All internal programming options are made via PCB mounted dipswitches and jumpers.

Dipswitch / Jumper Settings

DIPSW1 -SW3 - Logic In/Out Settings

SW1 position 1 sets logic port 1 as logic input when ON or logic output when OFF.
SW1 position 2 sets logic port 2 as logic input when ON or logic output when OFF.
SW1 position 3 sets logic port 3 as logic input when ON or logic output when OFF.
SW1 position 4 sets logic port 4 as logic input when ON or logic output when OFF.
SW2 position 1 sets logic port 5 as logic input when ON or logic output when OFF.
SW2 position 2 sets logic port 6 as logic input when ON or logic output when OFF.
SW2 position 3 sets logic port 7 as logic input when ON or logic output when OFF.
SW2 position 4 sets logic port 8 as logic input when ON or logic output when OFF.
SW3 position 1 sets logic port 9 as logic input when ON or logic output when OFF.
SW3 position 2 sets logic port 10 as logic input when ON or logic output when OFF.
SW3 position 3 sets logic port 11 as logic input when ON or logic output when OFF.
SW3 position 4 sets logic port 12 as logic input when ON or logic output when OFF.

J3 - AGND to DGND - default is "CLOSED"

J3 connects Audio Ground to Digital Ground.

Hook-Ups

All user wiring from the LIO-NC4 card takes place at the female DB-25 connector on the cage rear.

Logic Connections

These include 12 input/output sources. Pinout drawing on page 2-22 shows all wiring connections at a glance.

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

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

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

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

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

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

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

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

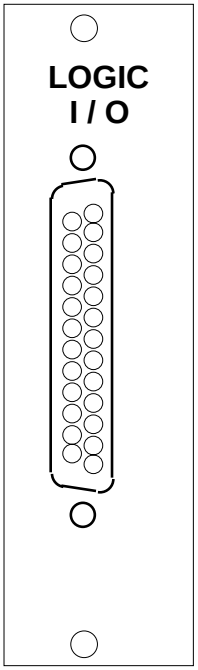
Pin 4 – Logic 9 In/Out +
Pin 17 – Logic 9 In/Out -

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

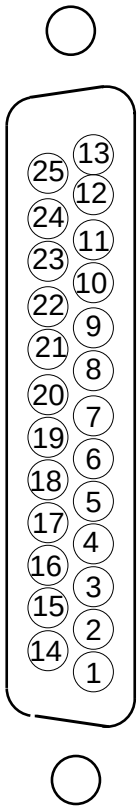
Pin 2 – Logic 11 In/Out +
Pin 15 – Logic 11 In/Out -

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

LIO-NC Panel
Logic Input / Output Connections



DB-25
Input/Output Ports



Dual Audio Network Card (AT-NC2)

Overview

The Dual Audio Network card provides the audio and logic link between the central E-WHEATNET, the E-SAT, and optionally, a MICROSAT. All Audio Transport (AT) connections are made using UTP CAT-5 wired as *crossover* and terminated with RJ-45 connectors.

The 2 AT ports, LINK 1 and 2, are pre-configured in hardware and software. LINK-1 always connects to the E-NET. LINK-2 always connects to a MICROSAT.

Which specific E-NET port you connect LINK-1 to depends on the configuration you have loaded. XPoint software is used to load "canned" configurations that map the AT LINK-1 and 2 ports to specific E-NET ports.

The AT-NC2 provides a tremendous amount of flexibility and routing power. Please note the following design aspects:

- The XPoint configuration you load determines how the system <u>must</u> be wired.
- E-SAT cages always connect to the E-WHEATNET central switch.

Internal Programming Options

All internal programming is done via PCB mounted switches.

Switch Settings

SW1 - Reset

Momentarily pressing the switch resets the LAN chip, while pressing and holding the switch also resets the FPGA.

DIPSW2

Pos.1 (labeled DIPSWØ on the circuit board) - Sample Rate Select - 48kHz/44.1kHz

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

48kHz when switch is ON,

44.1kHz when switch is OFF.

Note!!
Sample Rate must match on all E-Series Network devices.

Pos.2 - Not Used

Pos.3 - Disables Remote Rack

A Remote Rack is a rack connected via the LINK 2 connector.

ON - no Remote Rack,

OFF - Remote Rack connected.

Pos.4 - Normally ON

OFF - Resets cage when LINK 1 (to the E-WHEATNET) is disconnected.

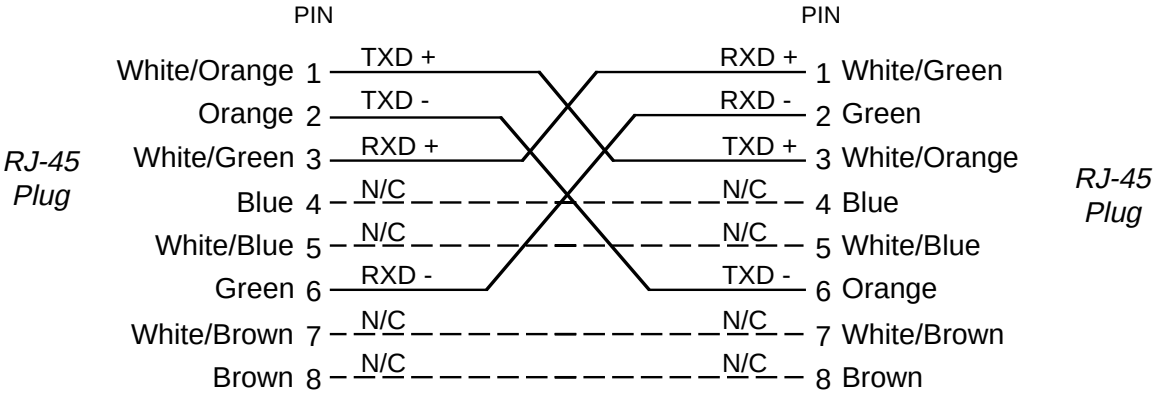
Hook-Ups

All user wiring to and from the AT-NC2 card's LINK1 and 2 RJ-45 connectors is made using UTP CAT5 cable wired as ***crossover***. For typical CAT5 cable pinouts see below.

LINK 1 and 2 RJ-45—CAT5 Audio Network Connectors

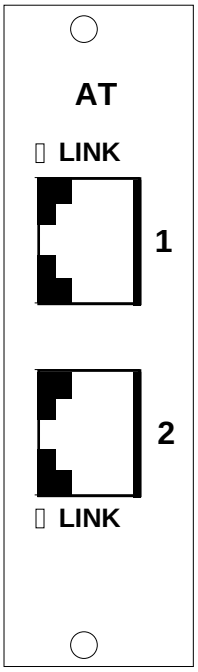
Pin 1 – TXD +
Pin 2 – TXD -
Pin 3 – RXD +
Pin 4 – N/C
Pin 5 – N/C
Pin 6 – RXD -
Pin 7 – N/C
Pin 8 – N/C

TYPICAL CROSSOVER CABLE

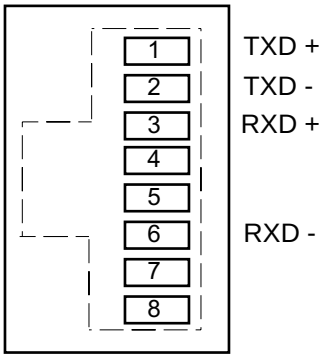


USED TO CONNECT THE LINK1 CONNECTOR TO THE E-NET AND THE LINK 2 CONNECTOR TO AN OPTIONAL MICROSAT.

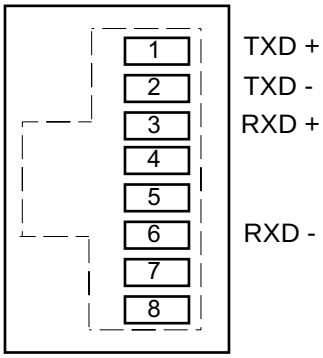
AT-NC Panel Network Connections



LINK 1 - RJ-45



LINK 2 - RJ-45



Digital Signal Processor Card (DSP-NC)

Overview

The DSP-NC card is the digital signal processing card used by the E-SAT 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.

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 using the "LINK" RJ-45 connector on the DSP-NC rear panel. 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.

LINK is connected to the E-Surface using a crossover cable.

Internal Programming Options

There are no internal programming options on the DSP-NC card.

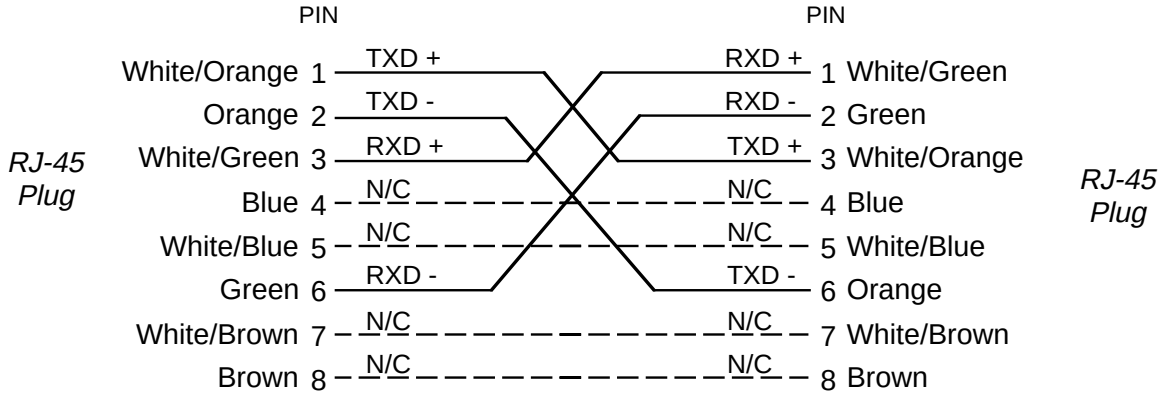
Hook-Ups

All user wiring to and from the DSP-NC card's LINK RJ-45 connector is made using UTP CAT5 cable wired as ***crossover***. For typical CAT5 cable pinouts see below.

LINK—CAT5 Audio Network Connectors

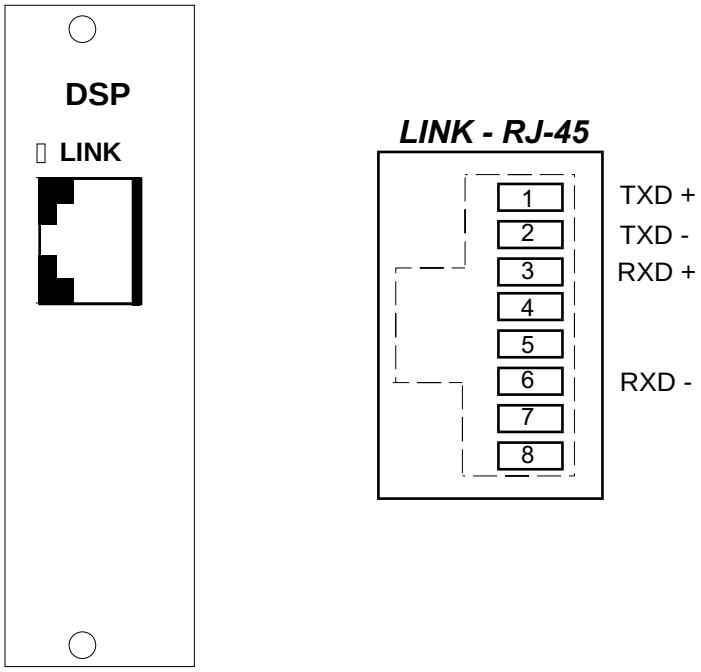
Pin 1 – TXD +
Pin 2 – TXD -
Pin 3 – RXD +
Pin 4 – N/C
Pin 5 – N/C
Pin 6 – RXD -
Pin 7 – N/C
Pin 8 – N/C

TYPICAL CROSSOVER CABLE



USED TO CONNECT THE LINK CONNECTOR TO AN OPTIONAL CONTROL SURFACE.

DSP-NC Panel
Network Connections



XPoint Software Setup Guide

Chapter Contents

Caution!

Configuring the Wheatstone E-Series Network hardware is a relatively simple 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.

E-WHEATNET Ethernet / IP Address Quick Start

Ethernet Cabling

- Use a CAT 5 *crossover* Ethernet cable to connect a PC directly to the E-WHEATNET, OR
- Use a standard CAT5 Ethernet cable to connect the E-WHEATNET to your network hub.

Default IP Address

The E-WHEATNET 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 E-WHEATNET.

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.

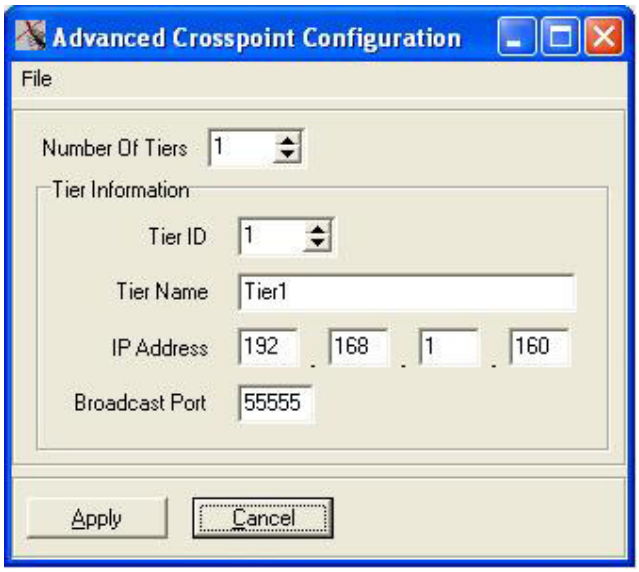
Changing the E-WHEATNET's IP Address

Changing the IP address of devices in the system requires the editing of a text file located on the E-WHEATNET's system CPU. You will need a third party FTP application to be able to FTP to the E-WHEATNET. We recommend the freeware FTP client FTP Surfer by Whisper Technology. Google™ to "*FTP Surfer* " to download the client. Windows™ Internet Explorer™ allows FTP, but in our experience it is not the best choice for this file maintenance application.

To change the IP address scheme, carefully follow the instructions in the *Configuring System IP Addresses* Appendix 1 at the back of this manual.

Configuring IP Address in XPoint Software

Next, start the XPoint application, log on as administrator (default 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 CPU is located on the network. To modify the actual network settings of the CPU card located in the system's Master Rack - see Configuring System IP Addresses Appendix 1.

Important Note!
Before closing this form and saving your configuration make sure the Tier ID spin box shows the main system CPU Tier number, usually 1.

Important:

• If you changed the E-WHEATNET's IP Address, enter the parameters you entered in the xp_net.txt network text file.

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 System 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 Network System hardware is pre-configured at the factory. This approach greatly speeds the installation process getting you "online" faster. You may not need to make any software configuration changes.

The XPoint software used to customize and configure the Wheatstone Network System is supplied with your system on CD-ROM. It is a Windows™ Graphical User Interface (GUI) program, intended to be straightforward in use. To install XPoint software be sure that the PC you wish to use is Windows™ compliant, has a CD-ROM drive, and has an available ethernet connection.

Also included on the CD-ROM is the DEFAULT configuration for *your* specific system. It is very important that you copy this default folder to your PC. This will ensure that when XPoint is started, the correct configuration files for your system are loaded. The default configuration path for the configuration is: *C:\Program Files\Wheatstone\Xpoint\cfg\default.*

Install the software on the PC by loading the X-Point CD into the drive tray and then running the install wizard on the CD by double-clicking on "Setup.exe".

The following sections will guide the user through all phases of the software configuration.

Basic System Requirements

Platform - PC, Operating system - Windows XP - Service Pack 2, Win 2000

Memory - 256MB, Hard Disk - 20 GB

Monitor -1024 x768

Network - 100BaseT NIC, optional 2nd NIC for Wheatstone Support access

GUI Log-In

Once the XPoint software has been installed and started, a “Log In” dialog box will be displayed on the screen.

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

While in Admin mode you can change the password that is used to enter Admin mode. Select the User/Change Password... menu option to bring up the “Change Password” dialog box. Enter a password between 4 and 10 characters long in the “New Password:” text box, then re-enter the password in the “Verify Password:” text box. Click “OK” to change the password or “Cancel” to cancel the operation.

Custom users access may be created at the factory—contact Wheatstone sales.

Password

The default password is “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.

Connecting E-WHEATNET and XPoint

E-WHEATNET and the PC running the XPoint GUI must be connected together in a stand alone LAN through an Ethernet switch. All other devices in the E-WHEATNET system (e.g. control surfaces, XY controllers, automation interfaces, etc.) will also be connected through this LAN.

E-WHEATNET should be installed, powered-up, and verified to be operating normally; you should see source and destination signal names in any XY controllers, and the ERROR LED should not be lit. Connect a straight CAT5 cable from the LAN switch to E-WHEATNET’s RJ-45 ETHERNET jack on the rear. Likewise, the GUI should be installed on the desired PC and also connected to the LAN.

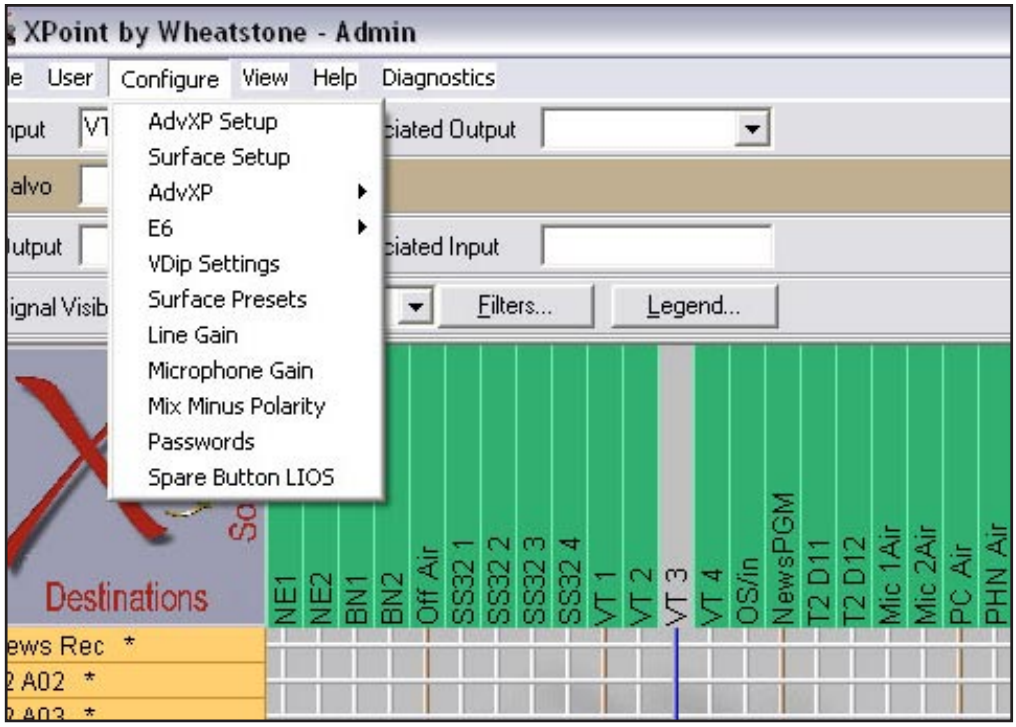
IP Addressing

All devices connected on the E-WHEATNET system LAN must have static IP addresses and share the same network prefix /subnet mask. The default network prefix is 192.168.1.xxx, and the default subnet mask is 255.255.255.0.

It is possible to change the IP addresses of your system by editing a simple text file, XP_NET.txt, located on the E-WHEATNET CPU. An FTP client application is used to gain access to the files stored on the CPU. Please see Appendix 1 or contact Wheatstone Technical Support for details.

System Configuration Menus

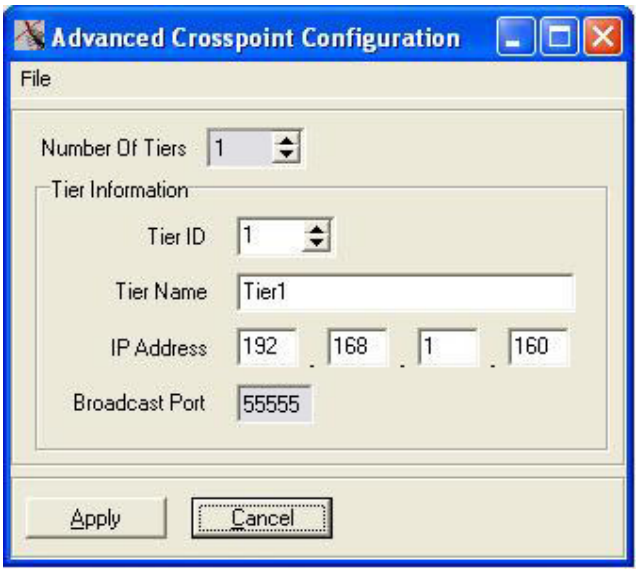
From the user point of view, configuration of the Wheatstone E-Series Network system is relatively simple, since the Configuration GUI does much of the actual underlying configuration assignment work automatically. This section will outline a general procedure for configuring an E-Series Network system.



Tier Configuration

Note that your system was pre-configured and this step is not necessary unless you have changed the IP address of the E-WHEATNET.

