D-32 Digital Control Surface

TECHNICAL MANUAL

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D-32 Digital Control Surface Technical Manual - 1st Edition

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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.

D-32 Technical Manual

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General Information

Introduction

The Wheatstone D-32 Digital Television Audio Control Surface is compact and fully loaded with all the functions and control capability needed by most television broadcast facilities: 5.1 digital surround plus three stereo masters, a host of mix-minus clean feed outputs, individual channel bus-minus outputs, 7-band digital equalization, digital dynamic processing, and integrated routing that can access literally thousands of sources and feed thousands of destinations. The D-32 gives your operators the added convenience of eight stereo subgroups, sixteen stereo auxiliary busses, four DCM/MUTE groups, and a full event/memory front panel storage and recall system that doesn't require an external computer to operate. And because it's a live television console, it has extensive communication capability. If there is a mix, you can talk to it. It even has twelve programmable talkback buttons. Due to the increased processing capability offered by the new Gibraltar Mix Engine the D-32 can now support up to 128 input channels on paged faders. Thanks to the 1024 processing paths offered by Gibraltar the D-32's eight sub-groups can now be configured as 5.1 stems with full EQ and Dynamics processing capability. Additionally, processing can now be applied to the 16 mix minus / direct out busses and 16 aux sends available in the D-32.

Designed to integrate flawlessly with the Wheatstone BRIDGE digital audio network router, the D-32 control surface allows you to easily create large or small platform-based systems that are exceptionally user-friendly and flexible. 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 fiber-optic or CAT-5 cables to provide single wire studio integration schemes.

Once configured, the system operates entirely independently of external computers. Configuration itself is intuitive and carried out onsite by means of user-friendly graphic interfaces provided by Wheatstone desktop software. The D-32 system also takes full advantage of Wheatstone's exclusive VDip configuration software, so that studio functions (like mutes, fader and timer starts, tally, etc.) are easily accomplished right at your desktop. Once completed, all settings are retained in non-volatile storage, allowing the entire system to run independently. Ethernet protocol is built in, providing interface with automation, scheduling, and hardware controllers as you require.

Control Surface Placement

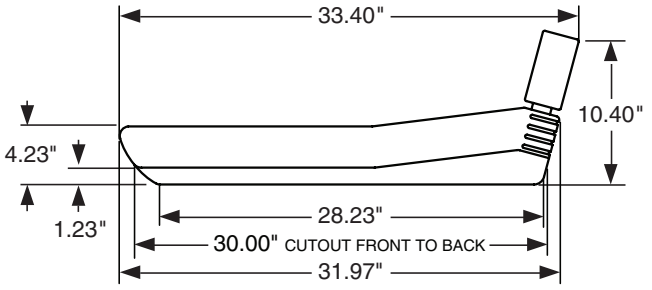
The D-32 digital audio control surface is designed for simple drop-in installation in a countertop. Cutout dimensions are shown in the drawings below for two available frame sizes. Other frame sizes are available. Please contact Wheatstone Corporation for specific information about your control surface.

Do not connect the D-32 control surface to its power supply (and do not connect the power supply to the AC power line) until instructed to do so.

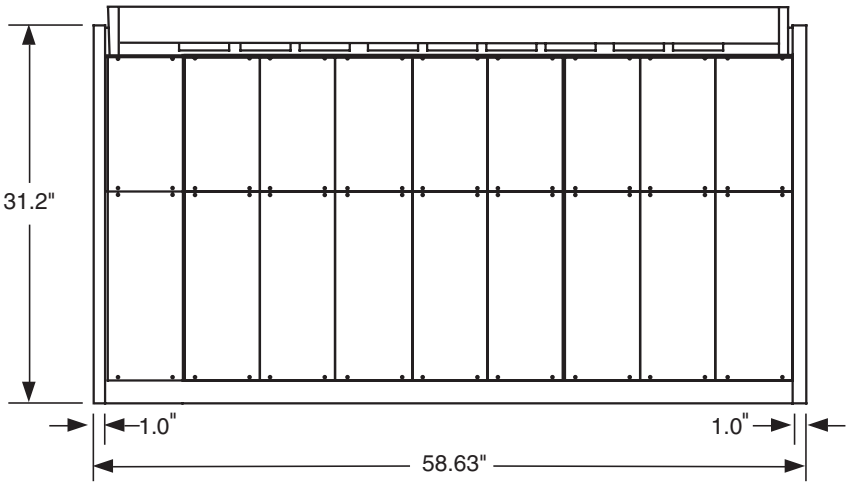
CUTOUT DIMENSION

36 INPUT FRAME - 30.0" x 57.75"

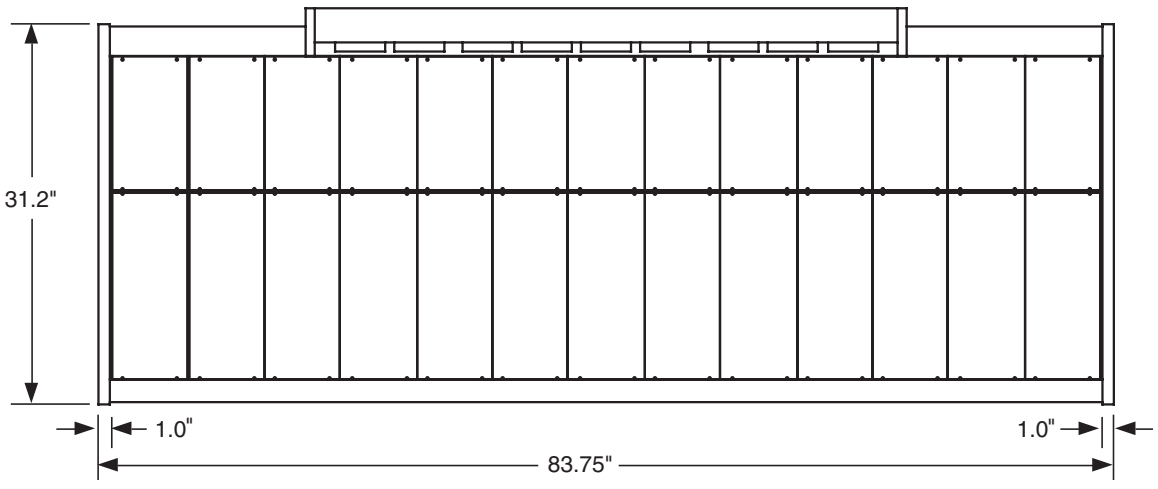
52 INPUT FRAME - 30.0" x 83.00"



D-32 36 INPUT FRAME

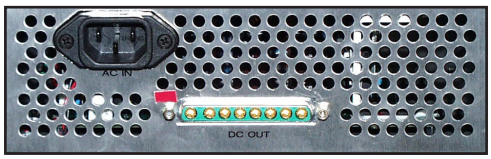


D-32 52 INPUT FRAME

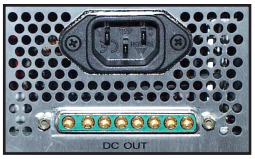


Power Supply

Front view of the PSR rackmount power supply



Rear view of the SPS-400 unit

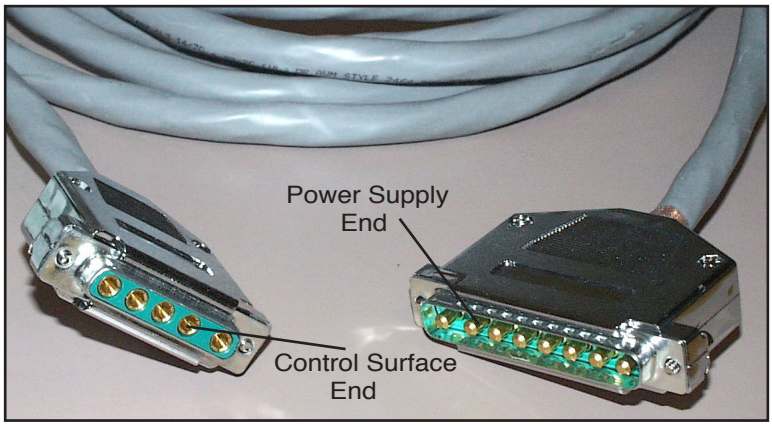


Rear view of the SPS-180 unit

The D-32 control surface is powered by an SPS-180, or SPS-400 power supply installed in a Wheatstone Model PSR rackmount unit. Each PSR houses up to four SPS-180, or up to two SPS-400 power supply units. Mount the power supply in a standard 19″ equipment rack, keeping in mind that adequate ventilation is necessary to prevent heat build-up within the rack.

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



Once the supply is rackmounted, it should be connected to the control surface using the factory supplied cable. The cable has two different types of connectors on it: a 5-pin female connector that connects to the control surface's power supply connector, and an 8-pin male connector that plugs into the PSR power supply. The control surface's two power supply connectors are located at the rear of the control surface, in the middle of the meterbridge bottom pan. If you are using one supply, connect it to one of the control surface connectors (it doesn't matter which one). If you are using the failsafe option, connect one end of a power supply cable to either control surface power connector and connect the other end of the cable to one of the two power supply connectors. Then use the other cable to connect the second power supply connector to the remaining control surface power supply connector. Connect the cable(s) first to the control surface, then to the rear of the rackmount power supply.

PS Cable Pinout

Console End 5-pin Connector *Female*	PIN		PIN	Power Supply End 8-pin Connector *Male*
RED	1	+V in →	8 RED, YEL	
YEL	2	-V in →	7 BLU, BLK	
BLU	3		6 N/C	
BLK	4		5 N/C	
N/C	5		4 N/C	
			3 N/C	
			2 N/C	
			1 N/C	

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 SPS-180 or SPS-400 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-32 control surface mainframe is properly placed, and its PSR power supply (or supplies) correctly rackmounted and connected to the control surface, you may now energize the PSR rackmount power supply by plugging it into the AC mains. The control surface's LCD 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-32 control surface is made via connectors located on the control surface's rear panel. There are two RJ-45 connectors for main and failsafe ethernet connections. The "TB/ MIC" DB-9 connector is for talkback microphone connection (see the pinout on page 8-2). CAT5 or multi-mode optical FIBER mixer link connections are made via RJ-45 or LC type optical connectors. Two 5-pin male connectors are for power supply connections. VGA connections are made via the female DB-15 connector that is mounted next to ethernet connectors. For all wiring pinout connections refer to Chapter 11. The photo below shows connector locations.

NOTE: Keyboard, VGA, and COM connectors for factory use only.

Dobby

Many of the controls on the D-32 surface are encoders, which consist of a rotary element, adjusted by turning the knob, and a vertical switch element, used by pressing and releasing the knob. The process of "dobbying" such a control, mentioned in several places in this manual, refers to pressing and releasing the knob. You can also "double-dobby" by pressing and releasing the knob twice in rapid succession, much like double-clicking a mouse button.

Input Panel (IS-D32)

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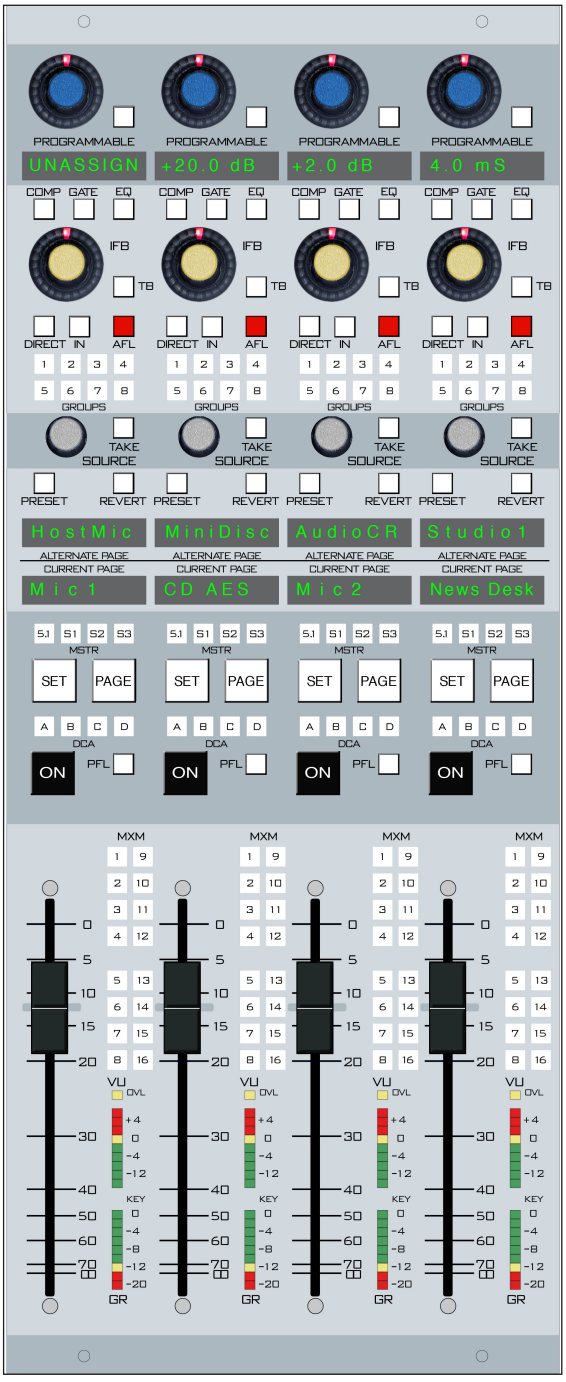
Input Panel (IS-D32)



Controls and Functions

Each input panel of the D-32 digital audio control surface has four identical strips representing four input channels.

Programmable Section

Each input has a programmable encoder, 8 character display, and switch. The user may map any centrally located function included in the function list to this rotary knob/display/switch. The function mapped to the Programmable section is mirrored in the central section when the input SET button is pressed.

A list of available functions (see the table on page 2-8) is accessed by pressing and holding the Programmable Encoder for 3 seconds. After 3 sec, the user scrolls through the available functions until the desired function is displayed, and selects it by pressing the Programmable switch. The Programmable switch will light if the displayed function is already assigned to the channel, or otherwise will flash. To change to a new function, repeat the process.

Programming Example: Setting up a Gain control knob with Phantom Power switch.

1 - Press an input fader SET button.

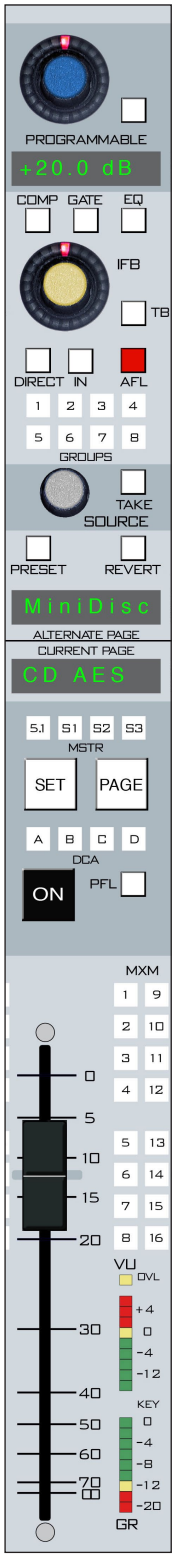
2 - Press and HOLD the programmable encoder for 3 sec.

3 - Rotate the encoder through the list until GAIN is displayed.

4 - Press the Programmable switch.

5 - The current gain setting in dB is displayed. Rotating the programmable encoder adjusts line or mic gain depending on the input source. Pressing the programmable switch turns on/off phantom power if the source is a mic; otherwise the switch is inactive.

Standalone Switches



The following switches directly access certain input functions.

COMP - activates compressor/limiter settings stored for the input strip. Use the SET switch on the strip to access the centralized LIMITER controls on the EQD-D32 panel.

GATE - activates gate settings stored for the input strip. Use the SET switch on the strip to access the centralized GATE controls on the EQD-D32 panel.

EQ - activates equalizer settings stored for the input strip. Use the SET switch on the strip to access the centralized EQ controls on the EQD-D32 panel.

SET - press an input's SET switch to access centralized controls associated with the input channel strip. Central controls include PAN/BAL, MODE, EQ, Dynamics, Source Select and IFB output Routing, Delay, Phase Reverse, and Source Gain.

PAGE - Press PAGE to access the second layer of a channel strip (essentially another full input channel). Each layer is totally independent.

ON - turns the input channel ON. All Bus assignments mapped as POST ON feeds will receive audio from the input channel. Certain logic signals may be mapped.

PFL - puts the input channel's signal into the PFL (CUE) mix pre-fader/pre-on, and post gain, EQ, and DYN.

IFB (Interruptible Fold-back)

There is one common IFB bus. Users add any or all input channels to the bus via the IN switch on each individual channel. The channel's IFB encoder adjusts the level of that particular channel's IFB output (designated herein as IFBx to indicate the IFB output of channel x). The IFBx signal may be routed to any physical audio output on the router by pressing the input channel's SET switch, then using the Destination router on the XYE-D32 panel. AFL and TB switches allow the surface operator to monitor and interrupt the IFB, respectively.

DIRECT - when pressed, changes the IFBx output to be a direct output (post fade, post ON) of channel x rather then an IFB output.

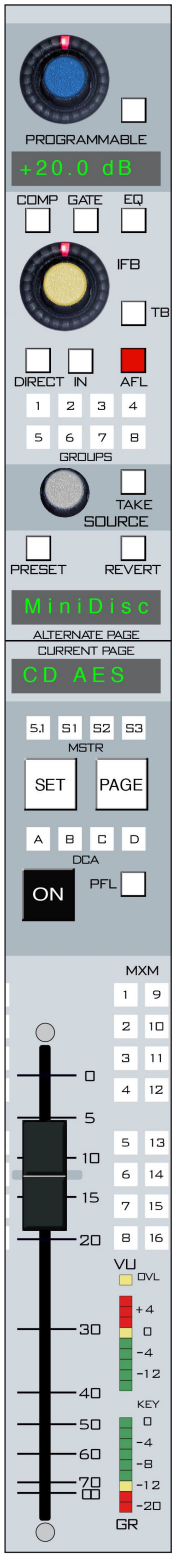
IN - puts the input channel post fader/post ON audio onto the IFB bus.

IFB encoder – adjusts the output level of the IFBx feed.

TB - momentary switch interrupts the IFB feed with Talkback audio. Talkback audio may be any source on the router that is cross-connected to the D-32's TB input.

AFL - puts the IFBx audio into the AFL/SOLO/PFL mix.

Source Selection



This section allows the user to select any source visible to its X controller. A Preset memory location stores a single source signal for recall via the PRESET switch. The REVERT switch causes the previously selected input to be recalled. **Sources may be taken at any time regardless of the input fader ON status.**

SOURCE - this encoder (X controller) scrolls through the available sources. The source list may be limited through the D-32 Visibility – X Controller settings in the XPoint GUI.

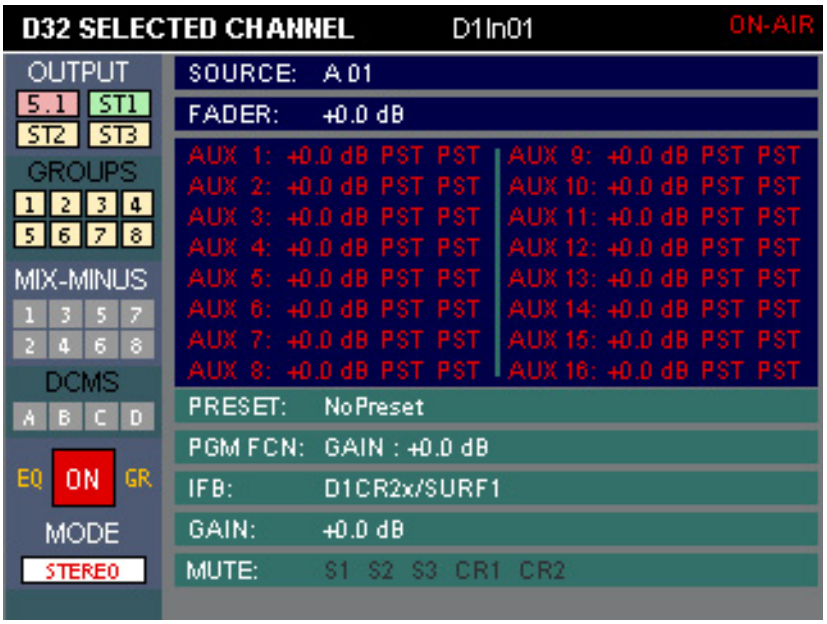
TAKE - press this switch to assign the source displayed in the lower source window to this input channel strip.

REVERT - press this switch to go back to the previously selected source. Acts as an A/B source selector that toggles between the PRESET and the selected source.

PRESET - used to store a source in PRESET memory. Spin the SOURCES encoder until the desired source is displayed in the CURRENT PAGE display. Then *PRESS* and *HOLD* the PRESET switch until the PRESET button goes off and the CURRENT PAGE display reverts to the actual current source. The PRESET source name is shown on the channel's LCD display.

ALTERNATE PAGE Display - top display shows the source for the alternate page (see discussion of PAGE button on page 2-3)

CURRENT PAGE Display - lower display shows the channel strip's active source.



VU and Gain Reduction Metering

Each input fader has two independent 9-segment LED vertical columns to provide input signal metering. The top column handles pre-fader post/ gain control signal presence VU metering. The lower column handles Gain Reduction as determined by the dynamics settings for the input channel strip, and follows the state of the channel's DYN switch.

Motorized Fader

The fader controls the channel strip's signal level to all post fader busses. The nominal unity gain level is at the -12dB mark on the scale. Note that EVENT recall includes the fader setting.

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

Bus Assign LED's

Each input strip has four sets of LED indicators which display the state of the channels bus assignments. An illuminated LED indicates:

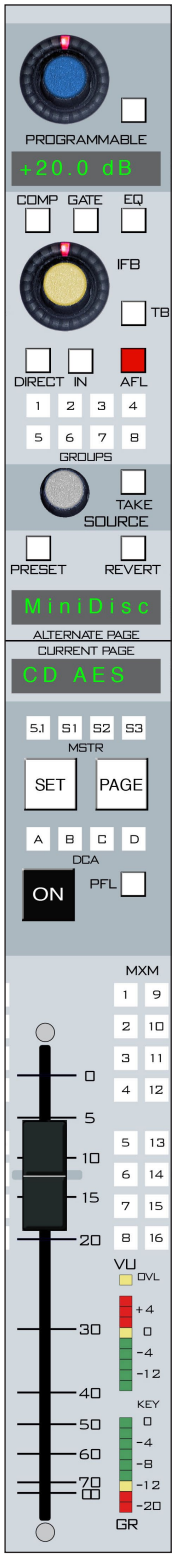
GROUPS – shows which Groups the input is assigned to: 1 through 8.

MSTR – shows which Masters the input is assigned to; 5.1, S1, S2, and S3.

DCA – shows which DCA masters the input is assigned to: A, B, C, and D. If lit, the DCA assign LED(s) will flash if the DCA master is turned OFF or if the DCA master fader reaches a threshold setting of approximately -60.

MXM – shows which MXM the input is subtracted from. An Xpoint GUI setting, MXM POLARITY, forces the MXM LED logic to flip. In the flipped state, lit MXM assign LED's mean that the channel is ADDED to the MXM mix.

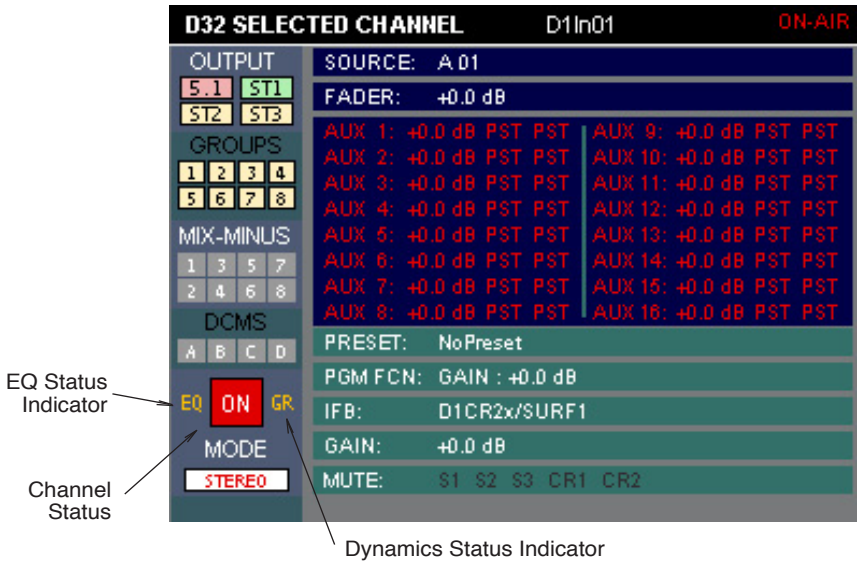
Channel assignments to these busses are made by first pressing the channel SET button and then pressing the appropriate ASSIGN button on the MXM-D32 panel.

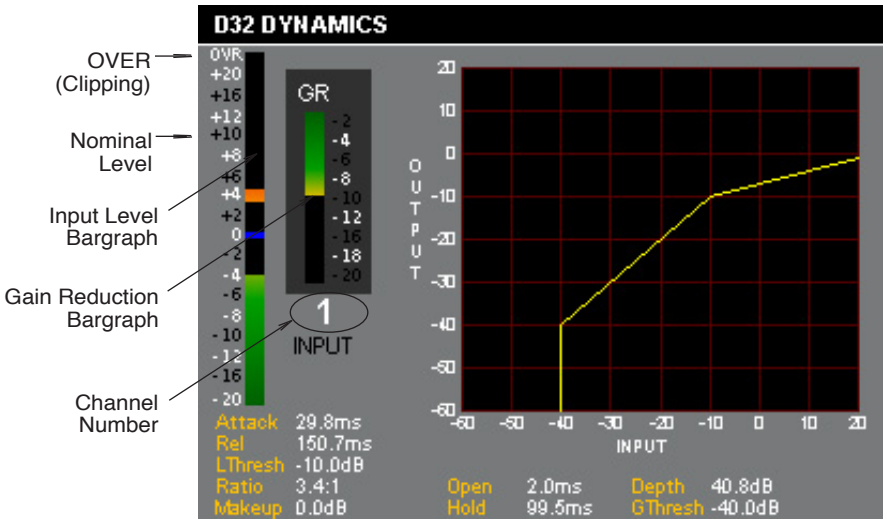


LCD Displays

Channel Status

The selected input channel status information shows on one of the LCD displays in the control surface meterbridge. The display show input level, selected source, channel number, preset source, channel status, gain reduction, and other information.





Input Level

The pre-fader level of the input signal is shown on a different LCD display by a large vertical bargraph. The level is indicated in dB on a calibrated scale beside the bargraph. If the channel is stereo, the bargraph shows the sum of the left and right signals. The bargraph is colored, with green indicating lower levels and red indicating high levels. The nominal level position is in the middle of the range at the "0" scale marking, and shows as a thin blue band in the bargraph. The bargraph itself consists of a moving "DOT" over a solid "COLUMN" where the "DOT" indicates the peak value of the signal, and the

"COLUMN" indicates the average value. On the D-32 control surface the average value column has been set to VU timing characteristics. In addition, a bright yellow rectangle will light at the top of the column if digital "OVER" or clipping is detected.

Nominal Level 0dB = +4dBu analog and -20dBFS digital.

Selected Source

The currently selected source name shows on the Channel Status LCD display underneath the channel description. This name is the 8-character name as defined in the Wheatstone Bridge Router configuration.

Preset Source

The currently loaded preset source name shows on the Channel Status LCD display underneath the AUX SEND information. Once again, this 8-character name is as defined in the Wheatstone Bridge Router.

Channel Status

Various indicators on the Channel Status LCD display will show status information for the associated channel. Above the level bargraph the words "ON," "OFF," "ON AIR," or "MUTING" will appear as the channel status changes. "MUTING" indicates that the channel is turned ON and has a mute set. "ON AIR" indicates that the channel is ON and the fader is up. The letters "EQ" will show in the Input Level display if equalizer functions are active for the channel, and "GR" will appear if signal dynamics functions (compression, limiting) are engaged.

Channel Number

A large white number shows under the GR meter on the Input Level display to indicate the channel number.

Available Functions Table

Function Name	Encoder	Dobby	Switch ON/OFF	Display
UNASSIGN				UNASSIGN
GAIN	Gain Control		Phantom Power	Gain in dB units
DELAY mS	Delay Control		IN/OUT	Delay in mS units
DELAY Fr	Delay Control		IN/OUT	Delay in frames
BLEND	Cross-Fader	Center	Blend / Centered	BLEND IN or BLENDOFF
WIDTH	Width Control	Center	IN/OUT	Stereo Width
MODE	PAN/BAL	Center	MODE Select	Selected MODE
AUX1 (to 16)	Send Level		IN/OUT	AUX x
HPF	HPF Freq		IN/OUT	HPF Frequency
NOTCH	Notch Freq		IN/OUT	Notch Frequency
LPF	LPF Freq		IN/OUT	LPF Frequency
LOW F	Low Band Freq		SHELF	Low Band Frequency
LOW Q	Low Band BW		SHELF	Low Band Q or SHELF
LOW L	Low Band +/-		SHELF	Low Band Level
LOMID F	Low Mid Band Freq			Low Mid Band Frequency
LOWMID Q	Low Mid Band BW			Low Mid Band Q
LOWMID L	Low Mid Band +/-			Low Mid Band Level
HIMID F	High Mid Band Freq			High Mid Band Frequency
HIMID Q	High Mid Band BW			High Mid Band Q
HIMID L	High Mid Band +/-			High Mid Band Level
HIGH F	High Band Freq		SHELF	High Band Frequency
HIGH Q	High Band BW		SHELF	High Band Q or SHELF
HIGH L	High Band +/-		SHELF	High Band Level
LIM TRSH	Limiter THRESH			Limiter Threshold
LIM RAT	Limiter RATIO			Limiter Ratio
LIM ATCK	Limiter ATTACK			Limiter Attack
LIM REL	Limiter RELEASE			Limiter Release
LIM GAIN	Limiter MAKEUP GAIN			Limiter Makeup Gain
GT TRSH	Gate THRESH			Gate Threshold
GT OPEN	Gate OPEN			Gate Open
GT HOLD	Gate HOLD			Gate Hold
GT DPTH	Gate DEPTH			Gate Depth
TRIM LFE	5.1 LFE Trim			5.1 LFE Trim
TRIM LF	5.1 LT FRONT Trim			5.1 LT FRONT Trim
TRIM CTR	5.1 CENTER Trim			5.1 CENTER Trim
TRIM RF	5.1 RT FRONT Trim			5.1 RT FRONT Trim
TRIM LR	5.1 LT REAR Trim			5.1 LT REAR Trim
TRIM RR	5.1 RT REAR Trim			5.1 RT REAR Trim
LFE LVL	5.1 LFE Level			5.1 LFE Level
LEFT/RGT	5.1 LT/RT			5.1 LT/RT
FNT/REAR	5.1 FRONT/REAR			5.1 FRONT/REAR
SRND/CTR	5.1 SURROUND/CENTER			5.1 SURROUND/CENTER

Mix-Minus Panel (MXM-D32 & MXM-D32#2)

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Mix-Minus Panel (MXM-D32 & MXM-D32#2)

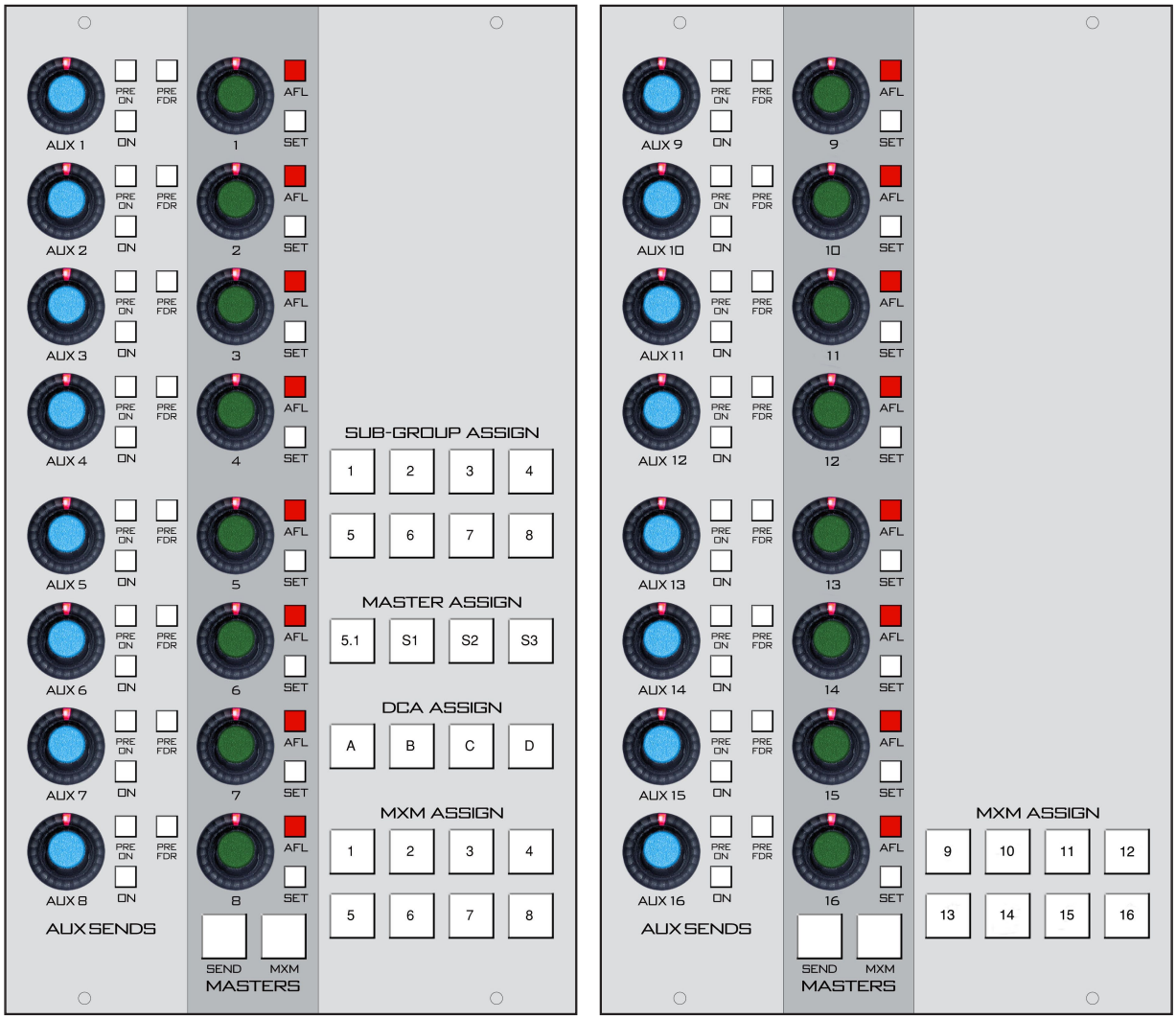
Controls and Functions

The D-32 digital audio control surface is equipped with two Mix-Minus Panels.

Both, MXM-D32 and MXM-D32#2, panels house AUX SENDS, MXM MASTER OUTPUTS, and MXM ASSIGN. In addition, the MXM-D32 panel has SUB-GROUP, MASTER, and DCA ASSIGN buttons.

AUX Sends

There are a total of eight AUX SENDs on the each of the Mix-Minus panels. A brief comment on the controls is called for before diving into the details.



The column of 8 knobs ("1" through "8" or "9" through "16") labeled MASTERS, and their associated SET and AFL switches, have a dual-purpose. If the MXM button in that section is lit, the control operation applies to the surface's MXM outputs, which are dealt with later in this chapter. But if the SEND button is lit, the control operation applies to the AUX SENDs. For the present discussion on AUX SENDs we assume the SEND button is lit, and we will freely discuss controls in both the AUX SENDS and MASTERS sections of the panel without qualifying which panel section the control being discussed is located in.

We will begin by explaining the operation for AUX SEND 1. The same discussion can be applied to any of the 16 AUX SENDs.

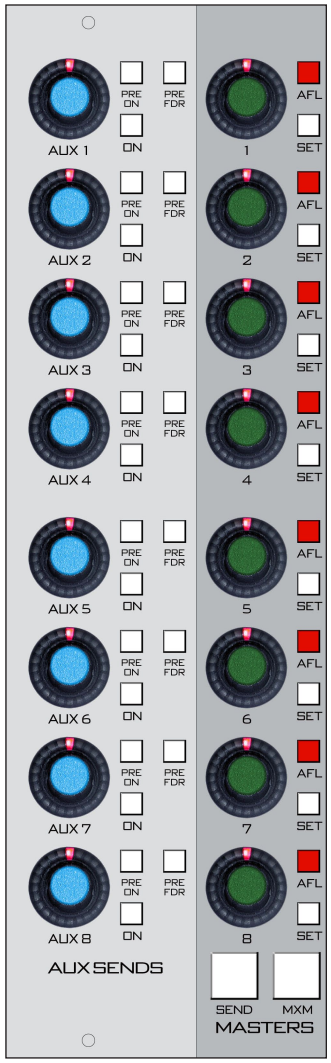
Any surface input channel can feed AUX SEND 1. To do so, press the SET button on the input channel, then press the MXM-D32 panel ON button for AUX 1. If the button is already lit when you press the channel SET button, then that channel is already feeding AUX SEND 1.

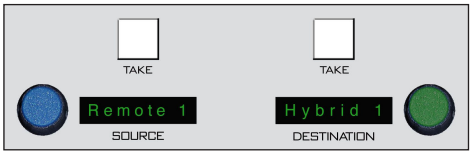
Channels normally feed the AUX SEND a post fader signal that follows the channel's ON button (post on). If you press the MXM-D32 PRE ON button for AUX 1, that channel will feed the AUX SEND regardless of its ON button status. In a similar fashion, the channel can be made to feed a constant signal level to the AUX SEND regardless of its fader position by pressing the PRE FDR button. PRE ON and PRE FDR can be used in any combination.

You can set the level of each channel feeding AUX SEND 1 independently. The AUX 1 control affects the signal level to AUX SEND 1 of the channel that currently has its SET button lit. Thus you can generate a mix to AUX SEND 1 from several channels if desired.

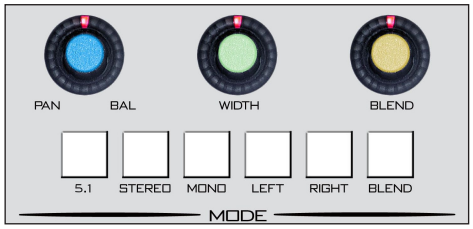
Once you have the desired channel(s) feeding AUX SEND 1, you can adjust the output level of AUX SEND 1 by using the AUX SEND 1 MASTER, the knob labeled "1" in the MASTERS area. The actual destination that AUX SEND 1 is routed to is assigned by first pressing the AUX SEND 1 SET button, then dialing up the desired destination on the DESTINATION knob on the XYE-D32 panel and pressing the associated TAKE button-

AUX SEND 1 can be mono or stereo. Press the AUX SEND 1 button, then press the appropriate MODE button on the SUR-D32 panel. If AUX SEND 1 is in STEREO mode, and if the selected channel is in STEREO mode as well, the AUX 1 control will act as a BAL control if it is pressed down while being turned. If the selected channel is in MONO, the pressed action of AUX 1 is as a PAN. If the AUX SEND 1 is in MONO mode, the AUX 1 knob does nothing if you press it while turning. NOTE that surround sends are not created. A surround source will send a desired stereo to a stereo AUX SEND.





XYE-D32 Panel

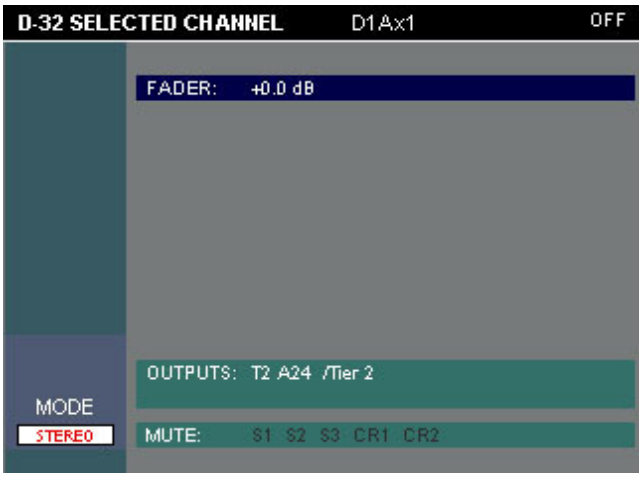


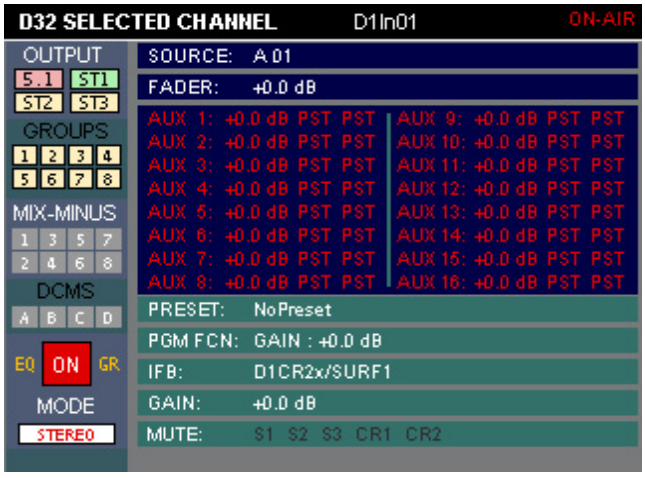
SUR-D32 Panel

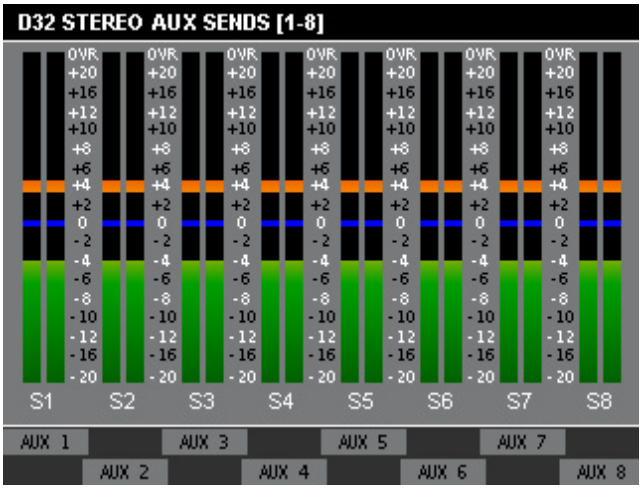
The AUX SEND 1 AFL switch routes a post AUX 1 level control signal to the SOLO mix.

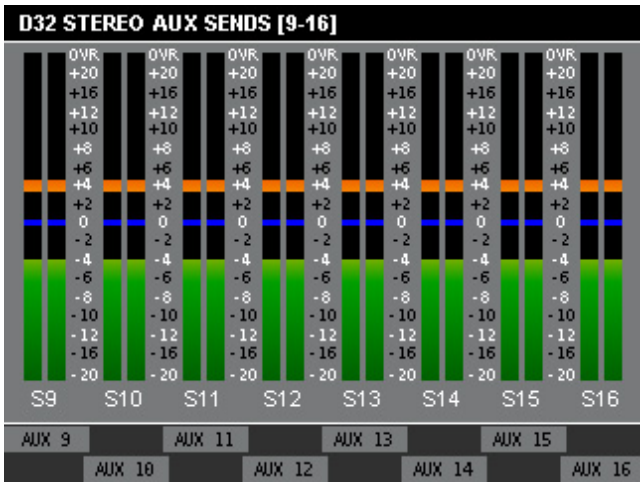
AUX SEND settings are shown on the LCD displays.

AUX SENDs 2 - 16 work in the same manner as AUX SEND 1.









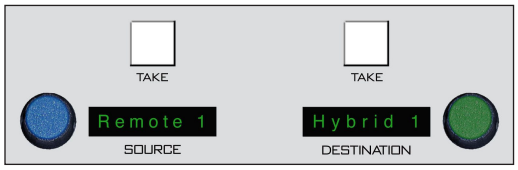
MXM Master Outputs

There are a total of sixteen MXM's (mix-minuses) available in the D-32 control surface. For this discussion on MXM's we assume the MXM button in the MASTERS section of the panel is lit. MXM 1 is discussed but the remaining MXMs work in the same fashion.

As mentioned in the chapter on the IS-D32 Input panel, channels may be assigned to an MXM by pressing the channel's SET button, then pressing the appropriate MXM ASSIGN button in the BUS ASSIGN section of this panel. Subgroups may also be assigned to MXMs in a similar manner.

Global settings may be made in the Options Text file (see Appendix 2) to determine if the channel assignments to the MXMs are pre or post fade and pre or post ON. Settings are made individually to each of the 16 MXMs, but are global in the sense that, once they are made, the settings apply equally to all MXM sources.

Once you have the desired sources feeding MXM 1, you can adjust its output level by using MXM 1 MASTER, the knob labeled "1" in the MASTERS section. The actual destination that MXM 1 is routed to is assigned by first pressing the MXM 1 SET button (next to the level control, and, yes, this is the same button that serves for AUX SEND 1 SET), then dialing up the desired destination on the DESTINATION knob on the XYE-D32 panel and pressing the associated TAKE button.

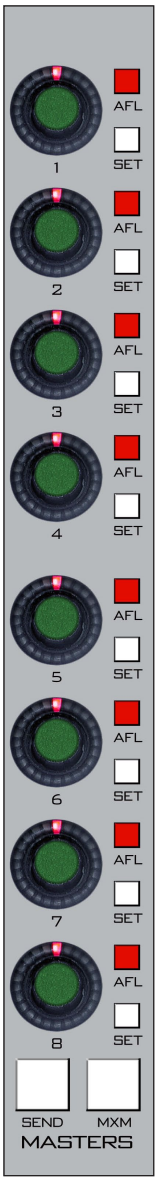


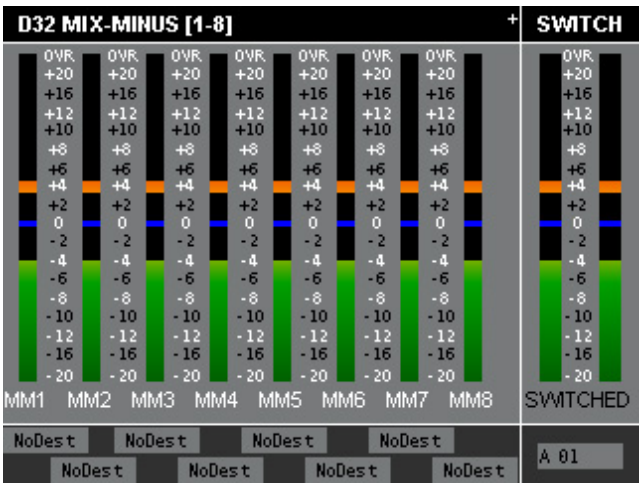
XYE-D32 Panel

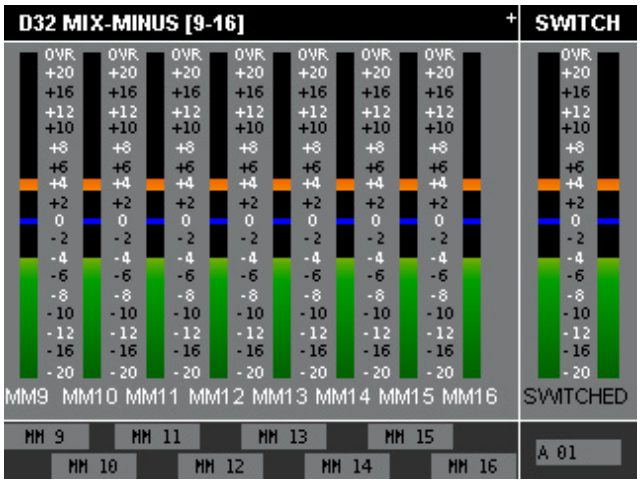
The MXM 1 AFL switch (also known as the AUX SEND 1 AFL switch) routes a post MXM 1 level control signal to the SOLO mix.

The MXM 1 level and output assign are shown on one of the LCD displays when the MXM 1 SET button is lit.

MXM's 2 - 16 work in the same manner as MXM 1.







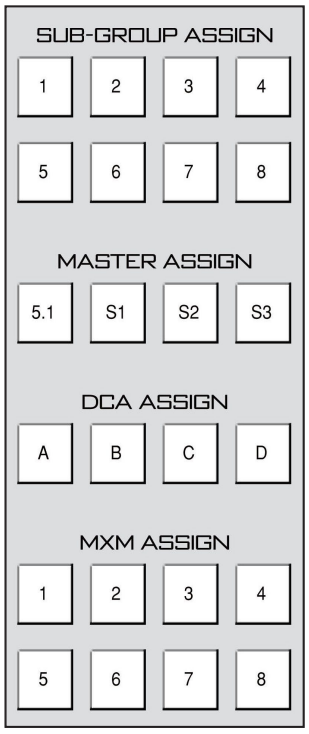
Bus Assign Section

All bus assignment is accomplished through the four sets of ASSIGN switches, consisting of eight sub-group, four master, four DCA, and sixteen mix-minus assign switches. The switches illuminate to indicate the assign status of the input channel or group whose SET switch is currently active. Indicator windows on the input, group, and master panels show the assign status for each individual source.

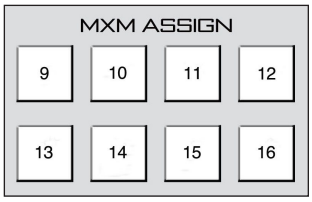
Bus assignment is accomplished by first pressing the SET button on the desired input channel (IS-D32), group (GRP-D32 panel), or master (MSTR-D32 panel). The assign switches illuminate to show the source's current bus assignment. Press required switches to create the desired set of bus assigns. The local indicators on the IS-D32, GRP-D32 or MSTR-D32 panel will change to reflect the new bus assignment.

Input channels may be assigned to any group, master, DCA, or MXM in any combination. The situation is similar for groups, except that groups may not be assigned to groups. Masters may be assigned only to DCAs, but in any combination.

Pressing an input fader SET button will activate the bank of MXM ASSIGN switches and allow the user to assign or minus an input from each MXM bus. Pressing a switch (1-16) toggles the input channel assignment to the MXM bus. The appropriate MXM LED indicator on the input panel also lights. The Mix-minus polarity setting, accessed through the XPoint GUI, determines whether the channel is added to (positive polarity) or subtracted from (negative polarity) the chosen MXM bus. With positive polarity setting the LED lights when the signal is added to the MXM bus. With negative polarity setting the LED lights when the signal is subtracted from the MXM bus. MXM polarity is set globally for all 16 MXM busses.



