D-8 Digital Control Surface

TECHNICAL MANUAL

Wheatstone Corporation

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VGA TOUCH SCREEN LCD MONITOR INSTALLATION

The D-8 control surface and the VGA monitor are packed separately for shipping - the control surface is in the wooden crate, while VGA Monitor is in the box with the power supply or the other component of the system. Perform the following steps to install the monitor:



1. Under the back side of the D-8 control surface, and running the length of the surface above the rear panel connectors, is a cover, held in place by eight screws. Remove this cover.
2. Remove the two nuts, lock washers, and washers from the threaded rods on the bottom of the monitor.
3. Feed the VGA and USB wires through the rectangular hole on the top of the control surface.
4. Guide the threaded rods through the two mounting holes on the top of the control surface.
5. Secure the monitor in place using the washers, lock washers, and nuts removed in step 2.
6. Plug the VGA and USB cables into the recessed plugs labeled “TOUCH SCREEN” on the rear of the control surface.
7. Fold the VGA and USB cables up into the recessed area and replace the cover removed in step 1.



IMPORTANT!

Cleaning the Acrylic Surface

An acrylic surface is a beautiful, lustrous material that is outstanding in durability and break resistance. With proper care, it will retain its attractive appearance for many years to come. This care should include precautions against scratching or contact with objects of high temperature that might mar the surface. A few simple precautions will preserve the beauty of the acrylic.

• FIRST be sure the surface to be cleaned is powered off.

• NEVER spray or pour any liquid directly onto the surface.

• TO AVOID scratching these surfaces, use a soft brush or cloth to gently brush away any larger dirt particles. Alternately the larger particles can be blown from the surface with the use of canned air.

• USE a soft, clean lint free cloth or micro fiber cloth and clean lukewarm water to clean the surface. For stubborn dirt and stains use a mild, nonabrasive soap and water mixture with the gentle cleaning cloth. Use only light pressure when cleaning. Avoid rubbing dirt or grit into the surface. Turn the cloth often and replace with a clean cloth frequently. Dry by blotting gently with a clean, dry cloth.

• AVOID using kleenex, paper towels, sponges or other coarse shop towels, as these materials may contain abrasives that can scratch acrylic surface.

• DO NOT USE ketones, aromatics, esters, halogens, window cleaning sprays, alcohol, kitchen scouring compounds, or solvents (such as acetone, benzene, gasoline, carbon tetrachloride, or thinners).

Caution! Do not use ammonia based cleaning solutions as they can cause the surface to yellow, and became brittle and eventually cause structural damage to the acrylic surface.

Wheatstone will not be liable for damage resulting from improper cleaning and maintenance.



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

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General Information

Introduction

The D-8 Digital Audio Control Surface is a member of Wheatstone's line of D-series control surfaces with the functions and control capabilities required by television broadcast facilities, including plenty of output mixes:

2 main mix buses - one may be configured for 5.1 digital surround

4 stereo subgroup mixes

2 stereo auxiliary sends

8 mono Mix-Minus outputs

24 mono Bus-Minus or direct outputs

4 mute groups

The intuitive input fader section provides LED indicators for all bus assignments for "at a glance" confirmation of main bus and Mix-Minus assignments. Above each fader on the input panel is a channel ON switch, 8-character backlit LCD source display, PFL switch, BUS-MINUS TB switch, eight Mix-Minus and four subgroup assignment LED's, two lighted stereo bus assign switches, four mute group status LED's, two AUX Send encoders with ON switches, and a SET switch. The SET switch provides instant access to the integrated touch screen monitor for comprehensive input channel control including EQ, filters, compressor/limiter, expander, and surround panning.

The Master output control panel provides group bus and master output faders, mute group control, and talkback functions. Integrated on the output panels are central shared controls for assigning input faders to group, Mix-Minus, and mute group buses. The

Monitor Control panel features three monitor output level controls with source displays and studio talkback, an event recall system (with security function), and an array of user-programmable switches.

Designed to integrate flawlessly with the Wheatstone BRIDGE digital audio network router, the D-8 control surface allows you to easily create large or small expandable platform-based systems that are exceptionally user-friendly. Wheatstone BRIDGE network cages house all I/O ports and engine cards, and may be wired in tandem within a single equipment room or interconnected to separate remote locations by means of CAT-5 cables or fiber to provide single wire studio integration schemes.

Once configured, the system operates entirely independently of external computers. Configuration itself is intuitive and customized onsite by means of user-friendly graphical interfaces provided by Wheatstone desktop software. The D-8 surface also takes full advantage of Wheatstone's exclusive VDip configuration software, so that studio functions (like mutes, fader and timer starts, tallies, etc.) are easily configured right at your desktop. All settings are retained in non-volatile storage, allowing the entire system to run independently.

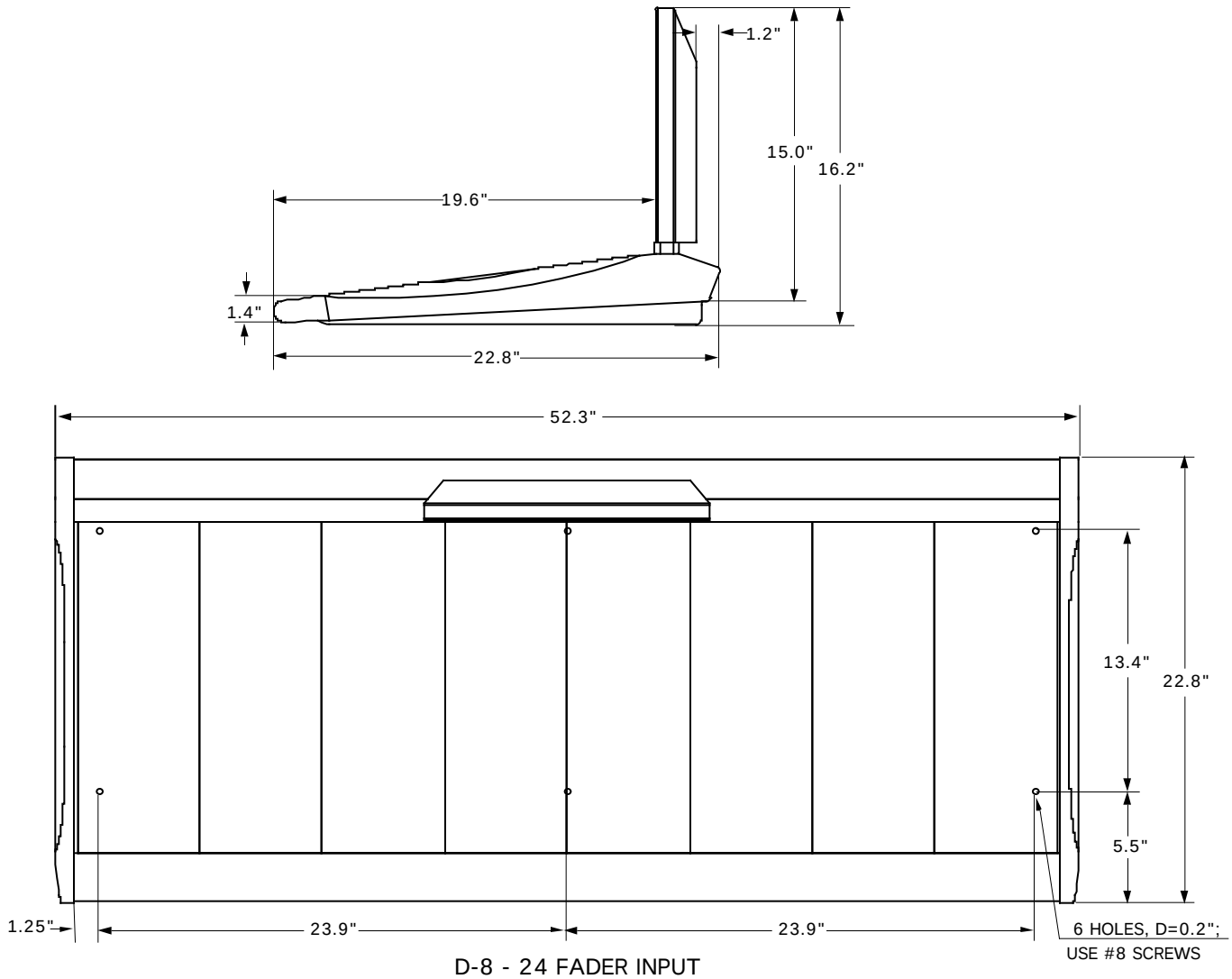
All D-8 surfaces have a built in automation control Interface which enables external control of many D-8 surface functions by popular video automation systems over an Ethernet network. Our Translator desktop software adds another level of flexibility by integrating house router crosspoint control with the D-8 surface.

Control Surface Placement

The D-8 digital audio control surface is designed for leg set or countertop mounting. Leg set assembly instructions are included with the optional leg set.

Although the rubber feet on the bottom keep the surface from being easily moved when simply placed on the counter, holes have been provided so that screws may be used to mount the surface securely to the countertop. Carefully remove the appropriate end panels from the frame, screw the mainframe to the counter top, and reinstall the removed panels. The frame dimensions (in inches) are shown in the drawings below.

Do not connect the D-8 control surface to its power supply until the surface is installed or mounted on the leg set. Never connect the power supply to the AC power line unless the surface's 5-pin D-SUB DC power cable is securely connected first.



D-8 - 24 FADER INPUT

Power Supply



Front view of the PSU-1 rackmount power supply



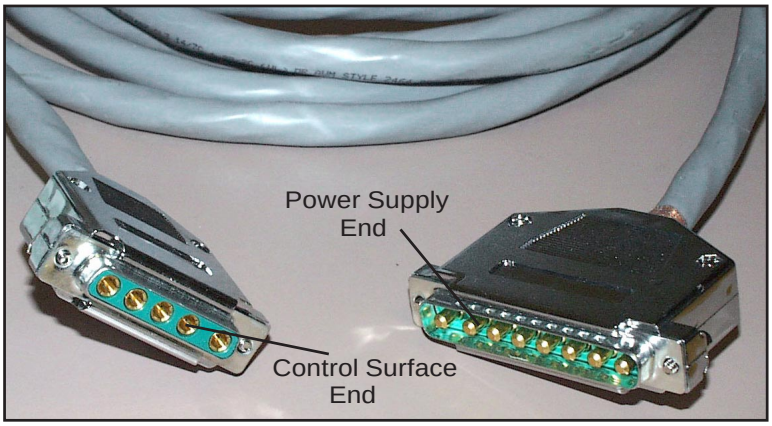
Rear view of the PSU-1 rackmount power supply

The D-8 control surface is powered by a Wheatstone Model PSU-1 rackmount power supply. This unit occupies two 19” wide rack spaces (total height 3-1/2”). Convection cooled, it requires ample ventilation space above and below it.

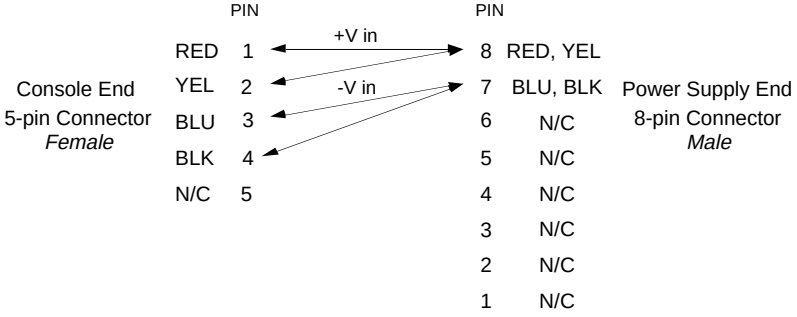
If failsafe redundant supplies have been ordered, you will be installing two PSU-1 units.

Note the power supply (supplies) should be mounted in an equipment rack within fifteen feet of the control surface (but no closer than 3 feet). Avoid locating any high gain equipment too near the rackmount supplies, to avoid magnetic interference into that equipment.

Once the supply is rackmounted, it should be connected to the control surface using the factory supplied DC power cable. The cable has two different types of connectors on it: a 5-pin female connector that connects to either one of the control surface’s power supply connectors, and an 8-pin male connector that plugs into the power supply. Redundant, five pin male “D-SUB” style power supply connectors are located at the rear-left area of the control surface. If you are using one supply, connect it to one of the control surface connectors (it doesn’t



PS Cable Pinout



matter which one). For redundant power supply installation, simply connect each supply to the console. Power supplies may be connected in any order but it makes sense to number or label your power cables for ease of identification when servicing the system.

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

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

Failsafe Dual Redundant Supply

Wheatstone failsafe power supply systems use two PSU-1 power supplies for each piece of powered equipment. Though either is capable of running a full load on its own, in failsafe operation both units run in tandem: if one fails, the other takes over, assuring uninterrupted operation.

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

Energizing

Assuming the D-8 control surface mainframe is properly placed, and its PSU-1 power supply (or supplies) correctly rackmounted and connected to the control surface, you may now energize the rackmount power supply by plugging it into the AC mains. The “GOOD” LEDs on the power supply front panel should light up to indicate the presence of their respective voltages. The control surface’s touch screen display and alphanumeric displays will illuminate, and individual module switches will assume factory default settings.

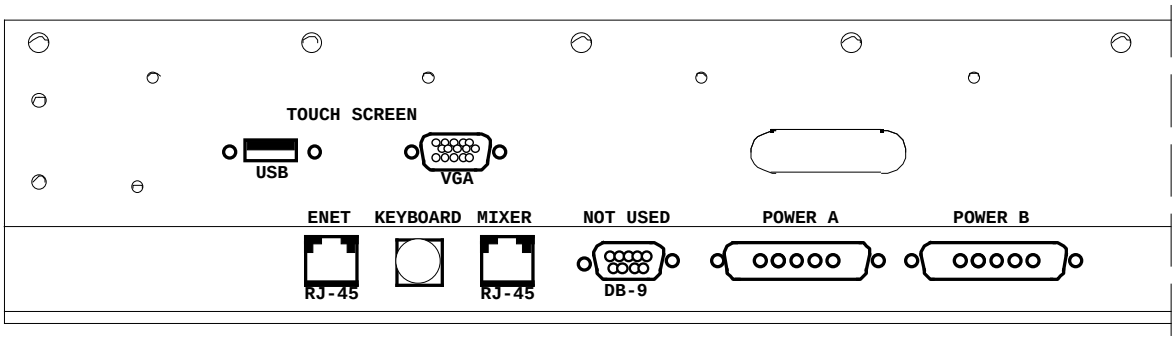
Note: To de-energize the control surface, unplug the rackmount power supply’s AC cord from the AC mains. ***Never de-energize the control surface by disconnecting the cable that connects the control surface and power supply together.***

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

I/O Connections

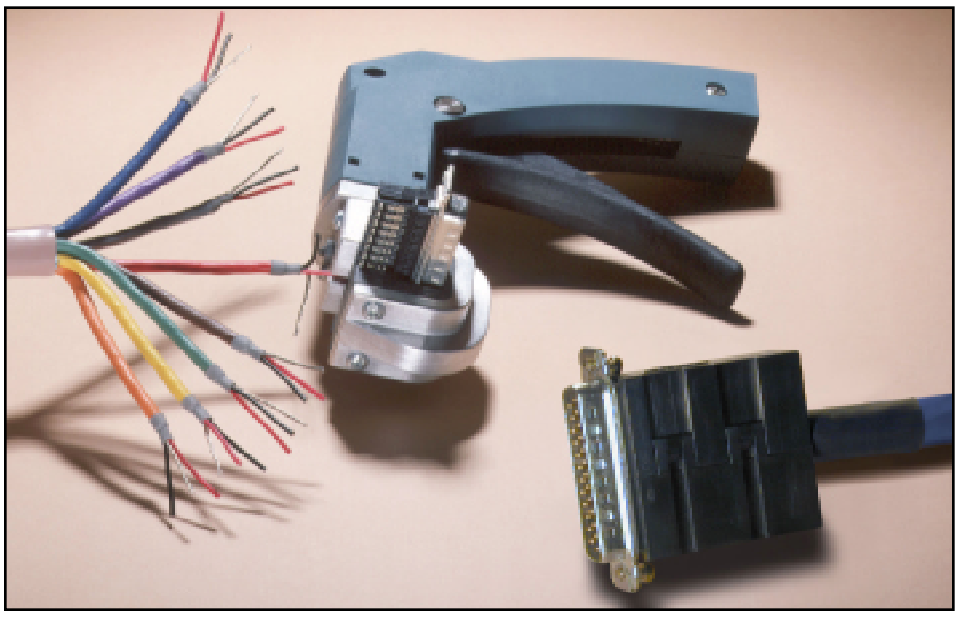
All user wiring to and from the D-8 control surface is made via connectors located on the control surface's rear panel. Two 5-pin male D-SUB connectors at the center of the control surface's rear are for power supply connections. There are two RJ-45 connectors, one on the left for Ethernet and one on the right for the Mixer Link connection. Connect the Ethernet port to an Ethernet switch along with the other Wheatstone devices. The Mixer link connects to a system specific QAT Port - refer to your system's connection map or XPoint to determine where this connects. The USB and VGA connectors are provided to connect the touch screen monitor. The DB-9 connector is not used.

The keyboard connector is for factory use only. The sketch below shows connector locations. For all wiring pinout connections refer to Chapter 5, page 5-6.



The Insulation Displacement Connector System

The I/O wiring interface system is based on insulation displacement technology. A special AMP wiring tool is included with each control surface; it is auto-indexing, and allows individual wire connections to be positively made with a single squeeze of the tool's trigger. The trigger action is ratchet controlled, and will not release until



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

a full connection is made. Once released, the multipin connector held in the tool's jaw automatically indexes to the next connector pin. The technology is such that no stripping, soldering, or tinning of wire ends is required; all that is needed is that the wires destined for the connector be snub cut and laid out in order (although tubing should be used on bare drain wires). An empty DB-15 connector is inserted into the tool, indexed to the first pin, and the wires are inserted one by one into the jaw and the trigger squeezed. In this way a single multipin connector can be completely wired up in a minute or two. These connectors will accept wire gauge 22 - 26 AWG.

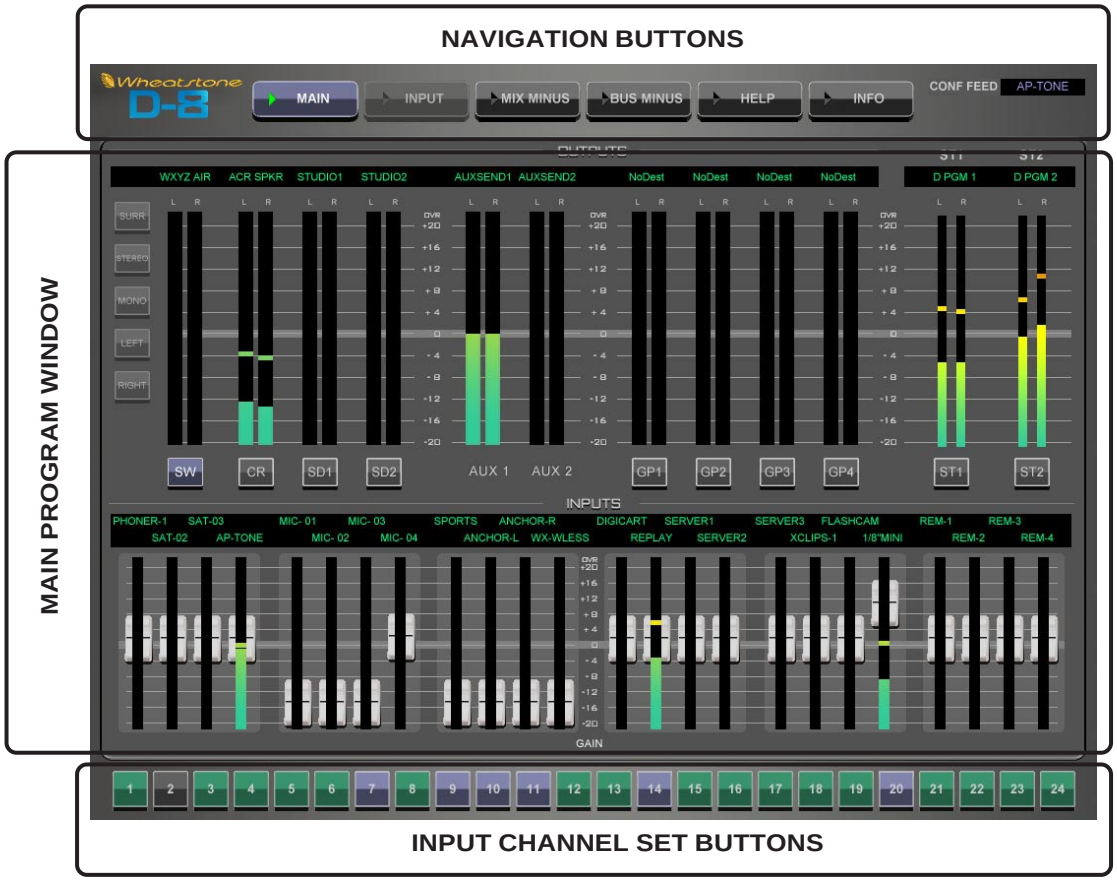
In the event of a wiring error, connector pins may easily be removed from the shell with the wire still attached, and inserted into the correct position. Observe the side of the connector, with the metal part down. You will see a row of "Vees"—simply press the top of the vee together with a scribe or other sharp instrument; this will unlock the pin from the shell, and it can be removed and inserted into the correct position. Spread the vee apart to lock the pin in the new position. It should never be necessary to discard a connector due to a wiring error.

Note that mating hoods for each connector are also supplied with the system. These have locking screws that hold the connectors securely to their mates.

Getting Started

The D-8 control surface comes with the D-8 Embedded Graphical User Interface (GUI) program, intended to be straightforward in use, controlling and displaying graphics, production tools, and set up screens. All controls of the GUI's main screen are in fixed positions, except that the FUNCTION DISPLAY area contents will change according to selected function.

Connect the VGA touch screen LCD monitor to the DB-15 "TOUCH SCREEN" connector on the control surface's rear panel, power up the surface, and the GUI will appear on the monitor. An optional USB mouse may be used for navigation. Connect the USB mouse to the USB2 connector on the rear of the surface. Right-click mouse to activate cursor.



We will also refer throughout this manual to the XPoint program. This program, which runs on a user-supplied PC running Windows XP, complements the embedded surface GUI program, providing additional programming and control functionality. Read more about XPoint in the Wheatstone Evolution Series Digital Audio Network System Technical Manual.

Log-In

When the surface boots, it enters the log in level that was last accessed. There are three log in levels; ADMIN, USER, and GUEST. Logging in as ADMIN allows the operator to access all controls on the surface. USER mode is useful for normal operation as it provides access to most controls and prevents operators from accidentally overwriting saved surface Events. Passwords may be viewed and edited using the provided XPoint software application. Please see the *Monitor Panel - Control Modes* section of this manual for detailed information regarding passcodes.

Button Navigation

The D-8 GUI features a "hot-button" navigation architecture to easily access the system's features with a touch screen or mouse. There are a few subtleties you need to be familiar with to efficiently get around the various software screens. This section introduces you to the buttons; detailed function information is included in the *Input* and *Master* panel sections.

Navigation buttons located across the top of the display area provide access to various control screens or "pages." You may access any of the screens by simply pressing or left-clicking on them. To access Input functions, press an Input fader's SET button and the Function Pane will jump to settings for that input fader strip.

Once on the "Input" page, use the Function Buttons on the right side to jump to the various control screens for each of the processing functions--Filters, Expander, Compressor, EQ, and PAN.

Notice the Input Fader Selector buttons at the bottom of the VGA monitor. These selector buttons may also be used to easily switch between fader channels.

Main Screen - The top half of this screen displays metering information for all of the console's outputs; Switched/PFL, Audio CR and Studio speaker feeds, Aux Sends, Groups, and Masters all have individual meters. The lower half of the screen has meter/gain widget controls for all 24 input faders. The input selector bar allows quick access to individual input faders from any screen.

Input Selector Bar - 24 buttons located along the bottom of the VGA monitor - click on a numbered button to access the DSP processing controls and Bus-Minus output for the selected fader. This input selector bar allows quick access to individual faders from any screen.

Input Screen - The top half of this screen provides a comprehensive parameter control section for the selected fader strip. Here you can adjust source Gain and Mode, Phantom power, Phase, HPF-LPF Filters, and add Delay. A Bus-Minus control section allows easy configuration of the fader's discrete Bus-Minus (IFB) output.

The bottom half of the screen provides an X vs. Y graph window for viewing filter, EQ, or dynamics curves. Use the function buttons to the right of the X-Y window to select a processing function- Filters- Expander- Compressor- EQ- Pan.

Mix-Minus Screen - The top half of this screen provides metering and master output level controls for each of the eight Mix-Minus master outputs. The 24 x 8 matrix at the bottom lets the operator quickly assign any one of the 24 input faders to any or all of the eight Mix-Minus buses. The matrix also provides a clear "at a glance" picture of the board's entire Mix-Minus setup.

Note that the D-8 is configured so that a green dot on the 24 x 8 matrix indicates that the fader is "subtracted" or removed from the Mix-Minus output. This method is useful because the operator only needs to select a single crosspoint to configure the Mix-Minus. A typical show may have only three or four green dots making it very easy to "see" how the board's Mix-Minus is configured.

Bus-Minus Screen - This screen displays meter/gain widgets for all 24 Bus-Minus outputs. This comprehensive view gives the operator a clear "at a glance" picture of all 24 Bus-Minus outputs. A dynamic label at the top of each meter indicates where the Bus-Minus output is routed, and dedicated ON and Talkback buttons are provided.

Bus-Minus outputs may be individually configured as pre or post fader Direct outputs on the Input screen for each fader.

Help Tab - Pressing the HELP button at the top of the VGA screen opens a HELP menu that provides guidance with settings such as a Mix-Minus, or with surface operation in general.

Info Tab - Pressing the INFO button at the top of the VGA screen opens the INFO screen, which shows technical information about the surface's software version and connection status to its companion rack MT link, Ethernet link, and automation interface. In the event that you need to consult the factory about the D-8 control surface, you may need to have the surface software version number available.

Note: Each Screen is described in detail in the D-8 GUI Interface section of this manual.

Input Panel (IP-D8)

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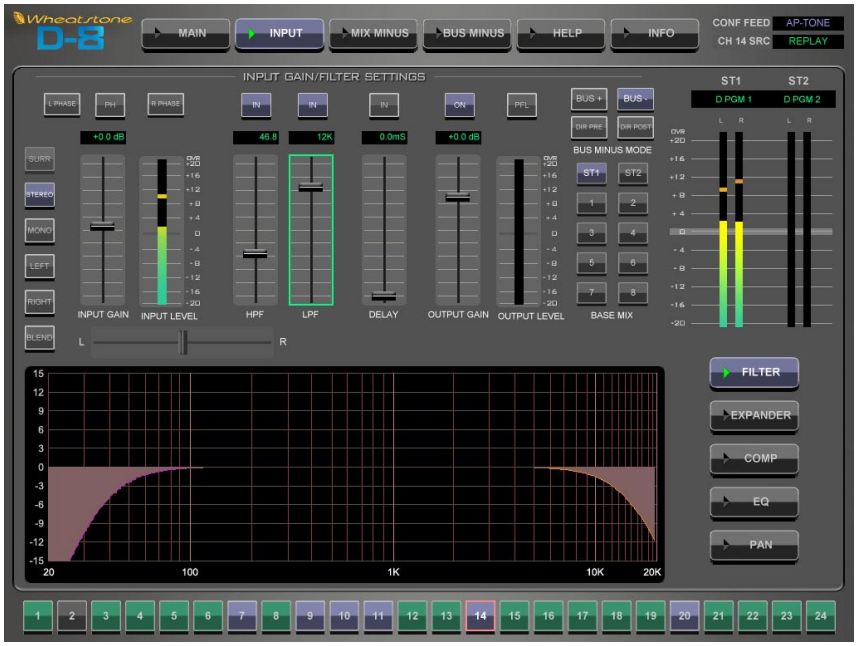
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Input Panel (IP-D8)

Controls and Functions

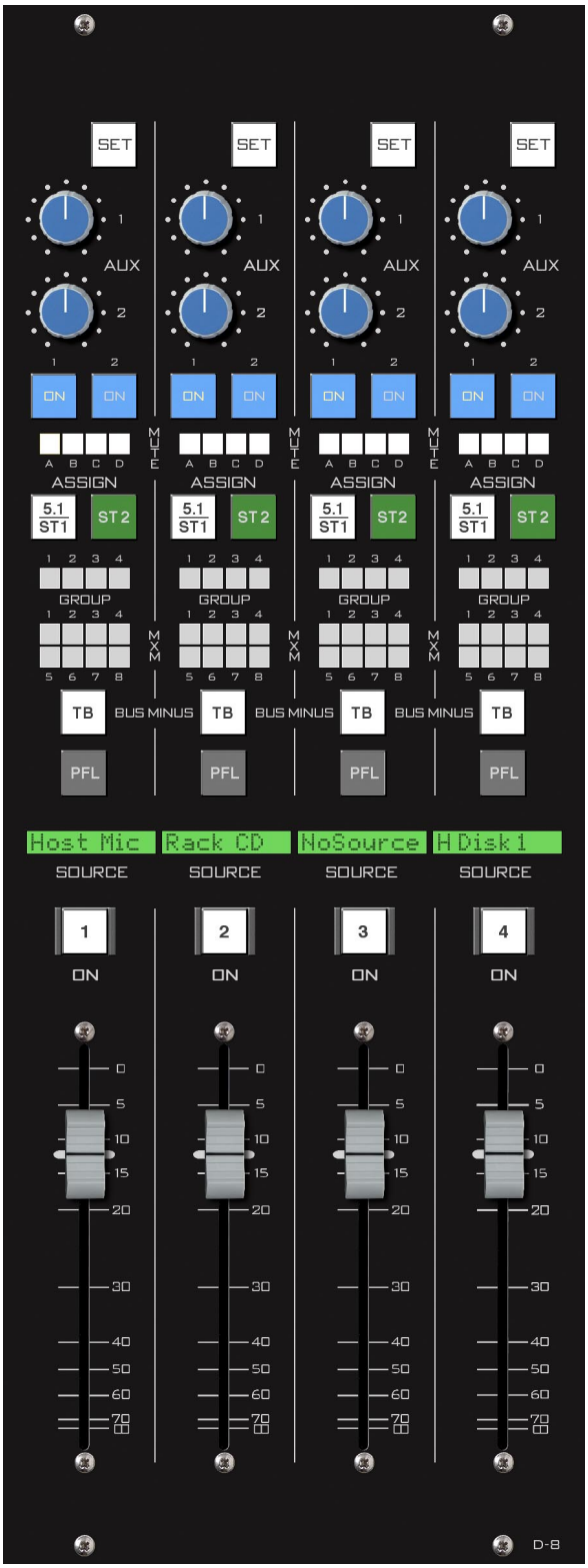
Each input panel of the D-8 digital audio control surface has four identical strips representing four input channels. The D-8 provides two methods for changing parameters on a fader strip. The majority of functions are accessed from the touch screen VGA monitor (see Chapter 6 for details). A small number of functions are directly accessed using hardware switches and pots located on the surface. Most users will use a combination of both methods in day-to-day operation.



Note that the Input fader strip has a minimum number of physical controls, and certain bus assignment buttons located on the MASTER output and MONITOR panels are shared among all input faders.

Input Sources

Each input fader panel is fitted with four faders. Mono, Stereo, or 5.1 Sources can be routed to the fader from any cage in the system. Note that certain fader positions may be dedicated to 5.1 sources as denoted by the “5.1” label on the fader knob. To select the desired input source, first press the channel’s SET button or click on the fader’s number in the Input Selector Bar at the bottom of the VGA monitor. By turning the SOURCE SELECT knob (on the MON-D8





MON-D8 Panel

panel), the available inputs are displayed in the fader's 8-character SOURCE display. When the desired input source is scrolled into the SOURCE window, pressing the TAKE button (on the MON-D8 panel) will cause that source to be switched to the input of the channel, and the source name will be displayed in the SOURCE window.