Before you can connect to the system the Configuration GUI must be setup with some information regarding the E-WHEATNET's network parameters. This is done by selecting the *Configure / AdvXP Setup* menu option; the following Tier Configuration form appears.



Important Note!
This form tells the XPoint software where the Host CPU is located on the network. To modify the actual network settings of the Host CPU card located in the system's Master Rack, see Configuring System IP Addresses Appendix 1.

The IP Address value *for Tier ID1* must match the current settings of the E-WHEATNET CPU in order to connect. Make sure *Tier ID* "1" is showing before clicking the Apply button.

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.

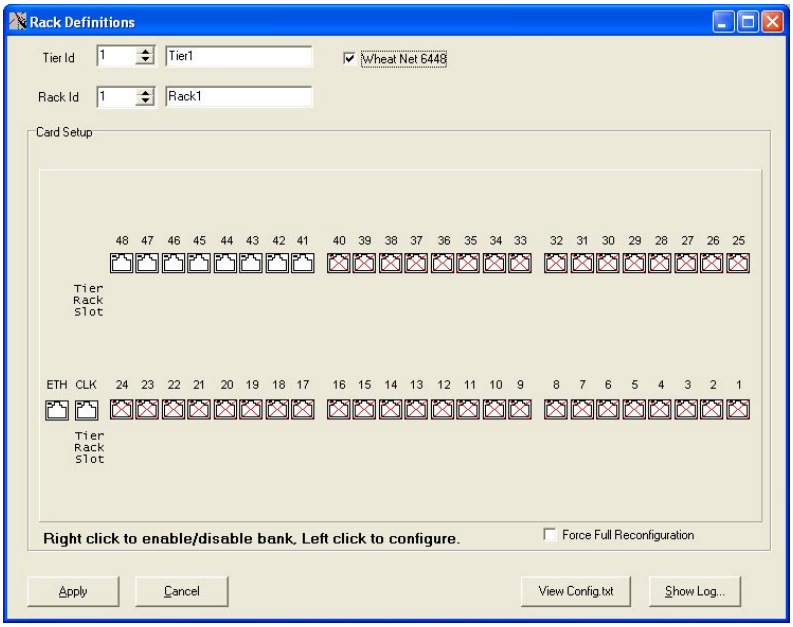
Note: When done, the Tier ID spin box must show the Tier number of the Tier that houses the main system CPU (usually Tier 1) or XPoint will not be able to connect to the system on startup.

E-WHEATNET Rack Configuration

Note that your E-WHEATNET was pre-configured and this step is not necessary unless you are reconfiguring the system.

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

There are the 2 banks (1-8 and 9-16) of RJ-45 connectors each with eight connectors available for the E-WHEATNET.



Ports 17 through 48 are disabled in E-WHEATNET systems.

Surface Setup

Note that your system was pre-configured and this step is not necessary unless you have changed the IP address of a surface.

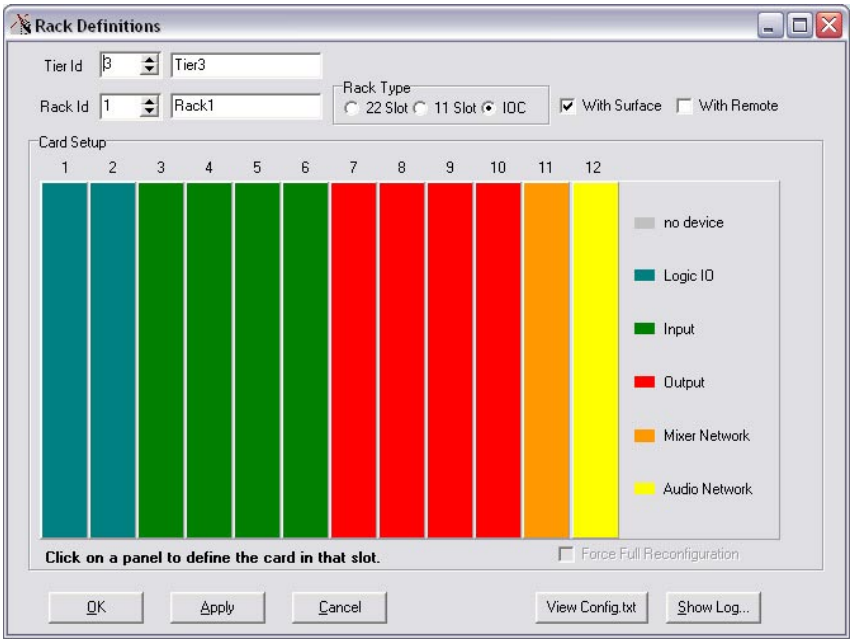
Control Surface configuration is done by selecting the *Configure / Surface Setup* menu option; the Surface Setup form, shown on the right, appears.

For each Surface ID is used in the system you can edit the Control Surface Name (up to 8 characters) and the IP Address.

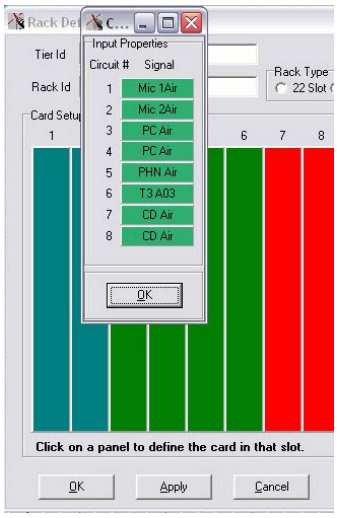
E-SAT Rack Configuration

Note that your E-SAT racks are configured at the factory, and you do not have access to change configuration .

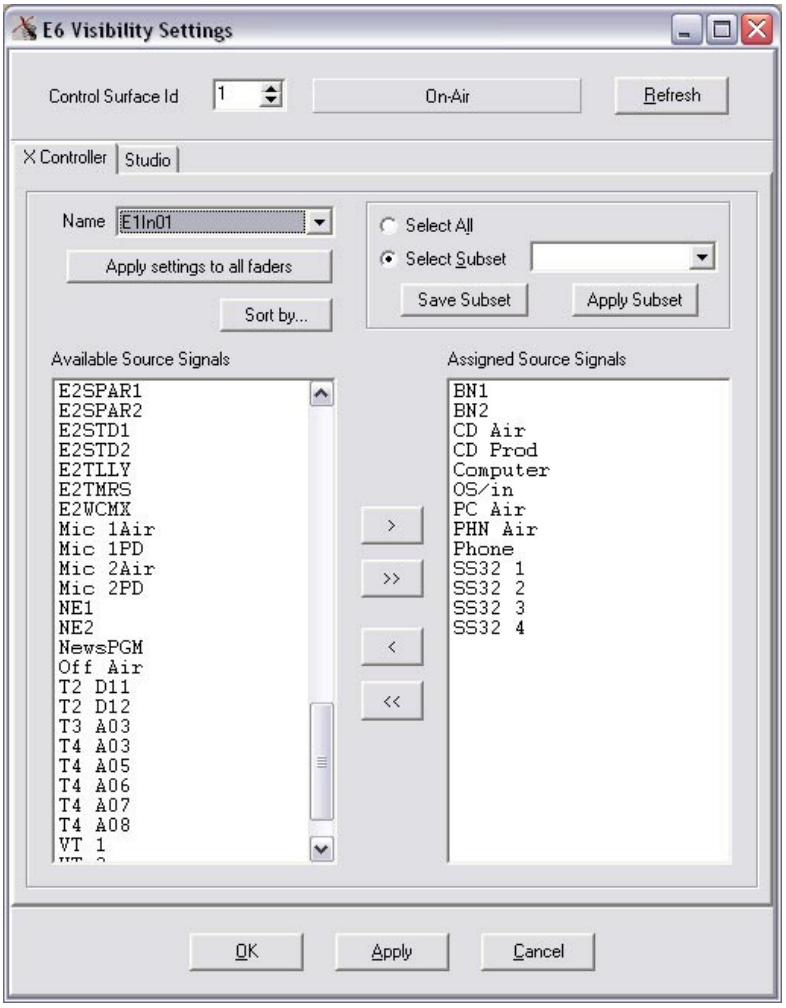
Select the *Configure / AdvXP / Rack Defs...* menu option, the following form appears, and you will be able to view racks configuration.



Right-click on the appropriate slot in the E-SAT rack to view Input Properties, Output Properties, Logic I/O Properties, or Card Properties for DSP, depending on the slot you select.



Visibility Settings



To view the control surface's visibility settings select *Configure/E6/Visibility Settings* menu option, which will display the form on the right.

By scrolling up and down the "Control Surface Id" box, choose the appropriate control surface by its unique number. Then view or modify the settings for X Controller (faders and switched meter) and Studio (monitors) by clicking on the appropriate tab. To modify settings (by default all signals are visible) click the Select Subset radio button.

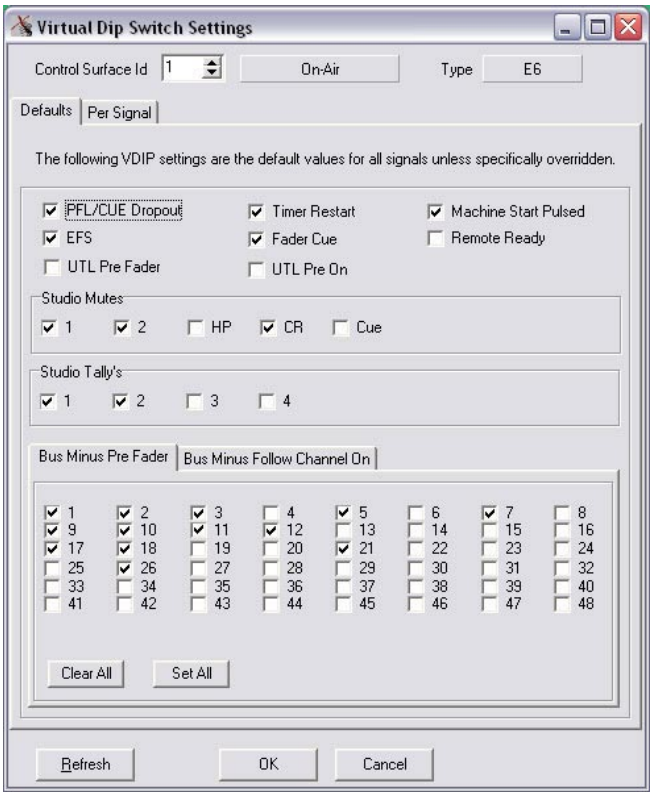
Next highlight the desired source signal(s) in the left column, then click on the single right arrow box (>) found between the columns. In order to make all signals visible click the double right arrow (>>) box found between the columns. The left arrow buttons are to remove signal(s) from the visible list found in the right column. Clicking the *Apply* button will save the visibility options.

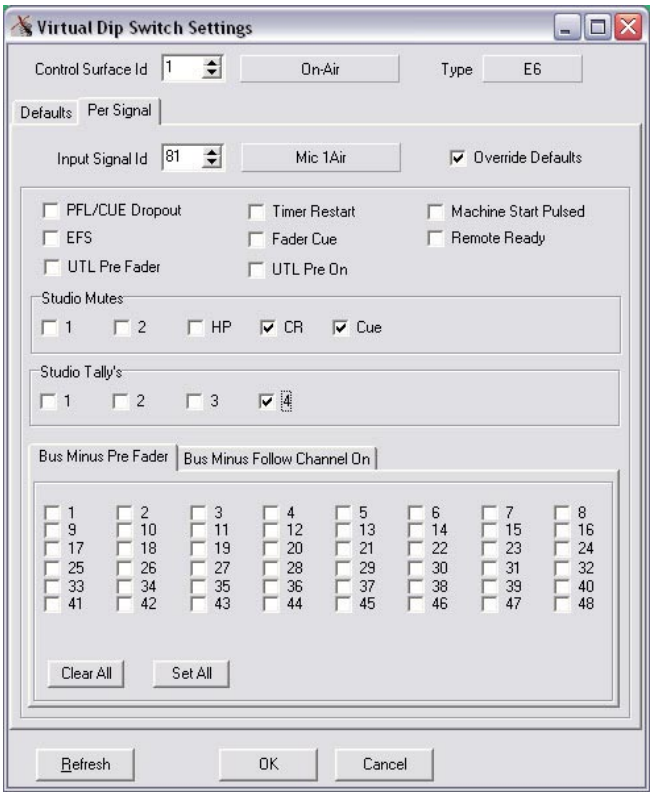
- *Sort by...* - User may choose to sort the displayed signals according to Signal ID, Signal Name, or Signal Location.
- *Subsets* - User may create subsets of signals and apply the subset to individual inputs (EQs), studios, etc.
- *Apply Settings to All EQ's* - This button takes the selected set of Assigned Source Signal and applies it to all of the selected control surface's input X Controllers.
- *Refresh* - It is possible for the visibility settings stored with XPoint to be out of sync with the settings stored in the surface - this button causes the surface settings to override the current settings as displayed in XPoint (but not the settings **stored** with XPoint, unless you use the button and then save your config).

VDip Settings

To view or modify the Virtual Dip Switch Settings select the *Configure / VDip Settings* menu option, which will display the forms shown below. The content of the forms will vary depending on the surface type. The Defaults tab (shown on the left below) shows the default values for all signals unless specifically overridden. To override settings for a signal press the "Per Signal" tab, dial up the desired Input Signal ID, check the "Override Defaults" box, make your selections, and click the "OK" button to save your changes.

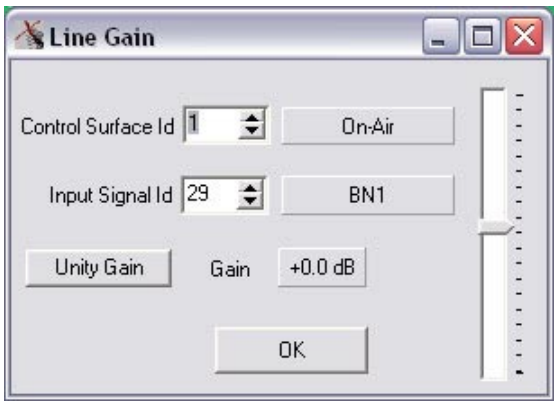
- *PFL/Cue Dropout* - When a channel's CUE button is pressed it will assign the channel's signal to the CUE bus. When "PFL/Cue Dropout" is checked it causes the channel's CUE function to be de-activated whenever the channel ON switch is pressed.
- *EFS* - Will turn the channel OFF when the fader is moved all the way down and turn the channel ON when the fader moves from the fully down position.
- *Fader Cue* - Will assign the signal to the Cue bus when the fader is moved all the way down.
- *UTL Pre Fader* - When checked will cause the signal assigned to the UTL output to be tapped before the fader. On the E-6 surface there is no UTL output - instead the function applies to the PGM D output.
- *UTL Pre On* - When checked will cause the signal assigned to the UTL output to be tapped before the channel ON/OFF switches. On the E-6 surface there is no UTL output - instead the function applies to the PGM D output.
- *Timer Restart* - The digital timer can be programmed to automatically reset to zero and begin counting up when the channel's ON button is pressed. To enable this function the "AUTO" button in the timer section has to be activated.





- *Machine Start Pulsed* - This check box has no effect.
- *Remote Ready* - Will control the channel's OFF switch LED with a signal from an external source machine instead of it being controlled directly by the surface.
- *Studio Mutes* - Input channels can be programmed to mute the studio or cue speakers when the channel is ON. There are five studio mutes options. Checked boxes show which speakers are muted.
- *Studio Tallies* - Turning the channel ON can activate a remote tally indicator. There are four tally control lines.
- *Bus Minus Pre Fader* - sets the input signal sent to the Bus Minus system to be pre-fader. If this box is unchecked it is post fader.
- *Bus Minus Follow Channel On* - Sets the input signal sent to the Bus Minus system to follow the channel ON switch.

Line Gain

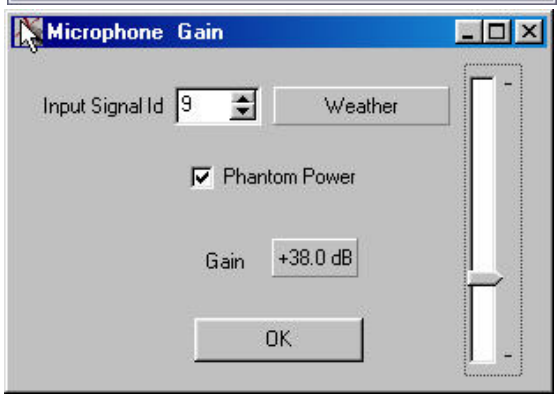


To view or modify the line input channel gain select the *Configure / Line Gain* menu option, which will display the form shown at the right.

Each control surface and input signal is identified via the "Control Surface Id" and "Input Signal Id" spin edit boxes. Define the line gain level and click the "OK" button.

Click the *Unity Gain* button to set gain to 0.0dB.

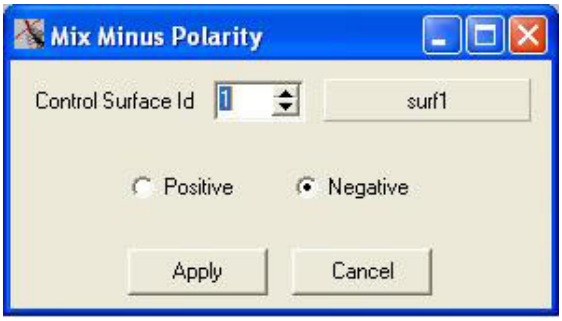
Microphone Gain



To view or modify the mic input channel gain select the *Configure / Microphone Gain* menu option, which will display the form shown at the right.

Use this control in systems that have mic input cards but do not have control surfaces with mic gain controls.

Mix Minus Polarity



To modify the mix-minus polarity select the *Configure / Mix Minus Polarity* menu option, which will display the form shown at the right.

- *Negative* - Preferred in Radio applications; requires users to assign each fader to a MXM bus.
- *Positive* - Preferred in TV applications; users simply press a single MXM switch to subtract the fader from the MXM bus.

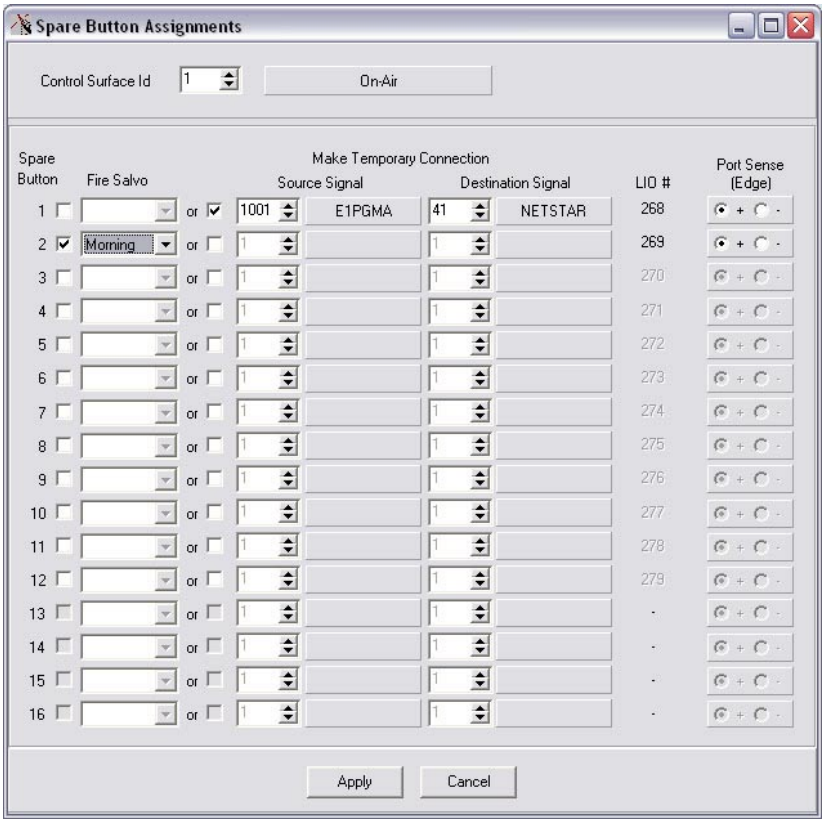
Password Modes

This menu item does not apply to E-Series surfaces. Password control of the E-Series surface is done at the surface, see the surface manual for details.

Programmable Buttons

The control surface's programmable buttons can be used in different ways.

If you want a button to fire a Salvo or make a temporary crosspoint, select the *Configure / Spare Button LIOS* menu, which will display the form shown at the right. To program a button to fire a Salvo, check the box immediately to the right of the Spare Button number, then select a Salvo from the pulldown list under Fire Salvo. The Salvo will fire whenever the programmed button is pressed.



To cause the button to make a temporary crosspoint, check the box to the right of the word "or" on the same line as the desired button number, then select the desired Source and Destination Signals for the temporary crosspoint. For example, let's say you program button 3 to temporarily connect a source named "OUT 1" to a destination named "IN 1". As long as you are holding button 3 down, OUT 1 will feed IN 1. If a different signal was feeding IN 1 to start, that connection will disappear while the button is pressed and reappear when the button is released.