MXM-D32 Panel



MXM-D32#2 Panel

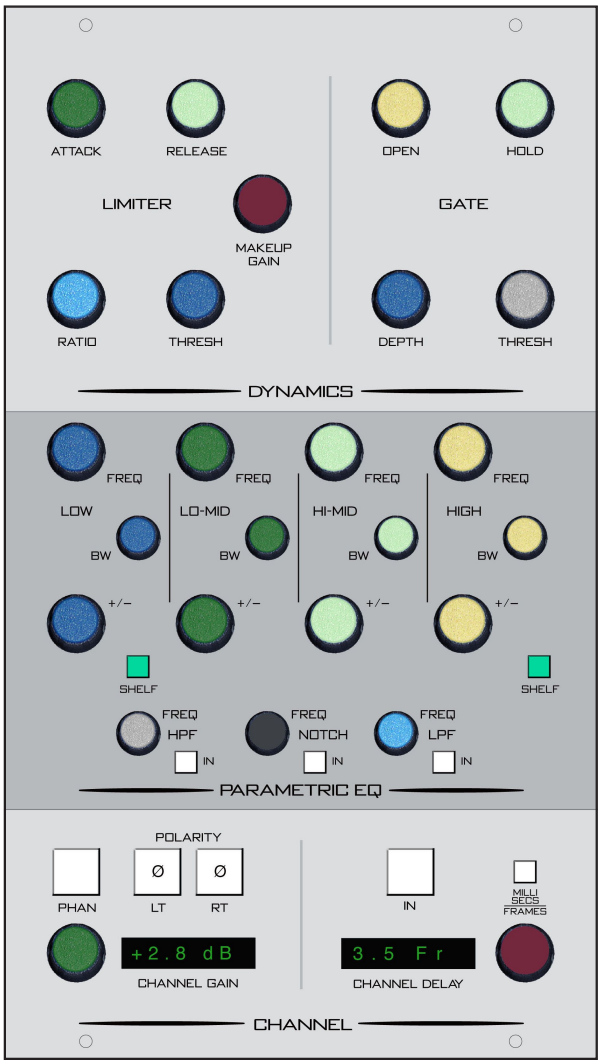
EQ / Dynamics Panel (EQD-D32)

Chapter Contents

EQ / Dynamics Panel (EQD-D32)

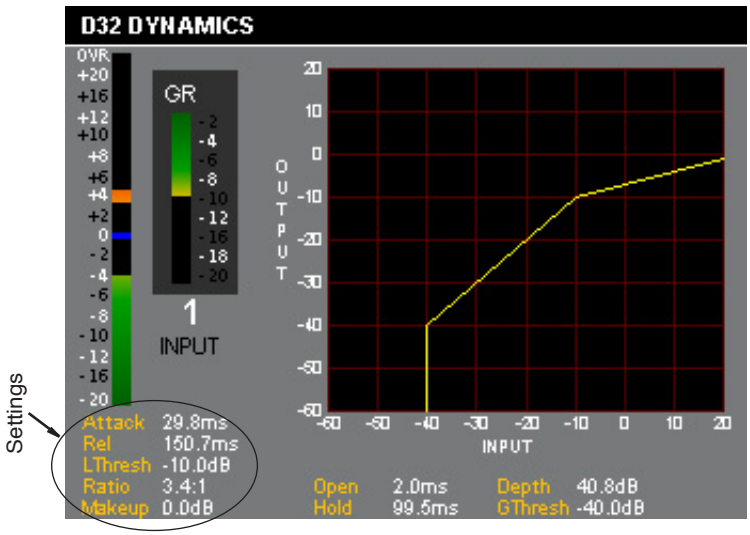
Controls and Functions

The D-32 digital audio control surface is equipped with one EQ / Dynamics Panel. This panel houses EQ, DYNAMICS, PHANTOM POWER, CHANNEL GAIN, DELAY, and POLARITY sections.

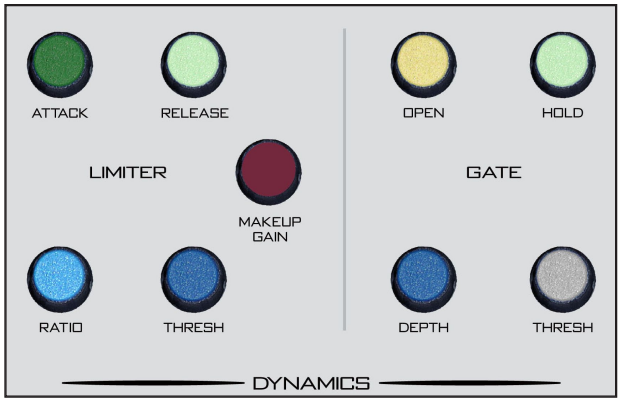


Dynamics Section

This section provides compression, limiting, expansion and gating functions for individual input channels. DSP based dynamics control is simultaneously available for all input faders and output masters. Dynamics controls are accessible by selecting an input or master fader SET button. Dynamics may be switched in/out directly from the input fader (COMP and GATE) and master fader (DYN) switches without having to press the SET button. Dynamics width follows the width of the selected source (i.e., stereo or 5.1). An integral meterbridge LCD display draws a real-time composite dynamics curve based on the compressor/limiter and gate knob and switch settings. The setting of each knob is shown in the display. Gain reduction is displayed on an LED ladder next to each input fader and on the dynamics LCD meter.



Compressor/Limiter



The compressor algorithm used in the D-32 control surface is designed to:

- 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 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" normal to most compressors.

While the overall gain-reduction scheme is "feed-forward," the heart of the detector stage itself is a feedback limiter; this allows for this carefully-contrived loosely-damped servo-loop to permit far more interesting dynamic effects.

The compressor is "soft-knee," meaning the compression ratio increases slowly with increasing applied level, greatly easing the sonic transition into full compression; it helps 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:

Threshold

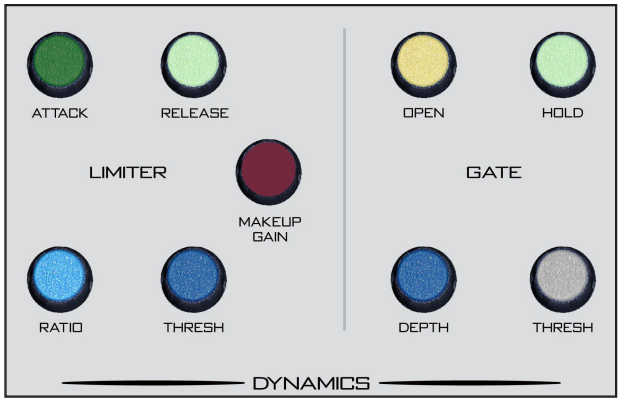
The THRESH knob sets the level at which the compressor is fully into compression of whatever ratio is set. This can be set anywhere in the range of -30dB to +10dB, unless the lower range is limited by the GATE THRESH setting (see below).

Attack

This control determines how quickly (between nominally 0.1mS and 330mS) the compressor reacts to signals. Faster attack times result in "tighter" and more obvious control; longer attack times lend themselves well to gentler automatic volume control.

Ratio

This control determines how much the compressor's gain is reduced in relation to the applied signal. For instance, if the ratio is set at 3:1 and the input level above threshold changes by 12dB, the output level will changed by 4dB. Normal usage is between approximately 2:1 and 4:1; anything greater than, say, 7:1 may be considered "limiting". The ratio can be set anywhere from 1.0:1 to 20.0:1.



Release

This knob determines the nominal time the compressor takes to recover after excitation (between 50.0mS and 3.0 Seconds). Short release times make for more intense, denser, obvious processing; longer release times are better suited to automatic gain control.

Makeup Gain

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.

Gate

The Dynamics section also contains a noise gate, useful for reducing sounds below a certain threshold.

The GATE THRESH control determines the signal level at which the gate operates. This level be anywhere between -60.0dB and +10.0dB. This setting will determine the minimum available setting of the LIMITER THRESH knob; the LIMITER THRESH cannot be set lower then the GATE THRESH.

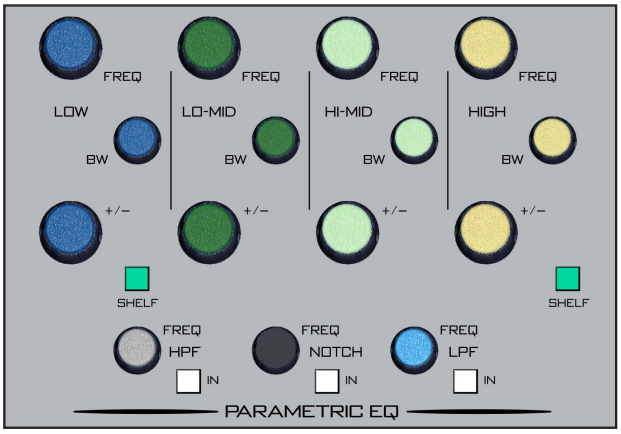
The OPEN knob determines how quickly the gate opens to allow signal passage once the threshold is reached. It can be set anywhere in the range of 0.1mS to 330.0mS. The gate close time is fixed at 200mS.

The DEPTH knob sets the amount of attenuation given to signals below the GATE THRESH setting, and can be adjusted to be between 0dB and 30.0dB.

The HOLD knob determines how long the gate will stay open after the signal falls below the GATE THRESH level before it begins to close, and can be adjusted between 50.0mS and 3.0 Seconds.

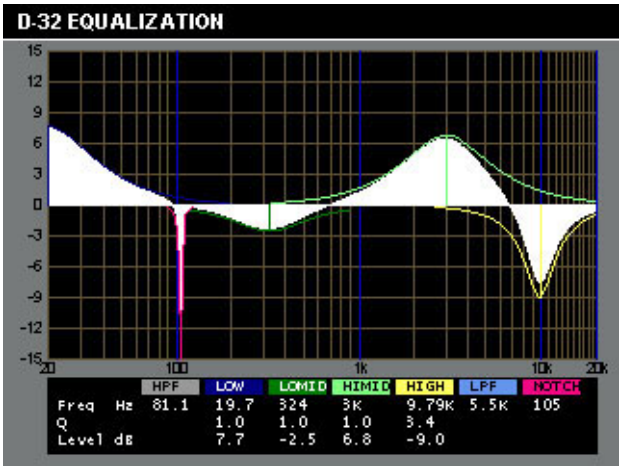
EQ Section

The EQ section consist of a bank of knobs and switches that operate the equalizer, a four band, parametric design with sweepable center frequency, bandwidth, and boost/cut controls. Shelving curves may be independently selected for low and high bands. Separate High Pass, Notch, and Low Pass filters may also be inserted. EQ control is accessible by selecting an input or master fader SET button. EQ width follows the width of the selected source (i.e., stereo or 5.1). An integral meterbridge LCD display draws a real-time composite equalization curve based on the knob and switch settings. Dobbying any boost/cut (+/-) knob will toggle the parameter between flat and the current value.



Tip: DOBBY (pronounce dah-bee) - means to quickly press and release an encoder knob.

To access EQ on an individual input channel, press the appropriate channel's SET button and make the desired adjustments in the EQ Section. To actually place the adjusted EQ in the signal chain, press the channel's EQ button in the IS-D32 panel. The input channel's EQ button will light, and its LCD display will show "EQ."



High-Pass Filter

This is a 24dB/octave variable high-pass filter with Butterworth characteristics, tunable between 16.1Hz and 500Hz, and with a separate in/out switch ("HPF" switch). 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. The display indicates the filter's frequency, and the filter may be clicked in and out by way of the IN switch.

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

Notch Filter

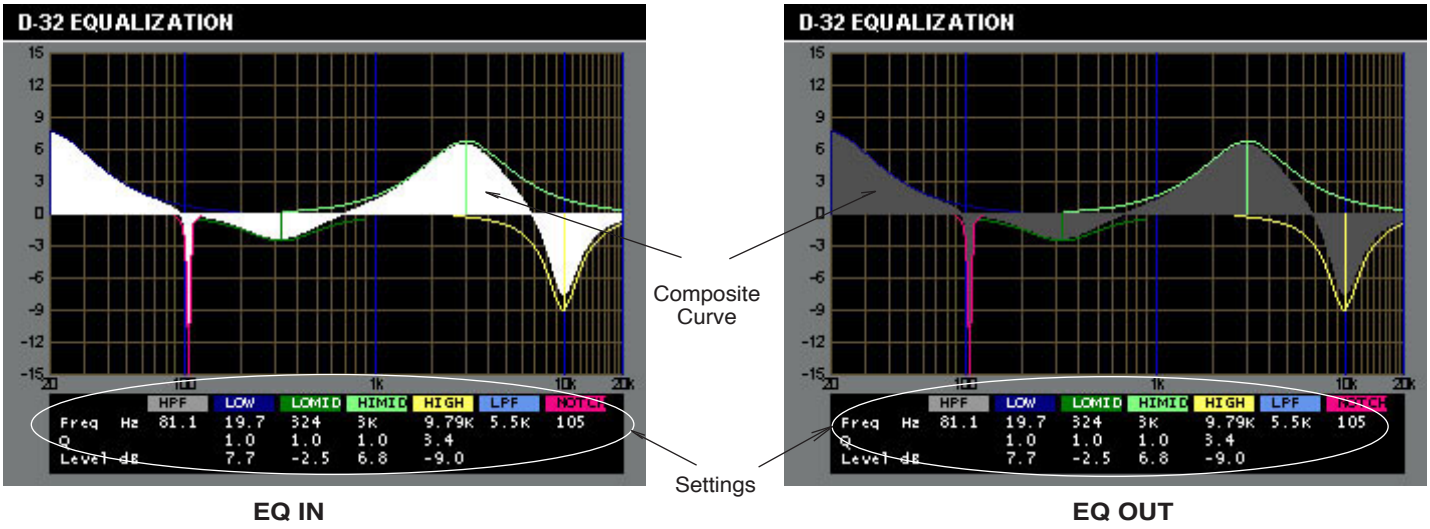
This 1/10th octave, variable center frequency notch filter is tunable between 16.1Hz and 20.2KHz. This filter is used to remove specific audio frequencies, such as 60Hz or 120Hz for an AC power line hum or buzz, or perhaps a horizontal scanning interference from a monitor. The display indicates the filter's center frequency, and the filter may be clicked in and out by way of the IN switch.

Low-Pass Filter

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. The display indicates the filter's frequency, and the filter may be clicked in and out by way of the IN switch.

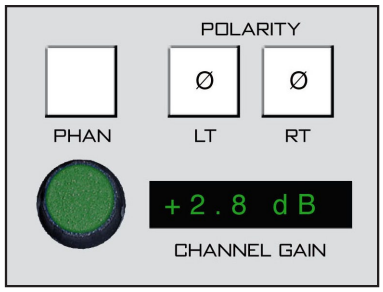
Equalizer

This consists of four bands of parametric control used for modifying the sonic qualities of a signal. Each band has +/-14dB of BOOST/CUT capabilities (+/- knob; "double click" the knob to return to 0.0dB), sweepable center frequency over the range of 16.1Hz to 20.2kHz, and with a filter "Q" or sharpness [BW(BandWidth) knob] sweepable between 0.3 and 5.0 octaves. The LOW and HIGH bands also have a switchable shelving function. The composite effect of any EQ adjustments is shown on the screen, along with text describing the equalizer settings.



Polarity

A pair of switches, one for left and one for right, are provided to allow for the reversal of absolute phase of the signal path.



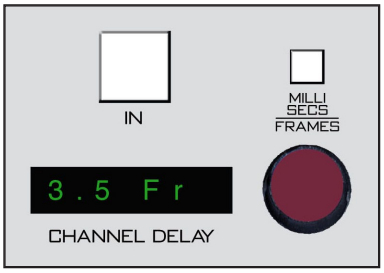
Channel Gain

The CHANNEL GAIN level adjusts the input fader's selected source gain. Line inputs are adjusted in a -18dB to +12dB range; mics are adjusted in a +20dB to +80dB range. Relative gain is shown in its attendant 8-character display.

The input channel's PROGRAMMABLE level control and button on the top of the IS-D32 panel can be programmed to duplicate the gain control function.

Audio Delay

Audio delay is shown in the CHANNEL DELAY display. Delay is accomplished for inputs, submixes, master mixes, aux sends, and mix-minuses by means of activating their corresponding SET button and simply dialing in the audio delay. Delay may be set in milliseconds (0.0 to 667.0) or frames (0.0 to 20.0 in 0.5 frame steps) by means of the MILLI SECS/FRAMES button.



The IN switch inserts the delay on the currently selected input or output signal.

Delay settings are vitally important, permitting audio time delay adjustments to allow for video processor delays or satellite-to-terrestrial link audio/video timing discrepancies.

The input channel's PROGRAMMABLE level control and button on the top of the IS-D32 panel can be programmed to duplicate the delay function.

Surround Panel (SUR-D32)

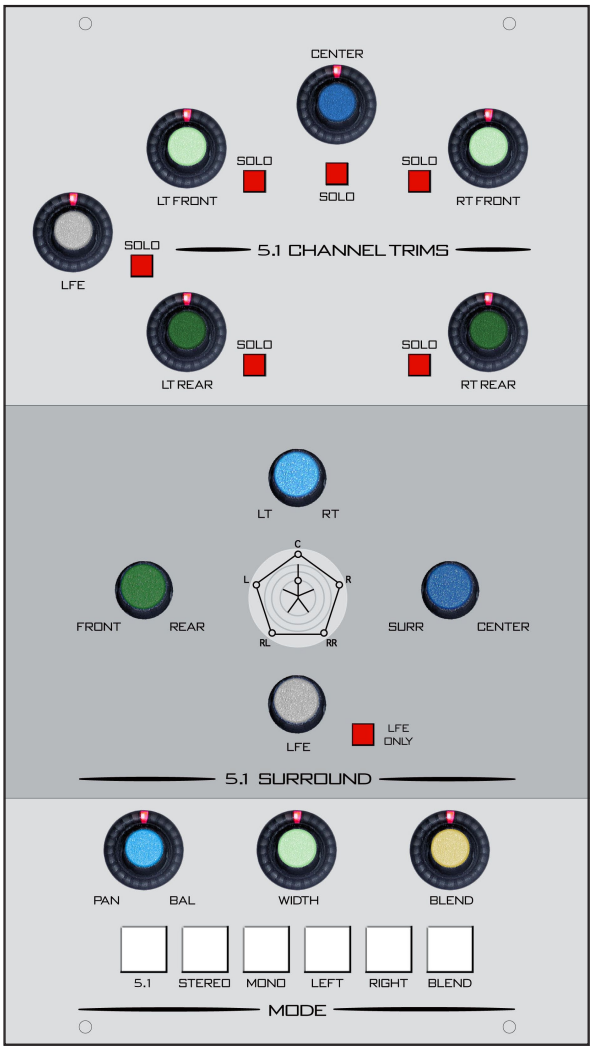
Chapter Contents

Surround Panel (SUR-D32)

Controls and Functions

The D-32 digital audio control surface is equipped with one SURROUND Panel. This panel houses 5.1 CHANNEL TRIMS, 5.1 SURROUND, and MODE sections.

5.1 Channel Trims



This section includes independent rotary level controls and Solo switches for each component of a 5.1 signal (i.e. LT FRONT, CENTER, RT FRONT, LT REAR, RT REAR, and LFE). The 5.1 trims work with surround input faders, the 5.1 master, and the CR1 and CR2 monitors. Trims are accessed by pressing the input channel or output mix SET button.

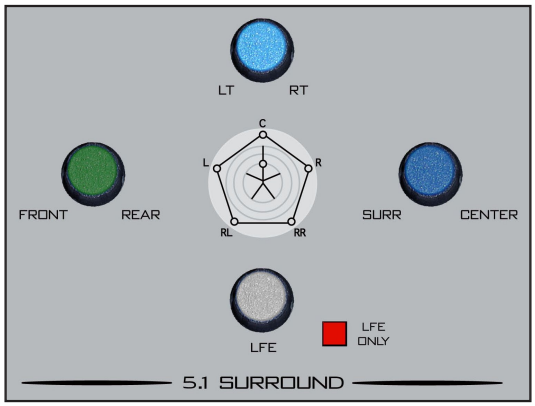
Each rotary trim control allows for +12/-60dB boost/cut when trimming an input channel, or +12/-12dB boost/cut when trimming an output bus. Dobbying the trim knob will reset it to 0dB. SOLO switches allow for monitoring of each component.

The 5.1 trims are gain offsets independently applied to the current gain setting of each component of the 5.1 signal. Conversely, the input fader's GAIN control will affect all 6 channels equally.

SOLO Switches – Each 5.1 component (FL, FR, C, LFE, LR, RR) has a Solo switch. This SOLO section assumes the CR is set to SURROUND mode and works a bit differently from other SOLO switches on the surface. Each SOLO switch mutes all of the CR output mix channels except for the SOLO'd component. Example, if you SOLO the CENTER, only the CENTER speaker is heard. If you SOLO the R-Rear, only the right rear speaker is heard. Multiple SOLO's may be pressed. The SOLO audio heard in the selected speaker also depends on which SET switch is pressed. Here are the SET button choices:

- 5.1 Master- SOLO listens to the 5.1 Master Mix, post fader & ON switch.
- CR-1 - SOLO listens to the SOURCE feeding the Control Room 1 output.
- 5.1 Input Fader - SOLO listens to the selected input fader, post fader & ON switch.
- Stereo/Mono Input Fader - Solo listens to the 5.1 Master Mix. You may pan the stereo or mono channel to hear its contribution to the selected speaker(s).

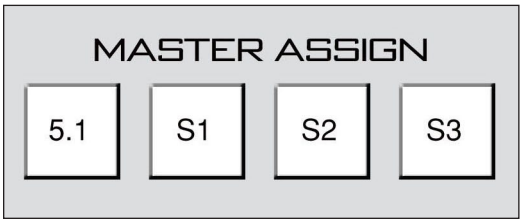
Surround Pan System



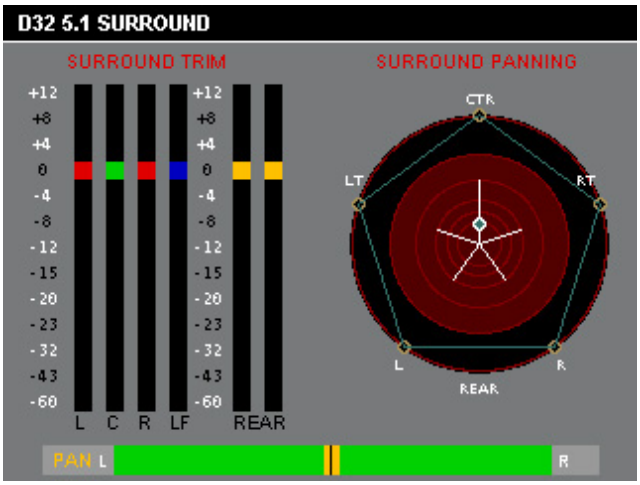
This section provides a set of controls to pan an input fader signal anywhere in the 5.1 Mix bus. Input fader signals may be mono, stereo, or 5.1 signals. The surround panner is accessed by pressing an input SET button.

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.

PROGRAMMING A CHANNEL FOR SURROUND SOUND: Select the channel you wish to program by pressing its SET button. Assign it to the 5.1 destination by means of the ASSIGN switchbank on the MXM-D32 panel.



MXM-D32 Panel



The 5.1 SURROUND section will indicate the current settings of the encoder LT/RT, FRONT/REAR, SURR/CENTER, and LFE knobs.

The meterbridge display will also show a multi-color graphic representation of this system.

The system can generate 5.1 signals from MONO or STEREO sources, and can modify the 5.1 signal of existing 5.1 input sources. Double-clicking any of the encoders will return that parameter to its default setting (for example, LT/RT returns to center).

LT/RT - rotary knob moves the signal left to right; dobbying the knob centers signal.

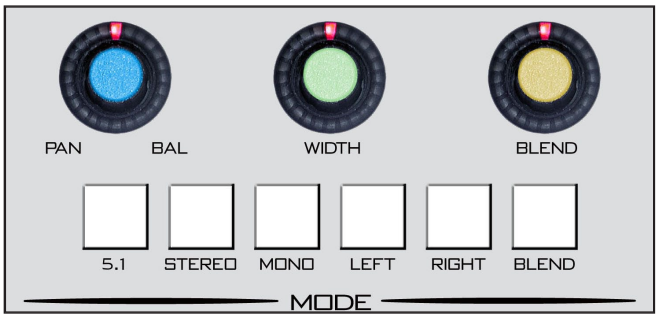
FRONT/REAR - rotary knob moves the signal front to back, dobbying the knob centers signal.

SURR/CENTER - rotary knob controls the ratio of CENTER imaging. Full left removes signal from CENTER and is applied to the LT/RT and FRONT/REAR panner, full right pans signal to CENTER only.

LFE - rotary knob controls level of signal sent to subwoofer channel.

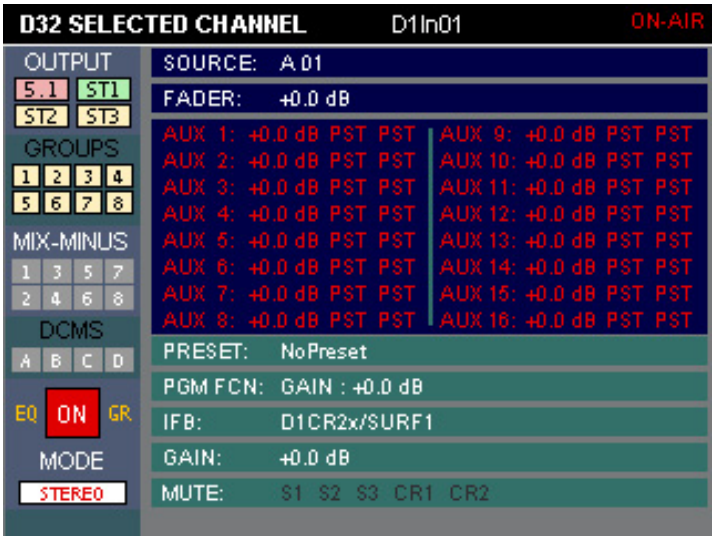
Tip: DOBBY (pronounce dah-bee) - means to quickly press and release an encoder knob.

Mode Section



The mode selector switchbank includes 5.1, STEREO, MONO, LEFT, RIGHT, and BLEND buttons. When pressed, the switch will light up to indicate the selected mode and it will be displayed in the SELECTED CHANNEL LCD display.

Access this section by pressing an input, subgroup, master, or monitor SET button. The functions available depend on which SET button is pressed. PAN and BLEND rotary controls only work with inputs.



INPUT SET PRESSED:

The PAN/BAL mode knob acts as a balance control in STEREO mode and as a panpot in MONO, LT-ONLY, and RT-ONLY modes.

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

The BLEND mode sends both the left and right input signals to both the left and right sides of assigned stereo destinations. The BLEND knob acts as a cross-fader between the left and right source channels. Used for correcting the edited mix of split track sources like news packages. The voice and "nat" tracks feed BOTH LT and RT master outputs.

MODE - row of six interlocked switches (only one selected at a time). Affects which channels of the source signal are passed to the rest of the input signal path.

5.1 (surround) – sets the input fader to be a surround channel. Only input fader channels configured in hardware as 5.1 channels may be put in this mode. Put channel in 5.1 when selecting 5.1 surround sources.

STEREO – selects stereo mode; LT feeds left, right feeds RT; used for stereo music, normal mixing applications. If a mono source is selected, it will feed both LT and RT. A 5.1 source will be down-mixed to stereo.

MONO - selects mono mode; If a stereo source is selected it is summed to mono and reduced by 6dB. A 5.1 source will be down-mixed to mono.

LEFT (left only) – passes only the left channel of a stereo source.

RIGHT (right only) – passes only the right channel of a stereo source.

BLEND – sends the left and right channels to the rotary BLEND control for cross fading. The output of the BLEND control is summed.

MODE can be reconfigured by pressing any allowable button. In most cases pressing a disallowed button has no effect. The exception to this is when you press the BLEND button and BLEND is not a valid choice but STEREO is; in that case pressing BLEND will automatically select STEREO.

MSTR AUX or MSTR MXM SET BUTTON PRESSED:

Press STEREO, MONO, LEFT, or RIGHT to put the AUX send in stereo, mono, left only, or right only mode.

MXM's are always MONO.

SUB-GROUPS or STEREO MASTER SET PRESSED:

5.1 master is permanently set to 5.1 mode.

Press STEREO, MONO, LEFT, or RIGHT to put the subgroup or master in stereo, mono, left only or right only mode.

MONITOR SET PRESSED:

Press 5.1, STEREO, MONO, LEFT, or RIGHT to put the monitor in surround, stereo, mono, left only or right only mode.

Only the CR1 and CR2 monitor mixes can be 5.1.

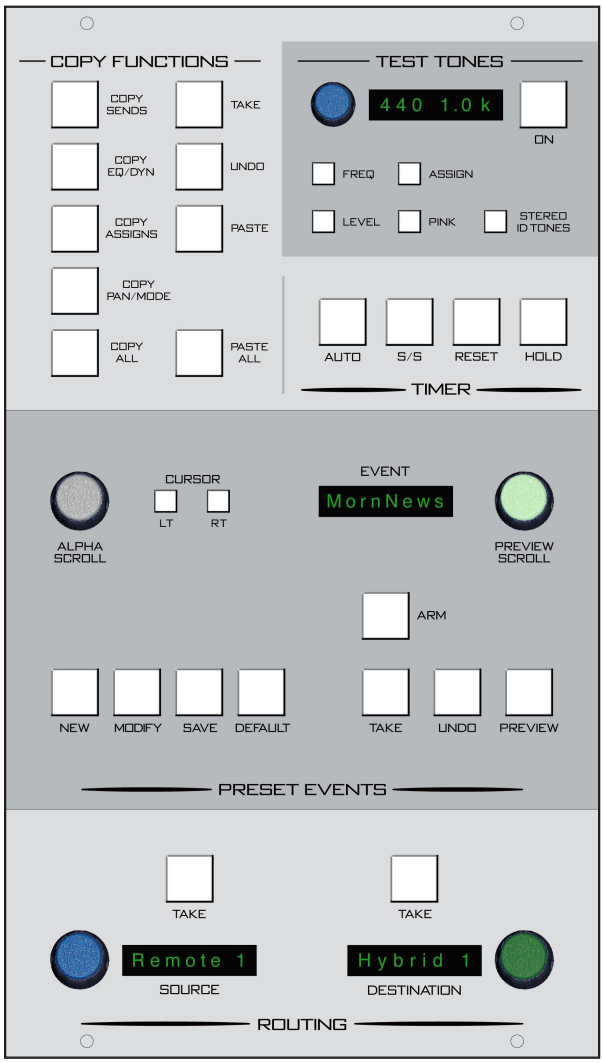
Events Panel (XYE-D32)

Chapter Contents

Events Panel (XYE-D32)

Controls and Functions

The D-32 digital audio control surface is equipped with one EVENTS Panel. This panel contains COPY FUNCTIONS, TEST TONES, TIMER, PRESET EVENTS, and XY CONTROLLER sections.



Copy Functions Section

This system provides a convenient means of copying input channel settings (SENDS, EQ/DYN, ASSIGNS, PAN/MODE, or ALL) and duplicating them to other input channels. The process involves choosing a ***copy type*** switch first. It will flash.

Copy Type Switches:

COPY SENDS - initiates a copy of AUX send settings only.

COPY EQ/DYN - initiates a copy of EQ and dynamics settings only.

COPY ASSIGNS - initiates a copy of bus assigns only (master, group, MXM, & DCA).

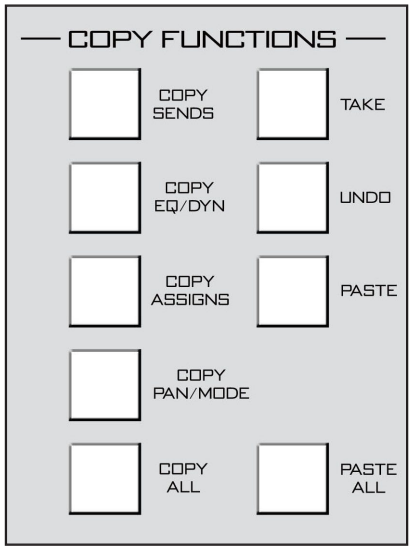
COPY PAN/MODE - initiates a copy of PAN and MODE select settings only.

COPY ALL - copies all settings from the source fader except Source & Preset.

Choose the desired channel to be copied by pressing its SET button (IS-D32 panel). The SET button will then flash in concert with the COPY button and the PASTE and PASTE ALL buttons will light. To go into PASTE mode, press the PASTE button. It will flash, and the COPY and PASTE ALL buttons will go out. Then press the SET button of the target module you wish to copy to. It will begin to flash in concert with the PASTE button, and the TAKE button will light. To accomplish the copy, press the TAKE button. See the section “To Copy One To All” for an explanation of the PASTE ALL button.

The UNDO button is used to undo a TAKE copy. Simply press UNDO and then TAKE to return the modified channel to its pre-TAKE status. There is only one level of UNDO. If you do a copy operation, then do another copy operation, then press UNDO to go back to the status before the last copy, pressing UNDO again will have no effect.

To Copy Groups



It is possible to take a bank of channels and duplicate it to another channel bank of equal number. Press the COPY button, then press the desired SET buttons on the source bank. The COPY button and the source bank SET buttons will flash in concert. Then press the PASTE button, which will begin flashing; press the desired target channel SET buttons, which will flash in concert with the PASTE button. To execute, press the TAKE button.

This function can be used to copy the settings from any number of channels to an equal size group of channels. The channels in each group do not have to be consecutive, and channels within a group can be a mixture from each PAGE if desired. There can even be overlap; for example, you can choose to copy from channels 1, 2, and 3 to channels 2, 4, and 5. After this copy, channels 1 and 3 would not have changed, channel 2 would be set as channel 1 had been, channel 4 would be set as channel 2 had been, and channel 5 would be set as channel 3 had been.

When selecting channels for the COPY and PASTE sets, the order in which you press the buttons matters. For example, if you selected, in order, channels 1, 2, 4 and 3 for COPY, and then selected, in order, channels 5, 7, 6, and 8 for PASTE, the end result would be that channel 5 would have channel 1 settings, channel 6 would have channel 4 settings, channel 7 would have channel 2 settings, and channel 8 would have channel 3 settings. Not that this is something you would necessarily want to do, but that's what would happen. To reiterate, order matters when selecting the COPY and PASTE sets.

If the size of the COPY and PASTE groups are different, TAKE will not effect the change, except for the special case of Copy One and Paste Many, described next.

To Copy One and Paste Many

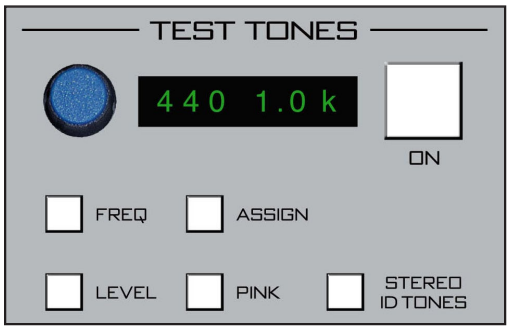
Press the COPY button, and then the desired source channel SET button; both will flash in concert. Then press the PASTE button and the target channel SET buttons, which will flash in concert with the PASTE button. To execute, press the TAKE button.

To Copy One To All

Press the COPY button, and then the desired source channel SET button; both will flash in concert. Then press PASTE ALL, which will commence flashing. To execute the global paste, press TAKE.

NOTE: If the TAKE button is not pressed within a timeout period of 10 seconds, the entire copy/paste operation will cancel out.

Test Tones Section



The TEST TONES section provides adjustable frequency test signals, a pink noise source, and a stereo ID tones source.

The multi function oscillator may be assigned to any mix bus output or input fader. Press the SET button on the input or mix bus output to begin.

Operate as follows: The encoder knob operates as both a frequency knob and a level control knob. By pressing the FREQ button, the encoder will now adjust the oscillator frequency designated in the TEST TONES display. Its level can then be adjusted by pressing the LEVEL button and using the encoder to adjust the level as displayed in the TEST TONES display. If a pink noise is desired, press the PINK button and adjust its level by pressing the LEVEL button. For STEREO ID tones, press the STEREO ID TONES button and adjust the level by pressing the LEVEL button. The test tone destination is chosen by pressing the SET button at the desired destination location and then the ASSIGN button in the test tone section. To use any of the test tones, press the ON button. When it is lit the selected test tone is available; when not lit the tones are off.

Frequency Select Switches:

STEREO ID TONES - generates 440Hz on the left channel and 1kHz on the right channel. The TEST TONES display shows both frequencies.

PINK - generates pink noise on both channels. The TEST TONES display shows **PinkNoiz**.

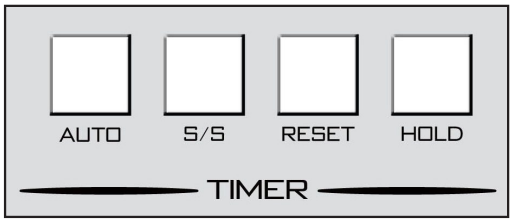
FREQ - defaults to 440Hz; the rotary encoder adjust the frequency in the range of 20Hz to 20kHz and updates the display.

LEVEL Switch - puts encoder and display in level setting mode. Default is -20dBFS. Encoder sweeps in 1dB steps in a range from 0dBFS down to OFF. Dobbying the encoder sets a nominal -20dBFS level.

ASSIGN Switch - assigns the oscillator to the selected mix output or input fader.

ON Switch - turns the oscillator ON.

Timer Section



The control surface timer is provided with an AUTO-RESTART function so programmed (via GUI) input modules can automatically reset the timer display (located on the bottom of the BS.1770-2 LOUDNESS MONITOR LCD screen) to zero and start a new count (if the timer is currently running), allowing the announcer to easily track his own pace.

The S/S (start/stop) button halts the timer, holds the last count, and then restarts and accumulates the count when depressed again–perfect for compiling tapes of desired duration.

RESET has a dual-mode capability:

- if you depress it while the timer is counting, the display will instantly reset to zero and start a fresh count;

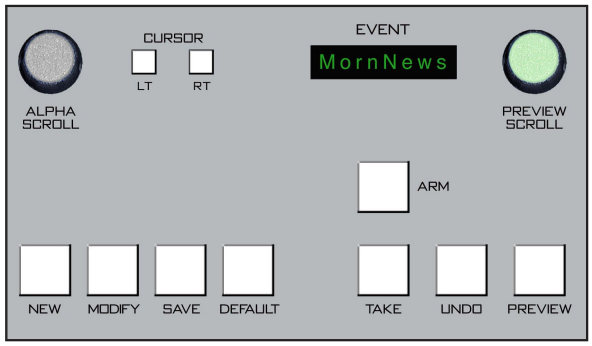
- if the timer is already stopped, depressing this button will reset the timer to zero, where it will hold until start is pressed.

The HOLD button allows you to hold the display for a longer viewing duration, while still allowing the counter to continue in the background. Releasing the button will then display the current count.

Time of Day Clock

The MASTER LCD screen includes the display of a time of day clock. To set the time on this clock you run a Wheatstone utility program, WSTimeSet.exe, on a network computer. The program allows you to set the clocks on multiple control surfaces by specifying the IP addresses of the control surfaces in a list. A single command then updates all specified clocks. Program options allow auto updating at midnight or at the top of the hour. See Appendix 1 for details.

Preset Events Section

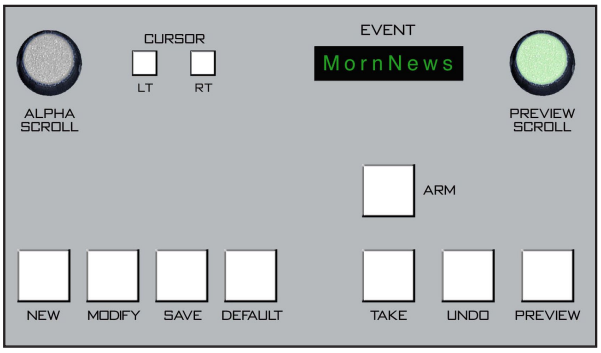


This section provides a means for storage and retrieval of control surface settings, and naming those settings as "events". In this manner complete configuration and setting information that is used repeatedly (for example, morning show) can be saved and recalled. Event names may be re-titled by the user. Up to 99 different events can be stored. A special DEFAULT event stores a user defined setup. Events may be triggered by the PROGRAMMABLE buttons on the IS-D32 panel.

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 EVENT window, then quickly press MODIFY, then SAVE.



Taking an Event

Rotate the PREVIEW SCROLL encoder until the desired event is shown in the EVENT 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 button 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.

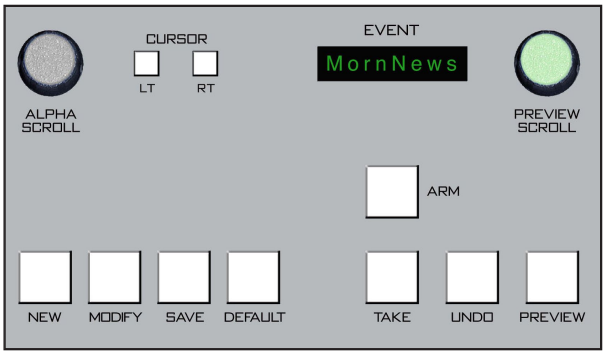
Deleting an Event

Rotate the PREVIEW SCROLL encoder until the Event to be deleted is shown in the EVENT 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 and available EVENT names will be shown in the 8-character EVENT 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 several seconds.

Control Modes

The D-32 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 MXM level, MXM assign, Event takes, and visibility changes from being controlled by the surface.

To change the control mode, begin by pressing and holding the PREVIEW SCROLL knob until the display reads “Admin” and the TAKE button lights (if the surface is currently in Admin mode the ARM button will also light). Turn PREVIEW SCROLL until the desired new mode (Admin, User, or Guest) is showing in the display and press TAKE. Turn PREVIEW SCROLL 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 PREVIEW SCROLL until the display reads “<<Exit” and press TAKE to finish the mode select operation.

The ARM 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.

Routing (XY Controller) Section

This section is a multi-use X-Y controller. Rotary knobs are provided for selecting Sources and Destinations. TAKE buttons are provided for both sources and destinations.

The information displayed in the eight character SOURCE and DESTINATION windows depends on which SET button is pressed. Signal source and destination visibility is set in the XPoint GUI. Dobby the DESTINATION knob to step through a list of routes where the mixer signal is routed to multiple destinations.

Control variations:

Input SET switch pressed:

SOURCE acts as source selector for input fader.

DESTINATION controls IFB (BUS MINUS) routing.

AUXx master SET switch pressed (MSTR SEND pressed):

SOURCE - not used

DESTINATION – used to route AUX bus to an output.

MXMx Master SET switch pressed (MSTR MXM pressed):

SOURCE – displays/routes Confidence feed source.

DESTINATION – used to route MXM x bus to an output.

Group or Master SET button pressed -

SOURCE - not used

DESTINATION – used to route Group or Master mix to an output.

Monitor SET button pressed -

SOURCE - displays/routes monitor EXT source.

DESTINATION – used to route monitor mix to an output.

Selecting Input Channel Sources

The operator designates the desired input channel by pressing its SET button in the Input section. Its current input source is shown in the SOURCE display. Input channel meterbridge LCD displays will mirror that same information. A different input source may be chosen by rotating the SOURCE knob. When the desired source is shown in the SOURCE display, pressing the TAKE button will execute the take command on the downstroke, and the new input will be shown in the SOURCE display and in the meterbridge LCD display. This function operates the same as the SOURCE knob on the input panels. To remove the input source from the input channel and leave nothing connected TAKE the source named "NOSOURCE".

Selecting Output Mix Destinations

When a SET button on an output mix channel (i.e., any of the auxes, monitors, or MXM masters) is pressed, its most current destination will be shown in the DESTINATION display. A mix is capable of being sent to one or many outputs. To see all the destinations that the mix feeds, rotate the DESTINATION knob. If the mix doesn't feed the displayed destination the TAKE button will light. You may also "dobby" the DESTINATION knob to step through all of the currently routed destinations.

EXAMPLE: An example might be a MXM feed routed to several listeners participating in the program, or an AUD bus routed to multiple recording devices.

Tip: The CR monitor SPKR A and SPKR B buttons act as SET buttons to program the SPKR A and SPKR B destination(s) separately.

Tip: DOBBY (pronounce dah-bee) - means to quickly press and release an encoder knob.

Changing Output Mix Destinations

Rotate the DESTINATION knob until the desired destination is shown in the DESTINATION display. When the knob is rotated, the TAKE button will light if the displayed destination is not being fed by the mix. If the operator wishes to add the destination shown, press the TAKE button to execute the command and the new destination will become the current destination, shown in available displays elsewhere on the control surface. Disallowed destinations (established in the configuration software) will not be shown.

To remove a destination, rotate or dobby the DESTINATION knob until that destination appears in the display, then press and hold the TAKE button until it lights.

Monitor Panel (MON-D32)

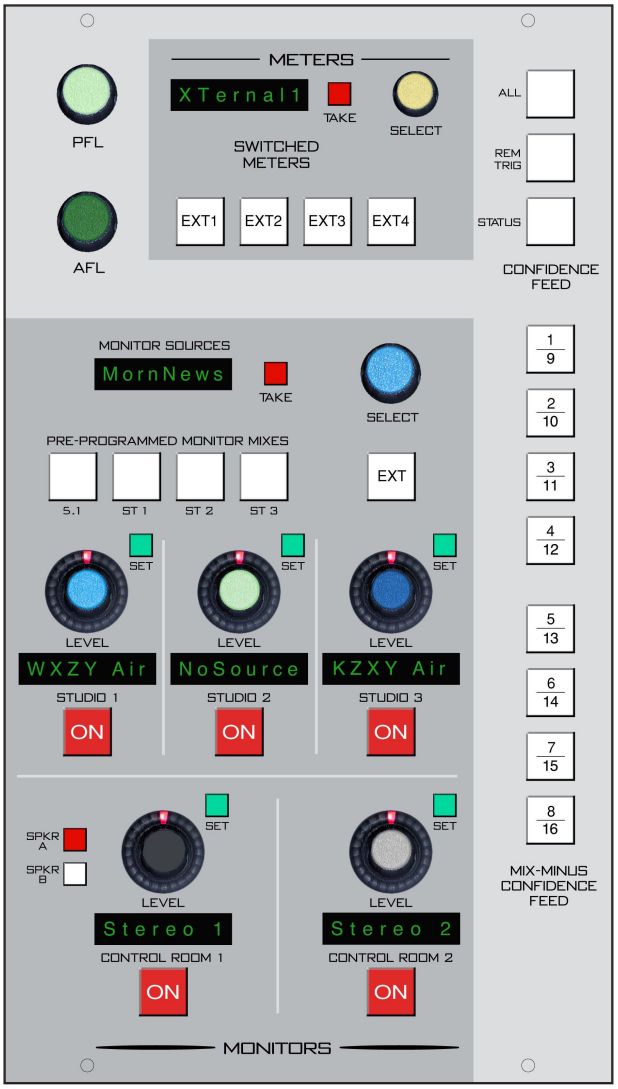
Chapter Contents

Monitor Panel (MON-D32)

Controls and Functions

The D-32 digital audio control surface is equipped with one MONITOR Panel. This panel houses MONITORS, AFL & PFL levels, SWITCHED METERS, and CONFIDENCE FEED sections.

PFL(Cue)/AFL(Solo) Section



The PFL(CUE) and AFL(SOLO) master level controls are located on the left top section of the MONITOR panel.

These rotary controls provide volume control of the PFL (CUE) and AFL mixes respectively. PFL is "pre-fader listen," AFL is "after fader listen." Monitors may optionally be interrupted with the PFL/AFL signal. This interrupt action is defined in the OPTIONS.txt file stored on the D-32 surface (see sample in Appendix 2). The default is no interrupt.

Input faders put into the PFL mix are summed and output on a PFL mix signal, which may be mono or stereo. The PFL mix is sent to the switched meters whenever a PFL switch is lit. Likewise, input faders put into the AFL mix are summed and output on the AFL mix signal (mono or stereo) which is sent to the switched meters when any AFL switch is lit. IFB, Groups, and AUX and MXM masters may also be switched to AFL.

Switched Meters Section

This section has a dedicated source control knob, eight character display, and TAKE button to route any signal on the router to the switched meter. There are four "hot" buttons: EXT1, EXT2, EXT3, and EXT4.

To select a signal to meter, rotate the encoder SELECT. Available sources will be displayed in the eight character SWITCHED METERS 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 5 seconds, the TAKE button is not pressed, the array will revert back to its previous selected program.

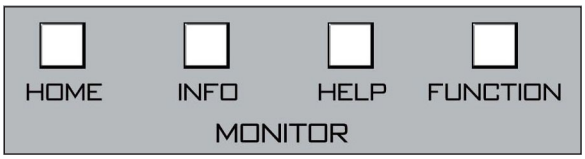
The four interlocked switches (EXT 1 - 4) act as source selects for the switched meter. Program a meter hot button by scrolling through the available source signals with the rotary control until the desired source is displayed. Press and hold the EXTx switch for 3 sec to load the signal.

Any time a channel AFL/PFL button is pressed, the SOLO/CUE level will be temporarily shown in the switched meter display until the AFL/PFL button is deactivated.

Confidence Feed Section

This system provides a means of sending an external signal to any or all of the 16 MXM outputs. This is typically used during show setup or airtime operations so talent can remain confident that their MXM feeds are active and working. (A typical confidence feed signal might be master control audio.)

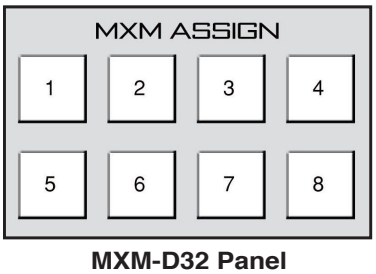
A bank of 8 buttons and the FUNCTION button on the MSTR-D32 panel allow the user to individually route confidence audio to a MXM output. Press the FUNCTION button to toggle between 1 - 8 and 9 -16 MXM confidence feeds. Each feed can be unique. Additionally, all 16 outputs can be put into confidence mode by means of a CONFIDENCE FEED ALL switch. Also, the CONFIDENCE FEED ALL feed function can be triggered from an external contact closure and armed for such action by means of the REM TRIG button. To trigger the ALL function the user defines an LIO Only input signal in the XPoint destination column with the CONFIDENCE FEED ALL LED function. This input is cross connected to an auto-generated mixer signal with the CONFIDENCE FEED LED (CFLED1, for example) function attached (the signal name will be DxCF1 for confidence feeds 1 - 6, DxCF2 for confidence feeds 7 - 12, or DxCF3 for confidence feeds 13-16, where the "x" represents a surface number in multi-surface systems). The remote closure is wired to the defined logic I/O port. This allows remote control of CONFIDENCE FEED ALL by master control switcher as the console goes to and from air and breaks. As a result, reporters can hear the off-air programming when dialing in and when the station is in a break.



MSTR-D32 Panel

All Confidence Feed programming is included in the EVENT storage.