SET Button

The SET button is located at the top of each fader strip and forces the focus of the VGA to the selected input fader strip. This allows the operator to access various controls and displays in the MON-D8 panel and apply them to the selected channel. To use, press the SET button and then make your appropriate section settings in other areas of the control surface. Once a SET button has been pressed, the button lights up, and all setting changes will apply to **that input channel** until a different input SET button is pressed. The SET function may be configured in the Options.txt file (see Appendix 1) to automatically timeout after 20 seconds.

AUX

Each channel of the input panel has two AUX send knobs (AUX 1 and AUX 2) to set the level of the channel's audio in the AUX SENDS. Two switches (ON 1 and ON 2), determine whether the channel feeds AUX 1 (ON 1) and/or AUX 2 (ON 2). Aux sends may be pre-configured in the Options.txt file to be tapped pre or post fader. See the User Programming section in the Appendix 2 of this manual for details.

Mute Assign Displays

Each fader can be assigned in any combination to MUTE MASTER A, B, C, or D by pressing the fader's SET button, then selecting the desired *INPUT CHANNEL MUTE ASSIGN* switch located at the top of the MASTER fader panel. The MUTE indicator LED's on the fader strip will light solid to indicate the assignment and flash slowly when muted. Any channel that is assigned to a MUTE MASTER will be muted when the corresponding MUTE MASTER is activated. Mute masters are useful for turning several microphone faders Off with a single button press - like when going to a break.

ASSIGN Switches - 5.1/ST 1 and ST 2

ASSIGN buttons assign the input channel signal to the two main buses: 5.1 (surround)/ST 1 (stereo 1) and ST 2 (stereo 2), respectively. The buttons light up to show which buses the input channel has been assigned to. Note that the 5.1/ST 1 switch routes to the first master bus. This master bus has been pre-configured to be a surround bus **or** stereo bus; it is not two separate buses.

GROUP Assign Displays

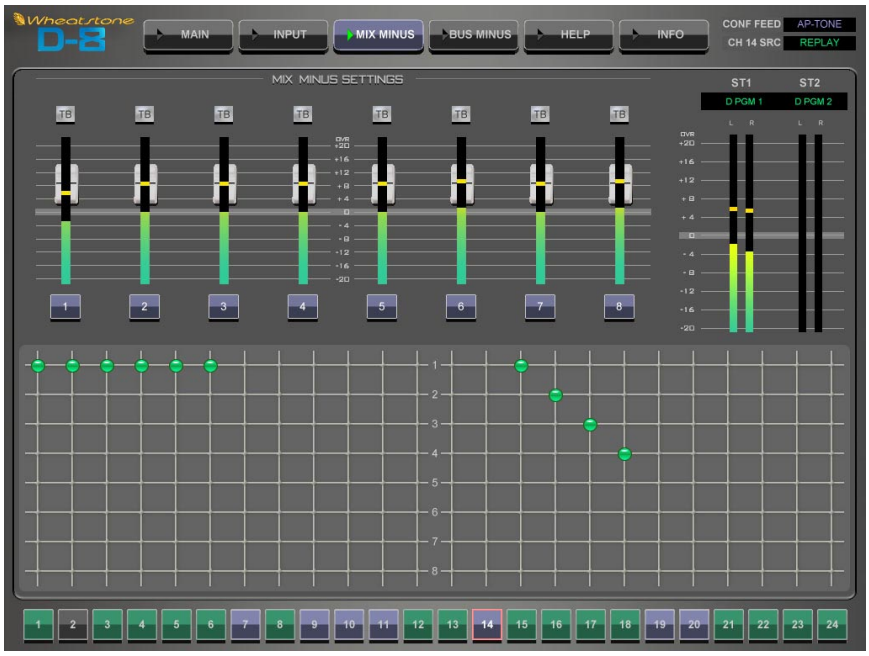
These four LED indicators (GROUP) show which audio group(s) the channel has been assigned to using control switches in the GROUP ASSIGN section of the MST-D8 panel (page 4-3). To assign an input fader to a GROUP, first press the INPUT fader's SET switch, then press the appropriate Group assign switch at the top of the MASTER fader panel.

MXM Displays

Each fader can be assigned to any combination of the eight Mix-Minus buses. The assigned settings are displayed in the MXM 1-8 LED displays. Faders are assigned to these MXMs by using the touch screen GUI on the VGA monitor (see Chapter 6 for details) or using the hardware switches located on the MON-D8 panel. On the GUI press the MIX MINUS button at the top of the VGA monitor. Use the MXM Matrix to select the desired input fader and then press the desired MIX-MINUS ASSIGN button, located on the MON-D8 panel. When you light one of these LED's you are removing the fader from the Mix-Minus bus.



MON-D8 Panel





PFL(CUE) Switch

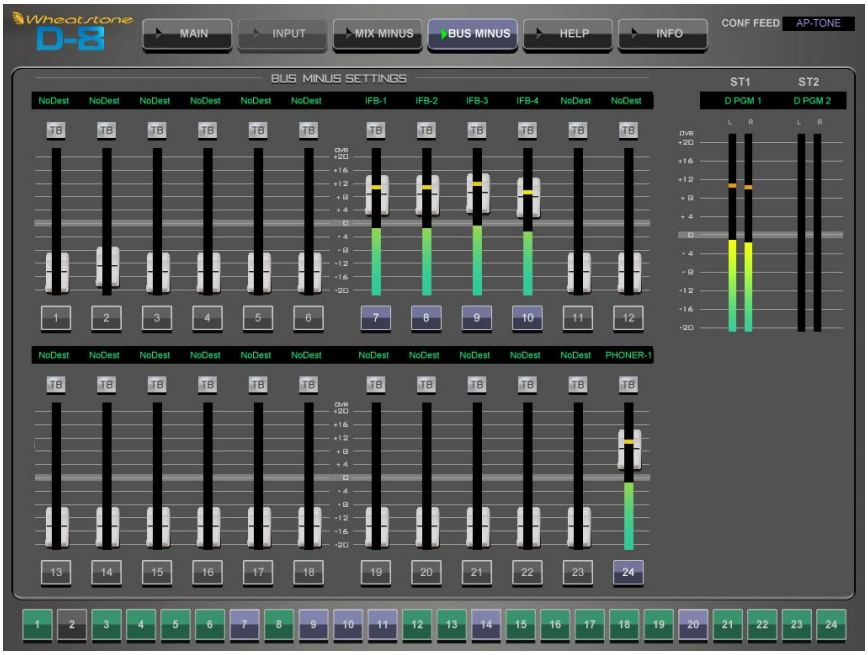
The CUE switch lets the control surface operator monitor the channel's pre-fader signal.

Bus-Minus Outputs

Each fader has a special dedicated output for IFB, Mix-Minus, or Direct feeds - these outputs are collectively known Bus-Minus. These monaural audio output signals may be freely routed to feed telephone hybrids, ISDN interfaces, recording feeds, or other devices as required. Note that Bus-Minus is a separate system from the dedicated eight Mix-Minus buses.

What appears at the Bus-Minus output for a fader is determined by how you configure the Bus-Minus output on the D-8 Input screen for your fader. In a typical application like feeding a TV remote, one might configure the remote talent's Bus-Minus output to include a base mix of the board's main program output *bus* (say ST 1) *minus* the remote talent's fader. Many other Bus-Minus configurations are easily configured, including direct outs for recording.

You can control and meter the output level of any Bus-Minus output by switching to the Input screen for your fader or navigating to the main BUS MINUS screen. You can always press the SET button on the fader strip to cause the VGA monitor to switch to that fader's Input Screen. Click on the main BUS MINUS navigation button on the top of the VGA to see all 24 bus minus outputs at once (see Chapter 6 for details).





Bus-Minus Routing

Bus-Minus outputs for each surface fader appear as *Sources* in the Surface signal area of XPoint, typically located above source signal ID1001. A typical Bus-Minus output signal name is in the *D1BM01* through *D1BM24* range; however, the exact name depends on the fader and surface ID number.

Bus-Minus TB Switch

The BUS MINUS TB switch routes the TB BUS audio, typically the operator's intercom microphone, to the Bus-Minus output for that channel, allowing the operator to talkback to the talent hearing that Bus-Minus signal.

Channel ON Switch

The channel ON switch turns the channel signal ON and OFF and fires the channel ON(START)/OFF(STOP) logic. The switch LED lights to indicate the channel is ON. Channel ON may be remotely controlled by a physical GPI or by external automation via the surface's TCP/IP control interface.

Fader

Channel output level is set by a long-throw motorized fader for automated level control.

NOTE that input channels configured for 5.1 sources have fader knobs engraved with "5.1."



Monitor Panel (MON-D8)

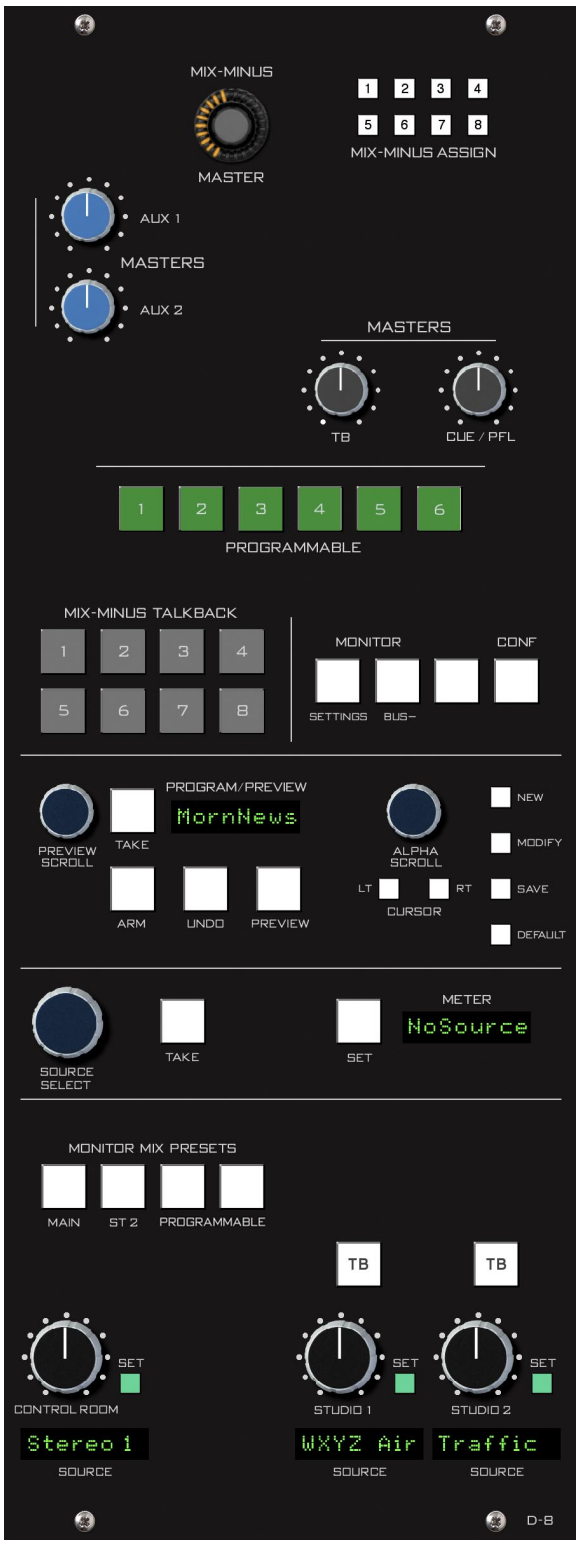
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Monitor Panel (MON-D8)

Controls and Functions

The D-8 digital audio control surface is equipped with one MONITOR panel. This panel provides speaker volume controls for the audio CR, two studios, and a PFL speaker. Also included are master volume controls for the Aux Sends, MXM outputs, and Talkback level. Other functions include an Event snapshot store/recall system, six programmable buttons, and a universal Source selector knob.



Monitor Speaker Controls

There are three monitor outputs available: CONTROL ROOM, STUDIO 1, and STUDIO 2.

Each monitor has a LEVEL control, a SET button, and a SOURCE display, located at the bottom section of the MON-D8 panel. There are also TB buttons to talkback to the two STUDIO sections.

A "soft" MODE selector is located on the MAIN screen that allows users to switch between SURROUND, STEREO, MONO, LEFT only, and RIGHT only modes.

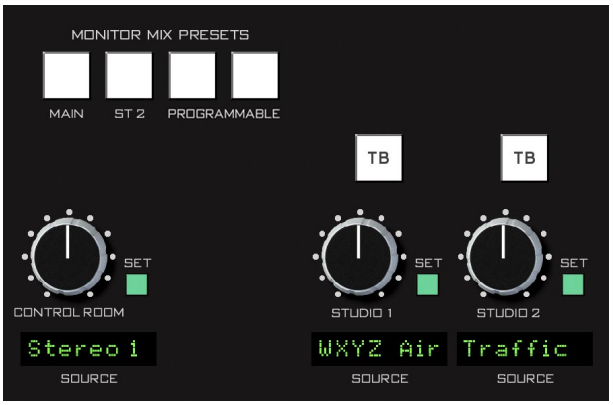
Monitor sources can be selected using the MONITOR MIX PRESETS buttons located directly above the Control Room knob or by scrolling the list of available sources using the SOURCE SELECT knob.

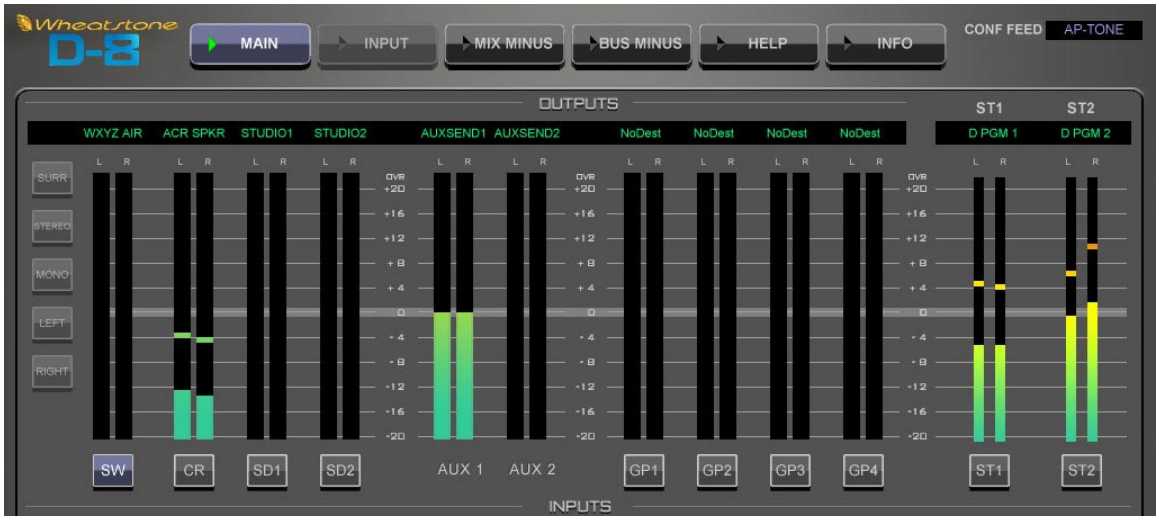
Selecting Monitor Sources

- Press the SET button right next to the CONTROL ROOM or STUDIO knob.
- Press one of the MONITOR MIX PRESETS buttons to select MAIN, ST 2, or one of two programmable sources.
- Sources can be randomly selected with the SOURCE SELECT knob and the TAKE button located just above the MONITOR MIX PRESETS buttons. First, press the SET button for the monitor pot you'd like to change the source on, then use the SOURCE SELECT knob to dial up the desired signal. Press TAKE next to the SOURCE SELECT knob to complete the route.

Using the MODE Selector

On the far top left section of the MAIN touch screen is a MODE selector. Access this selector by pressing a monitor's SET button on the Monitor panel, or pressing a button below the CR, ST1, or ST2 meters on the MAIN touch screen.





When switching modes, note that the CR can be set to Surround only if preconfigured as a 5.1 output. Studio outputs are typically configured as Stereo.

When SURROUND is selected for the CR, mono mixes or Sources will be routed to the CENTER channel.

Programmable Presets

The last two MONITOR MIX PRESETS buttons are user programmable. These may be loaded with commonly used sources like AIR, Tuner, etc. To program a button, decide on the source you want that button to represent. If the source in question is not currently assigned to one of the monitors, make the assignment now, as described above. Next, make sure the SET button on the monitor to which the source in question is assigned is lit. Then press and hold the programmable button for three seconds. The new source is now loaded into the button. Confirm the source storage by switching through the MONITOR MIX PRESETS.

Studio Output Functions

Studio Outputs have extra functionality that must be programmed using the XPoint software. In most installations, a STUDIO output is programmed to MUTE whenever a D-8 fader controlling a microphone in the corresponding Studio is turned ON. Logic output ports may also be programmed to drive an ON AIR light whenever one of these microphones is turned ON. Please refer to the *User Programming* in the Appendix 2 of this manual for details.

Talkback



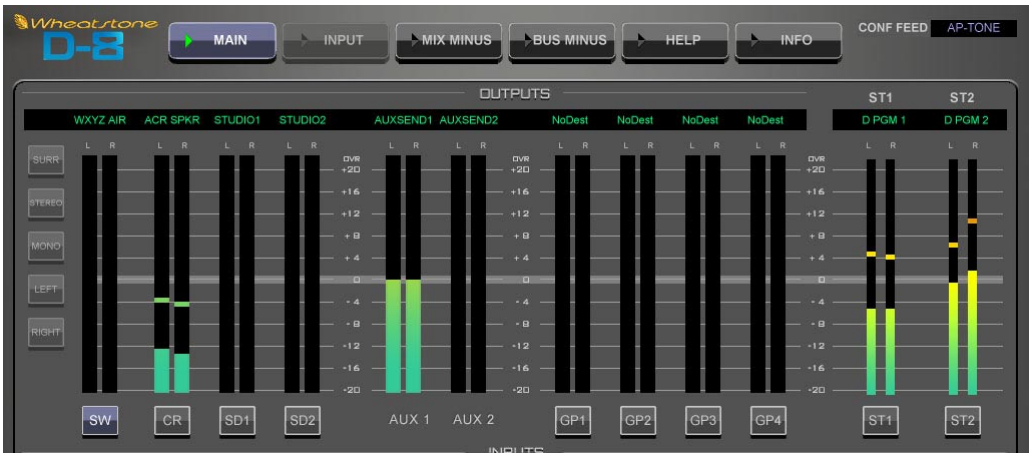
TALKBACK (TB) BUTTON - There may be times when the control surface operator wishes to talk to the Studio floor through the studio speakers. When the TB button in the studio monitor section is pressed, a predefined signal, usually the operator's intercom mic, will "interrupt" the speaker feed that is normally heard in the studio.

The TB source signal can be any source on the Wheatstone router. You must route the desired source to the D1TBk signal using XPoint.

If there is a live mic in the studio which has activated the mute feature, talkback will also be muted in the speakers. Below the top-center of the MON-D8 panel is the TB master level control that sets the talkback output and the level of the talkback interrupt signal.

CUE/PFL Section

The CUE/PFL master level control is located in the center section of the MON-D8 panel. The CUE/PFL signal is pre-fader, and is normally used to check signal integrity. When a channel is CUE'd, its pre-fader signal will appear in the surface's D1PFL mix, and the switched meter array on the MAIN screen will show the level of the pre-fader signal.



The CUE/PFL level control determines the overall loudness of the cue signal.

Engineering Notes

There are two ways to listen to the PFL mix. Most users will route the D1PFL mix to a stereo or mono analog output that is connected to dedicated PFL speakers. Alternatively, you can program the CR or Studio outputs to interrupt whenever a PFL switch is engaged. Programming is done by editing the CUE interrupt section of a text file called D8_opts.txt. The file is located on the D8's internal flash hard disk. Access the file by FTP'ing to the surface, as described in Appendix 1.

Similar to the control room speakers, the cue speaker also has the potential for feedback and should be muted (using the configuration software—VDIP menu) whenever the control room speakers are muted.

Switched Meters Section



The control surface has provision for a switched meter.

To select a signal to meter, first press the SET button, then rotate the encoder SOURCE SELECT. Available sources will be displayed in the eight character METER display. When the desired signal is displayed, press the TAKE button. The switched meter array will then display the signal level. If, however, after a timeout period of 20 seconds, the TAKE button is not pressed, the array will revert back to its previous selected program.

AUX Master Outputs



MASTERS controls AUX 1 and AUX 2 are provided at the top of the MON-D8 panel to set the output levels of AUX sends 1 and 2, respectively.

Mix-Minus Master



This section is a secondary way to control the MIX-MINUS MASTER level for each of the eight Mix-Minus outputs. Double-tap the MXM MASTER knob, then press a MIX-MINUS ASSIGN button. The assign button will flash and any other assign button may be pressed. Rotate the MIX-MINUS MASTER control to set the output level for that Mix-Minus.

Note that you can use the touch screen sliders on the MIX MINUS screen to set MXM master output levels.



Mix-Minus Assign

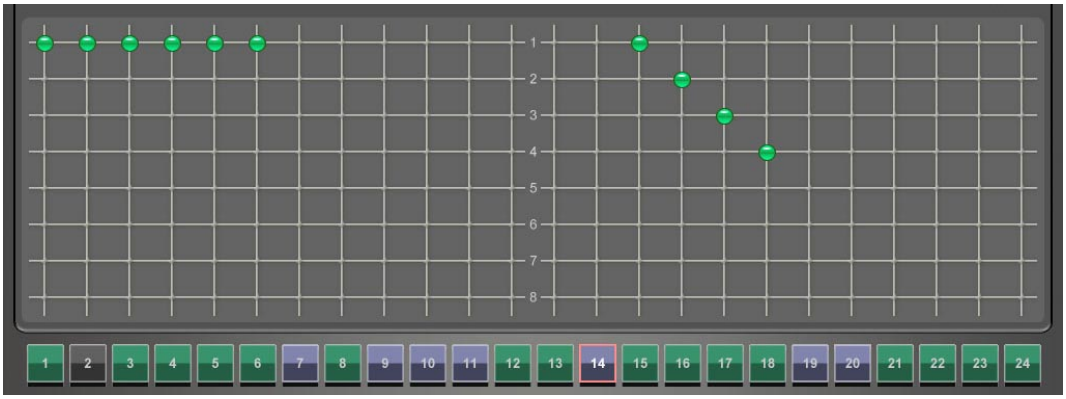
These buttons are used to assign/de-assign input faders to the eight Mix-Minus buses.

The D-8 is configured so that when you light a MXM assign switch the audio on the fader is ***removed*** from the Mix-Minus bus. This method makes it very easy to see which MXM output a particular fader is using and prevents clutter LED's on the input fader

panels and the MIX MINUS screen.

Press the SET button on any input fader channel. When a fader is assigned to feed a Mix-Minus bus, the corresponding MIX-MINUS ASSIGN switch will be lit on the input channel strip. Pressing a MIX-MINUS ASSIGN switch will toggle that channel's signal into or out of the corresponding Mix-Minus bus.

Note that you can use the touch screen grid on the MIX MINUS screen to view and set Mix-Minus assignments.

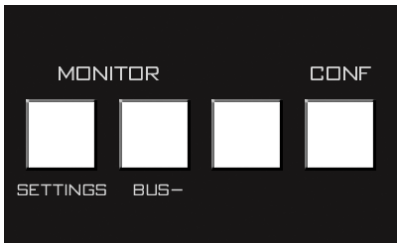


Mix-Minus Talkback



To interrupt a Mix-Minus output with the predefined TB signal, press any of the eight MIX-MINUS TALKBACK momentary switches. The talkback signal - TB - may be any audio source on the router. Please see the Talkback discussion earlier in this section.

MONITOR Buttons



The two switches labeled "SETTINGS" and "BUS-" act as hot buttons to switch between the Input settings and BUS MINUS screens.

CONF Button

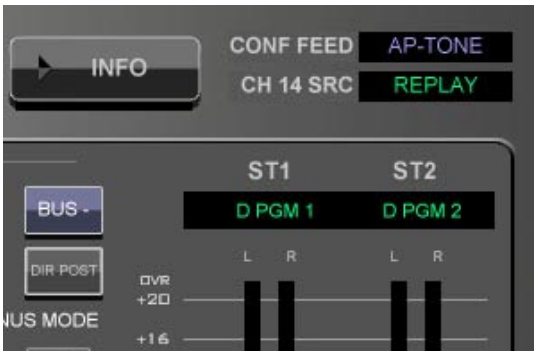
Pressing the CONF button activates the D-8's Confidence Feed function and lights the LED. Confidence feed automatically replaces mix-minus output audio with a user defined source during commercial breaks. Please see details below.

What is Confidence Feed?

Confidence feed is a way to automatically replace the normal Mix-Minus audio heard by talent in the field with master control audio when your station goes into a commercial break. When you return from break, confidence feed is automatically turned off and normal Mix-Minus is fed out.

The confidence feed audio source is usually your master control or "air" feed, but it can be any source on the router. Confidence audio is patched in XPoint software by cross connecting the desired source signal to the D-8's DxCFD

destination signal. When CONF is activated a confidence source name box in the upper right hand corner of the VGA monitor will also begin to "wink" slowly. This function may also be remotely controlled with a tally relay from master control. Please see the *User Programming* note in the Appendix 2 section of this manual for details.



Event Controller Section

This section provides a means for storage and retrieval of control surface settings, and naming those settings as "Events." In this manner complete configuration and setting information that is used repeatedly (for example, "6PM News") can be saved and recalled. Up to 100 different events can be stored.



Storing an Event

When an event is stored, all of the control surface's current settings are saved and will be recalled when that event is executed through the TAKE command. To create a new event from current control surface settings, hit the NEW button, and then hit the SAVE button. To overwrite an existing event with the current settings, turn the PREVIEW SCROLL knob until the desired event is displayed in the PROGRAM/PREVIEW window, then quickly press MODIFY, then SAVE.

Taking an Event

Rotate the PREVIEW SCROLL encoder until the desired event is shown in the PROGRAM/PREVIEW display. To prevent accidental takes, the ARM button must be pressed to arm the function. The TAKE button will now flash indicating that the panel is ready to act on a take. Then press the TAKE button to execute the EVENT.

Undoing an Event

To recover from a premature or erroneous EVENT take, press the ARM and UNDO buttons. This will return the system to its status prior to the last take, with the last program event being once again the current program event, and the last preview event (the one just taken) becoming the preview event once again. There is only one level of undo. If undo has been done and a subsequent take has not been done, pressing the undo function again will do nothing.

Modifying the Currently Selected Event

It is presumed an event has already been executed on the control surface. Modifications to that event can be accomplished by simply adjusting the controls and switches as desired and then pressing the MODIFY button, then the SAVE button. In this way the modified event will overwrite the old event setting and be saved, with the same name, in its place.

Deleting an Event



Rotate the PREVIEW SCROLL encoder until the Event to be deleted is shown in the PROGRAM/PREVIEW display. Press the Modify button, then press the PREVIEW SCROLL knob; the display will ask "DELETE?" Press the TAKE button to delete the previously displayed Event. Do nothing and Delete mode will time out after approximately 7 seconds. ***Deleted Events may NOT be restored.***

Previewing an Event

Rotate the PREVIEW SCROLL encoder (push knob in while rotating for faster scrolling) and available EVENT names will be shown in the 8-character PROGRAM/PREVIEW display. When the desired event is shown in the display, press the ARM button, then press the PREVIEW button. This will cause the entire control surface to display all settings associated with that event, without disturbing the current operative event. The preview status will be indicated by illumination of the PREVIEW button and flashing of all source and destination displays, to remind the operator that these would be the intended settings when the change is made. Pressing the PREVIEW button a second time will cancel the preview. ***It should be noted that no audio signals are changed in any way by the preview feature.***

Event Default Button

This control allows rapid access to a default or home control surface setting. Push it, and the TAKE button in the Preview section will flash. Hit the TAKE button and the default setting will be executed.

Establishing the Default Setting

This setting would normally be set only once. For example, it may be desirable to have all controls set to zero, or everything programmed to typical nominal settings. To establish the default setting, adjust all the control surface controls to their desired settings, press the MODIFY button, and then the DEFAULT button. The default setting is stored.

Naming an Event

When events are saved, they receive a default event designation number. This way events can be saved quickly without having to name them. However, an event may be custom named when saved, or at a later time. To rename the displayed event, press the ALPHA SCROLL knob. The CURSOR LT and CURSOR RT buttons will light and the cursor, indicated by a flashing character, will be at the beginning of the name. Also, the SAVE button will begin to flash. At any time you can use CURSOR LT and CURSOR RT to move to a character you want to change. Once the cursor is at the desired character, rotate the ALPHA SCROLL encoder until the desired new character is displayed. Once all desired characters have been changed, simply press SAVE to save your changes. The event is stored with the

desired name. At any time you can cancel the name edit by pressing the ALPHA SCROLL knob. Also, if you stop making name changes but fail to press the SAVE button, the name edit process will automatically cancel after a delay of about 10 seconds.

Control Modes and Log In Levels

The D-8 control surface is operated in one of three modes. In Administrator mode access is allowed to all surface functions. In User mode a limited set of user functions is allowed. The set of functions allowed in User mode is set independently for each console using the Bridge XPoint software (see the Bridge Router manual for details). The third mode, Guest, blocks out Mix-Minus assign, Event takes, Event saves, and visibility changes from being controlled by the surface.



To change the control mode, begin by pressing and holding the SOURCE SELECT knob until the display reads "Admin" and the TAKE button lights (if the surface is currently in Admin mode the SET button will also light). Turn SOURCE SELECT until the desired new mode (Admin, User, or Guest) is showing in the display and press TAKE. Turn SOURCE SELECT again to select the first digit of the password. Default passwords, which may be changed in XPoint, are "1234" for Admin, "2222" for User, and "0000" for Guest. After dialing up the first character of the password, press TAKE. Then dial up the second digit. Continue this procedure until the four characters have been entered. Upon pressing TAKE after entering the fourth character, the display will read "Okay..." if you were successful and "Sorry..." if you were not. When finished, turn SOURCE SELECT until the display reads "<<Exit" and press TAKE to finish the mode select operation.

The SET button lights as you select the mode that the surface is currently in. If you press TAKE when displaying the current mode, the display will switch to "Okay..." and you will not need to enter the password. If you stop partway through the procedure, the mode selection process will time out after about 15 seconds.

Once a given control mode is selected for a surface, that setting will persist through a power cycle or surface reset.

Programmable Buttons



These six (6) momentary switches and indicating LEDs are designed for user accessible external functions (GPI/GPOs). With these switches the user can fire Salvos or make a temporary crosspoint without having to wire any physical logic ports. These switches may also be mapped to control physical Logic card output ports, and the LEDs on the Spare buttons may also be lit by a remote device connected to a Logic card input port. See the *User Programming* section in the Appendix 2 of this manual for details.

Master Panel (MST-D8)

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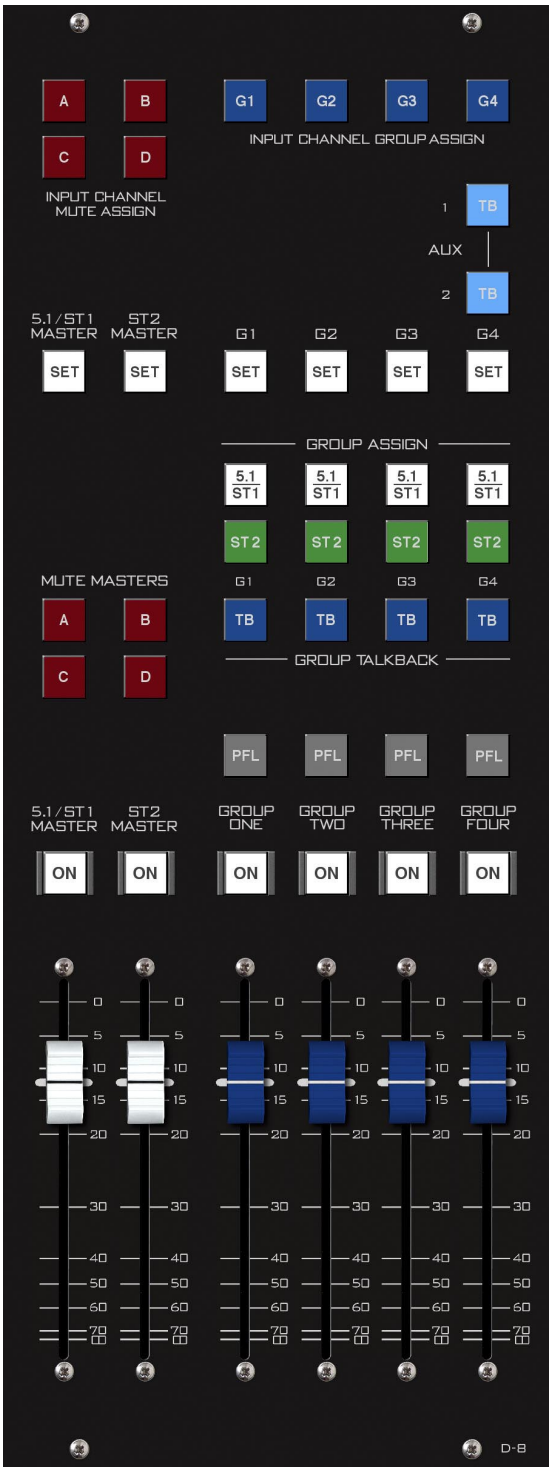
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Master Panel (MST-D8)

Controls and Functions

The D-8 digital audio control surface is equipped with one MASTER panel. The lower half of this panel provides fader control of the two master program outputs and four group outputs. The top section's assign switches work in conjunction with the Input fader's SET buttons to assign Input faders to the A-B-C-D MUTE assign and to the four audio Groups G1-G2-G3-G4. Rounding out the panel are talkback switches to the AUX Sends and the four MUTE MASTER switches.