You can also control a physical logic output with a programmable button. When the system is originally created, two signals will be auto-generated to enable programmable button use: ExxSPAR1 is associated with buttons 1-6, and ExxSPAR2 is associated with buttons 7-12. If you look at the signal definitions of these signals, you will find that function names are assigned to them. You can use default names, or create your own. The key is to create a physical Logic Only destination (see page 3-20 for details), such as LOut1, and use the same function name for that destination as you are using for programmable button that will control it. Assuming for the moment you are working with button 1, the last step is to make a crosspoint on the XPoint grid to connect ExxSPAR1 (remember, it deals with buttons 1-6) and your Logic Only destination (in this case, LOut1). The combination of the crosspoint and the matching function names causes the specified logic output port to respond to button 1.

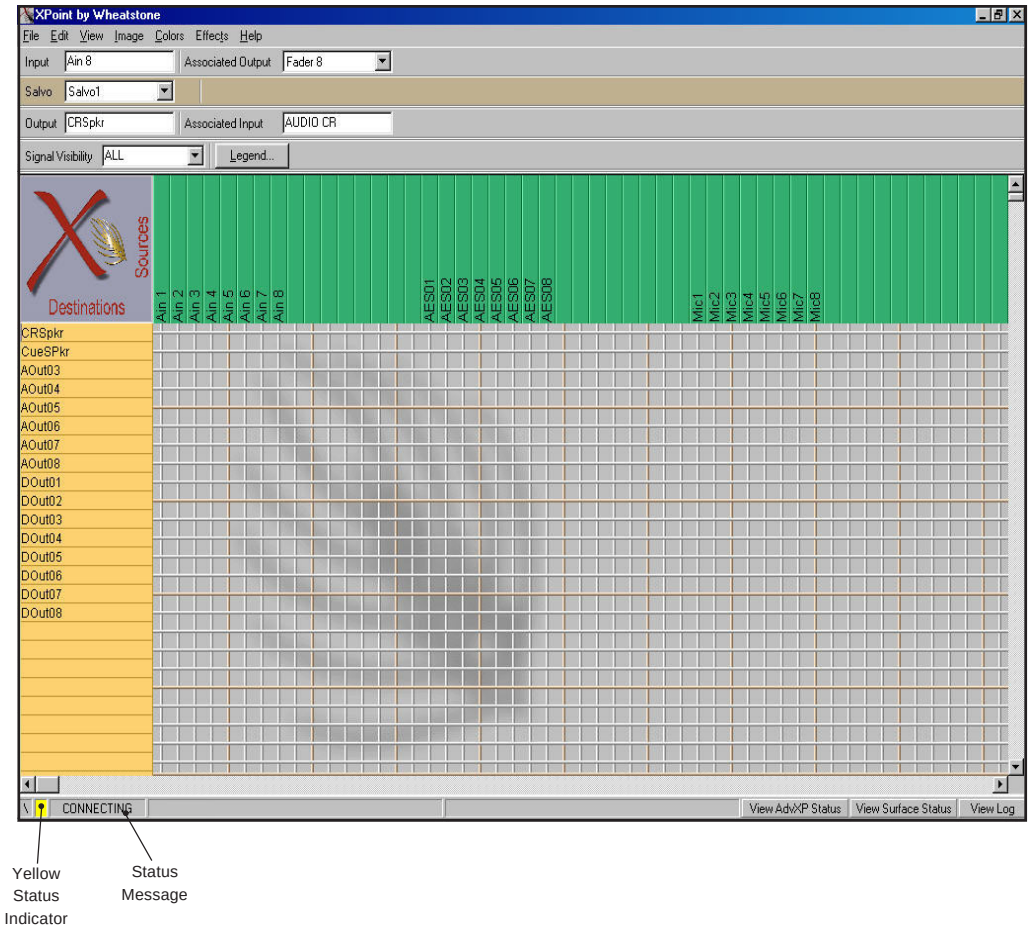
In a similar manner the LEDs that light up the programmable buttons can be controlled by physical logic inputs. Once again you create a physical Logic Only destination, map a source signal to the programmable button signal by function name, and make the crosspoint connection in XPoint.

Note: The "xx" part of the signal name is usually the surface number in a multi surface system. These signals are located in the horizontal Sources set of signals and are typically in the signal space above signal ID 1000 of the XPoint grid.

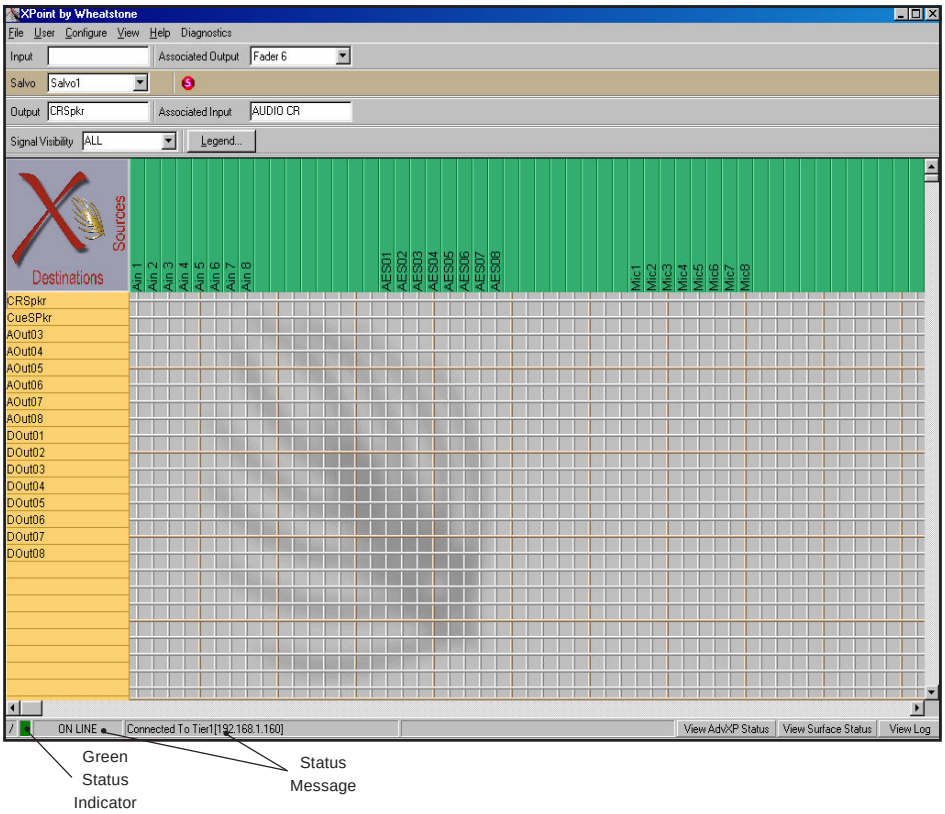
Connection Between the Configuration GUI and E-WHEATNET

While in OFFLINE mode, 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. The program starts in ONLINE mode but can be switched to OFFLINE mode by selecting the *View / Mode / Offline* menu option.

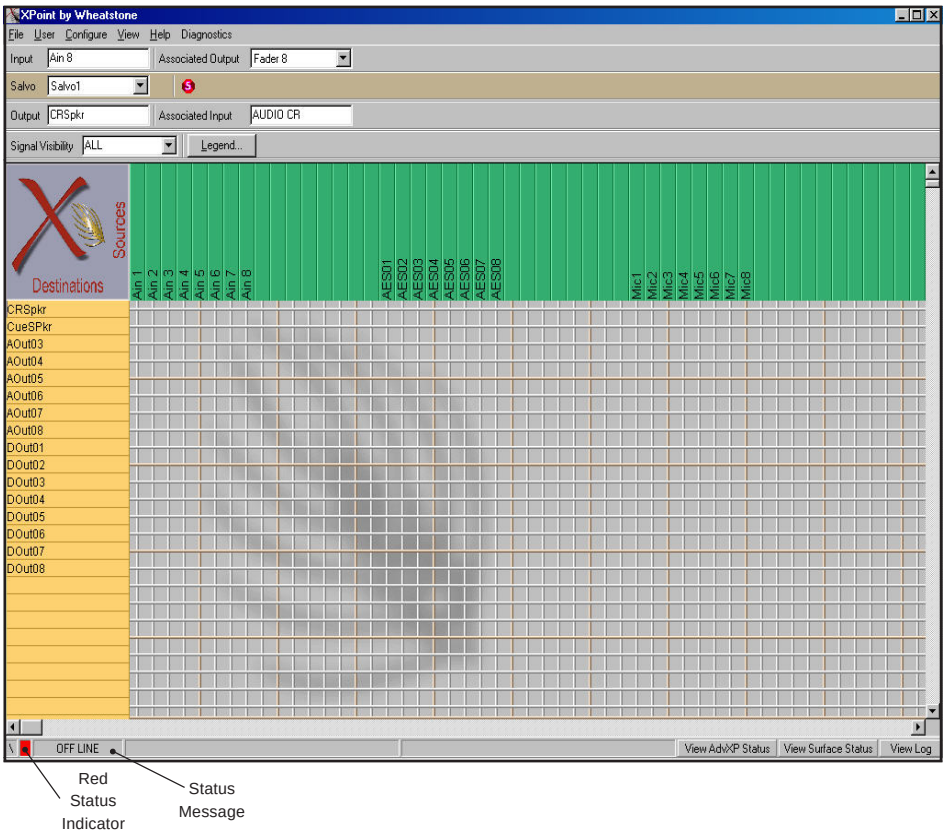
In ONLINE mode a TCP connection to the Host CPU will be attempted, as indicated by the status message and yellow status indicator shown below.



When the GUI successfully communicates with the E-WHEATNET CPU software it will start receiving the configuration that the E-WHEATNET CPU has stored in its nonvolatile memory. While downloading 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): “Downloading Config From 192.168.1.160 [Tier 1]”.



Once the configuration has been downloaded the GUI enters the ONLINE state as shown to the left.



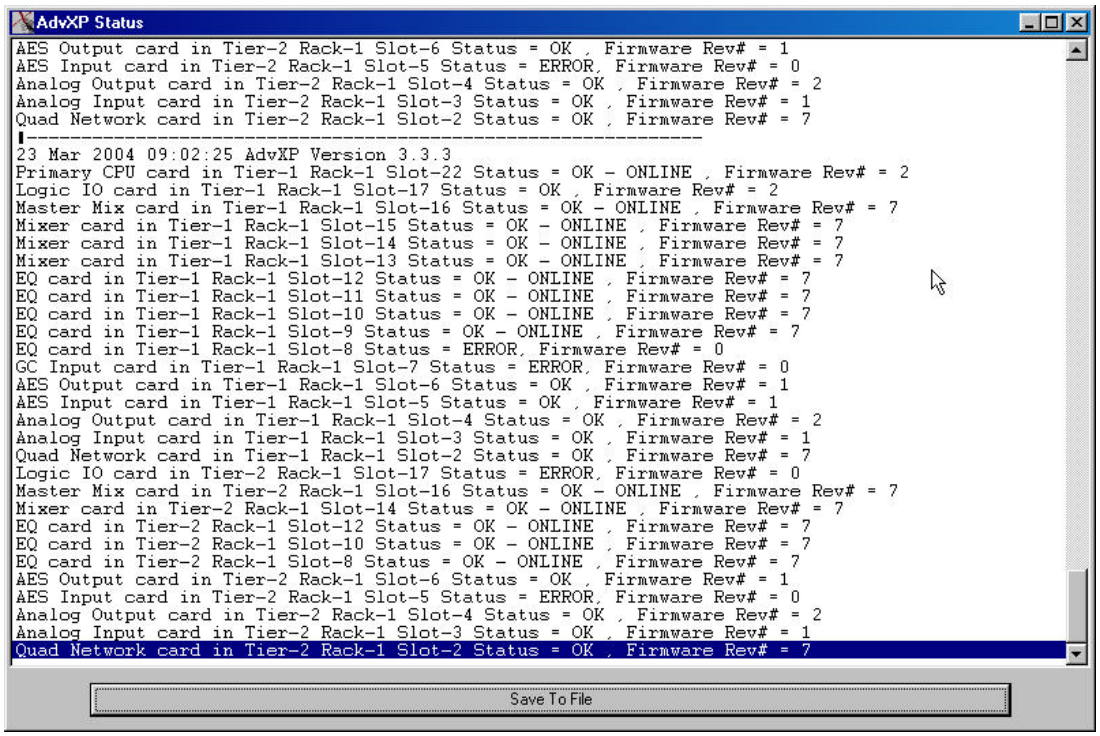
To disconnect from the E-WHEATNET CPU and go to OFFLINE mode, select the *View / Mode / Offline* menu option. The status indicator on the screen will then change as shown to the left.

To connect to the E-WHEATNET 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 makes any configuration or crosspoint changes in OFFLINE mode and then goes to ONLINE mode, this message box pops-up:

Choose YES to save OFFLINE changes.

There are three tabs, *View AdvXP Status / View Surface Status / View Log*, on the bottom of the Configuration GUI form to view rack configuration, status of all active installed hardware, and card firmware revisions. A window like the following will appear when you click on the *View AdvXP Status* tab.

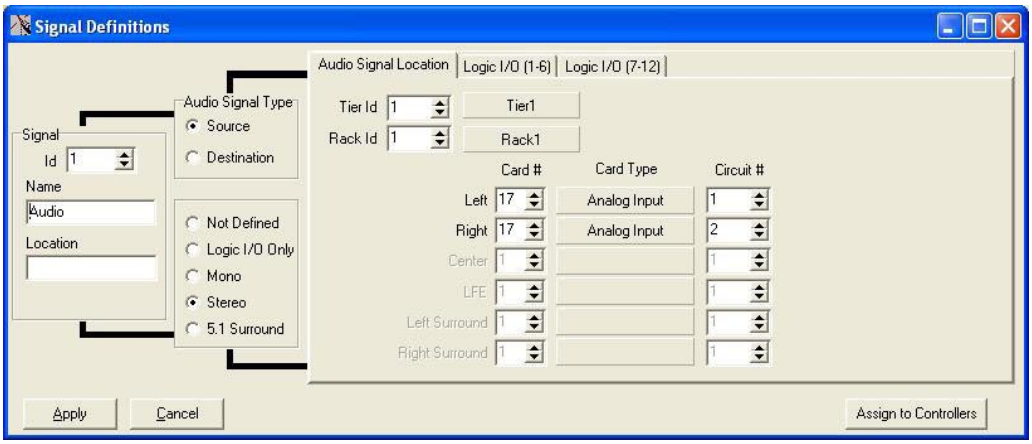


Signal Definition

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 / AdvXP / Rack Defs* form, click on an input card; press the *Signal Definitions* button.

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

- *Signal Name:* Enter the 8 Character name to be displayed on XY controllers and the Xpoint GUI.



- *Location:* Enter an optional 8 Character description of the 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 twelve 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 four stereo channels (4x2 channels = 8 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-NCA adds 12 programmable logic functions, configured individually as inputs or outputs, 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 triggered 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 twelve 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.

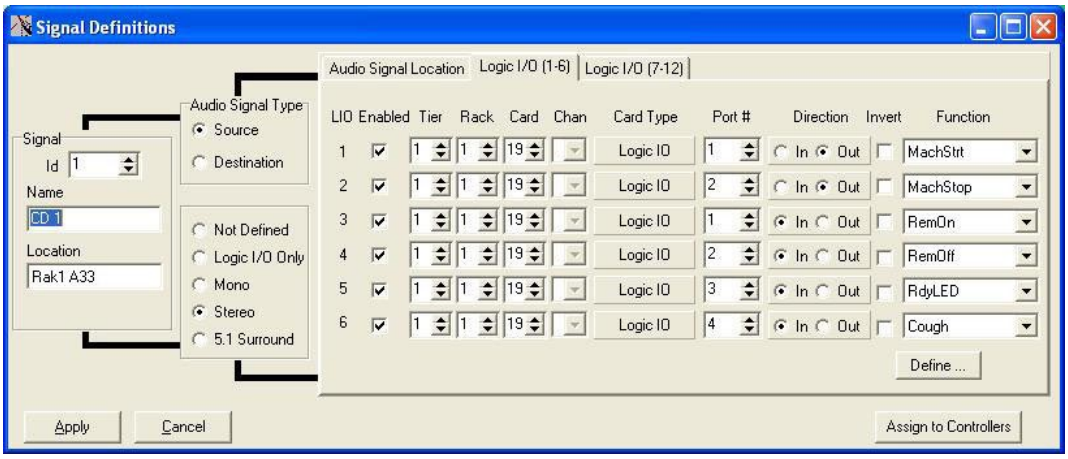
Mapped logic signals enable the user to automatically route up to twelve logic signals along with an audio source. When an audio source is routed to a destination, all logic mapped to the source device is automatically routed to the destination device. The mapped logic I/O configuration greatly simplifies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

Triggered 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 a means of confirming that the salvo has fired or the 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 ether *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 twelve routable logic port signals to the current signal.
  - *Enabled* -LIO#1 through #12, check to activate up to twelve 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.)

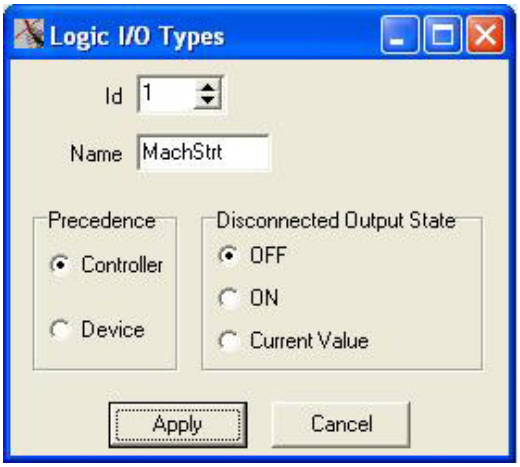
Example - To add a single logic input function to a Source signal:

- 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. **Important**: the direction must match the dipswitch setting for that logic port on the LIO-NCA card.
- 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 100 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 *one of the two Logic I/O* tabs, then click on the "*Define* " button in the lower right corner to open the *Logic I/O Types* form shown at the right.

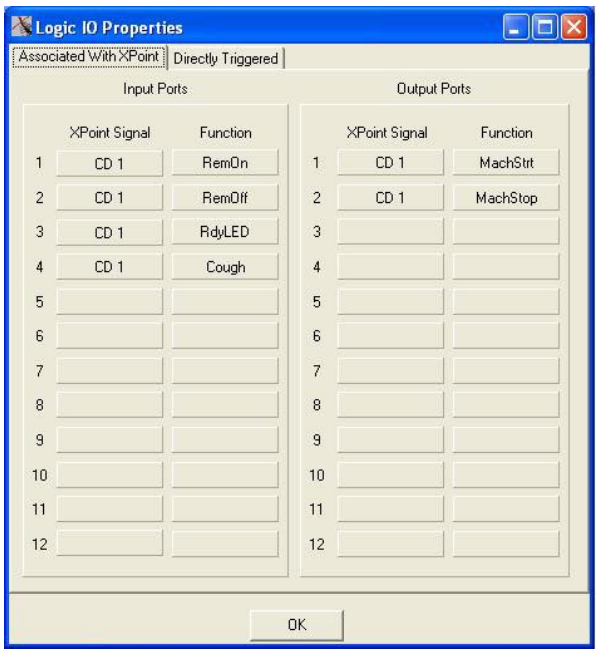


- *ID* - static value from 1 to 100 , cannot be changed. Use the up /down arrows to scroll to the desired function number.
- *Name* - Be sure to assign each function a unique name to avoid potential confusion when mapping logic functions. Names may be up to 8 characters long.
- *Precedence* - always 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). OFF is must often the correct choice.

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.