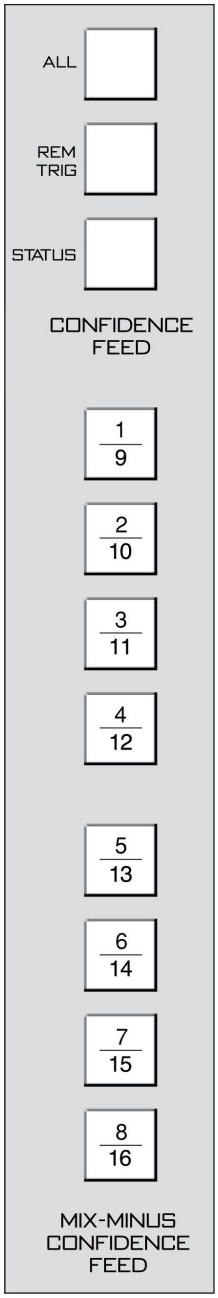
To set and store a confidence feed signal, go to the MIX-MINUS ASSIGN section of the MXM-D32 panel and hit the corresponding button to establish a programming mode. Select the desired source in the XY Controller section of the XYE-D32 panel by rotating the SOURCE knob until the desired signal is shown in the SOURCE display, at which time the TAKE button will flash. Pressing that TAKE button will now program the corresponding MXM to receive the selected source. Repeat the procedure for each of the 8 MXM outputs in the MIX-MINUS ASSIGN section on the MXM-D32 panel.



MXM-D32 Panel

To remove the source for an MXM, TAKE the source named "NOSOURCE."

XYE-D32 Panel



The STATUS button, when pressed, lights, and a list of MXM sources and destinations appears on one of the LCD displays. After viewing the MXM status, press the desired MONITOR button (MSTR-D32 panel) to revert the display to normal operation and turn off the STATUS light.

D32 CONFIDENCE FEEDS [1-8]

```
CONFIDENCE 1  SOURCE: MxM 1    DEST:  NoDest
CONFIDENCE 2  SOURCE: MxM 2    DEST:  NoDest
CONFIDENCE 3  SOURCE: MxM 3    DEST:  NoDest
CONFIDENCE 4  SOURCE: MxM 4    DEST:  NoDest
CONFIDENCE 5  SOURCE: MxM 5    DEST:  NoDest
CONFIDENCE 6  SOURCE: MxM 6    DEST:  NoDest
CONFIDENCE 7  SOURCE: MxM 7    DEST:  NoDest
CONFIDENCE 8  SOURCE: MxM 8    DEST:  NoDest
```

D32 CONFIDENCE FEEDS [9-16]

```
CONFIDENCE 9  SOURCE: MxM 9    DEST:  NoDest
CONFIDENCE 10 SOURCE: MxM 10   DEST:  NoDest
CONFIDENCE 11 SOURCE: MxM 11   DEST:  NoDest
CONFIDENCE 12 SOURCE: MxM 12   DEST:  NoDest
CONFIDENCE 13 SOURCE: MxM 13   DEST:  NoDest
CONFIDENCE 14 SOURCE: MxM 14   DEST:  NoDest
CONFIDENCE 15 SOURCE: MxM 15   DEST:  NoDest
CONFIDENCE 16 SOURCE: MxM 16   DEST:  NoDest
```

Monitors

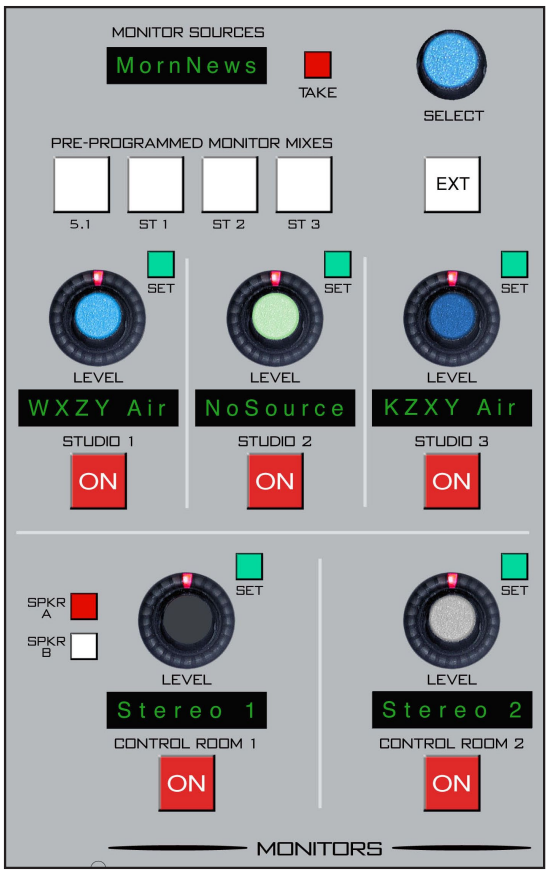
There are five monitor outputs available: STUDIO 1 through 3, and CONTROL ROOM 1 and 2.

Each monitor has a LEVEL control, a SET button, an ON switch, and a display.

The CONTROL ROOM 1 monitor section also has the two speaker select switches.

Pressing a monitor SET button gains access to the monitor source encoder and master mix hot buttons. Displays below each monitor pot show the selected source.

MONITOR SOURCE display – shows the currently programmed source. Use rotary encoder and TAKE to select a new source.



Monitor sources can be selected several ways:

• Four PRE-PROGRAMMED MONITOR MIXES switches (5.1, ST1, ST2 and ST3) allow direct access to the main mixes most frequently monitored.

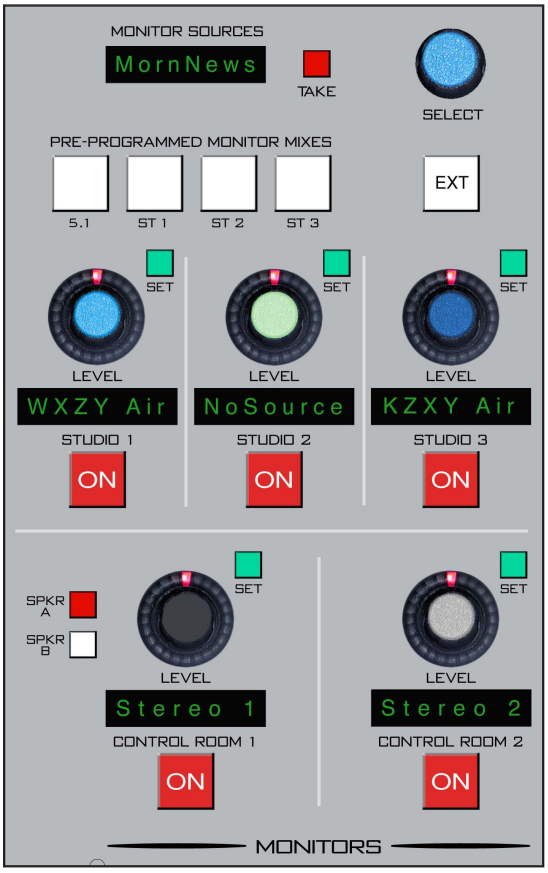
• Sources can be randomly selected with the SELECT knob and its attendant SOURCE display and TAKE button.

• The EXT switch selects the pre-programmed EXT source. To program this, press and hold the EXT button until it lights (approx. 3 seconds), then dial up the desired source with the SELECT knob and press TAKE. The source is stored. NOTE that to do this, all monitor SET buttons must be OFF (unlit).

To select a source for a monitor by one of the above methods, first press the SET button next to the knob for the desired monitor.

The knob controls the level of the monitor signal.

Control Room Section



In a typical radio or television application the control surface is located in the audio control room. Speakers in the control room allow the control surface operator to listen to the various control surface bus outputs to be assured that the control surface is performing as desired. These speakers are fed by a stereo or 5.1 signal routed from the control surface's control room output.

In some instances the control surface operator may also be performing talent whose voice will be heard over the radio. The operator's microphone may thus provide a part of the signal that is going out over the air. If that signal is the one being monitored with the control room speakers, there is the potential for feedback. The amplified signal from the control room speakers is picked up by the microphone and reamplified to a new, higher, level, which then is once again picked up by the microphone. The signal quickly rises to an ear-splitting screech. To prevent this, the operator's microphone is normally set in the configuration software to MUTE the control room output to prevent the occurrence of feedback.

CR SET BUTTON - lets the operator select the source to be listened to in the control room speakers using the XY Controller on the XYE-D32 panel. Source/Destination visibility is set in XPoint.

CR DISPLAY - the eight character display shows the source, that is selected for monitoring in the control room.

CR LEVEL CONTROL - determines the overall loudness of the signal being monitored as it appears in the control room speakers.

ON SWITCH - turns the control room signal ON and OFF. The switch LED lights to indicate the signal is ON.

SPKR A, SPKR B - these two switches are used to determine which of two outputs will be fed by the CR1 signal. Each feed may have its mode programmed separately (see Selecting Output Mix Destinations on page 6-9). A/B state is stored with an EVENT.

A/B Switch Destination Mapping (Set once)

1 - Press CR SET switch

2 - Press CR SPKR A switch

3 - Use XY controller on the XYE-D32 panel to route CR to an output.

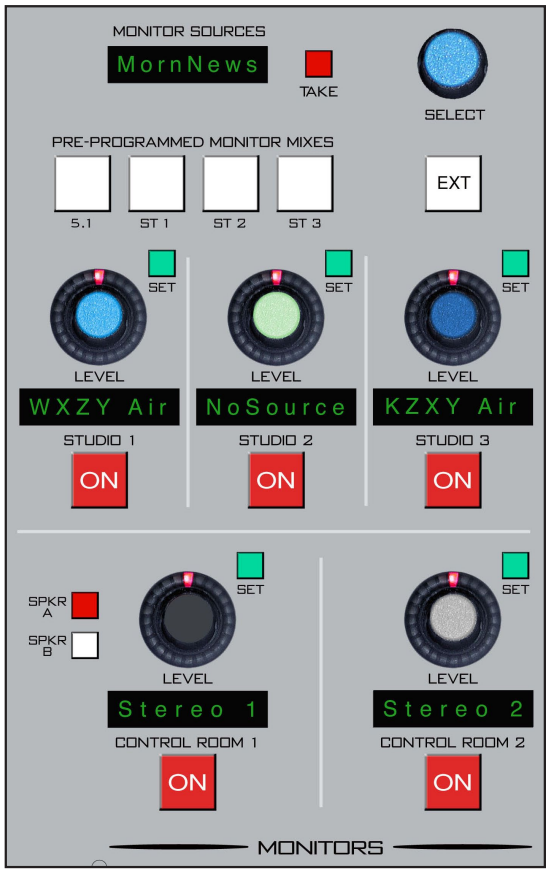
4 - Use the XYE-D32 TAKE button to store the destination.

5 - Press CR SPKR B switch

6 - Use XY controller on the XYE-D32 panel to route CR to an output.

7 - Use the XYE-D32 TAKE button to store the destination.

Studio Section



In addition to the control room, there may be one or more studios (the D-32 supports three studios) in which one or more performers will be assembled, usually with microphones so that their voices can become part of the mix. Speakers may be provided in the studio to allow the talent to listen to the various control surface bus outputs at times that they are not actually on air. These speakers are fed from one of the control surface's stereo studio outputs.

As in the control room, the potential for feedback also exists in the studio. The talent microphones will usually provide a part of the signal that is going out over the air. If that signal is the one being monitored with the studio speakers, feedback will occur. To prevent this, the studio mic faders are usually set to MUTE the studio output in the configuration software to prevent the occurrence of feedback.

ST SET BUTTON - lets the operator select the source to be listened to in the studio using the XY Controller on the XYE-D32 panel. Source/Destination visibility is set in XPoint.

ST DISPLAY - the eight character display shows the source, that is selected for monitoring in the studio.

ST LEVEL CONTROL - determines the overall loudness of the signal being monitored as it appears in the studio speakers.

ON SWITCH - turns the studio monitor signal ON and OFF. The switch LED lights to indicate the signal is ON.

TB / MIC Panel (TBM-D32)

Chapter Contents

TB / MIC Panel (TBM-D32)

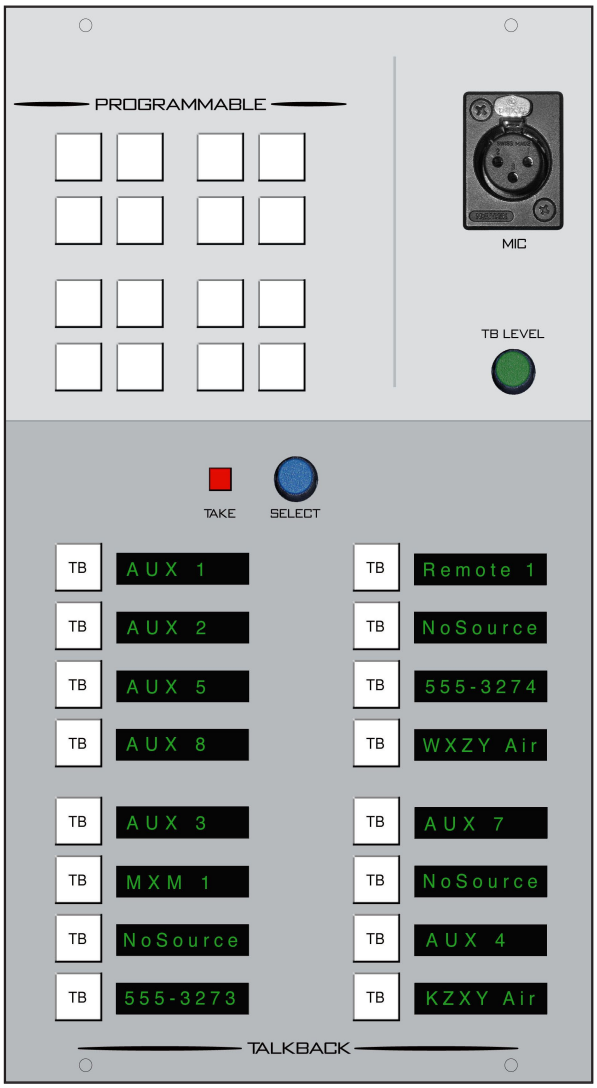
Controls and Functions

The D-32 digital audio control surface is equipped with one TALKBACK/ MIC Panel. This panel houses the TALKBACK MIC, the TALKBACK preselects, and the PROGRAMMABLE buttons sections.

Programmable Buttons

These (16) momentary switches and indicating LEDs are designed for user accessible external functions (GPIs). Users modify behavior of the switches/ leds in the OPTIONS.TXT file for the surface (see sample in Appendix 2). The XPoint GUI is used to map Salvo or Preset takes or Temporary Connections to these switches.

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 Bridge Router manual for details.



Talkback Mic

The operator's talkback mic plugs into the panel mounted XLR connector located on the upper-right corner of the panel. This a jack only with no preamplifier built into the D-32 control surface. This signal is then available for the various TALKBACK functions of the control surface. The XLR-M connector is wired to the "TB MIC" DB-9 connector located on the control surface's rear panel. This DB-9 connector must be wired out to a destination, such as a Bridge Router mic input (phantom power is supported), to be usable by the system.

Pin 1 XLR SH – Pin 4 "TB MIC" DB-9 SH
Pin 2 XLR HI – Pin 5 "TB MIC" DB-9 HI
Pin 3 XLR LO – Pin 9 "TB MIC" DB-9 LO

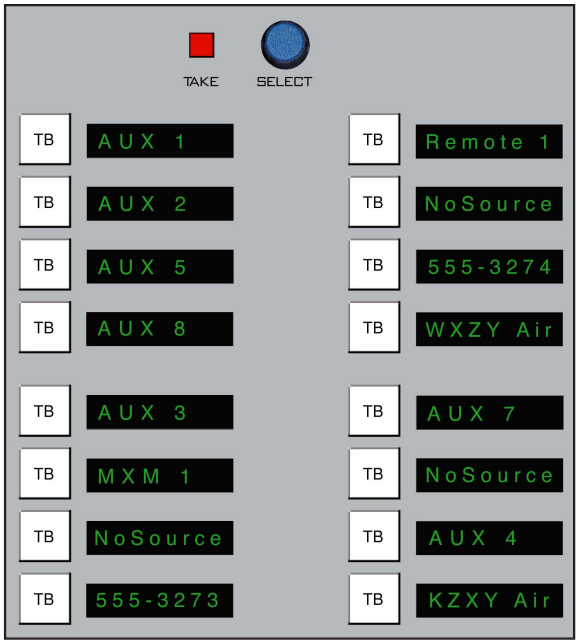
XPoint software is used to route the user defined TB MIC source signal to the D-32's auto generated TBACK input signal. Note that any source on the router can be the TB source.

Other external microphones may also be connected to the engine system and talk to destinations or mixes and be triggered through the system's logic LIO-2001 I/O card (Bridge Router). This function would be mapped through the GUI.

The TB LEVEL rotary knob is used to trim the level of the TB signal.

Talkback Preselects

These sixteen programmable switches allow for a dedicated Bridge Router output to be designated as a destination for the talkback signal. Once a specific output has been programmed into the preselector, the talkback signal can be sent to that output at any time by pressing the corresponding switch.



Each individual TB button is programmed as follows:

1 - Press and hold the TAKE button (this button will light) to enter programming mode.

2 - Press the TB button you want to program (the TB button will flash).

3 - Rotate the SELECT rotary encoder until the desired mix is displayed.

4 - Press the TAKE button to write the mix name into TB switch display.

Repeat this procedure for each of the sixteen TB buttons. The procedure will time out after about 5 seconds if you fail to complete one of the steps.

When EVENTS are stored, the sixteen TB preselects as displayed at the time of the EVENT SAVE action will be also stored and can be recalled with that EVENT.

Available mixes are AUX, MXM, Studios, Masters, IFB's, AFL, PFL, and Sub-Groups. A TB visibility setting in the XPoint GUI allows the user to limit what users "see" when they rotate the SELECT knob.

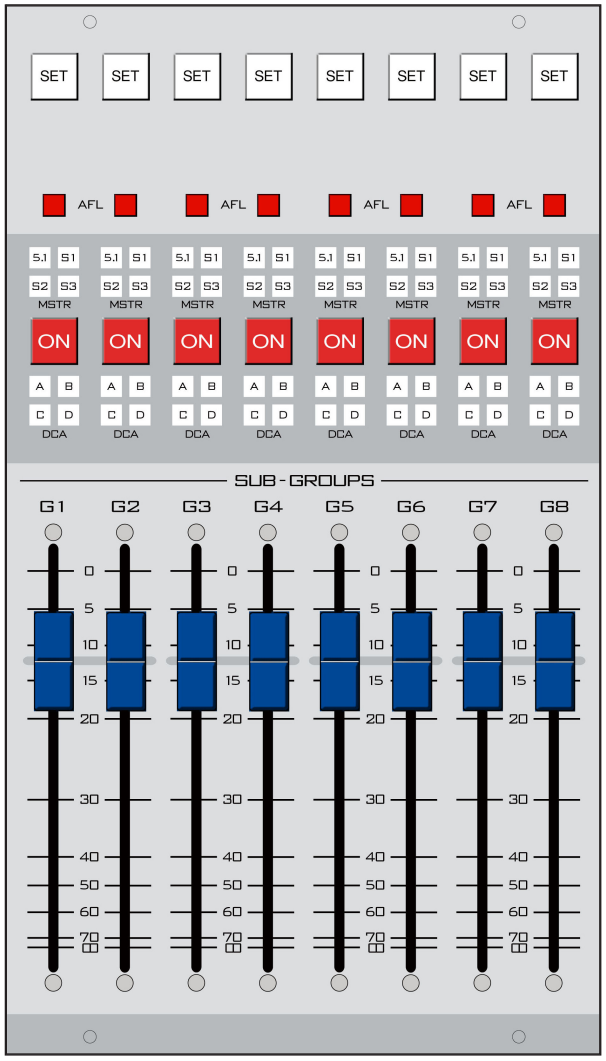
Sub-Groups Panel (GRP-D32)

Chapter Contents

Sub-Groups Panel (GRP-D32)

Controls and Functions

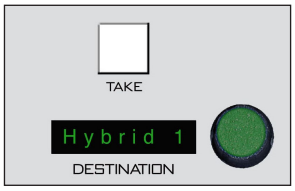
The D-32 digital audio control surface is equipped with one SUB-GROUPS Panel. This panel houses eight sub-group outputs. Each sub-group has identical set of controls: SET, ON, and AFL buttons, and MSTR and DCA assign displays.



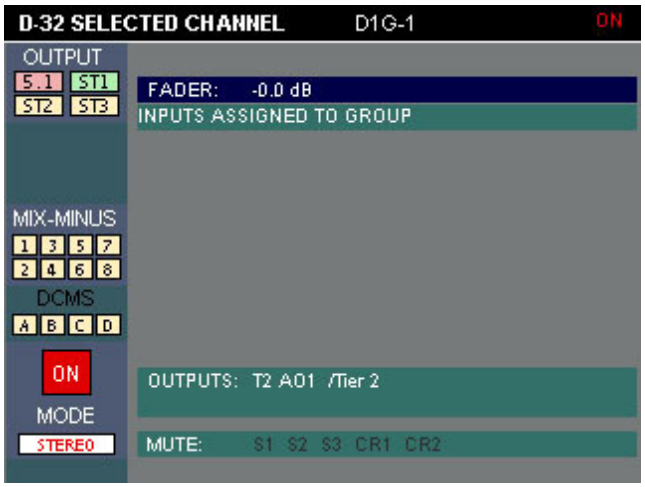
Output Destinations, Sub-Group 1 Example

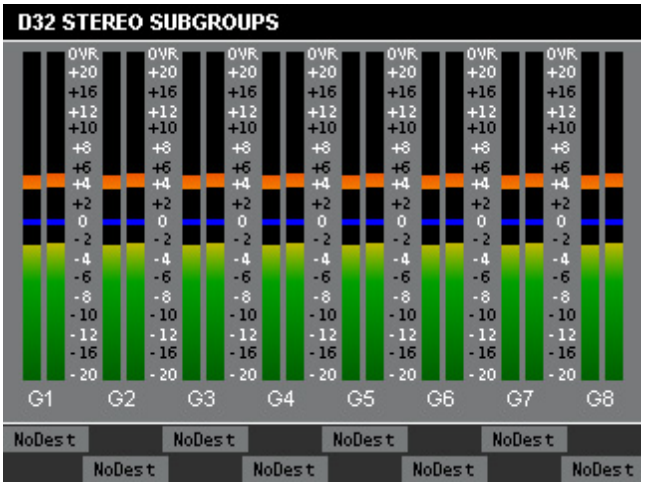
Press a groups's SET switch (for example, the G1 SET switch) to access centralized controls associated with the group. Central controls include PAN/BAL, MODE, EQ, Dynamics, Test Tone assign, and Routing. The group may be in Surround Mode (if configured as a surround group), Stereo, LEFT, RIGHT, or MONO modes. The group MODE setting affects the group output but does not affect the group signal as assigned to masters.

The DESTINATION display (XYE-D32 panel) will show the most *recent* output destination assigned. It should be noted, however, that a mix channel can go to multiple destinations, and for this reason the entire list of destinations that channel is assigned to is displayed in the LCD display when that channel's SET button is active. If the mix is not assigned anywhere the display will show "NoDest."



XYE-D32 Panel

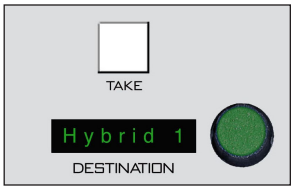




As you rotate the DESTINATION knob in the XYE-D32 panel the names of allowable destinations will appear in the DESTINATION display. If G1 is not currently routed to the displayed output, the TAKE button will be lit. Press the TAKE button when lit to add the currently displayed output as a G1 destination.

To remove a destination, rotate or dobby the DESTINATION knob until that destination appears in the display, then press and hold the TAKE button until it lights.

Destinations for the remaining sub-group outputs are handled in a like manner.



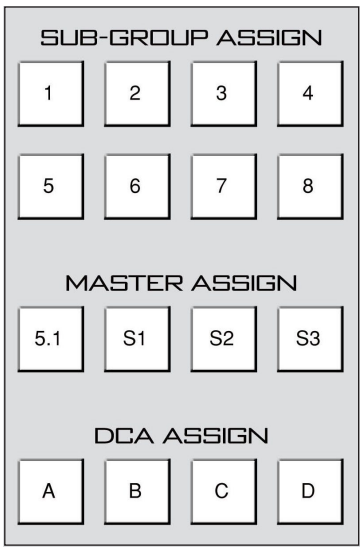
XYE-D32 Panel

Tip: DOBBY (pronounce dah-bee) - means to quickly press and release an encoder knob.

Groups Output Display

Each group can be assigned to any of the four main output buses using the MASTER ASSIGN buttons in the MXM-D32 panel. The assigned setting is displayed by the four indicators of the MSTR display group.

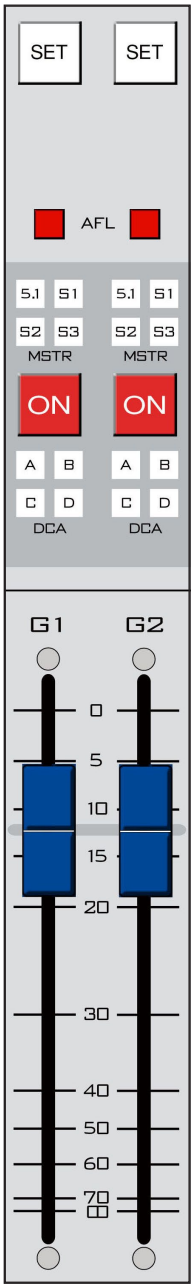
Groups can also be assigned to MXM masters, but this assignment is not indicated on the GRP-D32 panel, but only on the MXM-D32 panel.



MXM-D32 Panel

DCA Group Displays

Each sub-group channel can be assigned to any combination of the four DCA masters using the DCA ASSIGN buttons in the MXM-D32 panel. The assigned setting is displayed by the four indicators of the DCA display group.



ON 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.

AFL(Solo)

This switch activates After Fader Listen (SOLO) and puts the post fader group audio into the AFL monitor section and meter.

Sub-Groups Faders

These linear controls set the output levels of the sub-groups channels. Nominal unity gain setting is at the -12dB point on the fader scale.

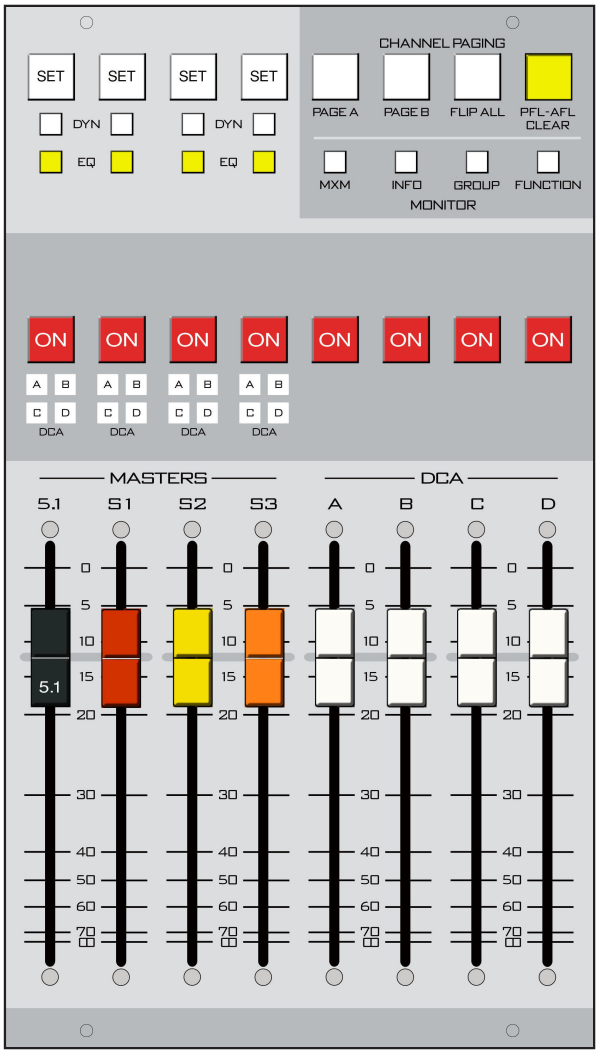
Master Panel (MSTR-D32)

Chapter Contents

Master Panel (MSTR-D32)

Controls and Functions

The D-32 digital audio control surface is equipped with one MASTER panel. This panel houses four MASTER program outputs, four DCA outputs, CHANNEL PAGING buttons, the master PFL-AFL CLEAR button, and four MONITOR mode buttons.



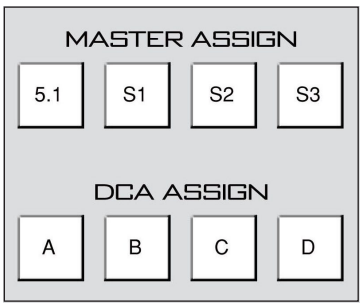
Masters Section

Each master mix, 5.1, S1, S2, and S3, has SET, ON, DYN, and EQ assign switches, and a DCA assign display.

NOTE: There are four different mix destinations: Surround (5.1), Stereo 1 (S1), Stereo 2 (S2) and Stereo 3 (S3). For descriptive purposes we will be discussing the controls for one section only, 5.1 Surround, with occasional references to other sections. Control descriptions for one section also apply to identical controls at the other three destinations on the MSTR-D32 panel.

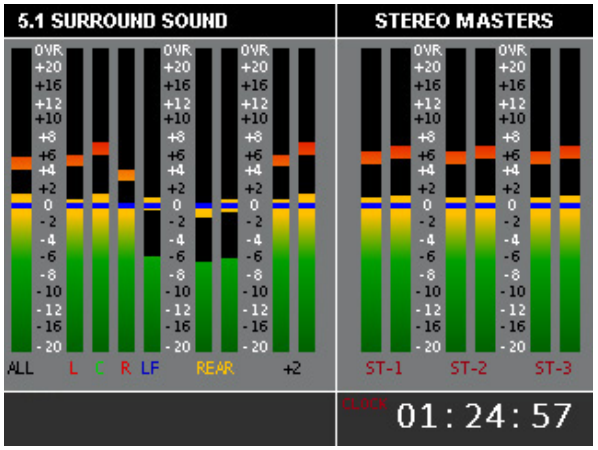
Mix Destination 5.1 Surround

Input channels are assigned to the 5.1 Surround master by means of BUS ASSIGN button "5.1" (MASTER ASSIGN section on the MXM-D32 panel). Mono input sources would pan between the left front and right front. Stereo inputs would route to left front/right front.



MXM-D32 Panel

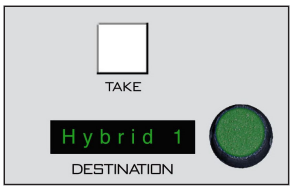
Mono and stereo inputs may be processed into 5.1 Surround signals by means of the 5.1 SURROUND section on the SUR-D32 panel. 5.1 input sources would preferably route to the SURROUND output unmodified. Groups may also be routed to the masters (including the 5.1).



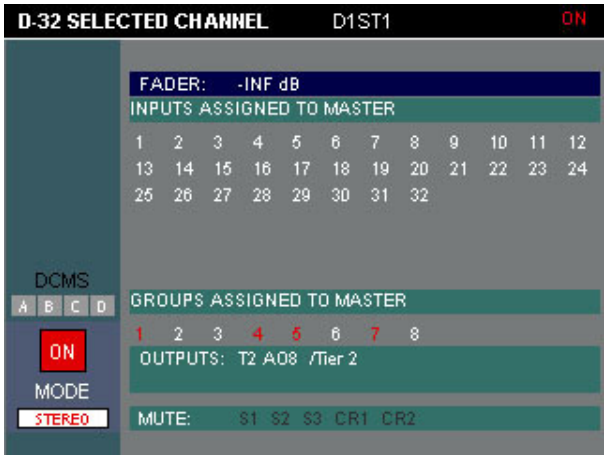
Master Mix Destinations

Press a master's SET switch to access centralized controls associated with the master. Central controls include MODE, EQ, Dynamics, Test Tone assign, and Routing. The 5.1 master may be in Surround mode only. Stereo masters S1, S2, and S3 may be in STEREO, LEFT, RIGHT, or MONO modes.

The DESTINATION display (XYE-D32 panel) will show the most *recent* output destination assigned. It should be noted, however, that a mix channel can go to multiple destinations, and for this reason the entire list of destinations that channel is assigned to is displayed in the LCD display when that channel's SET button is active. If the mix is not assigned anywhere the display will show "NoDest."



XYE-D32 Panel



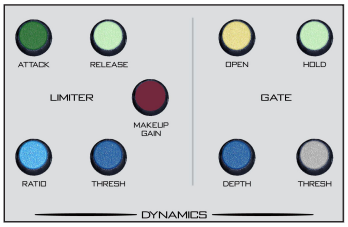
As you rotate the DESTINATION knob in the XYE-D32 panel the names of allowable destinations will appear in the DESTINATION display. If 5.1 is not currently routed to the displayed output, the TAKE button will be lit.

To remove a destination, rotate or dobby the DESTINATION knob until that destination appears in the display, then press and hold the TAKE button until it lights.

Tip: DOBBY (pronounce dah-bee) - means to quickly press and release an encoder knob.

Destinations for the remaining master outputs are handled in a like manner.

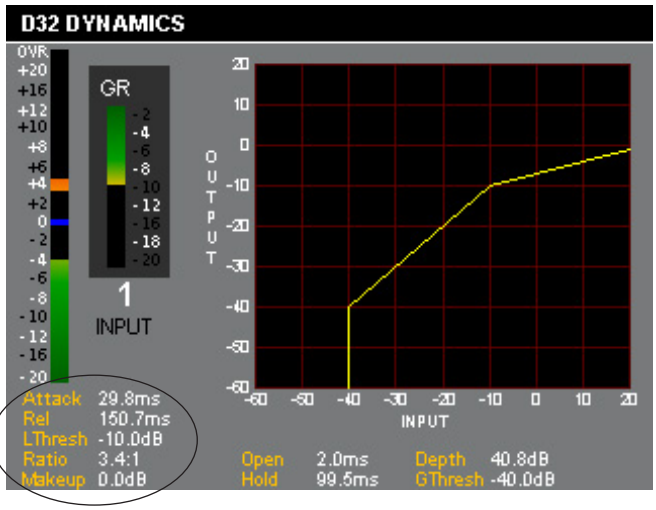
DYN

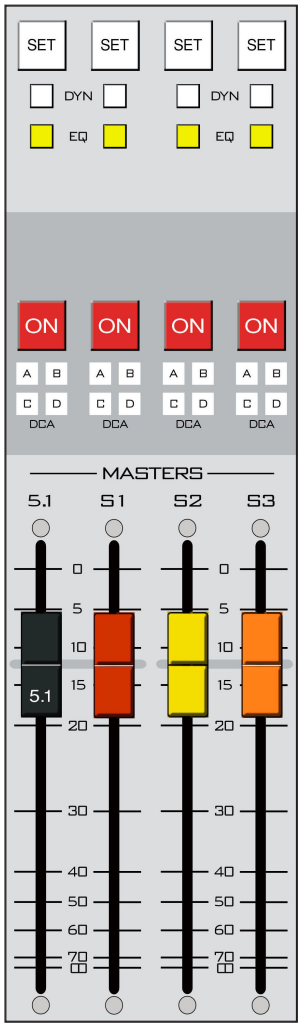


EQD-D32 Panel

This switch inserts dynamic functions that have been preset by the operator in the DYNAMICS section in the EQD-D32 panel. The LED is lit when dynamics are engaged.

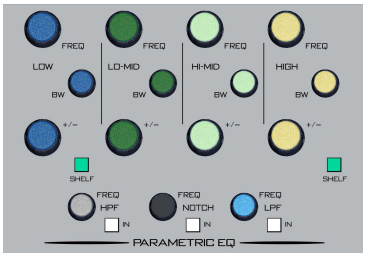
The DYNAMICS LCD screen shows the knob settings along with a graphical representation of the applied dynamics.



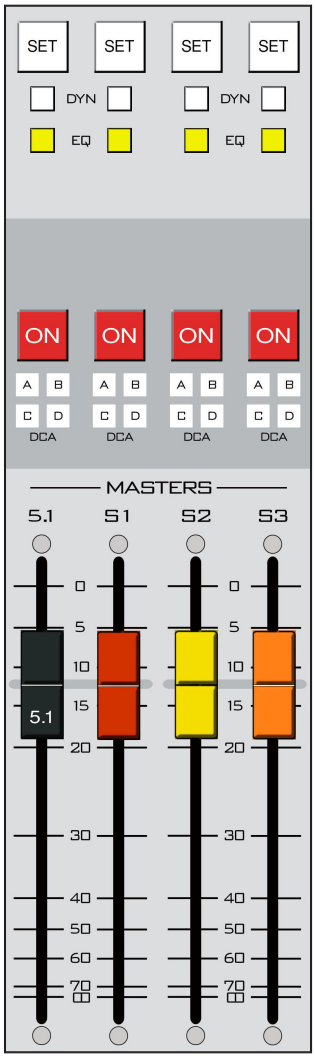


EQ

This switch inserts EQ functions that have been preset by the operator in the PARAMETRIC EQ section of the EQD-D32 panel. The LED is lit when EQ is engaged. When any knob of the EQ section is rotated, the LCD displays a graphical representation of the EQ settings, as well as the actual knob settings.



EQD-D32 Panel



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.

DCA Master Displays

Each channel can be assigned to any combination of the four DCA masters using the DCA ASSIGN buttons in the MXM-D32 panel. The assigned setting is displayed by the four indicators of the DCA display group.

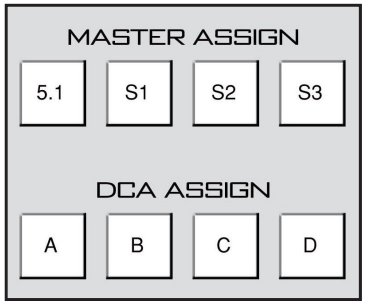
Master Faders

These linear controls set the levels of the master channels. Nominal unity gain setting is at the -12dB point on the fader scale.

NOTE that the 5.1 MASTERS fader knob is engraved with "5.1."

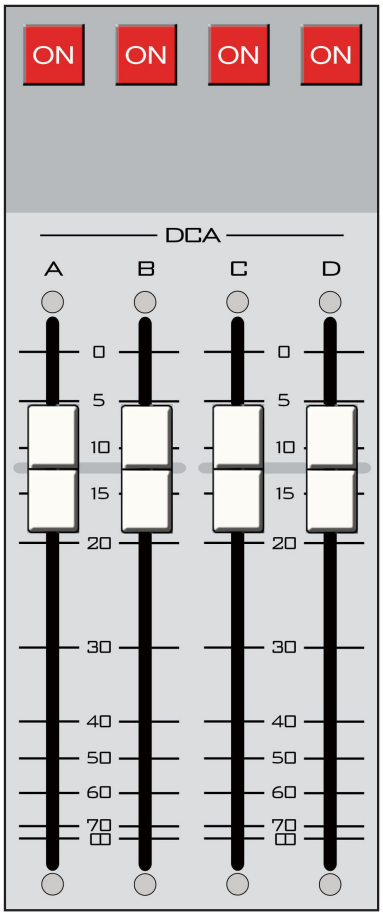
DCA Master Section

The DCA (Digitally Controlled Amplifier) faders allow the user to control a cluster of Input, Sub-group, and Master faders from a single DCA fader and ON switch. Faders assigned to a DCA will track the position of the DCA master. If an input or output is "muted" by a DCA master then the corresponding DCA assign LED (A, B, C, or D) flashes to indicate the DCA has control.



MXM-D32 Panel

To assign a DCA to an input, sub-group or master, place the input, sub-group or master channel in the SET MODE and press any combination of the DCA ASSIGN buttons on the MXM-D32 panel. The appropriate DCA display cluster on the input, sub-group, or master panel, will be illuminated, as well as the assign buttons.



DCA ON

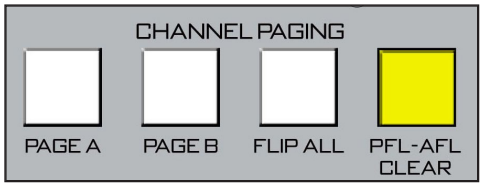
The ON switch turns the DCA master ON; faders assigned to the master will also be turned ON.

Fader

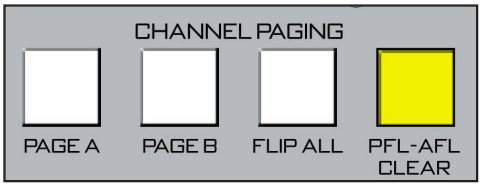
A long-throw fader controls the relative fader level of all inputs, groups, and masters assigned to DCA. The fader range is 0dB (no attenuation) at the top to full attenuation (OFF) at the bottom. When a DCA master is full OFF the ON LEDs remain lit on the cluster.

Clear PFL/AFL

When any PFL (Cue) or AFL (Solo) button on the control surface is pressed, its light will be illuminated and flash slowly. The PFL/AFL CLEAR button will also flash synchronously with any active PFL/AFL buttons. Any signal can be released from cue/solo by pressing its individual PFL/AFL button a second time. All PFL/AFL activated buttons can be cleared at once by pressing the PFL/AFL CLEAR button.



Channel Paging Section



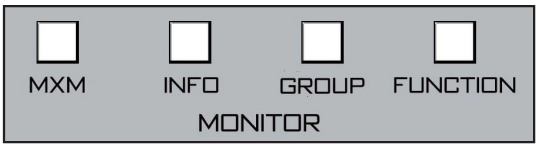
This section provides global page controls for the surfaces two "pages." Each page includes all input channel strip knob, switch, and fader settings. D-32 control surfaces may be configured with optional PAGE switches fitted above the input faders. A control surface with 24 physical faders will be able to control 48 input channels strips (i.e., PAGE A controls channels 1 - 24; PAGE B controls channels 25 - 48). Each PAGE is always active, meaning input audio from a channel may be ON and playing out a master even while its fader is switched to the opposite page.

The PAGE A button forces all input channel strips to display the top page knob, switch, and fader settings.

The PAGE B button forces all input channel strips to display the second page knob, switch, and fader settings.

The FLIP ALL button flips the currently selected PAGE to the opposite PAGE on all input faders (i.e., A becomes B, B becomes A). Useful for instant LIVE to BREAK setups.

Display Monitor Controls



These switches change what information is displayed on some of the LCD displays.

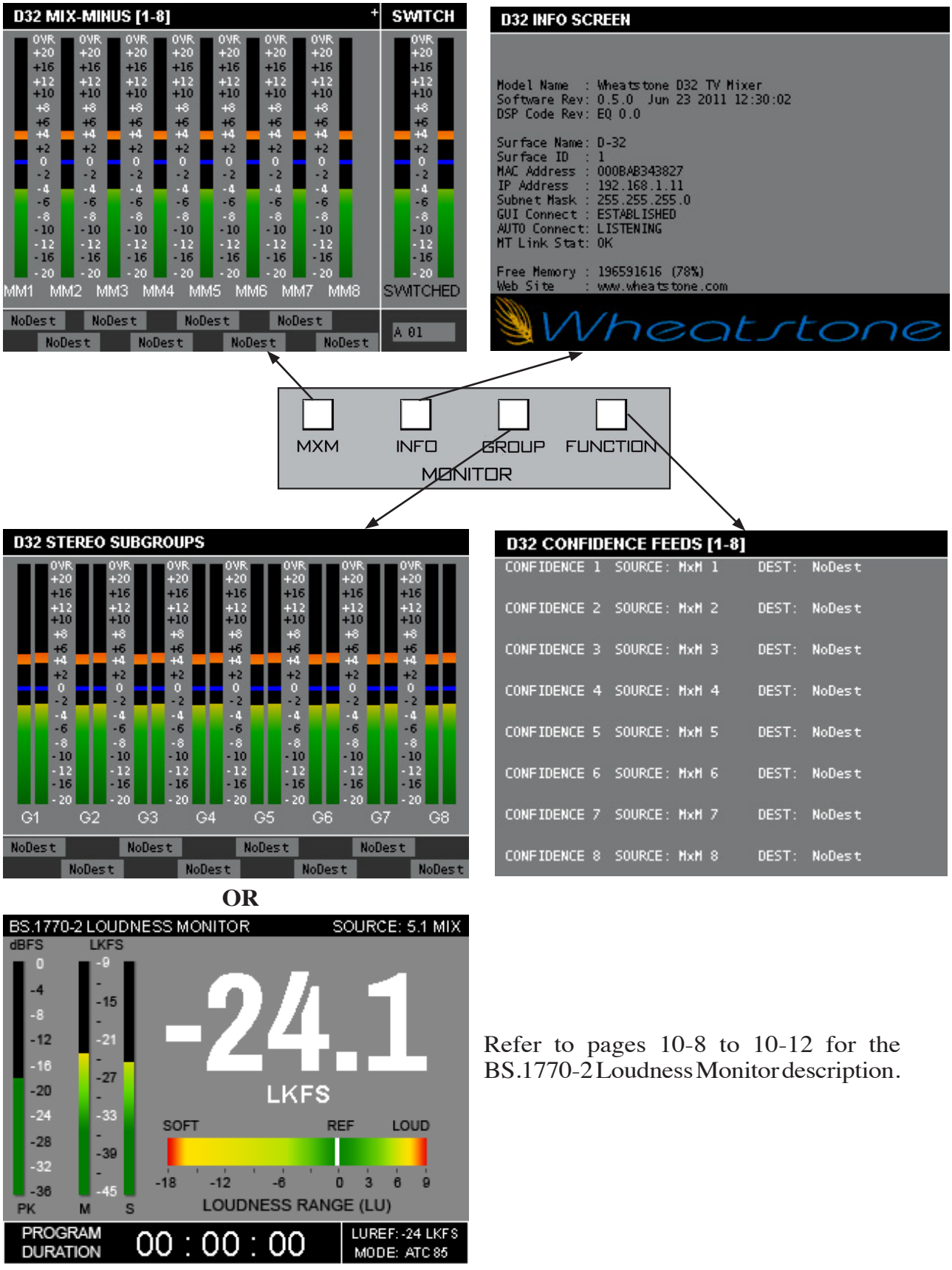
There are four MONITOR buttons on the MSTR-D32 panel. These buttons toggle various VGA display modes.

MXM - switches the MXM meter displays between 1 - 8 and 9 - 16 when required by the surface configuration. The surface may be configured for 8 or 16 mix-minuses.

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

GROUP - switches between the Loudness Monitor and the Groups meter screens.

FUNCTION - toggles between Mix-Minus Confidence feed outputs 1 - 8 and 9 - 16 control functions and screen displays.



Refer to pages 10-8 to 10-12 for the BS.1770-2 Loudness Monitor description.

BS.1770-2 Loudness Monitor

Overview

The implementation of the CALM Act in December 2012 has focused the attention of broadcasters in the U.S on taming the audio levels at various stages of the on-air signal chain.

The Loudness Monitor provides a flexible tool which audio operators may use to track the apparent loudness of the program material mixed on the console and delivered for recording or broadcast. Logging functions allow the engineering staff to verify and document audio levels leaving the control surface over specific periods of time.

The Multi-channel Loudness Algorithm

The Loudness Monitor uses the multi-channel loudness measurement algorithm specified in the ITU recommendation document ITU-R BS.1770-2 (03/2011). The algorithm calculates weighted measurement values for subjective loudness as it is perceived over time. Extensive testing has shown a strong correlation between subjective listening and objective measurements.

The four stage processing chain applies a K weighting filter which accounts for "acoustic effects of the head" followed by a mean square calculation for each channel. The results are summed with surround channels weighted slightly higher to compensate for psychoacoustic effects. The LFE subwoofer channel is not currently included in the measurement and is a focus of continuing work. A final gating stage prevents silence and momentary low levels from adversely affecting the results.

Units and References

The following units and references are used in scale markings and meter configuration. Note that the ITU specified LKFS units and the EBU specified LUFS units are synonymous and the values are numerically identical.

- dBFS – Decibels full scale referenced to a maximum output level of 0dBFS (+24dBu analog)
- LKFS – Loudness (K) weighted, Full Scale
- LUFS – Loudness Units Full Scale, K weighted
- 0dBFS = 0 LKFS = 0LUFS, -24dBFS = -24LKFS = -24LUFS
- AT/85 Reference level: -24LKFS
- EBU Reference level: -23LKFS

Loudness Range Reference Level:

- AT/85 mode: -24LKFS = 0 LU
- EBU Mode: -23LUFS = 0 LU
- USER Mode: Custom, can be set to the station's "dialnorm" metadata value in dB.

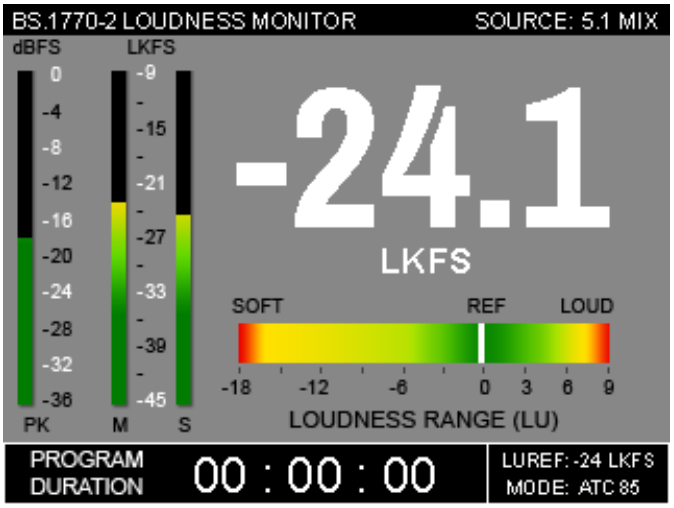
Reference Documents

- ITU-R BS.1770-2 Algorithms to measure audio programme loudness and true peak audio level
- AT/85:2011 ATSC Recommended Practice: Techniques for Establishing and Maintaining Audio Loudness for Digital Television.
- EBU-TECH 3341 Loudness Metering:EBU Mode metering to supplement loudness normalization in accordance with EBU R128.

Meter Components

Audio Source

The audio source feeding the Loudness Monitor is user selectable. You may route any mono, stereo, or 5.1 surround source available in the router to the control surface's DxLKFS destination. This flexibility allows for monitoring of any analog, AES digital, MADI, or SDI source as well as any surface mix bus output, de-modulated program sources, pre-recorded programming, etc.



Bargraphs

- Peak Program – sample peak meter displays highest peak from any meter channel.
- (M)omentary Loudness – K weighted loudness measured in a 400mSec sliding window.
- (S)hort Term Loudness – K weighted loudness measured in a 3Sec sliding window.