Input Channel Assign Buttons

At the top of the MASTER panel are two sets of buttons that only work whenever an input fader's SET button is pressed. These are the A-B-C-D Mute Assigns and the G1-G2-G3-G4 Group Assign switches.

Mapping an Input Fader to a Mute Group

To map an input fader to a MUTE GROUP, first press the input fader's SET switch, then select the desired A-B-C-D INPUT CHANNEL MUTE ASSIGN switches.

Routing an Input Fader to an Audio Group

To route an input fader to an audio GROUP, first press the input fader's SET switch, then select the desired G1-G2-G3-G4 INPUT CHANNEL GROUP ASSIGN switches.

AUX Talkback

Below and to the right of the Input Channel Group Assign switches are two talkback buttons. Pressing the AUX 1 TB button will interrupt the AUX 1 output with the predefined TB signal. AUX 2 TB works in a similar manner. Please refer to the Talkback section in the Monitor Panel chapter of this manual for details on configuring talkback.

SET Buttons

Like the SET button on input fader strips, the MASTER and GROUP SET buttons are used to access other controls and apply their settings to the selected output mix. The masters may have their MODE settings changed and may be assigned to MUTE MASTERS A, B, C, and/or D.

Master and Group SET buttons are located in the upper portion of the panel. Groups may be assigned to Mix-Minus buses too.

Pressing a MASTER or GROUP SET button will cause the D-8's VGA screen to switch to the MAIN screen and display the output meters.

Master Program Outputs

Input Fader Assign to Masters

Input faders are routed to either master audio output by using the MASTER ASSIGN switches located directly on the input fader strips. You may freely assign any input fader to either the 5.1/ST 1 or ST 2 master audio outputs, or even to both.

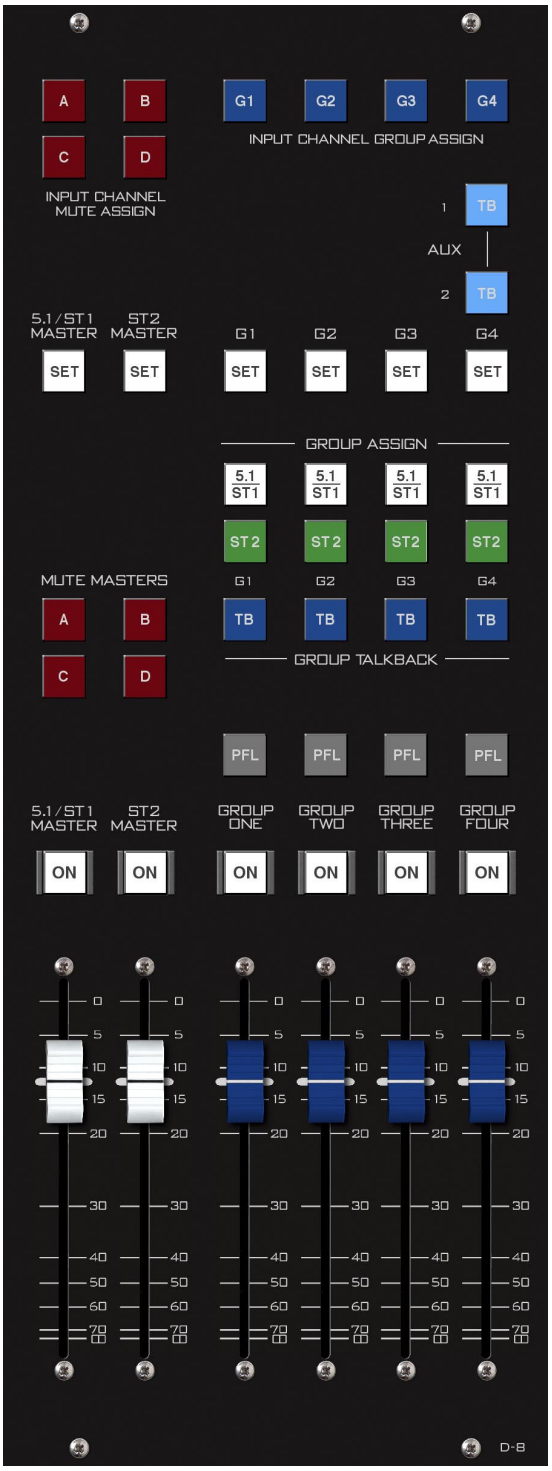
Channel Master ON/OFF

The ON switch turns the channel signal ON; pressing it again turns the channel signal OFF. The switch LED lights to indicate the channel is ON.

Master Faders

These motorized controls set the levels of the master channels.

NOTE that 5.1 MASTER fader's knob engraved with "5.1."



Mute Groups

Mute Group Assign

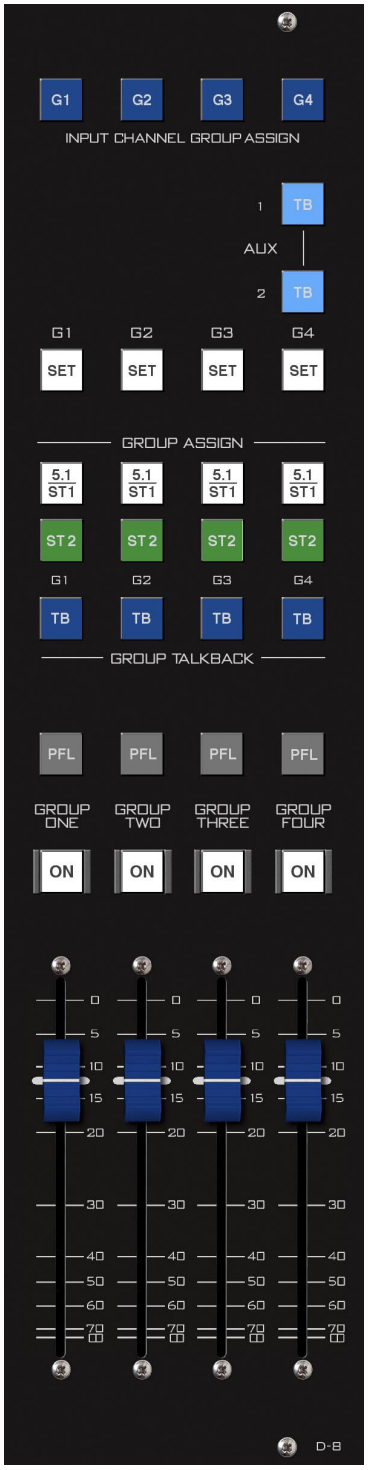
Each input fader, Group, and Master can be assigned in any combination to MUTE ASSIGN A, B, C or D. Assignment is made by first pressing the channel's SET button, then pressing the desired INPUT CHANNEL MUTE ASSIGN button located at the top of the MASTERS panel. Indicators on the input panels show the mute assignments.

Mute Master

The MUTE MASTERS A, B, C and D buttons provide a rapid way to mute a group of signals. When MUTE MASTERS A is engaged (the button is lit) all channels that have been assigned to MUTE MASTERS A, as indicated by the MUTES display on each input channel, will mute. MUTE MASTERS B, C, and D work in a similar manner.

Audio Group Outputs

The four audio groups G1-G4 operate in stereo mode and may be assigned to one or both of the MASTER output busses. Use the GROUP SET buttons to assign the GROUP to a MUTE GROUP or Mix-Minus bus. Pressing a GROUP SET button switches the VGA monitor to the MAIN screen.



Group Assign Buttons

INPUT CHANNEL GROUP ASSIGN buttons located at the top of the MASTER panel are used to assign input faders to the Groups. Press SET on the input, then press any desired GROUP ASSIGN button(s). Assignment for the channel with its SET currently active are indicated by the lighting of the four INPUT CHANNEL GROUP ASSIGN buttons, while the GROUP displays on each channel show that channel's group assignment whether its SET is active or not.

Group Assign to Masters

Each Group has two GROUP ASSIGN switches located in the center of the MASTERS panel which are used to assign the Group mix to either (or both) of the two main output busses - 5.1/ST 1 or ST 2. Each switch's LED will light to indicate assignment is made.

Groups may be used to control the level of several common signals (e.g. band mics, round table mics, etc.). That GROUP signal is then routed to the main program mix out of the board via the switches described in this section. Microphones or other sources that are assigned to a Group are usually NOT assigned directly to a MASTER fader.

Group Talkback

Pressing a G1-G2-G3-G4 TB button will interrupt the group output with the predefined TB signal.

ON (GROUP ONE - GROUP FOUR) Switch

The ON switch turns the group channel signal ON, pressing it again turns the Group channel signal OFF. The switch LED lights when the Group is ON.

PFL(Cue)

These switches let the control surface operator monitor the Group's pre-fader signal.

Group Faders

These motorized controls set the output levels of the audio GROUPS.

Group Destination Routing

GROUP fader mixes are usually routed to a MASTER mix as described above using the GROUP ASSIGN buttons. In this scenario, the GROUP audio is mixed in with the MASTER output and never leaves the surface's DSP as a discrete mix. However, GROUP mix audio does appear as four individual stereo SOURCE signals in the router and may be freely routed to any physical audio output destination.

Group mixes usually appear in XPoint software at SOURCE signal ID numbers higher than ID1001. The default signal names for Groups are D1GRP1 through 4 but the exact name depends on the number of surfaces in your system. In multi surface systems the "x" in the Dx prefix is replaced with surface ID number (e.g. D1, D2, D3, etc.).

Host CPU (HC-3)

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"CAT5" RJ-45 - Mixer Link Connector 5-4

DB-9 Connector - Not Used 5-4

Typical Ethernet Cable **5-5**

Typical Crossover Cable **5-5**

HC-3 Pinouts Drawing **5-6**



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

Host Controller (HC-3)

Overview

The host controller card used in the D-8 incorporates a PC/104 computer mounted on the HC-3 PCB. The host computer utilizes RAM, a flash disk (which emulates a standard IDE hard drive), and an Ethernet port. There is no hard disk drive. A video port is provided for the VGA monitor, and a keyboard port is for factory use only.

The purpose of the host controller is to provide control of the D-8 control surface. The HC-3 communicates to the XPoint Configuration PC via TCP/IP over Ethernet through a standard ethernet hub or switch. It also communicates to the Bridge Router system via a special mixer link connection.

Hardware and software configuration, as well as real time crosspoint information, is saved in non-volatile storage on the HC-3 card and is restored at power up or reset. This configuration information provides details to the host application running on the HC-3, such as the specific audio hardware available.

HC-3 BIOS Settings/Format

BIOS Setup and formatting of the Host CPU is completed prior to the testing of your D-8 control surface at the Wheatstone factory. There are no user adjustable settings.

Ethernet IP Addressing

The Wheatstone D-8 control surface ships with the host controller IP address set. Stand-alone systems (not interfaced to a station's existing network) require no IP address changes.

Ethernet Interface Wiring

Networked systems are connected to the network hub or switch via a straight (pin to pin) CAT5 cable. Typical CAT5 cable pinouts are included in the "Hook-Ups" section near the end of this chapter. These connections are for communicating with the configuration computer; a separate ethernet connection should be provided for each control surface.

Mixer Link Wiring

This RJ-45 connection provides the control link between the control surface and the Bridge Router system. All settings and commands generated on the control surface pass through this link. A special CAT5 cable wired in "crossover" fashion is used for this link. This special cable connects the RJ-45 jack on the control surface to the matching RJ-45 jack on the Bridge Router system. Please note that, in a typical system, there will be many RJ-45 jacks in the Bridge Router, and for proper operation, the control surface must be connected to the specific RJ-45 jack defined for it in the system configuration.

Internal Programming Options

All internal programming options are made via PCB mounted switches.

Switch Settings



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

SW1 Position 1 - Sample Rate

This dipswitch position must be set to agree with the sample rate of the system. The switch is off for a sample rate of 44.1kHz and on for a sample rate of 48kHz.

SW1 Positions 2 and 3 - Not Used

These dipswitch positions are reserved for future use.

SW1 Position 4 - CAT5 Enable

Position 4 of SW1 must be in the on position in order to activate the CAT5 mixer link connections.

Hook-Ups

All user wiring to and from the host controller is made via I/O connectors located on the control surface rear. There are two RJ-45 connectors: one is for Ethernet connection, and the other is for the CAT5 Mixer Link connection. There is also a female DB-9 connector that not used. The pinout drawing on page 5-6 shows all wiring connections at a glance.

"ETH" RJ-45—Main Ethernet Connector

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

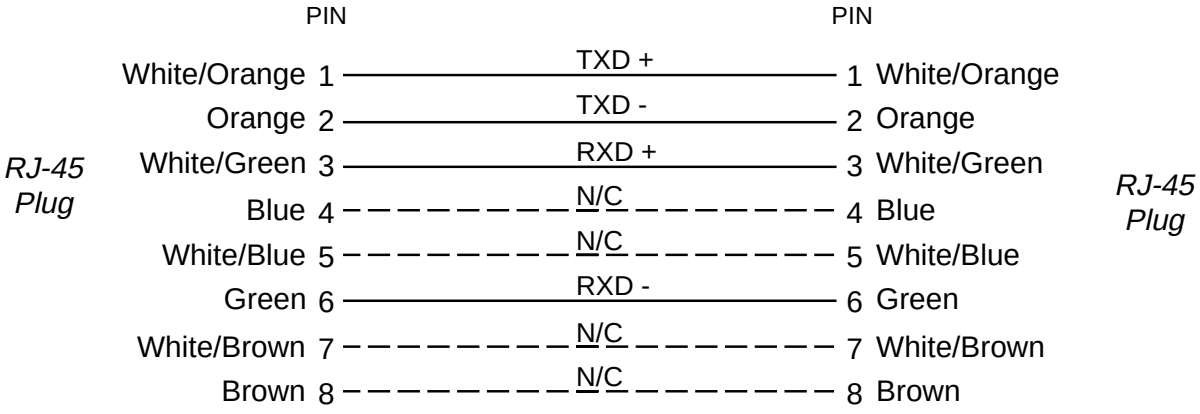
"CAT5" RJ-45—Mixer Link Connector

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

DB-9 Connector—Not Used

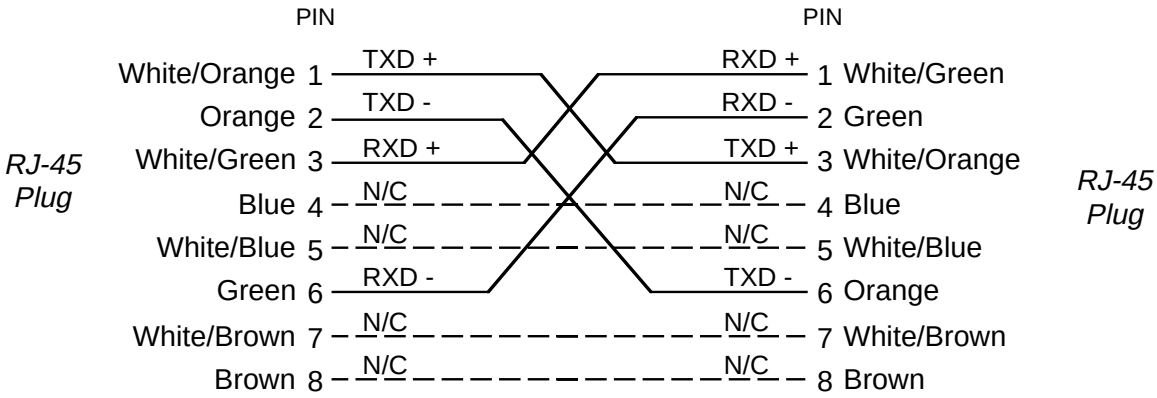
Pin 1 – NOT USED
Pin 2 – NOT USED
Pin 3 – NOT USED
Pin 4 – NOT USED
Pin 5 – NOT USED
Pin 6 – NOT USED
Pin 7 – NOT USED
Pin 8 – NOT USED
Pin 9 – NOT USED

TYPICAL ETHERNET CABLE



USED FOR CONNECTING THE HOST CONTROLLER TO YOUR NETWORK HUB.

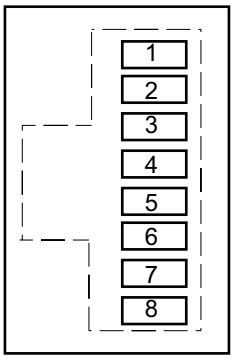
TYPICAL CROSSOVER CABLE



USED FOR MIXER LINK CONNECTOR.

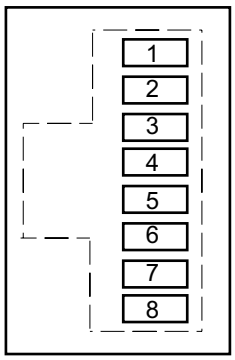
HC-3 Host Controller I/O Connections

Ethernet Connector (RJ-45)



TXD +
TXD -
RXD +
N/C
N/C
RXD -
LN LED
LK LED

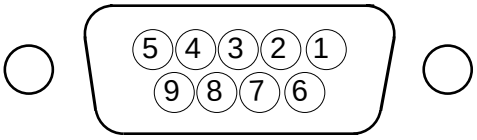
Mixer Link CAT5 Connector (RJ-45)



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

(crossover)

Female DB-9 (Not Used)



D-8 GUI

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D-8 GUI

GUI Overview

The D-8 control surface is supplied with a custom embedded Graphical User Interface (GUI) program that serves three primary purposes - comprehensive audio I/O metering, simplified Mix-Minus configuration and status, and detailed control of all of the D-8's audio processing functions. The program runs as part of the D-8 surface software and requires no external PC to operate. A touch screen interface and a multi-function scroll knob (SOURCE SELECT on the MONITOR panel) may be used to control levels, switches, and processing functions. An optional user provided mouse may be used with a standard VGA monitor in lieu of the touch screen.



Connecting the D-8 and the GUI

Before applying power, connect the touch screen VGA monitor to the DB-15 "VGA" connector on the left-rear of the D-8 frame. Connect the touch screen's USB cable to the D-8's USB connector, then apply power to the D-8. No other configuration is required.

Touch Screen Calibration

Before using the touch screen for the first time run the calibration routine. It may be necessary to periodically re-calibrate for different users. Invoke the calibration routine by double-tapping the Alpha-Scroll knob located on the Monitor panel. Press the target in the upper left and then lower right corners. Press DONE when finished.

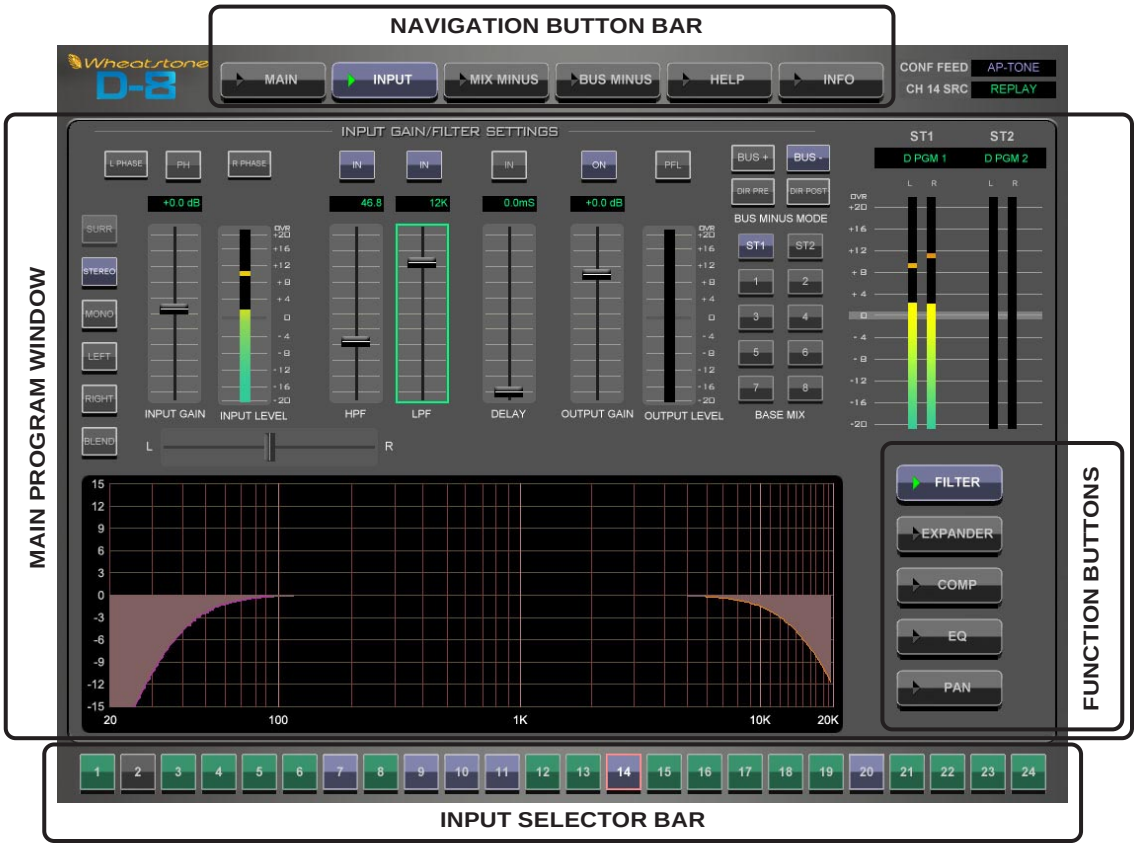
Using the GUI

The GUI is meant to be operated via the integral touch screen interface. The SOURCE SELECT knob located on the MONITOR panel serves as a “soft” knob for users who prefer the tactile feedback of a real knob when adjusting various processing and level settings. Tap the top of a parameter to highlight it, the “soft” knob will control the setting. Press the “soft” knob to tab (advance) to the next parameter.

Each window of the GUI is generally divided into two main parts, the top and bottom sections. The top half provides metering and control functions while the lower half provides additional control or interactive processing curves. Along the very top of the VGA monitor is a Navigation Button Bar which provides quick access to the D-8’s set of screens. Primary console functions divided into this set of screens include a Main Meter/ Fader view, Input control view, Mix-Minus view, Bus-Minus view, Help, and technical Info.

Along the bottom of the GUI window is the Input Selector Bar that remotely invokes any of the 24 input fader SET switches, providing instant access to control functions for any input fader. The numbered buttons indicate by color the status of each channel. The button is gray if the channel is OFF and the fader is down all the way, green if the channel is ON and the fader is down all the way, yellow if the channel is OFF and the fader is not fully down, or blue if the channels is ON and the fader is not fully down.

A set of FUNCTION buttons on the right side of the INPUT screen allows easy access to a host of processing functions for the selected fader including HPF and LPF Filters, Expander, Compressor, four band Parametric Equalizer, and Surround or Stereo Panning. Dedicated screens for Mix-Minus and Bus-Minus settings let the operator quickly determine the status of any remote or IFB feed.



Navigation Button Bar

Use the Nav Bar along the top of every screen to instantly jump to the desired screen. A green arrow indicator lights in the currently selected button.

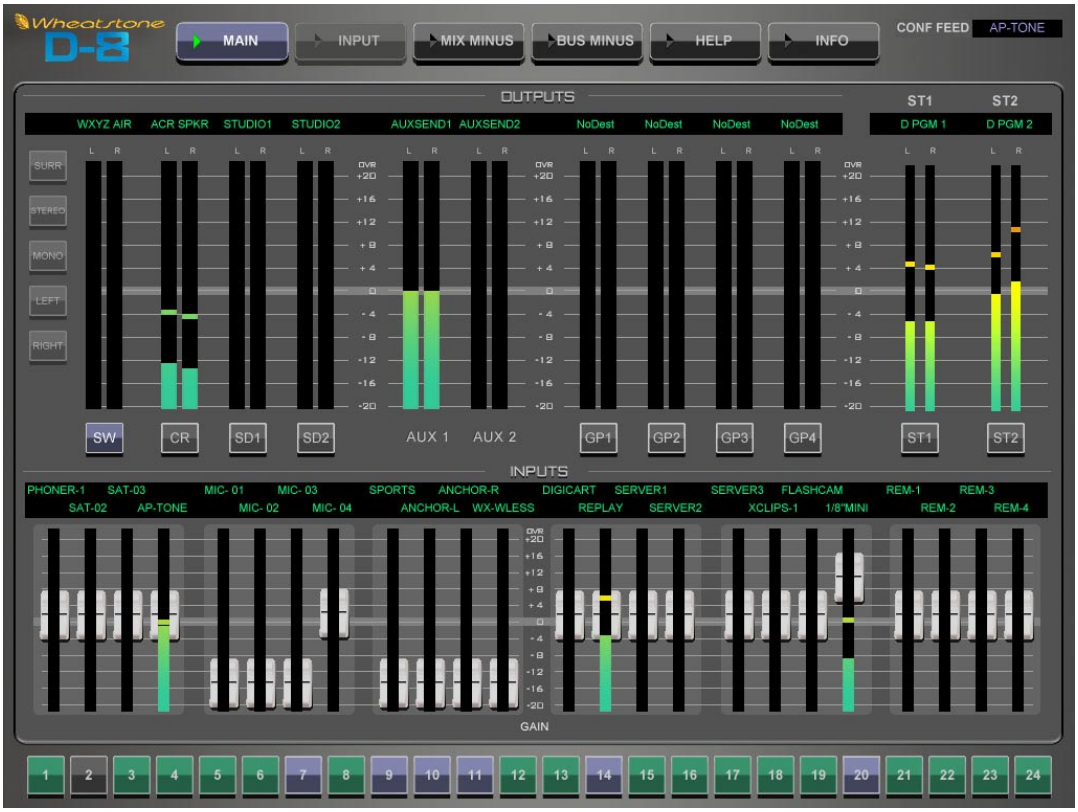


- MAIN - jumps to Main metering screen
- INPUT - jumps to the Input fader control screen
- MIX MINUS - jumps to the Mix-Minus control screen
- BUS MINUS - jumps to the Bus-Minus control screen
- HELP - displays an integrated help system
- INFO - displays technical information about the D-8 surface

MAIN Navigation Button

When first powered up the D-8 defaults to the MAIN Screen. You may access this screen anytime by selecting MAIN from the Navigation bar at the top of the monitor.

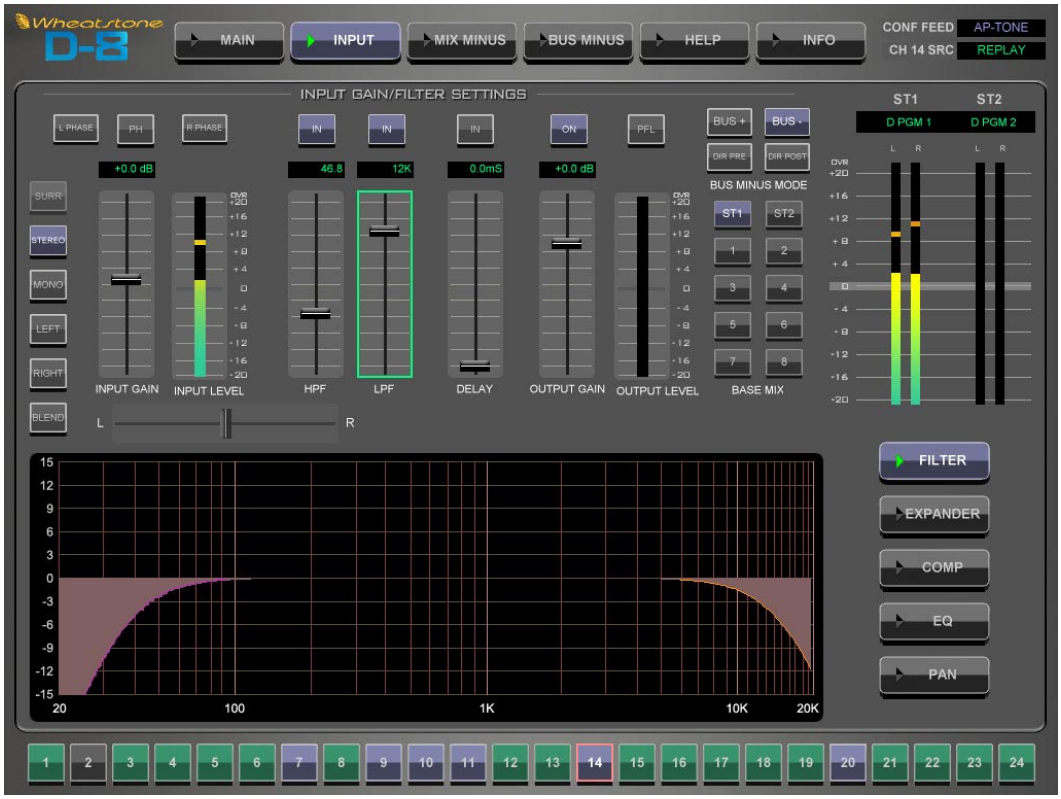
The Output meter array in the top half of the display is divided into four sections: Monitors-Aux Sends-Groups-and Masters. Use the SET buttons under the MONITOR meter columns to access the MODE selector on the left.



The INPUTS section in the lower half of the screen displays a meter array of the D-8's 24 input faders. A unique gain/meter indicator "widget" allows users to easily set input gain or fader levels with the touch screen or Source Scroll knob. The "widget" is a meter column morphed with a draggable gain slider. Just touch the meter and drag the level or processing parameter to the desired setting.

INPUT Navigation Button

You may access this screen anytime by selecting INPUT from the Navigation bar at the top of the monitor or by pressing a fader's SET button. Once the INPUT screen is open, you can change fader channels by clicking on the INPUT SELECTOR BAR located at the bottom of the monitor.

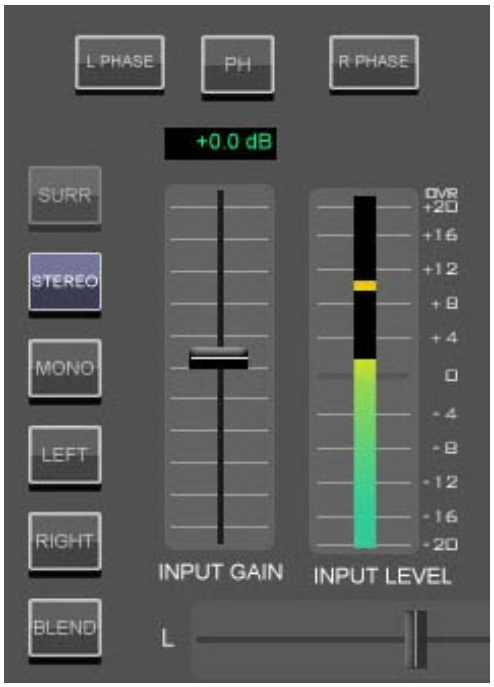


The INPUT screen is divided into top and bottom sections with Input Source controls, filters, delay, and Bus Minus output controls located at the top. A graphical curve window displays various settings depending on which processing function is selected. Processing Selector buttons on the lower right let you quickly switch between Expander, Compressor, EQ, and PAN screens for the fader.

