D-5.1
Digital Television Control Surface

TECHNICAL MANUAL

Wheatstone Corporation

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D-5.1 Digital Television Control Surface Technical Manual - 1st Edition

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Attention!

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

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

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

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

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

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-5.1 Technical Manual

Table of Contents

Chapter 1 – General Information

Introduction 1-2

Control Surface Placement 1-3

Power Supply 1-4

Failsafe Dual Redundant Supply 1-5
Energizing 1-5

I/O Connections 1-6

The Insulation Displacement Connector System 1- 6
Wiring Procedure - Double Connection to One Pin 1-8

Chapter 2 - Input Section (IS-D5.1 & IFS-5.1)

Controls and Functions 2-2

Gain Control 2-2
Phantom Power 2-2
Insert 2-2
AUX 2-3
Mode Selector 2-4
Bus Minus 2-4
Talkback 2-4
Solo 2-4
Destination Display 2-5
Mix-Minus 2-5
Presets A & B 2-6
Set 2-7
Page 2-7
PFL (Cue) 2-7
AFL (Solo) 2-7
Dynamics 2-7
EQ 2-8
Output Assign Displays 2-8
Channel ON Switches 2-8
DCM Displays 2-9
VU 2-9
GR 2-9
Fader 2-9

Chapter 3 - Control Section (EFS-D5.1 & SFS-5.1)

Controls and Functions 3-2
Bus Assign Section 3-2
Mode Select Section 3-3
Talkback Mic 3-3
AUX/MXM Master Outputs 3-4
Insert Section 3-4
Copy Section 3-4
To Copy Groups 3-5
To Copy One and Paste Many 3-5
To Copy One To All 3-5
DCM Set Section 3-6
EQ Section 3-6
High-Pass Filter 3-6
Notch Filter 3-7
Low-Pass Filter 3-7
Equalizer 3-7
Phase 3-7
Group Mix-Minus Assign 3-7
TB 3-8
Output Destinations Group 1 Example 3-8
PFL (Cue) 3-8
AFL (Solo) 3-8
Bus Assign Displays 3-9
Mute/ON-OFF Switch 3-9
DCM Master Displays 3-9
Submix/Group Fader 3-9

Chapter 4 - Master Section (MS-D5.1 & MFS-5.1)

Controls and Functions 4-3
Monitors 4-3
Production and Control Room Sections 4-3
Studio Section 4-4
Headphone Section 4-5
Programming Monitor Section 4-6
Test Section 4-6
Cue (PFL)/Solo (AFL)/Mute/Dim Section 4-7
Surround/PAN System 4-8
Switched Meter Section 4-8
XY Controller Section 4-9
Selecting Input Channel Sources 4-9
Selecting Output Mix Destinations 4-9
Event Controller Section 4-10
Storing an Event 4-10
Taking an Event 4-10
Undoing an Event 4-10
Modifying the Currently Selected Event 4-10
Deleting an Event 4-11
Previewing an Event 4-11
Event Default Button 4-11
Establishing the Default Setting 4-11
Naming an Event 4-11

Mute Groups 4-12
Confidence Feed 4-12
Mix Destination 5.1 Surround 4-12
Output Destination, 5.1 Master Example 4-13
Set 4-14
PFL (Cue) 4-14
AFL (Solo) 4-14
DYN (Dynamics) 4-14
EQ 4-14
DCM Displays 4-15
Channel Master ON/OFF 4-15
5.1 Master Faders 4-15
GM (Grand Master) Assign 4-16
Grand Master ON/OFF 4-16
Function Lock 4-16
Clear PFL/AFL 4-16
Page Buttons 4-16
Timer Section 4-17

Chapter 5 - DCM Section (DS-5.1 & DCM-D5.1)

Controls and Functions 5-2
Dynamics Section 5-2
Compressor/Limiter 5-2
Dyn In 5-3
Threshold 5-3
Attack 5-3
Ratio 5-4
Release 5-4
Makeup Gain 5-4
Gate 5-4
Talkback Preselects 5-5
MXM Confidence Feed 5-6
Audio Delay 5-6
DCM Section 5-7
DCM ON 5-7
Fader 5-7
Programmable Buttons 5-7
Display Buttons 5-8

Chapter 6 - Host CPU (HC-5.1)

Overview 6-2
HC-5.1 BIOS Settings/Format 6-2
Ethernet IP Addressing 6-2
Ethernet Interface Wiring 6-2
Mixer Link Wiring 6-3
Internal Programming Options 6-3
Switch Settings 6-3
SW5-SW8 - CAT5 vs. Fiber & Transceiver Select 6-3
SW9 - Master Reset 6-3