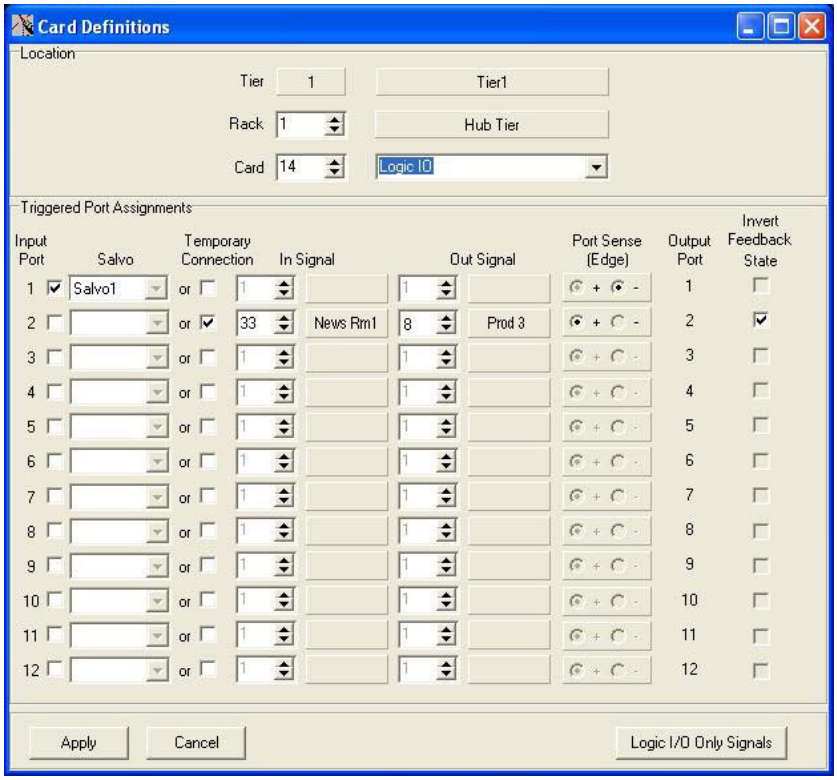
Select the *Configure / Rack Defs...* menu option to view a given rack. You may now query any logic card by *right* clicking on its location. A form similar to the one on the right will be displayed. The "Associated With Xpoint" tab displays all mapped and routable logic signals on the card. The "Directly 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. 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 the 12 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:

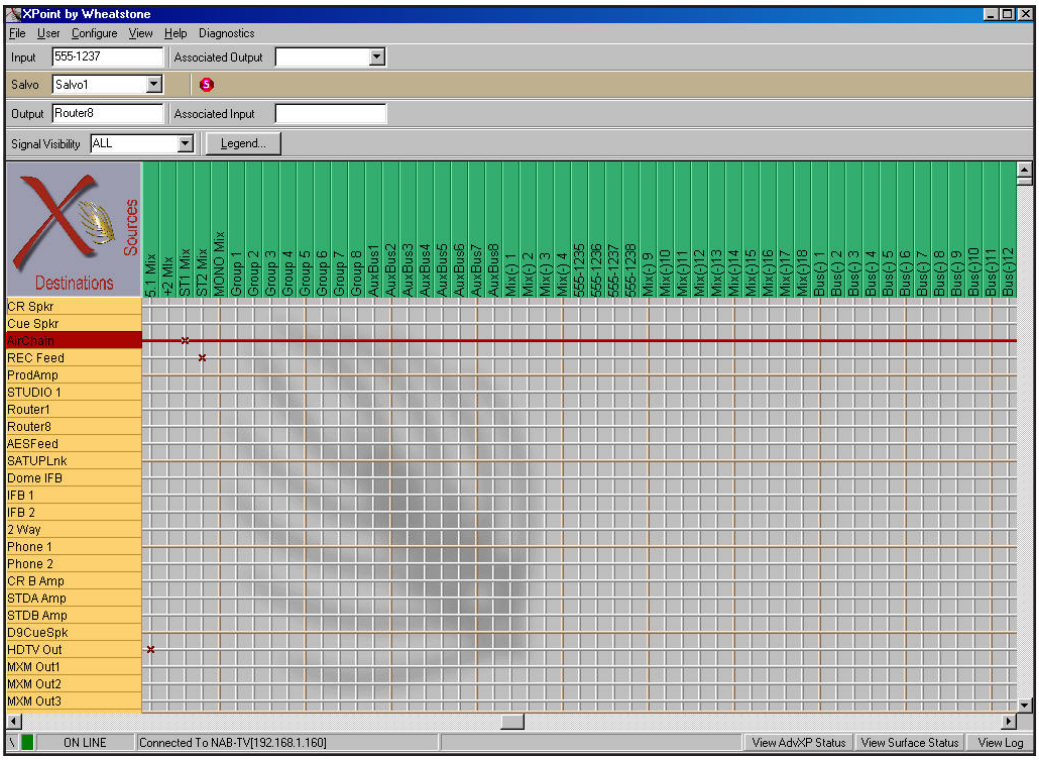
- *Input Port* - indicates which physical port is being configured.
- *Salvo* check boxes - assigns input port to fire a salvo.
- *Salvo* - use drop down list arrow to select a Salvo to be fired.
- *Temporary Connection* check boxes - assigns input port to temporarily connect a source to a destination (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 affected 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 the desired output channel on the crosspoint grid and select “Lock Connection”.

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



Note that you must be in ONLINE mode to lock a connection.

Salvo Definition

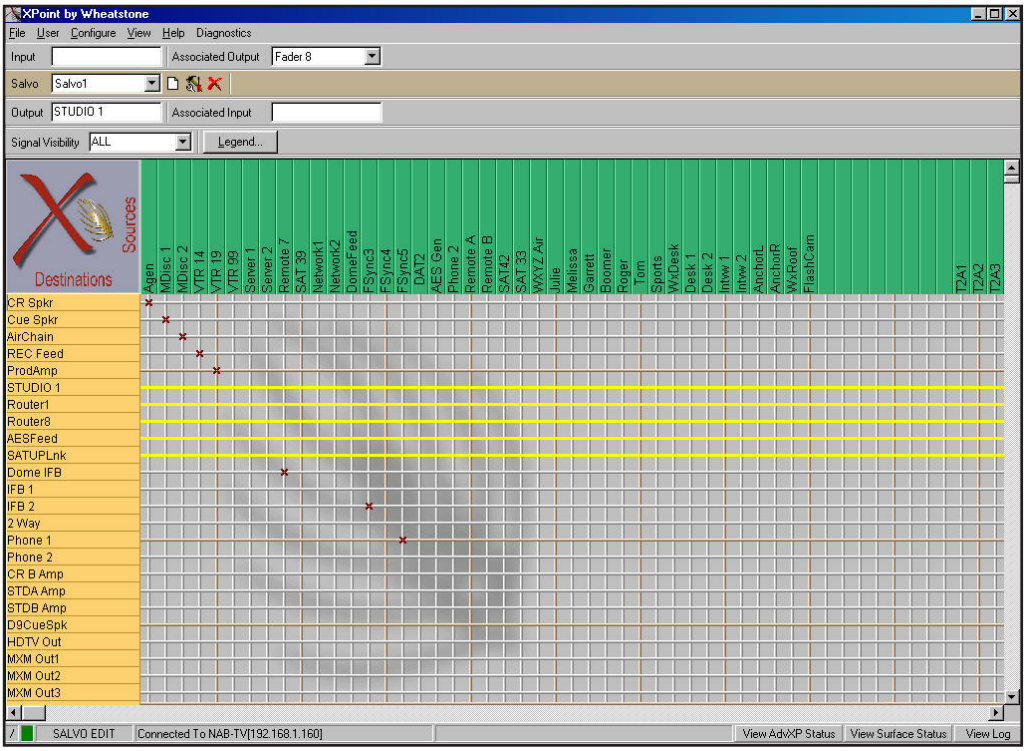
Macro control of the E-WHEATNET is accomplished by creating and firing Salvos. A Salvo is simply a group of cross connects, disconnects and "do nothings" that occur when the selected Salvo is fired. Each Salvo has a unique name and can be programmed to be visible to any XY controller.

To define a Salvo, use the Configuration GUI and enter *Salvo Edit Mode* by selecting the *View / Mode / Edit Salvos* 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 (ONLINE 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 / *Mode / 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**

Note: If the Salvo Tool Bar is not visible, select *View / Tools / Salvo* from the main menu.

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

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 to load previously saved configuration elements for off-line viewing/editing or download to Host CPU.

Save : Opens the *Save Configuration* form to 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.

Send Cfg To E6 Surface : Initiates download of currently loaded configuration to the control surface. Use this to update the system hardware with config changes. You can select individual surfaces or update all surfaces at once.

Request Cfg From Switch : Request the current configuration from the router.

Request Cfg From E6 Surface : Request the current configuration from all control surfaces of this type, or from individual surfaces.

Export Signals : Export signal names to a comma separated format suitable for speadsheet input.

Exit : Exits the XPoint program.

User Menu

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

Change Password : Allows the Administrator to change the Admin access level Log-in password.

Configure Menu

AdvXP Setup : Configure tier names and IP Addresses.

Surface Setup : Configure surface, name, and IP Address.

AdvXP

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

XY Controller Configuration : Used to define and configure hardware based serial (not Ethernet) XY controllers present in the system. Access XYC *Signal Visibility* editing here. Ethernet Controllers use a separate application for visibility.

E6

Visibility Settings : Define input and output signal visibility.

VDip Settings : Define muting, tally, and other surface behavior.

Line Gain : Make gain adjustments on line inputs.

Microphone Gain : Make gain adjustments and enable/disable phantom power on mic inputs.

Mix Minus Polarity : Set additive or subtractive mode.

Passwords : Not used with E-Series surfaces.

Spare Buttons LIOS : Used to assign programmable buttons to fire Salvos and to make a temprorary crosspoint.

View Menu

Mode-OffLine : Select OFF-LINE to edit configuration. Be sure to Save configuration prior to returning ON-LINE. This menu option is only available if you are currently ON LINE.

Mode-Online : Initiates network connection to Host CPU, uploads Host configuration once connected. View real time status of all crosspoints. This menu option is only available if you are currently OFF LINE.

Mode-Edit Salvo : Create, define and edit Salvos in this mode. This menu option is only available if you are not in Salvo Edit mode.

Mode-Leave Salvo Edit Mode : Exit Salvo Edit mode. This menu option is only available if you are in Salvo Edit mode.

Mode-Cancel Salvo Edits : Cancels any edits made in Salvo Edit mode and exits Salvo Edit mode. This menu option is only available if you are in Salvo Edit mode.

Tools-Inputs : Toggles visibility of the Input toolbar.

Tools-Salvo : Toggles visibility of the Salvo toolbar.

Tools-Outputs : Toggles visibility of the Output toolbar.

Tools-Signal Visibility : Toggles visibility of the Signal Visibility toolbar.

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 TCP Connection Status : Opens a window displaying TCP/IP connection status for the router and all surfaces.

View System Health Status: Lists all E-WHEATNET ports, shows partner E-SAT, and CAT5 link status. Reveals intermittent or broken cabling and devices.

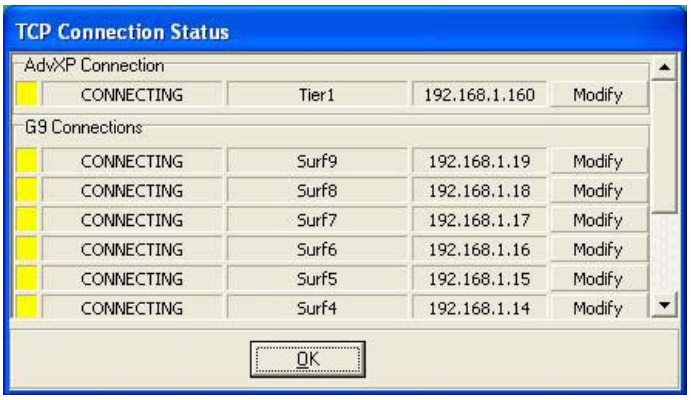
View UDP Log : Opens error logging permission. May be enabled/disabled.

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

System Integrity Check : Used to verify the AdvXP and surface configurations, and signal mappings.

Diagnostics Menu Examples

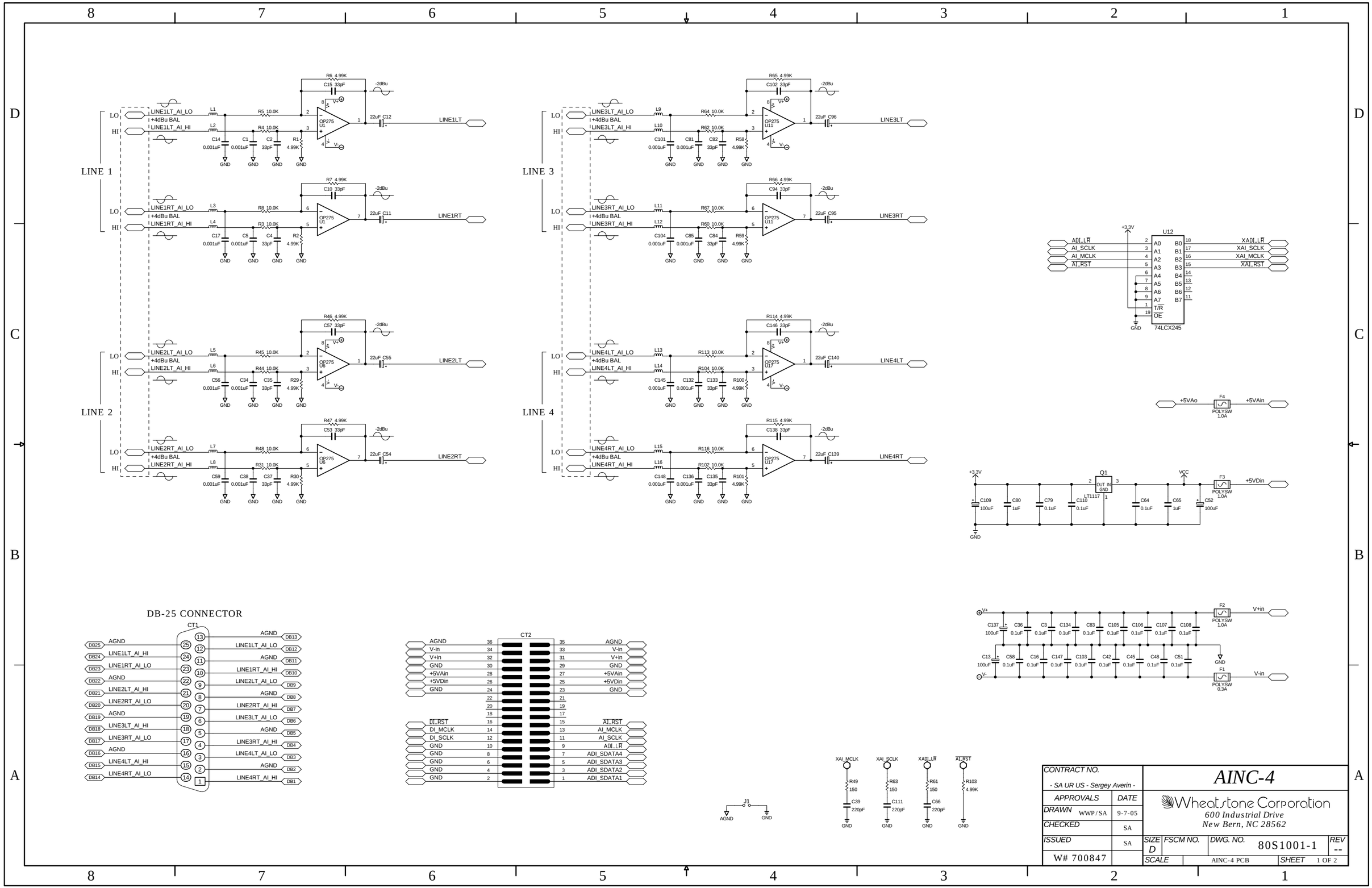
View TCP Connection Status Form:



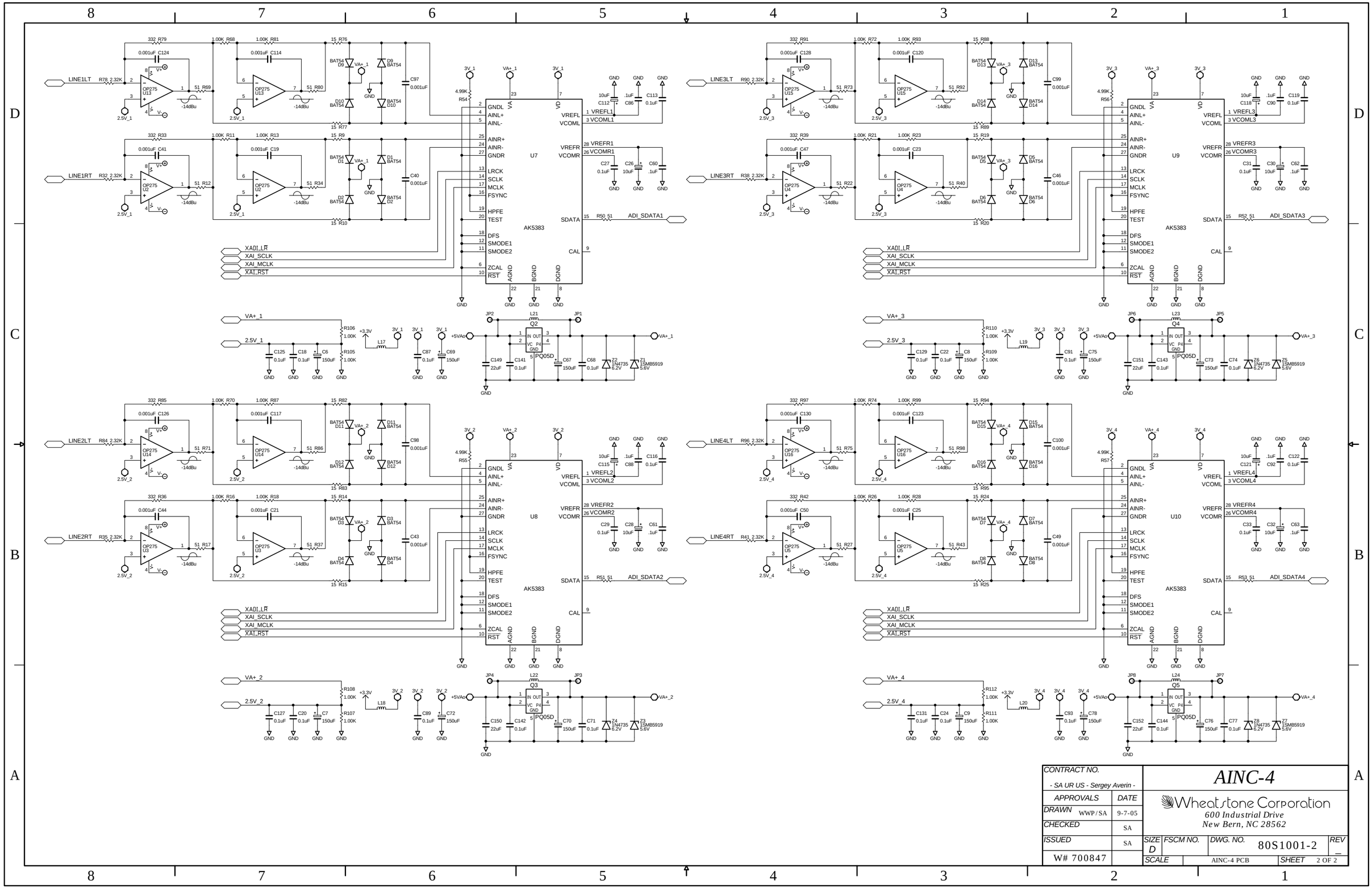
View System Integrity Form:

I/O Schematic Drawings

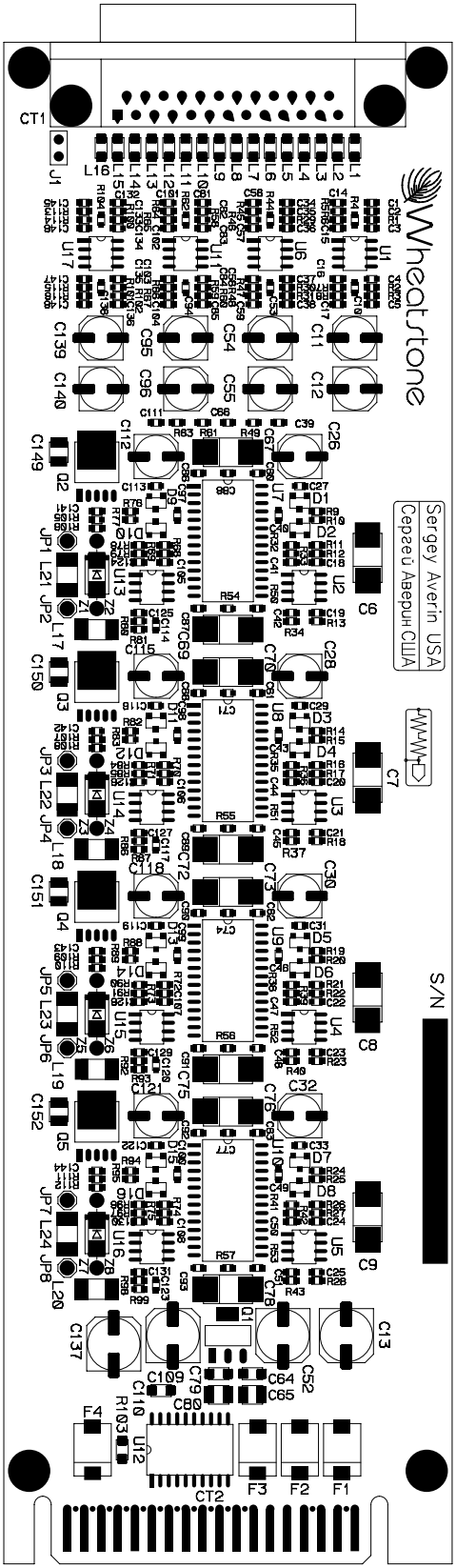
Chapter Contents



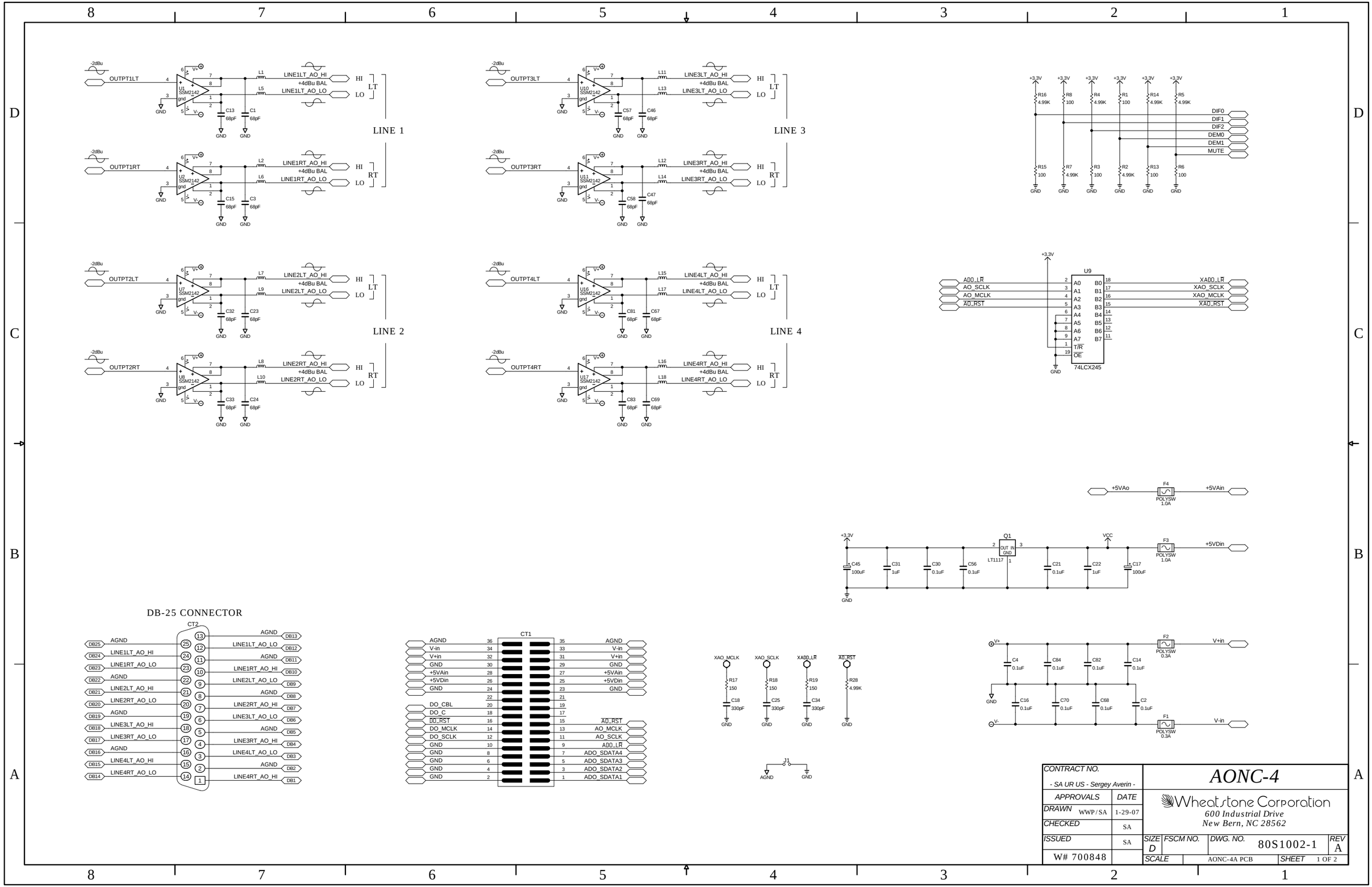
4 Analog Inputs Network I/O Center (AINC-4) Schematic



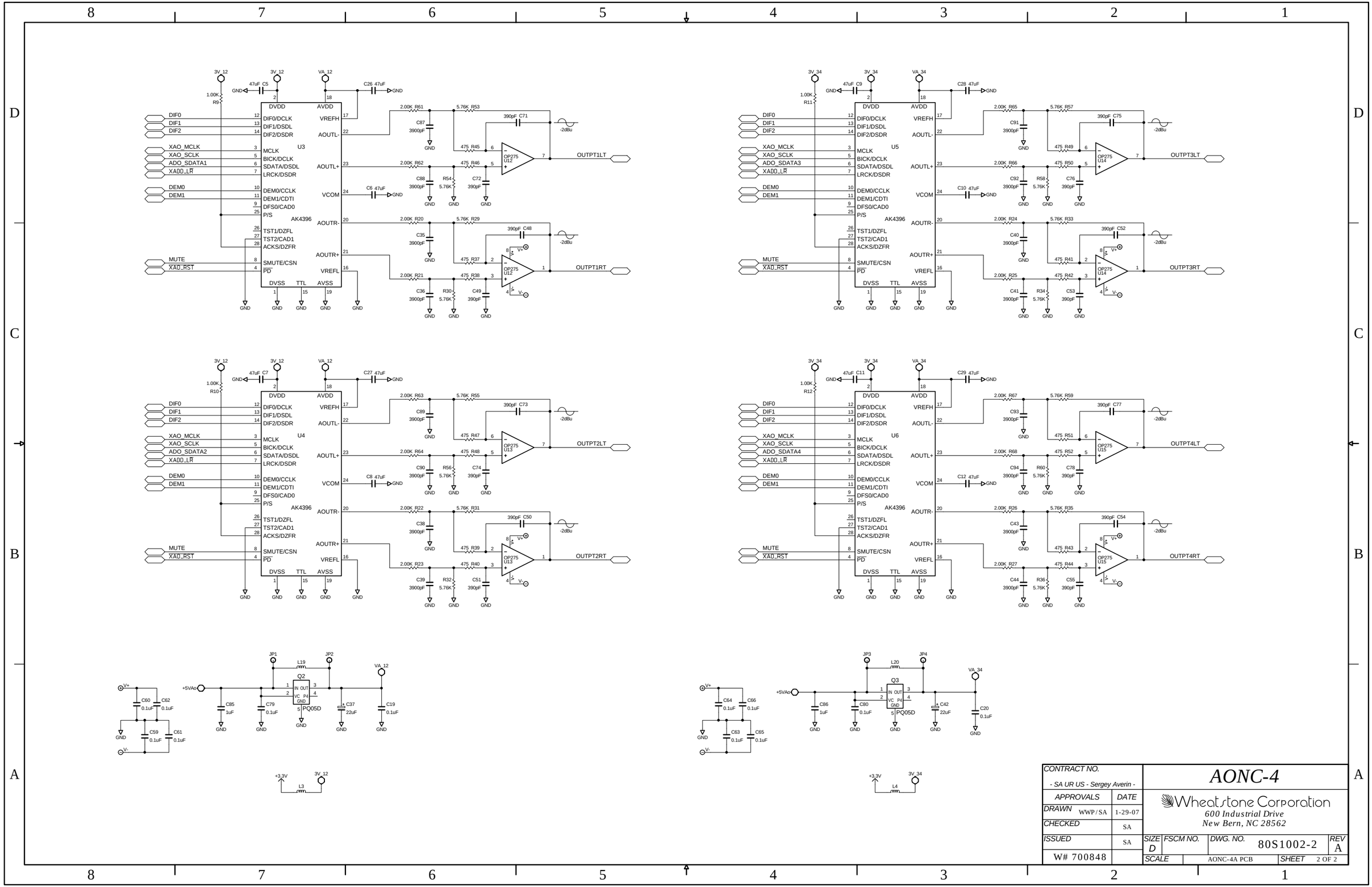
4 Analog Inputs Network I/O Center (AINC-4) Schematic



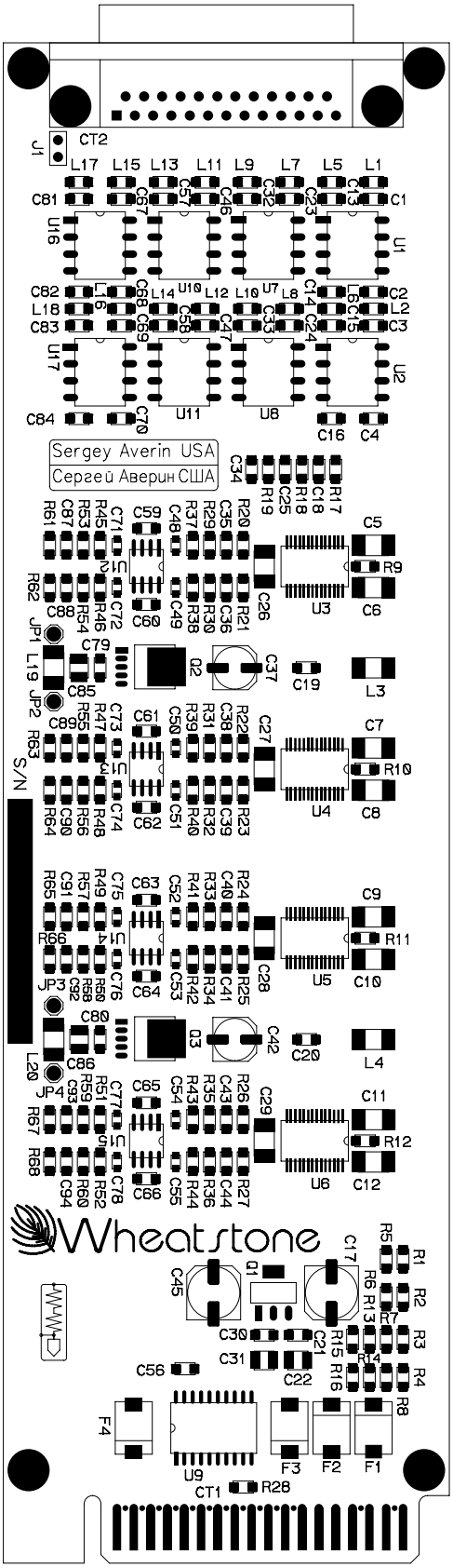
4 Analog Inputs Network I/O Center (AINC-4) - Load Sheet



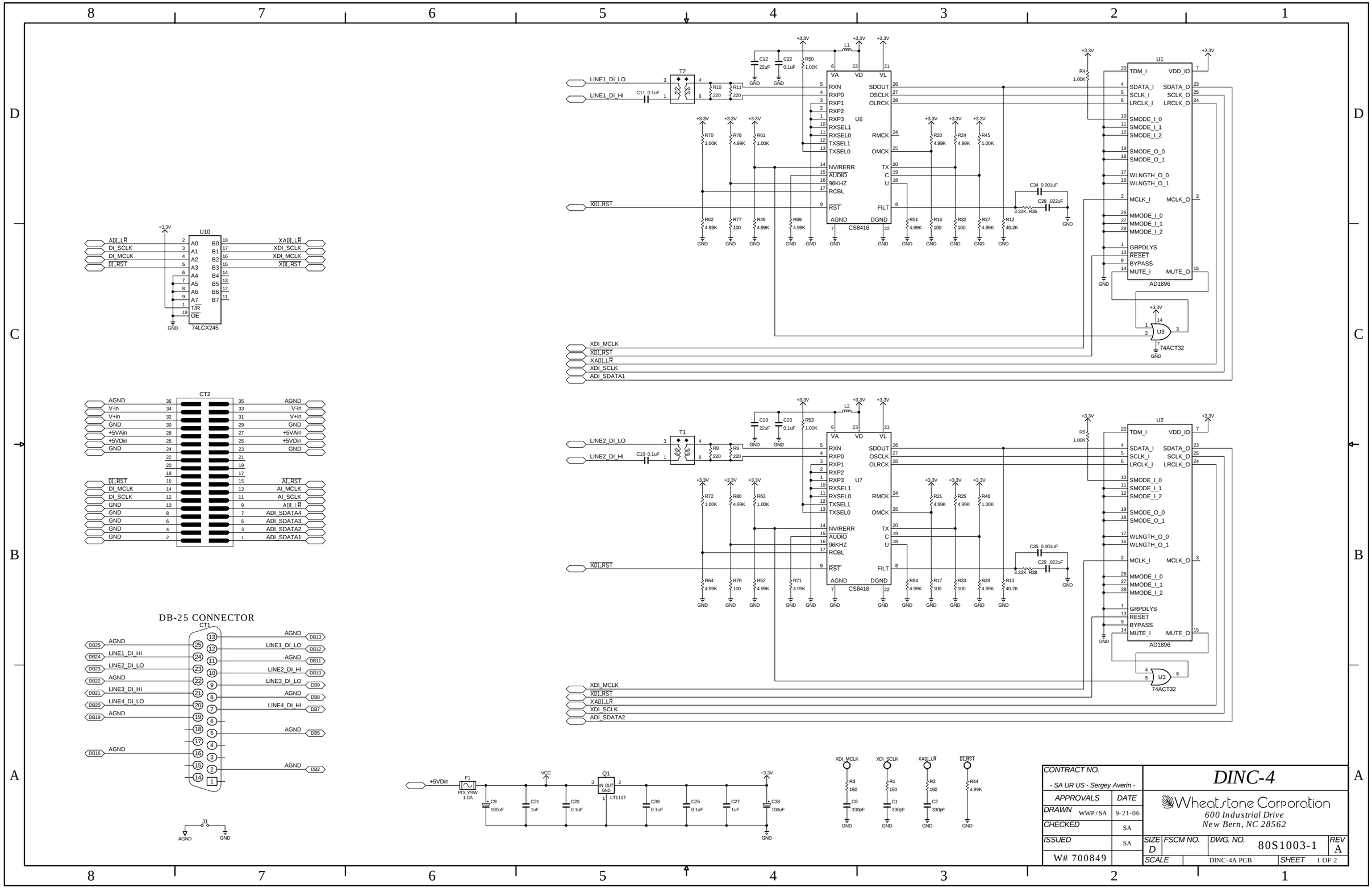
4 Analog Outputs Network I/O Center (AONC-4) Schematic



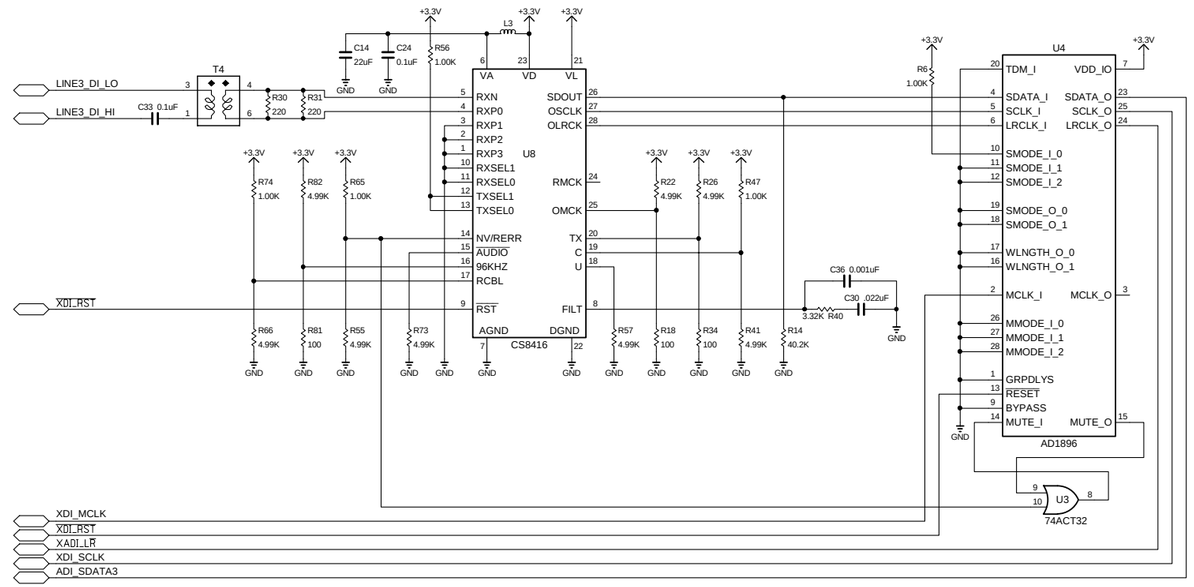
4 Analog Outputs Network I/O Center (AONC-4) Schematic

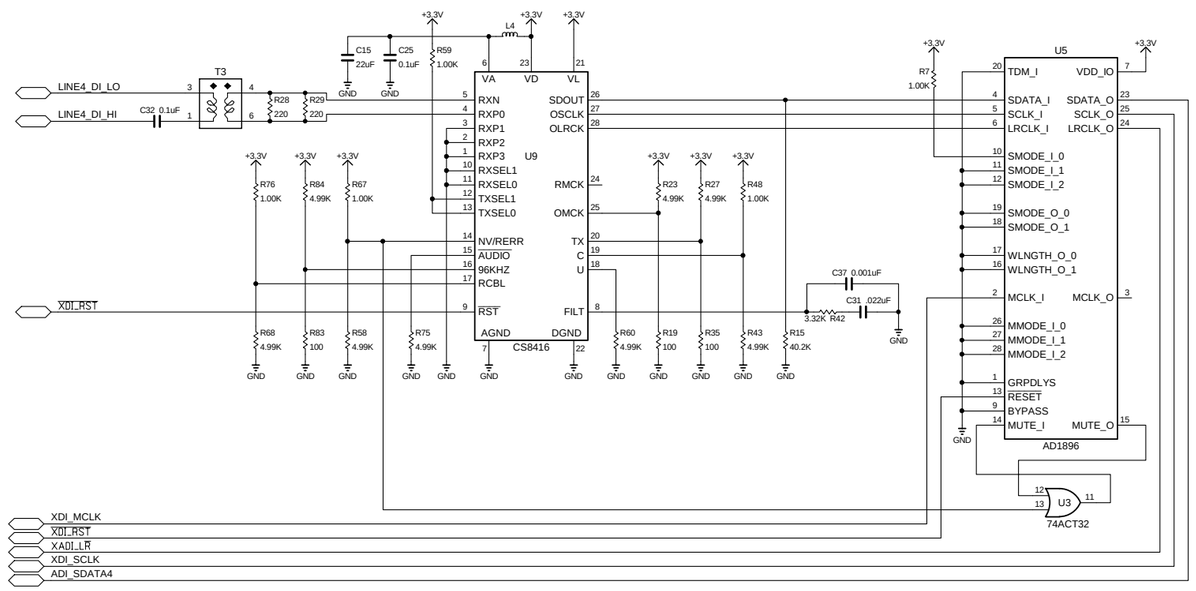


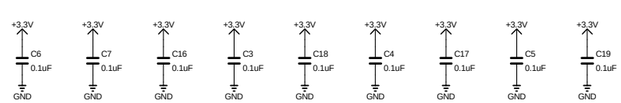
4 Analog Outputs Network I/O Center (AONC-4) - Load Sheet



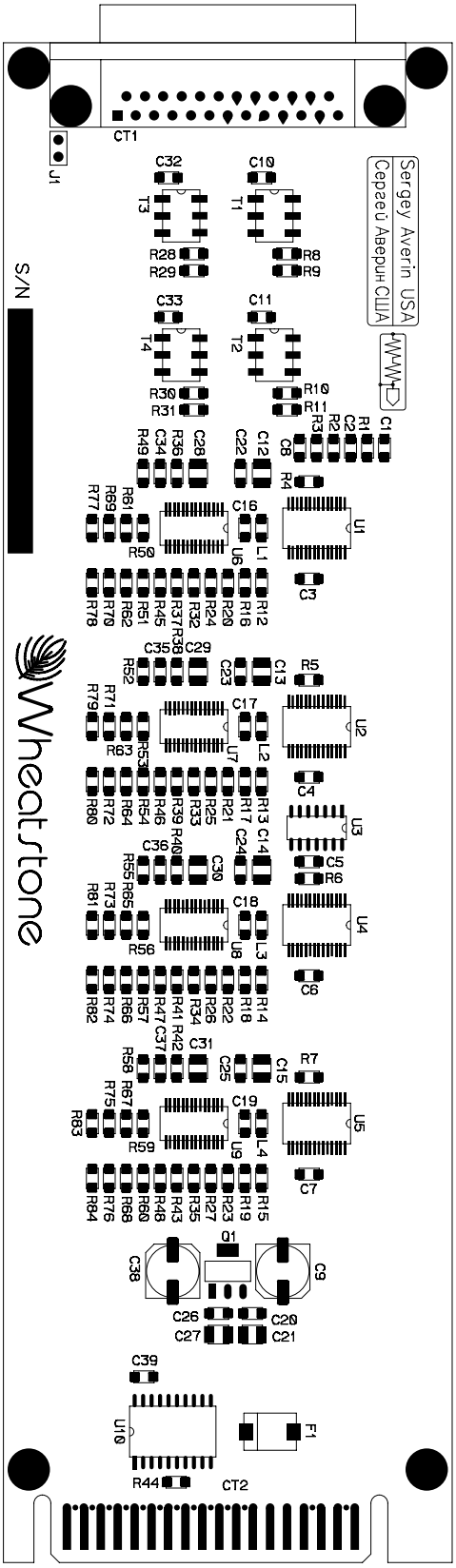
4 Digital Inputs Network I/O Center (DINC-4) Schematic