INPUT CHANNEL CONTROLS

Gain Control Slider

Adjust input signal gain between -18.0dB - +12.0dB.



VU Meter

The level meter is a dual-indicating peak-over-average, with peaks riding as a lone "dot" over a solid bar-graphed average. An "Over" indication is at the top of the input level bargraph.

MODE Selector Switches

The mode selector switchbank include Surround, Stereo, Mono, Left, Right, and Blend buttons. When pressed, the switch will light up to indicate the selected mode.

To select a MODE, press the SET button of the desired channel or mix; the SET button will illuminate and the current mode setting for that channel will be displayed on the MODE switches. Select the desired MODE setting. Surround mode is only available on input faders configured for 5.1 as indicated by the 5.1 label printed on the fader knob.

Polarity Switches

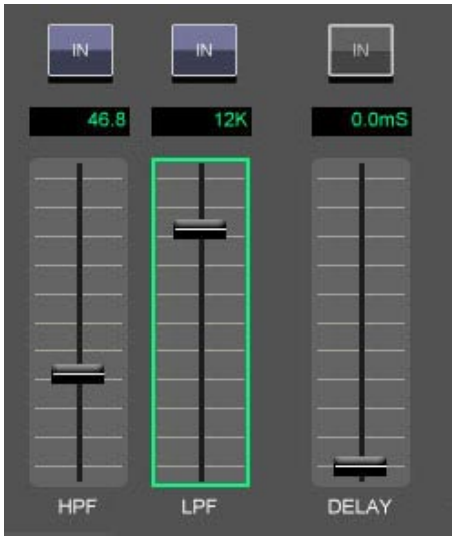
A pair of buttons, one for left and one for right, are provided to cause the reversal of absolute phase of the input signal path, in case there is an inadvertent reversal elsewhere in the signal chain.

PH - Phantom Power Switch

When a microphone signal is selected as the source for the current fader, you can switch phantom power ON or OFF. This switch is inactive for all other analog or digital sources.

HPF (High-Pass Filter)

Use the IN switch at the top of the HPF slider to activate this filter. Use the slider to adjust the cut-off frequency. A graphical representation of the filter's effect is displayed in the filter curve window below.



This is a 24dB/octave variable high-pass filter with Butterworth characteristics, tunable between 16.1Hz and 500Hz. The relatively high order of filter is necessary to allow definite and decisive removal of unwanted low-frequency artifacts (air-conditioning rumble, line hum, traffic, or footstep impacts) with minimal effect on the required program.

LPF (Low-Pass Filter)

Use the IN switch at the top of the LPF slider to activate this filter. Use the slider to adjust the cut-off frequency. A graphical representation of the filter's effect is displayed in the filter curve window below.

This is a 24dB/octave variable low-pass filter with Butterworth characteristics, tunable between 1KHz and 20.2KHz. This filter is used to remove unwanted high frequency artifacts (noise, squeaks, etc.) with minimal effect on the required program.

Note: Butterworth Filters typically yield excellent flatness, no ripple in the pass band, and a rounded amplitude response near the cutoff frequency.

Delay

Select the IN switch at the top of the DELAY slider to add delay to the current source signal. The delay may be continuously adjusted in a range from 0-667mS (20 NTSC frames). Delay may be added to correct for timing inconsistencies between audio and video that create noticeable lip sync problems.

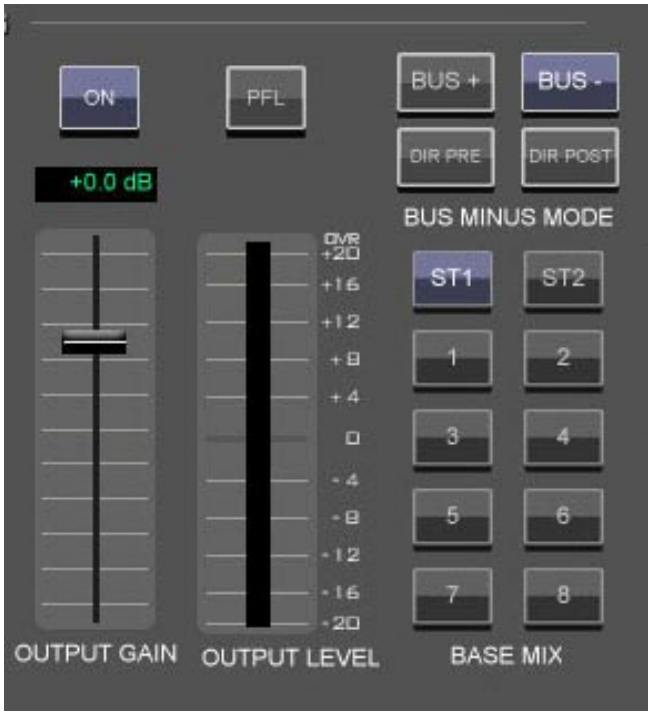
Bus-Minus Section

Bus-Minus offers the ability for every input fader to produce its own unique Mix-Minus output. This section is where you configure what the talent or guest on the other end of this output will hear. Typically you want them to hear a pre-defined mix, minus their own voice.

To set up a typical Bus-Minus output you will do the following:

- Turn ON the Bus-Minus output and set a nominal output level.
- Press the "BUS-" button to remove the fader's own signal.
- Select a Base Mix. This is typically a Master 1 or 2 bus but could be any Mix-Minus 1-8 bus.

What the talent hears is the base mix, minus their own voice.



Bus-Minus Controls

Bus-Minus ON Switch - select this to enable or disable the fader's Bus-Minus output.

Output Gain Slider - adjust Bus-Minus output level.

Meter - will display the audio level at the Bus-Minus output.

PFL Switch - press this switch to listen to this Bus-Minus output.

Bus-Minus Mode - select one of four mutually exclusive operating modes:

- Bus+: destination hears themselves along with the Base Mix.
- Bus-: destination hears the selected Base Mix, minus themselves.
- DIR PRE: destination gets a direct, pre-fader clean feed of the input fader.
- DIR POST: destination gets a direct, post-fader clean feed of the input fader.

Base Mix - select a mix on the surface you wish the destination to hear. Choose from one of the two master outputs and the eight Mix-Minus busses.

Processing Selector

Processing Selector buttons on the lower right side of the Input Screen let you quickly switch between Filters, Expander, Compressor, EQ, and PAN screens for the selected input fader.



EXP (EXPANDER) SCREEN



An expander is a useful tool for reducing unwanted background noises. These could be variously air-conditioning rumble or noise, background conversation, phone-line noises, recording hiss, etc. It is also useful for reducing the inevitable general increase in background noise of some recorded material when subject to heavy compression. A common usage in live sound is to effectively turn a microphone off when not being talked or sung into, so as to reduce corruption of a mix or reduce the chances of feedback with an unwanted open microphone.

The expander is slightly counter-intuitive when first encountered in that, unlike nearly any other processing element, it is active - i.e. working, attenuating away the input signal - when the input signal is at its quietest, at or below the threshold. If the expander is on, there will be gain reduction when no signal is present. The gain-reduction reduces as the threshold is approached, and there is none above the threshold.

The controls are:

EXP IN — A switch that allows the expander to be enabled and disabled.

THRESHOLD (-60.0dB - 0.0dB) — Below which the automatic attenuation starts to take effect.

RATIO (1:1.0 - 1:5.0) — Being the proportion of how many dB the input signal is attenuated for every dB it drops below the threshold. 1:3 indicates 18dB loss for 6dB drop in input signal level.

DEPTH (0.0dB - 40.0dB) — The maximum amount the expander is permitted to reduce the input signal level.

OPEN (1.00mS - 100.0mS) — The time-constant of the rate at which the expander un-attenuates, or opens; sometimes called “attack”.

HANG (0.00mS - 1.000S) — An adjustable period of time the expander remains open without attenuating, before starting to close. Handy to keep the expander open during, say, speech inter-syllables or other short pauses, without having to resort to excessively long...

CLOSE (50.0mS - 3.000S) — ... close times, being the rate at which the expander attenuates away the input signal once below the threshold.

An input/output plot, a graphical representation of the relationships between threshold, ratio, and depth, is seen on the Expander Control screen of the GUI. It is a handy visual aid.

Almost always, the trick is to set the threshold of the expander - below which it starts to attenuate away the input signal - high enough to capture the noise, but not too high as to snatch at the lower levels of the desired parts of the program material. That can sound really irritating.

Sometimes the gain reduction is required to be subtle so as not to draw attention to the fact that the expander is in operation. Under these conditions shallow expansion ratios, such as 1:1.5 or 1:2 are preferred, as are restricted depth - 6dB, or 10dB, is plenty and makes a substantial subjective improvement to the noise.

These, too, are the kind of settings used for another application of an expander, that of effectively shortening an excessively long room reverberation time, or an instrument’s ring-out that is overly persistent. In these cases the threshold is set somewhat higher, well up into the desired audio levels - in this way the attenuation becomes part of the overall sound, but the gentle ratio prevents a sense of anything “odd” happening. Again, relatively shallow depths of 12dB or so are plenty to achieve the desired effect.

More aggressive expansion, or “gating,” is accomplished with steep ratios (1:3, 1:5) and with shorter open and close times than for “unobtrusive.” It is still best not to go overboard with depth - even just 14dB, 20dB tops, is enough to make a signal “disappear” in the context of a mix; the whole gating sound, especially surprisingly its opening, is less obvious with shallower depth. Sometimes the “Surprise!” element is required, though, for effect.

COMP (COMPRESSOR) SCREEN



The compressor algorithm used in the D-8 is designed to:

- prevent really ghastly noises from being achieved too easily;
- allow smooth, inaudible, and unobtrusive level control on uneven sources;
- be able to act as a peak limiter for inadvertent overload control;
- enable deep effects if required.

The D-8 compressor section is a compound of many diverse dynamics elements.

The level detector is a pseudo-RMS averaging type with its own symmetrical-in-time attack-and-release characteristic adjustable between 0.1mS and 330mS ("Attack" control). At the slower end of its range, by itself it achieves a nouveau-classic "dbx" style syllabic-rate level control. As the time-constant is shortened, it becomes progressively shorter in relation to the lower audio frequencies themselves; the effect is to turn the detector into more of a peak-level detector, necessary for limiting or wilder effects. A secondary effect at intermediate to fast attack times is that low frequencies are peak sensed while high frequencies are average sensed, resulting in an effective high-frequency bias (up to as much as 6dB differential), which helps to mitigate the detrimental limiting effect of the resulting audio seeming "bottom heavy" that is normal to most compressors.

While the overall gain-reduction scheme is "feed-forward" the heart of the detector stage itself is a feedback limiter, which allows for this carefully-contrived, loosely-damped servo-loop to permit far more interesting dynamic effects than the analytically perfect but deathly boring deterministic classic feed-forward detection schemes typically afford.

The compressor is "soft-knee," meaning the compression ratio increases slowly with increasing applied level, greatly easing the sonic transition into full compression. This helps to avoid the "snatching" and "pumping" at threshold that many "hard-knee" dynamics units exhibit.

A full range of controls is available over the compressor's behavior:

CMP IN — A switch that allows the compressor to be enabled and disabled.

THRESHOLD (-30.0dB - +10.0dB) — Threshold, the level above which gain reduction is applied.

RATIO (1:1.00 - 1:20.0) — The proportion by which a signal exceeding the threshold is reduced in level. "1:3" means that a change in signal level above the threshold by 15dB will be reduced to only a 5dB change in level.

ATTACK (0.10mS - 330.0Ms) — How quickly the compressor responds to a signal exceeding the threshold.

RELEASE (50.0mS - 3.000S) — The speed with which the compressor recovers as the exciting input signal reduces or disappears.

MAKEUP (0.0dB - 20.0dB) — When fairly deep compression is invoked (large gain reduction) it can be necessary to increase the compressor's output level back up to nominal system signal level. Up to 20dB of output gain is available to allow this.

AGC

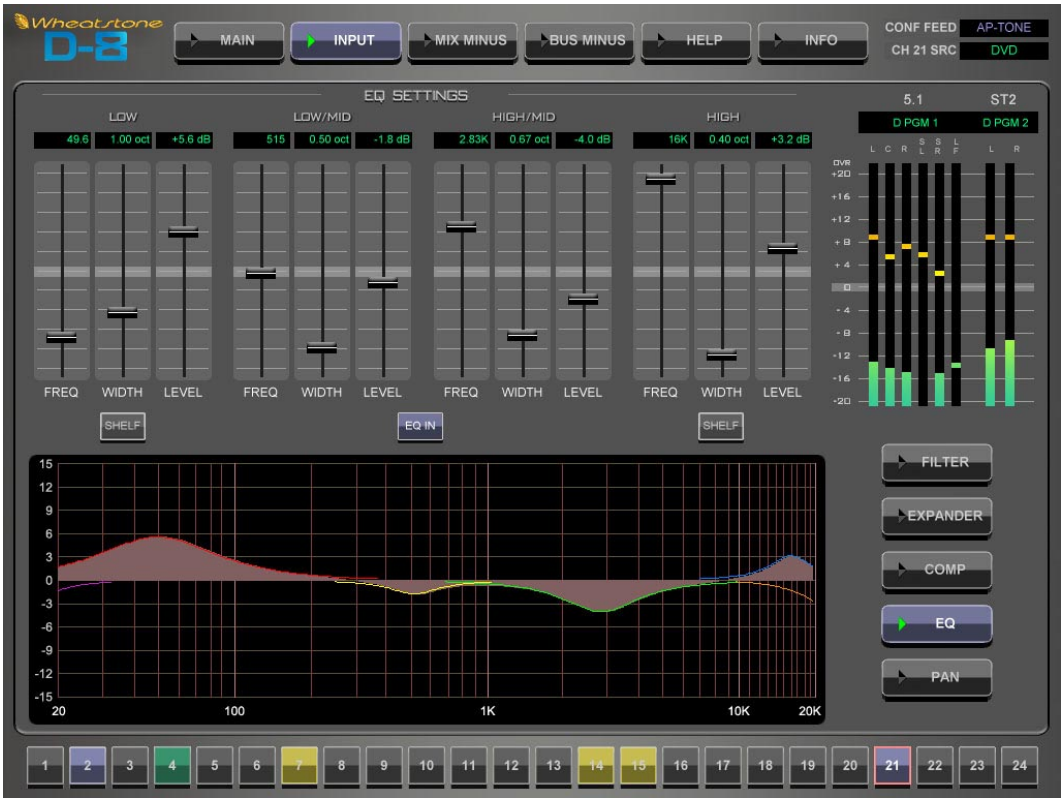
The AGC is an additional sidechain operating in conjunction with the compressor. Generally the AGC has much slower integration times for attack and release, so that it responds more to the medium or long-term energy of the program material in a given band, unlike the more typically energetic actions of the compressor.

The AGC action rides "underneath" the compressor. Depending on the time-constant settings and character of the program material, the AGC can follow the average long term level changes and create a gain-reduction "bed" some 12dB to 6dB under the compression gain-reduction peaks. The AGC rides the general level, so that the compressor processing for effect takes place on a consistently controlled signal.

On sudden application of an input signal, the faster compressor's attack captures the onslaught, with the AGC eventually catching up. On release, the effect is identical to the much-vaunted "two-slope release" of classic compressor units such as the Audio and Design F760xrs and Joemeek SC2. On departure or reduction of the input signal the usually faster compressor release predominates until its gain-reduction contribution falls below that of the AGC, whose much slower release rate takes over. A big advantage of the compounded processes is that on normal program material, the compressor does not have to "move as far" to capture signal peaks, so reducing the "snatching" which can occur at deep compression onset.

For most purposes the combination AGC/compression is the most transparent, but if the intention is wild effect, deriving all the gain-reduction from the compressor alone is probably better.

EQ (EQUALIZER) SCREEN



The EQ system consists of a four-band parametric EQ with low band and high band PEAK/SHELF switching, plus variable frequency high and low pass filters. As any of the controls are adjusted, a real time graphic display shows the resulting frequency response curves.

Reasonably conventional parametric sections are employed, with +/-14dB lift and cut capability, centre-frequency sweepable over the range of 16.1Hz to 20.2kHz, and a filter sharpness (Width) sweepable between 0.2 and 3.0 octaves. The LOW and HIGH bands also have a shelving function. The entire EQ is switchable in or out ("EQ IN" switch). The composite effect of any EQ adjustments is shown in the frequency-domain graph.

Low and High Shelving

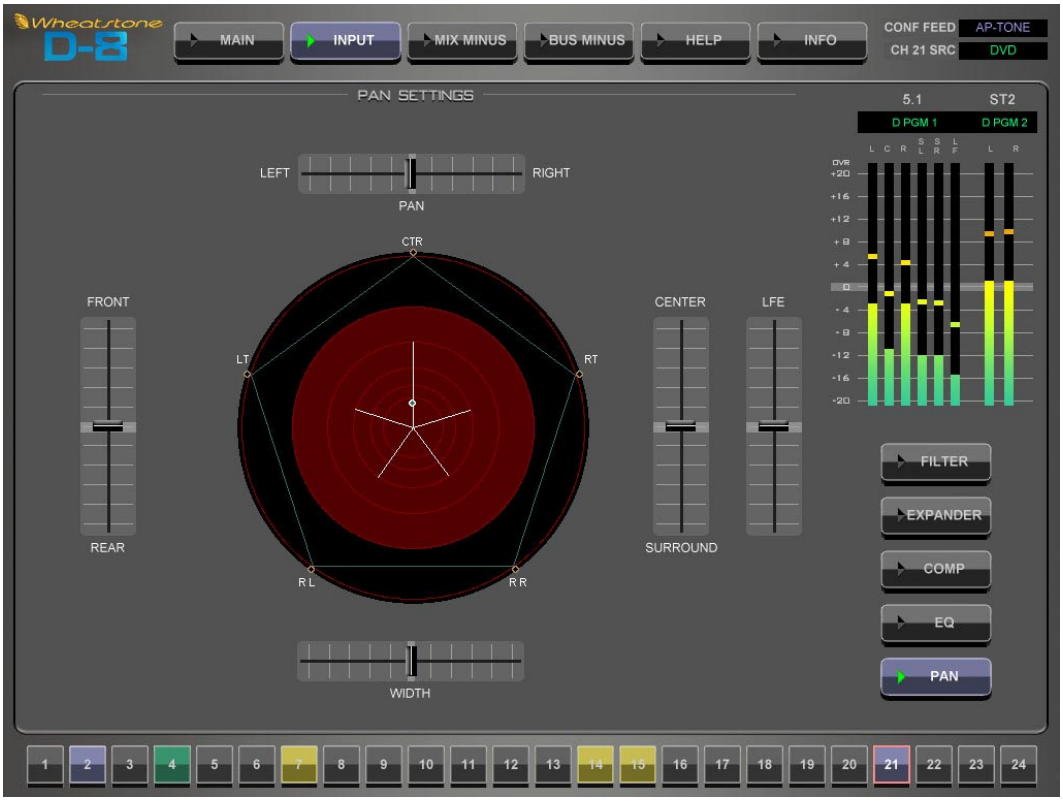
The high and low "shelving" EQ sections are designed to correct for real or subjective lack in low or high frequency energy in the program material.

The low shelver at the lower end of its range will enable specific kick-drum or bass guitar elements of a source to be balanced with respect to the rest of the source; at higher frequency settings it acts progressively more as a conventional "bass" control.

Similarly, at lower frequency settings the high shelver acts as a conventional "treble" control; as the frequency is raised the effect is confined to progressively higher frequencies allowing "sizzle" or "sparkle" to be (re)introduced without adding the harshness that a corresponding rise in high-mid frequencies would introduce.

At mid-point frequency settings the shelvers reasonably emulate the classic "Baxandall" style tone control, noted for its ease in rapid correction of tonal imbalance.

PAN SCREEN



The PAN screen is used to place a mono or stereo source signal anywhere in the stereo or 5.1 surround sound field. When a surround source in the router is selected on one of the dedicated surround input faders, then the PAN screen provides a method for re-balancing the individual elements of the surround source - L front, Center, R front, L surround, R surround, and LFE (sub woofer).

Note: Normally 5.1 source signals are routed to input faders that have been configured as surround inputs. Routing a 5.1 signal to a stereo input fader will get just the L-R front signals.

LEFT/RIGHT — Slider moves the signal left to right.

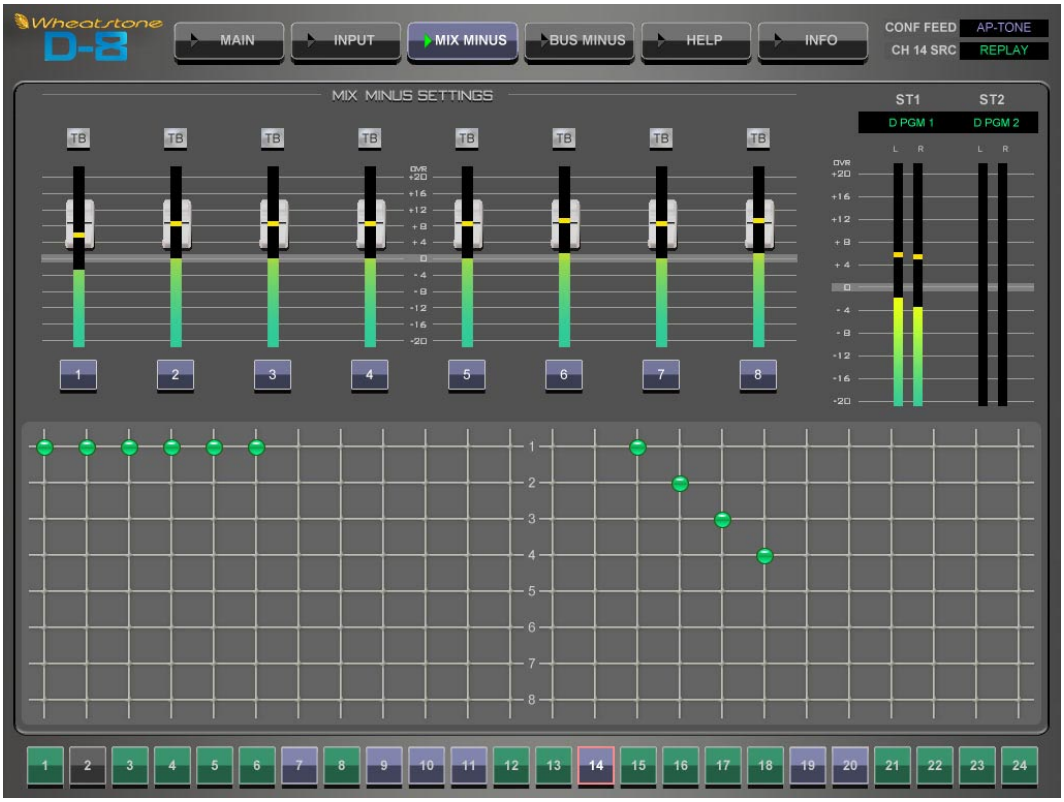
FRONT/REAR — Slider moves the signal front to back.

CENTER/SURROUND — Slider controls the ratio of CENTER imaging. Full down removes signal from CENTER and is applied to the LT/RT and FRONT/REAR slider, full up pans signal to CENTER only.

LFE — Slider controls level of signal sent to subwoofer channel.

WIDTH - An effect that changes the apparent distance between the speaker - applies to stereo signals only.

MIX MINUS Navigation Button



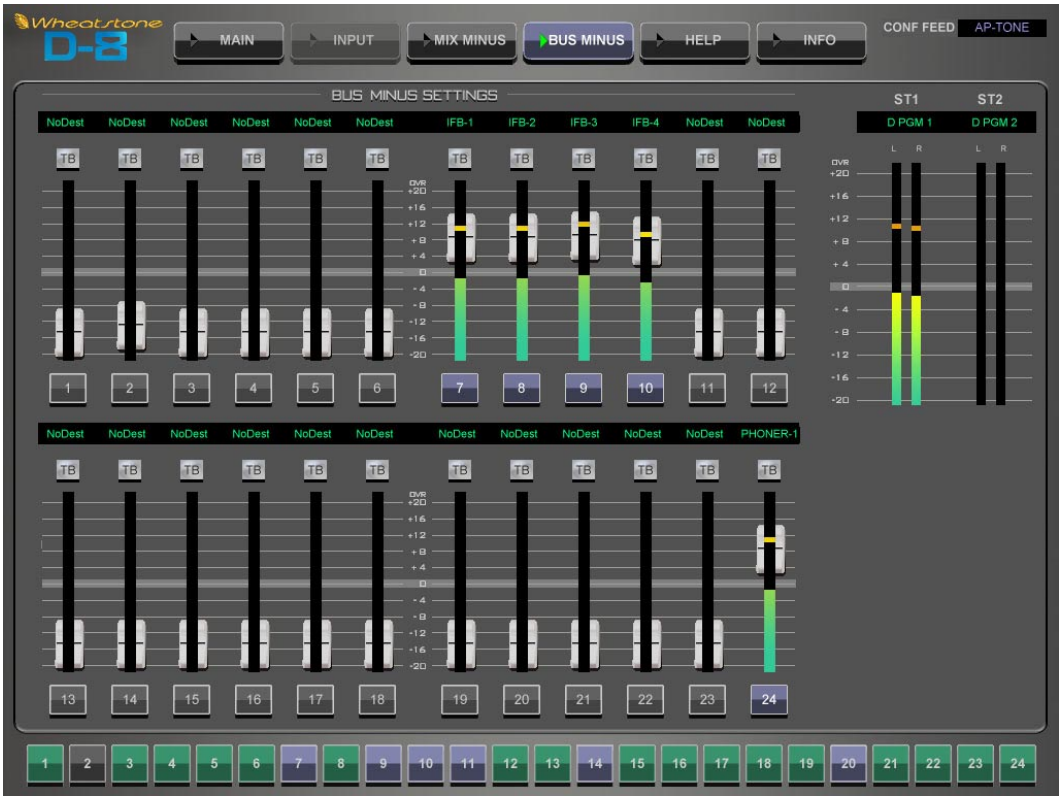
Pressing the MiIX MINUS button on the navigation bar at the top of the VGA monitor opens up the Mix-Minus Control screen. This screen is split into two main parts: the upper half provides dedicated meters and level control for all eight Mix-Minus output masters.

The lower section of the screen labeled MIX MINUS SETTINGS is a 24 x 8 Mix-Minus assignment matrix. This matrix provides a very easy way to view the Mix-Minus setup of the entire board.

Using the Mix-Minus Matrix

The Mix-Minus matrix provides an easy way to view and configure Mix-Minus assignments for the whole console. There are 24 columns, one for each input fader and eight rows - one for each Mix-Minus bus. Simply touch the intersection of a fader column and Mix-Minus row to subtract the fader from the Mix-Minus output. When an X is present, you are subtracting the selected fader column from the Mix-Minus output. An MXM LED will light on each applicable input fader strip to show selections made in the matrix.

BUS MINUS Navigation Button



Selecting the BUS MINUS navigation button on the top of the touch screen opens a BUS MINUS Master view that lets you see all 24 Bus-Minus outputs at once. This view lets you control and meter the output level of any Bus-Minus output right from one convenient screen. The destination window on top of each Bus-Minus meter widget shows where each Bus-Minus output mix is routed.

A Word About Bus-Minus Outputs

Each input fader has a special dedicated output for IFB or Mix-Minus feeds - these outputs are collectively known as Bus-Minus. These monaural audio output signals may be freely routed in XPoint to feed telephone hybrids, ISDN interfaces, recording feeds, or other devices as required. Note that Bus-Minus is a separate system from the dedicated eight Mix-Minus busses.

What appears at the Bus-Minus output for a fader is determined by how you configure the Bus-Minus output on the D-8 Input screen for your fader. In a typical application like feeding a TV remote, one might configure the remote talent's Bus-Minus output to include a base mix of the board's main program output *bus* (say ST 1) *minus* the remote talent's fader. Many other Bus-Minus configurations are easily made, including direct outs for recording.

You can also control and meter the output level of any Bus-Minus output by switching to the Input screen for your fader or navigating to the main BUS MINUS screen. You can always press the SET button on the fader strip to cause the VGA monitor to switch to that fader's Input Screen.

HELP Navigation Button

Clicking the HELP button at the top of the touch screen will display a "browser" style, linked help window.

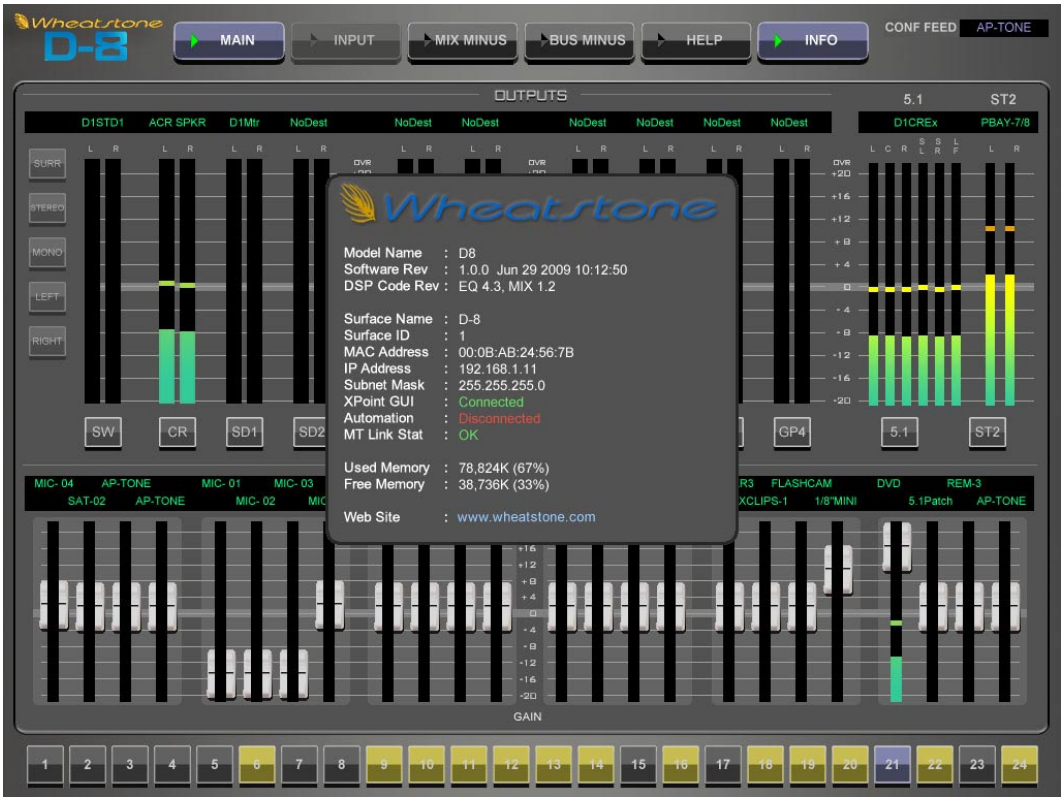


The Help system guides users through basic setup and control of the console. Simply select a "browser" link by touching the screen.

To close this window select the main HELP button again.

INFO Navigation Button

Clicking the INFO button will display an information window:



INFO — the technical information about the surface's software versions and connection status to its companion rack MT link, Ethernet link, and automation interface.

To close this window select the INFO button again.