SW10 - CPU Reset 6-3
SW11 Position 1 - Sample Rate 6-3
SW11 Position 3 - Redundant CPU 6-4
SW11 Position 4 - CAT5 vs. Fiber 6-4

Hook-Ups 6-4
"ETH A" RJ-45 - Main Ethernet Connector 6-4
"ETH B" RJ-45 - Optional Redundant Computer Ethernet Connector 6-4
"CAT5" RJ-45 - Mixer Link Connector 6-4

Typical Ethernet Cable 6-5

Typical Crossover Cable 6-5

Optical Fiber Interface 6-6
Optical Transceiver 6-6
Connectors Type 6-6
Optical Fiber Cable 6-6

HC-9 Pinouts Drawing 6-7

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

Chapter 7 - Schematic and Load Sheet Drawings

IS-5.1 4 Inputs Panel Switch Card
Schematic 7-3
Load Sheet 7-11

IFS-5.1 4 Inputs Fader Panel Switch Card
Schematic 7-12
Load Sheet 7-16

EFS-5.1 Control Panel Switch Card
Schematic 7-17
Load Sheet 7-24

SFS-5.1 4 Outputs Fader Panel Switch Card
Schematic 7-25
Load Sheet 7-28

MS-5.1 Master Panel Switch Card
Schematic 7-29
Load Sheet 7-35

MFS-5.1 Master Fader Panel Switch Card
Schematic 7-36
Load Sheet 7-39

DS-5.1 Dynamics Panel Switch Card
Schematic 7-40
Load Sheet 7-46

DCM-5.1 Dynamics Fader Panel Switch Card
Schematic 7-47
Load Sheet 7-50

HC-5.1 Host Controller Card
Schematic 7-51
Load Sheet 7-57

MG-5.1 Main Gate Card
Schematic 7-58
Load Sheet 7-60

BP-5.1 Back Plane Card
Schematic 7-61
Load Sheet 7-62

BPR-5.1 Back Plane Repeater Card
Schematic 7-63
Load Sheet 7-64

LVU-5.1 LED VU Card
Schematic 7-65
Load Sheet 7-74

PWI-5.1 Power Interface Card
Schematic 7-75
Load Sheet 7-76

Appendices

Appendix 1

Options Text File A-3
Introduction A-3
Modifying The Options Text File..... A-3
A Sample Example From The File A-4
A Second Example A-5
An Example File - Complete..... A-6

Appendix 2

Replacement Parts List A-9

General Information

Chapter Contents

Introduction 1-2

Control Surface Placement 1-3

Power Supply 1-4

Failsafe Dual Redundant Supply 1-5

Energizing 1-5

I/O Connections 1-6

The Insulation Displacement Connector System 1- 6

Wiring Procedure - Double Connection to One Pin 1-8

General Information

Introduction

The Wheatstone D-5.1 Digital Television Control Surface is the next step in the continuing evolution of Wheatstone's proven BRIDGE technology. Designed to integrate flawlessly with the Wheatstone BRIDGE digital audio network router, the D-5.1 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 configurated, 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-5.1 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-5.1 digital audio control surface may be mounted either on a custom constructed table or the optional factory leg support system, using the holes provided in the bottom of the chassis. In either case, the control surface's handrest top would be generally located 29-30 inches from the floor. The D-5.1 control surface 4-bay frame size is shown below.

Do not connect the D-5.1 control surface to its power supply (and do not connect the power supply to the AC power line) until instructed to do so.