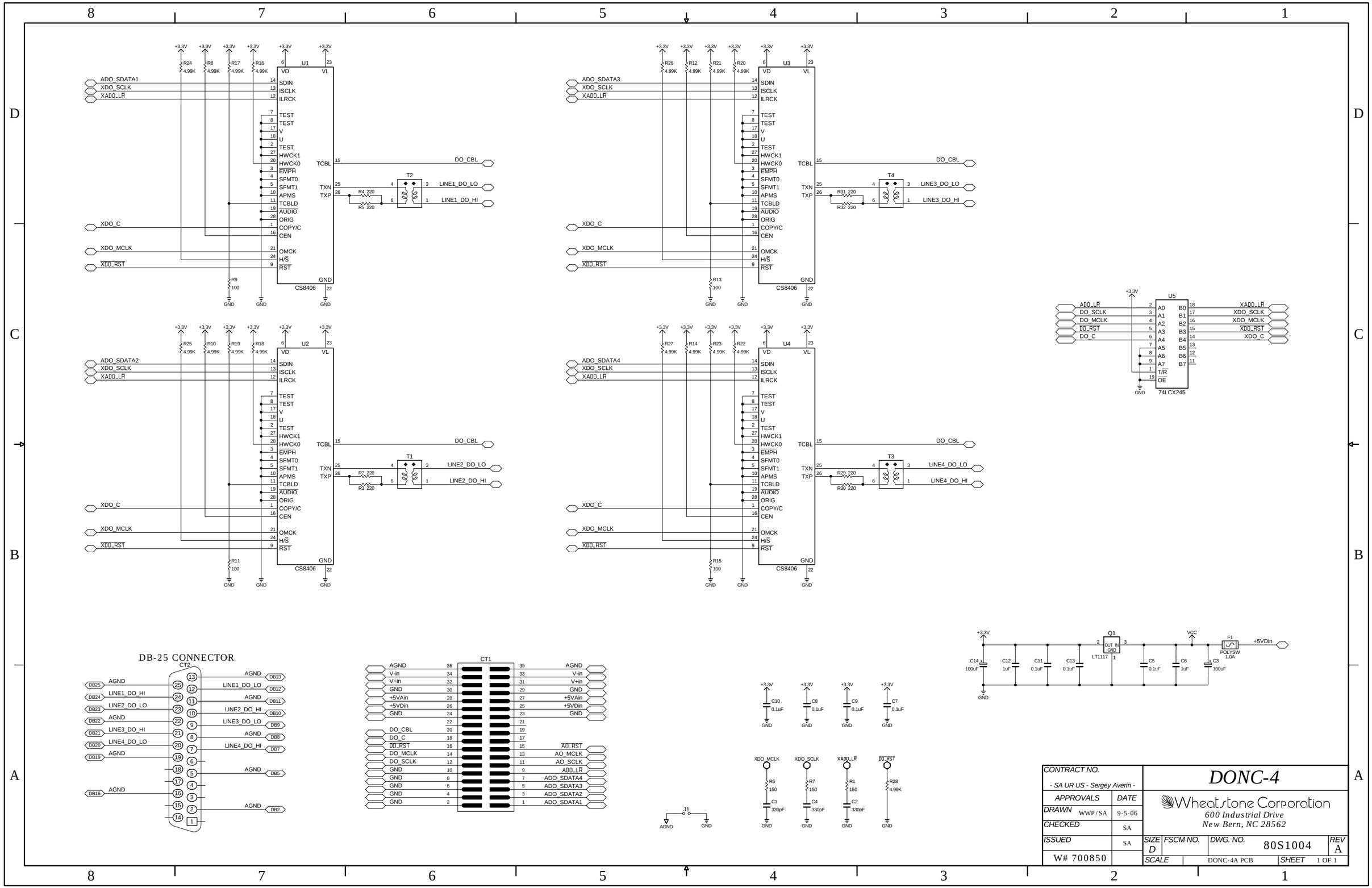




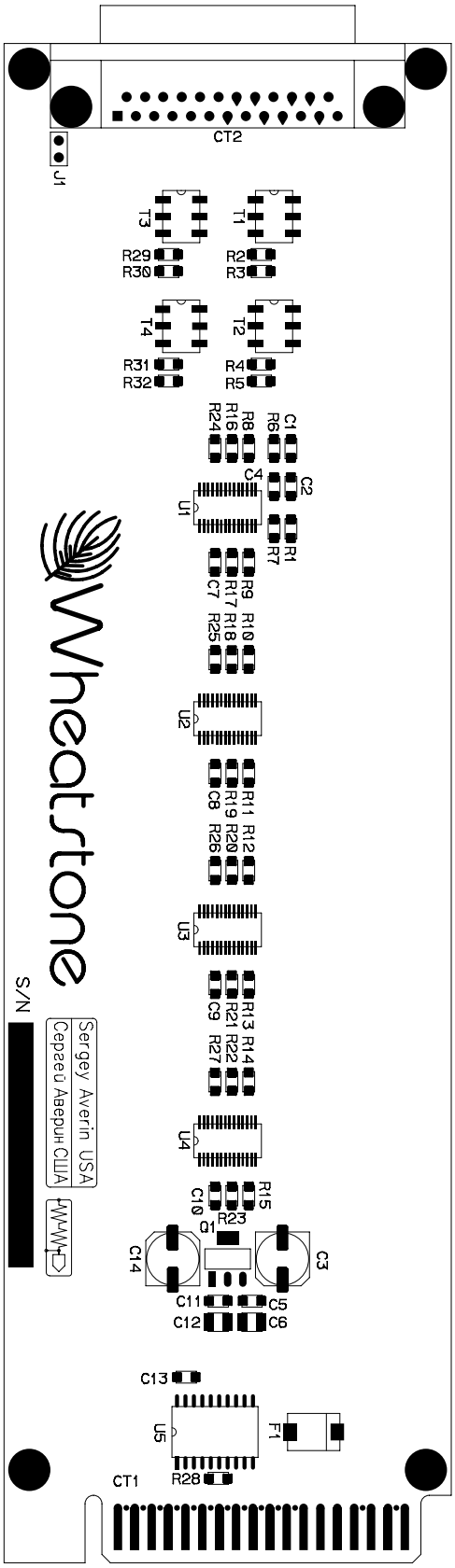
CONTRACT NO.		DINC-4			
- SA UR US - Sergey Averin -					
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562			
DRAWN WWP/SA	9-21-06				
CHECKED	SA				
ISSUED	SA	SIZE D	FSCM NO.	DWG. NO. 80S1003-2	REV A
W# 700849		SCALE	DINC-4A PCB	SHEET 2 OF 2	



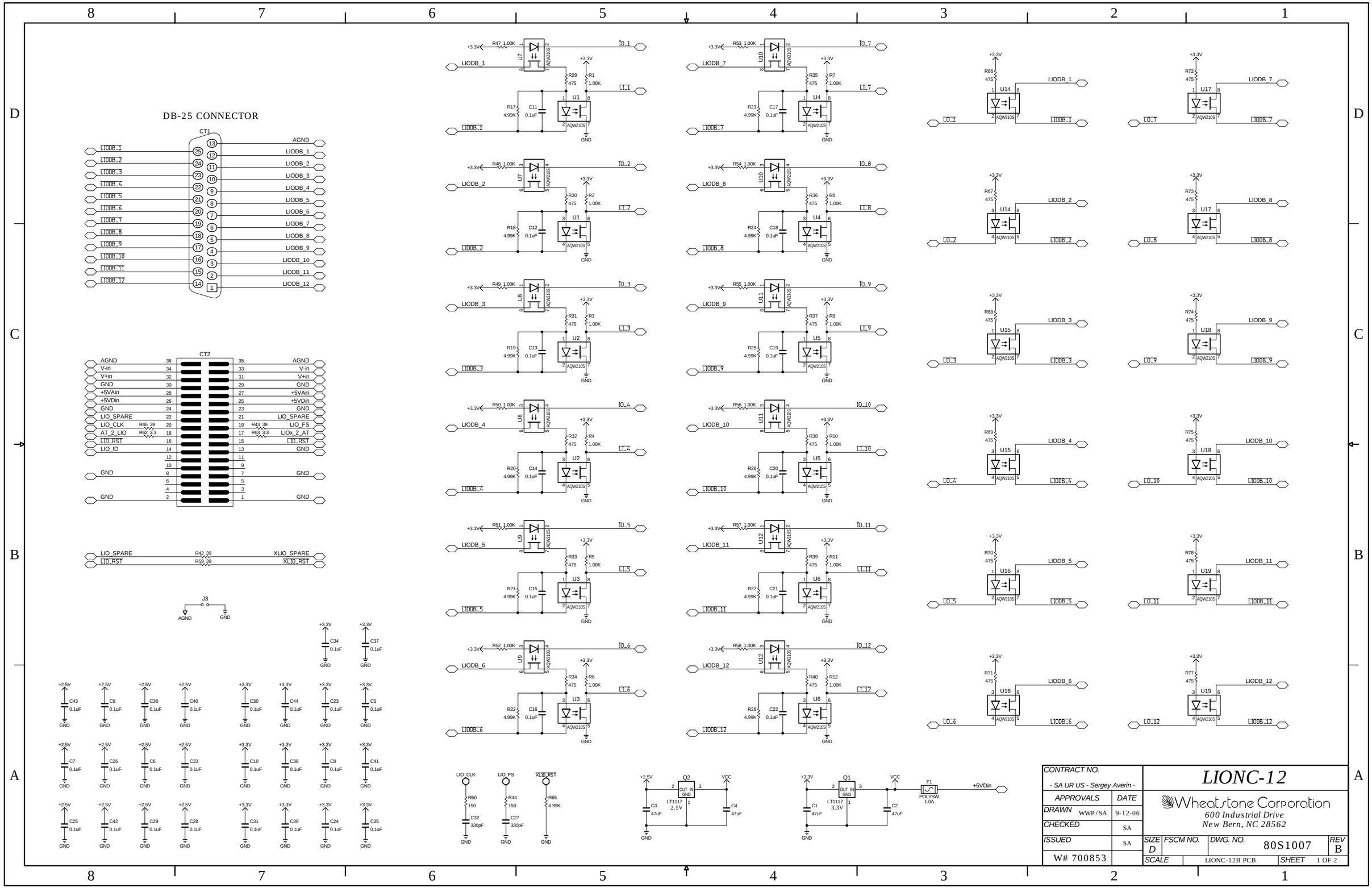
4 Digital Inputs Network I/O Center (DINC-4) - Load Sheet



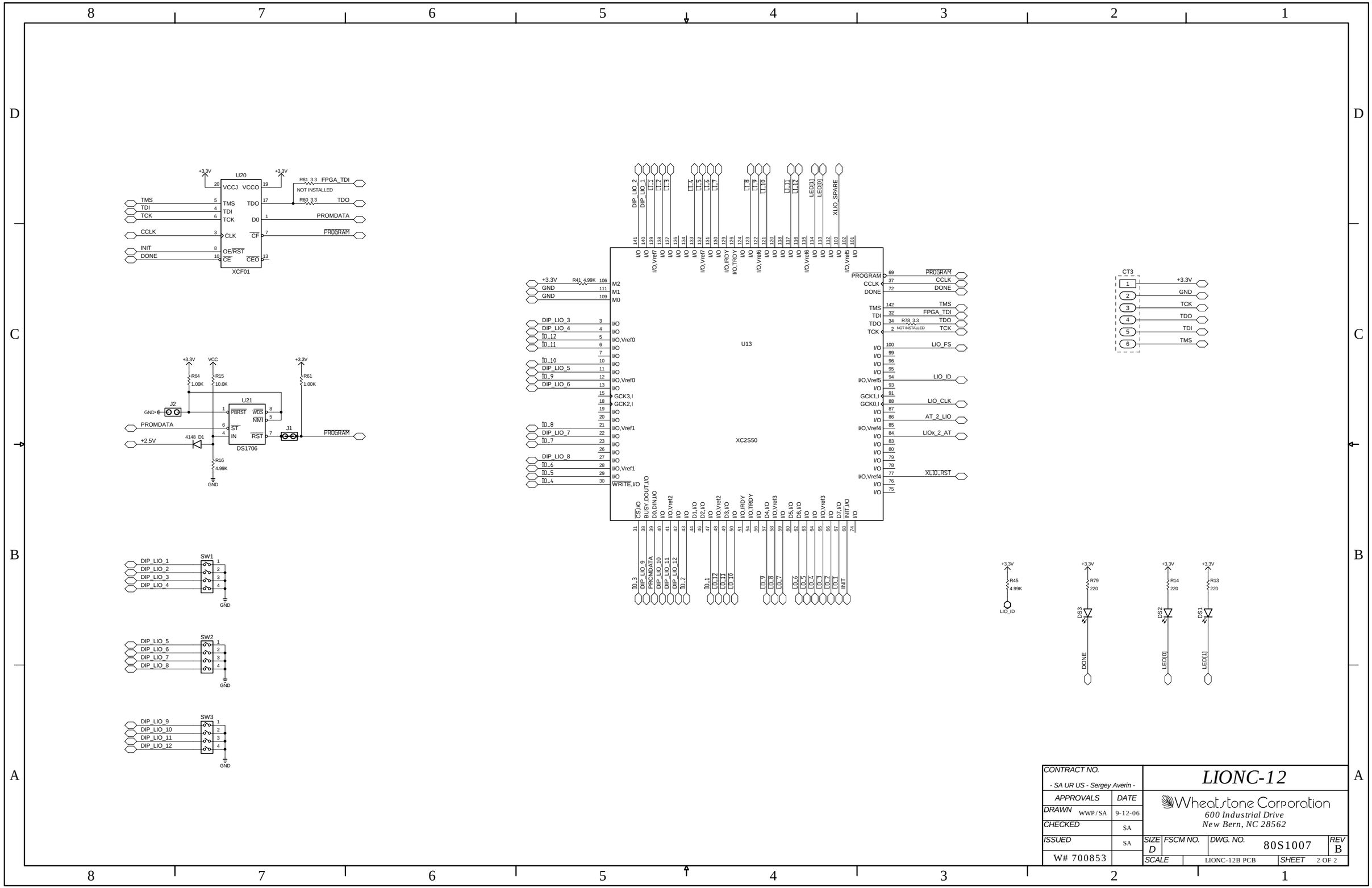
4 Digital Outputs Network I/O Center (DONC-4) Schematic



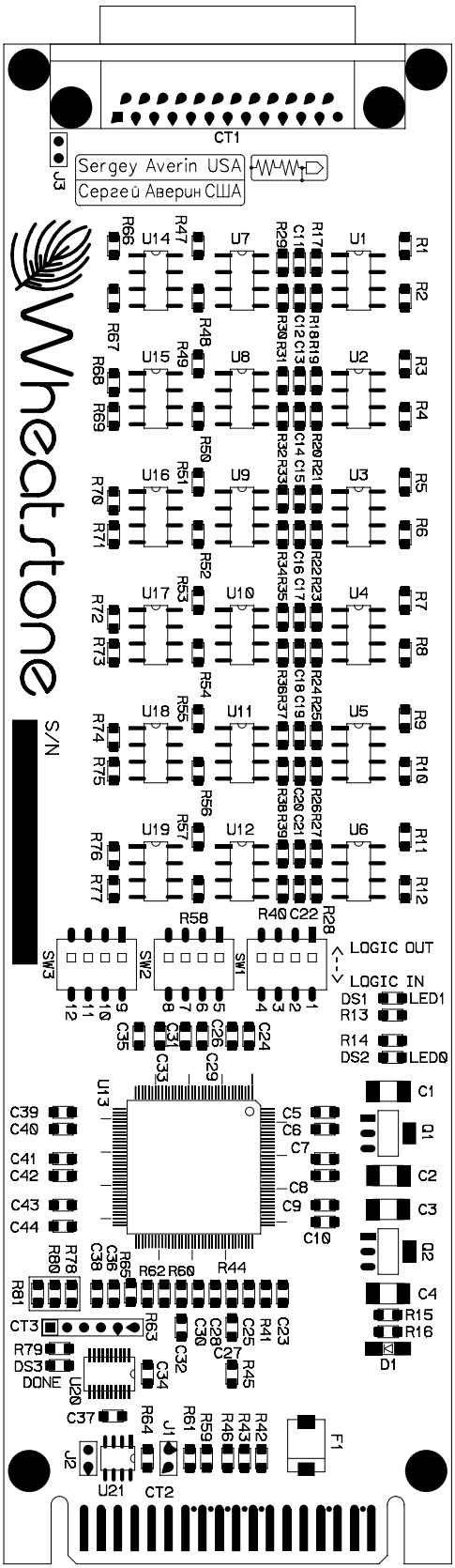
4 Digital Outputs Network I/O Center (DONC-4) - Load Sheet



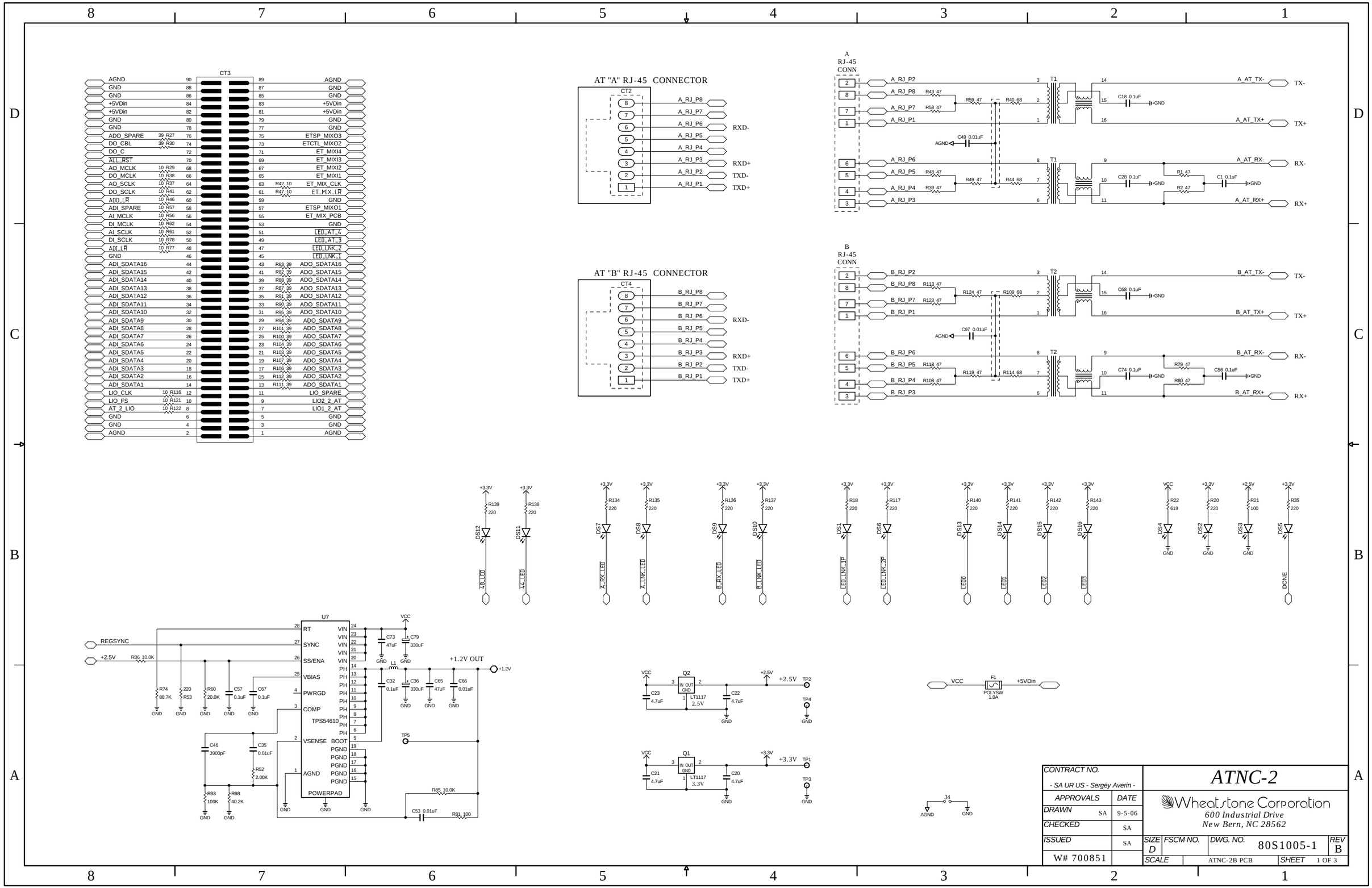
Logic Interface Network I/O Center (LIONC-12) Schematic