Integrated Loudness

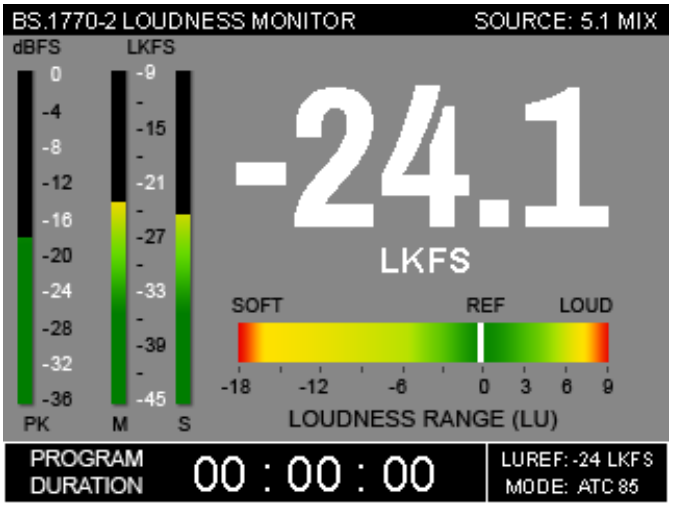
This large format three digit readout displays the integrated K weighted loudness of the program material. The default integration time is 10 seconds and can be set to 3 seconds in the surface's Options file – see options section below. The units are displayed as LKFS in AT/85 mode and LUFS in EBU mode. Operators must understand that this value is *integrated over time* and does not instantaneously react to fader moves. Operators should use the (M)omentary bargraph meter for in-hand level adjustments as riding fader levels from the Integrated digits will result in over or under compensation in output level as they "chase" the target value.

Gating

The DSP algorithm for measuring loudness incorporates a two-stage gating mechanism that "pauses" integration during silent or momentarily soft passages in program material. The absolute and relative thresholds are applied in accordance with the BS.1770-2 specification to eliminate skewing of the measured result from program material lower than an absolute value of -70LKFS or a relative value of -10LU as measured in a sliding window.

Loudness Range

The loudness range bar provides a way for an operator to see where the program has been and alerts the user to loudness levels that are too soft or loud. The range bar follows the long term integrated loudness value displayed in the main three digit display. The loudness range provides a +9 to -18 LU window with the "zero" centered on the currently selected 0 LU reference. Loudness "history," the measured loudness level over time, is displayed as a solid white bar in the center. History tracking begins when the timer starts and is cleared when the timer is reset.



Program Duration Timer

The program duration timer is provided to co-ordinate the capture, display, and logging of program loudness for a specific period of time – such as a live newscast or pre-recorded program. The Timer Start switch begins a period of measurement. The Timer Stop switch pauses integration and displays GATED on the meter. The timer controls are located on the Events Panel.

Operation

Operators must understand that the large digit value is *integrated over time* and does not instantaneously react to fader moves. Operators should use the (M)omentary bargraph meter for in-hand level adjustments as riding fader levels from the Integrated digits will result in over or under compensation in output level as they "chase" the target value. When drawing a comparison to the primary mix bus VU meters, a good rule of thumb is to target a -4dB average level on the main mix meters (-24dBFS).

Logic Control

The Program Duration timer may be controlled from an external contact closure. For convenience, the timer has been designed to work off the existing contact closure for the Confidence Feed input. This allows the integrated loudness level to be automatically gated whenever master control goes to a break and resume when you return to live programming.

This feature may be disabled by turning off the REM TRIG switch in the Confidence Feed section of the surface or with the surface's Options file – see Options section below.

Using External Control

To enable control make sure the REM TRIG switch is lit in the Confidence Feed section of the surface. Make sure the timer is reset BEFORE the show begins and the timer will automatically begin measurement and logging when master control takes the control room to air.

Logging

Loudness monitor values are logged to a text file using the Xpoint software. Each entry is date and time stamped and provides the measured loudness level, program duration timer value, and logic control state transitions.

To access the log go to the main screen of Xpoint and click on the Loudness Status Log button at the bottom of the screen. The following is a sample of the log:

```
INFO   :06 Nov 2012, 05:11:13, -24.0 LKFS, 00:00:00
INFO   :06 Nov 2012, 05:11:13, Timer - Started, 00:00:00
INFO   :06 Nov 2012, 05:11:14, -24.5 LKFS, 00:00:00
INFO   :06 Nov 2012, 05:11:15, -25.3 LKFS, 00:00:01
INFO   :06 Nov 2012, 05:11:16, -26.3 LKFS, 00:00:02
INFO   :06 Nov 2012, 05:11:17, -27.0 LKFS, 00:00:03
INFO   :06 Nov 2012, 05:11:18, -26.8 LKFS, 00:00:04
INFO   :06 Nov 2012, 05:11:19, -27.0 LKFS, 00:00:05
INFO   :06 Nov 2012, 05:11:20, -26.8 LKFS, 00:00:06
INFO   :06 Nov 2012, 05:11:21, -26.8 LKFS, 00:00:07
INFO   :06 Nov 2012, 05:11:22, -26.8 LKFS, 00:00:08
INFO   :06 Nov 2012, 05:11:23, -26.8 LKFS, 00:00:09
INFO   :06 Nov 2012, 05:11:24, -26.8 LKFS, 00:00:10
INFO   :06 Nov 2012, 05:11:25, -26.8 LKFS, 00:00:11
INFO   :06 Nov 2012, 05:11:26, -26.8 LKFS, 00:00:12
INFO   :06 Nov 2012, 05:11:27, -26.8 LKFS, 00:00:13
INFO   :06 Nov 2012, 05:11:28, -26.3 LKFS, 00:00:14
INFO   :06 Nov 2012, 05:11:28, Timer - Paused by LIO, 00:00:14
INFO   :06 Nov 2012, 05:11:33, Timer - Started by LIO, 00:00:14
INFO   :06 Nov 2012, 05:11:34, -26.3 LKFS, 00:00:15
INFO   :06 Nov 2012, 05:11:35, -26.3 LKFS, 00:00:16
INFO   :06 Nov 2012, 05:11:36, -26.3 LKFS, 00:00:17
INFO   :06 Nov 2012, 05:11:37, -26.3 LKFS, 00:00:18
INFO   :06 Nov 2012, 05:11:38, -26.3 LKFS, 00:00:19
```

Options Settings

The following options may be set by FTPing to the surface and editing the surface's options text file, then re-booting the console. The file is in the surface's root directory and is called Dx_OPTS.TXT; note the "x" in Dx is the D series model number, D32, D8, D20, etc.

```
BS1770_BAR:0
// Syntax: BS1770_DIGITS:?
// Whether to use 10s or 30s integration for the loudness digit display
// ? 1 = 30s, 0 = 10s
BS1770_DIGITS:0
// Syntax: GATE_TIMER:?
// Whether to use the CONFALL logic input to trigger pause/restart of
timer
// ? 1 = enable, 0 = disable
GATE_TIMER:1
// Syntax: LUMODE:?
// Which mode to user for loudness integration and display
// ? 0 = AT/85, 1 = EBU, 2 = User (custom)
LUMODE:0
```

```
// Syntax: LUREF:?
// Value to use as loudness reference (only used when LUMODE is USER)
// ? Any value between -36 and -1
LUREF:-24
// Syntax: LUNITS:?
// Units to use for loudness readout
// ? 1 = LUFS, 0 = LKFS
LUNITS:0
```

Host CPU (HC-9)

Chapter Contents

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

Host Controller (HC-9)

Overview

The host controller card used in the D-32 incorporates a PC/104 computer mounted on the HC-9 PCB. The host computer utilizes RAM, a flash disk (which emulates a standard IDE hard drive) and an Ethernet port. There is no hard disk drive. Keyboard, floppy controller and video ports are for factory use only.

The purpose of the host controller is to control the operation of the D-32 control surface. The HC-9 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-9 card and is restored at power up or reset. This configuration information provides details to the host application running on the HC-9, such as the specific audio hardware available and serial port allocation. The HC-9 host controller card can be fitted with an optional 2nd PC/104 computer for redundancy.

HC-9 BIOS Settings/Format

BIOS Setup and formatting of the Host CPU is completed prior to the testing of your D-32 control surface at the Wheatstone factory. There are no user adjustable settings.

Ethernet IP Addressing

The Wheatstone D-32 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.

A surface with a redundant CPU will have two such connections; both connections should be used.

Mixer Link Wiring

This RJ-45 (or optical) 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 dipswitches.

Switch Settings

DIPSW1 - SW4 & SW9 - Not Used

The four positions of dipswitches SW1-SW4 and SW9 are reserved for future use.

SW5 - SW8 - CAT5 vs. Fiber & Transceiver Select

These slide switches can be used to select the CAT5 or fiber optic mixer link connection.

To set MIXER LINK 1 for CAT5 connection slide switches SW6 - TX and SW8 - RX to the up position (toward the surface's rear). Sliding these switches down selects fiber optic connection for transceiver 1.

To set MIXER LINK 2 for CAT5 connection slide switches SW5 - TX and SW7 - RX to the up position (toward the surface's rear). Sliding these switches down selects fiber optic connection for transceiver 2.

Note that the setting of these switches and SW12 pos 4 (see below) must be made to the same selection. The Mixer Link is either CAT5 or FIBER.

SW10 - Master Reset

This switch can be used to force takeover by the backup CPU if the main CPU has failed and automatic failover has not been accomplished.

SW11 - CPU Reset

This switch can be used to reset the host controller's main CPU without powering down the system. If the system is running from the backup CPU this switch will NOT cause the main CPU to take over again. To do that you must recycle the surface power.

SW12 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.

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

SW12 Position 2 - Not Used

This dipswitch position is reserved for future use.

SW12 Position 3 - Redundant CPU

To enable automatic failover from the main CPU to the backup CPU this switch position must be on.

SW12 Position 4 - CAT5 vs. Fiber

The mixer link can be connected via CAT5 cable or fiber optic cable. Set position 4 of SW12 on if you are using CAT5 or off if you are using fiber. Note that switches SW5 - SW8 must also be set to agree with the SW12 position 4 setting.

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 Ethernet connectors. CAT5 or multi-mode optical fiber Mixer Link connections are made via RJ-45 or LC type optical connectors. The pinout drawing on page 11-7 shows all wiring connections at a glance.

"ETH A" 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

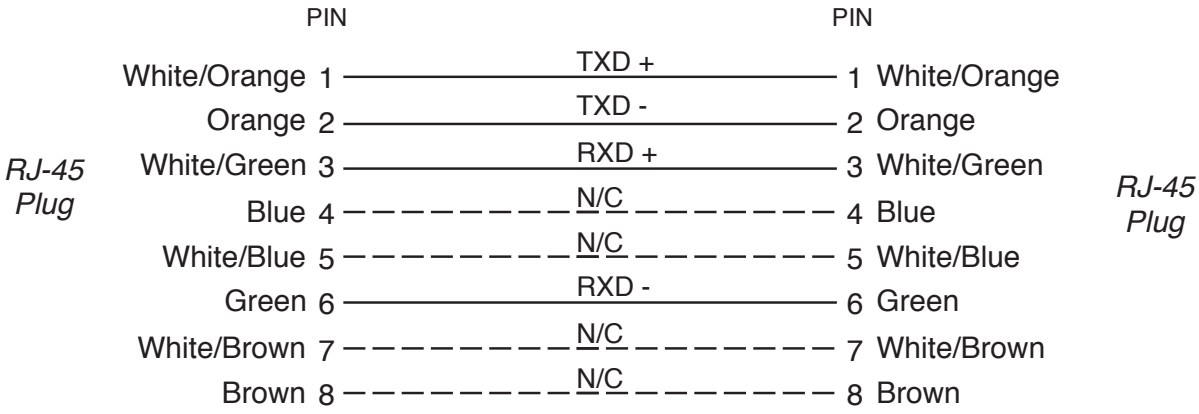
"ETH B" RJ-45—Optional Redundant Computer Ethernet Connector

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

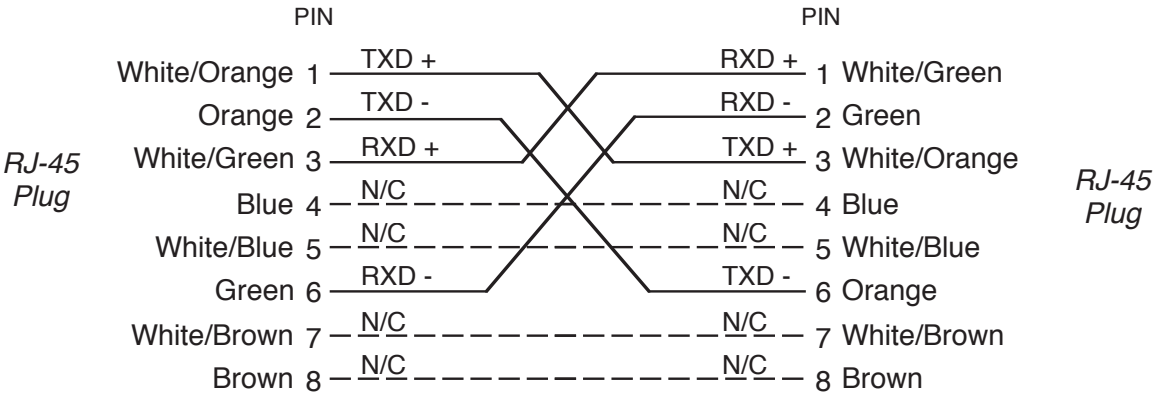
Pin 1 – TXD +
Pin 2 – TXD -
Pin 3 – RXD +
Pin 4 – N/C
Pin 5 – N/C
Pin 6 – RXD -
Pin 7 – N/C
Pin 8 – N/C

Typical Ethernet Cable



Used for connecting the host controller to your network hub.

Typical Crossover Cable



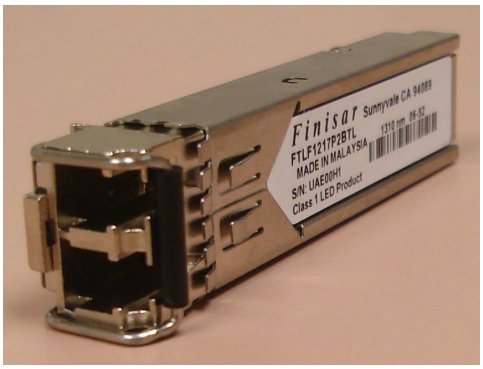
Used for mixer link connector.

Optical Fiber Interface

The D-32 control surface supports an optional fiber connection to the Bridge Router. The D-32 surface uses an SFP module interface with integral LC connectors. Note that the QOT-2001 rear panel on the Bridge router uses SC connectors, so a patch cable fitted with LC connectors on one end and SC connectors on the other end is required.

Optical Transceiver

Optical Transceivers convert physical signals from electrical to optical (and vice-versa) in a network and couple the optical signals into (and out of) optical fiber. Small form factor pluggable (SFP) transceivers, used in the D-32 surface, are designed to be hot-swappable in industry standard cages and connectors (for easy field repair), and offer high speed and physical compactness.



Optical Transceiver

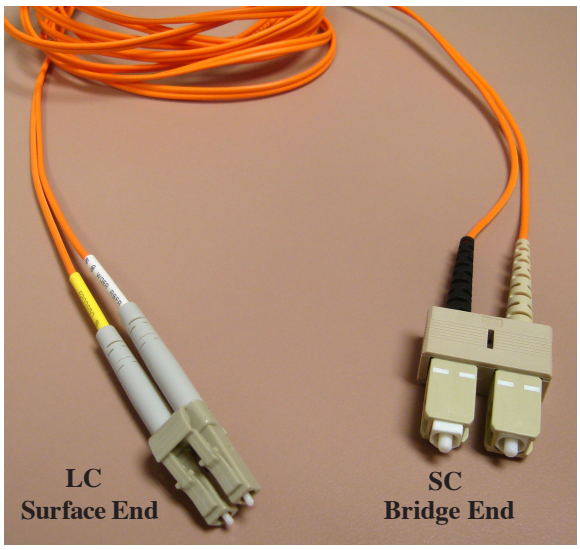
Connector Types

The high-density *LC Duplex* connector has a tabbed locking mechanism similar to what you would find on a phone jack. This enables secure connectivity and easy removal.

The *SC* (subscription channel) *Duplex* connector is a low insertion loss connector using a push/pull locking mechanism.

Optical Fiber Cable

The SC-LC optical fiber cable required in this application is a multimode duplex fiber optic patch cable with a core/cladding size *62.5/125 micron* suitable for low-to-moderate-speed data links (≤100Mbps). The Fiber Instrument Sales, Inc. part number X2YLM3FISC may be used to reference the physical characteristics of the required cable assembly. The full-duplex nature of the audio network interface requires one fiber for transmit, and one for receive; hence dual zip cables are recommended.



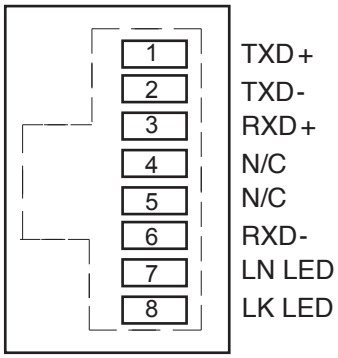
Optical Fiber Cable

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

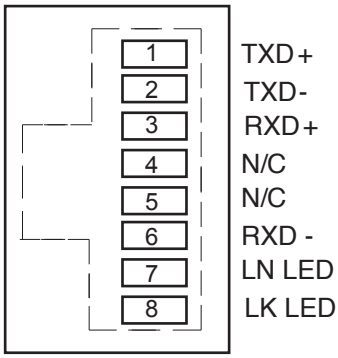
HC-9 Host Controller I/O Connections

Ethernet Connections

"A" Main Ethernet Connector (RJ-45)

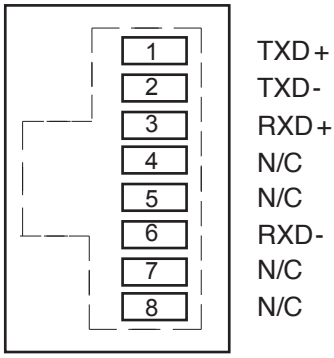


"B" Optional Redundant Computer Ethernet Connector (RJ-45)



Mixer Link Connections

CAT5 Connector (RJ-45)



(crossover)

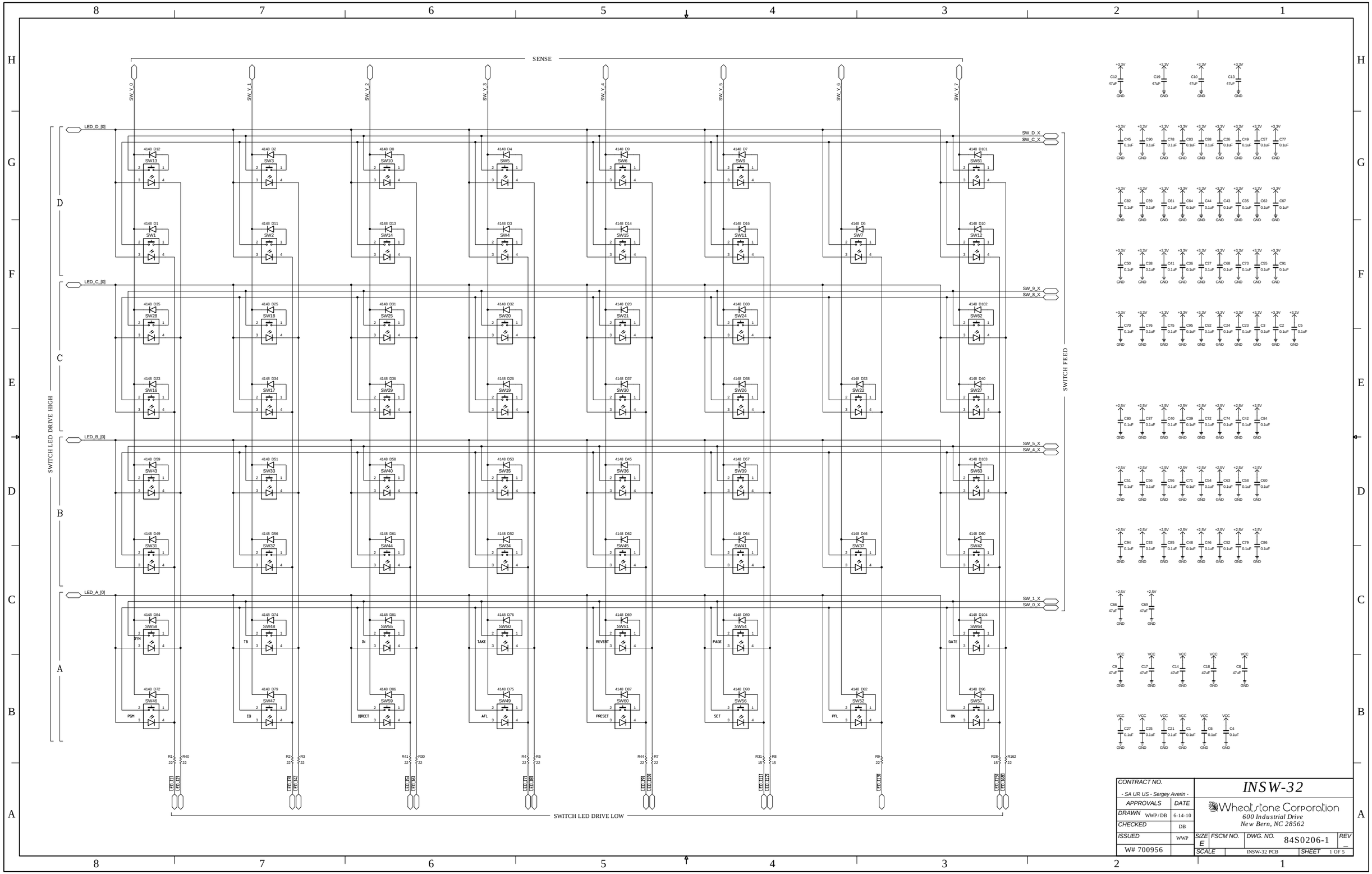
Optional Optical FIBER (LC Connector)

Schematic and Load Sheet Drawings

Chapter Contents

VU Receiver Card

Power Interface Card



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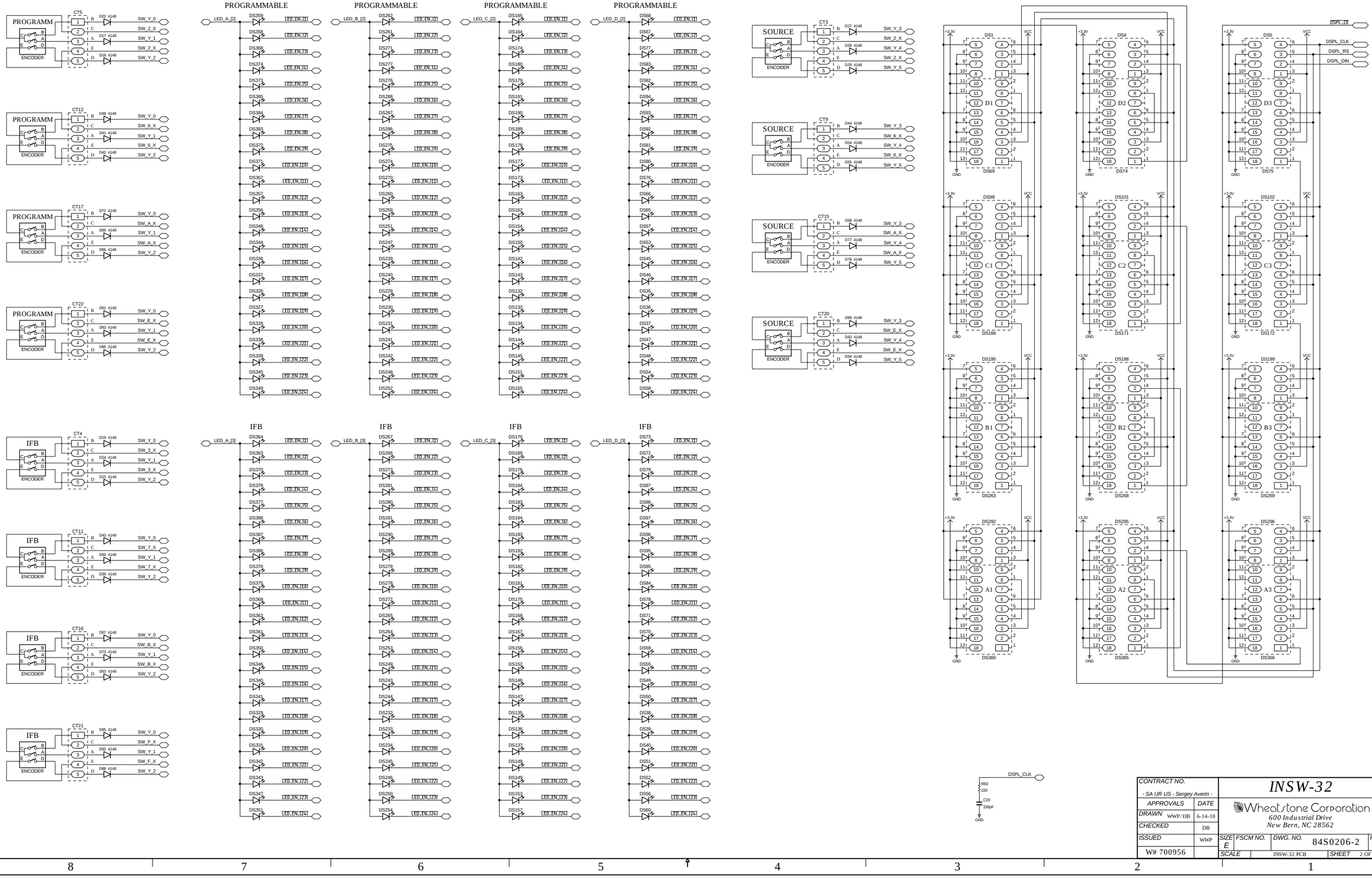
CHECKED DB	
ISSUED WWP	SIZE E · FSCM NO. · DWG. NO. 84S0206-1 · REV –
W# 700956	SCALE · INSW-32 PCB · SHEET 1 OF 5



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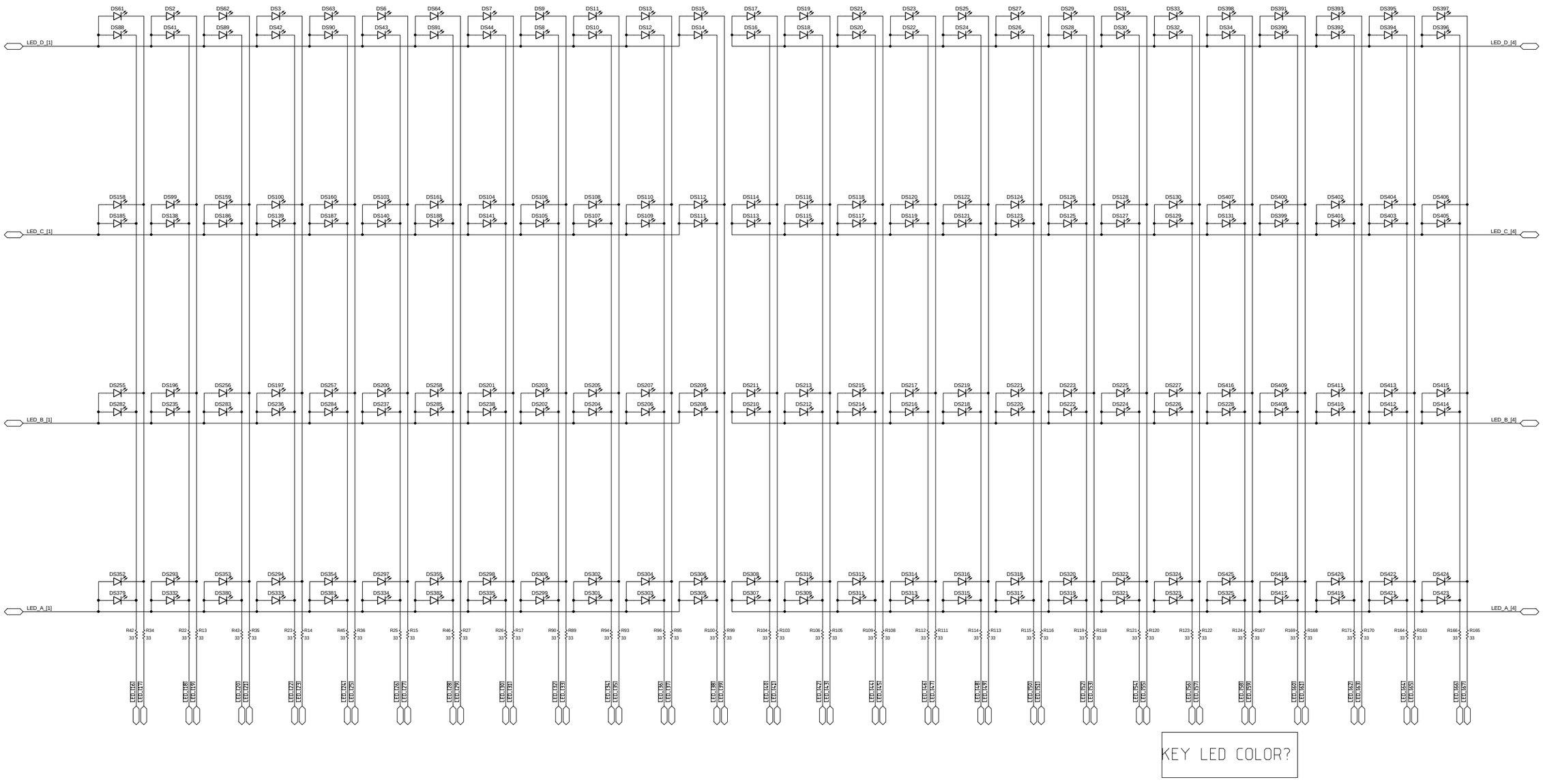
W# 700956	SCALE · INSW-32 PCB · SHEET 2 OF 5



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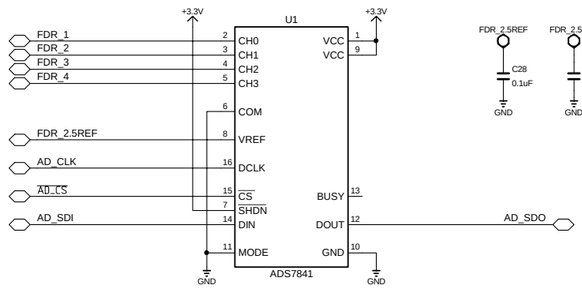

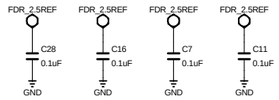

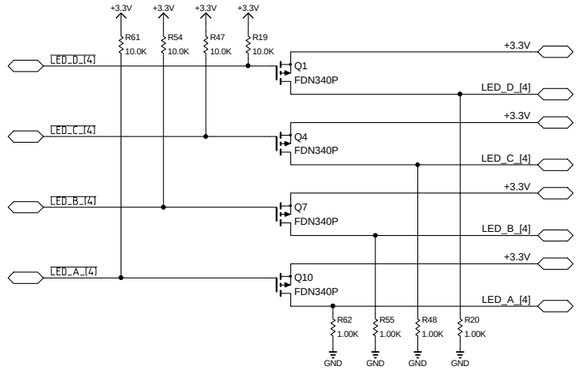

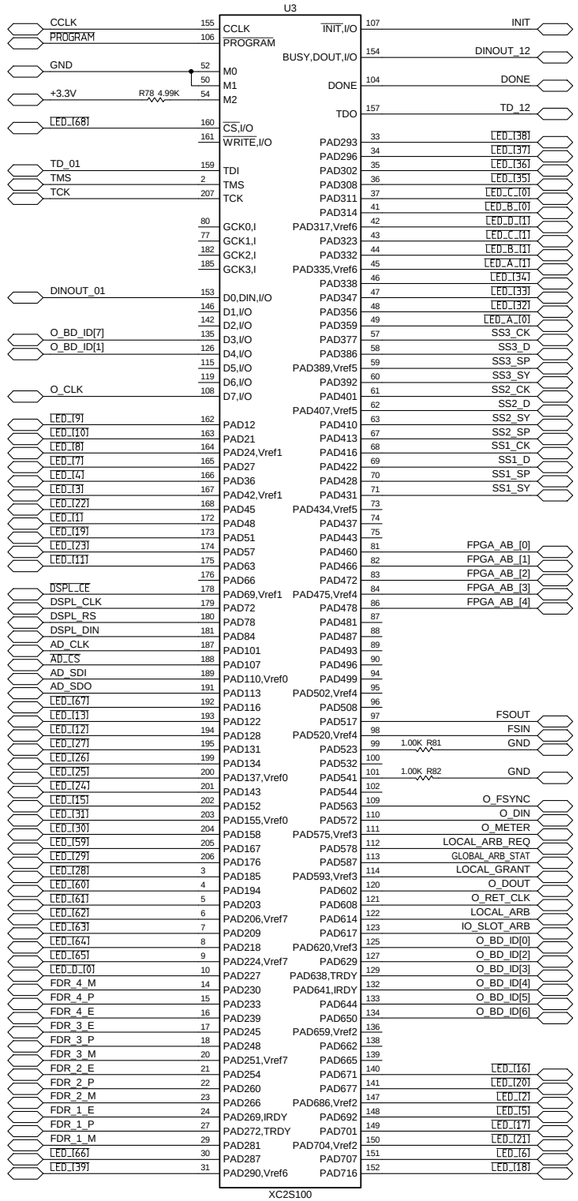

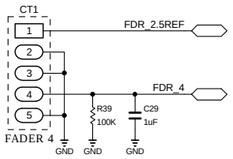

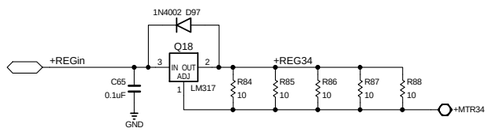

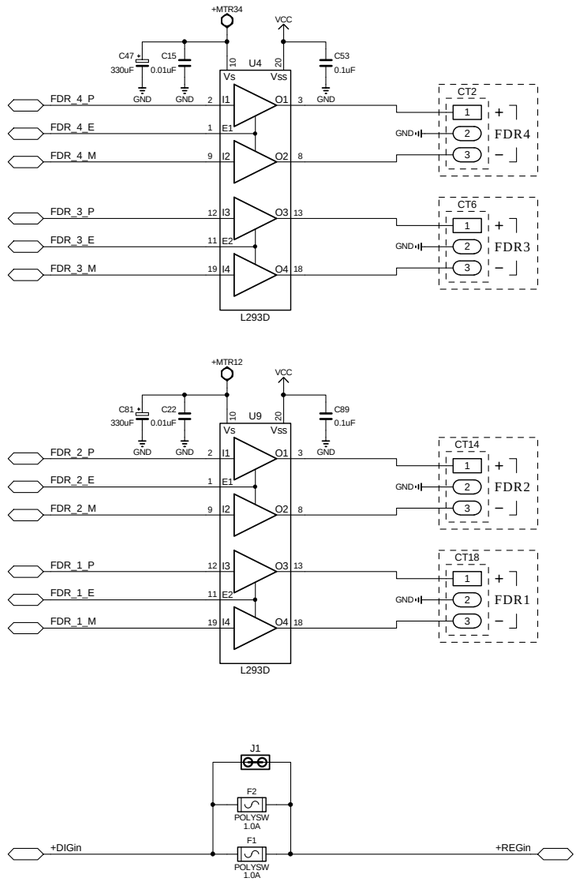

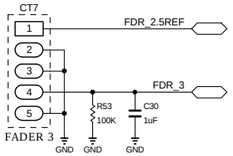

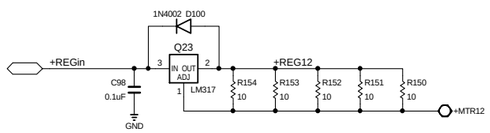

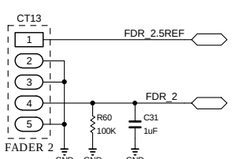

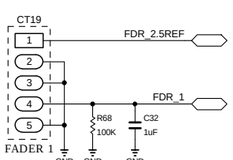

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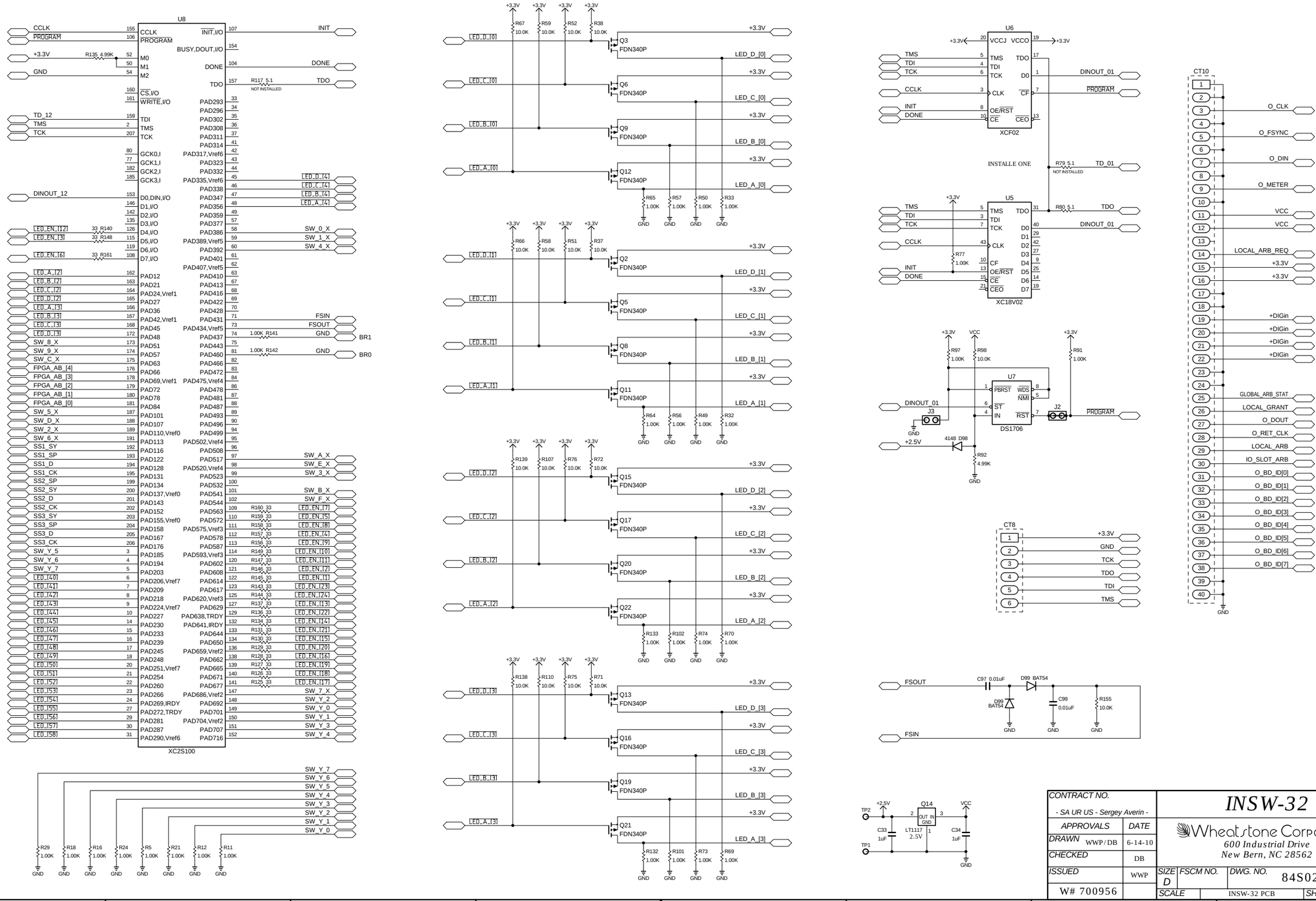
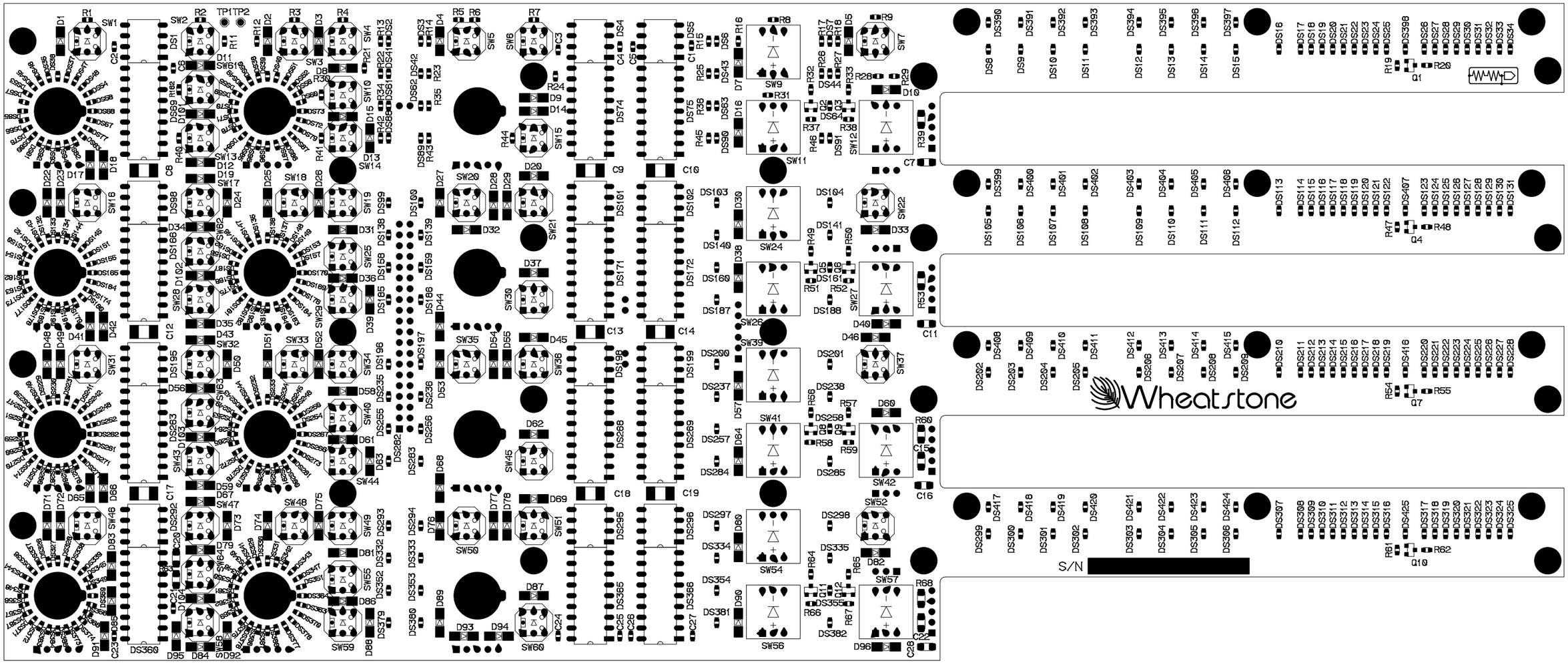
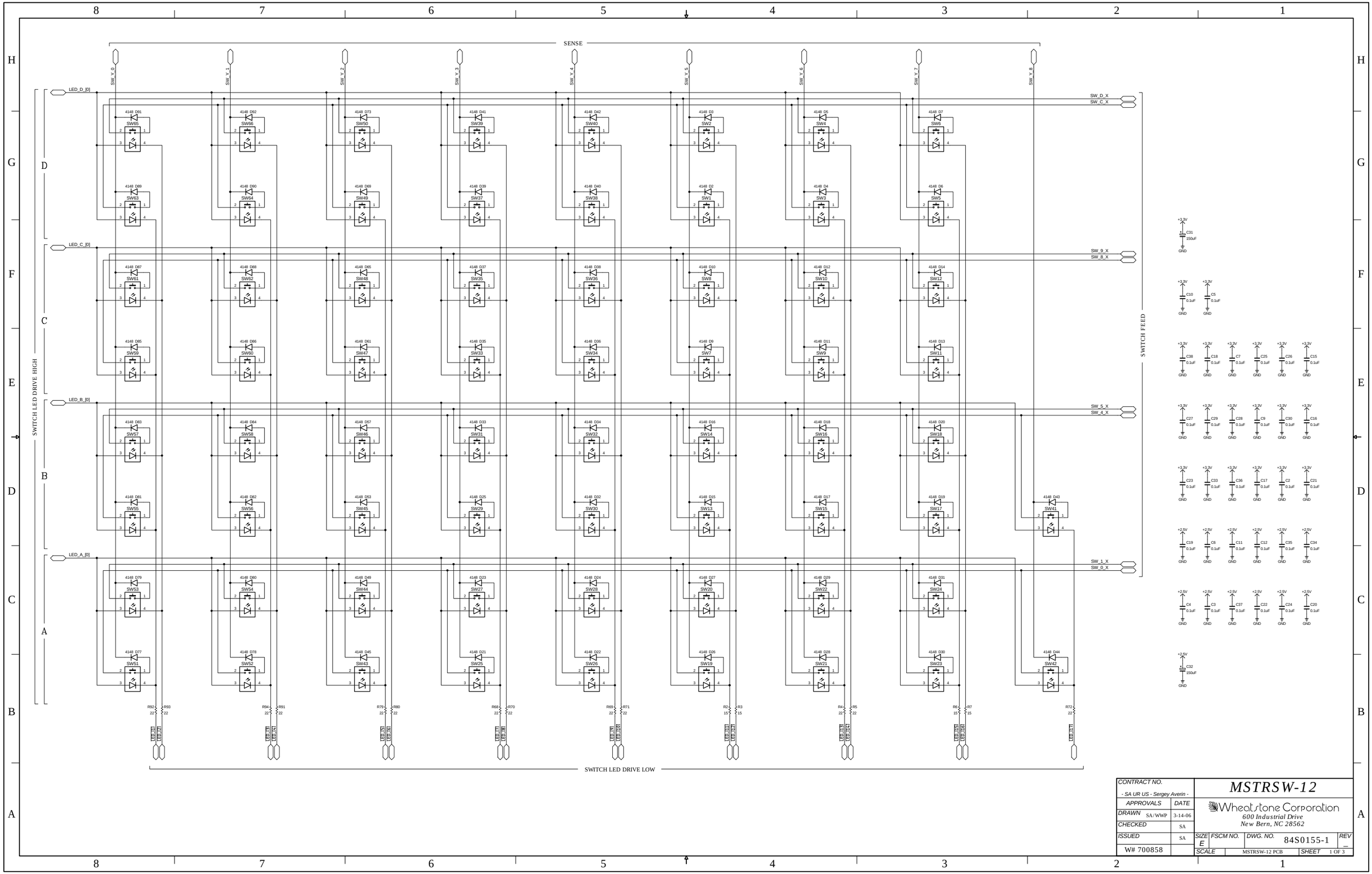
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN WWP/DB	6-14-10		
CHECKED	DB		
ISSUED	WWP	SIZE D / FSCM NO. / DWG. NO. 84S0206-4 / REV —	
W# 700956		SCALE / INSW-32 PCB / SHEET 4 OF 5	