Power Supply

Front view of the PSR rackmount power supply

Rear view of the SPS-400 unit

Rear view of the SPS-40 unit

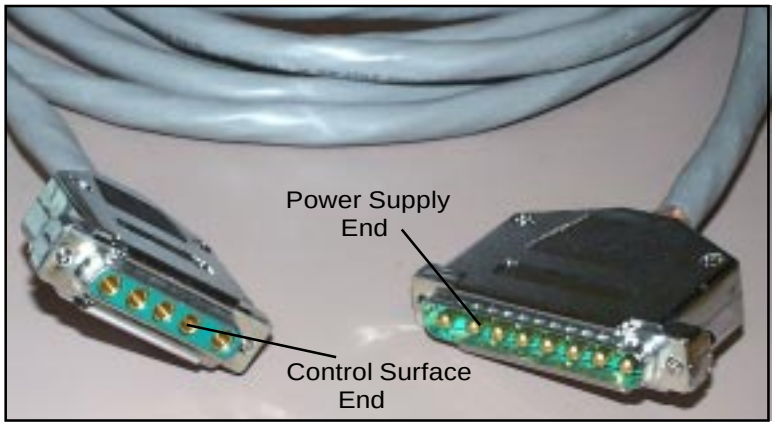
Rear view of the SPS-180 unit

The D-5.1 control surface is powered by an SPS-180, SPS-400 or SPS-40 power supply installed in a Wheatstone Model PSR rackmount unit. Each PSR houses up to four SPS-180 or up to two SPS-400/SPS-40 power supply units. Mount the two-rackunit power supply chassis in a standard 19" equipment rack, keeping in mind that adequate ventilation is necessary to prevent heat build-up within the rack.

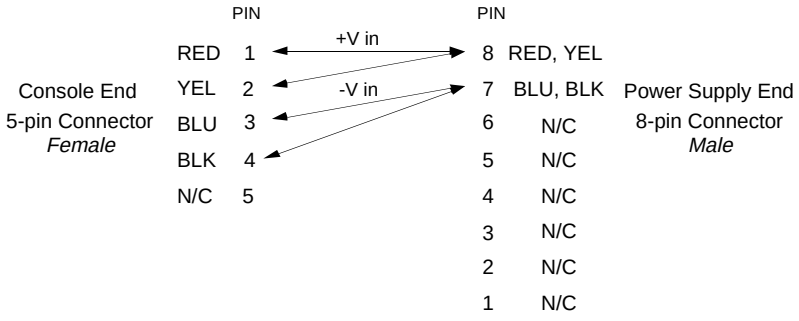
If failsafe redundant supplies have been ordered, you will be installing two SPS-180, SPS-400, or SPS-40 units.

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 its end: 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



PS Cable Pinout



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.

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, SPS-400, or SPS-40 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-5.1 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.

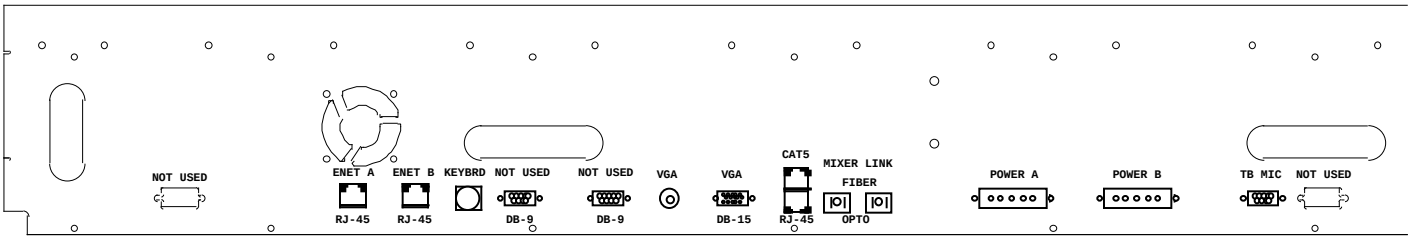
Note: To de-energize the control surface, unplug the rackmount power supply’s AC cord from the AC mains. ***Never de-energize the control surface by disconnecting the cable that connects the control surface and power supply together.***

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

I/O Connections

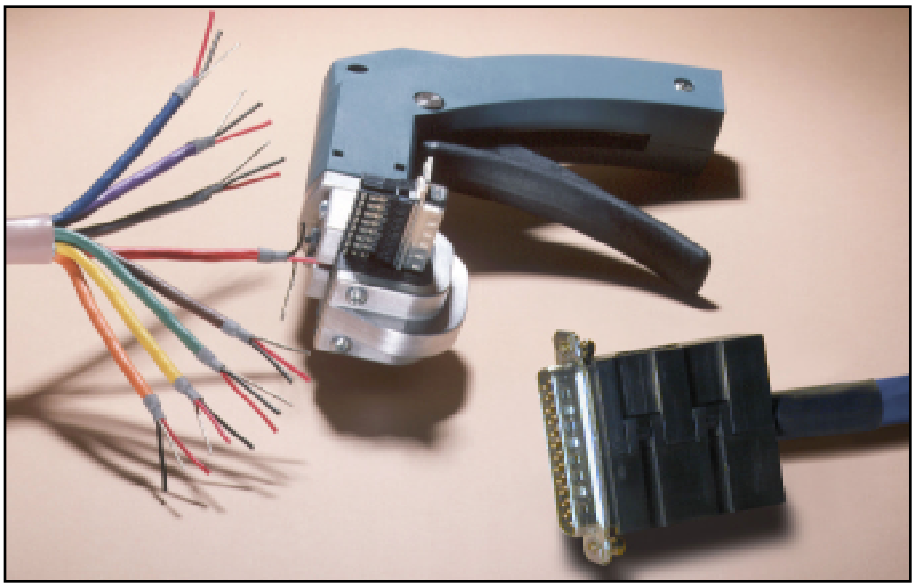
All user wiring to and from the D-5.1 control surface is made via connectors located on the control surface's rear panel. There are two RJ-45 connectors for main and failsafe ethernet connections. The "TB MIC" DB-9 connector is for talkback microphone connection (see the pinout on page 3-3). CAT-5 or 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. For all wiring pinout connections refer to Chapter 6. The sketch below shows connector locations.