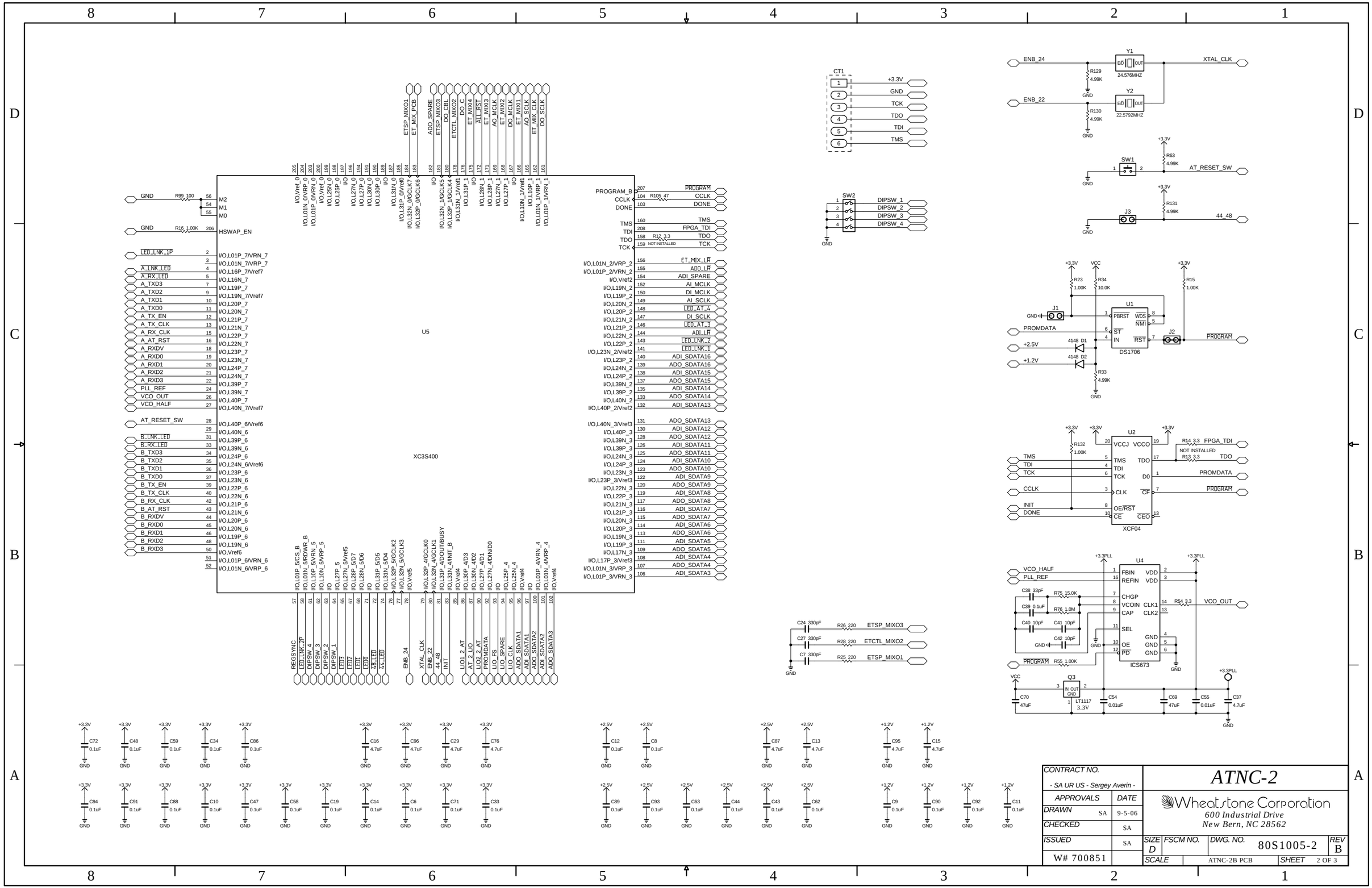
Logic Interface Network I/O Center (LIONC-12) Schematic



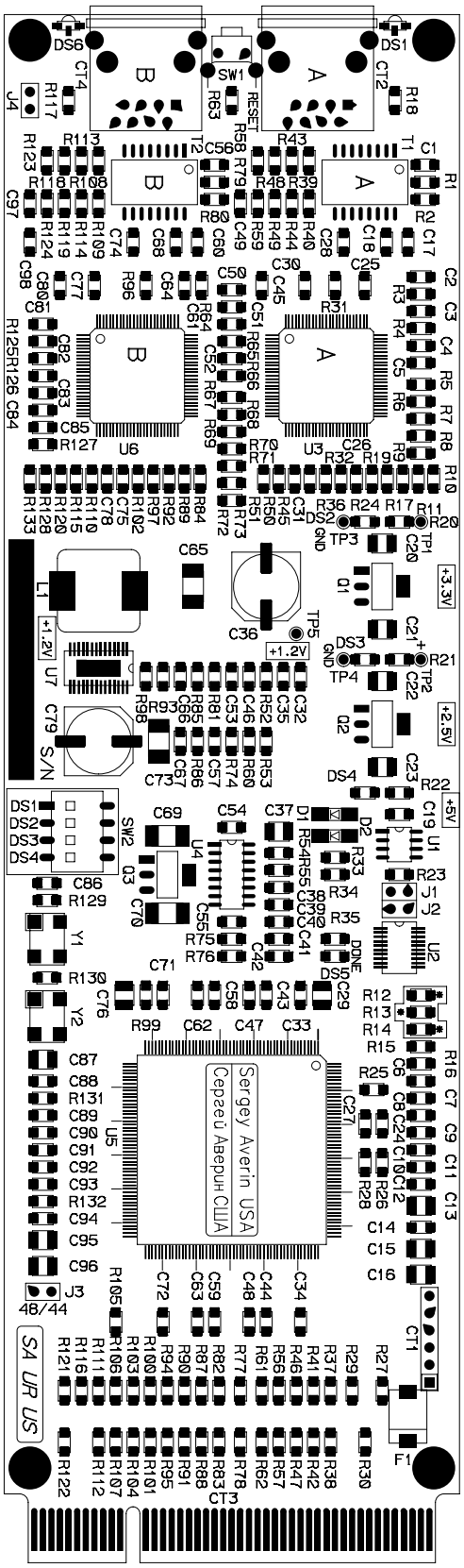
Logic Interface Network I/O Center (LIONC-12) - Load Sheet



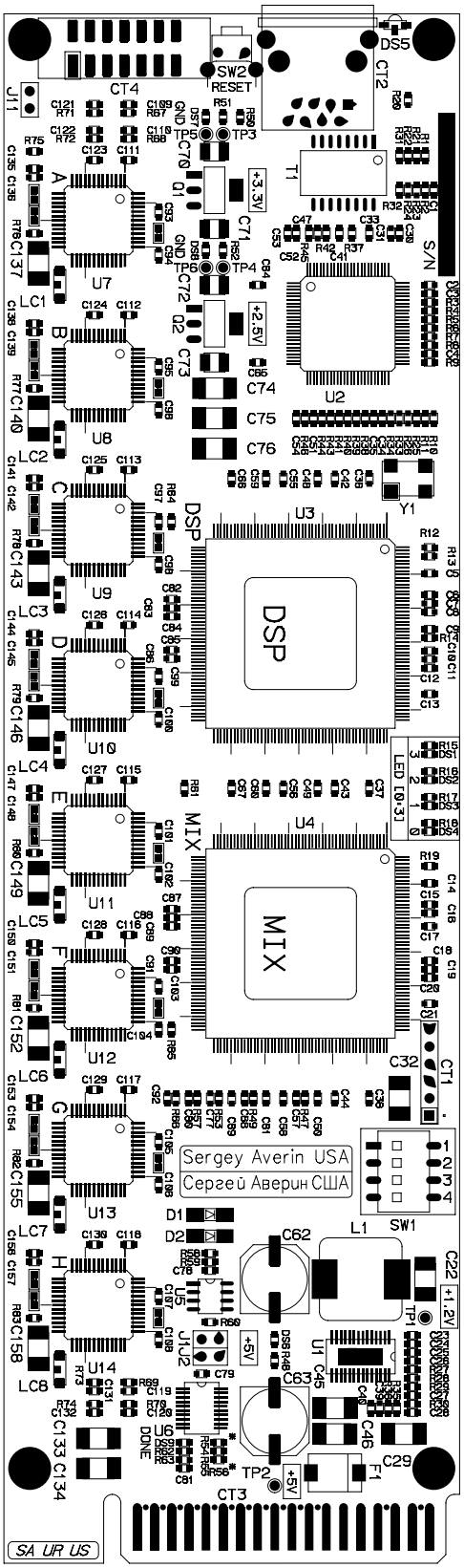
Dual Audio Transport Network I/O Center (ATNC-2) Schematic



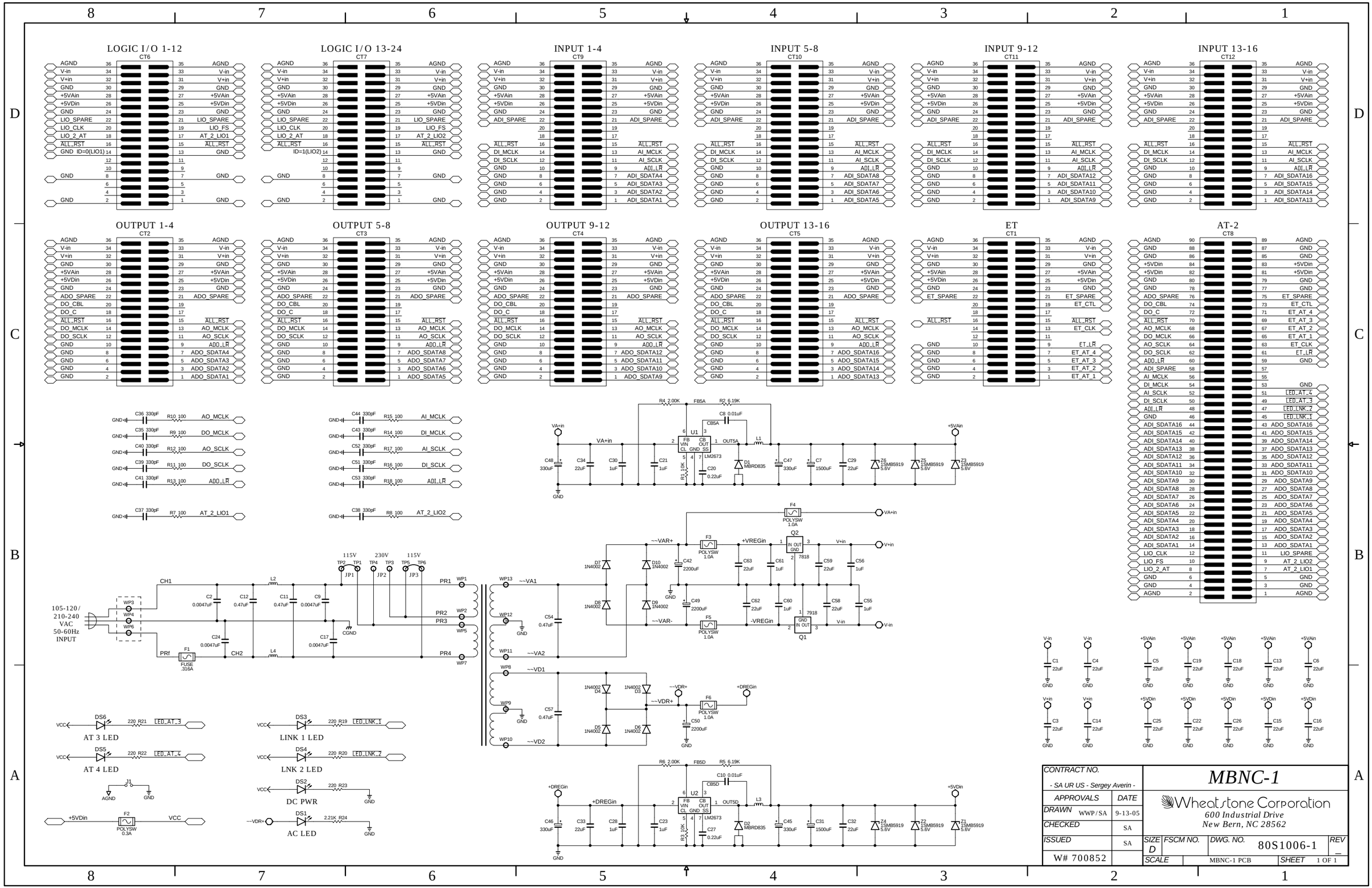
Dual Audio Transport Network I/O Center (ATNC-2) Schematic



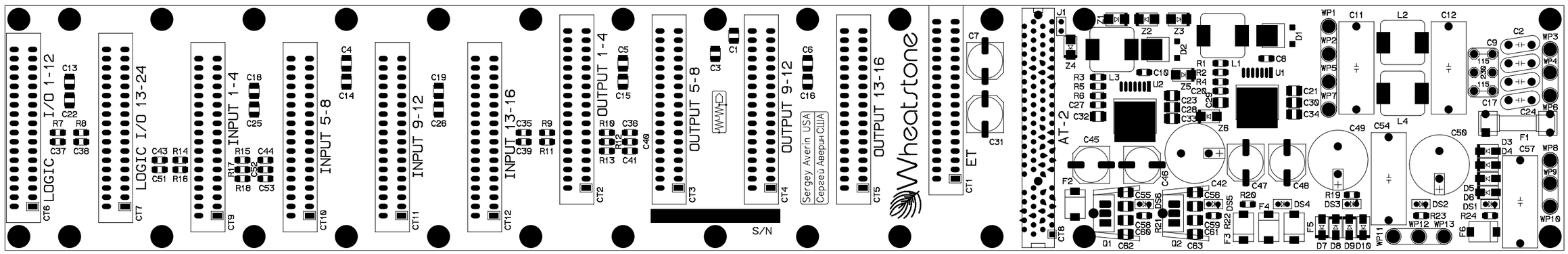
Dual Audio Transport Network I/O Center (ATNC-2) - Load Sheet

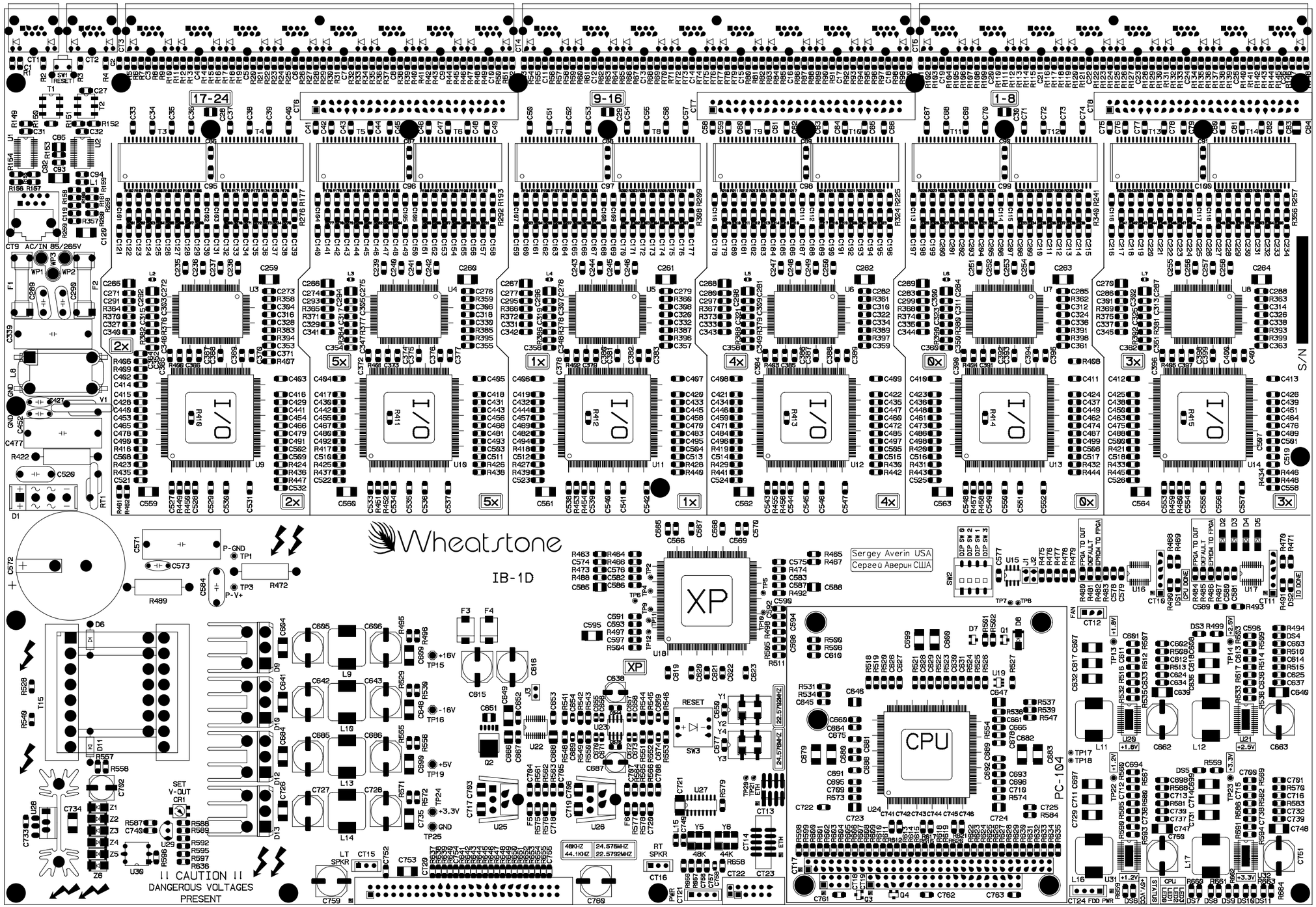


Digital Signal Processor Card (DSP-NC) - Load Sheet

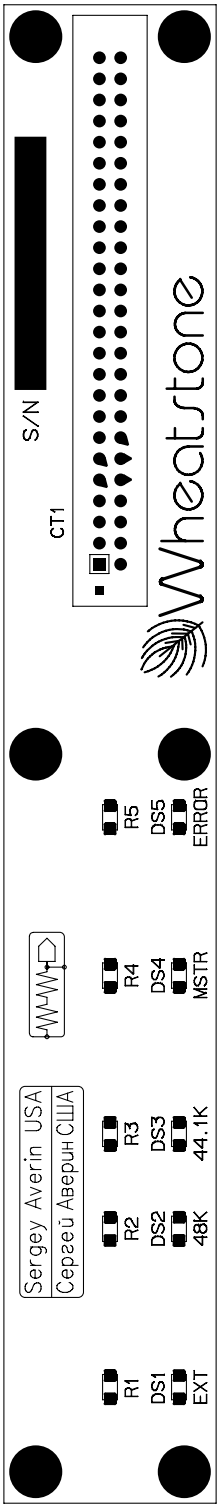


Mother Board Network I/O Center (MBNC-1) Schematic

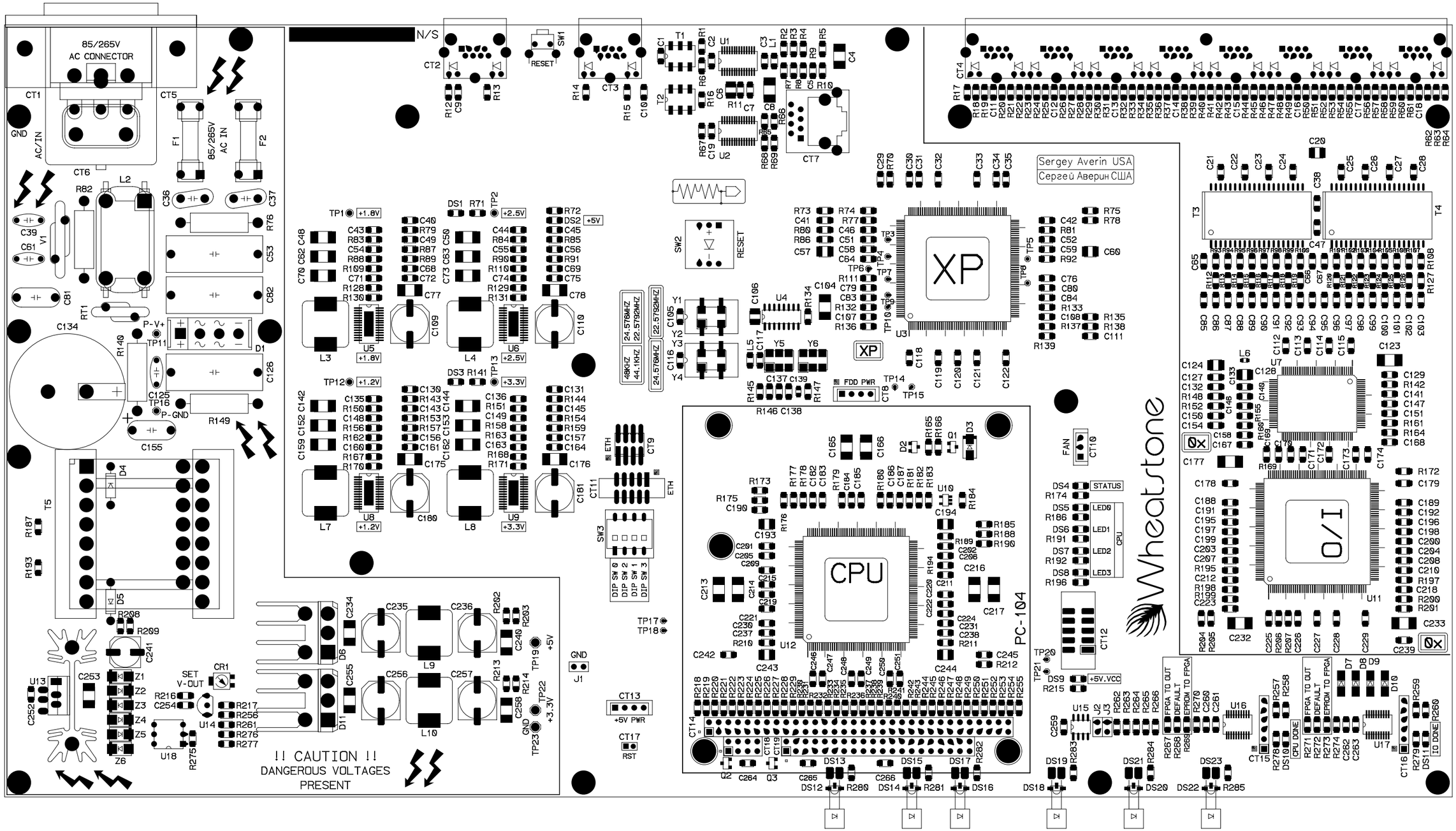

LOGIC
LOGIC I/O 1-12
LOGIC I/O 13-24
INPUT 1-4
INPUT 5-8
INPUT 9-12
INPUT 13-16
OUTPUT 1-4
OUTPUT 5-8
OUTPUT 9-12
OUTPUT 13-16
ET
AT-2
S/N
Sergey Averin USA
Сергей Аверин США
Wheatstone