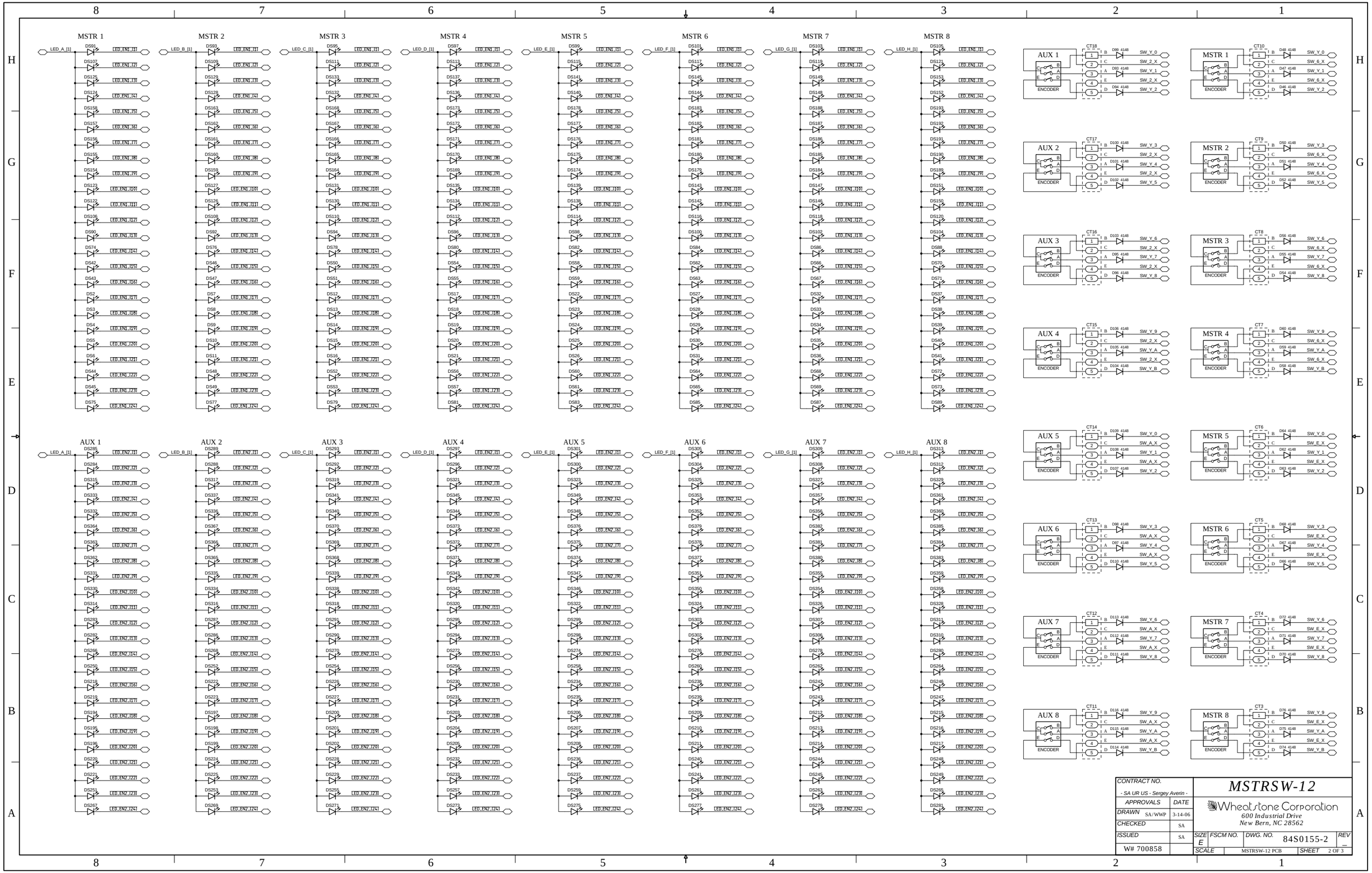


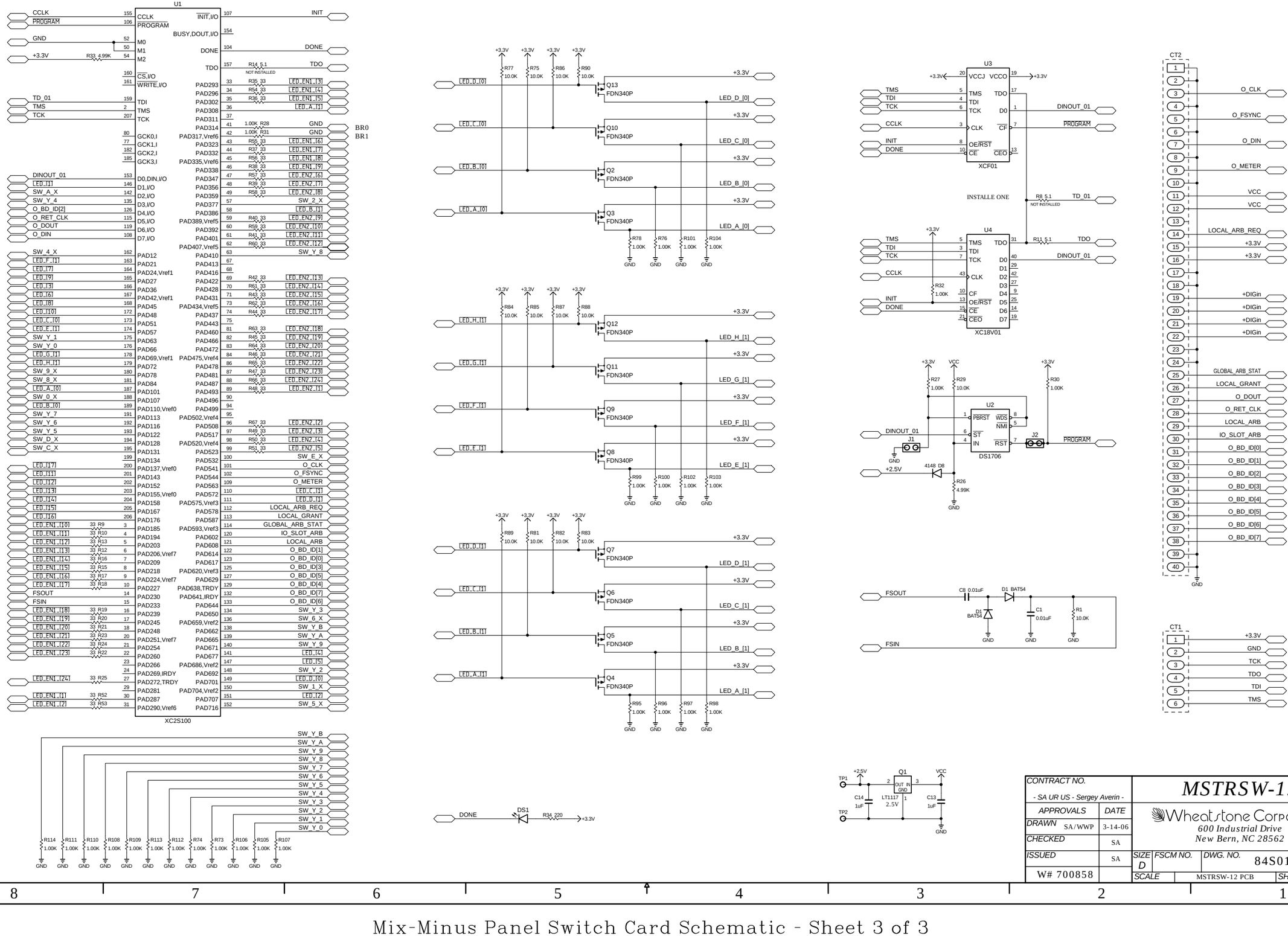
4 Inputs Panel Switch Card Schematic - Sheet 5 of 5

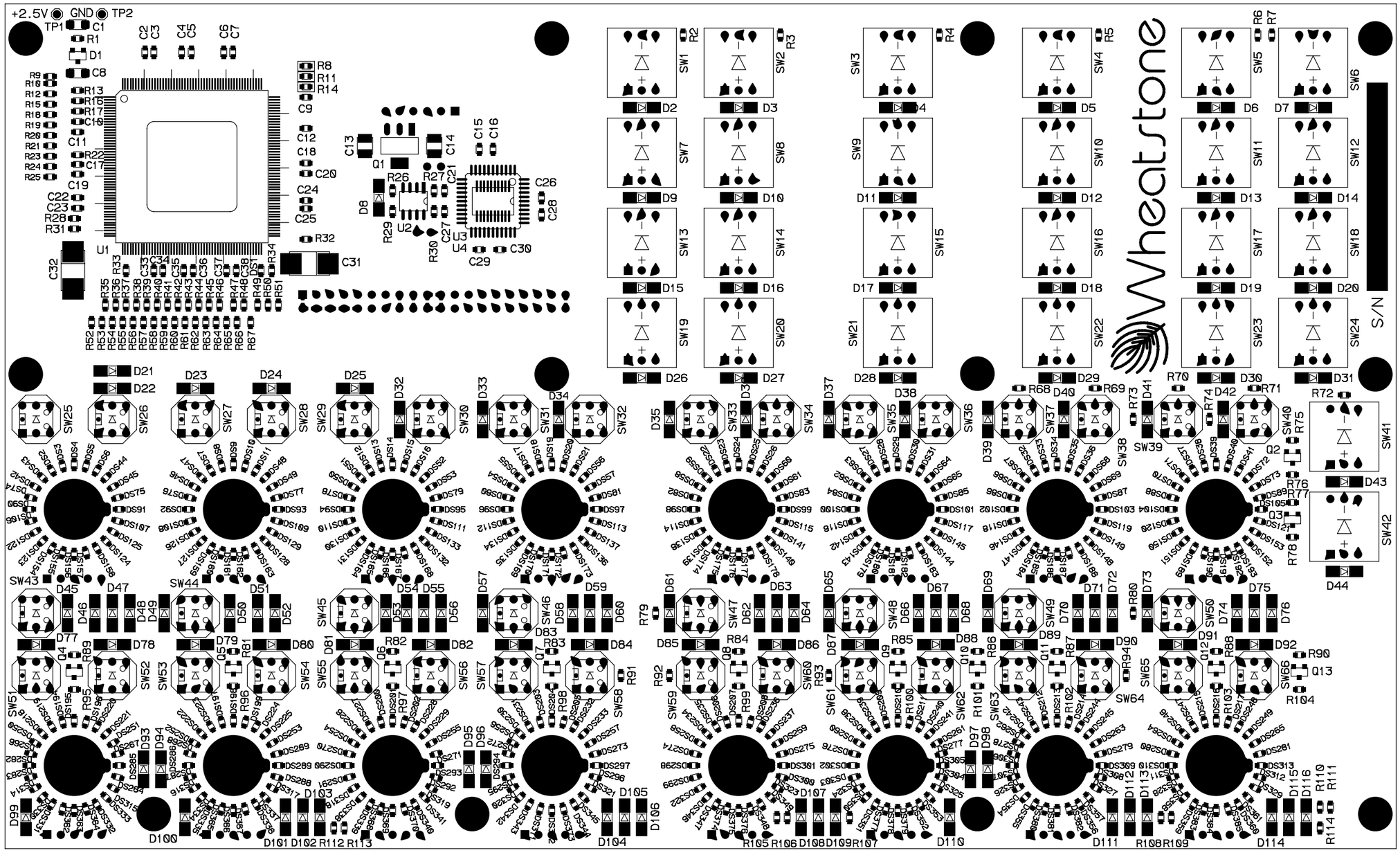

Wheatstone
S/N

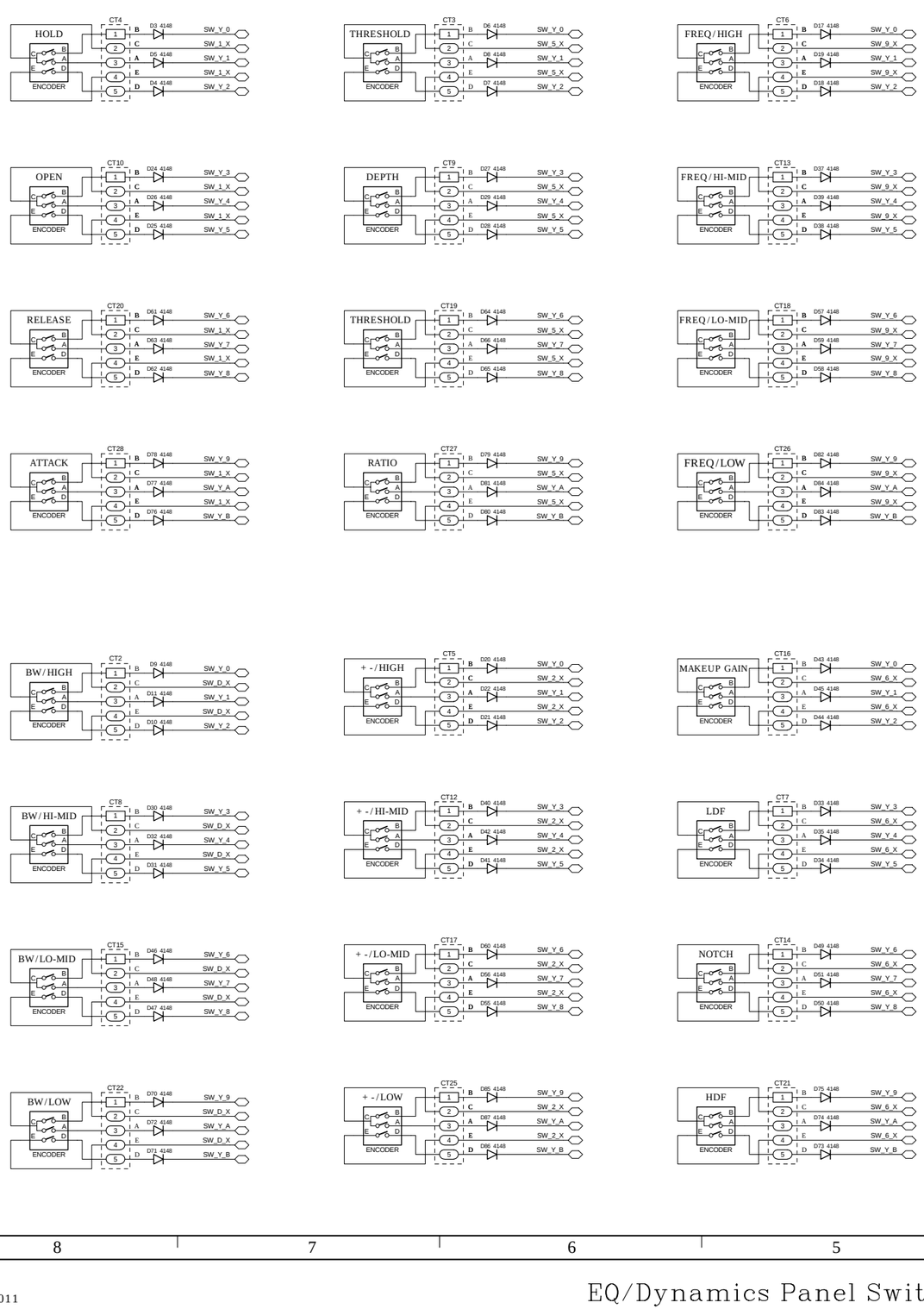


CONTRACT NO. - SA UR US - Sergey Averin -		MSTRSW-12	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA/WWP	3-14-06		
CHECKED	SA		
ISSUED	SA	SIZE E / FSCM NO. / DWG. NO. 84S0155-1 / REV —	
W# 700858		SCALE MSTRSW-12 PCB / SHEET 1 OF 3	

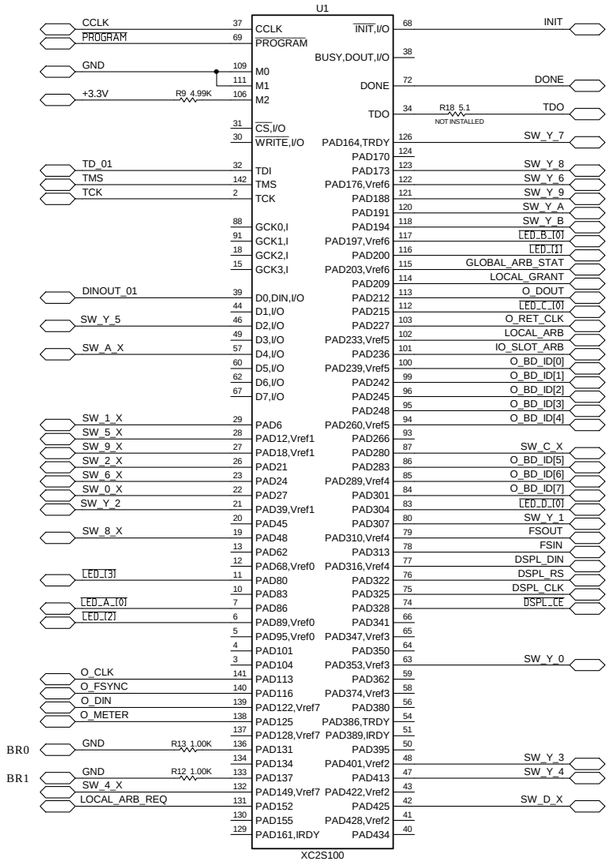

MSTR 1
MSTR 2
MSTR 3
MSTR 4
MSTR 5
MSTR 6
MSTR 7
MSTR 8
AUX 1
AUX 2
AUX 3
AUX 4
AUX 5
AUX 6
AUX 7
AUX 8
ENCODER
CONTRACT NO.
- SA UR US - Sergey Averin -
APPROVALS
DATE
DRAWN SA/WWP 3-14-06
CHECKED SA
ISSUED SA
W# 700858
MSTRSW-12
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE E
FSCM NO.
DWG. NO. 84S0155-2
REV —
SCALE MSTRSW-12 PCB
SHEET 2 OF 3

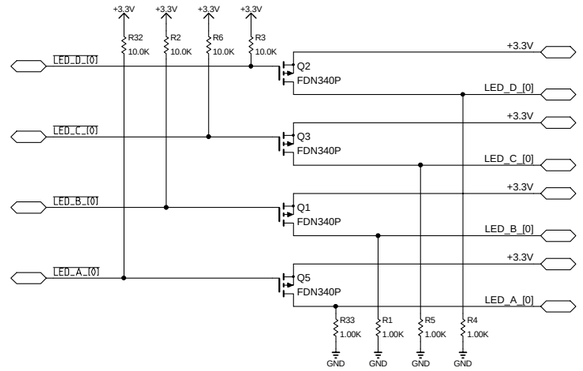

U1
XC2S100
CCLK
PROGRAM
GND
+3.3V
R33 4.99K
TD_01
TMS
TCK
DINOUT_01
SW_A_X
SW_Y_4
O_BD_ID[2]
O_RET_CLK
O_DOUT
O_DIN
SW_4_X
SW_F_[1]
SW_9
SW_3
SW_6
SW_8
SW_10
SW_C_[0]
SW_E_[1]
SW_Y_1
SW_Y_0
SW_G_[1]
SW_H_[1]
SW_9_X
SW_8_X
SW_A_[0]
SW_0_X
SW_B_[0]
SW_Y_7
SW_Y_6
SW_Y_5
SW_D_X
SW_C_X
SW_17
SW_11
SW_12
SW_13
SW_14
SW_15
SW_16
FSOUT
FSIN
SW_18
SW_19
SW_20
SW_21
SW_22
SW_23
SW_24
SW_1
SW_2
INIT
DONE
TDO
SW_E_X
O_CLK
O_FSYNC
O_METER
SW_C_[1]
SW_D_[1]
LOCAL_ARB_REQ
LOCAL_GRANT
GLOBAL_ARB_STAT
IO_SLOT_ARB
LOCAL_ARB
O_BD_ID[1]
O_BD_ID[0]
O_BD_ID[3]
O_BD_ID[5]
O_BD_ID[4]
O_BD_ID[7]
O_BD_ID[6]
SW_Y_3
SW_6_X
SW_Y_B
SW_Y_A
SW_Y_9
SW_2_X
SW_B_[1]
SW_Y_8
SW_Y_7
SW_Y_6
SW_Y_5
SW_Y_4
SW_Y_3
SW_Y_2
SW_Y_1
SW_Y_0
SW_5_X
BR0
BR1
Q13
Q10
Q2
Q3
Q12
Q11
Q9
Q8
Q7
Q6
Q5
Q4
FDN340P
LED_D_[0]
LED_C_[0]
LED_B_[0]
LED_A_[0]
LED_H_[1]
LED_G_[1]
LED_F_[1]
LED_E_[1]
LED_D_[1]
LED_C_[1]
LED_B_[1]
LED_A_[1]
DS1
R34 220
U3
XCF01
INSTALLE ONE
R8 5.1
NOT INSTALLED
U4
XC18V01
R32 1.00K
R11 5.1
U2
DS1706
J1
J2
4148 D8
R26 4.99K
C9 0.01uF
D1 BAT54
C1 0.01uF
R1 10.0K
CT2
CT1
Q1
LT1117 2.5V
C14 1uF
C13 1uF
TP1
TP2
CONTRACT NO.
- SA UR US - Sergey Averin -
APPROVALS
DATE
DRAWN SA/WWP 3-14-06
CHECKED SA
ISSUED SA
W# 700858
MSTRSW-12
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE D
FSCM NO.
DWG. NO. 84S0155-3
REV _
SCALE
MSTRSW-12 PCB
SHEET 3 OF 3

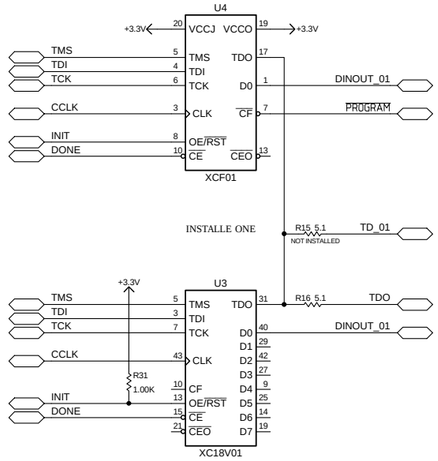

+2.5V
GND
TP2
TP1
Wheatstone
S/N

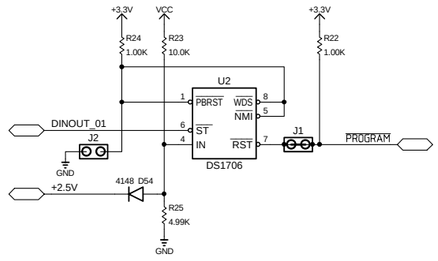


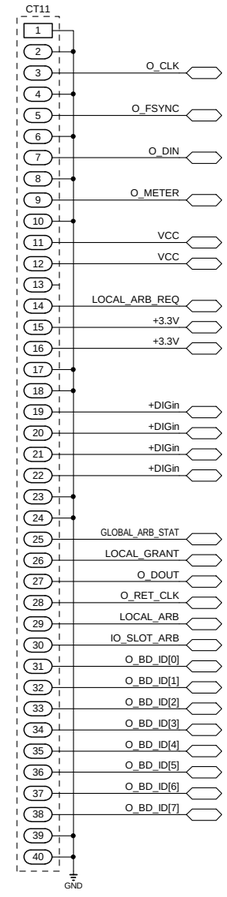
CONTRACT NO.		EQSW-12
- SA UR US - Sergey Averin -		
APPROVALS	DATE	Wheatstone Corporation
DRAWN WWP/SA	4-20-06	600 Industrial Drive, New Bern, NC 28562
CHECKED	SA	
ISSUED	SA	SIZE E · FSCM NO. · DWG. NO. 84S0156-1 · REV A
W# 700859		SCALE · EQSW-12A PCB · SHEET 1 OF 2

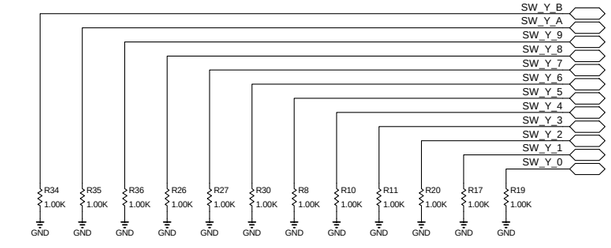


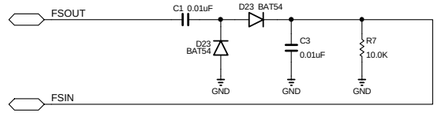


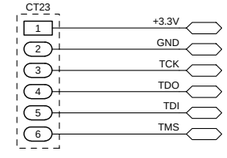


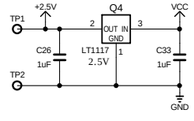




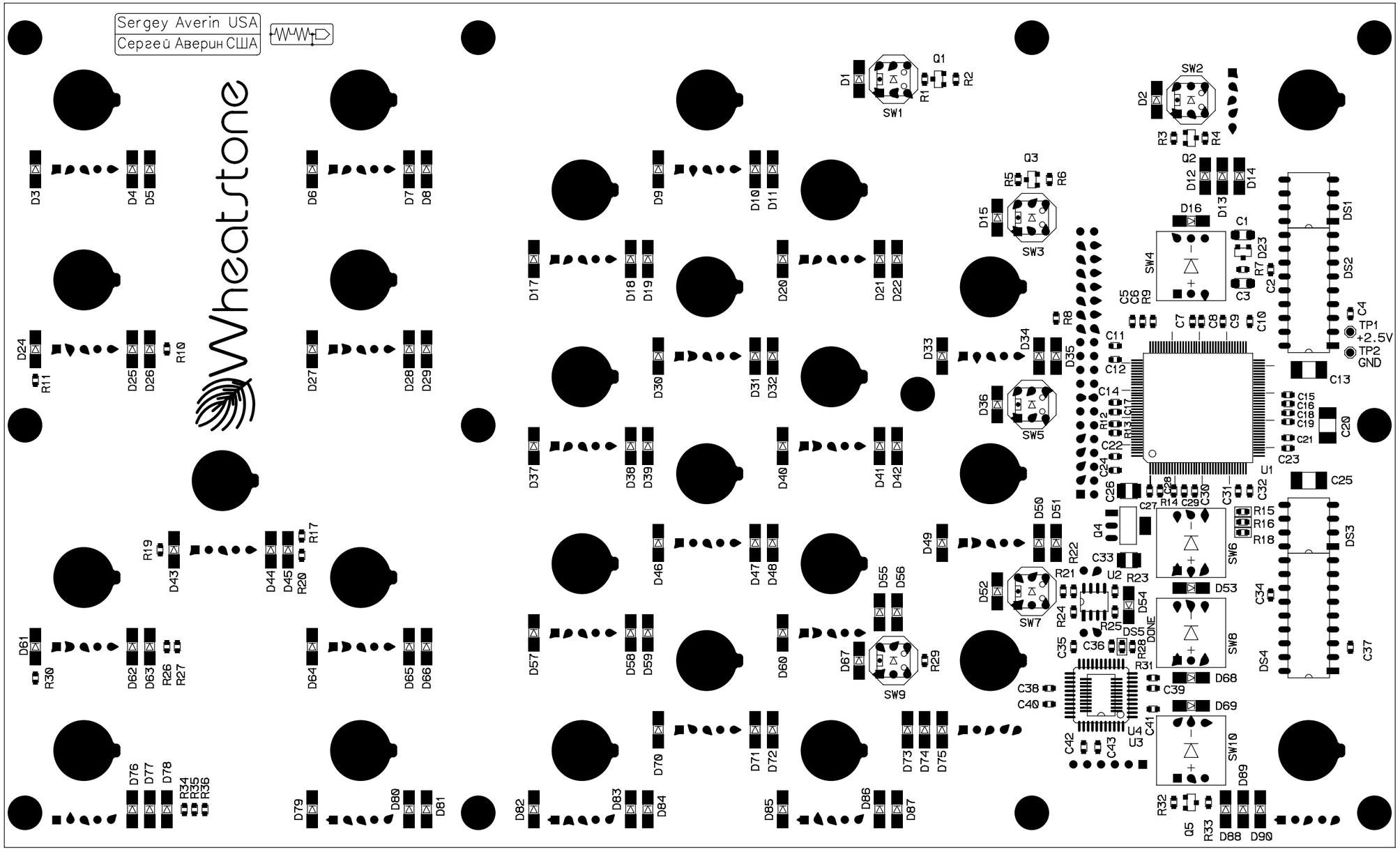


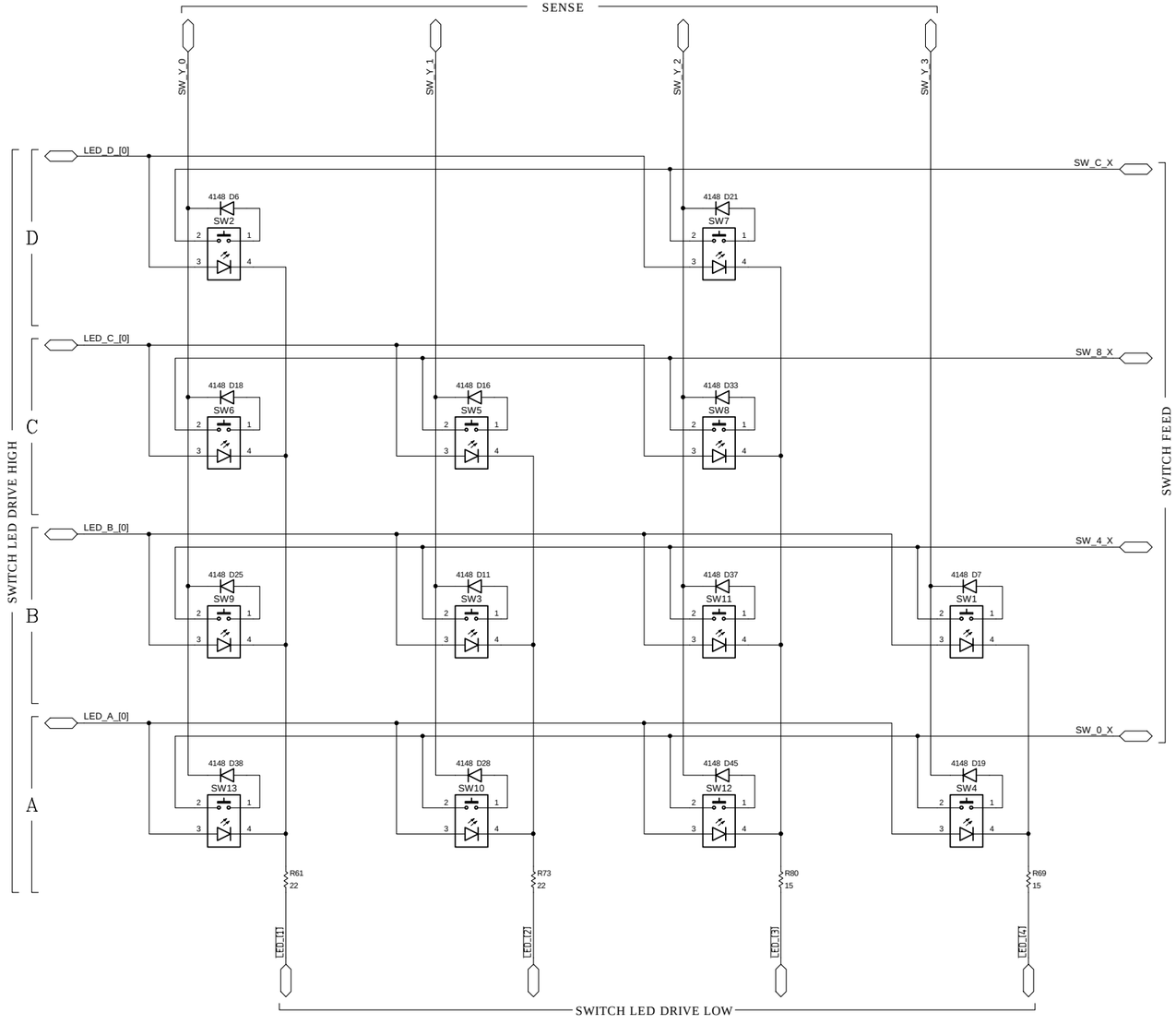


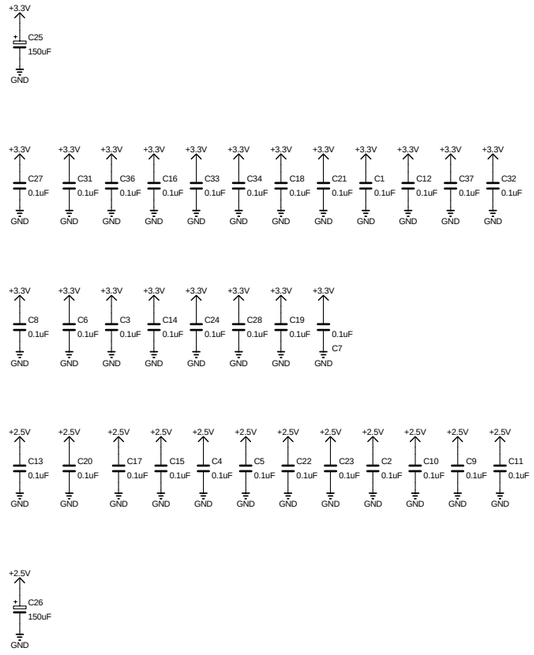




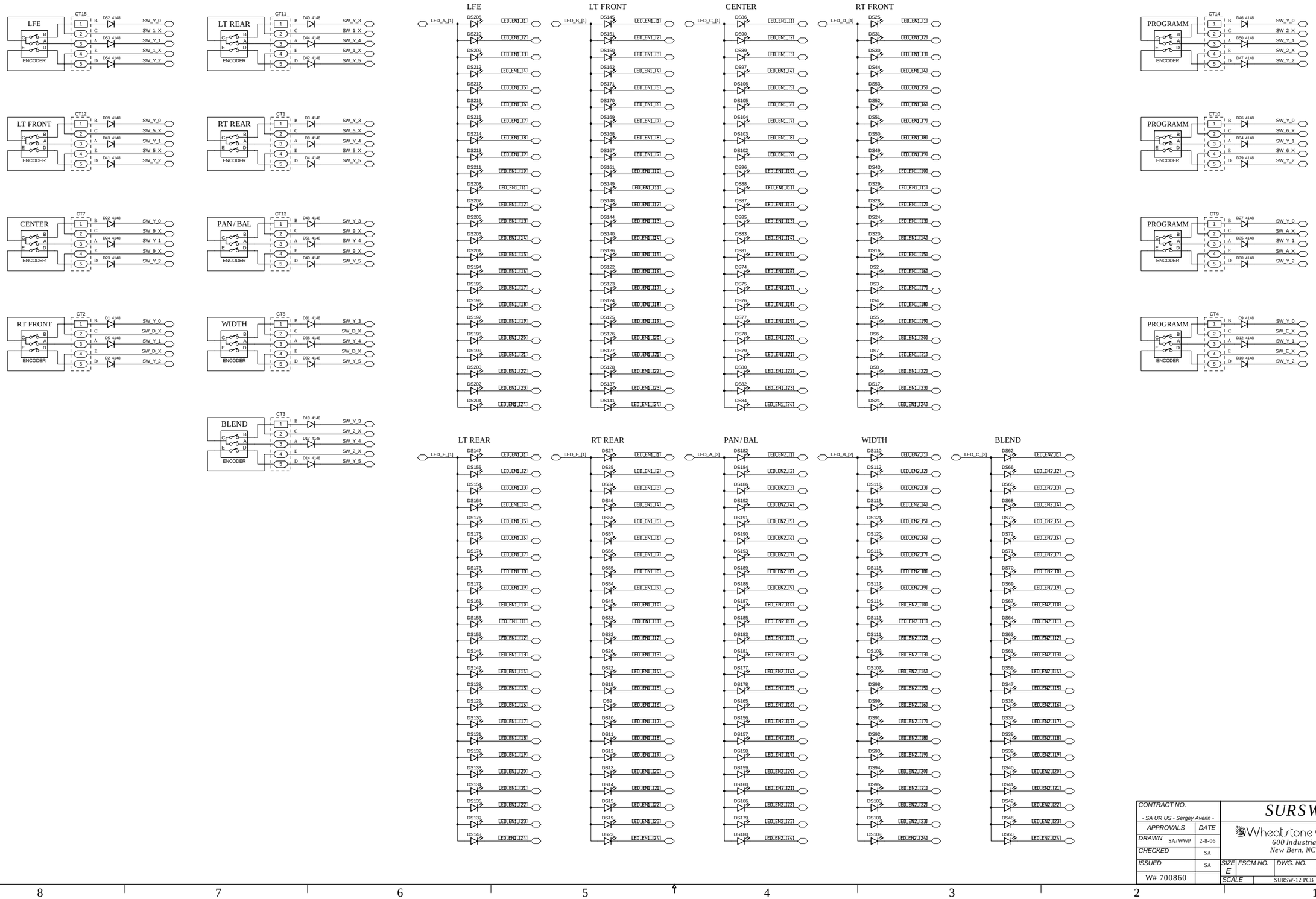
CONTRACT NO.	EQSW-12
- SA UR US - Sergey Averin -	
APPROVALS / DATE	Wheatstone Corporation
DRAWN WWP/SA 4-20-06	600 Industrial Drive
CHECKED SA	New Bern, NC 28562
ISSUED SA	SIZE D · FSCM NO. · DWG. NO. 84S0156-2 · REV A
W# 700859	SCALE EQSW-12A PCB · SHEET 2 OF 2


Sergey Averin USA
Сергей Аверин США
Wheatstone
SW1
SW2
SW3
SW4
SW5
SW6
SW7
SW8
SW9
SW10
U1
U2
U3
U4
TP1
+2.5V
TP2
GND
DONE

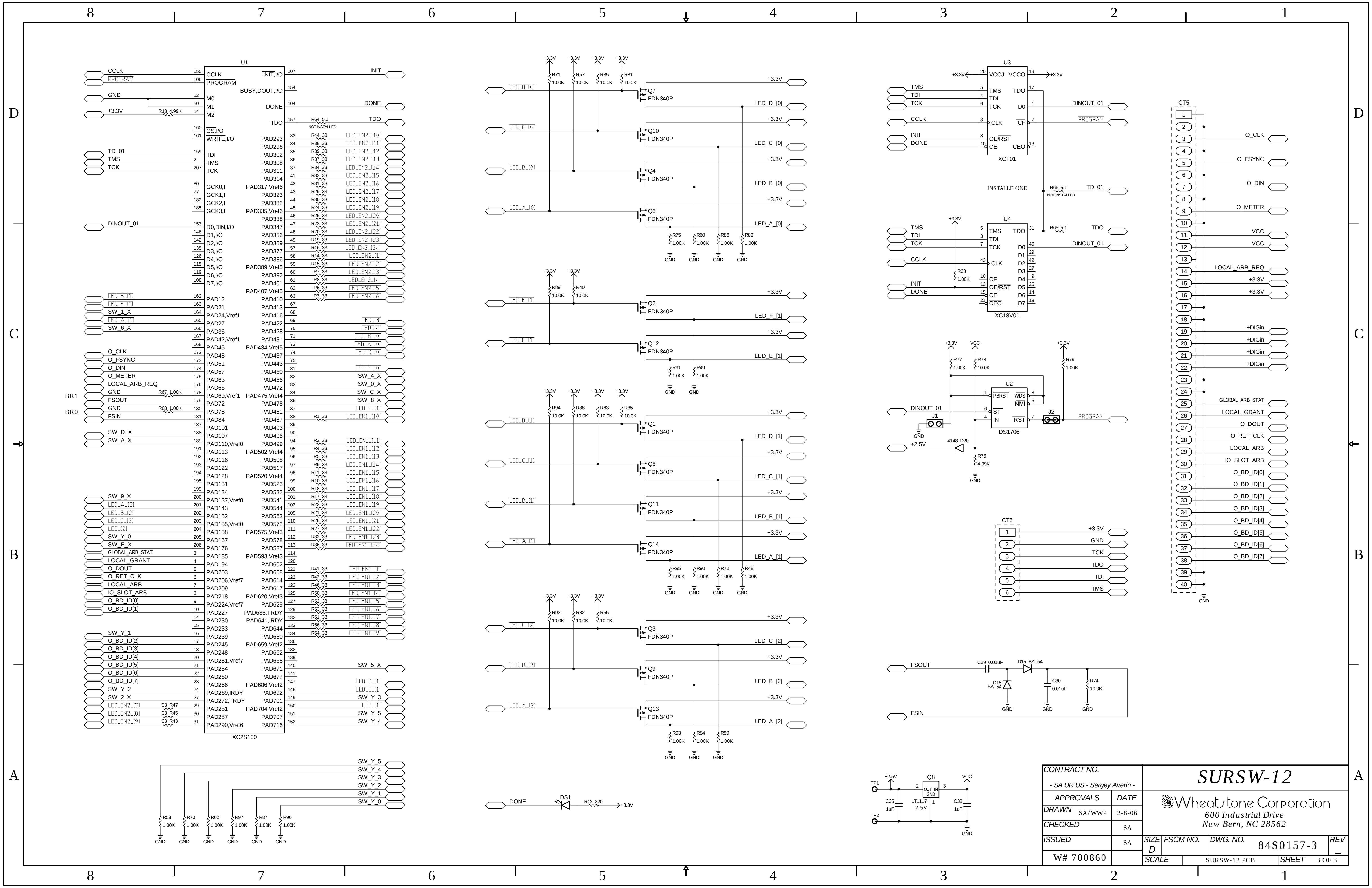




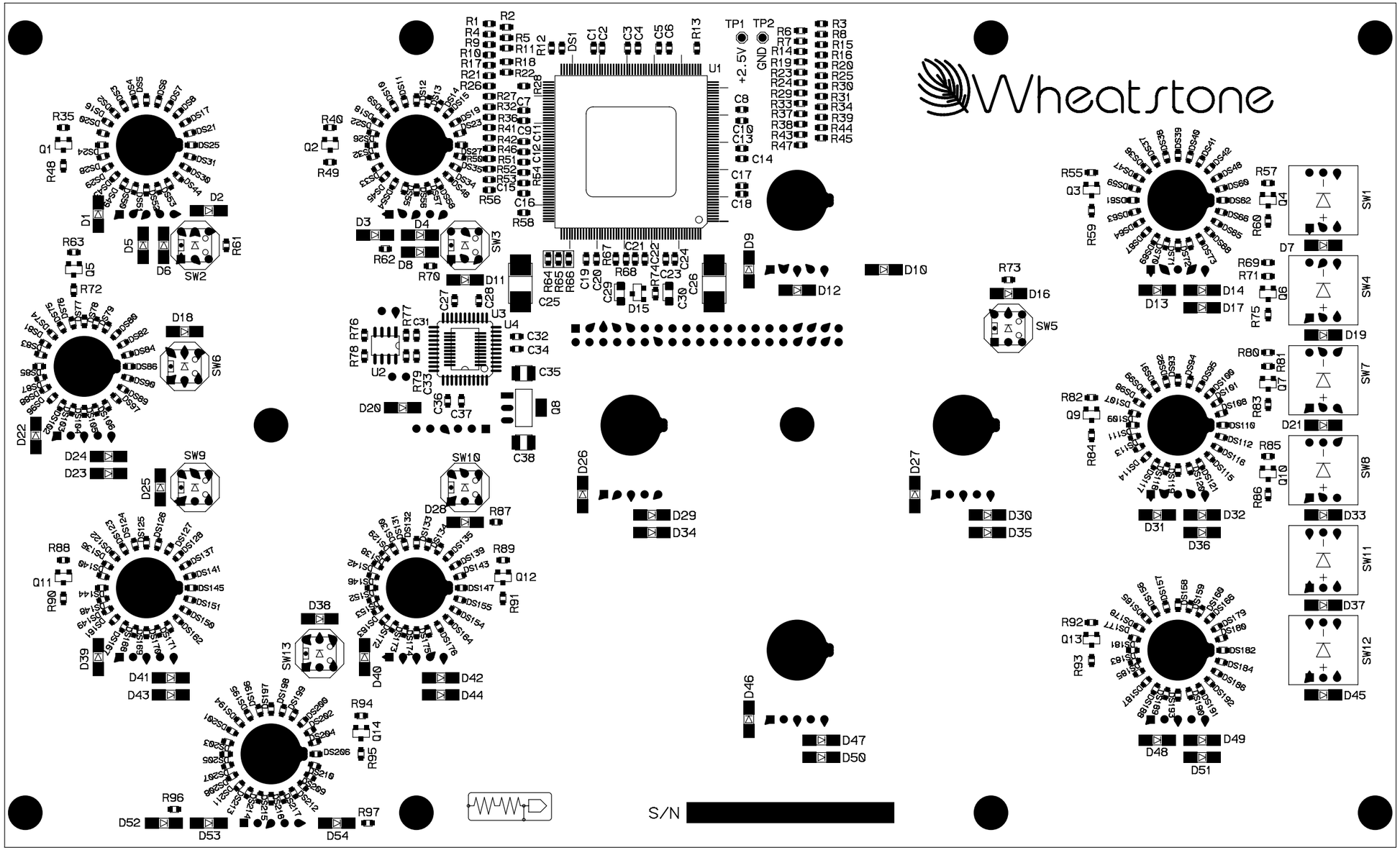
CONTRACT NO. - SA UR US - Sergey Averin -		SURSW-12	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA/WWP	2-8-06		
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0157-1 / REV –	
W# 700860		SCALE / SURSW-12 PCB / SHEET 1 OF 3	

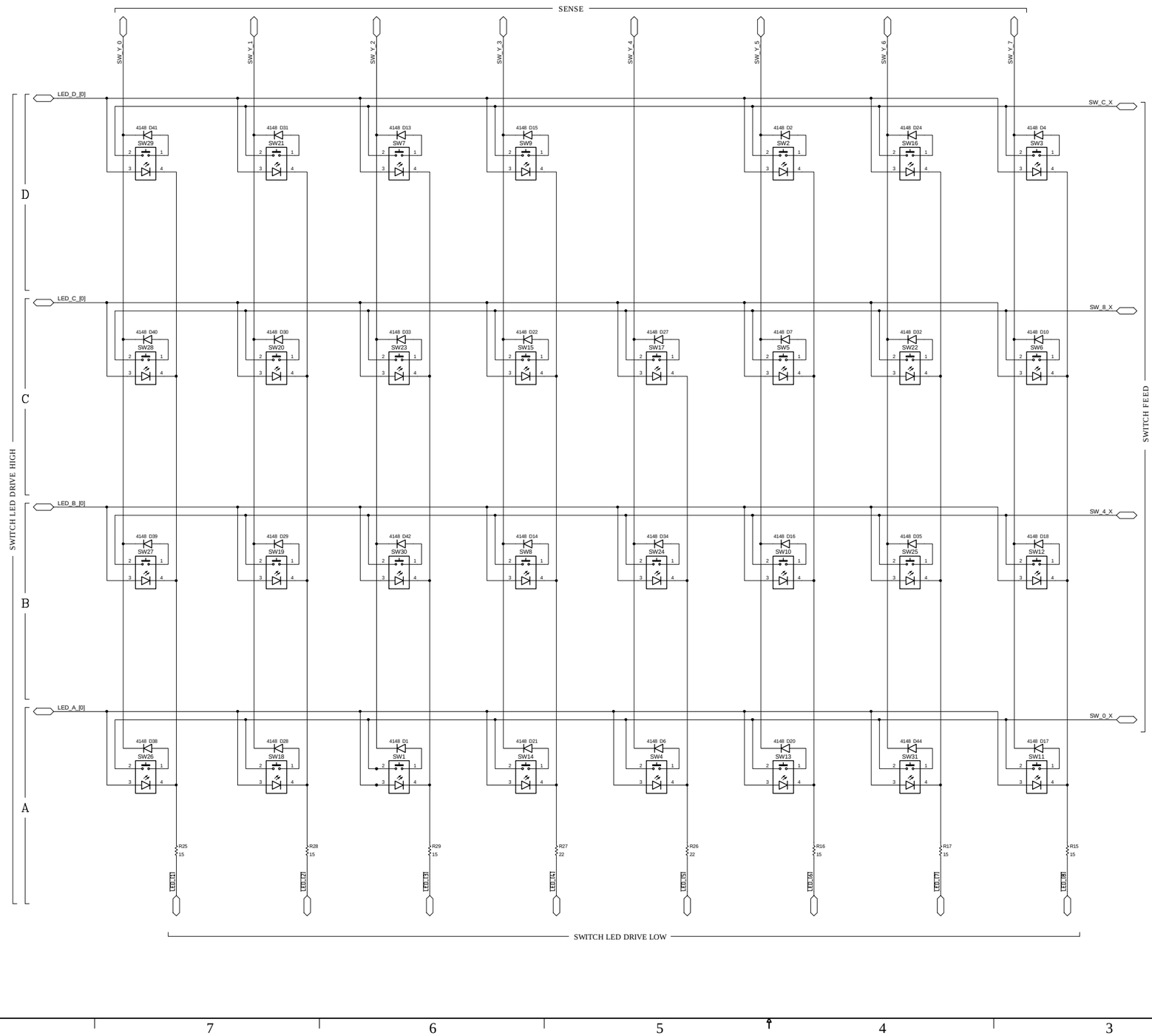


CONTRACT NO.	SURSW-12
- SA UR US - Sergey Averin -	
APPROVALS / DATE	Wheatstone Corporation
DRAWN SA/WWP 2-8-06	600 Industrial Drive, New Bern, NC 28562
CHECKED SA	
ISSUED SA	SIZE E · FSCM NO. · DWG. NO. 84S0157-2 · REV —
W# 700860	SCALE · SURSW-12 PCB · SHEET 2 OF 3