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



The Insulation Displacement Connector System

The I/O wiring interface system is based on insulation displacement technology. A special AMP wiring tool is included with each control surface; it is auto-indexing, and allows individual wire connections to be positively made with a single squeeze of the tool's trigger. The trigger action is ratchet controlled, and will not release until a full connection is made. Once released, the multipin connector held in the tool's jaw automatically indexes to the next connector pin. The technology is such that no stripping, soldering or tinning of wire ends is required; all that is needed is for the wires destined for the connector be snub cut and laid out in order (although tubing should be used on bare drain wires). An empty DB-9 connector is inserted into the tool, indexed to the first pin, and the wires are inserted one by one into the



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

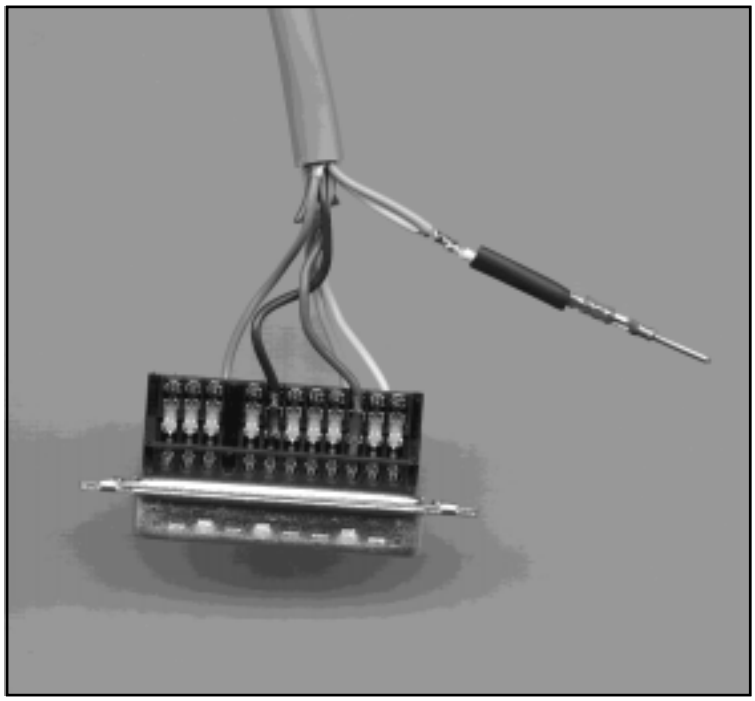
jaw and the trigger squeezed. In this way a single multipin connector can be completely wired up in a minute or two. These connectors will accept wire gauge 22 - 26 AWG.

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

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

Wiring Procedure - Double Connection to One Pin

ref: DB-25 male multi-pin connector



Most audio equipment machine interfaces (as well as Wheatstone consoles) use subminiature D-type connectors. Sometimes the interfaces require making two connections to a single DB pin. If the wiring has been set up using punchblocks, this is not a problem; however, for situations where direct machine-to-console wiring is used, Wheatstone recommends the following procedure:

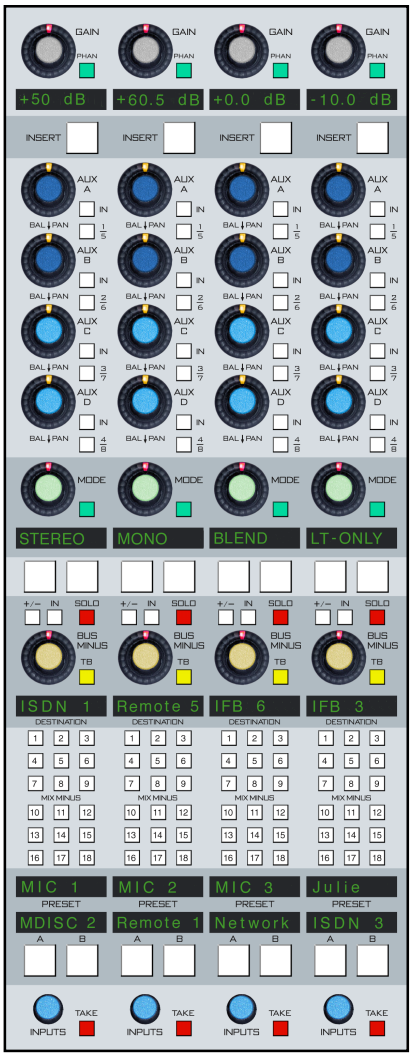
1) **Connect the first wire to the desired pin as you normally would.**
2) **Note connector pins may easily be removed from the DB-25 shell with the wire still attached: Hold the connector with the metal part down and observe its side. You will see a row of "Vees"—simply press the top of the selected vee together with a scribe or other sharp instrument; this will unlock the pin from the shell, allowing it to be removed.**
3) **With the pin removed, strip out a short section of insulation from the connected wire and wrap and solder the second wire to the first as shown above.**
4) **A short piece of heatshrink tubing (pictured here before being slid into place) completes the connection.**
5) **Re-insert the pin into the DB-25 shell, spreading the vee apart to lock it in place.**

Input Section (IS-D5.1 & IFS-5.1)

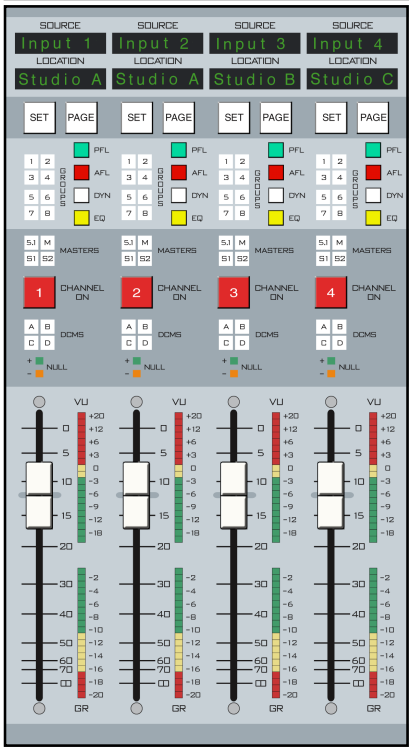
Chapter Contents

Controls and Functions 2-2
Gain Control 2-2
Phantom Power 2-2
Insert 2-2
AUX 2-3
Mode Selector 2-4
Bus Minus 2-4
Talkback 2-4
Solo 2-4
Destination Display 2-5
Mix-Minus 2-5
Presets A & B 2-6
Set 2-7
Page 2-7
PFL (Cue) 2-7
AFL (Solo) 2-7
Dynamics 2-7
EQ 2-8
Output Assign Displays 2-8
Channel ON Switches 2-8
DCM Displays 2-9
VU 2-9
GR 2-9
Fader 2-9

Input Section (IS-D5.1 & IFS-5.1)



IS-5.1 Panel



IFS-5.1 Panel

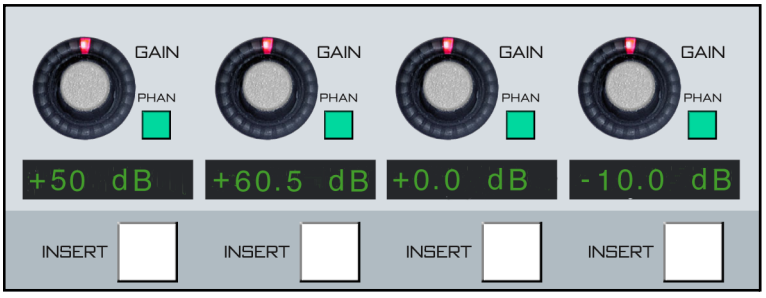
Controls and Functions

Each input section of the D-5.1 digital audio control surface consist of two panels (IS-5.1 and IFS-5.1with non-motorized faders, or IFSM-5.1 with motorized faders), and has four identical strips representing four input channels.