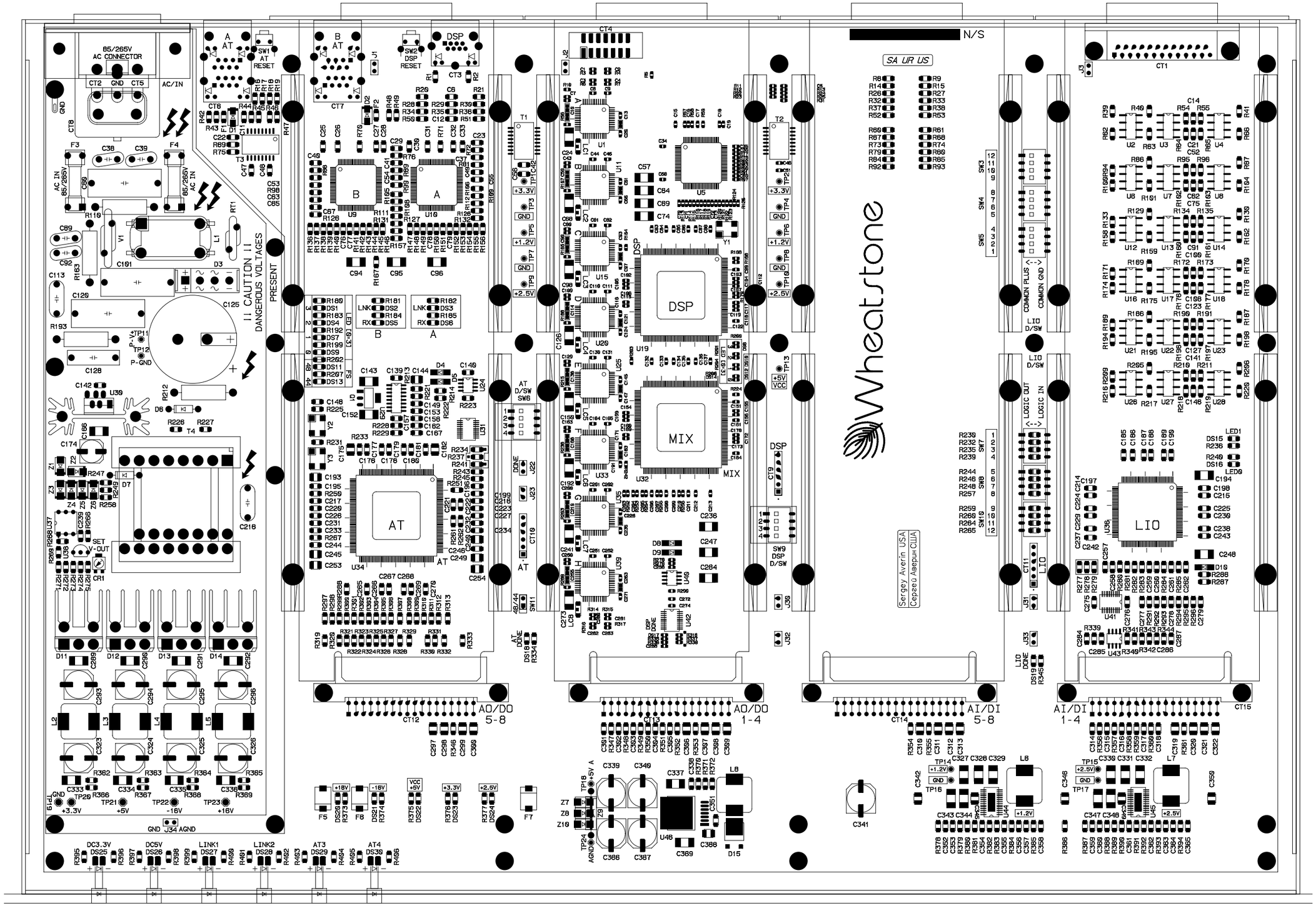
S-16 Wheatnet-E Super Hub Main Card (IB-1) - Load Sheet



S-16 Wheatnet-E Super Hub LED Card (IBEL-1) - Load Sheet



S-8 Wheatnet-E Super Hub Main Card (IBA-1) - Load Sheet



Micro Satellite Main Card (MCS-8 & MCS-8E) - Load Sheet

Glossary

The terminology used in this manual is defined as follows.

- ***Channel*** - A single, monaural audio stream. The E-SAT can switch up to 32 discrete inputs to 32 discrete outputs (16 x 16 stereo) per tier.
- ***Signal*** - Information from a single audio source. A signal may take up one (mono) or two (stereo) channels.
- ***Chassis or Rack*** - A single unit backplane.
- ***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.
- ***Slot*** - A position within a rack where a single card is located.
- ***Tier*** - E-SAT is based on advanced X-Point software that support multiple hardware levels called Tiers. While the software supports multiple tiers, the E-SAT hardware only supports one tier.
- ***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 Router configuration.

- ***Switch ID*** - A unique identifier assigned to each E-SAT.
- ***Rack ID*** - The physical chassis ID number.
- ***Slot ID*** - The physical slot number in each chassis (numbered from 1-12).
- ***Channel ID*** - Channel IDs within a chassis run from 1-32. Input Channel IDs are assigned directly to the input devices. Output Channel IDs are assigned directly to the output devices.
- ***Signal Type*** - Each input and output in the E-SAT is associated with a type of signal, either mono or stereo. The importance of this information at configuration time is the number of channels each signal consumes. Mono signals use 1 channel and stereo signals use 2.

Appendices

Appendix 1

Appendix 2

Appendix 1

Contents

Configuring System IP Addresses

Caution! Your system has been pre-configured at the factory for a default IP address of 192.168.1.160. Incorrect editing of network files will cause system malfunction. Please consult Wheatstone support if you are having trouble connecting your system to a network.

Overview

In order to communicate to the E-WHEATNET over ethernet, appropriate network parameters must be loaded. Constraints on the router configuration were made to simplify the installation, while still providing the flexibility to connect the router to existing customer networks. They are:

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

2. If dynamic address allocation is used on the network (e.g. DHCP), the router must be given a "permanent" address allocation. In order to allow the router 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 router.

Editing Network Parameters

The E-WHEATNET stores its network IP address and subnet information in a simple text file on its flash hard disk. Changing the E-WHEATNET's network parameters requires the user to download the xp_net.txt file via FTP from the E-WHEATNET, edit as required, then move the edited file back onto the E-WHEATNET. Once the editing process is complete, a system re-boot will initialize the new addressing scheme.

Setting up FTP Site Profiles

Typical FTP clients allow the user to create Site Profiles for frequently visited FTP sites. These site profiles store log-on information and site location information that would otherwise have to be entered every time you access the site. The E-WHEATNET is a "site". Required profile information is:

Site Name - identify the CPU you are connecting to (e.g. "E-NET")

IP address of FTP site (E-WHEATNET default 192.168.1.160)

User Name = knockknock (lower case)

Password = whosthere (lower case)

Open the third party FTP application and create a site profile for the E-WHEATNET's CPU using the *current* IP address (default is 192.168.1.160).

We recommend the freeware FTP client FTP Surfer by Whisper Technology. Windows Internet Explorer allows FTP, but in our experience it is not the best choice for this file maintenance application.

Editing the Network Text Files

Note: It is very important to save the edited file on your PC. This can help in the event a typo prevents you from connecting after re-boot.

Once connected via FTP to the E-WHEATNET's flash hard drive you will see a directory listing of files and an FDOS folder.

- Locate the "xp_net.txt" file in the file list.
- Copy this file to your desktop.
- Edit the IP address(es) and subnet mask as required.
- Locally Save, then Copy the edited xp_net.txt file back onto the router.
- Re-boot the system (Cycle power on the E-WHEATNET).
- Change your PC's IP address and the XPoint software IP address via the *Configure-AdvXP Setup* form. The E-WHEATNET CPU and the PC must be on the same subnet.

Sample network text files are included below for reference.

Sample E-WHEATNET CPU Network File

E-WHEATNET CPU - xp_net.txt

```
NAME:HUB                    << 8 Character limit
TIERID:1                    << Do NOT Edit - must match physical Tier location
NUMTIERS:4                  << Do NOT Edit
IPADDR1:192.168.1.160       << Edit IP addresses as required
IPADDR3:192.168.1.11
IPADDR4:192.168.1.12
GATEWAY:255.255.255.255     << Do NOT Edit
SUBNET:255.255.255.0        << Edit Subnet mask as required
BCAST:55555                 << Do NOT Edit
FAILIP:0.0.0.0              << Do NOT Edit
```

Surface Network Files

Surface network files follow the same basic format as the E-WHEATNET. Note that the file name will begin with the model type (e.g. E6_net.txt, E5_net.txt, etc.)

```
NAME:On-Air                 << Up to 8 characters
SURFID:1                    << Do NOT Edit
IPADDR:192.168.1.11         << Edit IP address as required
SUBNET:255.255.255.0        << Edit subnet mask as required
GATEWAY:255.255.255.255     << Do NOT edit
BCPORT:55555                << Do NOT Edit
TIERID:3                    << Do NOT Edit - must match physical Tier location
TIERICNT:4                  << Do NOT Edit - must match physical Tier location
TIERIPADDR:1,192.168.1.160  << Edit IP addresses as required
TIERIPADDR:2,0.0.0.0
TIERIPADDR:3,192.168.1.11
TIERIPADDR:3,192.168.1.12
```

AdvXP LITE ONLY

Appendix 2

Contents

For the most part there are no user-replaceable parts in the S-16 and S-8 E-WHEATNET, E-SAT, MCS-8, and MCS-8E units. Exceptions are those controls and components that in the course of normal use may need maintenance. A complete list of available components follows. 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 “techsupport@wheatstone.com”.

REPLACEMENT PARTS — S-16 E-WHEATNET

COMPONENT	DESCRIPTION	*WS P/N*
IBE-1NC LOADED CARD	PROCESSOR LOADED CARD ASSEMBLY W/O COMPUTER	***"009803"***
IBEL-1 LOADED CARD	LED LOADED CARD ASSEMBLY	***"009801"***
POWER CORD	7 1/2' BLACK POWER CORD	***"150017"***
CABLE	1MM PITCH FLAT FLEXIBLE CABLE	***"150188"***
CABLE	1MM 10 POSITION ROUND FLAT CABLE ROHS COMPLIANT	***"150206"***
I/O CONNECTOR	8 GANG RJ45 ASSEMBLY WITH GREEN/YELLOW LED	***"220137"***
I/O CONNECTOR	SINGLE RIGHT ANGLE RJ45 CONNECTOR WITH GREEN/YELLOW LED	***"220138"***
SOCKET	2MM 40 POSITION SOCKET	***"220144"***
SOCKET	20 PIN DIL SOCKET	***"250057"***
SOCKET	34 PIN DIL SOCKET	***"250058"***
HEADER	3 PIN .098" HEADER	***"250062"***
HEADER	4 PIN .098" HEADER	***"250063"***
HEADER	10 PIN BOXED HEADER, STRAIGHT	***"250077"***
HEADER	50 PIN PC MOUNT STRAIGHT HEADER ROHS COMPLIANT	***"250109A"***
PLUG	2MM 8 PIN PLUG ROHS COMPLIANT	***"250121"***
HEADER	2MM 10 POSITION RECEPTACLE ROHS COMPLIANT	***"250138"***
SWITCH	MOMENTARY PCB MOUNTED RIGHT ANGLE SWITCH	***"510248A"***
TRANSFORMER	POWER TRANSFORMER	***"800068"***
FUSE	SMALL 2 AMP FUSE ROHS COMPLIANT	***"830014"***
SOFTWARE	SOFTWARE CD FOR E-SERIES NETWORK SYSTEM	***"071778 "***
MANUAL	E-SERIES NETWORK SYSTEM OWNER'S MANUAL	***"009899"***

REPLACEMENT PARTS — S-8 E-WHEATNET

COMPONENT	DESCRIPTION	*WS P/N*
IBA-1NC LOADED CARD	PROCESSOR LOADED CARD ASSEMBLY W/O COMPUTER	***"008498"***
POWER CORD	7 1/2' BLACK POWER CORD	***"150017"***
I/O CONNECTOR	8 GANG RJ45 ASSEMBLY WITH GREEN/YELLOW LED	***"220137"***
I/O CONNECTOR	SINGLE RIGHT ANGLE RJ45 CONNECTOR WITH GREEN/YELLOW LED	***"220138"***
POWER CORD	POWER CORD CONNECTOR WITH PRINTED CIRCUIT TERMINALS	***"230071"***
SOCKET	20 PIN DIL SOCKET	***"250057"***
SOCKET	34 PIN DIL SOCKET	***"250058"***
HEADER	3 PIN .098" HEADER	***"250062"***
HEADER	4 PIN .098" HEADER	***"250063"***
PLUG	4 PIN .098" PLUG FOR #26 AWG	***"230029"***
SWITCH	MOMENTARY PCB MOUNTED RIGHT ANGLE SWITCH	***"510248A"***
SWITCH	NKK SWITCH W/BRIGHTER GREEN LED	***"510289"***
SWITCH CAP	GREEN SWITCH CAP	***"530001"***
FRONT PANEL LED	RECTANGULAR GREEN LED	***"600003"***
FRONT PANEL LED	RECTANGULAR RED LED	***"600004"***
FRONT PANEL LED	RECTANGULAR YELLOW LED	***"600005"***
TRANSFORMER	POWER TRANSFORMER	***"800021"***

REPLACEMENT PARTS — E-SATELLITE

COMPONENT	DESCRIPTION	*WS P/N*
AI-NC4 LOADED CARD	ANALOG INPUT CARD ASSEMBLY	***"008810"***
AO-NC4 LOADED CARD	ANALOG OUTPUT CARD ASSEMBLY	***"008811"***
DI-NC4 LOADED CARD	DIGITAL INPUT CARD ASSEMBLY	***"008812"***
DO-NC4 LOADED CARD	DIGITAL OUTPUT CARD ASSEMBLY	***"008813"***
AT-NC LOADED CARD	AUDIO NETWORK CARD ASSEMBLY	***"008814"***
LIO-NC LOADED CARD	LOGIC CARD ASSEMBLY	***"008815"***
DSP-NC LOADED CARD	DIGITAL SIGNAL PROCESSOR CARD ASSEMBLY	***"008888"***
MB-NC LOADED CARD	MOTHERBOARD CARD ASSEMBLY	***"008802"***
AI-NC REAR	ANALOG INPUT REAR PANEL	***"008820"***
AO-NC REAR	ANALOG OUTPUT REAR PANEL	***"008821"***
DI-NC REAR	DIGITAL INPUT REAR PANEL	***"008827"***
DO-NC REAR	DIGITAL OUTPUT REAR PANEL	***"008828"***
AT-NC REAR	AUDIO NETWORK REAR PANEL	***"008824"***
LIO-NC REAR	LOGIC REAR PANEL	***"008825"***
BK-NC REAR	BLANK REAR PANEL	***"008822"***
CONNECTOR KIT	FULL CONNECTOR KIT FOR IOC-16	***"008817"***
POWER CORD	7 1/2' BLACK POWER CORD	***"150017"***
I/O CONNECTOR	RIGHT ANGLE 25 PIN PC MOUNT CONNECTOR .318 FEMALE	***"220120"***
I/O CONNECTOR	RIGHT ANGLE SHIELDED RJ-45 CONNECTOR	***"260049"***
PLUG FOR DB-25 I/O CONNECTOR	DB25 INDIVIDUAL CRIMP PIN PLUG	***"200100"***
PIN FOR I/O CONNECTOR	MALE PIN FOR DB25 PLUG	***"200101"***
HOOD FOR DB-25 PLUG	METALIZED PLASTIC STRAIGHT HOOD FOR DB25 PLUG	***"200102"***
CRIMP TOOL	CRIMP TOOL FOR DB CONNECTOR	***"850067"***
TOOL EXTRACTOR	PIN EXTRACTOR TOOL	***"850069"***
FRONT PANEL LED	RECTANGULAR GREEN LED	***"600003"***
TRANSFORMER	POWER TRANSFORMER	***"800062"***
FUSE	1 AMP, 250 VOLT, GMA TYPE SLOW BLOW FUSE	***"830060"***
POWER FILTER	POWER LINE FILTER MODULE	***"960013"***

REPLACEMENT PARTS — MICROSATELLITE MCS-8

COMPONENT	DESCRIPTION	*WS P/N*
AI-NC4 LOADED CARD	ANALOG INPUT CARD ASSEMBLY	***"008810"***
AO-NC4 LOADED CARD	ANALOG OUTPUT CARD ASSEMBLY	***"008811"***
DI-NC4 LOADED CARD	DIGITAL INPUT CARD ASSEMBLY	***"008812"***
DO-NC4 LOADED CARD	DIGITAL OUTPUT CARD ASSEMBLY	***"008813"***
MCS-8 LOADED CARD	MOTHERBOARD CARD ASSEMBLY	***"009818"***
AI-NC REAR	ANALOG INPUT REAR PANEL	***"008820"***
AO-NC REAR	ANALOG OUTPUT REAR PANEL	***"008821"***
DI-NC REAR	DIGITAL INPUT REAR PANEL	***"008827"***
DO-NC REAR	DIGITAL OUTPUT REAR PANEL	***"008828"***
BK-NC REAR	BLANK REAR PANEL	***"008822"***
POWER CORD	7 1/2' BLACK POWER CORD	***"150017"***
I/O CONNECTOR	25 PIN DB PREWIRE CONNECTOR	***"200022"***
CONNECTOR HOOD	25 PIN DB CONNECTOR HOOD	***"200025"***
I/O CONNECTOR	2 PORT STACKED MODULAR JACK RJ45	***"260069"***
FRONT PANEL LED	RECTANGULAR GREEN LED	***"600003"***
TRANSFORMER	POWER TRANSFORMER	***"800068"***
FUSE	SMALL 2 AMP FUSE ROHS COMPLIANT	***"830015"***
POWER FILTER	POWER LINE FILTER MODULE R/A	***"960015"***

REPLACEMENT PARTS — MICROSATELLITE MCS-8E

COMPONENT	DESCRIPTION	*WS P/N*
AI-NC4 LOADED CARD	ANALOG INPUT CARD ASSEMBLY	***"008810"***
AO-NC4 LOADED CARD	ANALOG OUTPUT CARD ASSEMBLY	***"008811"***
DI-NC4 LOADED CARD	DIGITAL INPUT CARD ASSEMBLY	***"008812"***
DO-NC4 LOADED CARD	DIGITAL OUTPUT CARD ASSEMBLY	***"008813"***
MCS-8MIX LOADED CARD	MOTHERBOARD CARD ASSEMBLY WITH MIX ENGINE	***"009857"***
MCS-8MEQ LOADED CARD	MOTHERBOARD CARD ASSEMBLY WITH MIX ENGINE AND EQ	***"009817"***
AI-NC REAR	ANALOG INPUT REAR PANEL	***"008820"***
AO-NC REAR	ANALOG OUTPUT REAR PANEL	***"008821"***
DI-NC REAR	DIGITAL INPUT REAR PANEL	***"008827"***
DO-NC REAR	DIGITAL OUTPUT REAR PANEL	***"008828"***
BK-NC REAR	BLANK REAR PANEL	***"008822"***
MS-8MIX REAR	MS-8 MIXER LINK REAR PLATE	***"009861"***
POWER CORD	7 1/2' BLACK POWER CORD	***"150017"***
I/O CONNECTOR	25 PIN DB PREWIRE CONNECTOR	***"200022"***
CONNECTOR HOOD	25 PIN DB CONNECTOR HOOD	***"200025"***
I/O CONNECTOR	2 PORT STACKED MODULAR JACK RJ45	***"260069"***
I/O CONNECTOR	SINGLE RIGHT ANGLE RJ45 WITH GREEN/YELLOW LED ROHS COMPLIANT	***"220138"***
FRONT PANEL LED	RECTANGULAR GREEN LED	***"600003"***
TRANSFORMER	POWER TRANSFORMER	***"800068"***
FUSE	SMALL 2 AMP FUSE ROHS COMPLIANT	***"830015"***
POWER FILTER	POWER LINE FILTER MODULE R/A	***"960015"***