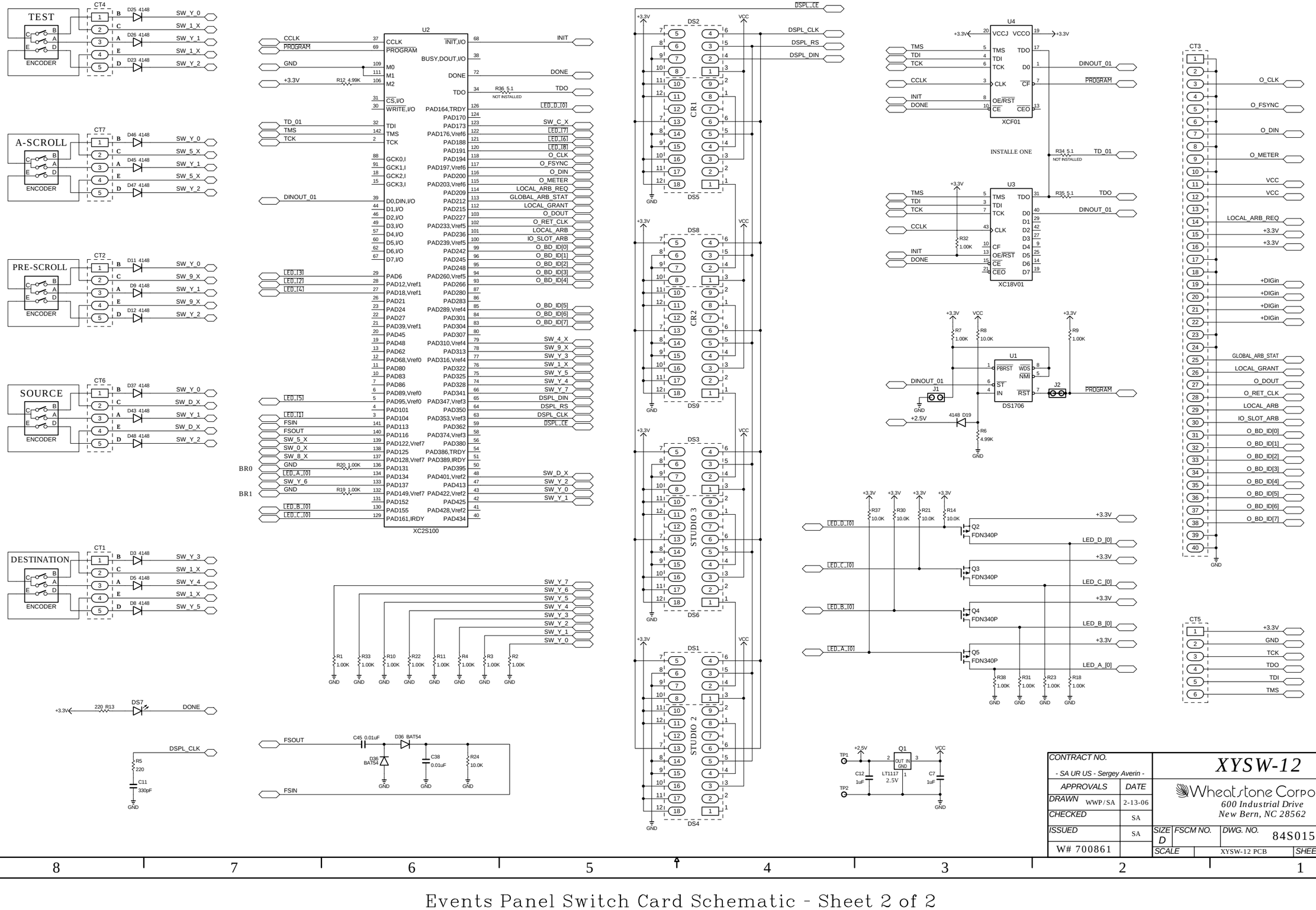


Surround Panel Switch Card Schematic - Sheet 3 of 3

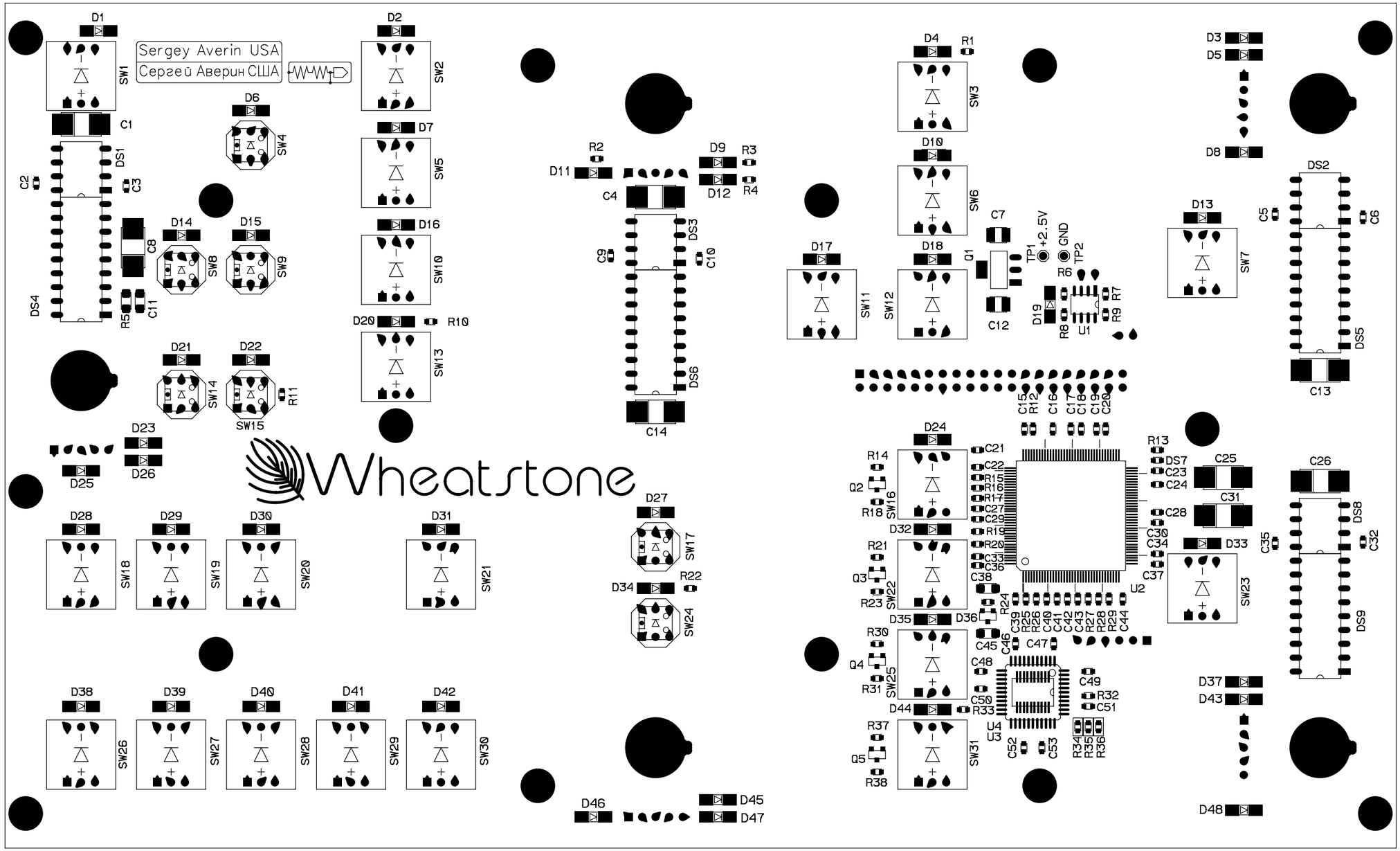

Wheatstone
S/N

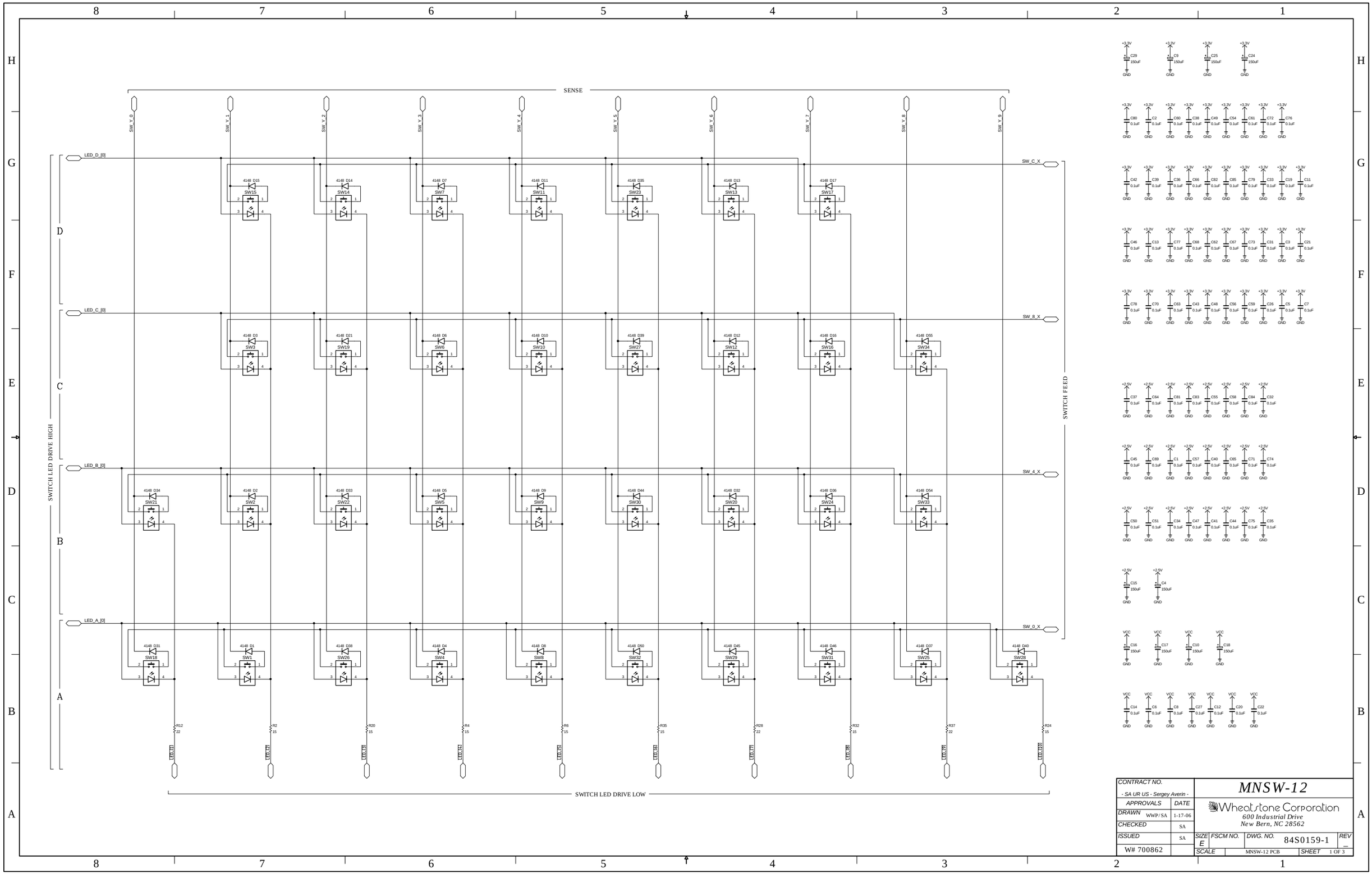


CONTRACT NO. - SA UR US - Sergey Averin -		XYSW-12	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN WWP/SA	2-13-06		
CHECKED	SA		
ISSUED	SA	SIZE E / FSCM NO. / DWG. NO. 84S0158-1 / REV —	
W# 700861		SCALE XYSW-12 PCB / SHEET 1 OF 2	

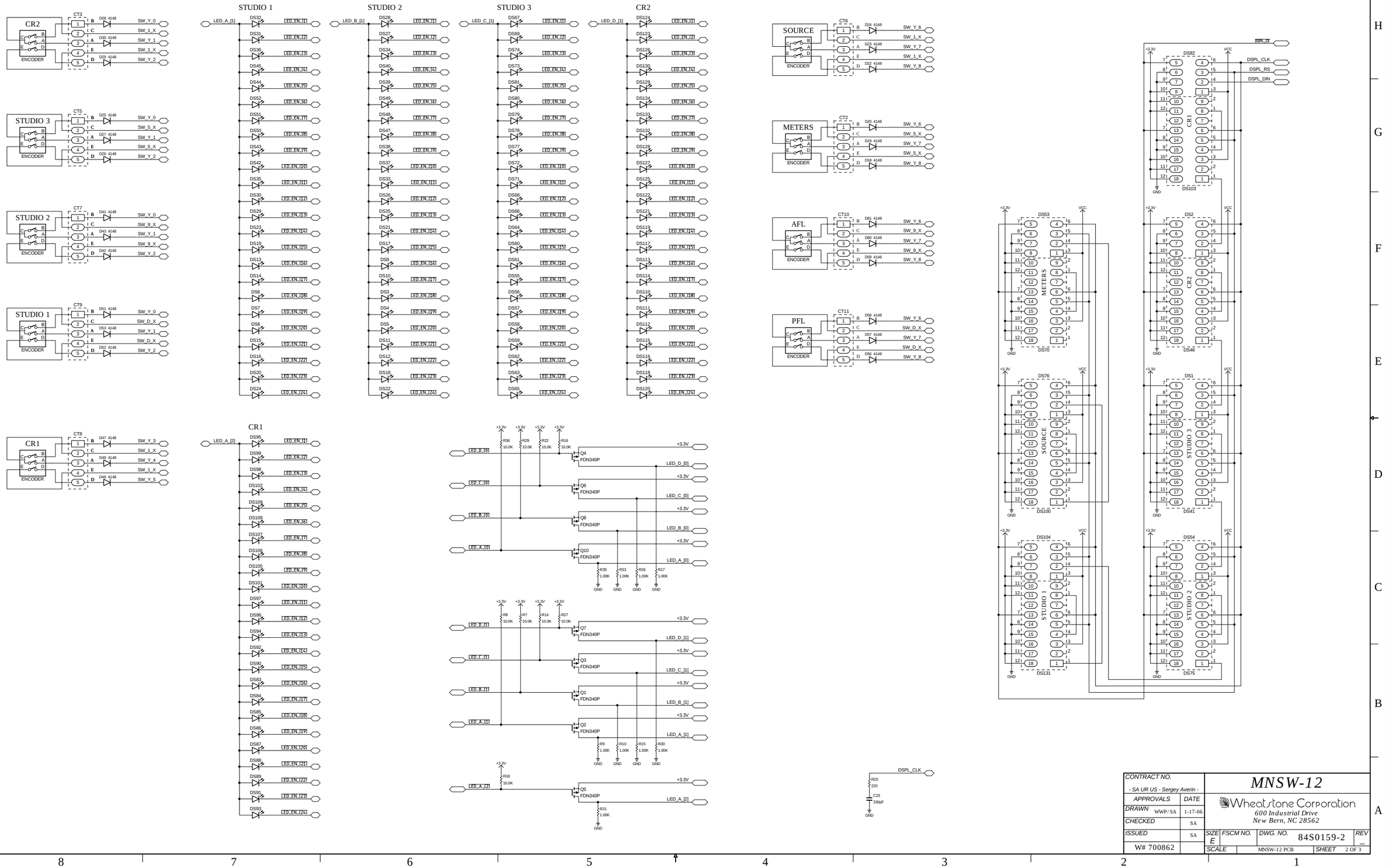


CONTRACT NO.	XYSW-12
- SA UR US - Sergey Averin -	Wheatstone Corporation
APPROVALS / DATE	600 Industrial Drive, New Bern, NC 28562
DRAWN WWP/SA 2-13-06	SIZE D · FSCM NO. · DWG. NO. 84S0158-2 · REV —
CHECKED SA	SCALE XYSW-12 PCB · SHEET 2 OF 2
ISSUED SA	
W# 700861	

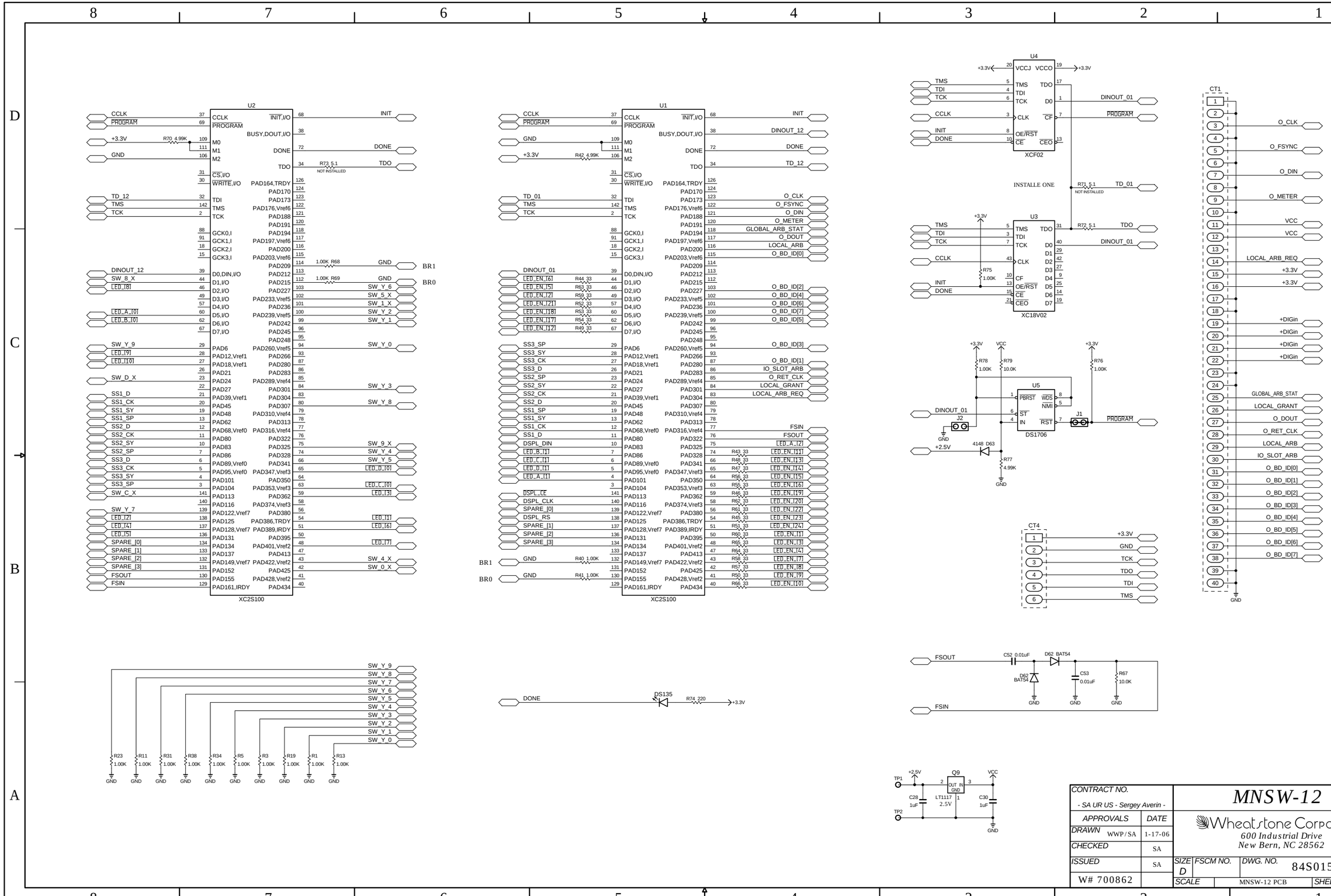

Sergey Averin USA
Сергей Аверин США
Wheatstone



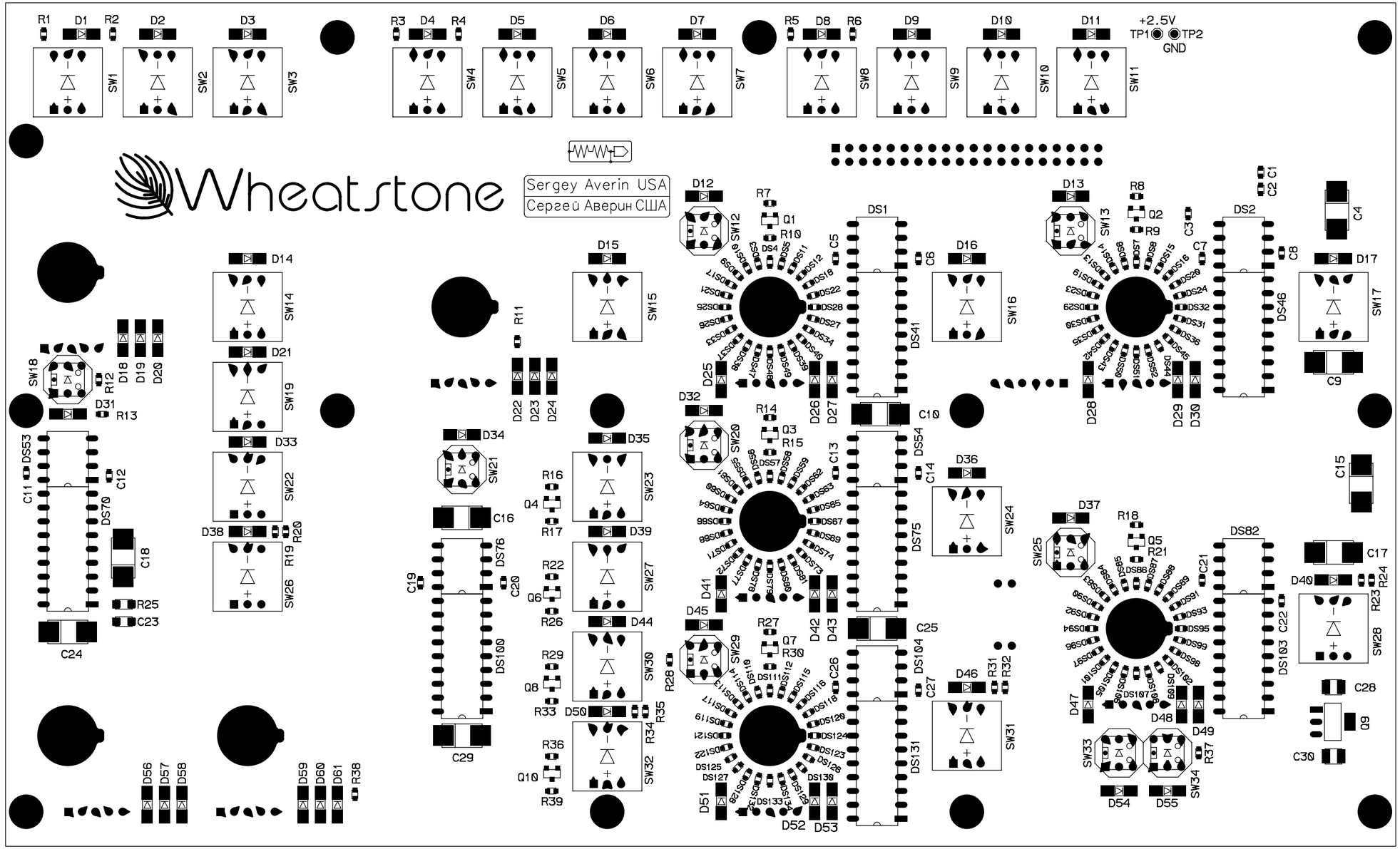
CONTRACT NO. - SA UR US - Sergey Averin -		MNSW-12	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN WWP/SA	1-17-06		
CHECKED	SA		
ISSUED	SA	SIZE E / FSCM NO. / DWG. NO. 84S0159-1 / REV —	
W# 700862		SCALE MNSW-12 PCB / SHEET 1 OF 3	

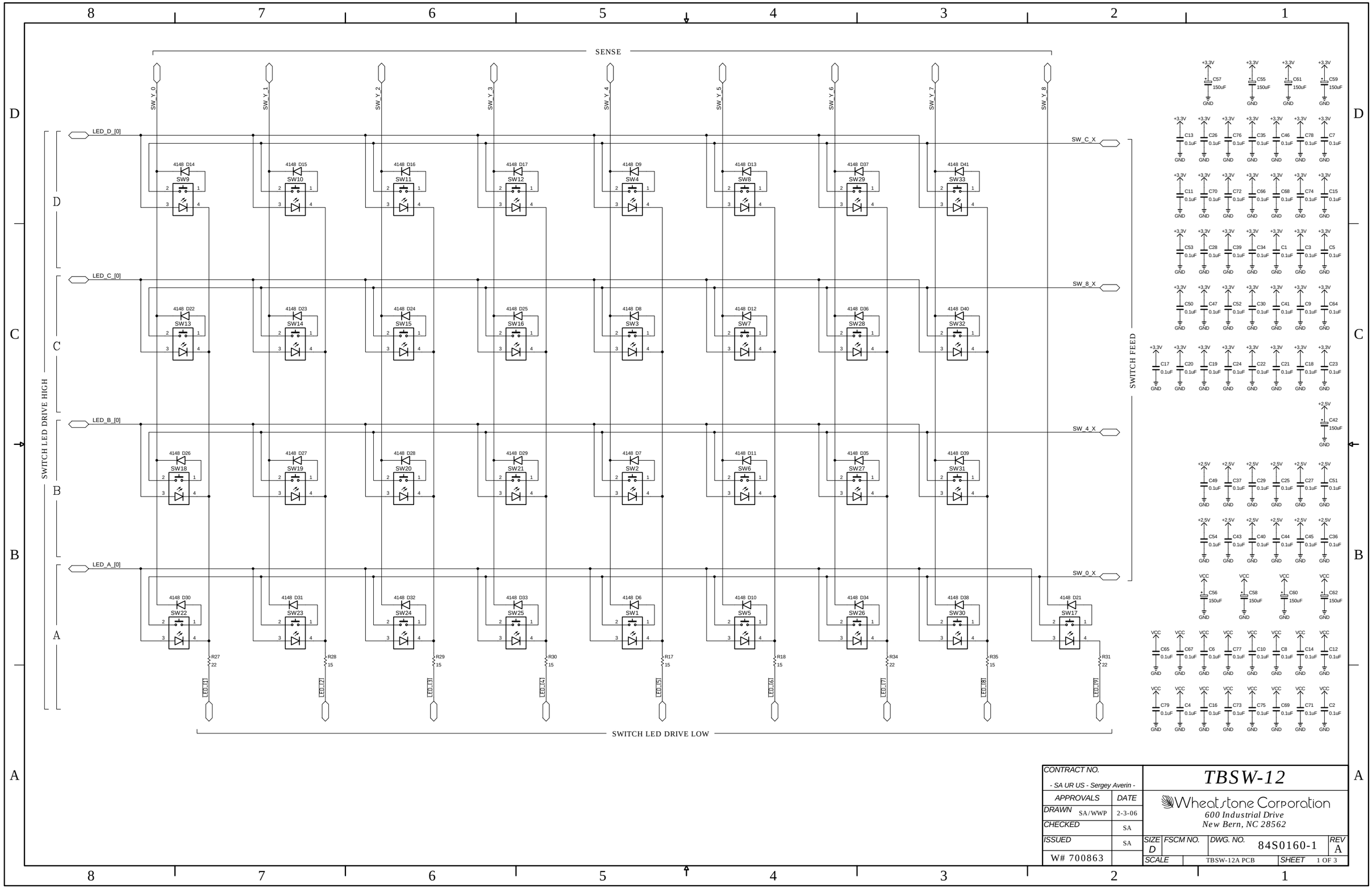


CONTRACT NO.	MNSW-12
- SA UR US - Sergey Averin -	
APPROVALS / DATE	Wheatstone Corporation
DRAWN WWP/SA 1-17-06	600 Industrial Drive
CHECKED SA	New Bern, NC 28562
ISSUED SA	SIZE E · FSCM NO. · DWG. NO. 84S0159-2 · REV —
W# 700862	SCALE MNSW-12 PCB · SHEET 2 OF 3



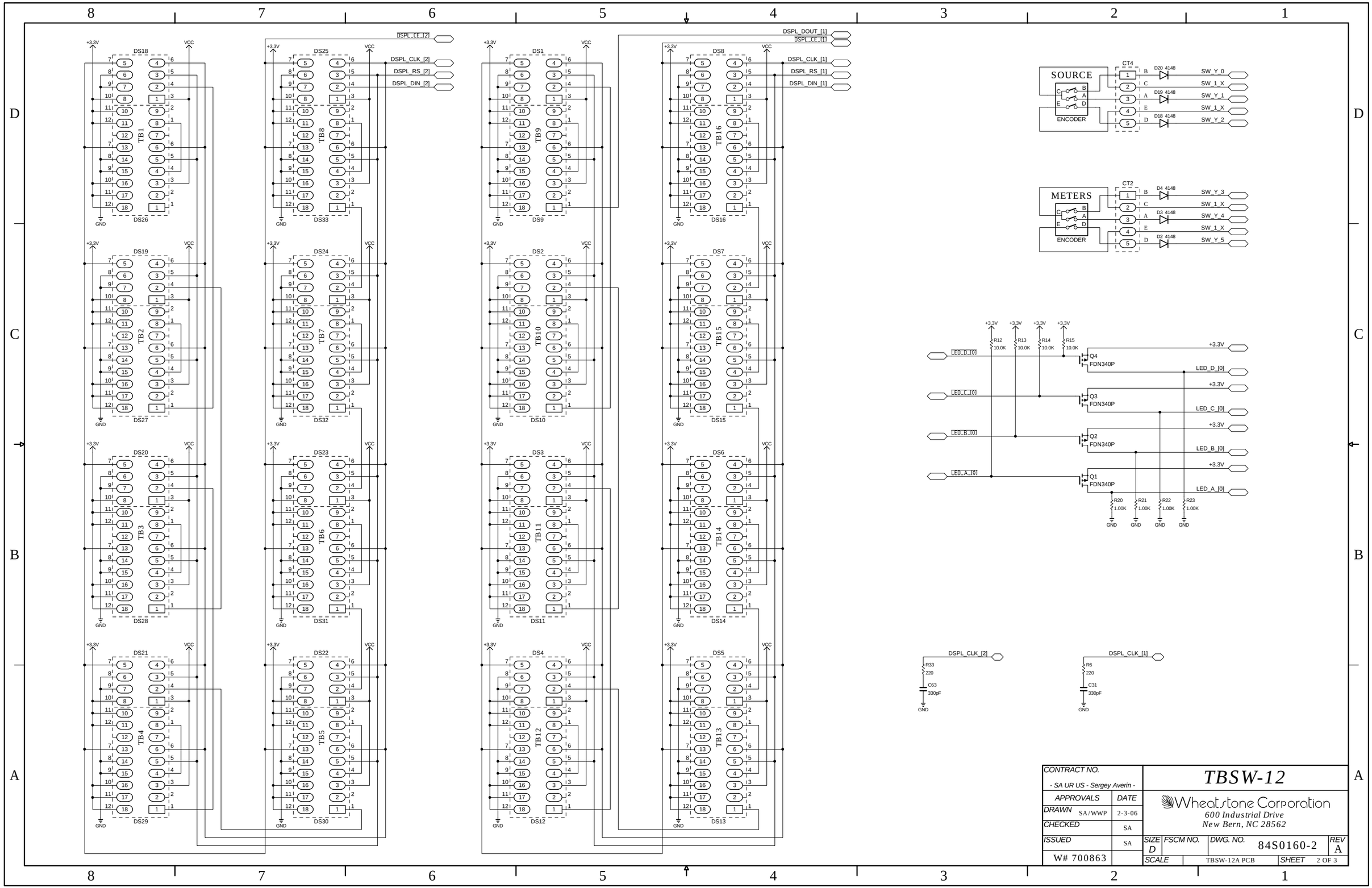
Monitor Panel Switch Card Schematic - Sheet 3 of 3


Wheatstone
Sergey Averin USA
Сергей Аверин США
+2.5V
TP1
TP2
GND



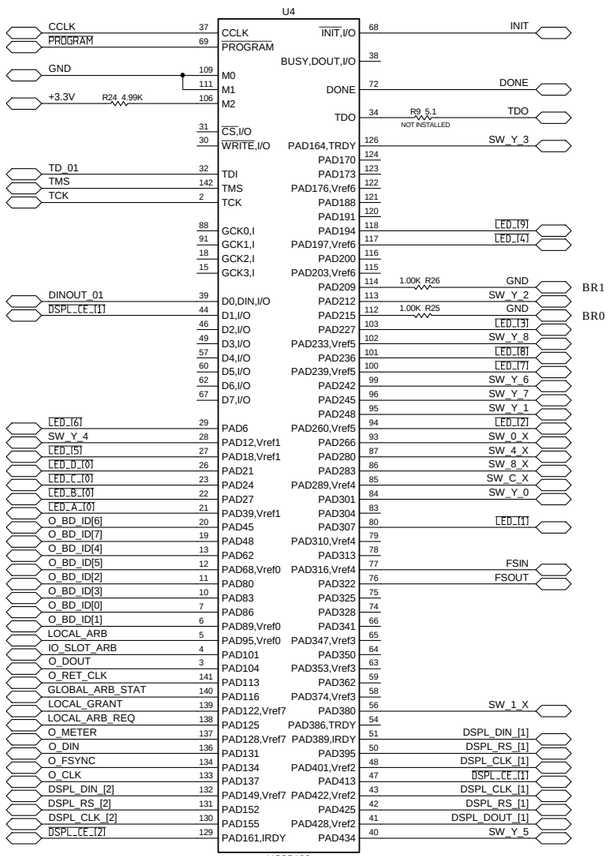
CONTRACT NO.	TBSW-12
- SA UR US - Sergey Averin -	
APPROVALS / DATE	Wheatstone Corporation
DRAWN SA/WWP 2-3-06	600 Industrial Drive
CHECKED SA	New Bern, NC 28562
ISSUED SA	SIZE D / FSCM NO. / DWG. NO. 84S0160-1 / REV A
W# 700863	SCALE TBSW-12A PCB / SHEET 1 OF 3

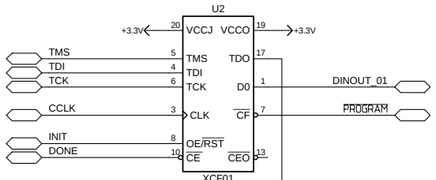
Talkback Panel Switch Card Schematic - Sheet 1 of 3

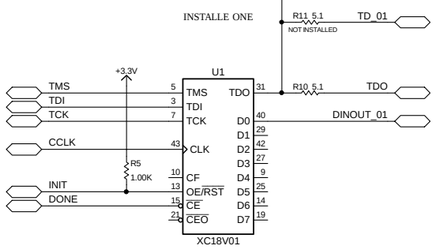


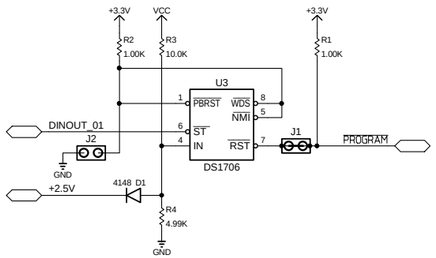
CONTRACT NO. - SA UR US - Sergey Averin -		TBSW-12
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562
DRAWN SA/WWP	2-3-06	
CHECKED	SA	
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0160-2 / REV A
W# 700863		SCALE TBSW-12A PCB / SHEET 2 OF 3

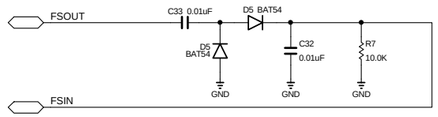
Talkback Panel Switch Card Schematic - Sheet 2 of 3

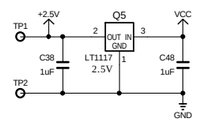


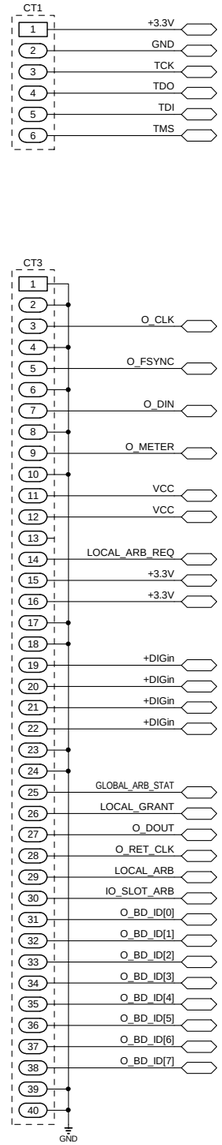




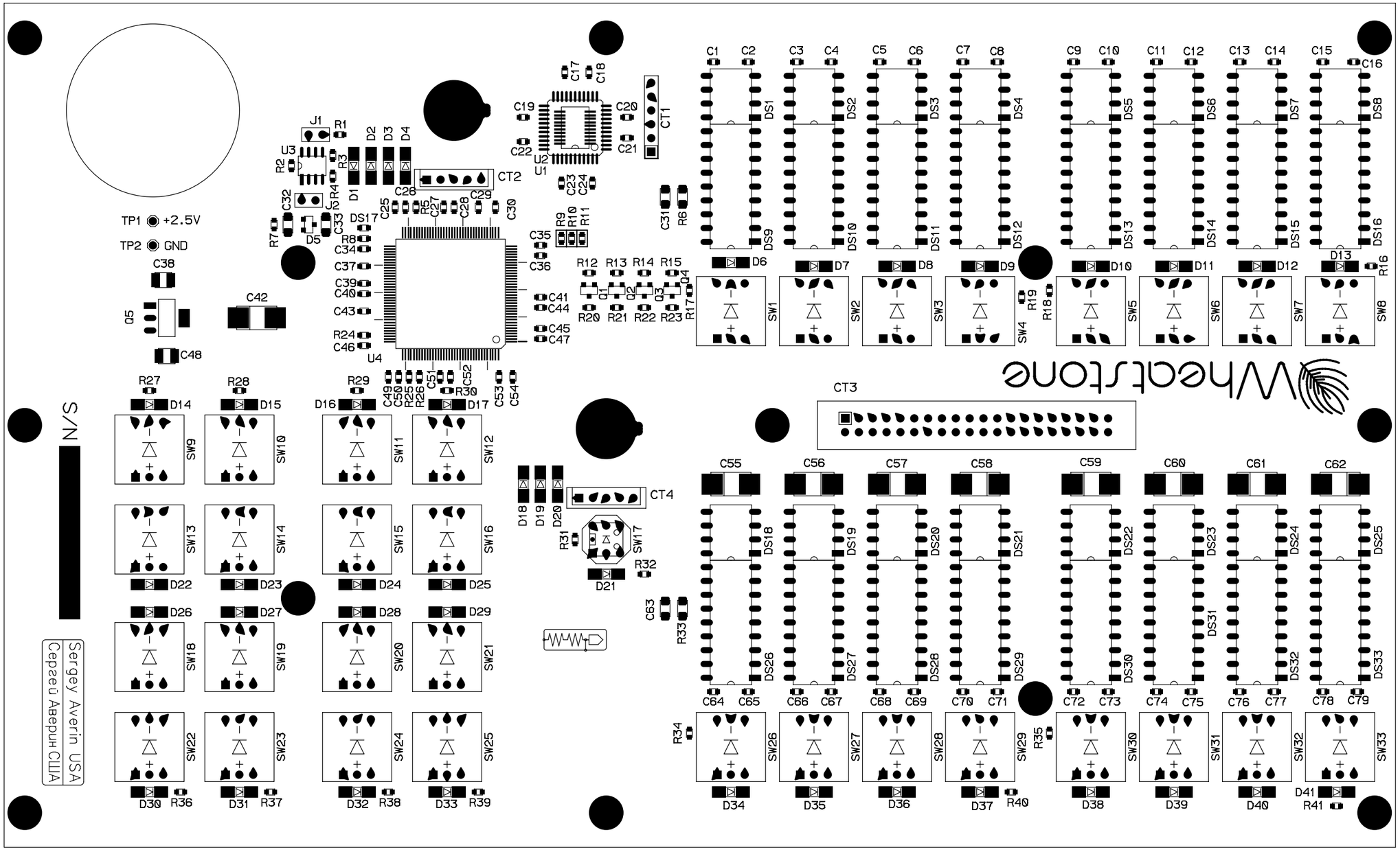








CONTRACT NO. - SA UR US - Sergey Averin -		TBSW-12
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562
DRAWN SA/WWP	2-3-06	
CHECKED	SA	
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0160-3 / REV A
W# 700863		SCALE / TBSW-12A PCB / SHEET 3 OF 3


Wheatstone
N/S
Sergey Averin USA
Сергей Аверин США
TP1 +2.5V
TP2 GND
CT1
CT2
CT3
CT4
U1
U2
U3
U4
J1
Q1
Q2
Q3
Q4
Q5
DS1
DS2
DS3
DS4
DS5
DS6
DS7
DS8
DS9
DS10
DS11
DS12
DS13
DS14
DS15
DS16
DS17
DS18
DS19
DS20
DS21
DS22
DS23
DS24
DS25
DS26
DS27
DS28
DS29
DS31
DS32
DS33
SW1
SW2
SW3
SW4
SW5
SW6
SW7
SW8
SW9
SW10
SW11
SW12
SW13
SW14
SW15
SW16
SW17
SW18
SW19
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SW25
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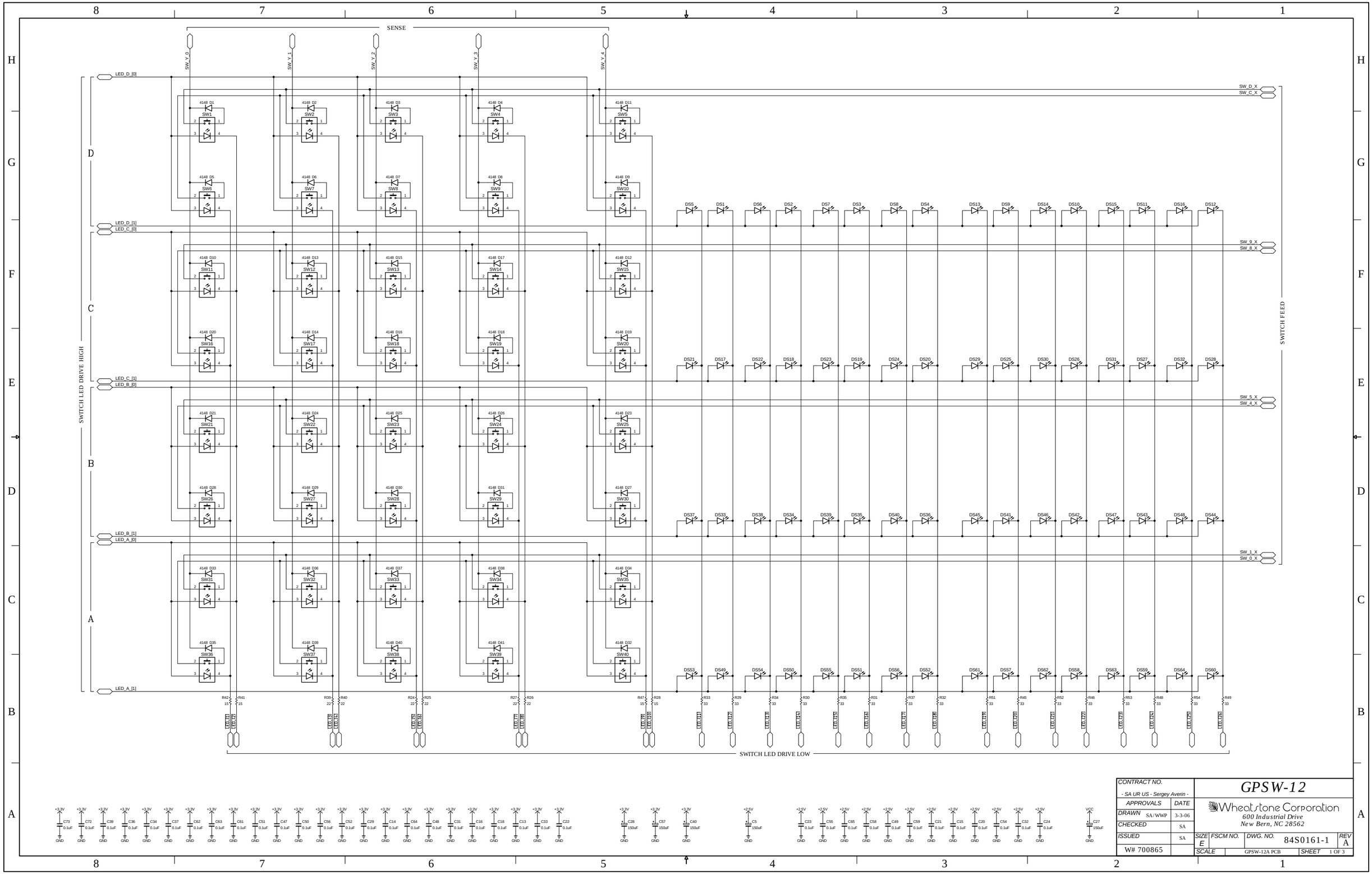
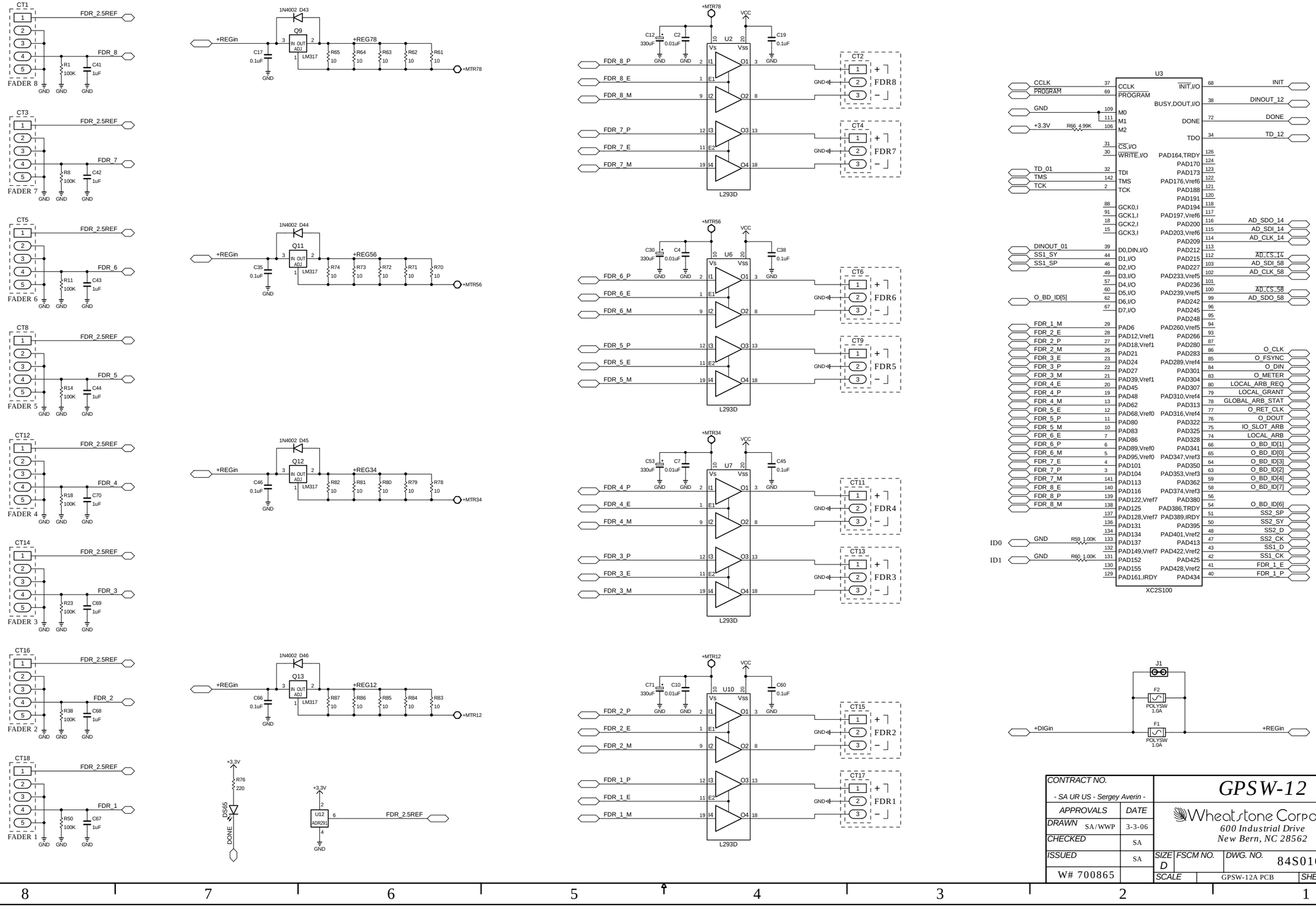
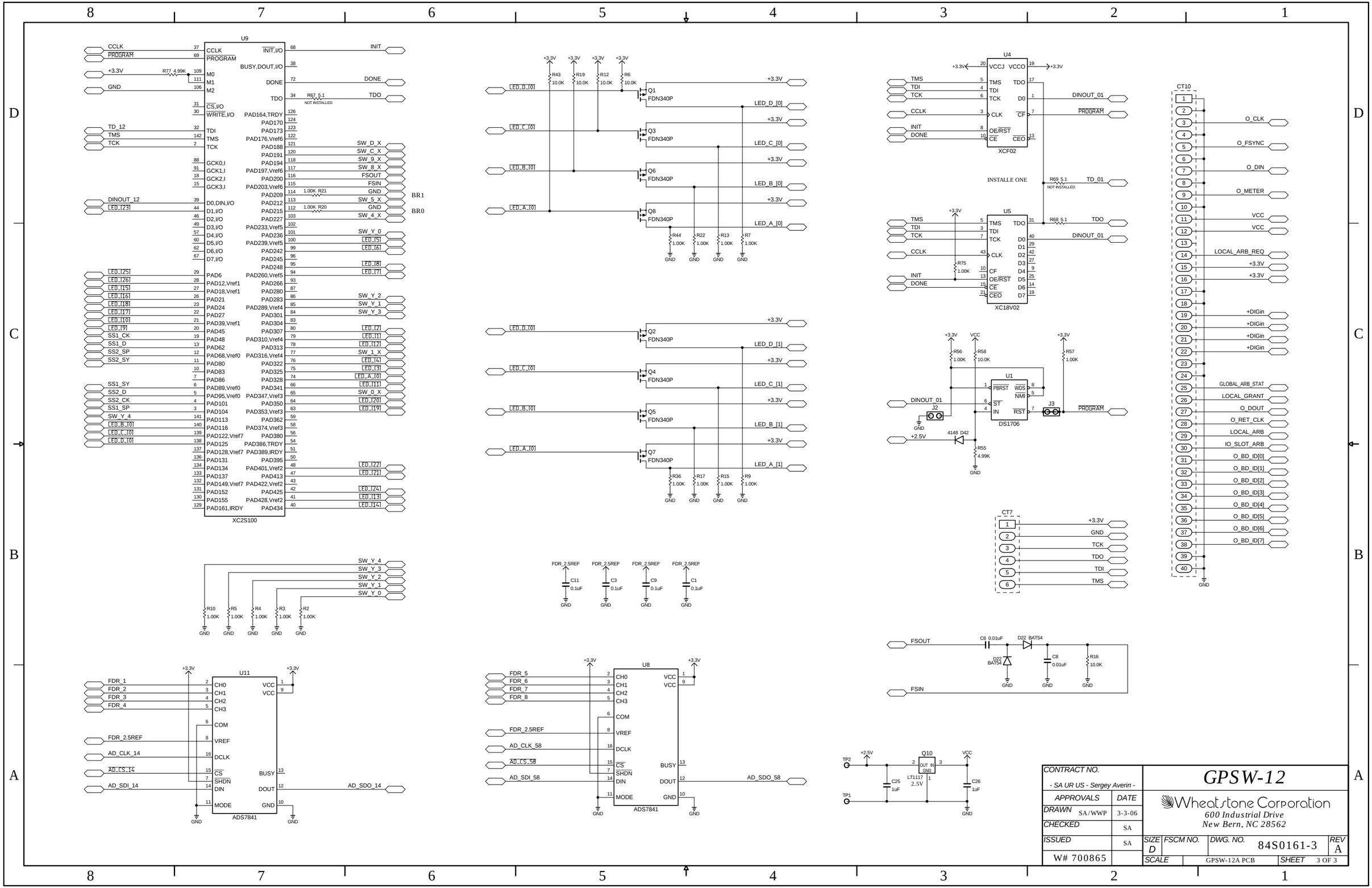
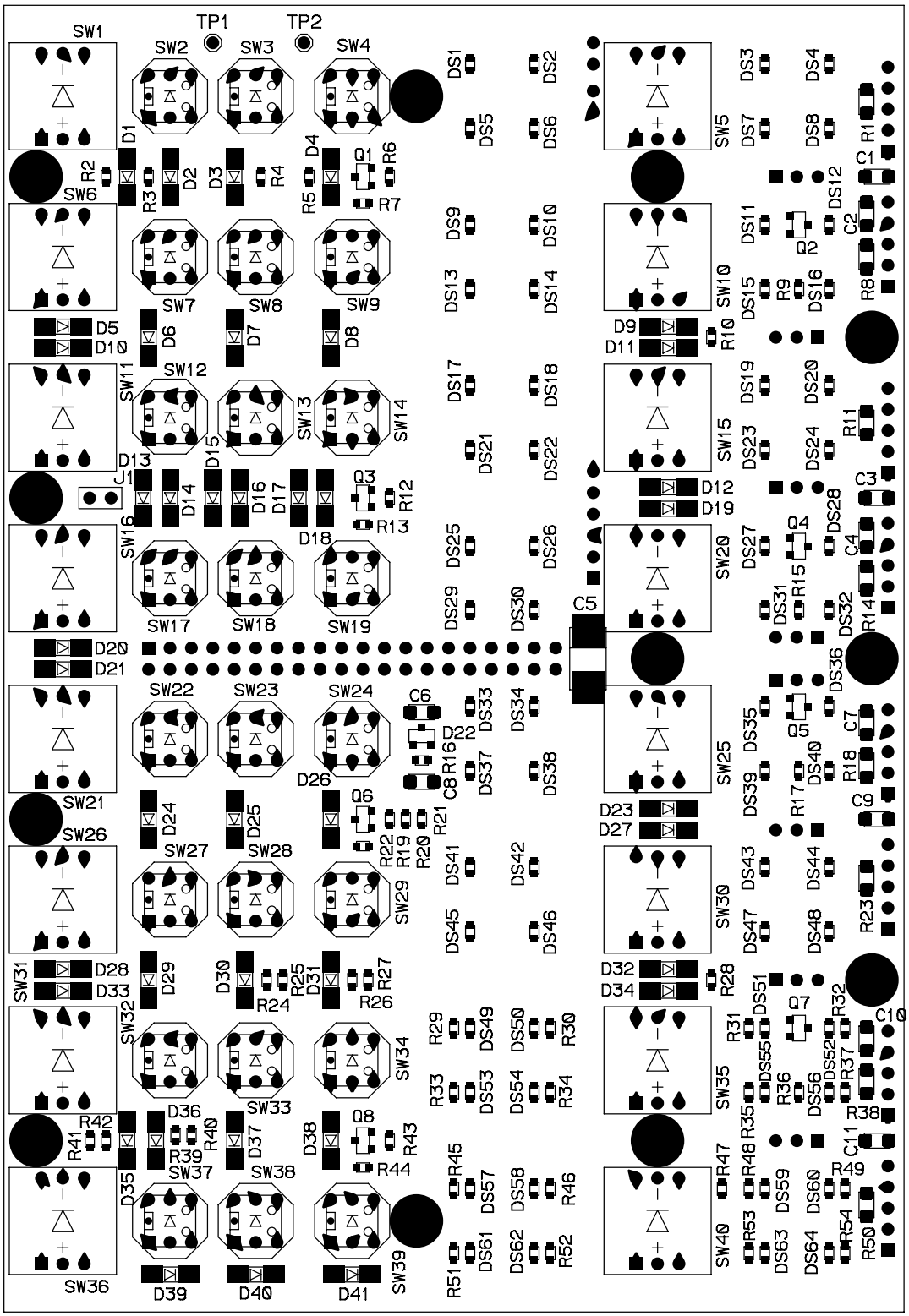
SW27
SW28
SW29
SW30
SW31
SW32
SW33