The D-5.1 control surface also can be built-up with optional IFSM-5.1NP motorized fader panels without PAGE buttons.

Gain Control

The GAIN level control controls mic or line gain for the selected input source. Relative gain is shown in the display below the GAIN knob.



Phantom Power

The PHAN On/Off switch applies phantom voltage to any selected microphone. The phantom power attribute stays ON even when the microphone is not selected on the control surface.

Insert

The INSERT switch applies a preselected insert device to the signal path. The INSERT button will light to indicate that the device has been INSERTed. If the button flashes a few times and then goes out, this indicates that an insert device has not been selected for that channel.

To select an insert device for a channel, press the channel's SET button. The display next to the INSERT SELECT knob in the EFS section (see Chapter 3) will show the name of the currently selected insert device, or will show "--------" if no insert device has been selected. Rotate the INSERT SELECT knob until the desired insert device is displayed. If that device has not already been assigned elsewhere, the TAKE button will be lit. Press TAKE to assign the selected insert device to the

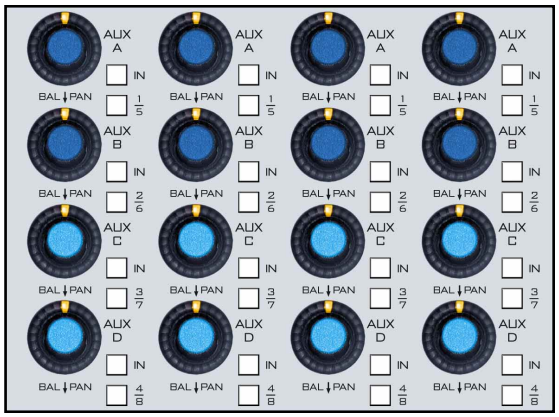
channel. If the TAKE button does not light for a given insert device, that device is already assigned to a different channel.

To free up a selected input device, press the channel SET button, rotate the INSERT SELECT knob until the display shows "--------", then press TAKE.

NOTE: Insert devices (both inputs and outputs) must be defined in the XPoint GUI (graphic user interface).

AUX

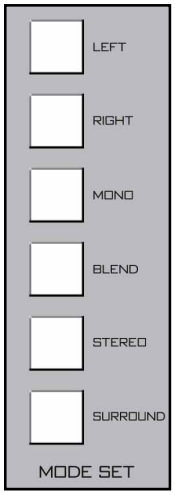
For clarity we will discuss AUX A. The same control descriptions also apply to AUX B, C and D.



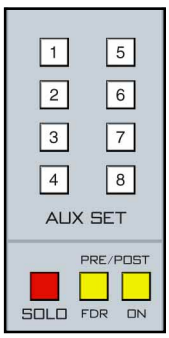
Encoder AUX A adjusts the gain for the channel in the AUX SEND, which may be mono or stereo. The default mode follows the source type (mono sources would have a mono send, stereo sources would have a stereo send). When the knob is pushed and turned, it then acts as a PAN or BALance control as appropriate. Additionally, the mode can be altered by means of the MODE SET buttons in the EFS section.

To set MODE for an AUX SEND, hit the appropriate AUX SET button and then the desired MODE SET button (in the EFS panel). NOTE that surround sends are not created. Surround input sources would default to a derived stereo AUX.

There are actually a total of eight AUX SENDs available, and controlled by the AUX A, AUX B, AUX C, and AUX D sections. For example, the AUX A knob controls the level of that channel to AUX 1 when the "1/5" select switch is in "1" (the switch is not lit), and the level of that channel to AUX 5 when the "1/5" select switch is in "5" (the switch is lit). Likewise, the AUX A IN button toggles the channel in and out of AUX 1 when "1/5" is off, and in and out of AUX 5 when "1/5" is on.



EFS-5.1 Panel



PRE/POST PROGRAMMING: The eight AUX sends can be programmed to be PRE or POST fader and PRE or POST channel ON. There are both global settings and individual settings for this.

Generally, the global settings should be made first. The factory default global setting for all AUX sends is post fader, post channel ON. To change a GLOBAL setting, press the AUX SET button for the desired send (on the EFS panel); it will light. Then program the PRE/POST FDR and ON switches respectively the way you want. Note that the signal is PRE when the button is lit and POST when the button is not lit. To reprogram another aux send, press its AUX SET button and proceed as before.