Schematic and Load Sheet Drawings

Chapter Contents

IP-D8 4 Input Panel Switch Card
Schematic 7-2
Load Sheet 7-5

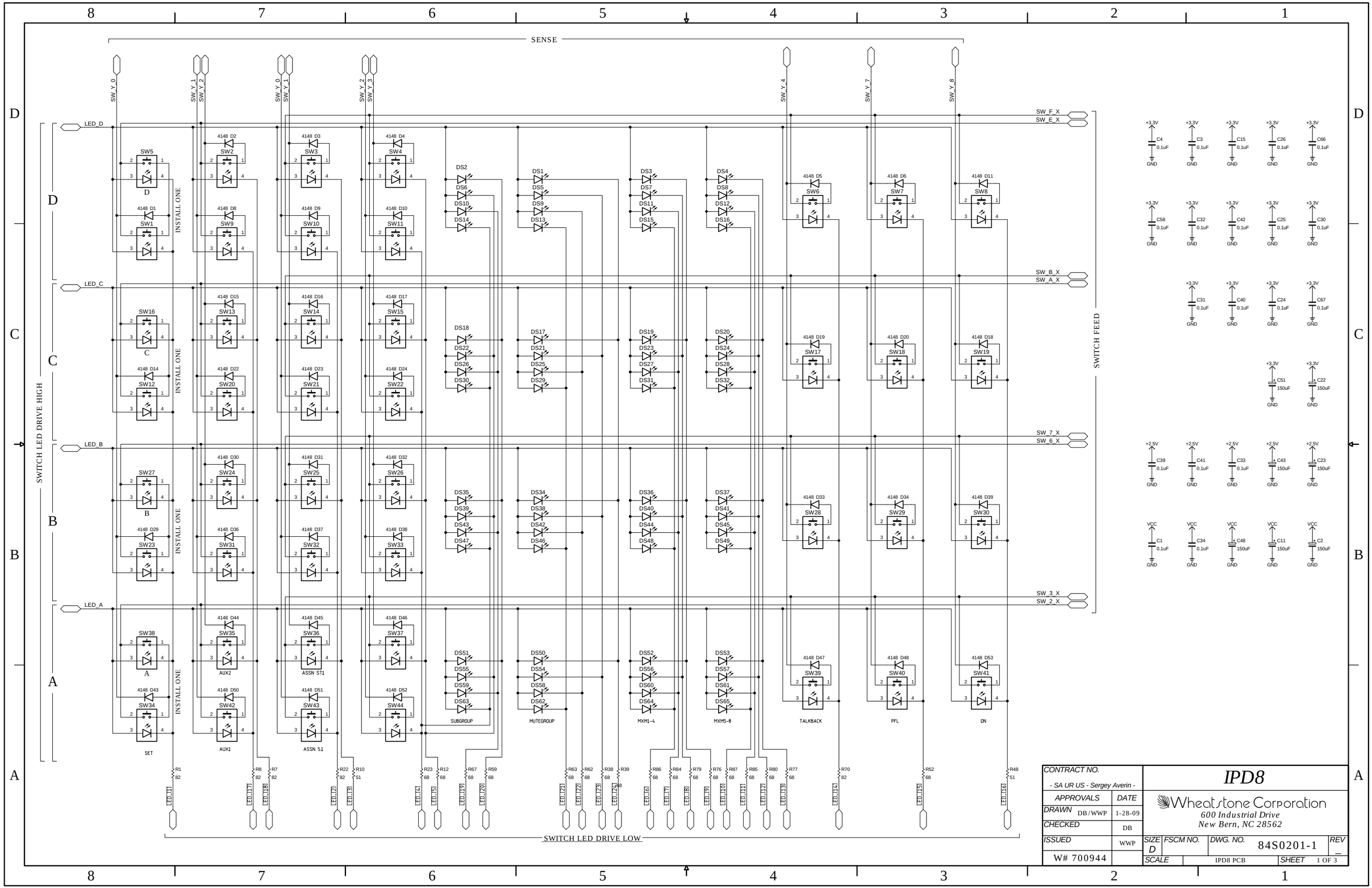
MON-D8 Monitor Panel Switch Card
Schematic 7-6
Load Sheet 7-9

MST-D8 Master Panel Switch Card
Schematic 7-10
Load Sheet 7-13

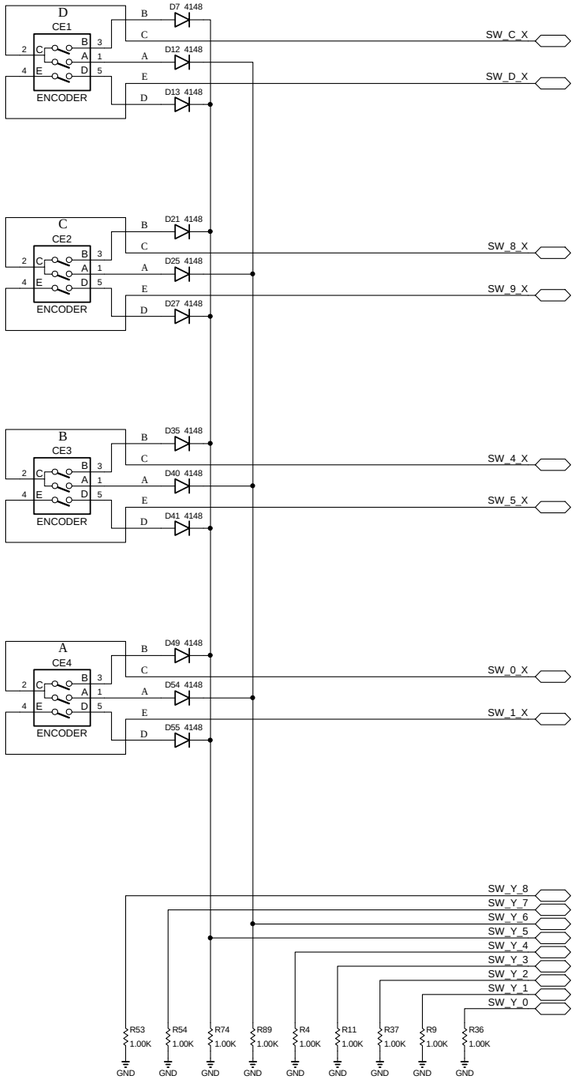
HC-3 Host Controller Card
Schematic 7-14
Load Sheet 7-18

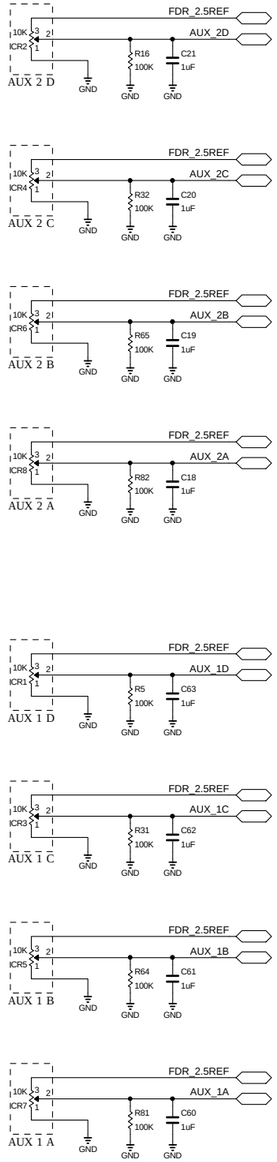
32VC5-5 +5V DC to DC Convertor Card
Schematic 7-19
Load Sheet 7-20

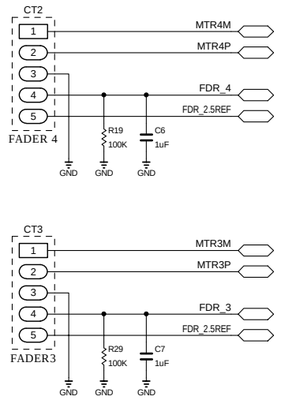
PSU-1 Power Supply
Schematic 7-21
Load Sheet 7-22

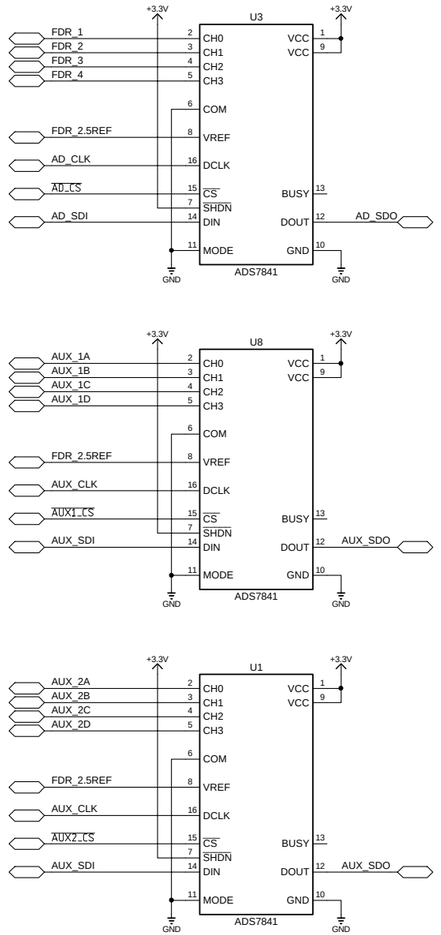

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SW_Y_0
SW_Y_1
SW_Y_2
SW_Y_3
SW_Y_4
SW_Y_7
SW_Y_8
LED_D
LED_C
LED_B
LED_A
SW_F_X
SW_E_X
SW_B_X
SW_A_X
SW_7_X
SW_6_X
SW_3_X
SW_2_X
SWITCH FEED
SWITCH LED DRIVE HIGH
SWITCH LED DRIVE LOW
INSTALL ONE
SUBGROUP
MUTEGROUP
MXM1-4
MXM5-8
TALKBACK
PFL
ON
AUX2
AUX1
ASSN ST1
ASSN 51
SET
+3.3V
+2.5V
VCC
GND
IPD8
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
CONTRACT NO.
- SA UR US - Sergey Averin -
APPROVALS
DATE
DRAWN DB/WWP 1-28-09
CHECKED DB
ISSUED WWP
W# 700944
SIZE D
FSCM NO.
DWG. NO. 84S0201-1
REV —
SCALE
IPD8 PCB
SHEET 1 OF 3

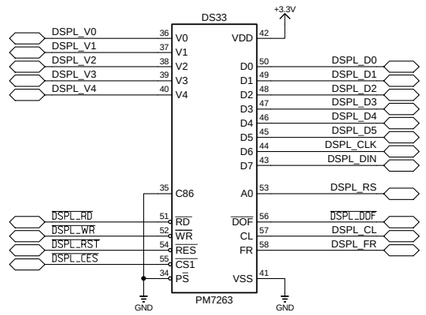
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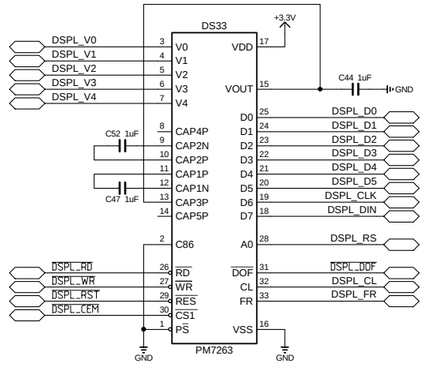


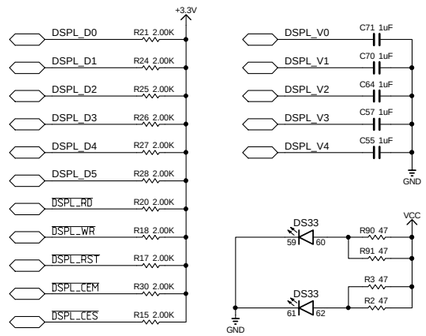


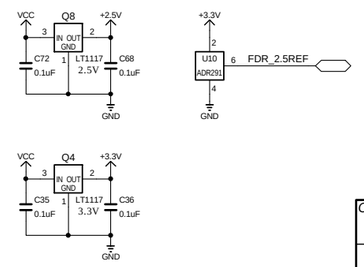


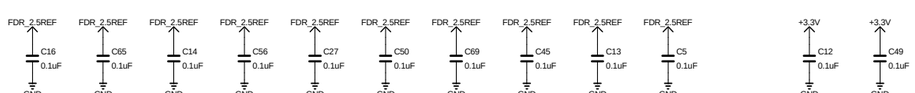




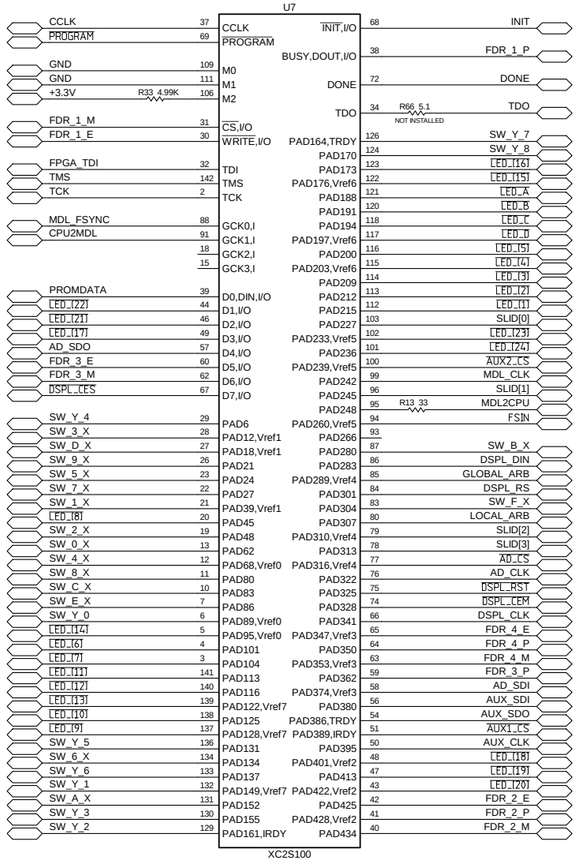




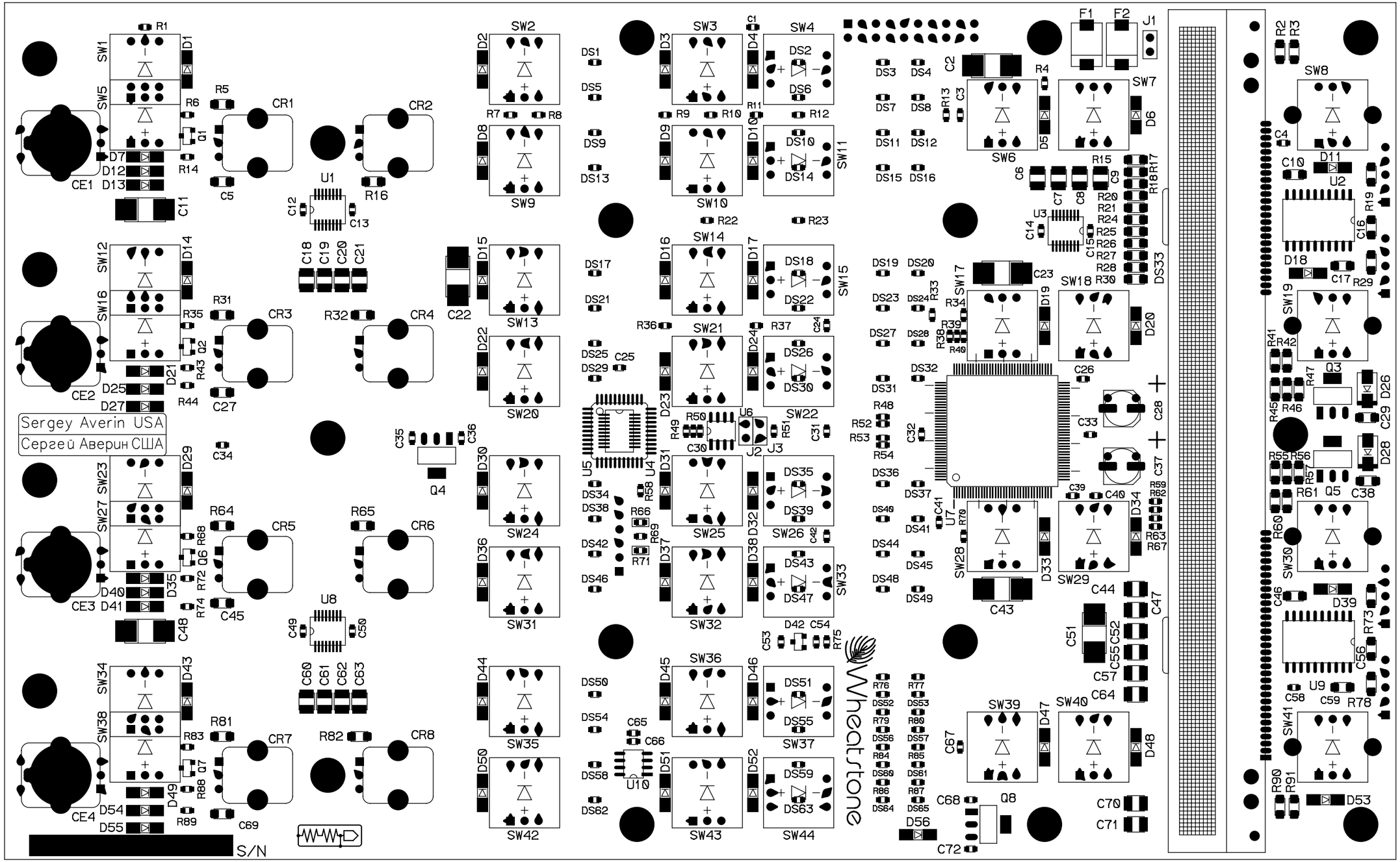


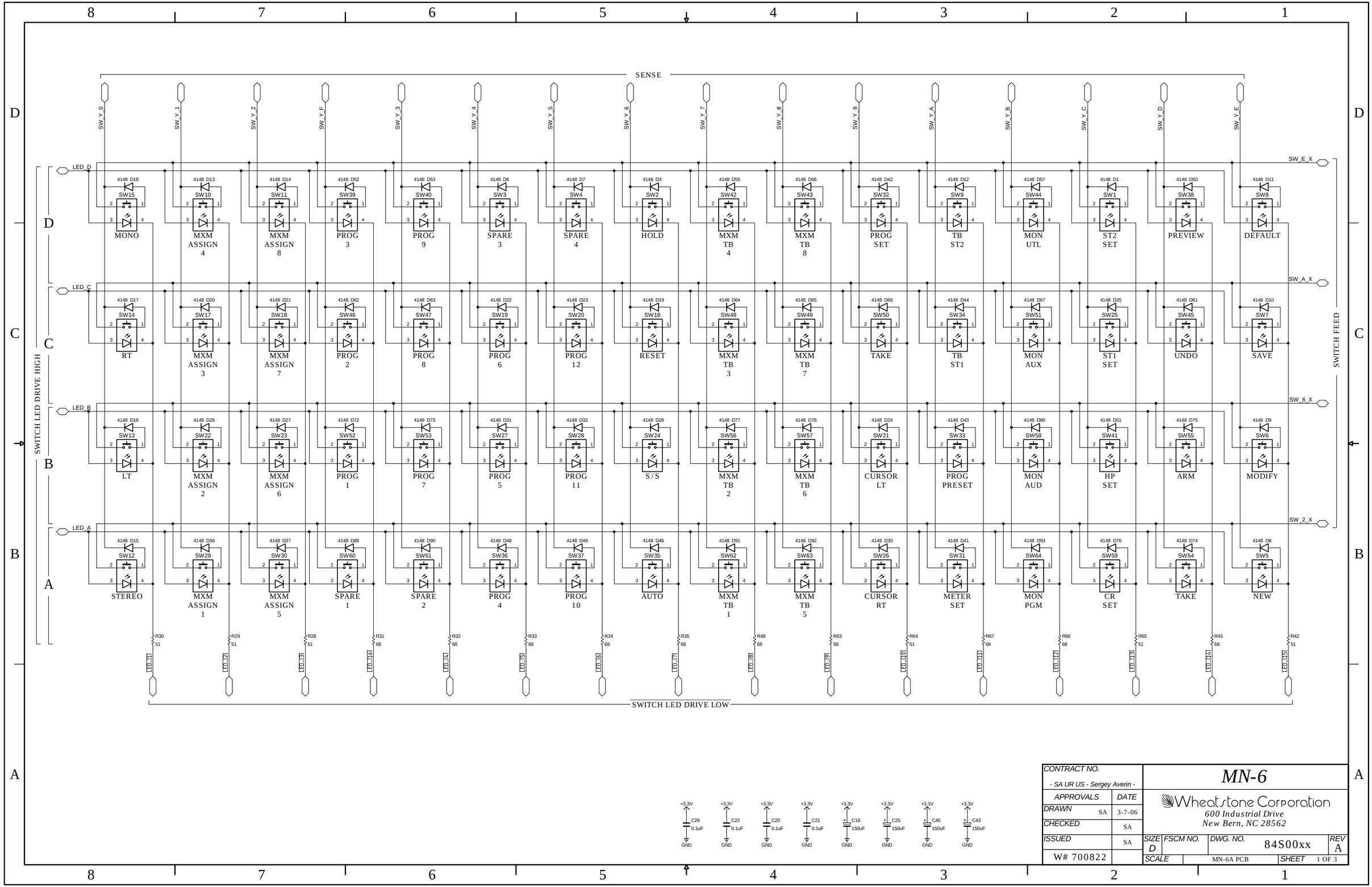


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W# 700944		SCALE / IPD8 PCB / SHEET 2 OF 3

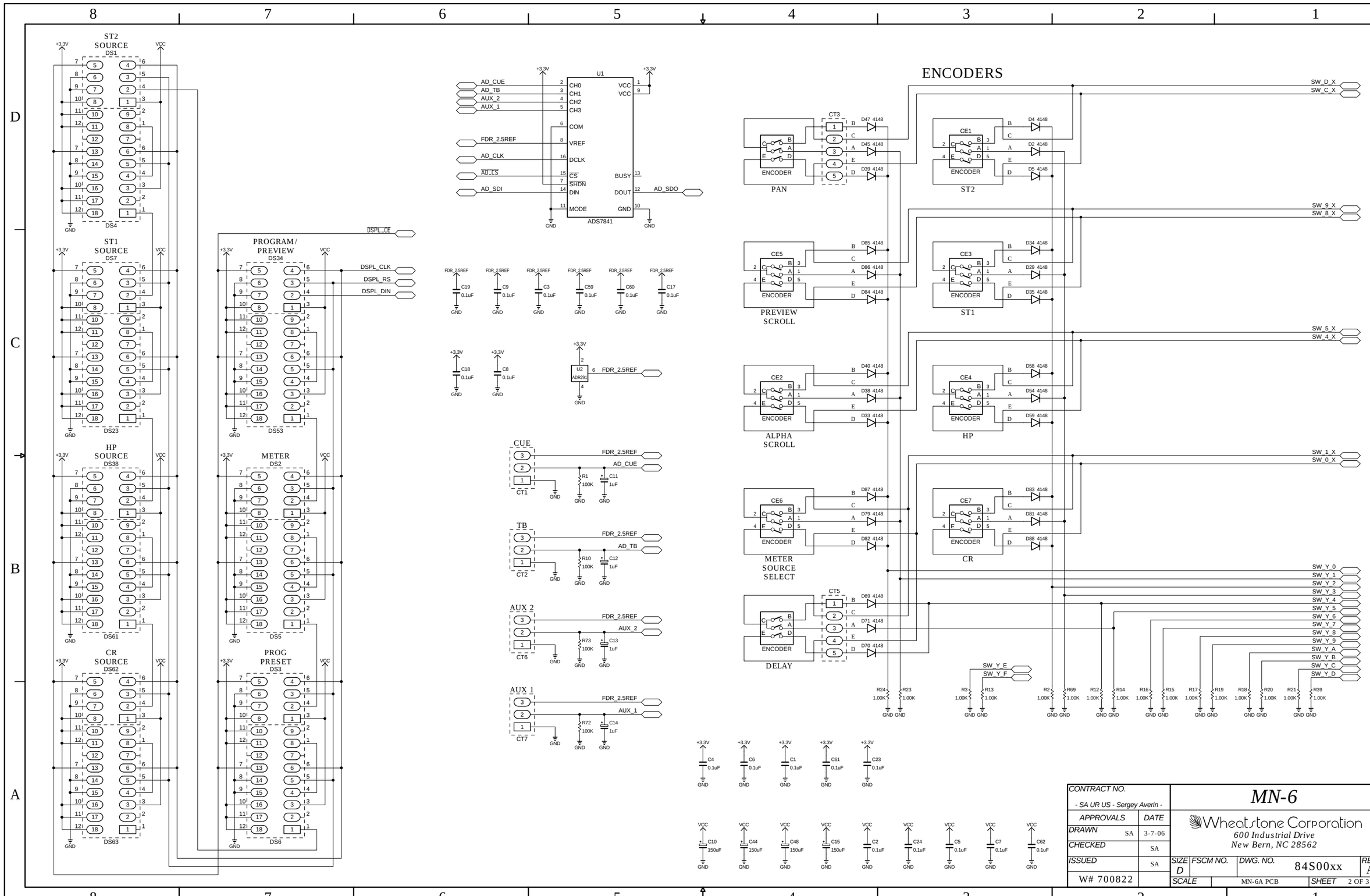


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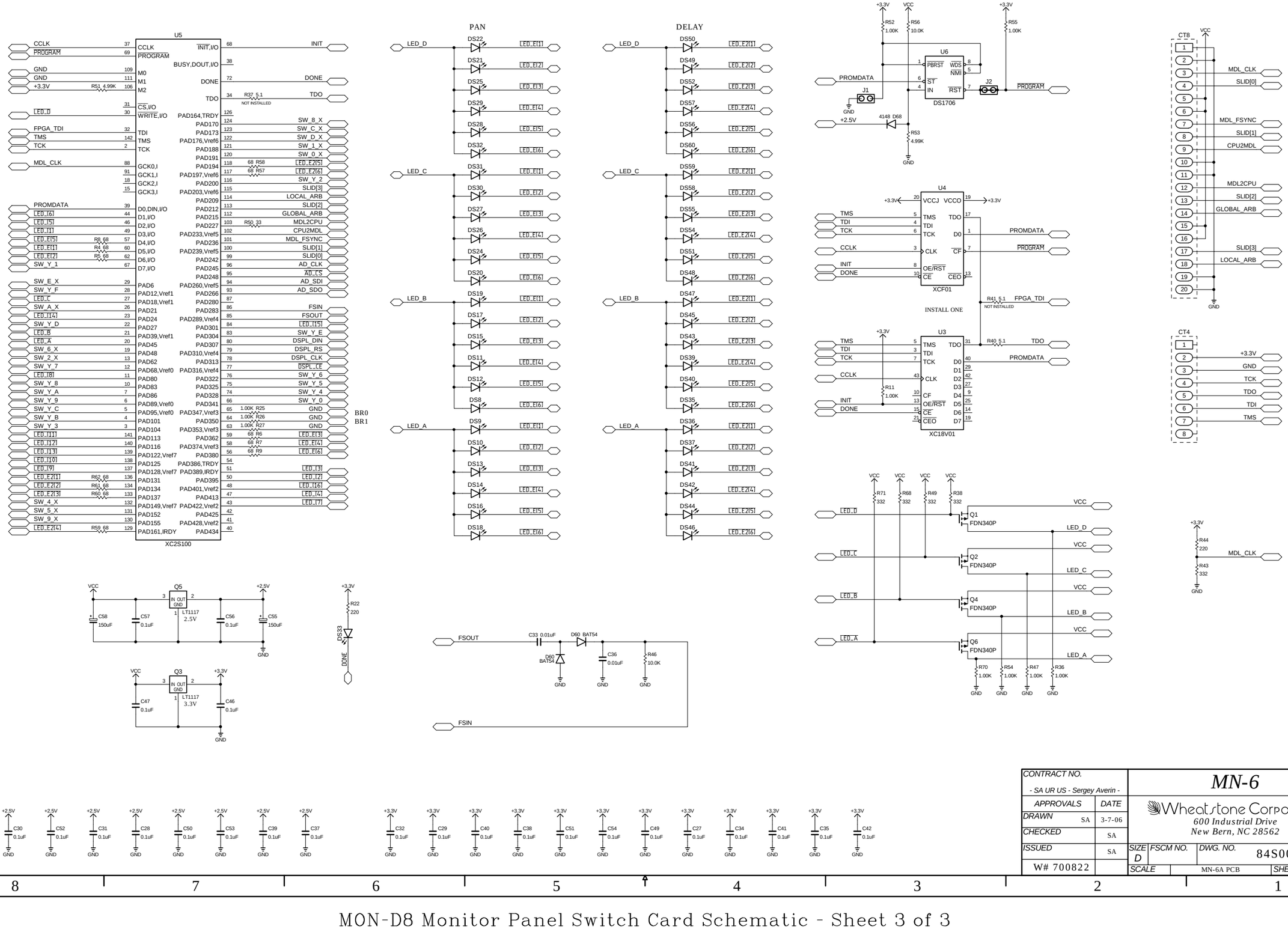

Sergey Averin USA
Сергей Аверин США
S/N
Wheatstone



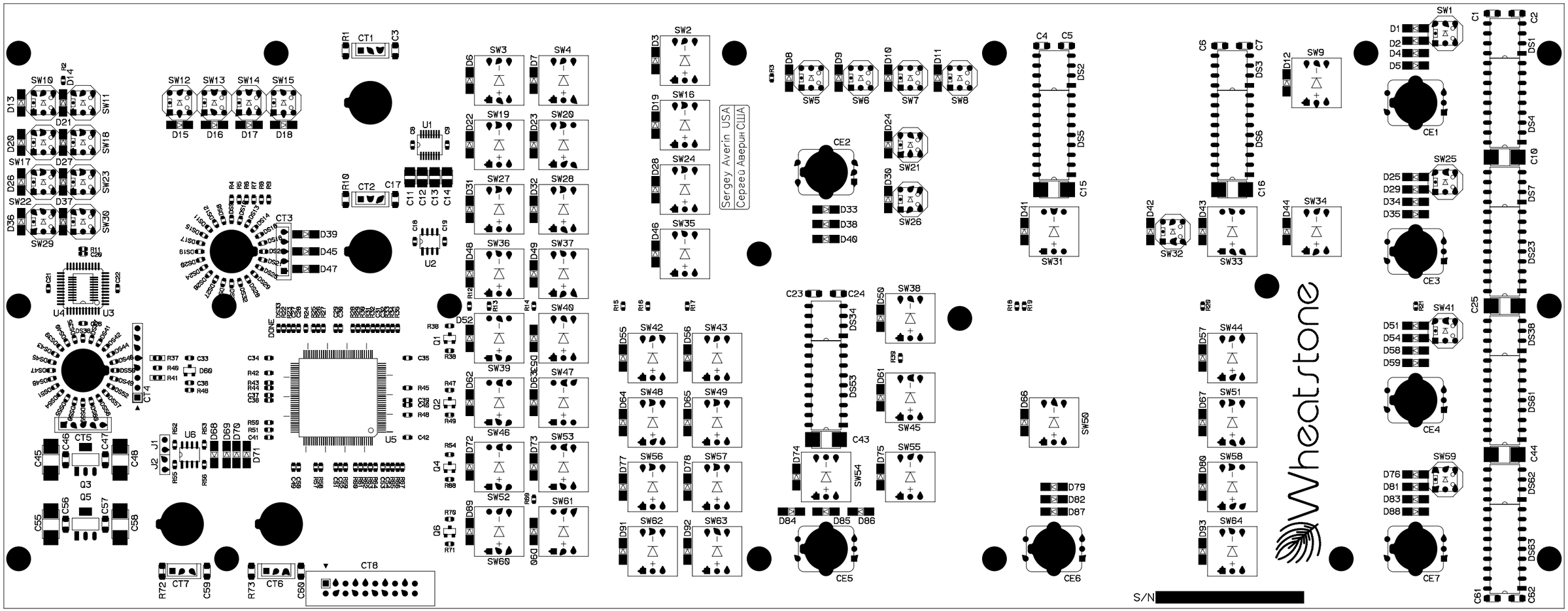
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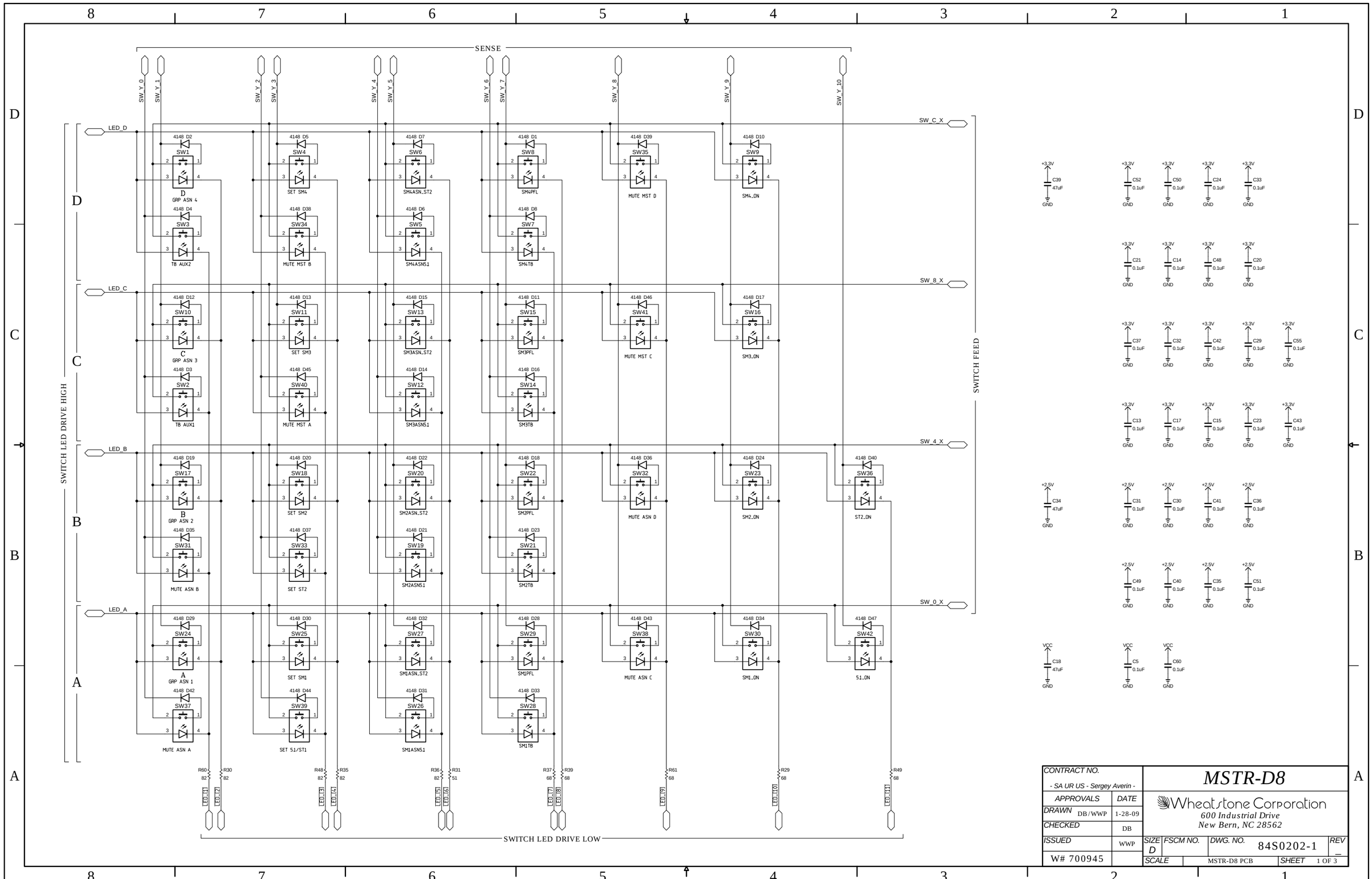