SENSE
SW_V_0
SW_V_1
SW_V_2
SW_V_3
SW_V_4
SWITCH LED DRIVE HIGH
SWITCH FEED
SWITCH LED DRIVE LOW
LED_D_[0]
LED_D_[1]
LED_C_[0]
LED_C_[1]
LED_B_[0]
LED_B_[1]
LED_A_[0]
LED_A_[1]
SW_D_X
SW_C_X
SW_9_X
SW_8_X
SW_5_X
SW_4_X
SW_1_X
SW_0_X
CONTRACT NO.
- SA UR US - Sergey Averin -
GPSW-12
APPROVALS
DATE
DRAWN SA/WWP 3-3-06
CHECKED SA
ISSUED SA
W# 700865
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE E
FSCM NO.
DWG. NO. 84S0161-1
REV A
SCALE GPSW-12A PCB
SHEET 1 OF 3

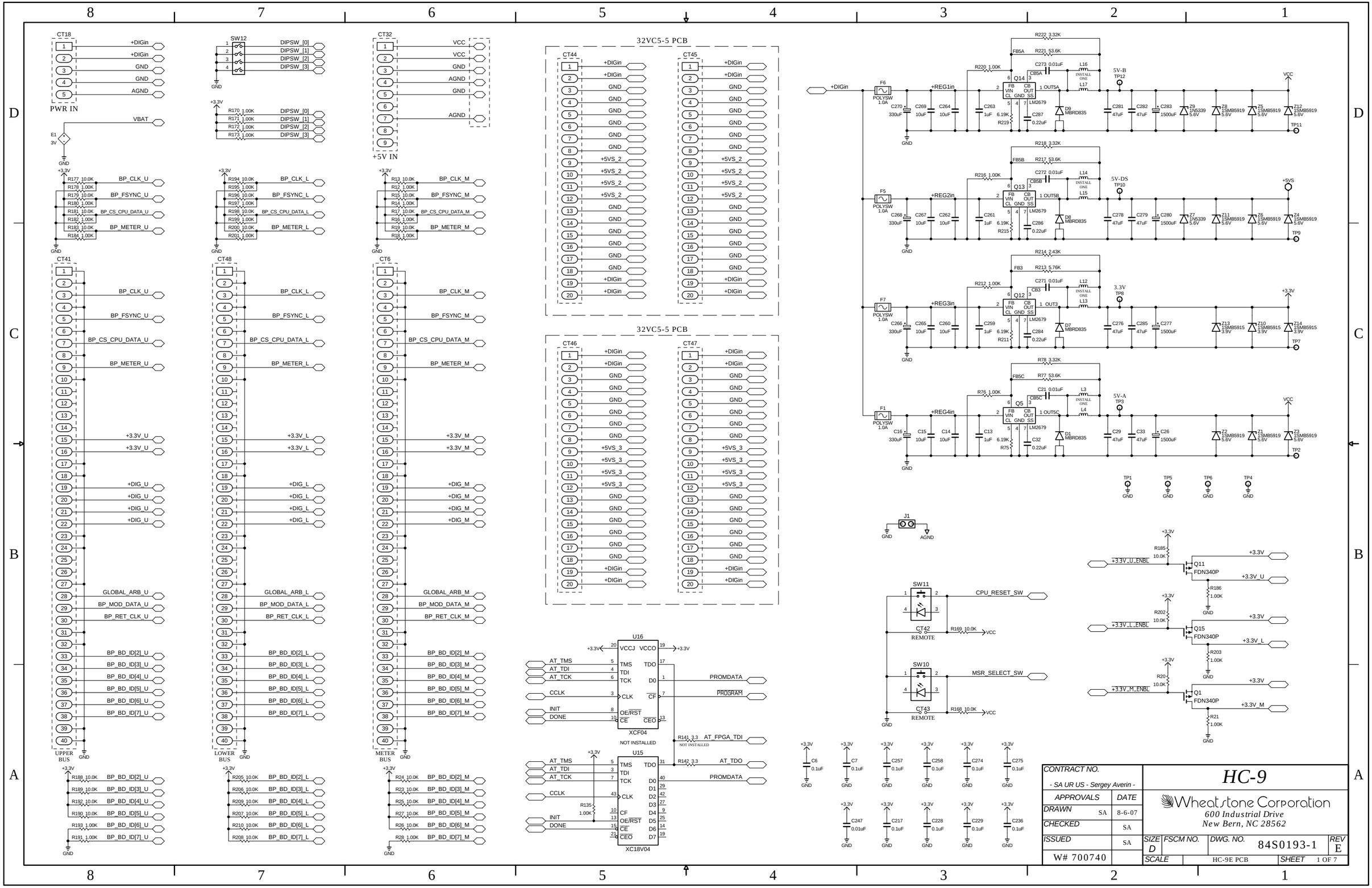


Masters and Sub-Groups Panels Switch Card Schematic - Sheet 2 of 3


U9
XC2S100
CCLK
PROGRAM
+3.3V
R77 4.99K
GND
TD_12
TMS
TCK
DINOUT_12
LED_23
LED_25
LED_26
LED_15
LED_16
LED_18
LED_17
LED_10
LED_9
SS1_CK
SS1_D
SS2_SP
SS2_SY
SS1_SY
SS2_D
SS2_CK
SS1_SP
SW_Y_4
LED_B_0
LED_C_0
LED_D_0
INIT
DONE
TDO
R67 5.1
NOT INSTALLED
SW_D_X
SW_C_X
SW_9_X
SW_8_X
FSOUT
FSIN
GND
1.00K R21
SW_5_X
1.00K R20
SW_4_X
BR1
BR0
SW_Y_0
LED_5
LED_6
LED_8
LED_7
SW_Y_2
SW_Y_1
SW_Y_3
LED_2
LED_1
LED_12
SW_1_X
LED_4
LED_3
LED_A_0
LED_11
SW_0_X
LED_20
LED_19
LED_22
LED_21
LED_24
LED_13
LED_14
R43 10.0K
R19 10.0K
R12 10.0K
R6 10.0K
Q1 FDN340P
Q3 FDN340P
Q6 FDN340P
Q8 FDN340P
R44 1.00K
R22 1.00K
R13 1.00K
R7 1.00K
Q2 FDN340P
Q4 FDN340P
Q5 FDN340P
Q7 FDN340P
R36 1.00K
R17 1.00K
R15 1.00K
R9 1.00K
U4
XCF02
VCCJ VCCO
TMS TDI TCK CCLK INIT DONE
TDO D0 CF CEO OE/RST CE
DINOUT_01
PROGRAM
INSTALLE ONE
R69 5.1
NOT INSTALLED
TD_01
U5
XC18V02
TDO D0 D1 D2 D3 D4 D5 D6 D7
R68 5.1
R75 1.00K
U1
DS1706
PBRST WDS NMI ST IN RST
R56 1.00K
R58 10.0K
R57 1.00K
J2
J3
4148 D42
R55 4.99K
+2.5V
CT10
O_CLK
O_FSYNC
O_DIN
O_METER
VCC
LOCAL_ARB_REQ
+DIGin
GLOBAL_ARB_STAT
LOCAL_GRANT
O_DOUT
O_RET_CLK
LOCAL_ARB
IO_SLOT_ARB
O_BD_ID[0]
O_BD_ID[1]
O_BD_ID[2]
O_BD_ID[3]
O_BD_ID[4]
O_BD_ID[5]
O_BD_ID[6]
O_BD_ID[7]
CT7
TCK
TDO
TDI
TMS
SW_Y_4
SW_Y_3
SW_Y_2
SW_Y_1
SW_Y_0
R10 1.00K
R5 1.00K
R4 1.00K
R3 1.00K
R2 1.00K
FDR_2.5REF
C11 0.1uF
C3 0.1uF
C9 0.1uF
C1 0.1uF
FSOUT
FSIN
C6 0.01uF
D22 BAT54
C8 0.01uF
R16 10.0K
U11
ADS7841
CH0 CH1 CH2 CH3 COM VREF DCLK CS SHDN DIN MODE VCC BUSY DOUT GND
FDR_1
FDR_2
FDR_3
FDR_4
AD_CLK_14
AD_CS_14
AD_SDI_14
AD_SDO_14
U8
FDR_5
FDR_6
FDR_7
FDR_8
AD_CLK_58
AD_CS_58
AD_SDI_58
AD_SDO_58
TP2
TP1
Q10
LT1117 2.5V
C25 1uF
C26 1uF
CONTRACT NO.
- SA UR US - Sergey Averin -
APPROVALS
DATE
DRAWN SA/WWP 3-3-06
CHECKED SA
ISSUED SA
W# 700865
GPSW-12
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE D
FSCM NO.
DWG. NO. 84S0161-3
REV A
SCALE
GPSW-12A PCB
SHEET 3 OF 3



Masters and Sub-GroupsPanels Switch Card Load Sheet


CT18
PWR IN
+DIGin
GND
AGND
VBAT
E1
3V
SW12
DIPSW_[0]
DIPSW_[1]
DIPSW_[2]
DIPSW_[3]
R170 1.00K
R171 1.00K
R172 1.00K
R173 1.00K
CT32
+5V IN
VCC
AGND
32VC5-5 PCB
CT44
CT45
+5VS_2
CT46
CT47
+5VS_3
CT41
UPPER BUS
CT48
LOWER BUS
CT6
METER BUS
BP_CLK_U
BP_FSYNC_U
BP_CS_CPU_DATA_U
BP_METER_U
+3.3V_U
+DIG_U
GLOBAL_ARB_U
BP_MOD_DATA_U
BP_RET_CLK_U
BP_BD_ID[2]_U
BP_BD_ID[3]_U
BP_BD_ID[4]_U
BP_BD_ID[5]_U
BP_BD_ID[6]_U
BP_BD_ID[7]_U
R177 10.0K
R178 1.00K
R179 10.0K
R180 1.00K
R181 10.0K
R182 1.00K
R183 10.0K
R184 1.00K
BP_CLK_L
BP_FSYNC_L
BP_CS_CPU_DATA_L
BP_METER_L
+3.3V_L
+DIG_L
GLOBAL_ARB_L
BP_MOD_DATA_L
BP_RET_CLK_L
BP_BD_ID[2]_L
BP_BD_ID[3]_L
BP_BD_ID[4]_L
BP_BD_ID[5]_L
BP_BD_ID[6]_L
BP_BD_ID[7]_L
R194 10.0K
R195 1.00K
R196 10.0K
R197 1.00K
R198 10.0K
R199 1.00K
R200 10.0K
R201 1.00K
BP_CLK_M
BP_FSYNC_M
BP_CS_CPU_DATA_M
BP_METER_M
+3.3V_M
+DIG_M
GLOBAL_ARB_M
BP_MOD_DATA_M
BP_RET_CLK_M
BP_BD_ID[2]_M
BP_BD_ID[3]_M
BP_BD_ID[4]_M
BP_BD_ID[5]_M
BP_BD_ID[6]_M
BP_BD_ID[7]_M
R13 10.0K
R12 1.00K
R15 10.0K
R14 1.00K
R17 10.0K
R16 1.00K
R19 10.0K
R18 1.00K
R188 10.0K
R189 10.0K
R192 10.0K
R190 10.0K
R193 1.00K
R191 1.00K
R205 10.0K
R206 10.0K
R209 10.0K
R207 10.0K
R210 10.0K
R208 10.0K
R24 10.0K
R23 10.0K
R25 10.0K
R27 10.0K
R26 10.0K
R28 1.00K
U16
XCF04
NOT INSTALLED
VCCJ
VCCO
TMS
TDI
TCK
CLK
OE/RST
CE
CEO
TDO
D0
CF
AT_TMS
AT_TDI
AT_TCK
CCLK
INIT
DONE
PROMDATA
PROGRAM
R141 3.3
AT_FPGA_TDI
U15
XC18V04
R135 1.00K
R142 3.3
AT_TDO
D1
D2
D3
D4
D5
D6
D7
J1
AGND
SW11
CT42
REMOTE
CPU_RESET_SW
R169 10.0K
VCC
SW10
CT43
MSR_SELECT_SW
R168 10.0K
C6 0.1uF
C7 0.1uF
C257 0.1uF
C258 0.1uF
C274 0.1uF
C275 0.1uF
C247 0.01uF
C217 0.1uF
C228 0.1uF
C229 0.1uF
C236 0.1uF
+DIGin
F6
POLYSW 1.0A
+REG1in
R222 3.32K
FB5A
R221 53.6K
R220 1.00K
Q14
LM2679
CB5A
L16
INSTALL ONE
L17
C273 0.01uF
C270 330uF
C269 10uF
C264 10uF
C263 1uF
6.19K R219
C287 0.22uF
D9 MBRD835
C281 47uF
C282 47uF
C283 1500uF
Z9 1N5339 5.6V
Z8 1SMB5919 5.6V
Z5 1SMB5919 5.6V
Z12 1SMB5919 5.6V
5V-B
TP12
VCC
TP11
F5
+REG2in
R218 3.32K
FB5B
R217 53.6K
R216 1.00K
Q13
CB5B
L14
L15
C272 0.01uF
C268 330uF
C267 10uF
C262 10uF
C261 1uF
6.19K R215
C286 0.22uF
D8 MBRD835
C278 47uF
C279 47uF
C280 1500uF
Z7 1N5339 5.6V
Z11 1SMB5919 5.6V
Z6 1SMB5919 5.6V
Z4 1SMB5919 5.6V
5V-DS
TP10
+5VS
TP9
F7
+REG3in
R214 2.43K
FB3
R213 5.76K
R212 1.00K
Q12
CB3
L12
L13
C271 0.01uF
C266 330uF
C265 10uF
C260 10uF
C259 1uF
6.19K R211
C284 0.22uF
D7 MBRD835
C276 47uF
C285 47uF
C277 1500uF
Z13 1SMB5915 3.9V
Z10 1SMB5915 3.9V
Z14 1SMB5915 3.9V
3.3V
TP8
+3.3V
TP7
F1
+REG4in
R78 3.32K
FB5C
R77 53.6K
R76 1.00K
Q5
CB5C
L3
L4
C21 0.01uF
C16 330uF
C15 10uF
C14 10uF
C13 1uF
6.19K R75
C32 0.22uF
D1 MBRD835
C29 47uF
C33 47uF
C26 1500uF
Z2 1SMB5919 5.6V
Z1 1SMB5919 5.6V
Z3 1SMB5919 5.6V
5V-A
TP3
VCC
TP2
TP1
TP5
TP6
TP4
+3.3V_U_ENBL
R185 10.0K
Q11
FDN340P
R186 1.00K
+3.3V_L_ENBL
R202 10.0K
Q15
R203 1.00K
+3.3V_M_ENBL
R20 10.0K
Q1
R21 1.00K
CONTRACT NO.
- SA UR US - Sergey Averin -
APPROVALS
DATE
DRAWN
SA
8-6-07
CHECKED
SA
ISSUED
SA
W# 700740
HC-9
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE
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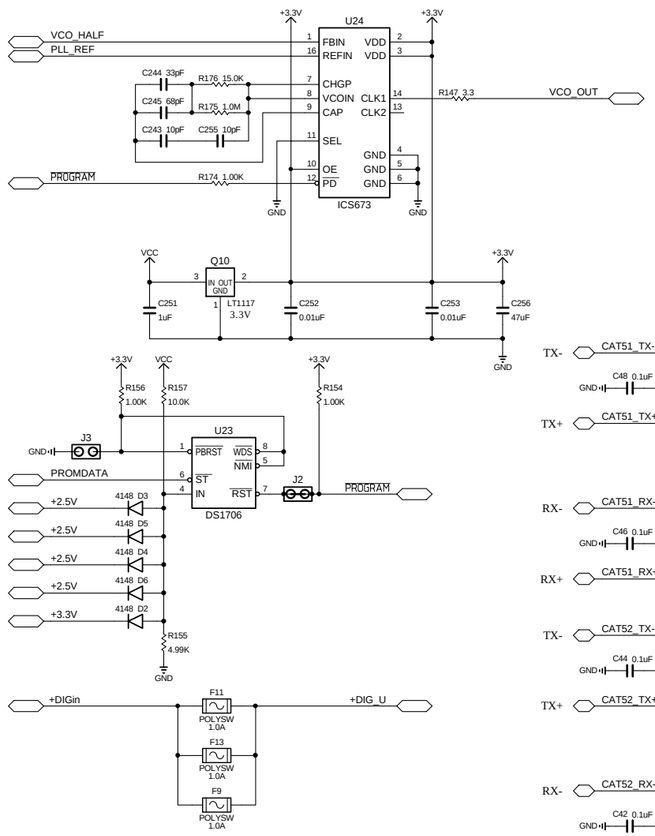
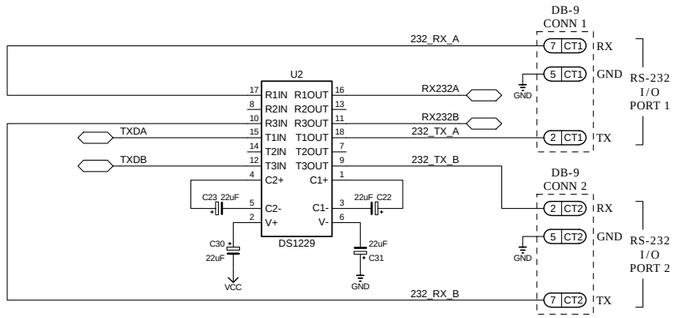
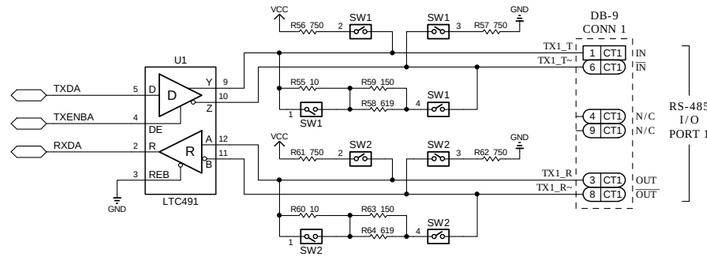
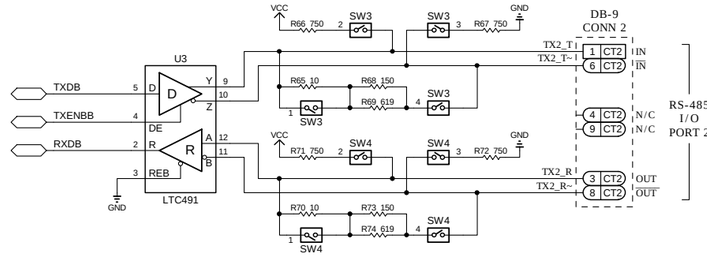
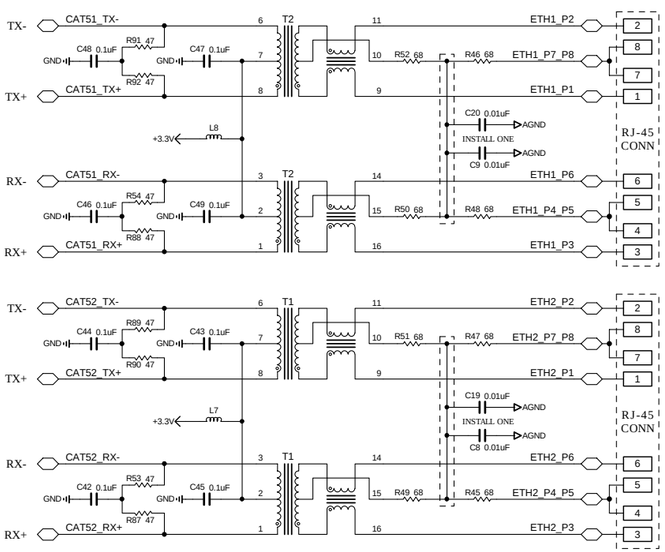
FSCM NO.
DWG. NO.
84S0193-1
REV
E
SCALE
HC-9E PCB
SHEET
1 OF 7

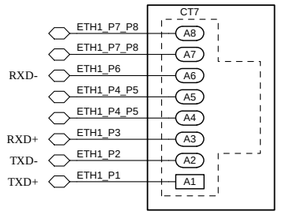


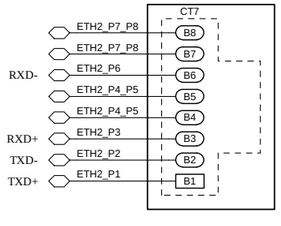


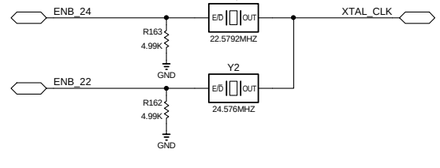


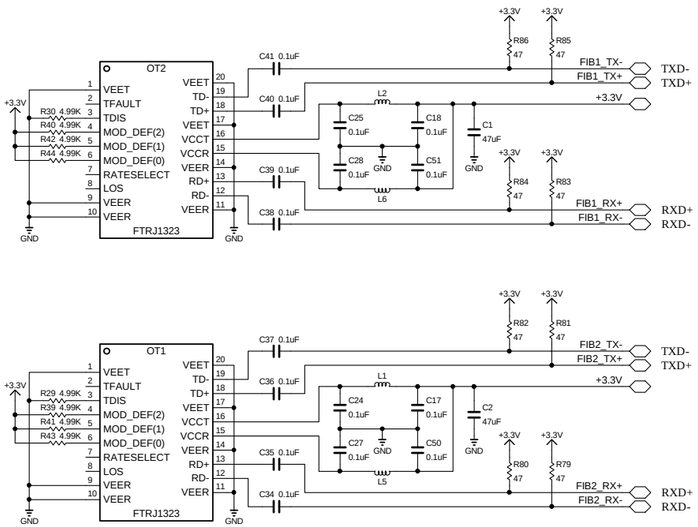


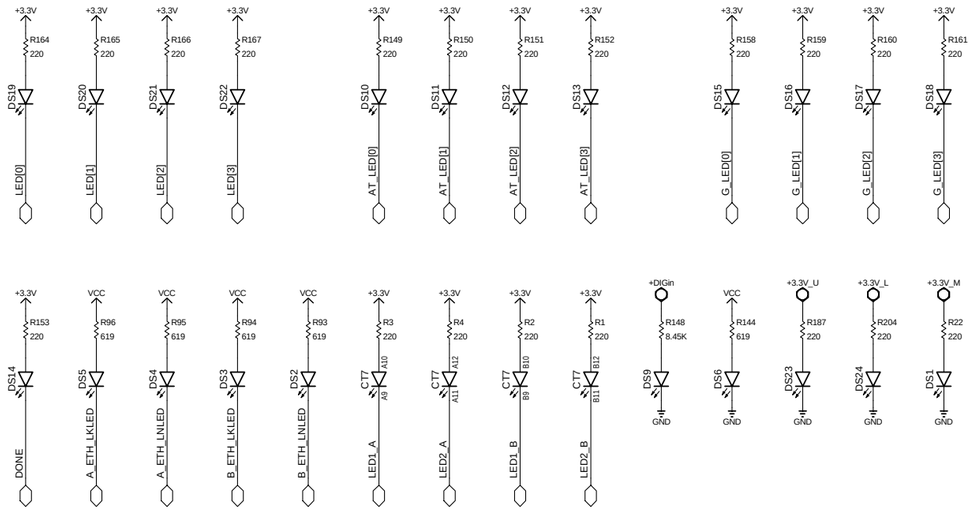




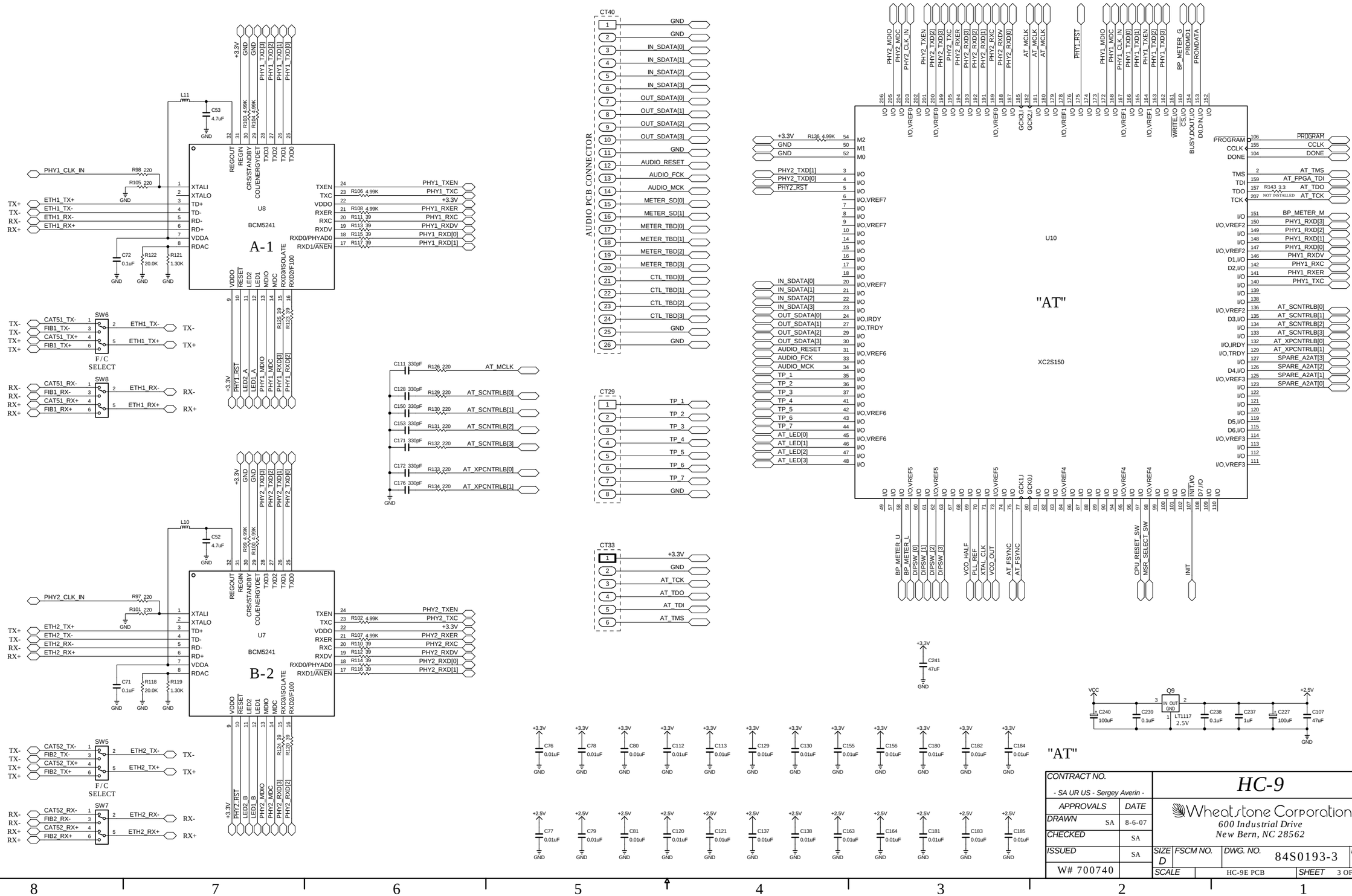








CONTRACT NO. - SA UR US - Sergey Averin -		HC-9	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	8-6-07		
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0193-2 / REV E	
W# 700740		SCALE HC-9E PCB / SHEET 2 OF 7	



Host Controller Card Schematic - Sheet 3 of 7

Power Connector
CT17
GND
A_PC104-5V
GND
VCC
A_PC104+12V
A_PC104-12V
VCC
CT28
GND
A_MEMCS16
A_IOCS16
A_IRQ10
A_IRQ11
A_IRQ12
A_IRQ13
A_IRQ14
A_DACK0
A_DRQ0
A_DACK5
A_DRQ5
A_DACK6
A_DRQ6
A_DACK7
A_DRQ7
VCC
A_MASTER
GND
A_SBHE
A_LA23
A_LA22
A_LA21
A_LA20
A_LA19
A_LA18
A_LA17
A_MEMR
A_MEMW
A_SD8
A_SD9
A_SD10
A_SD11
A_SD12
A_SD13
A_SD14
A_SD15
GND
AT Bus
XT Bus
CT26
A_IOCHCK
A_SD7
A_SD6
A_SD5
A_SD4
A_SD3
A_SD2
A_SD1
A_SD0
A_IOCHRDY
A_AEN
A_SA19
A_SA18
A_SA17
A_SA16
A_SA15
A_SA14
A_SA13
A_SA12
A_SA11
A_SA10
A_SA9
A_SA8
A_SA7
A_SA6
A_SA5
A_SA4
A_SA3
A_SA2
A_SA1
A_SA0
GND
GND
A_PC104_RST
VCC
A_IRQ9
A_PC104-5V
A_DRQ2
A_PC104-12V
A_0WS
A_PC104+12V
GND
A_SMEMW
A_SMEMR
A_IOW
A_IOR
A_DAC3
A_DRQ3
A_DAC1
A_DRQ1
A_REFRESH
A_SYSCLK
A_IRQ7
A_IRQ6
A_IRQ5
A_IRQ4
A_IRQ3
A_DAC2
A_TC
A_BALE
VCC
A_OSC
GND
GND
CT3
Keyboard
A_KDATA
GND
KBD_5V
A_KCLK
A_ETH_LNLED
A_ETH_LKLED
CT5
R7 619
R6 619
VCC
MAIN (A)
ETHERNET RJ-45 CONNECTOR
A_ETH_LKLED
A_ETH_LNLED
A_ETH_RXD-
A_ETH_P5
A_ETH_P4
A_ETH_RXD+
A_ETH_TXD-
A_ETH_TXD+
R8 3.3
R5 3.3
RXD-
RXD+
TXD-
TXD+
CT5
CT8
Keyboard
GND
A_KDATA
KBD_5V
A_KCLK
GND
CT37
Keyboard
VBAT
GND
A_KDATA
POWERGOOD
A_PC104SPKR
POWERGOOD
VCC
A_KCLK
A_KCLOCK
GND
CT38
POWERGOOD
GND
F2
POLYSW
0.3A
KBD_5V
+3.3V
C110
1uF
C75
100uF
C216
47uF
GND
Q8
IN
OUT
GND
LT1117
2.5V
C154
0.1uF
C175
0.1uF
C179
1uF
C213
100uF
C70
47uF
+2.5V
GND
VCC
R146
619
DSR
GND
A_SD12
RXDA
TXENBA
RXDB
TXENBB
TXDB
RX232B
TXDA
RX232A
TXCBL
TXRST
BP_CLK_M
BP_FSYNC_M
BP_CPU_DATA_M
AT_MCLK
A_DACK7
A_DRQ7
+3.3V_M_ENBL
GLOBAL_ARB_M
BP_MOD_DATA_M
BP_RET_CLK_M
B_ENBL
A_ENBL
PROMD2
GND
+3.3V
M2
M1
M0
R139 4.99K
A_SD7
A_PC104_RST
A_SD6
A_SD5
A_IRQ9
A_SD4
A_SD3
A_SD2
A_SD1
A_SD0
A_IOCHRDY
A_SBHE
A_AEN
A_IOCS16
A_IOW
A_IRQ11
A_IOR
A_IRQ12
A_SD11
A_SD10
A_SD8
A_SD9
A_SA11
A_SA10
A_SA9
A_SA8
A_SA7
A_SA6
A_SA5
A_SD15
A_SA4
A_BALE
A_SA3
A_SA2
A_SA1
U13
MAIN (A)
XC2S150
PROGRAM
CCLK
DONE
TMS
TDI
TDO
TCK
PROGRAM
CCLK
DONE
PC_TMS
TDO2TDI
PC_TDO
PC_TCK
WRITE_I/O
CS_I/O
BUSY_DOUT_I/O
D0_DIN_I/O
CS_FAIL
CS_ID_A
CS_MSR
CS_SELECT
AT_FSYNC
AT_SCNTRLB[0]
AT_SCNTRLB[1]
AT_SCNTRLB[2]
AT_SCNTRLB[3]
AT_XPCNTRLB[0]
AT_XPCNTRLB[1]
SPARE_A2AT[3]
SPARE_A2AT[2]
SPARE_A2AT[1]
SPARE_A2AT[0]
SPARE_AxB[3]
SPARE_AxB[2]
SPARE_AxB[1]
SPARE_AxB[0]
SPARE_A2B[3]
SPARE_A2B[2]
SPARE_A2B[1]
SPARE_A2B[0]
VGA_2_CS_2
A_SA0
A_SD14
A_SD13
POWERGOOD
DIPSW_[0]
DIPSW_[1]
DIPSW_[2]
DIPSW_[3]
LED[0]
LED[1]
LED[2]
LED[3]
BP_CLK_L
BP_FSYNC_L
BP_CS_CPU_DATA_L
+3.3V_L_ENBL
GLOBAL_ARB_L
BP_MOD_DATA_L
BP_RET_CLK_L
CTL_TBD[0]
CTL_TBD[1]
CTL_TBD[2]
CTL_TBD[3]
BP_CLK_U
BP_FSYNC_U
BP_CS_CPU_DATA_U
+3.3V_U_ENBL
GLOBAL_ARB_U
BP_MOD_DATA_U
BP_RET_CLK_U
ENB_22
ENB_24
CPU_RESET_SW
MSR_SELECT_SW
INIT
CS_2_VGA_1
CS_2_VGA_2
VGA_2_CS_1
CT20
+3.3V
GND
PC_TCK
PC_TDO
PC_TDI
PC_TMS
R128 100
CS_ID_A
GND
CT13
A_ETH_TXD+
A_ETH_TXD-
A_ETH_LNKED
A_ETH_RXD+
A_ETH_RXD-
A_ETH_LNKED
Ethernet Connector
CT15
A_ETH_LNLED
A_ETH_LKLED
A_ETH_P5
A_ETH_P4
A_ETH_RXD+
A_ETH_RXD-
A_ETH_TXD+
A_ETH_TXD-
Ethernet Connector
FDD
CT24
A_FDD_DCHNG
A_FDD_SIDE
A_FDD_RD
A_FDD_WP
A_FDD_TR00
A_FDD_WG
A_FDD_WD
A_FDD_STEP
A_FDD_DIR
A_FDD_MO0
A_FDD_DS0
A_FDD_IDX
GND
FDD
CT22
A_FDD_SIDE
A_FDD_RD
A_FDD_WP
A_FDD_TR00
A_FDD_WG
A_FDD_WD
A_FDD_STEP
A_FDD_DIR
A_FDD_MO0
A_FDD_PIN_8
A_FDD_DCHNG
A_FDD_DS0
A_FDD_IDX
A_FDD_PIN_13
A_FDD_PIN_11
A_FDD_PIN_9
A_FDD_PIN_7
VCC
FDD
PWR
CT31
VCC
GND
GND
FDD_VGA+12V
C61 47uF
C146 47uF
C149 47uF
C226 47uF
C65 0.01uF
C66 0.01uF
C67 0.01uF
C221 0.01uF
C222 0.01uF
C223 0.01uF
C99 1uF
C100 0.01uF
C102 0.01uF
C104 0.01uF
C118 0.01uF
C119 0.01uF
C135 0.01uF
C136 0.01uF
C161 0.01uF
C162 0.01uF
C209 1uF
C203 0.01uF
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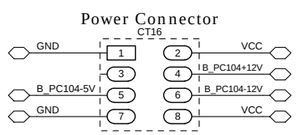
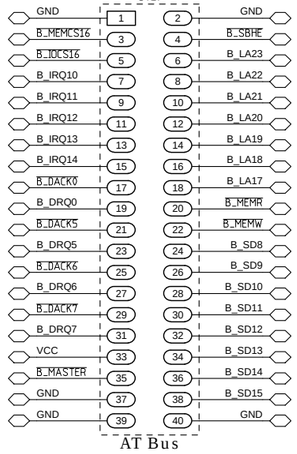
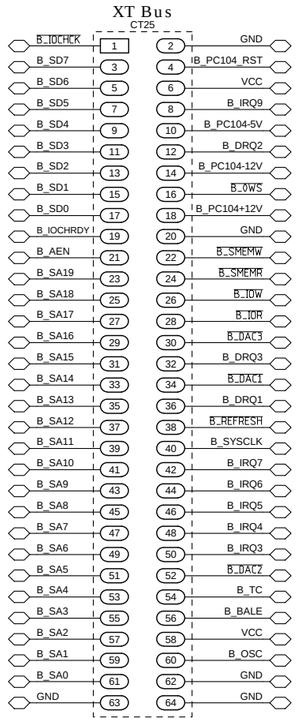
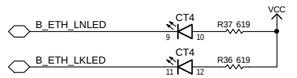
C207 0.01uF
C101 0.01uF
C103 0.01uF
C105 0.01uF
C106 1uF
C126 0.01uF
C127 0.01uF
C147 0.01uF
C148 0.01uF
C169 0.01uF
C170 0.01uF
C202 1uF
C204 0.01uF
C206 0.01uF
C208 0.01uF
MAIN (A) PC-104
CONTRACT NO.
- SA UR US - Sergey Averin -
APPROVALS
DATE
DRAWN SA 8-6-07
CHECKED SA
ISSUED SA
W# 700740
HC-9
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE D
FSCM NO.
DWG. NO. 84S0193-4
REV E
SCALE HC-9E PCB
SHEET 4 OF 7

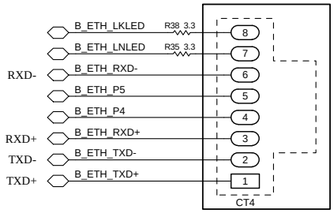
Host Controller Card Schematic - Sheet 4 of 7

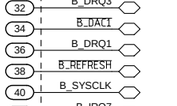


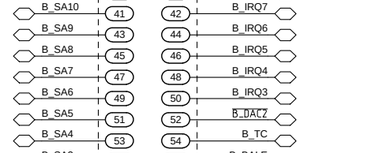


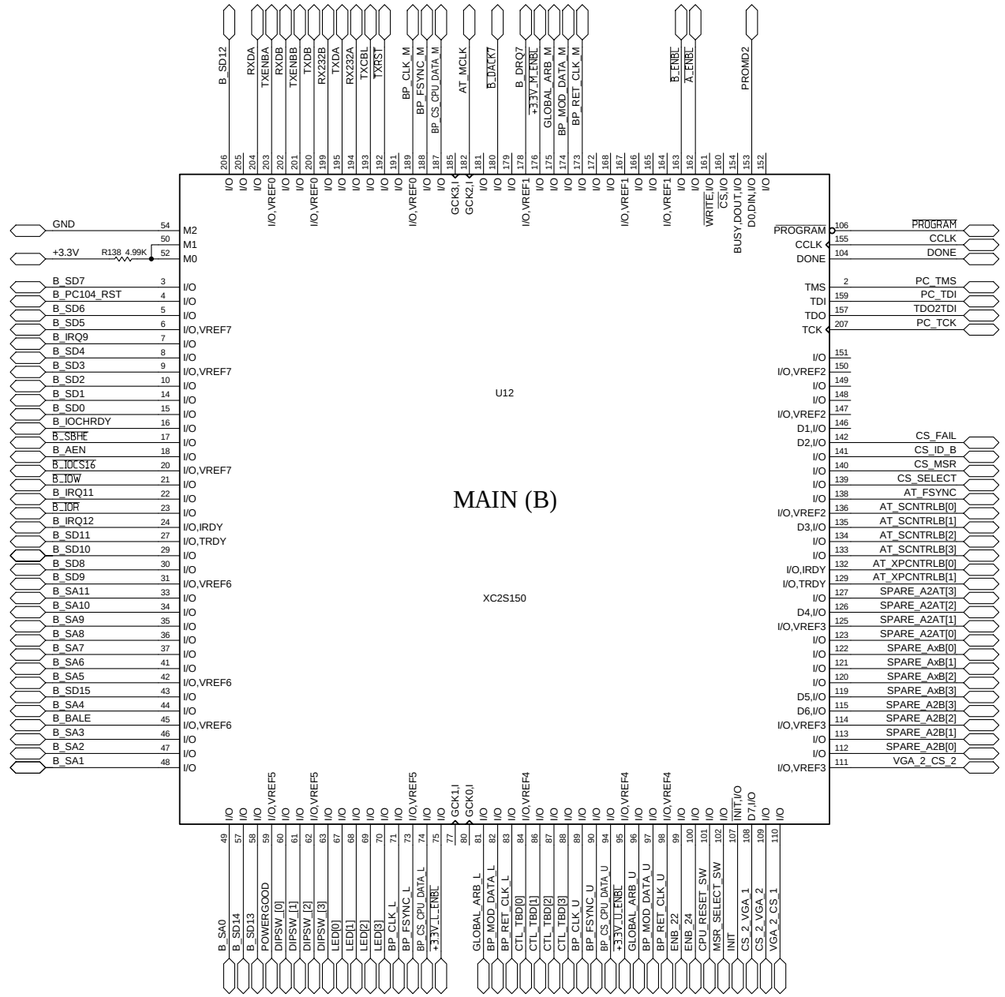


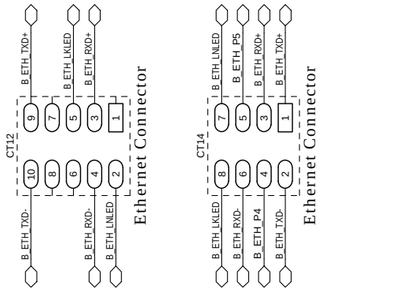


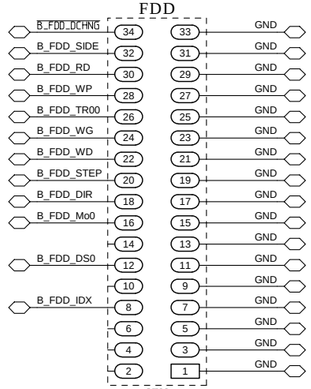


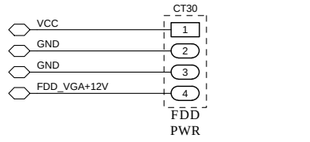






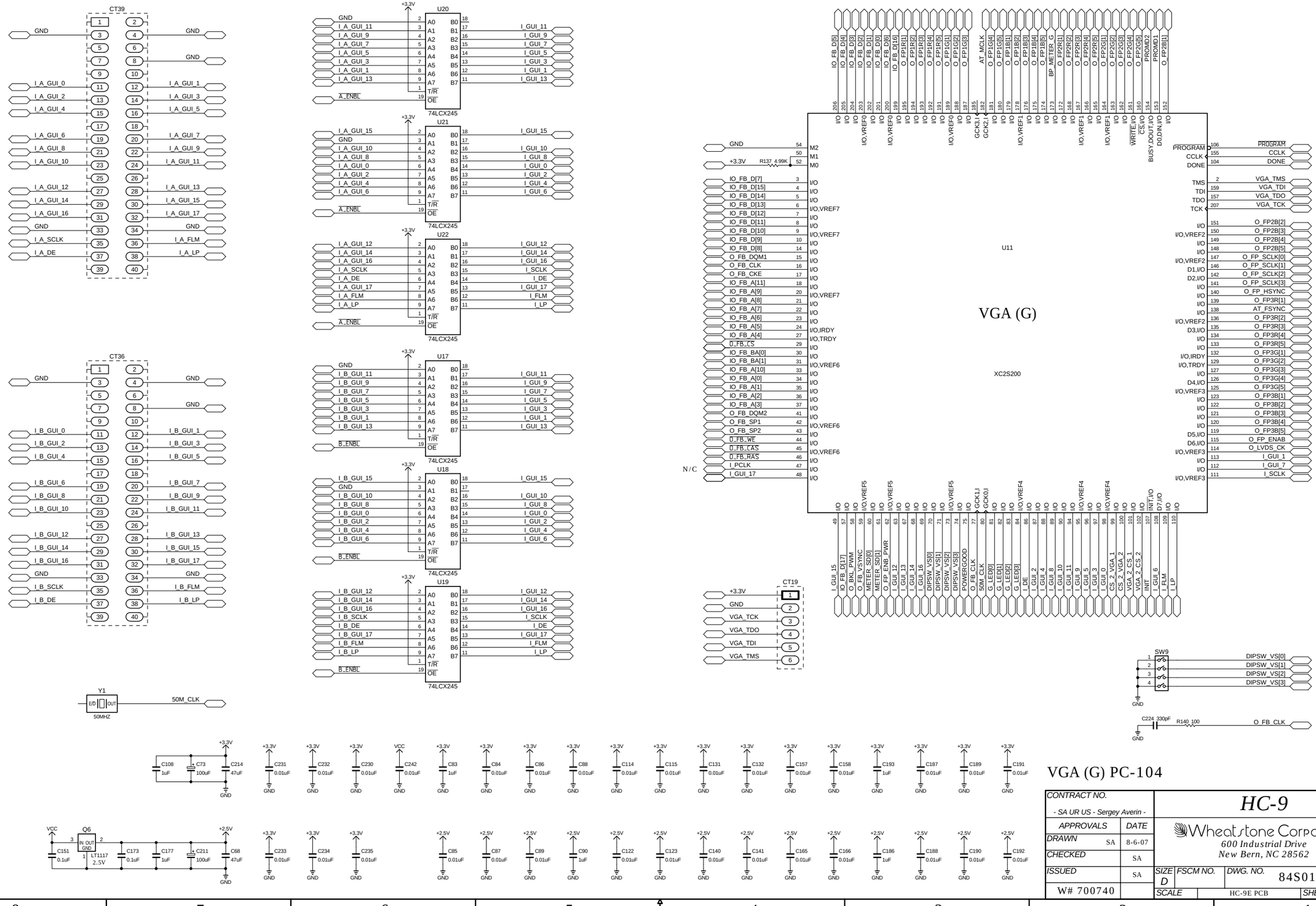




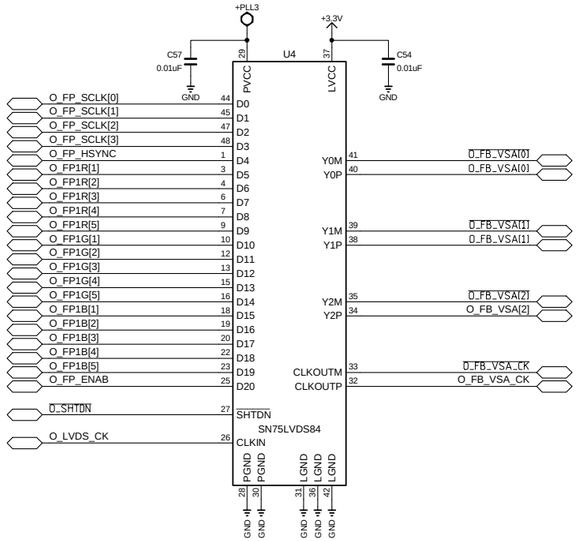


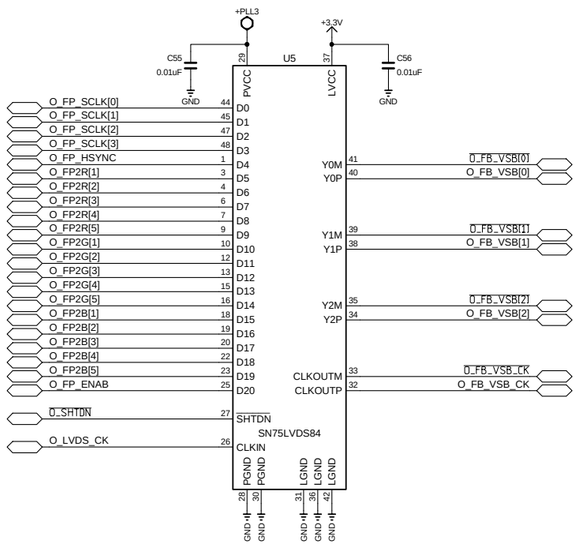
FAIL SAFE (B) PC-104

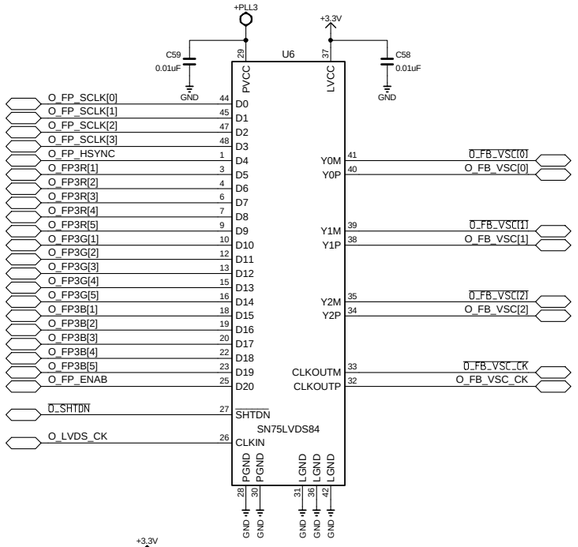
CONTRACT NO. - SA UR US - Sergey Averin -		*HC-9*	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	8-6-07		
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0193-5 / REV E	
W# 700740		SCALE HC-9E PCB / SHEET 5 OF 7	

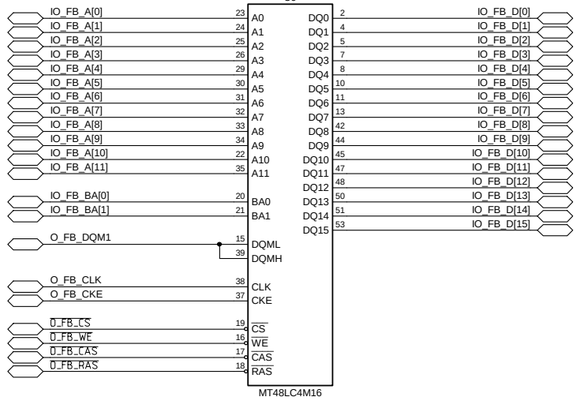


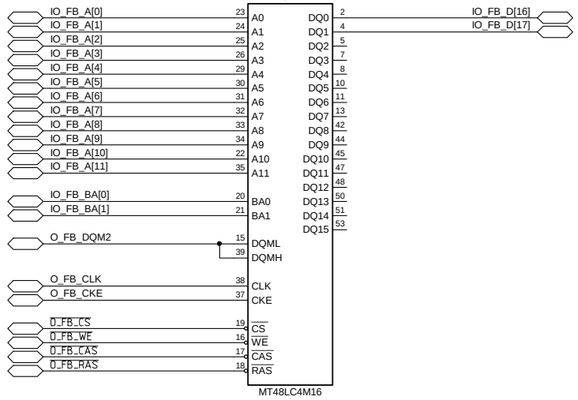
Host Controller Card Schematic - Sheet 6 of 7