As an example of programming an individual channel AUX send differently then the global setting, let's look specifically at AUX 1. Make sure the "1/5" button is off, then press the AUX A knob once. The button LED segment (6 o'clock position) of the encoder knob will light. The channel's PRE-ON and PRE-FADER buttons, just below the channel's MODE selector display (see next section) will indicate the channel's AUX 1 status (lit means PRE, unlit means POST). Use these switches to set the desired AUX 1 status for that channel.

Remember, changing the global settings for an AUX send will reprogram all channels to follow the global setting for that AUX, overriding any individual programming.

Mode Selector

The MODE button toggles through the channel's available modes. As shown on the display below the button the modes are STEREO, LT-ONLY, RT-ONLY, MONO, and BLEND. Pushing the button again returns to STEREO mode. When in STEREO mode the MODE button lights.

NOTE: these modes apply to those signals that are assigned to the stereo submixers or the stereo masters only. Bus assigns that are applied to 5.1 are routed through a special surround pan section on the MS panel. MODE may also be selected through the central mode section on the EFS panel.

The MODE knob acts as a balance control in STEREO mode and as a panpot in MONO, LT-ONLY, and RT-ONLY modes. The BLEND mode sends both the left and right input signals to both the left and right sides of assigned stereo destinations. In this mode the MODE knob acts as a mix control between the left and right inputs. Blend is useful for correcting NAT sound/voice-over imbalances.

MS-5.1 Panel

Bus Minus

Each input channel can generate its own independent mix-minus output, called BUS MINUS; thus each anchor, each announcer, each host, each guest can have a dedicated mix-minus feed.

Start by assigning any desired input channels to the Bus Minus bus. This is accomplished by pressing the BUS MINUS IN switch, which places a summed signal of those input channels onto a special dedicated mix bus. This bus now becomes available to other input channels for use in their own Bus Minus outputs. A BUS MINUS encoder controls the level for each of the individual IFB channel/direct outputs. That channel's input signal may be added or omitted by means of the +/- button. If the +/- button is lit, the channel is added; if unlit the channel is omitted.

TB (Talkback)

A TB switch lets the control surface operator talk back to that individual bus-minus/direct output (via a microphone plugged into the mic XLR connector located on the lower part of the TB-5.1 panel or an external mic plugged into the system and triggered externally) allowing communication between the operator and the talent receiving that mix.

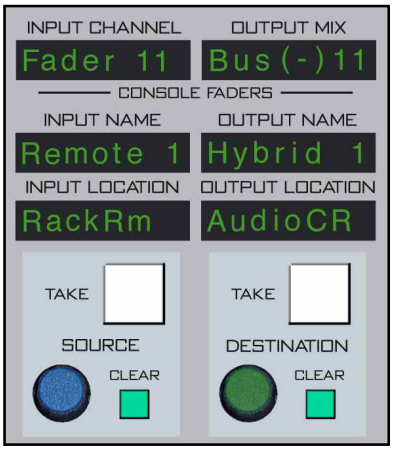
EFS-5.1 Panel

TB-5.1 Panel

Solo

A SOLO switch allows the operator to solo monitor the individual channel's IFB feed.

Destination Display



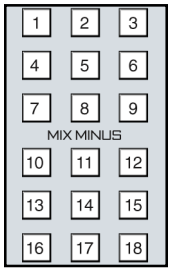
MS-5.1 Panel

The BUS MINUS DESTINATION display indicates which output on the various output cards is receiving this BUS MINUS mix. To select the BUS MINUS destination, press the channel's SET button. The input and output displays in the upper right corner of the MS-5.1 panel will display the channel's number on the INPUT CHANNEL display, the name of the channel's current input in the INPUT NAME display, the location of that input on the INPUT LOCATION display, the output mix number on the OUTPUT MIX display, the output name on the OUTPUT NAME display, and the location of that output on the OUTPUT LOCATION display. If no destination has been selected the OUTPUT NAME will show "NoDest". The channel's BUS MINUS DESTINATION display mirrors the MS-5.1 panel's OUTPUT NAME display. As you rotate the DESTINATION knob below the OUTPUT LOCATION display, the names and locations of the allowed destinations will appear in the matching displays. If that channel's BUS MINUS is not currently routed to the displayed output, the TAKE button will be lit; if it is currently routed to the displayed output, the CLEAR button will be lit. Press the TAKE button when it is lit and the channel's BUS MINUS will be routed to the displayed output. Note that a BUS MINUS mix may be sent to more that one output. Press the CLEAR button when it is lit and the channel's BUS MINUS will be removed from the displayed output.