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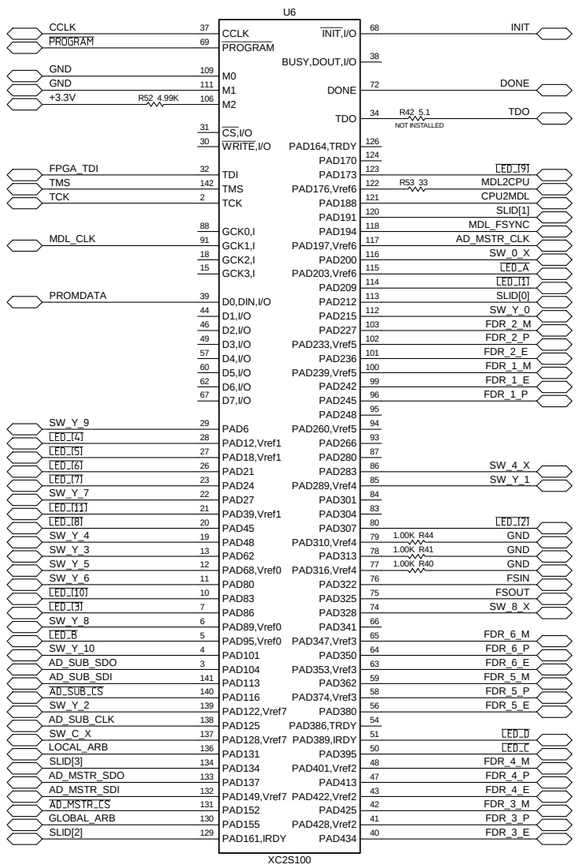


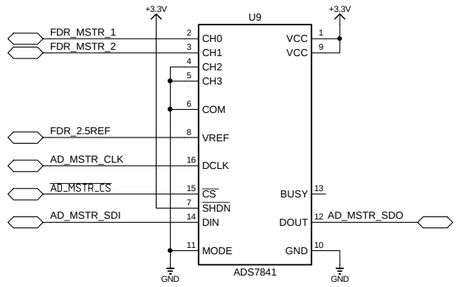
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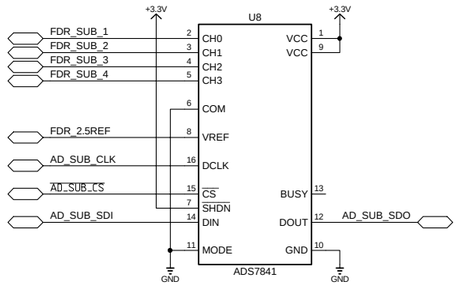

SW10
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CT1
CT2
CT3
CT4
CT5
CT6
CT7
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Sergey Averin USA
Сергей Аверин США
Wheatstone
S/N

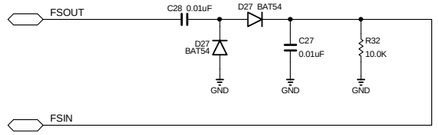


MST-D8 MasterPanel Switch Card Schematic - Sheet 1 of 3

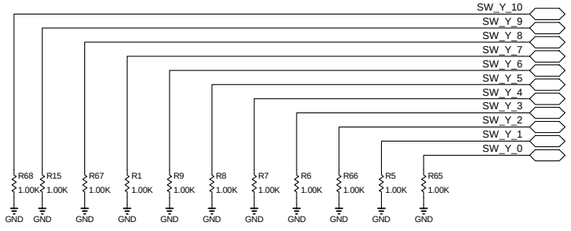


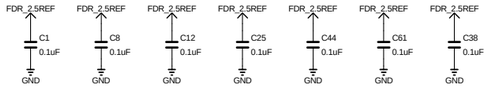


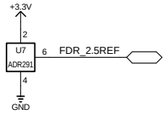


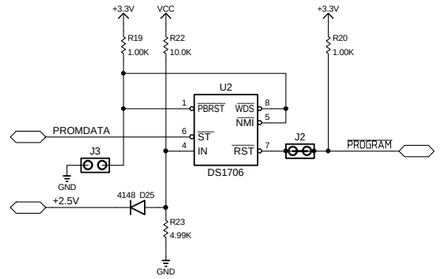


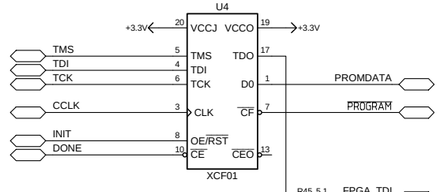


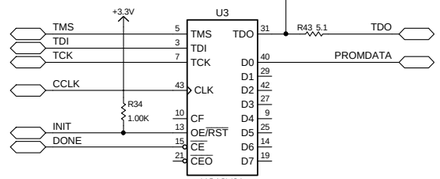


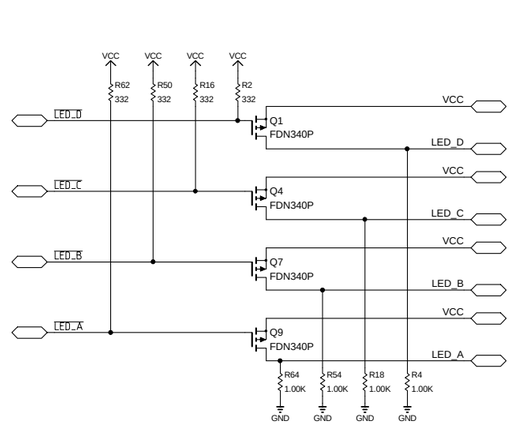


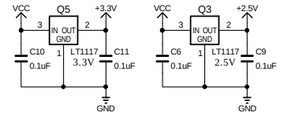


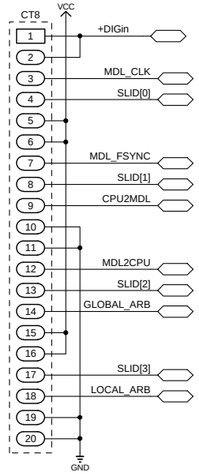


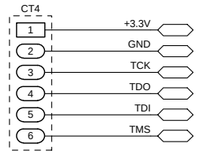




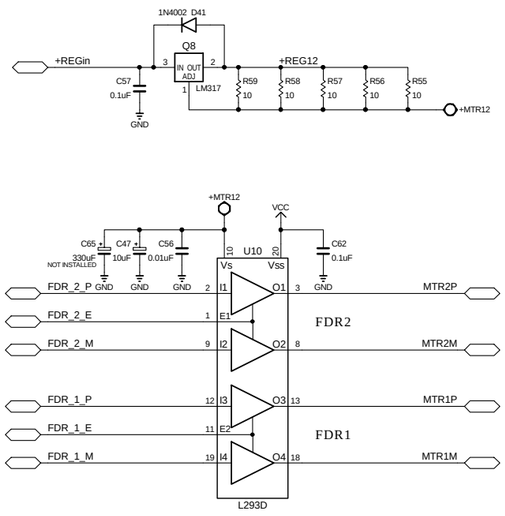


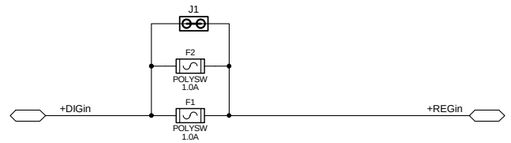


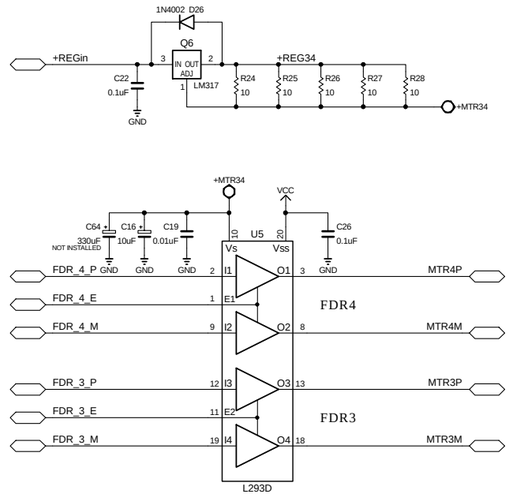


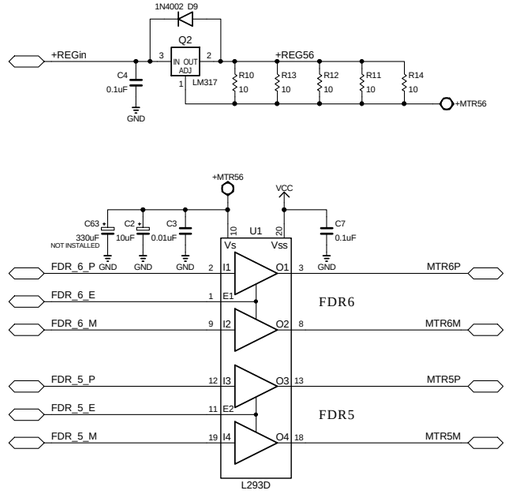


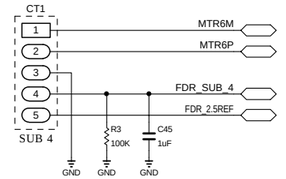
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W# 700945		SCALE / MSTR-D8 PCB / SHEET 2 OF 3

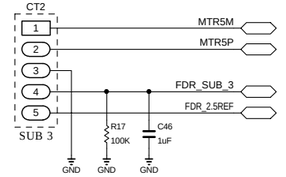


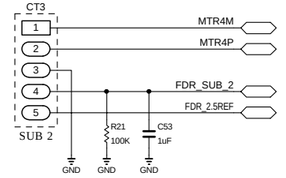


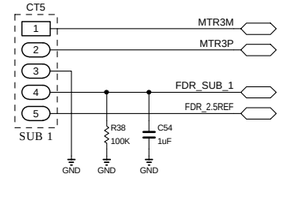


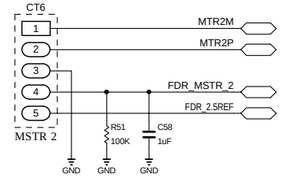


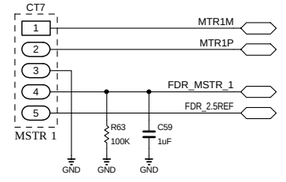




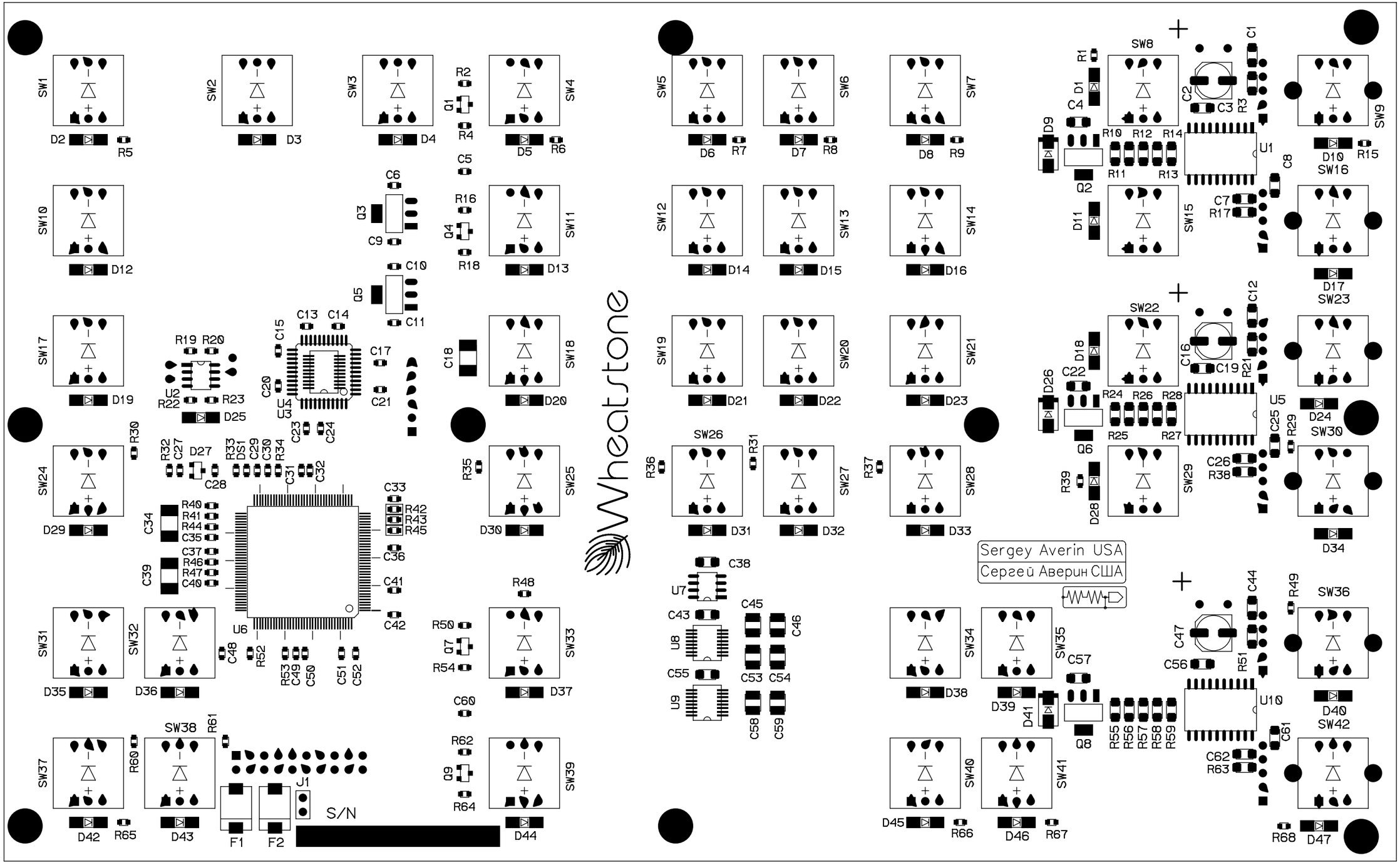


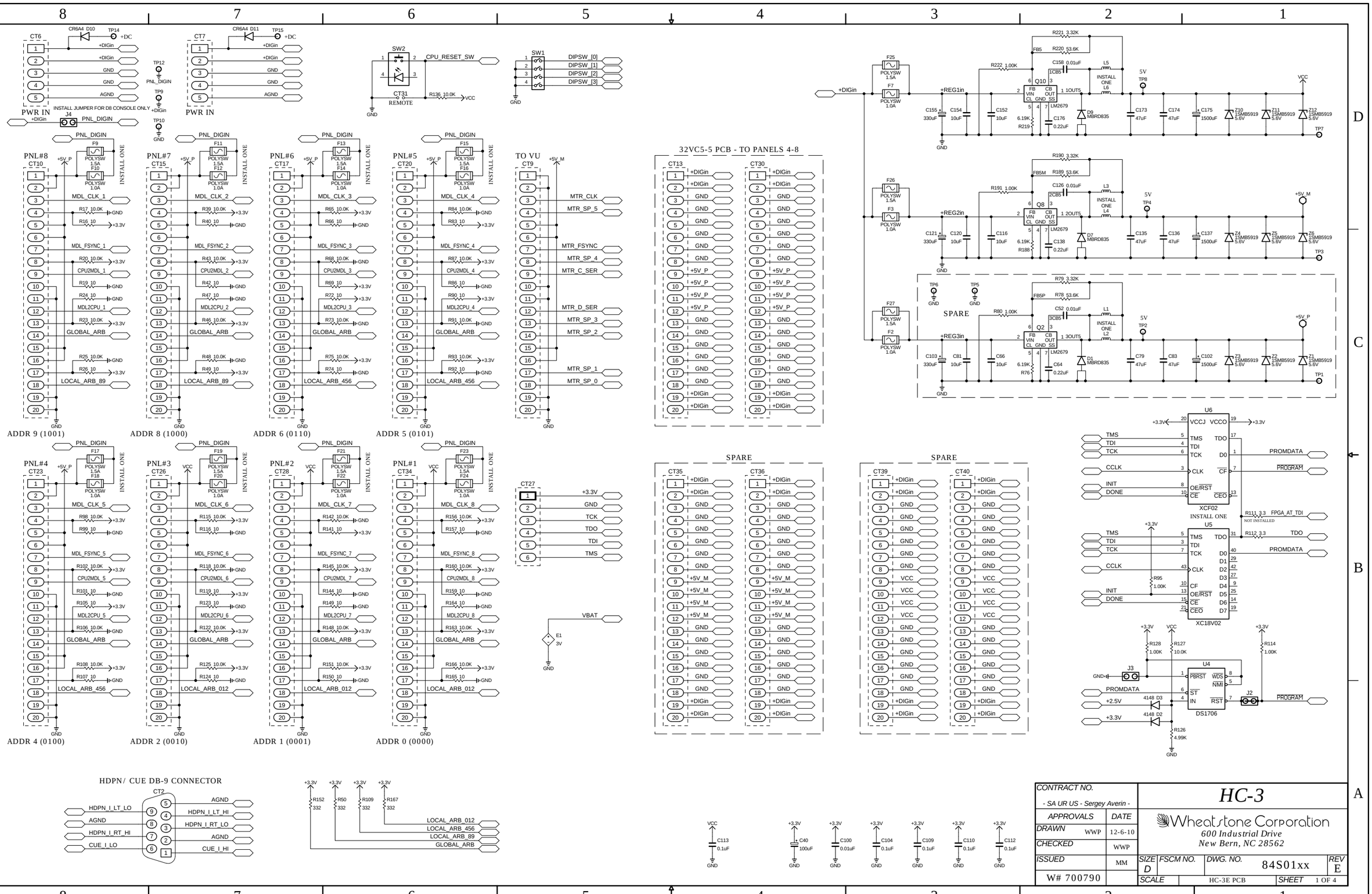




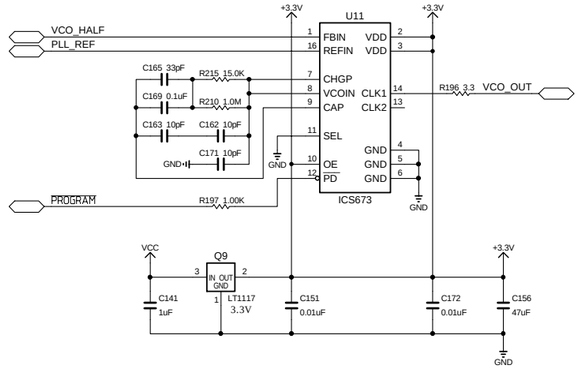


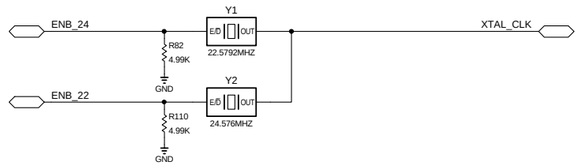
CONTRACT NO. - SA UR US - Sergey Averin -		*MSTR-D8*
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562
DRAWN DB/WWP	1-28-09	
CHECKED	DB	
ISSUED	WWP	SIZE D / FSCM NO. / DWG. NO. 84S0202-3 / REV —
W# 700945		SCALE / MSTR-D8 PCB / SHEET 3 OF 3

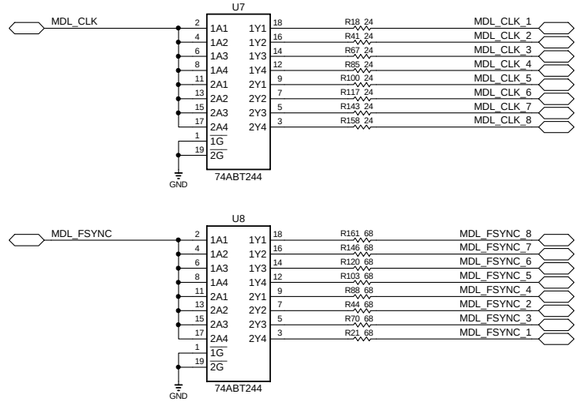

Wheatstone
Sergey Averin USA
Сергей Аверин США
S/N

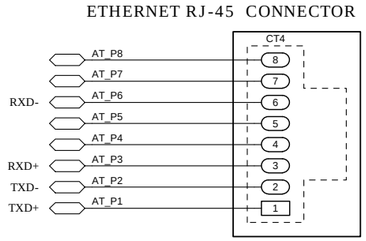


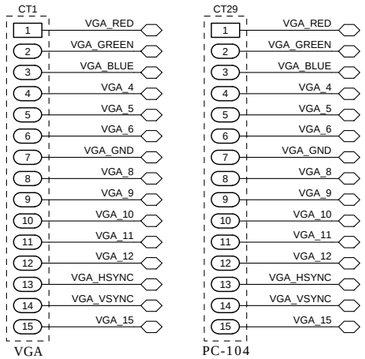
CONTRACT NO.		*HC-3*	
- SA UR US - Sergey Averin -		Wheatstone Corporation	
APPROVALS	DATE	600 Industrial Drive	
DRAWN WWP	12-6-10	New Bern, NC 28562	
CHECKED	WWP		
ISSUED	MM	SIZE D / FSCM NO. / DWG. NO. 84S01xx / REV E	
W# 700790		SCALE HC-3E PCB / SHEET 1 OF 4	