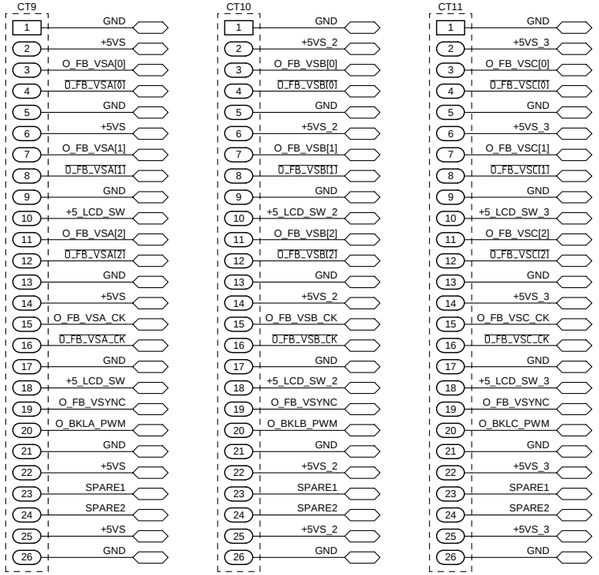


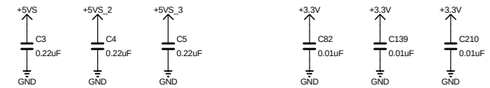




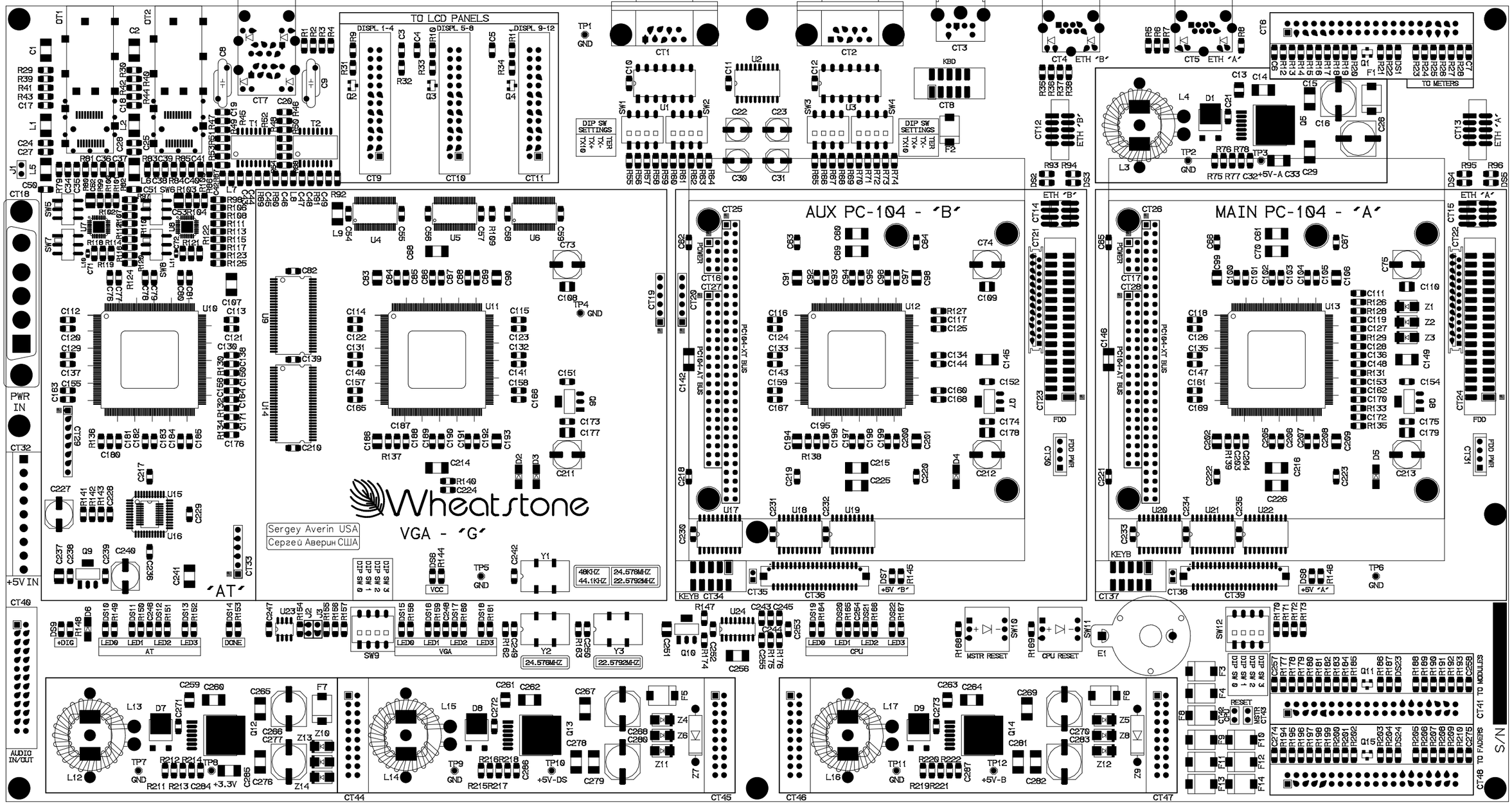




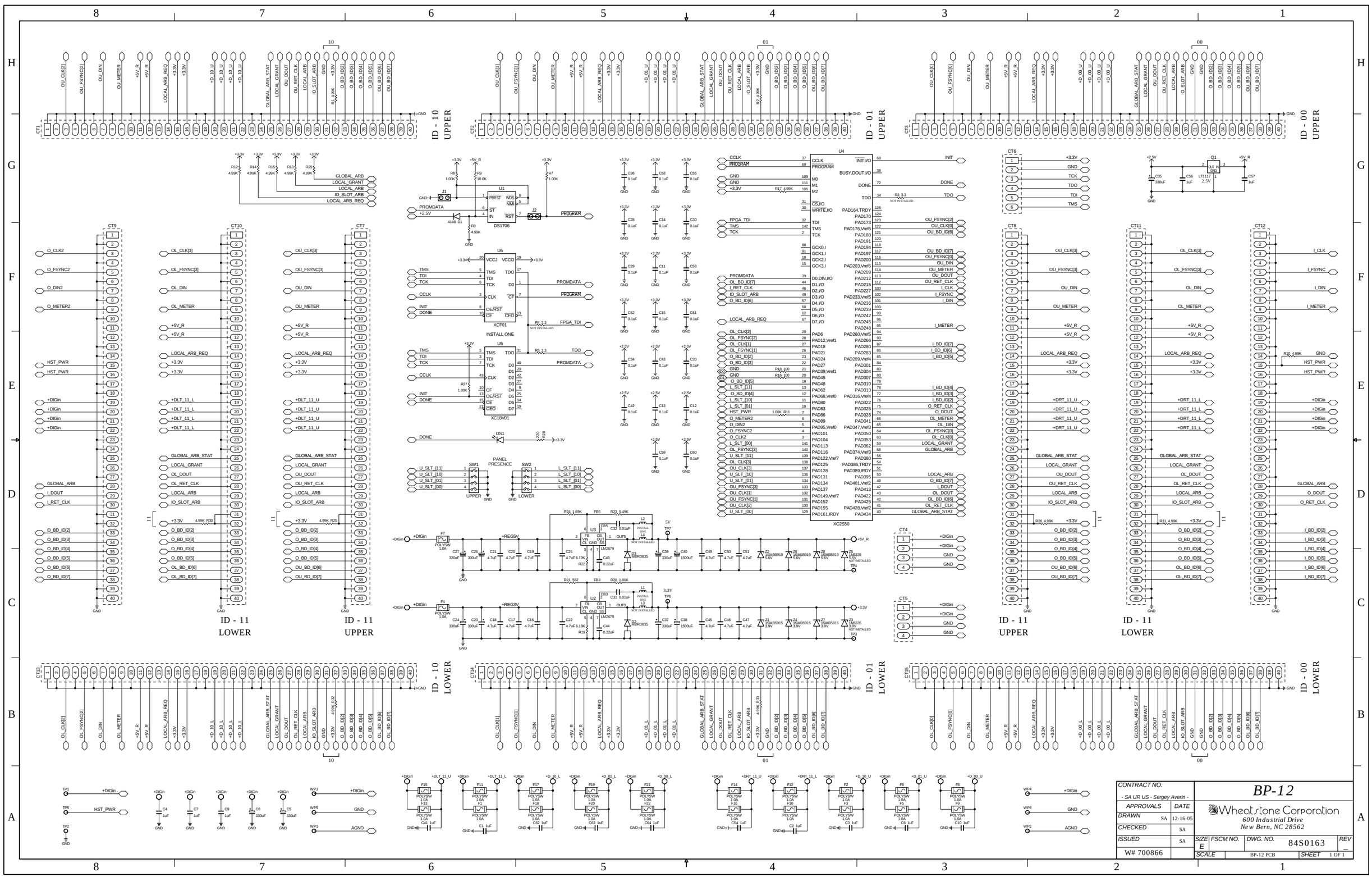


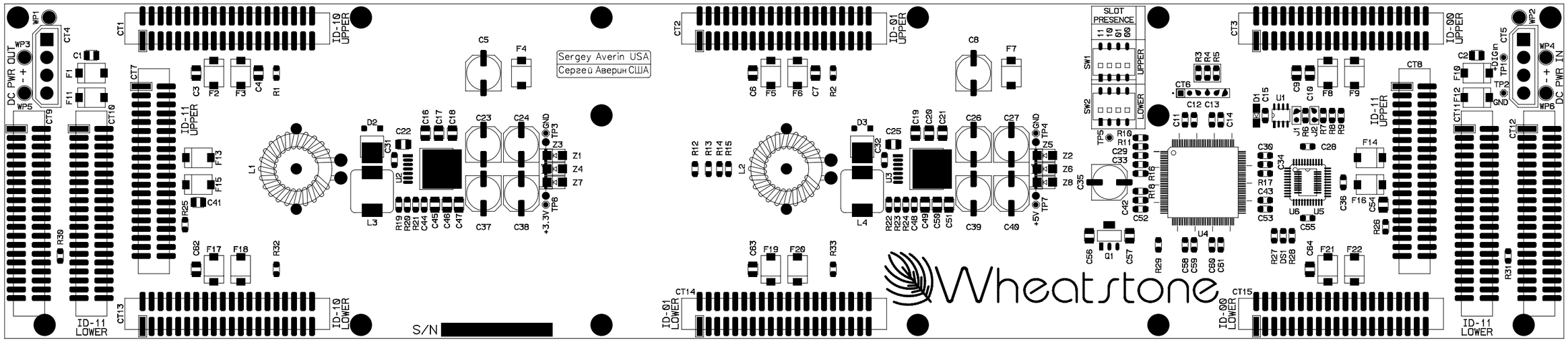


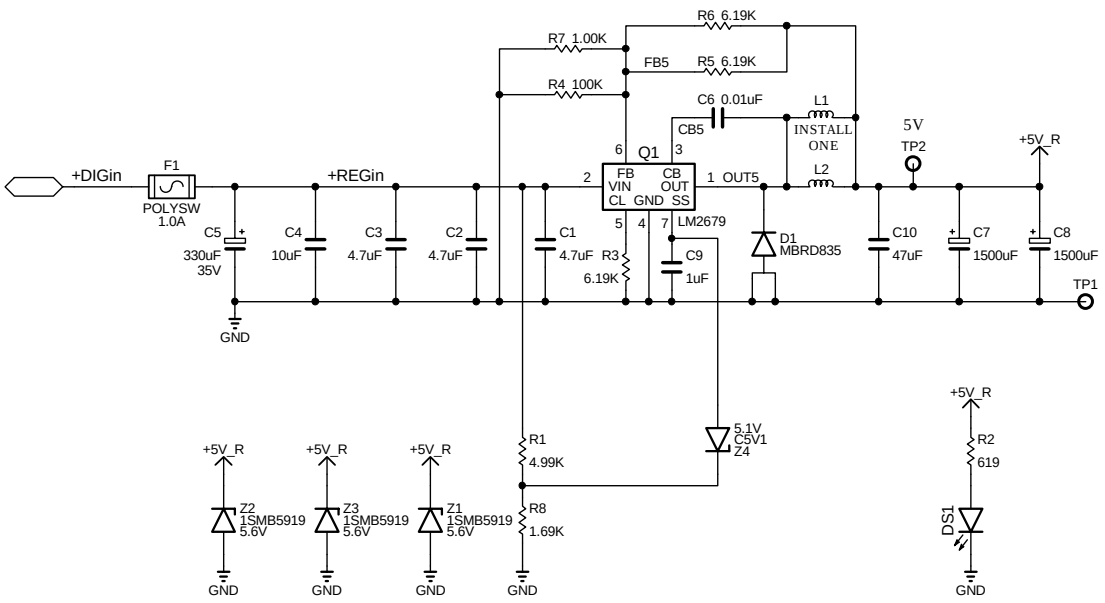
CONTRACT NO. - SA UR US - Sergey Averin -		HC-9	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	8-6-07		
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0193-7 / REV E	
W# 700740		SCALE / HC-9E PCB / SHEET 7 OF 7	



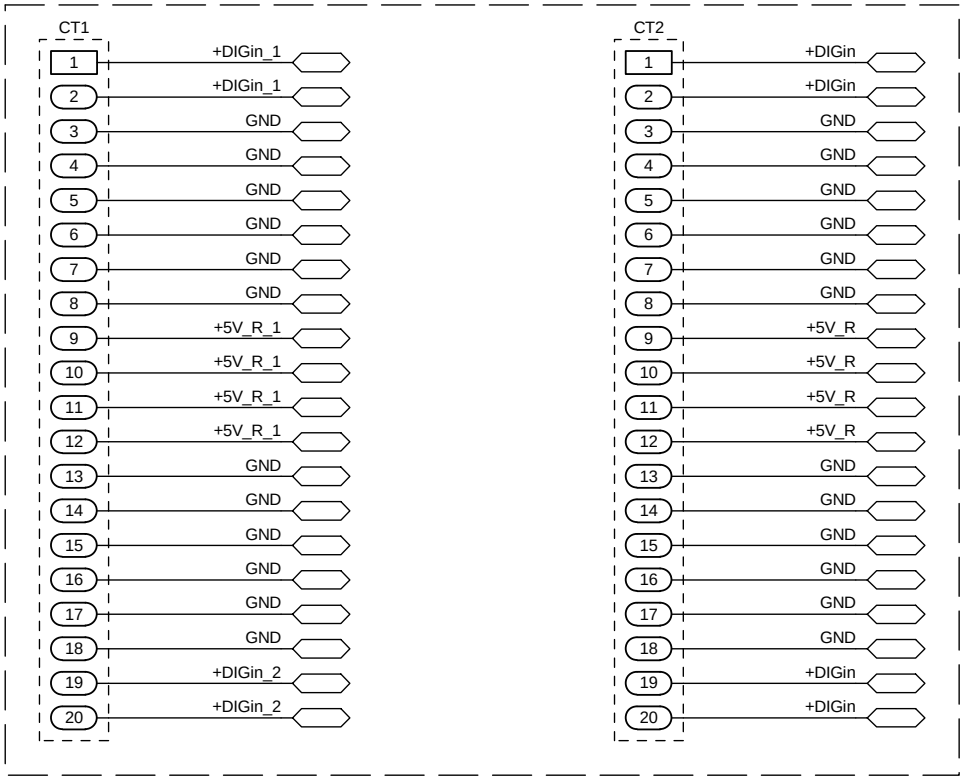
Host Controller Card Load Sheet


ID - 10 UPPER
ID - 01 UPPER
ID - 00 UPPER
ID - 11 LOWER
ID - 11 UPPER
ID - 11 UPPER
ID - 11 LOWER
ID - 10 LOWER
ID - 01 LOWER
ID - 00 LOWER
U4
XC2S50
U1
DS1706
U6
XCF01
INSTALL ONE
U5
XC18V01
PANEL PRESENCE
SW1
SW2
UPPER
LOWER
U3
U2
LM2679
CONTRACT NO.
- SA UR US - Sergey Averin -
APPROVALS
DATE
DRAWN SA 12-16-05
CHECKED SA
ISSUED SA
W# 700866
BP-12
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE E
FSCM NO.
DWG. NO. 84S0163
REV –
SCALE BP-12 PCB
SHEET 1 OF 1


Sergey Averin USA
Сергей Аверин США
Wheatstone
S/N
DC PWR OUT
DC PWR IN
SLOT PRESENCE
ID-10 UPPER
ID-01 UPPER
ID-00 UPPER
ID-11 UPPER
ID-11 LOWER
ID-10 LOWER
ID-01 LOWER
ID-00 LOWER
SW1
SW2
UPPER
LOWER
+DIGn
GND
+3.3V
+5V

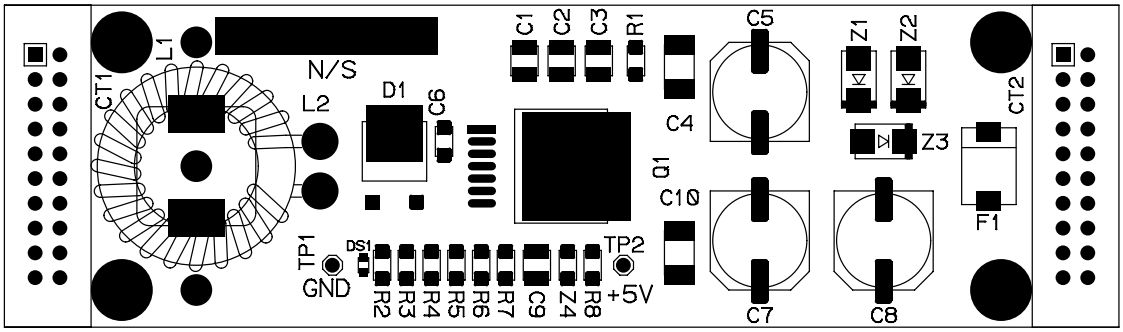


HC-9 PCB

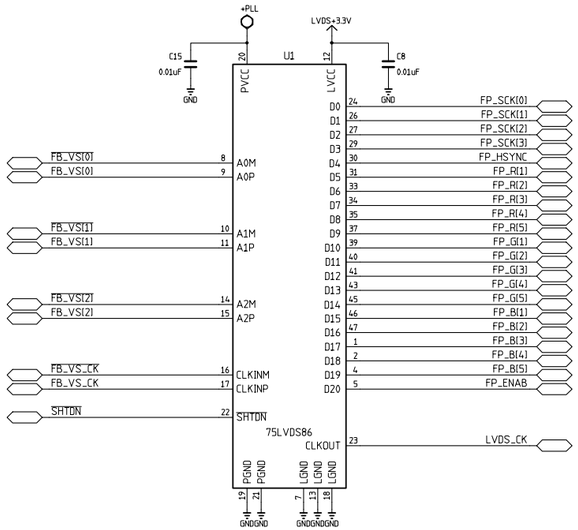


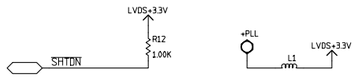
CONTRACT NO. - SA UR US - Sergey Averin -		32VC5-5	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	4-12-06		
CHECKED	SA		
ISSUED	SA	SIZE B / FSCM NO. / DWG. NO. 84S00xx	REV B
W# 700749		SCALE / 32VC5-5B PCB	SHEET 1 OF 1

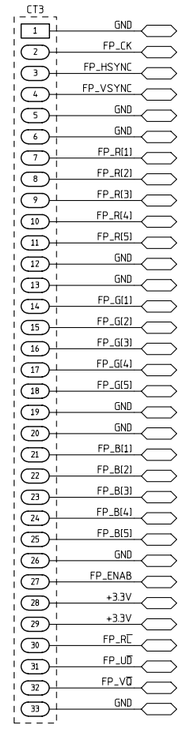
+5V DC to DC Convertor Schematic - Sheet 1 of 1

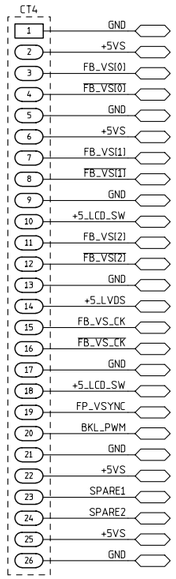


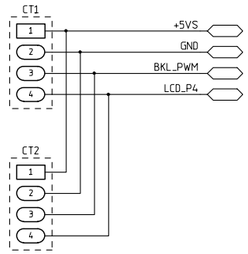
+5V DC to DC Converter Card Load Sheet

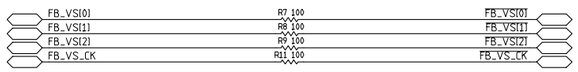


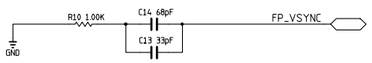


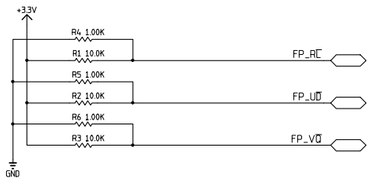


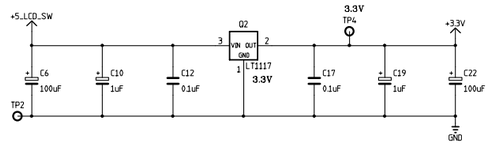


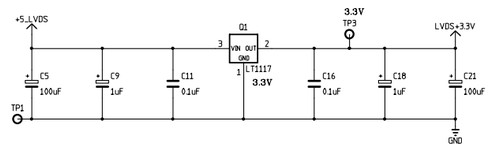


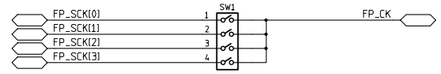




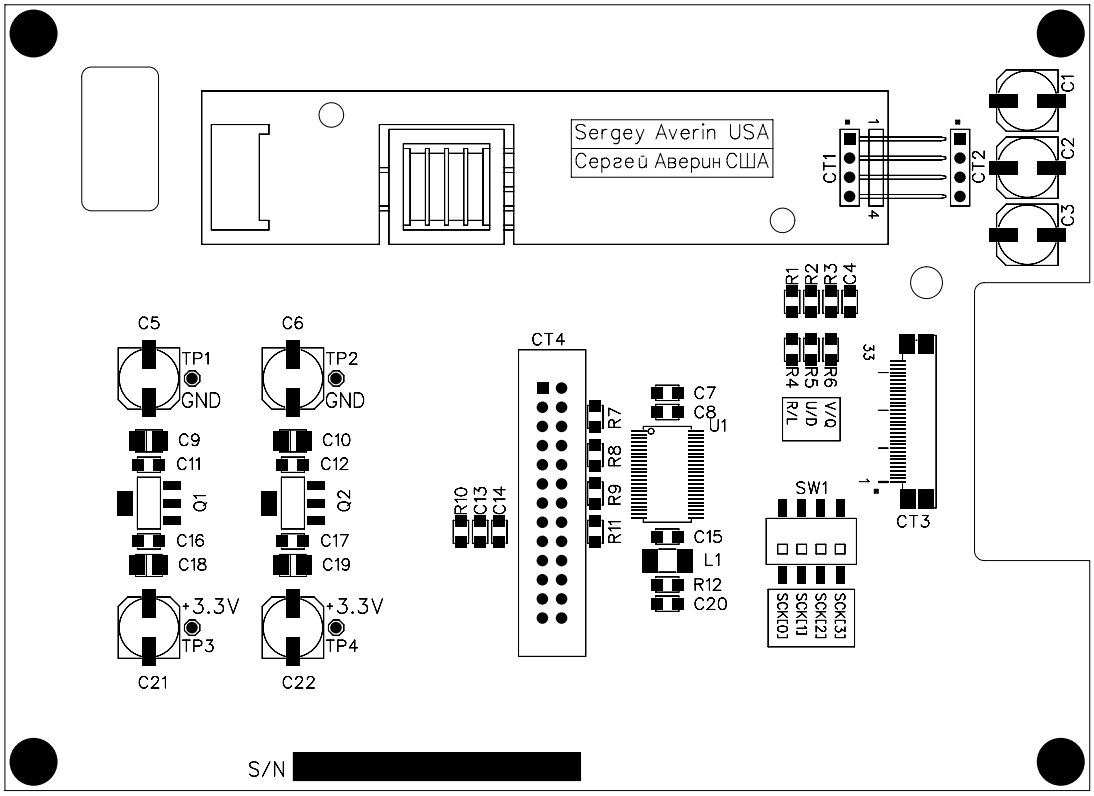




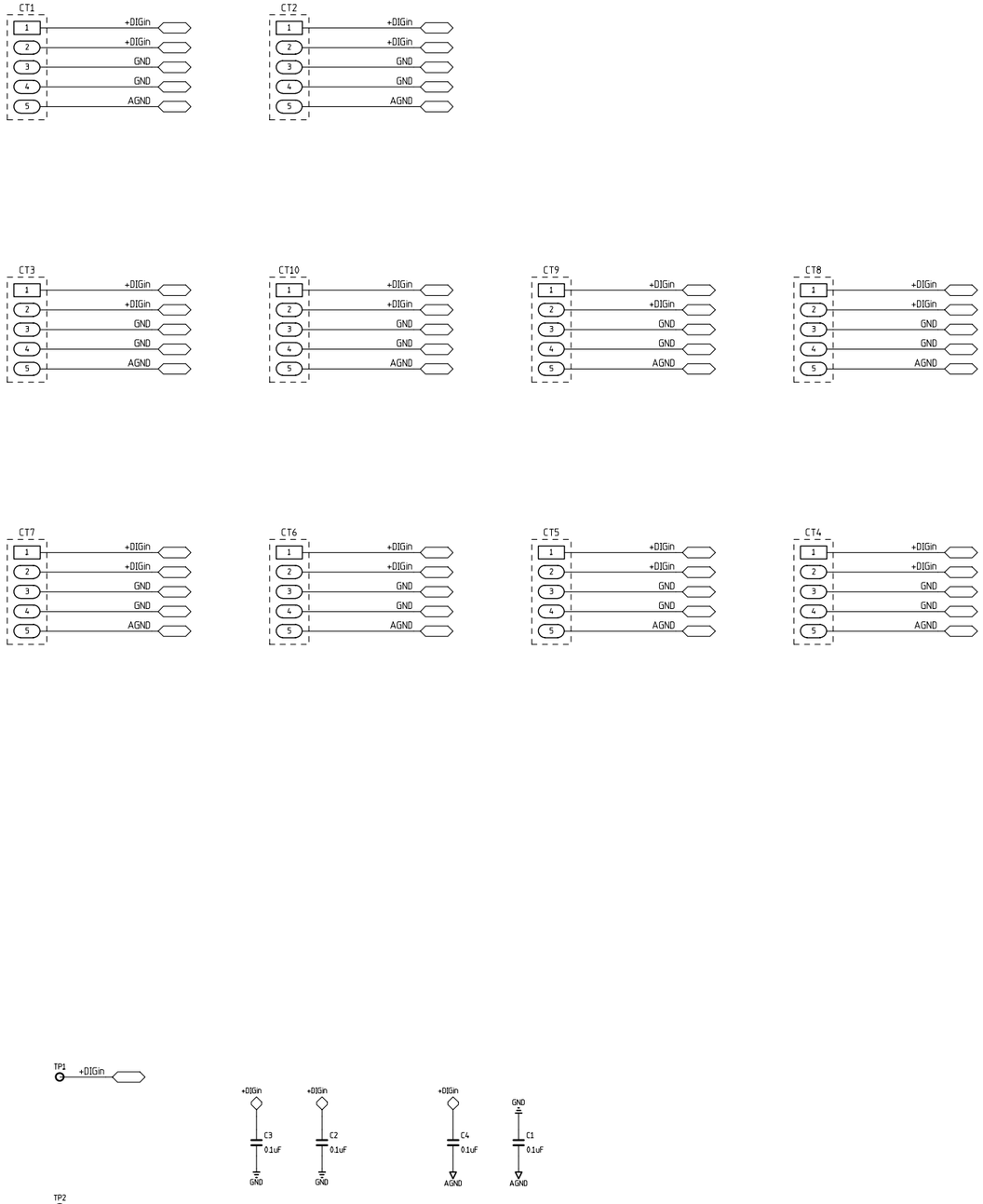




CONTRACT NO. - Sergey Averin -		VU-9	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	1-8-03		
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0141 / REV –	
W# 700745		SCALE / VU-9 PCB / SHEET 1 OF 1	

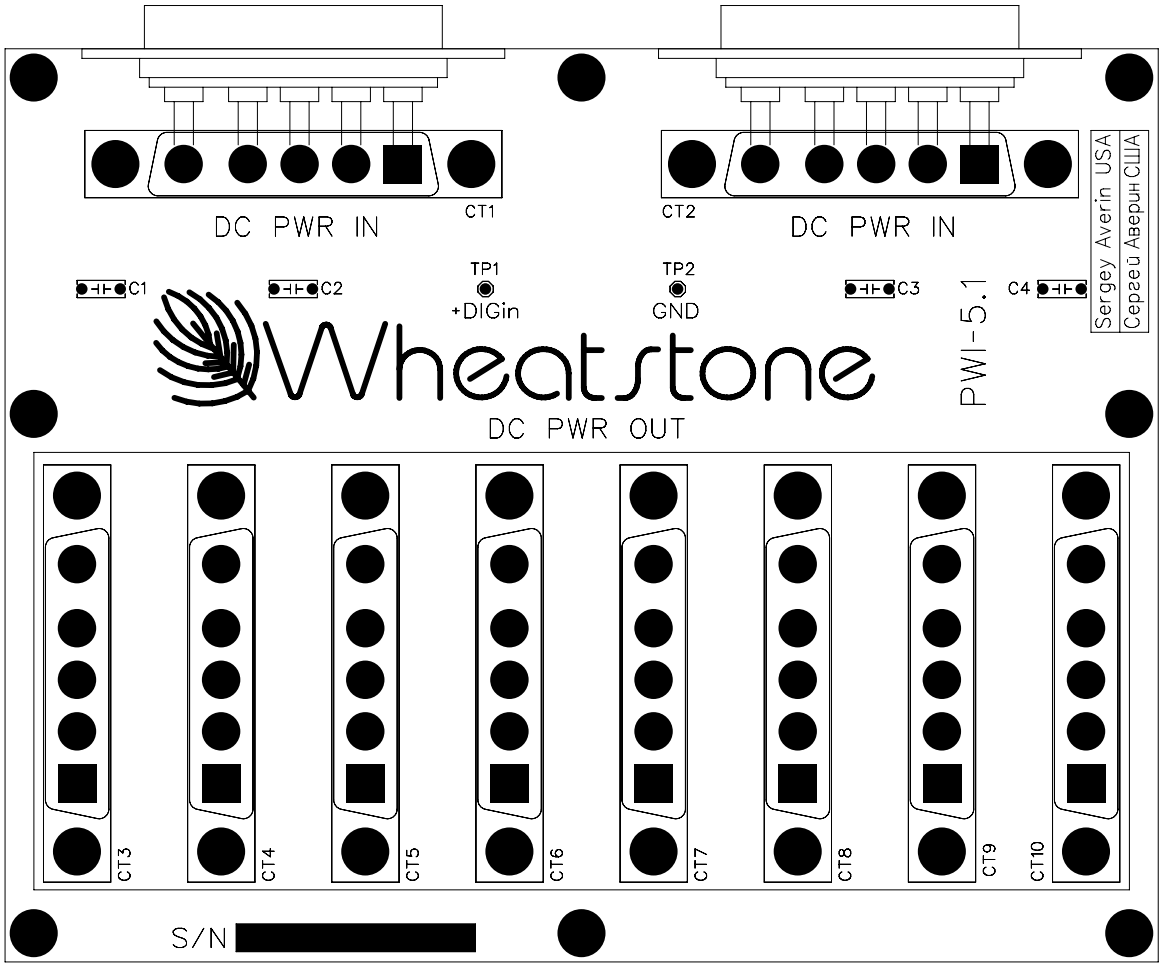


VU Receiver Card Load Sheet



CONTRACT NO. - Sergey Averin -		PWI-5.1	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN	SA 2-25-02		
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0095 / REV –	
W* 700724		SCALE / PWI-5.1 PCB / SHEET 1 OF 1	

Power Interface Card Schematic - Sheet 1 of 1



Power Interface Card Load Sheet

Appendices

Appendix 1

Appendix 2

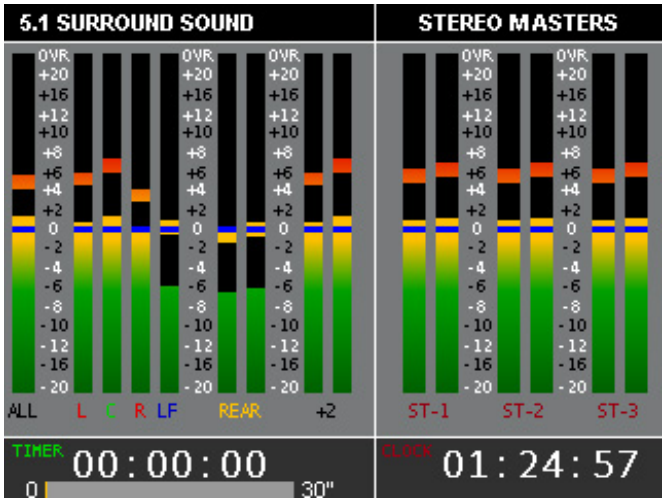
Appendix 3

Appendix 1

Contents

Control Surface Clock

The time of day clock is displayed on the bottom of the MASTER LCD screen.



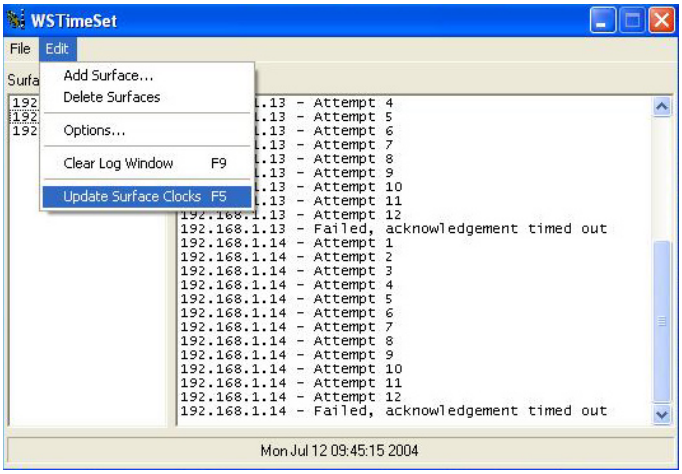
Setting the Time

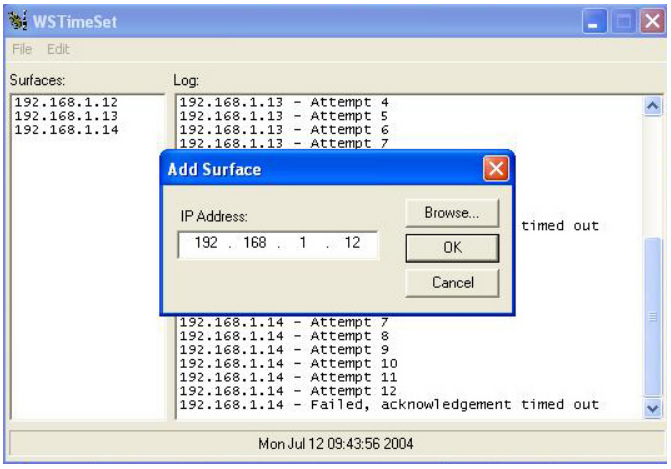
Setting the time of the control surface's clock is made via the Wheatstone Surface Time Manager software:

1. Select *Edit / Add Surface...* from the Main Menu, which will display the Add Surface form.

2. Enter an IP address of the control surface.

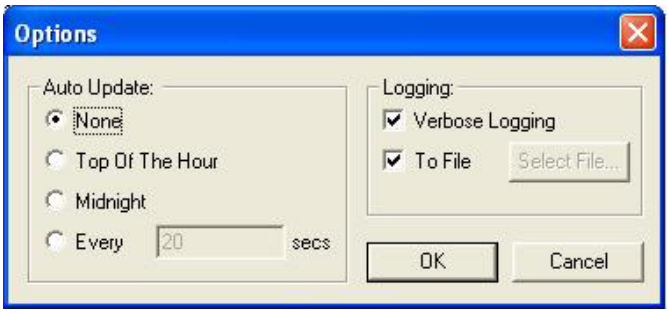
3. Select *Edit / Update Surface Clocks* or press *F5* key to update all surface clocks.





Update Options

Select *Edit / Options...* from the Main Menu. The Options form gives you different auto update options. Select the appropriate option for your application.



Synchronize

For the best accuracy synchronize the PC's clock to a master clock system. Refer to your master clock documentation for more information.

Appendix 2

Contents

Options Text File

Introduction

There are a number of operational features on the D-32 surface that are controlled by the contents of the Options Text File (D32_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.

```
// -------------------------------
// 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
MM9:0
MM10:0
MM11:0
MM12:0
MM13:0
MM14:0
MM15:0
MM16:0
// -------------------------------
// 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
SPARE13:2
SPARE14:2
SPARE15:2
SPARE16:2
// --------------------------------
// AFL /PFL defeat to studios
// --------------------------------
// Syntax: <STUDIO>:?
// <STUDIO> is the Studio name (SUT1,STU2,STU3,CR1,CR2)
// ? 1= defeated(default), 0 = not defeated
STU1:1
STU2:1
STU3:1
CR1:0
CR2:0
// --------------------------------
// MISC OPTIONS
// --------------------------------
// Syntax: SUM_AFL:?
// ? 1 = summed (default) AFL and PFL mixes are summed to PFL output.
// ? 0 = no sum, AFL only goes to AFL output.
SUM_AFL:1
// 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: USE_HELP:?
// ? 1 (default) help system enabled, 0 = no help.
USE_HELP:0
// Syntax: ONE_VIS:?
// ? 1 = one visibility for all presets, 0 (default) visibility stored for each preset.
ONE_VIS:1
// Syntax: XCHAN_VIS_DISABLE:?
// ? 0 = do not allow X visibility disable, 1 (default) allow X visibility disable.
XCHAN_VIS_DISABLE:1
// Syntax: ONE_VDIP:?
// ? 1 = one vdip config for all presets, 0 (default) vdip config stored for each preset.
ONE_VDIP:1
// Syntax: XYC_CHECKSUM:?
// ? 1 (default) = use checksum in XYC messages, 0 no checksum.
XYC_CHECKSUM:1
// Syntax: MUTE_METHOD:?
// ? 0 (default) = ON button, 1 = ON AIR.
MUTE_METHOD:1
// Syntax: HDW_LOGGER:?
// ? 1 = use hardware logger, 0 (default) no hardware logger.
HDW_LOGGER:0
```

```
// Syntax: CLOCK_24HR:?
// ? 0 (default) = 12 hour clock, 1 = 24 hour clock.
CLOCK_24HR:0
// Syntax: FRAME_RATE:?
// ? 60 (default) = 60 Hz (NTSC), 50 = 50 Hz (PAL).
FRAME_RATE:60
// Syntax: LCD_AUX:?
// ? LCD Panel for AUX Send meters 1-8 [1-10].
LCD_AUX:9
// Syntax: LCD_AUX2:?
// ? LCD Panel for AUX Send meters 9-16 [1-10].
LCD_AUX2:8
// Syntax: LCD_EQ:?
// ? LCD Panel for EQ settings [1-10].
LCD_EQ:7
// Syntax: LCD_DYN:?
// ? LCD Panel for Compressor/Gate settings [1-10].
LCD_DYN:6
// Syntax: LCD_SRND:?
// ? LCD Panel for Surround settings [1-10].
LCD_SRND:5
// Syntax: LCD_SET:?
// ? LCD Panel for Selected Info [1-10].
LCD_SET:4
// Syntax: LCD_MXM1:?
// ? LCD Panel for Mix-Minus meters [1-10].
LCD_MXM1:3
// Syntax: LCD_MXM2:?
// ? LCD Panel for Mix-Minus meters [1-10].
LCD_MXM2:10
// Syntax: LCD_MSTR:?
// ? LCD Panel for Masters meters [1-10].
LCD_MSTR:2
// Syntax: LCD_GRP:?
// ? LCD Panel for Group meters [1-10].
LCD_GRP:1
// Syntax: DCM_MUTE_LEVEL:?
// ? INF or -80 to -6 = (-60 default) dB level considered
//  muted for DCM assign LED indication.
DCM_MUTE_LEVEL:-60
// 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
// Syntax: DETENT_FADERS:?
// ? 1 = using detent input faders, 0 (default) normal input faders.
DETENT_FADERS:0
// Syntax: PAGE_FLIP_DELAY:?
// ? (default=300) Number of ms before you can press PAGE again.
// NOTE: This delay is to allow time for faders to move.
PAGE_FLIP_DELAY:300
```

```
// Syntax: NEW_INPT_BTN_MASK:?
// ? (default=1) 0 for old IS-D32 firmware, 1 for new.
// NOTE: If this setting does not match the FW, some buttons on the
//       input panel (i.e. REVERT) may not function correctly.
NEW_INPT_BTN_MASK:1
// Syntax: FORCE_PRESET_DESTS:?
// ? 0 = (default) When preset is recalled, do not disconnect destinations
that were not
//       connected when preset was saved.
// ? 1 = When preset is recalled, disconnect any destinations that were not
//       connected when preset was saved.
// NOTE: This option only affects signals connected to the control surface.
FORCE_PRESET_DESTS:0
// Syntax: SWAP_MT_LINKS:?
// ? 0 = (default) normal, 1 = swap primary/backup connections
SWAP_MT_LINKS:0
// Syntax: AUX_METERS_TOGGLE:?
// ? 1 = (default) aux meters toggle on METER button press, 0 = no toggle
AUX_METERS_TOGGLE:0
// Syntax: MXM_METERS_TOGGLE:?
// ? 1 = (default) mxm meters toggle on METER button press, 0 = no toggle
MXM_METERS_TOGGLE:1
```

Appendix 3

Contents

For the most part there are no user-replaceable parts in the D-32 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-32 CONTROL SURFACE

COMPONENT	DESCRIPTION	*WS P/N*
IS-D32 PANEL	COMPLETE INPUT PANEL WITH MOTORIZED FADERS	***"009113"***
MXM-D32 PANEL	COMPLETE MXM / AUX ASSIGN 1-8 PANEL	***"009101"***
MXM-D32#2 PANEL	COMPLETE MXM / AUX ASSIGN 9-16 PANEL	***"009114"***
EQD-D32 PANEL	COMPLETE EQ / DYNAMICS PANEL	***"009102"***
SUR-D32 PANEL	COMPLETE SURROUND / MODE PANEL	***"009103"***
XYE-D32 PANEL	COMPLETE EVENTS PANEL	***"009104"***
MON-D32 PANEL	COMPLETE MONITOR PANEL	***"009105"***
TBM-D32 PANEL	COMPLETE TALKBACK / MIC PANEL	***"009106"***
MST-D32 PANEL	COMPLETE MASTER PANEL	***"009107"***
GRP-D32 PANEL	COMPLETE GROUP PANEL	***"009108"***
BKS BLANK PANEL	FACEPLATE ASSEMBLY SHORT BLANK	***"009218"***
BKL BLANK PANEL	FACEPLATE ASSEMBLY LONG BLANK	***"009219"***
IS-D12 LOADED CARD	INPUT LOADED CARD ASSEMBLY	***"009140"***
MXM-D12 LOADED CARD	MXM / AUX ASSIGN 1-8 LOADED CARD ASSEMBLY	***"009141"***
MXM-D32#2 LOADED CARD	MXM / AUX ASSIGN 9-16 LOADED CARD ASSEMBLY	***"009153"***
EQD-D12 LOADED CARD	EQ / DYNAMICS LOADED CARD ASSEMBLY	***"009142"***
SUR-D12 LOADED CARD	SURROUND / MODE LOADED CARD ASSEMBLY	***"009143"***
XYE-D12 LOADED CARD	EVENT LOADED CARD ASSEMBLY	***"009144"***
MON-D12 LOADED CARD	MONITOR LOADED CARD ASSEMBLY	***"009145"***
TBM-D12 LOADED CARD	TALKBACK/MIC LOADED CARD ASSEMBLY	***"009146"***
MST-D12 LOADED CARD	MASTER LOADED CARD ASSEMBLY	***"009147"***
GRP-D12 LOADED CARD	GROUP LOADED CARD ASSEMBLY	***"009148"***
EI-5.1 LOADED CARD	ENCODER LOADED CARD	***"005030"***
HC-9 LOADED CARD	LOADED CARD ASSEMBLY WITH COMPUTER	***"005270"***
HC-9NC LOADED CARD	LOADED CARD ASSEMBLY W/O COMPUTER	***"005294"***
BP-12 LOADED CARD	LOADED CARD ASSEMBLY	***"009160"***
VU-9 LOADED CARD	LOADED CARD ASSEMBLY	***"005271"***
VC5-5HC LOADED CARD	LOADED CARD ASSEMBLY	***"005262"***
VC5-5 LOADED CARD	LOADED CARD ASSEMBLY	***"005274"***
PWI-5.1 LOADED CARD	LOADED CARD ASSEMBLY	***"005059"***

REPLACEMENT PARTS — D-32 CONTROL SURFACE

COMPONENT	DESCRIPTION	*WS P/N*
PSR POWER SUPPLY RACK UNIT	RACK CAGE FOR SPS POWER SUPPLIES	***"007232"***
SPS-180	POWER SUPPLY UNIT FOR USE IN PSR RACK	***"007231"***
SPS-400	POWER SUPPLY UNIT FOR USE IN PSR RACK	***"007233"***
SPS/PWI POWER CABLE	SPS DB TO CONTROL SURFACE PWI POWER CABLE	***"007261"***
REPLACEMENT FADER ASSEMBLY	WIRED MOTORIZED FADER	***"005297"***
REPLACEMENT FADER KNOB	BLACK FADER KNOB	***"520001"***
REPLACEMENT FADER KNOB	BLUE FADER KNOB	***"520002"***
REPLACEMENT FADER KNOB	ORANGE FADER KNOB	***"520005"***
REPLACEMENT FADER KNOB	RED FADER KNOB	***"520006"***
REPLACEMENT FADER KNOB	YELLOW FADER KNOB	***"520008"***
CABLE BELDEN	2 CONDUCTOR SHIELDED CABLE	***"150012"***
SWITCH	SINGLE POLE MOMENTARY SWITCH W/RED LED	***"510106"***
SWITCH	SINGLE POLE MOMENTARY SWITCH W/YELLOW LED	***"510296"***
SWITCH	SINGLE POLE MOMENTARY SWITCH W/GREEN LED	***"510297"***
NKK SWITCH	JB15 SWITCH W/BRIGHTER GREEN LED AND SILICON GASKET	***"510289"***
NKK SWITCH	JB15 SWITCH W/BRIGHTER RED LED AND SILICON GASKET	***"510290"***
NKK SWITCH	JB15 SWITCH W/BRIGHTER YELLOW LED AND SILICON GASKET	***"510291"***
SWITCH CAP	RED SWITCH CAP	***"530003"***
SWITCH CAP	WHITE SWITCH CAP	***"530004"***
SWITCH CAP	YELLOW SWITCH CAP	***"530005"***
ENCODER	11MM ROTARY ENCODER, 20MM SHAFT LENGTH, ORDER W# 005030	
ENCODER KNOB	15MM GRAY PUSH-ON KNOB FOR 6MM SHAFT	***"520017"***
ENCODER KNOB	11MM BLACK PUSH-ON KNOB	***"520105"***
ENCODER LIGHT PIPE	24 SEGMENT LIGHT PIPE FOR DTVM ENCODER	***"520104"***
ENCODER CAP	15MM LIGHT GREY CAP, NO LINE	***"530262"***
ENCODER CAP	PLAIN 11MM BLUE CAP FOR 15mm KNOB	***"530278"***
ENCODER CAP	PLAIN 11MM GREEN CAP FOR 15mm KNOB	***"530281"***
ENCODER CAP	PLAIN 11MM PALE BLUE CAP FOR 15mm KNOB	***"530282"***
ENCODER CAP	PLAIN 11MM CREAM CAP FOR 15mm KNOB	***"530283"***
ENCODER CAP	PLAIN 11MM PASTEL GREEN CAP FOR 15mm KNOB	***"530284"***
ENCODER CAP	PLAIN 11MM BURGUNDY CAP FOR 15mm KNOB	***"530285"***

REPLACEMENT PARTS — D-32 CONTROL SURFACE

COMPONENT	DESCRIPTION	*WS P/N*
ENCODER CAP	PLAIN BLACK CAP FOR 11MM COLLET KNOB	***"530290"***
ENCODER CAP	PLAIN BLUE CAP FOR 11MM COLLET KNOB	***"530291"***
ENCODER CAP	PLAIN GREEN CAP FOR 11MM COLLET KNOB	***"530292"***
ENCODER CAP	PLAIN GRAY CAP FOR 11MM COLLET KNOB	***"530293"***
ENCODER CAP	PLAIN PASTEL GREEN CAP FOR 11MM COLLET KNOB	***"530294"***
ENCODER CAP	PLAIN CREAM CAP FOR 11MM COLLET KNOB	***"530295"***
ENCODER CAP	PLAIN PALE BLUE CAP FOR 11MM COLLET KNOB	***"530296"***
LUMA BUTTON	WHITE LUMA BUTTON	***"530274"***
LUMA BUTTON	RED LUMA BUTTON	***"530275"***
LUMA BUTTON	YELLOW LUMA BUTTON	***"530276"***
LUMA BUTTON	GREEN LUMA BUTTON	***"530277"***
PLUG	3 PIN PLUG FOR #26 AWG	***"230028"***
PLUG	5 PIN PLUG FOR #26 AWG	***"230030"***
PLUG RIBBON	40 PIN RIBBON PLUG	***"250053"***
HEADER	40 PIN BOXED HEADER, STRAIGHT	***"250056"***
HEADER	3 PIN JST HEADER	***"250062"***
HEADER	5 PIN JST HEADER	***"250064"***
CONNECTOR	BLACK FEMALE XLR CONNECTOR	***"260002"***
RECEPTACLE HOUSING	5 POSITION RECEPTACLE HOUSING	***"200113"***
POWER SOCKET	40 AMP SOLDER CUP POWER SOCKET	***"200118"***
DISPLAY	4 SEGMENT GREEN ALPHA NUMERIC DISPLAY	***"610016"***
DISPLAY	4 SEGMENT ORANGE ALPHA NUMERIC DISPLAY	***"610023"***
LCD DISPLAY	5.7" TFT 320 X 240 6 BIT DIGITAL INPUT DISPLAY	***"940028"***
MANUAL	OWNER'S MANUAL	***"009198"***