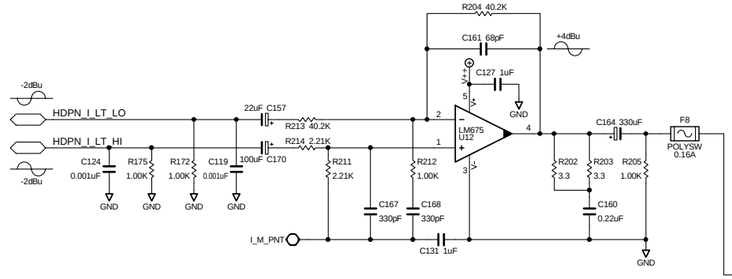


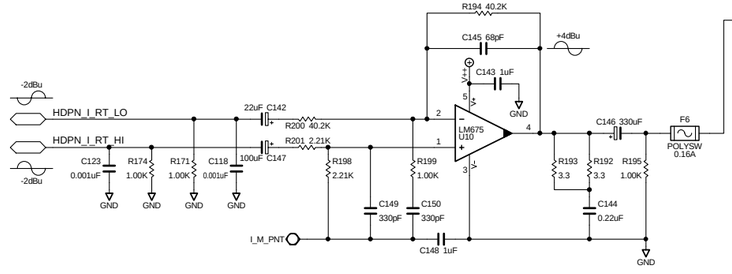


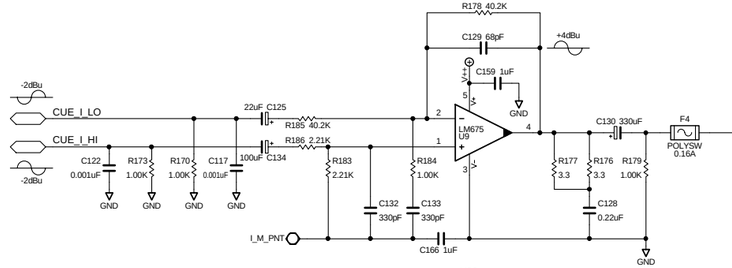


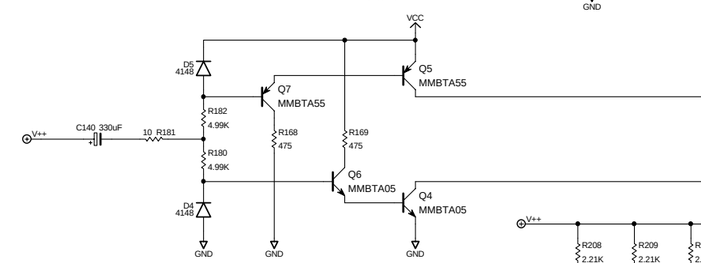


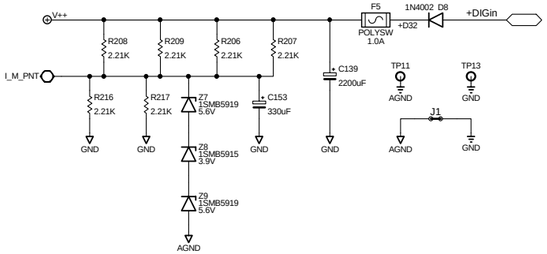


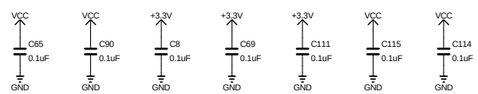


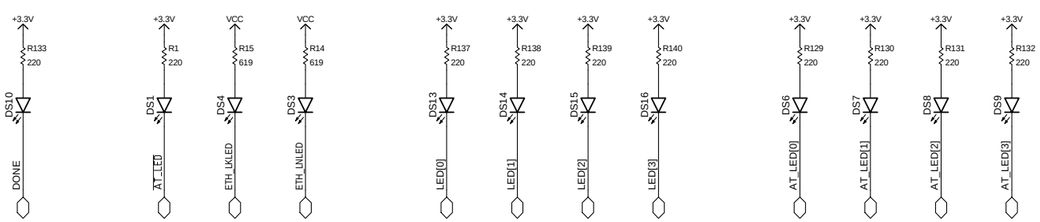




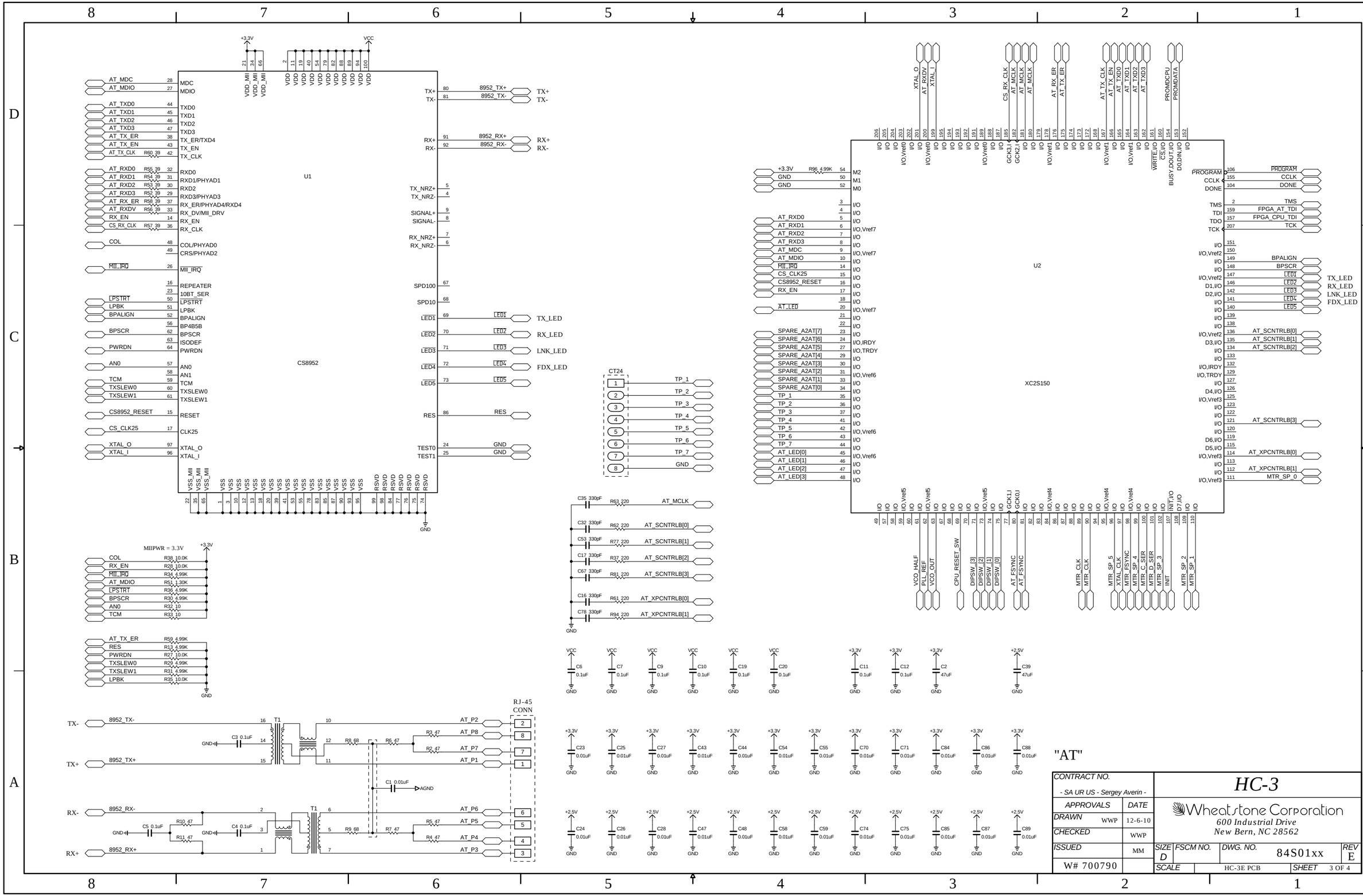




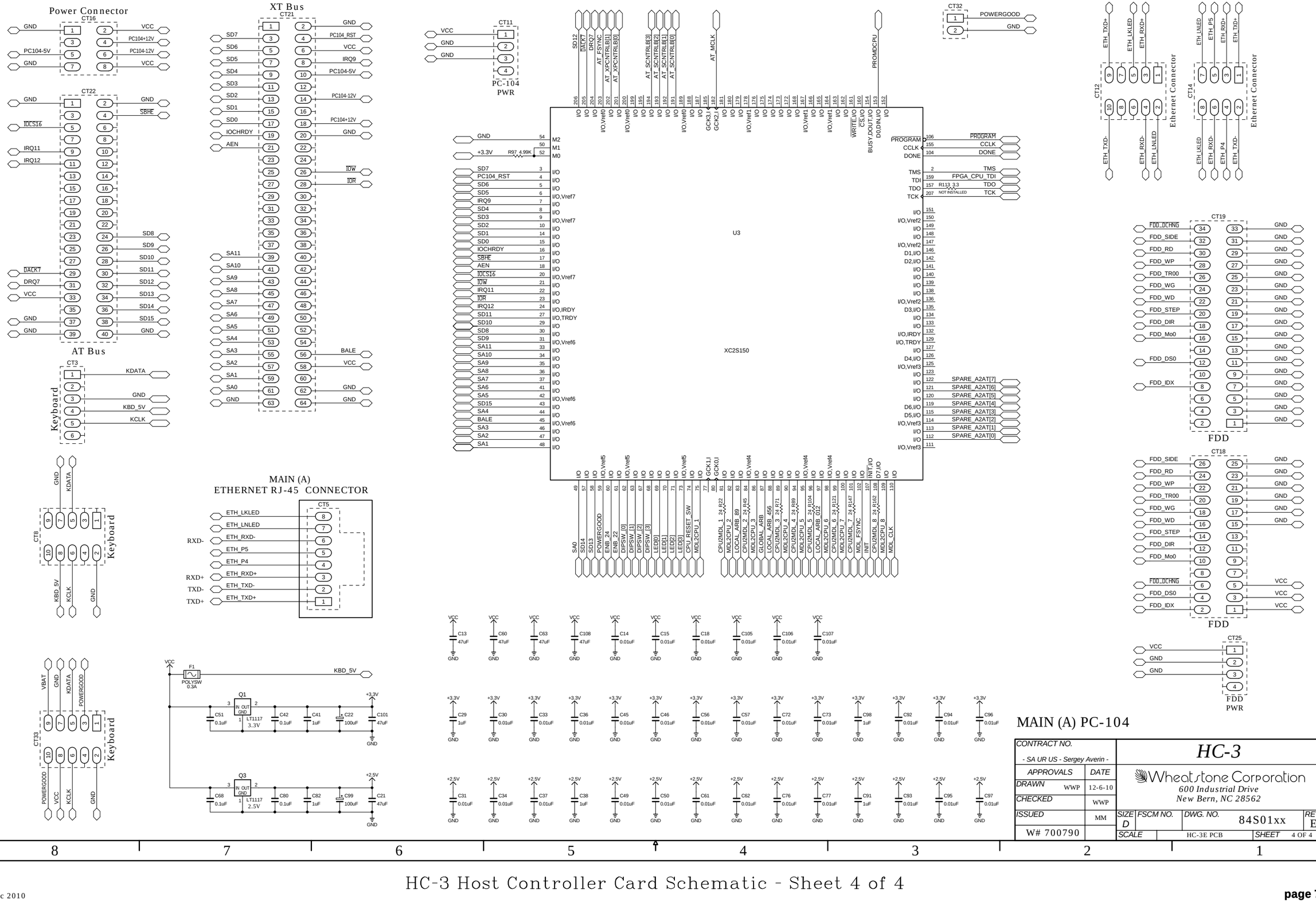


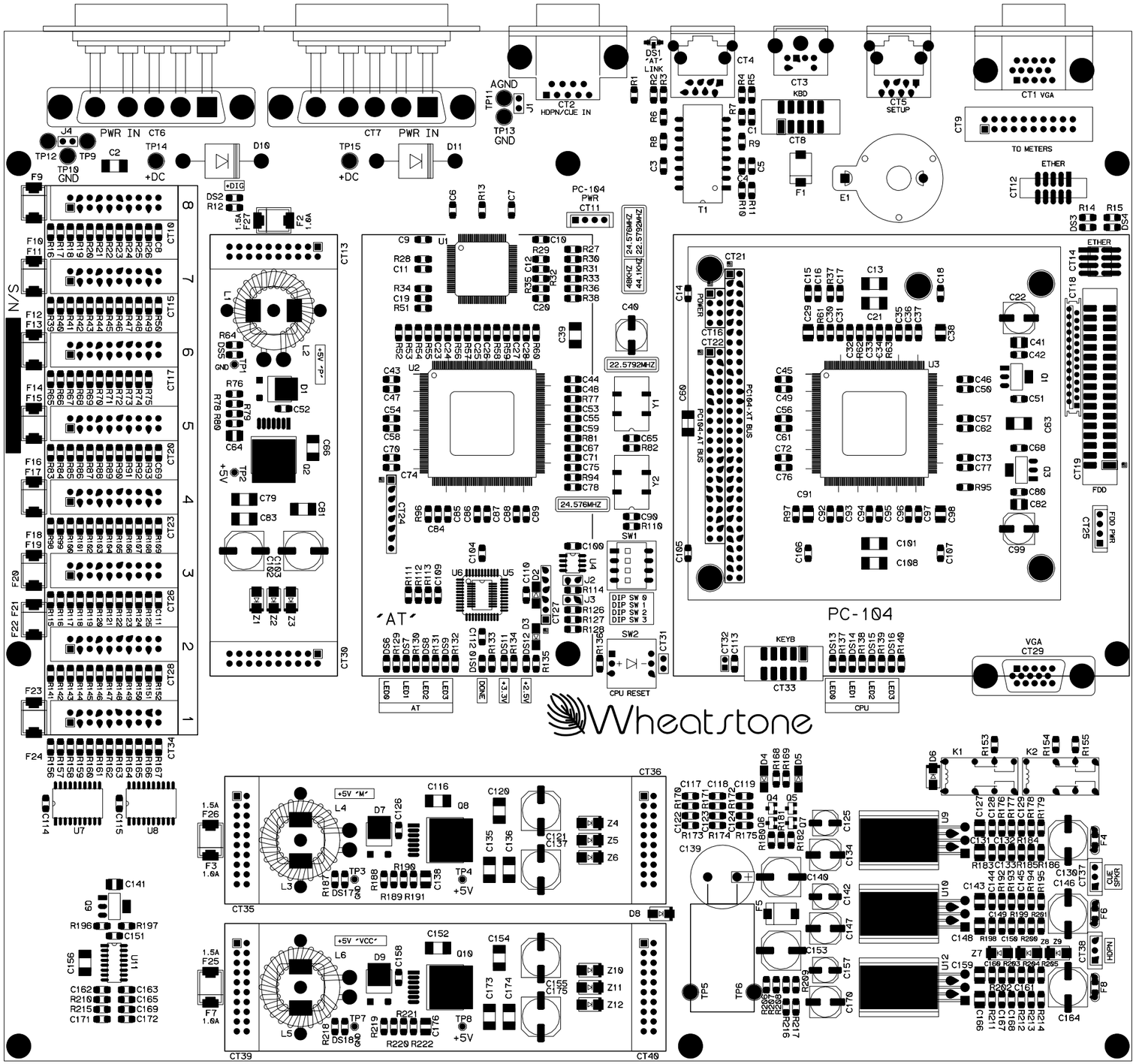


CONTRACT NO. - SA UR US - Sergey Averin -		HC-3
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562
DRAWN WWP	12-6-10	
CHECKED	WWP	
ISSUED	MM	SIZE D / FSCM NO. / DWG. NO. 84S01xx / REV E
W# 700790		SCALE / HC-3E PCB / SHEET 2 OF 4

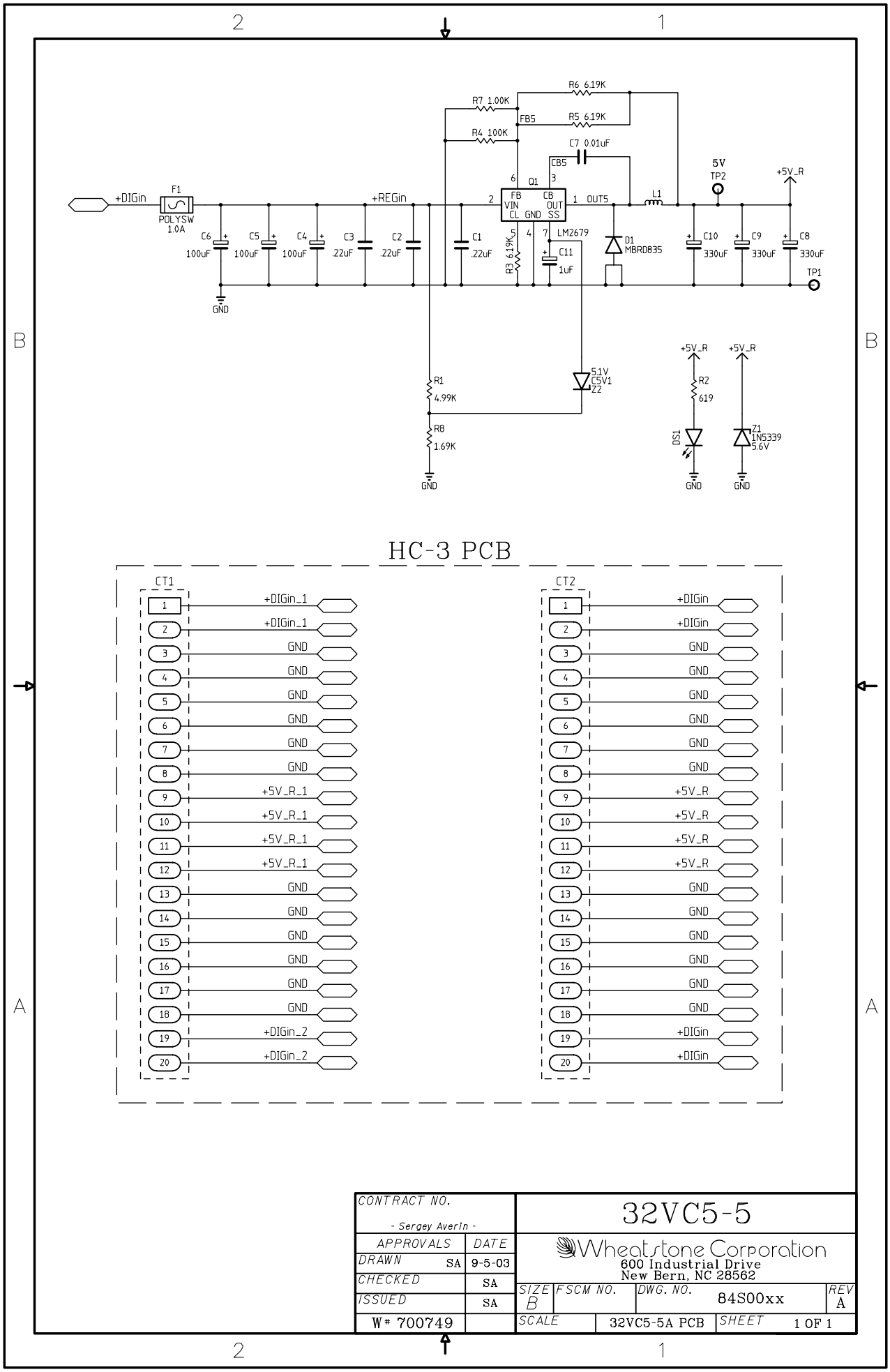


HC-3 Host Controller Card Schematic - Sheet 3 of 4


Power Connector
CT16
GND
PC104-5V
GND
VCC
PC104+12V
PC104-12V
VCC
CT22
GND
IOCS16
IRQ11
IRQ12
SBHE
SD8
SD9
SD10
SD11
SD12
SD13
SD14
SD15
DACK7
DRQ7
VCC
GND
GND
AT Bus
CT3
Keyboard
KDATA
GND
KBD_5V
KCLK
XT Bus
CT21
SD7
SD6
SD5
SD4
SD3
SD2
SD1
SD0
IOCHRDY
AEN
SA11
SA10
SA9
SA8
SA7
SA6
SA5
SA4
SA3
SA2
SA1
SA0
GND
PC104_RST
VCC
IRQ9
PC104-5V
PC104-12V
PC104+12V
GND
IOW
IOR
BALE
VCC
GND
GND
CT11
PC-104
PWR
VCC
GND
GND
CT32
POWERGOOD
GND
CT12
CT14
Ethernet Connector
ETH_TXD+
ETH_LNLED
ETH_RXD+
ETH_TXD-
ETH_RXD-
ETH_LNLED
ETH_LNLED
ETH_P5
ETH_RXD+
ETH_P4
ETH_RXD-
ETH_TXD-
U3
XC2S150
SD12
DACK7
DRQ7
AT_FSYNC
AT_XPCNTRLB[1]
AT_XPCNTRLB[0]
AT_SCNTRLB[3]
AT_SCNTRLB[2]
AT_SCNTRLB[1]
AT_SCNTRLB[0]
AT_MCLK
PROMDCPU
WRITE_I/O
CS_I/O
BUSY,DOUT,I/O
D0,DIN,I/O
PROGRAM
CCLK
DONE
TMS
TDI
TDO
TCK
R113 3.3
NOT INSTALLED
M2
M1
M0
+3.3V
R97 4.99K
CT19
FDD
FDD_DCHNG
FDD_SIDE
FDD_RD
FDD_WP
FDD_TR00
FDD_WG
FDD_WD
FDD_STEP
FDD_DIR
FDD_Mo0
FDD_DS0
FDD_IDX
CT18
FDD
FDD_DCHNG
FDD_DS0
FDD_IDX
VCC
CT25
FDD
PWR
MAIN (A)
ETHERNET RJ-45 CONNECTOR
CT5
ETH_LKLED
ETH_LNLED
ETH_RXD-
ETH_P5
ETH_P4
ETH_RXD+
ETH_TXD-
ETH_TXD+
RXD-
RXD+
TXD-
TXD+
CT8
Keyboard
KBD_5V
KCLK
GND
CT33
Keyboard
VBAT
GND
KDATA
POWERGOOD
POWERGOOD
VCC
KCLK
GND
F1
POLYSW
0.3A
KBD_5V
Q1
LT1117
3.3V
Q3
LT1117
2.5V
+3.3V
+2.5V
C13 47uF
C60 47uF
C63 47uF
C108 47uF
C14 0.01uF
C15 0.01uF
C18 0.01uF
C105 0.01uF
C106 0.01uF
C107 0.01uF
C29 1uF
C30 0.01uF
C33 0.01uF
C36 0.01uF
C45 0.01uF
C46 0.01uF
C56 0.01uF
C57 0.01uF
C72 0.01uF
C73 0.01uF
C98 1uF
C92 0.01uF
C94 0.01uF
C96 0.01uF
C31 0.01uF
C34 0.01uF
C37 0.01uF
C38 1uF
C49 0.01uF
C50 0.01uF
C61 0.01uF
C62 0.01uF
C76 0.01uF
C77 0.01uF
C91 1uF
C93 0.01uF
C95 0.01uF
C97 0.01uF
C51 0.1uF
C42 0.1uF
C41 1uF
C22 100uF
C101 47uF
C68 0.1uF
C80 0.1uF
C82 1uF
C99 100uF
C21 47uF
MAIN (A) PC-104
CONTRACT NO.
- SA UR US - Sergey Averin -
APPROVALS
DATE
DRAWN WWP 12-6-10
CHECKED WWP
ISSUED MM
W# 700790
HC-3
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE D
FSCM NO.
DWG. NO. 84S01xx
REV E
SCALE
HC-3E PCB
SHEET 4 OF 4

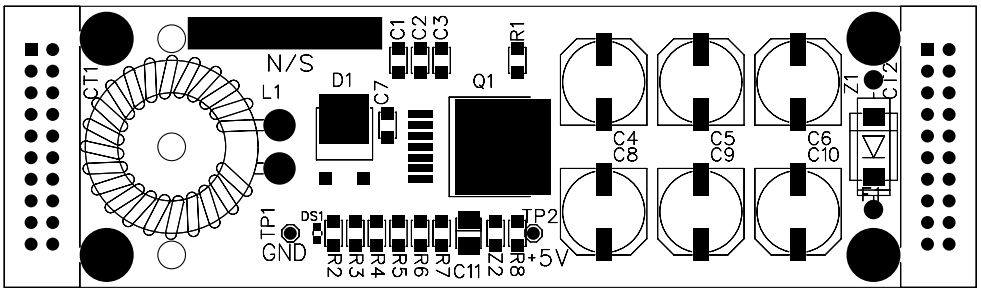


HC-3 Host Controller Card - Load Sheet

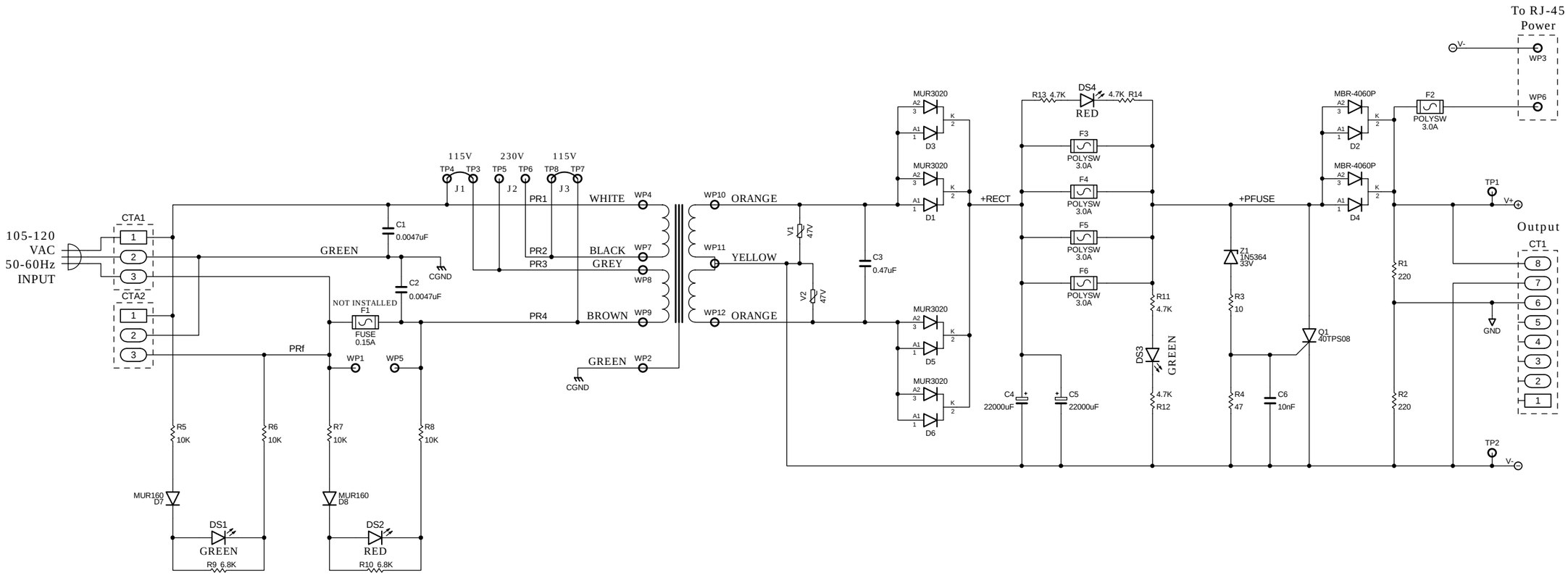


CONTRACT NO. - Sergey Averin -		32VC5-5	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	9-5-03		
CHECKED	SA		
ISSUED	SA	SIZE B / FSCM NO. / DWG. NO. 84S00xx	REV A
W# 700749		SCALE / 32VC5-5A PCB	SHEET 1 OF 1

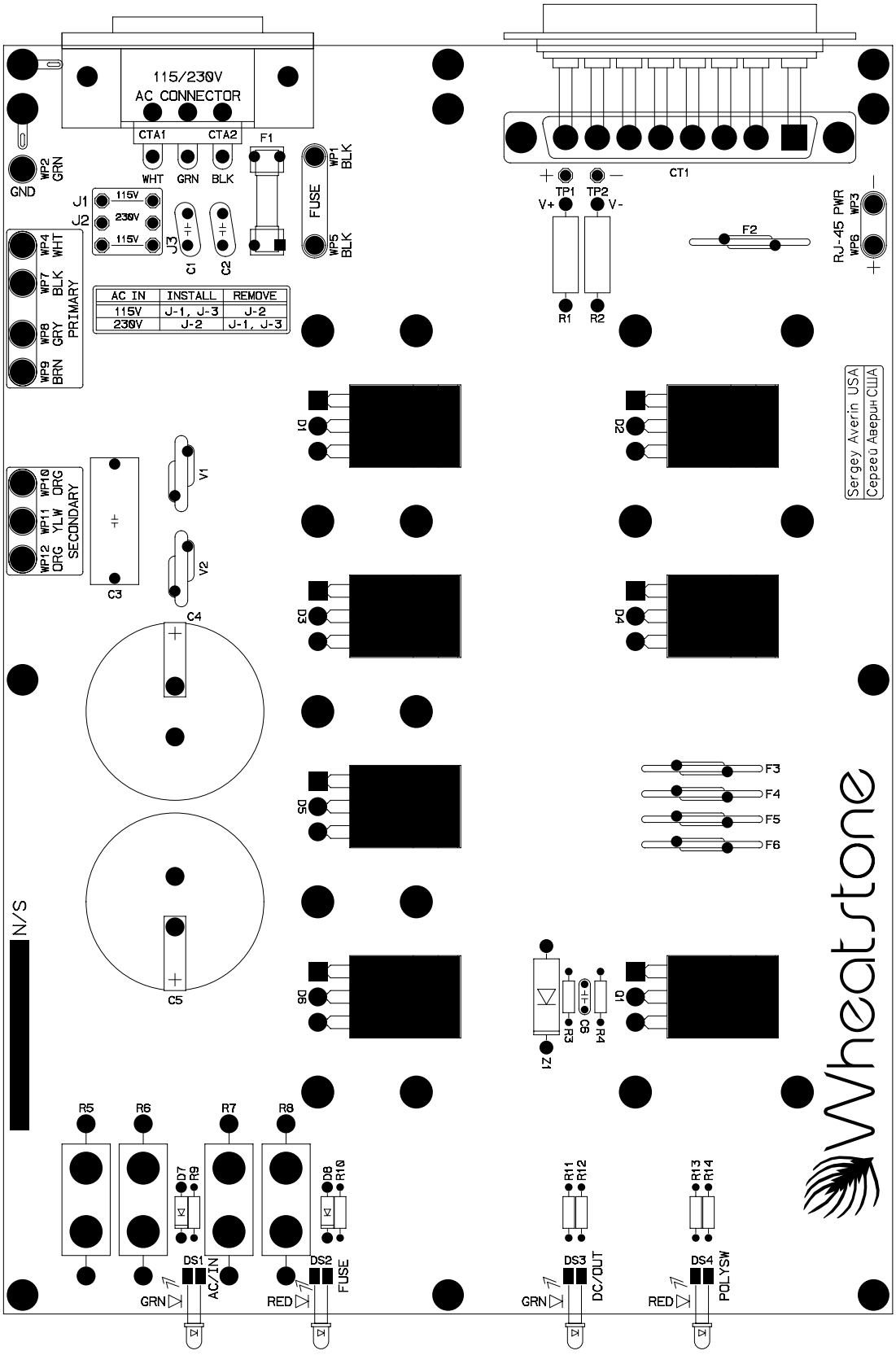
32VC5-5 +5V DC to DC Convertor Schematic - Sheet 1 of 1



32VC5-5 +5V DC to DC Convertor Load Sheet



CONTRACT NO. - SA UR US - Sergey Averin -		PSU-1	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	2-3-06		
CHECKED	SA		
ISSUED	SA		
W# 700828		SIZE C / FSCM NO. / DWG. NO. 00S0034 / REV B	
		SCALE PSU-1B PCB	SHEET 1 OF 1



PSU-1 Power Supply Load Sheet

Appendices

Appendix 1

Options Text File A-3
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An Example File - Complete A-6

Appendix 2

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Starting an Audio Playback Device from a Surface A-12
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Appendix 3

Replacement Parts List A-20

Appendix 1

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Options Text File

Introduction

There are a number of operational features on the D-8 surface that are controlled by the contents of the Options Text File (D8_OPTS.TXT) that resides on the surface's flash drive. In order to configure these features it is necessary to modify this file.

Modifying The Options Text File

There are several steps involved in modifying the file:

1. Establish an FTP (File Transfer Protocol) session with the surface. This is best done using an FTP program with a graphical interface, such as FTP Surfer by Whisper Technology. You will set up an anonymous session using the following information:

   Name: something useful, assuming you will save the setup
   Address: use the IP address of the surface
   User name: knockknock
   Password: whosthere

2. When the FTP session connects you will see a list of files and folders that are on the surface. One of those files is the Options Text file, named as specified above. Drag this file over to your PC's desktop so you can save a copy.
3. Make any required changes to the copy of the file on your desktop, according to the information in the following sections, then save the file and drag its icon back to the FTP window to send the modified file back to the surface.
4. Once the modified file is on the surface, wait a minute to be sure that the file has actually been written to the surface's flash memory. Then close the FTP session.
5. Reboot the surface for the changes to take effect.
6. If the surface has a backup CPU you should also save the same modified file to the backup CPU, which needs to be accessed by a separate FTP session using its IP address. You can wait to reboot the surface until you have sent the modified file to both surfaces; in this way you need only reboot the surface once.

A Simple Example From The File

As a simple example let's look at the MUTE_METHOD option. Scroll through the Options Text File (or look at the sample file listing at the end of this Appendix) until you see the following three lines of code:

```
// Syntax: MUTE_METHOD:?
// ? 0 (default) = ON button, 1 = ON AIR.
MUTE_METHOD:0
```

The first line describes the syntax for this option. It starts with two slashes, which are interpreted as the start of a comment line. Comment lines are made for **us** to read, and the surface CPU ignores them. This line shows that the syntax for the option is the keyword MUTE_METHOD followed by a colon (:) followed by some character, as represented by the "?" character.

The next line indicates that the "?" can be replaced by a "0" (a zero, not the letter O) if a muting channel being ON will trigger the mute, or a "1" if the muting channel must be both ON and assigned to a main bus (thus making it ON AIR) before it will trigger the mute. This specific example shows that the default setting is "0" for this option. Please note that this may or may not be the case for your particular surface, as the default option is subject to change. The **idea** of how to use the file remains true.

The third line is not a comment; this is the line the surface CPU actually reads from the file. This line, as shown, sets the muting method to ON (channel must be ON to activate a mute, but need not be ON AIR). If this is not the desired operation, this line must be edited. Change the "0" to a "1" and the muting method will change so that a channel is required to be ON AIR before it will activate a mute. As indicated in the instructions above for modifying the file, the actual change to operation will not happen until the surface has been rebooted and has read the modified file.

The edited line must follow the established syntax precisely or the surface may not behave as expected.

A Second Example

As a second example, lets look at something a little more involved. Once again, scroll through the Options Text File to find the following code (please note that some surfaces may have a different number of code lines in this section; the following is just for the purposes of example):

```
// Syntax: SPARE#:?
// # is the spare button number (1 - 12)
// ? is the mode (default = 2)...
//   0 = None, Button presses are ignored, LED controlled by DIO
//   1 = Toggle, Button state toggles on each press, LED controlled by Surface
//   2 = Momentary, Button is active when held down, LED controlled by Surface
//   3 = Momentary, Button is active when held down, LED controlled by DIO
//   4 = Automation, Button & LED are controlled by automation interface
//   5 = Preset Select, Button selects pre-configured preset, LED controlled by Surface
SPARE1:2
SPARE2:2
SPARE3:2
SPARE4:2
SPARE5:2
SPARE6:2
SPARE7:2
SPARE8:2
SPARE9:2
SPARE10:2
SPARE11:2
SPARE12:2
```

Once again, our first line is a comment line that shows the syntax used for this particular option. In this case there are several code lines, each one referring to a different spare (or programmable) button. Thus the “#” in the example syntax is replaced with a number on the actual code line to indicate which of the spare buttons that particular code line refers to. This fact is described on the second comment line.

The third comment line explains that a number indicating button mode will be used in place of the “?” on each actual code line.

The next few comment lines explain the possible modes that the spare buttons can operate in. You may have fewer or greater modes available depending on the surface model and vintage. In any event you can select the same or a different mode from the available modes for each programmable button on the surface.

An Example File - Complete

The following listing shows a typical Options Text File for the surface type covered by this manual. Your actual Options Text File may be somewhat different, depending on vintage, but the general ideas involved in editing the file will apply.

```
// -------------------------------
// METER OPTIONS
// -------------------------------
// Syntax: METERMODE:?
// ? is the meter mode (default = 0)
//   0 = PEAK & AVG
//   1 = PEAK only
//   2 = AVG only
METERMODE:0
// Syntax: DYNRANGE:?
// ? is the Dynamic Range (default = 40)
//   40 = 40dB
//   60 = 60dB
DYNRANGE:40
// -------------------------------
// MIX MINUS OPTIONS
// -------------------------------
// Syntax: MM#:?
// # is the mix minus bus number (1 - 8)
// ? is the mode (default = 0)...
//   0 = Post Fader, Post ON (default mode)
//   1 = Pre  Fader, Post ON
//   2 = Post Fader, Pre  ON
//   3 = Pre  Fader, Pre  ON
MM1:0
MM2:0
MM3:0
MM4:0
MM5:0
MM6:0
MM7:0
MM8:0
// -------------------------------
// AUX BUS OPTIONS
// -------------------------------
// Syntax: AUXA#:?  or  AUXB#:?
// # is the input channel number (1 - 24)
// ? is the mode (default = 0)...
//   0 = Post Fader, Post ON (default mode)
//   1 = Pre  Fader, Post ON
//   2 = Post Fader, Pre  ON
//   3 = Pre  Fader, Pre  ON
AUXA1:0
AUXB1:0
AUXA2:0
AUXB2:0
```

```
AUXA3:0
AUXB3:0
AUXA4:0
AUXB4:0
AUXA5:0
AUXB5:0
AUXA6:0
AUXB6:0
AUXA7:0
AUXB7:0
AUXA8:0
AUXB8:0
AUXA9:0
AUXB9:0
AUXA10:0
AUXB10:0
AUXA11:0
AUXB11:0
AUXA12:0
AUXB12:0
AUXA13:0
AUXB13:0
AUXA14:0
AUXB14:0
AUXA15:0
AUXB15:0
AUXA16:0
AUXB16:0
AUXA17:0
AUXB17:0
AUXA18:0
AUXB18:0
AUXA19:0
AUXB19:0
AUXA20:0
AUXB20:0
AUXA21:0
AUXB21:0
AUXA22:0
AUXB22:0
AUXA23:0
AUXB23:0
AUXA24:0
AUXB24:0
// --------------------------------
// SPARE OPTIONS
// --------------------------------
// Syntax: SPARE#:?
// # is the spare button number (1 - 12)
// ? is the mode (default = 2)...
//   0 = None, Button presses are ignored, LED controlled by DIO
//   1 = Toggle, Button state toggles on each press, LED controlled by Surface
//   2 = Momentary, Button is active when held down, LED controlled by Surface
//   3 = Momentary, Button is active when held down, LED controlled by DIO
```

```
//   4 = Automation, Button & LED are controlled by automation interface
//   5 = Preset Select, Button selects pre-configured preset, LED controlled by
Surface
SPARE1:2
SPARE2:2
SPARE3:2
SPARE4:2
SPARE5:2
SPARE6:2
SPARE7:2
SPARE8:2
SPARE9:2
SPARE10:2
SPARE11:2
SPARE12:2
// -------------------------------
// MISC OPTIONS
// -------------------------------
// Syntax: SET_TIMEOUT:?
// ? 1 (default) = 20 sec set button timeout enabled, 0 = no timeout.
SET_TIMEOUT:0
// Syntax: ALPHA_SORT:?
// ? 1 (default) = XY controller alpha sorting enabled, 0 = no sort.
ALPHA_SORT:1
// Syntax: INVERT_MM:?
// ? 1 (default) = MM button state inverted, 0 = no invert.
INVERT_MM:0
// Syntax: CUE_DEFEAT_STU1:?
// Syntax: CUE_DEFEAT_STU2:?
// Syntax: CUE_DEFEAT_CR:?
// ? 1 = cue defeat to this monitor, 0 cue enabled to this monitor.
CUE_DEFEAT_STU1:1
CUE_DEFEAT_STU2:1
CUE_DEFEAT_CR:1
// Syntax: MUTE_METHOD:?
// ? 0 (default) = ON button, 1 = ON AIR.
MUTE_METHOD:0
// Syntax: HDW_LOGGER:?
// ? 1 = use hardware logger, 0 (default) no hardware logger.
HDW_LOGGER:0
// Syntax: XYC_CHECKSUM:?
// ? 1 (default) = use checksum in XYC messages, 0 no checksum.
XYC_CHECKSUM:1
// Syntax: XCHAN_VIS_DISABLE:?
// ? 0 = do not allow X visibility disable, 1 (default) allow X visibility disable.
XCHAN_VIS_DISABLE:1
// Syntax: MXM_BY_SIGNAL:?
// ? 0 = (default) MxM assigns stored by fader, 1 = change MxM assigns as sources
change.
MXM_BY_SIGNAL:0
// Syntax: BM_BY_SIGNAL:?
// ? 0 = Bus Minus return assigns stored by fader, 1 (default) change Bus Minus
return assigns as sources change.
BM_BY_SIGNAL:0
```

```
// Syntax: MXM_LVL_CTL:?
// ? 0 = (default) No Mix Minus level control on Monitor card.
//   1 Monitor card has Mix Minus control.
MXM_LVL_CTL:1
// Syntax: INPUT_GAIN_SLIDERS:?
// ? 0 = No input gain sliders, 1 (default) = Input gain sliders.
INPUT_GAIN_SLIDERS:1
// Syntax: VGA_CONTROLS:?
// ? 0 (default) = No VGA Controls, 1 = VGA Controls.
VGA_CONTROLS:1
// Syntax: MOUSE_TYPE:?
// ? USB = (default) = USB Mouse, PS2 = PS/2 Mouse, COM2 = Serial Mouse.
MOUSE_TYPE:USB
// Syntax: FRAME_RATE:?
// ? 60 (default) = 60 Hz (NTSC), 50 = 50 Hz (PAL).
FRAME_RATE:60
// Syntax: READOUT_COLOR:0xRRGGBB
// 0x39ce94 (default) = Color for readout text.
READOUT_COLOR:0x00ff7f
// Syntax: READOUT_FONT_SIZE:?
// 7 (default) = Font point size for readout text (6, 7, 8 or 9)
READOUT_FONT_SIZE:8
// Syntax: ACI_DISABLE_MSS:?
// ? 0 (default) = send machine start/stop DIOs whenever input channels go on/off.
//   1 = supress machine start/stop DIOs when input channels on/off via ACI.
//   2 = supress machine start/stop DIOs when input channels on/off via remote on/off DIO.
//   3 = supress machine start/stop DIOs when input channels on/off via ACI and/or DIO.
ACI_DISABLE_MSS:0
```

Appendix 2

Contents

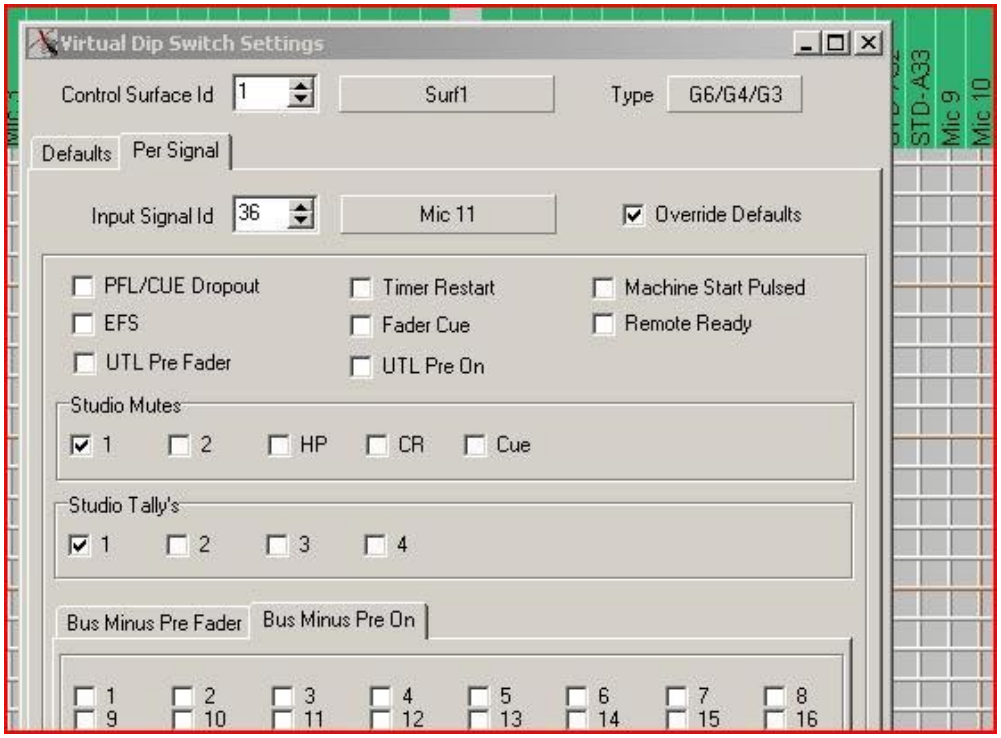
User Programming Section A-11
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User Programming Section

Muting a Studio Speaker When a Mic is Active

In traditional consoles monitor mutes, such as control room or studio mutes, are typically programmed by setting a switch or jumper. Surfaces used with the Wheatstone Bridge or Wheatnet use the VDip (Virtual Dipswitch) settings to activate muting.

As a simple example, let's see how to mute a studio monitor output when a microphone located in that studio is turned on. We will use the VDip settings in the Wheatstone XPoint application to set this up.



In our example we have a mic signal named "Mic 11" with a *Signal Id* of 36. We want the Studio 1 output to mute when a fader with this signal is on air. From the XPoint menu, select Configure>VDip Settings. The following form appears:

Make sure the *Control Surface Id* matches the surface you want to mute with this mic signal. On the *Per Signal* tab, dial up the *Input Signal Id* of the target mic signal (in this case, 36). Put a check mark in the *Override Defaults* check box to have this setting apply only to the specified signal. Put a check mark in the appropriate *Studio Mutes* check box (in this case, number 1). Normally you would also want this signal to activate the air tally light, so we also put a check mark in the number 1 Tally check box. Click OK at the bottom of the form, and save your configuration.

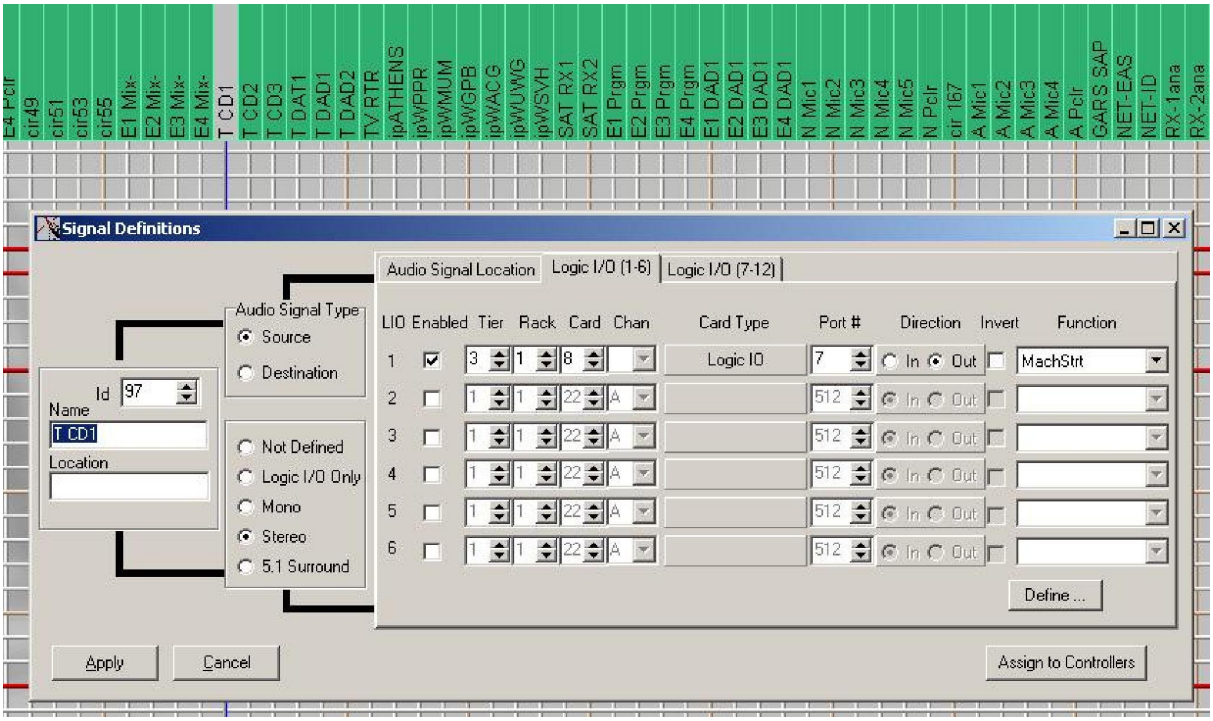
If this setup was done with XPoint in Online mode the settings are automatically sent to the surface.

Starting an Audio Playback Device from a Surface

One of the great features of the Wheatstone Bridge and Wheatnet systems is the ability to couple logic signals with audio signals, allowing remote logic inputs and outputs to follow an audio signal as it is routed from one surface fader to another.

Let's look at a simple example, that of starting an audio playback device when the fader it is routed to is turned on. We will use the Wheatstone XPoint application to set this up.

In our example we have an audio signal named "T CD1" that carries the audio from a CD player. Find this source signal in the green Sources area of the XPoint matrix. Right click on this signal name and select *Modify Signal Definition* from the popup menu to display the following *Signal Definitions* form:



Select the *Logic I/O (1-6)* tab. Put a check in the box in the Enabled column on the line that starts with "1." If you already are using LIO 1, go to the first available LIO [go to the *Logic I/O (7-12)* tab if necessary]. Select *Tier*, *Rack*, and *Card* numbers that point to the Logic IO card you will use to control the player, and select a *Port #* for a currently unused logic output on that card. Select "Out" as the *Direction*, and select "MachStrt" as the *Function*. Click *Apply* and save your configuration.

You will also need to wire the logic output port you specified on the *Signal Definitions* form to the device's start input. Refer to the device's documentation for wiring details. Also note that the Wheatstone logic output port is opto-isolated; see the Wheatstone Bridge manual for details on how this output needs to be connected.

Once you have the configuration and wiring properly done, all you need to do is select the device's audio signal as a source to a surface fader. Pressing the ON button on the fader to turn the channel on issues a momentary pulse that creates a closure on the logic output port to activate the device's start circuitry.

There are several other pre-defined logic Functions that can be used in a similar manner with Wheatstone surfaces. The following table shows the Function name, direction, and purpose for each of these Functions.

Function Name	Direction	Purpose
MachStart	Out	start a remote machine
MachStop	Out	stop a remote machine
OnTally	Out	light a remote channel ON indicator
OffTally	Out	light a remote channel OFF indicator
RemOn	In	turn a fader channel ON from a remote switch
RemOff	In	turn a fader channel OFF from a remote switch
RdyLED	In	control the OFF LED on a fader (typically by flashing) from a CUE output of a remote machine
Cough	In	mute the audio from a remote location (typically the audio signal here is from a microphone) by pressing a remotely located switch
Talkback	In	puts the fader channel in CUE on the surface - typically used to allow talent at a remote mic location to talk to a control room operator

Setting Up an Air Tally with the Wheatstone Bridge Router System

PURPOSE: Use the following procedure to set up an air tally logic output to be used to trigger an air tally light. All configuration is done using the Wheatstone XPoint GUI application.

PRELIMINARY: Before beginning the actual procedure you should read it through first and collect any information you will need to know, such as location of logic cards, availability of logic ports, signal ID numbers of audio signals that you want to use for triggering the tally, etc.

STEP 1 — Create a logic destination in the Xpoint matrix:

- this can be done at any unused destination signal ID, preferably below 1000
- for the sake of this discussion we will use signal ID number 1
- in the XPoint matrix right click on the first yellow box at the left under the word Destinations
- select Modify Signal Definition from the popup menu to see the Signal Definitions dialog box
- the Id should be 1
- enter a name, such as TheTally
- Destination will already be selected in the Source / Destination radio group
- select Logic I/O Only from the radio group of signal types
- select the Logic I/O (1-6) Tab and put a check under Enabled for LIO 1 (assuming it is not already in use)
- select the Tier, Rack, and Slot where the Logic IO card you will use is located
- select the port you want to use; I'll use 1 in my example
- set Direction to Out (you use a logic OUTPUT port to provide the tally closure)
- make sure the Invert box is unchecked
- from the drop-down Function list select ST4InUse (corresponds to CR tally in VDip)
- click Apply

A brief explanation is in order here. There are 4 monitor circuits associated with the Wheatstone surface: Studio1, Studio2, Headphone, and Control Room. These appear in the VDip screen as Studio Tally's 1, 2, HP, and CR. They appear in the function list, when setting up a logic signal's function, as ST1InUse, ST2InUse, ST3InUse, and ST4InUse. This is why you use ST4InUse to set up a Control Room (CR) tally.

STEP 2 — Create a new crosspoint

Next, create a crosspoint between the Destination just created (TheTally) and the auto-generated source signal that carries the tally functions for the surface. By auto-generated sources, we mean sources that are automatically generated by the XPoint program when a system is configured with one or more surfaces. These signals appear

at signal ID 1000 and above. The names of these signals are of the form GxTALLY, where G tells us that the surface is in the G-series (a surface in the D-series would have a D in place of the G) and x is a number indicating which of (possibly) several surfaces this signal is specific to. This all assumes that you haven't renamed the surface. GxTALLY will be one of the last Sources seen for a particular surface. You may want to lock this crosspoint to prevent it from being accidentally disconnected.

STEP 3 — Modify the Vdip settings

Next you will need to make the VDip settings for the surface inputs you want to trigger the tally with. Please note that the VDip settings apply to an input SIGNAL, and not to a surface channel.

- select the Configure | VDip Settings menu item in XPoint - defaults to Surf1
- unless you want the tally to activate whenever any surface channel is ON, select the Per Signal Tab - it will be helpful if you write down the signal ID numbers of the sources that will trigger the tally before you get to this point - for our example, assume the signals Mic1, Mic2, and Mic3 will be used, and that the signal IDs for these three signals are 33, 34, and 35
- highlight the Input Signal Id box entry (defaults to 1) and type 33 - the signal name of Mic1 is now also displayed
- click Override Defaults - put a check mark in the Studio Tally box labeled CR
- using the up arrow in the Id box, select 34 and repeat step 4 - and once more for Id 35
- Click OK

STEP 4 — Wire up the logic port

The only thing left to do is to wire up the logic card's output port 1 to the external circuitry (usually a relay) that will activate the tally light itself. Refer to the Wheatstone BRIDGE Generation Digital Audio Network System Technical Manual. In the Hardware chapter subsection that deals with the Logic Input/Output Card (LIO-2001) there is a diagram that indicates how the external wiring is done (page 2-77). Output port 1 appears on pins 12 and 25 of the LOWER DB-25 connector (see page 2-82 for the pinouts).

This should be sufficient information for you to set up a Control Room or Studio tally.

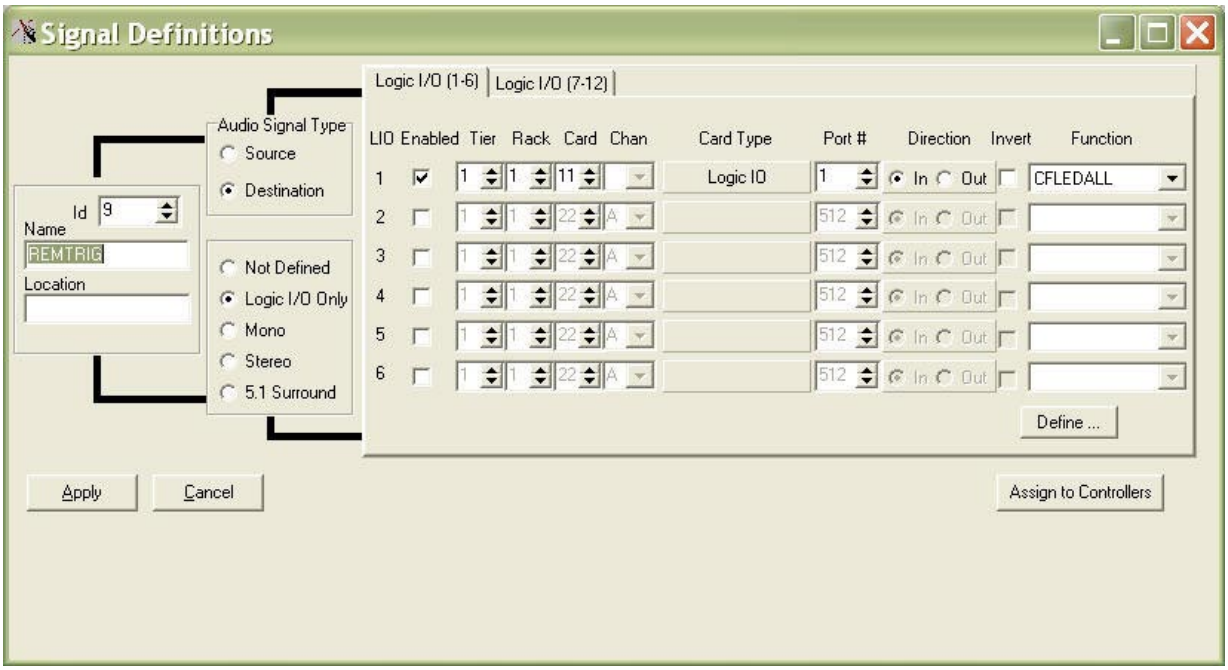
Setting Up Confidence Feed Control

This section explains how to remotely control the switching of confidence audio to your Mix-Minus and Bus-Minus outputs. The way the system works is this -

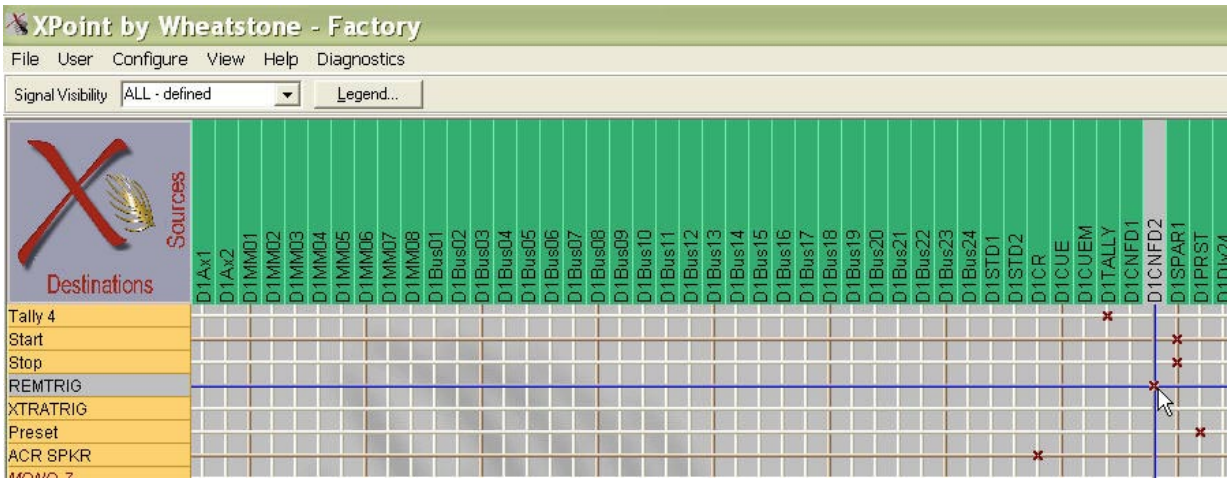
- A “normally closed” relay closure from the master control switcher is used to activate the confidence feed audio when the audio board is off air - not in the news. During this time the Confidence Feed function is active and the audio source you have selected in XPoint is heard at all Mix-Minus and Bus-Minus outputs.
- When master control takes the audio board live, the relay opens and normal Mix-Minus / Bus–Minus audio is fed to the respective outputs.

To set this up you need to do the following:

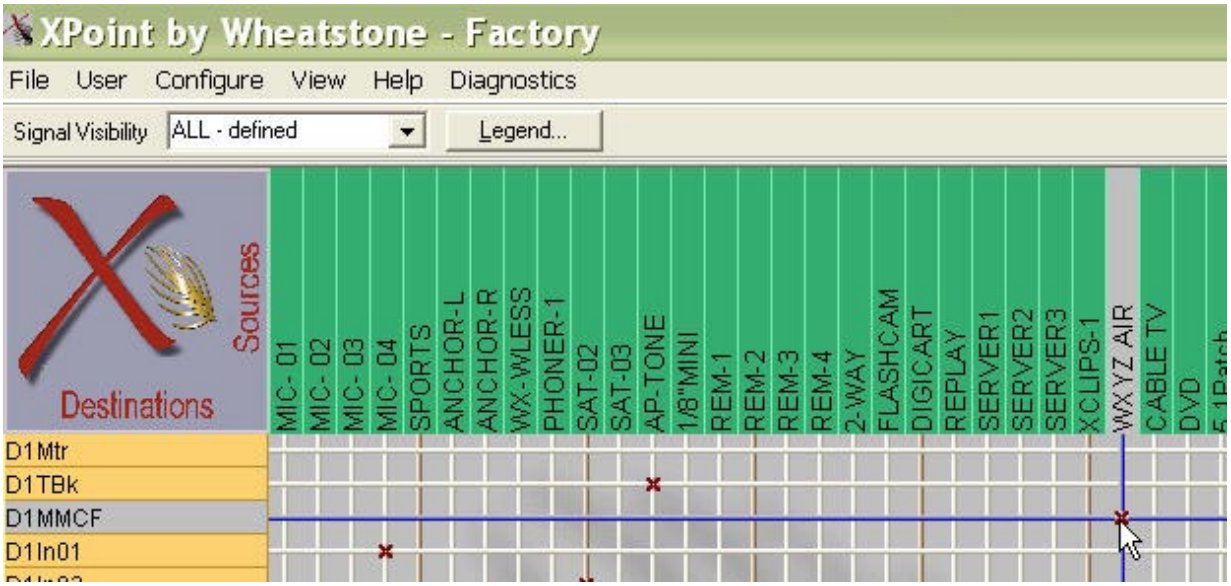
1. Create a new DESTINATION signal in XPoint and call it REM TRIG. Note that this signal may be created anywhere there is an open signal space in the Destination column. Make the signal be an INPUT and Logic I/O Only type. The function name must be CFLEDALL. A typical example of this signal definition is shown below.



2. Cross-connect the REMTRIG signal to the D-8's "D1CNFD2" Source signal. See example connection below.



3. Next, cross connect the audio Source signal you would like to use as a Confidence audio feed. Usually you would select the stations "Air" audio. Do this by routing the desired Source to the D1MMCF Destination signal in XPoint.



4. Wire up the Logic input port that you chose in step 1. Remember that when wiring logic inputs you need to supply an external DC voltage (+5 to +12 VDC) to the logic port's + input and switch the GND side of the logic input port with the relay.

Now when you go into a break Mix-Minus confidence feed audio will be heard at all remotes, phoners, IFB's etc. When the newscast is over, confidence audio is feeding Mix-Minus outputs so anyone dialing in will hear the confidence feed audio even if no one is at the audio board.

Setting Up Spare Buttons to Control Logic Outputs

This section explains how to map the Programmable (also called “Space”) buttons on the surface to logic output ports. The way the system works is this -

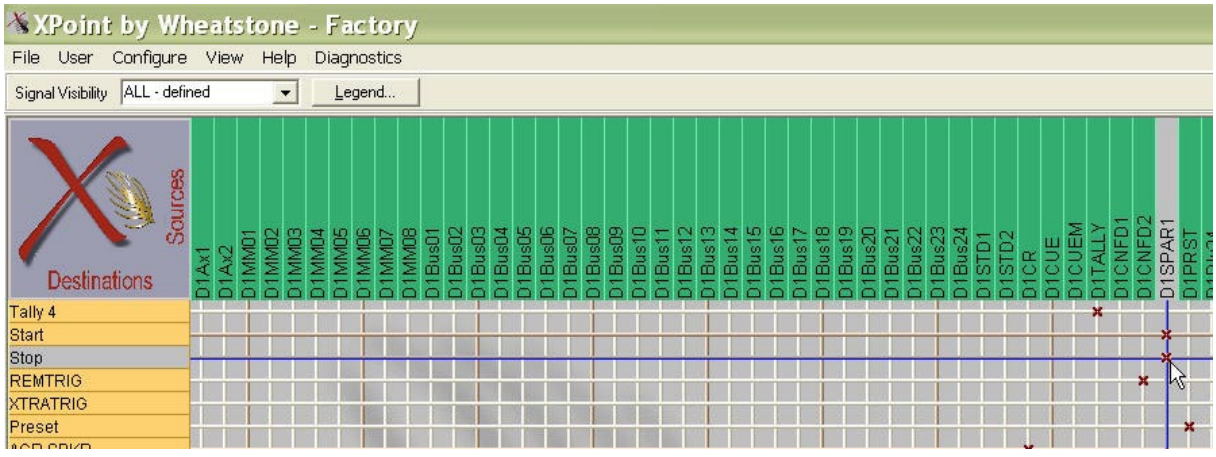
- First create a Destination Signal in XPoint. Make it be a “Logic I/O Only” type, choose the physical output port location, and select a SWITCHx function, where “x” is the spare button number.
- Next use XPoint to cross-connect the surface’s SPARE button Source signal to your newly created signal. The surface’s SPARE signal is typically D1SPAR1.

Here is an example of how to configure the Destination Signal:

- Note that it is an OUTPUT, “Logic I/O Only” Type, the and the Function is SWITCH1. The Function is selected from a drop down list. By choosing “SWITCH1” you are mapping the first Programmable button to control this logic output port. You can change the Function to be SWITCH1 through SWITCH 6.



- Once you have your logic output signal defined, cross connect the Surface’s SPARE signal to it.



Appendix 3

Contents

Replacement Parts List A-20

For the most part there are no user-replaceable parts in the D-8 control surface. Exceptions are those controls and components that in the course of normal use may need maintenance (i.e., faders, pots, ON switches, etc.). A complete list of available components is shown on the next page. Contact Wheatstone technical support for further information.

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

REPLACEMENT PARTS — D-8 CONTROL SURFACE

COMPONENT	DESCRIPTION	*WS P/N*
IS-D8 PANEL	COMPLETE INPUT PANEL	***"009400"***
MST-D8 PANEL	COMPLETE MASTER PANEL	***"009401"***
MON-D8 PANEL	COMPLETE MONITOR PANEL	***"009402"***
BK-D8 PANEL	BLANK PANEL	***"009413"***
IS-D8 LOADED CARD	INPUT PANEL LOADED CARD ASSEMBLY	***"009406"***
MST-D8 LOADED CARD	MASTER PANEL LOADED CARD ASSEMBLY	***"009407"***
MON-D8 LOADED CARD	CONTROL PANEL LOADED CARD ASSEMBLY	***"009408"***
HC-3 LOADED CARD	LOADED CARD ASSEMBLY WITH COMPUTER	***"005839"***
HC-3NC LOADED CARD	LOADED CARD ASSEMBLY W/O COMPUTER	***"005892"***
EI-5.1 LOADED CARD	ENCODER LOADED CARD	***"005030"***
PSU-1 RACKMOUNT UNIT	POWER SUPPLY RACK UNIT	***"007330"***
SPS/PWI POWER CABLE	SPS DB TO CONTROL SURFACE POWER CABLE	***"007261"***
FLAT RIBBON CABLE	20 CONDUCTOR FLAT RIBBON CABLE	***"150201"***
REPLACEMENT FADER	MOTORIZED FADER	***"540062"***
REPLACEMENT FADER KNOB	15MM GRAY PUSH-ON KNOB FOR 6MM SHAFT	***"520017"***
REPLACEMENT FADER KNOB	BLUE FADER KNOB WITH WHITE LINE	***"520042"***
REPLACEMENT FADER KNOB	WHITE FADER KNOB WITH BLACK LINE	***"520047"***
REPLACEMENT FADER KNOB	METALIZED FADER KNOB	***"520128"***
SWITCH	SINGLE POLE MOMENTARY SWITCH WITH RED LED	***"510106"***
NKK SWITCH	JB15 SWITCH W/BRIGHTER GREEN LED AND SILICON GASKET ROHS COMPLIANT	***"510289"***
NKK SWITCH	JB15 SWITCH W/BRIGHTER RED LED AND SILICON GASKET ROHS COMPLIANT	***"510290"***
NKK SWITCH	JB15 SWITCH W/BRIGHTER YELLOW LED AND SILICON GASKET ROHS COMPLIANT	***"510291"***
SWITCH	SINGLE POLE MOMENTARY SWITCH WITH YELLOW LED	***"510296"***
SWITCH	SINGLE POLE MOMENTARY SWITCH WITH GREEN LED	***"510297"***
SWITCH	LOW PROFILE PUSHBUTTON SWITCH WITH GREEN LED	***"510037"***
SWITCH	LOW PROFILE PUSHBUTTON SWITCH WTH RED LED	***"510038"***
SWITCH	LOW PROFILE PUSHBUTTON SWITCH WITH YELLOW LED	***"510039"***
SWITCH CAP	WHITE SWITCH CAP	***"530004"***

REPLACEMENT PARTS — D-8 CONTROL SURFACE

COMPONENT	DESCRIPTION	*WS P/N*
ENCODER	11MM ROTARY ENCODER WITH THREADED BUSHING	***"560002"***
ENCODER	11MM ROTARY ENCODER, 13.5MM SHAFT LENGTH	***"560003"***
ENCODER	11MM ROTARY ENCODER, 17MM SHAFT LENGTH	***"560004"***
ENCODER KNOB	15MM GRAY COLLET KNOB FOR 1/8" SHAFT	***"520022"***
ENCODER KNOB	21MM GRAY COLLET KNOB FOR 6MM SHAFT	***"520023"***
ENCODER KNOB	11MM BLACK PUSH-ON KNOB	***"520105"***
ENCODER KNOB	15MM GREY COLLET KNOB FOR 6MM SHAFT	***"520110"***
ENCODER CAP	11MM BLUE CAP W/WHITE LINE FOR 15MM KNOB	***"530045"***
ENCODER CAP	PLAIN 11MM BLUE CAP FOR 15MM KNOB	***"530278"***
ENCODER CAP	PLAIN GREY/6 CAP FOR 11MM COLLET KNOB	***"530293"***
ENCODER CAP	PLAIN BLACK CAP FOR 21MM COLLET KNOB	***"530316"***
POT	CONDUCTIVE PLASTIC DUAL LINEAR 10K POT NO C/D, 1/8" SHAFT ROHS COMPLIANT	***"500124"***
POT	10K SINGLE LINEAR PC VERTICAL MOUNT 9MM POT ROHS COMPLIANT	***"500126"***
POT KNOB	15MM GRAY PUSH-ON KNOB FOR 6MM SHAFT	***"520017"***
POT KNOB	15MM GREY COLLET KNOB FOR 6MM SHAFT	***"520110"***
LUMA BUTTON	WHITE LUMA BUTTON	***"530274"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "1"	***"530297"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "2"	***"530298"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "3"	***"530299"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "4"	***"530300"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "5"	***"530301"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "6"	***"530302"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "7"	***"530303"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "8"	***"530304"***
PLUG	3 PIN PLUG FOR #26 AWG	***"230028"***
PLUG	5 PIN PLUG FOR #26 AWG	***"230030"***
HEADER	3 PIN JST HEADER	***"250062"***
HEADER	5 PIN JST HEADER	***"250064"***
HEADER	20 PIN BOXED HEADER, STRAIGHT	***"250074"***
MONITOR PANEL DISPLAY	4 SEGMENT GREEN ALPHA NUMERIC DISPLAY ROHS COMPLIANT	***"610016"***
INPUT PANEL DISPLAY	CUSTOM LCD ALPHA/NUMERIC DISPLAY	***"610026"***
MANUAL	OWNER'S MANUAL	***"009499"***