A BUS MINUS mix can feed multiple destinations, but only one BUS MINUS mix can feed a given destination. When you assign a channel's BUS MINUS to an output which currently has a different channel's BUS MINUS assigned to it, the newest BUS MINUS will be assigned to that output and the old BUS MINUS will be removed.

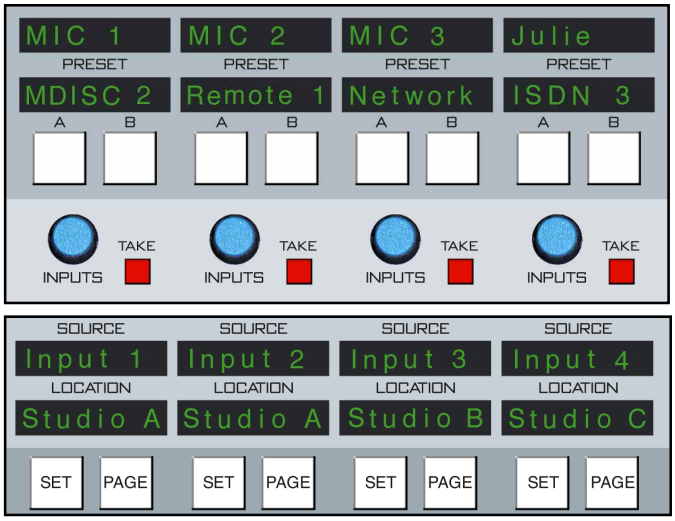
NOTE: The GUI must provide a means of restricting disallowed destinations for each channel.

Mix-Minus



There are 18 mix-minus buttons that normally will illuminate when the channel has been *removed* from any of the 18 mix-minuses. If the client prefers, GUI set-up allows for alternative illumination of the button when the channel is *added* to the mix. All mix-minuses are mono signals appropriately derived from the channel's mono/stereo/5.1 source. To toggle a channel into or out of a mix-minus, simply press the button.

Presets A & B



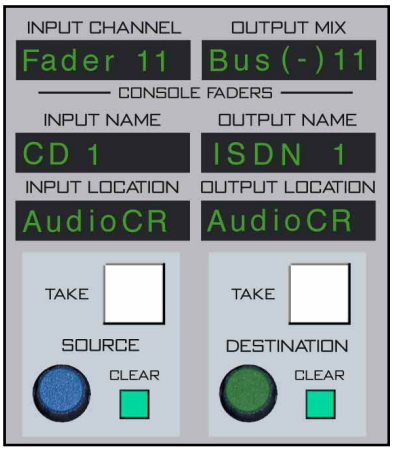
These displays indicate the signal source that the channel will receive if the PRESET A and B buttons are pushed. The channel's current source is displayed in the SOURCE display, along with an indication of the location of that source in the LOCATION display (that is, the studio, rack or other descriptor). If the preset A button is pressed, then PRESET A as shown in the display will be transferred as the current source in the channel SOURCE display; the appropriate location descriptor appears in the LOCATION display. The PRESET B button works in a similar fashion. If no preset source has been assigned to a PRESET button, the PRESET display will show "NOPRESET". The SOURCE displays "LOCKED" when the channel is ON and a PRESET or SOURCE is taken. Turn OFF the channel before taking a new source.

To program PRESET A, press the channel SET button, then press the PRESET A button. Rotate the INPUTS knob to the desired selection, as shown in the SOURCE display. Press and hold PRESET A until the source name appears in the PRESET A display. If you also want to immediately take this source after setting up the preset, just press the TAKE button. If you have not rotated the INPUTS knob or pressed the TAKE button for a period of about 5 seconds, the TAKE button will go out.

The current input as displayed in the SOURCE display can also be selected by means of the rotary channel input selector. By rotating the INPUTS knob permissible sources are displayed in the channel input SOURCE display. When the desired source has been located the operator can take that source by pressing the TAKE button. The source does not actually change until the take action has been initiated on the downstroke. If the take action hasn't been initiated after the knob has been idle for 5 seconds, the channel will revert to its previous status.

NOTE 1: There is an alternative way of selecting a channel's input source, and that is by pressing the channel SET button. The INPUT CHANNEL display on the MS panel will show the current channel number and the INPUT NAME and INPUT LOCATION displays will indicate a match to the channel's input SOURCE and LOCATION displays. If a different source is desired, rotate the SOURCE knob on the MS-5.1 panel. The INPUT NAME and INPUT LOCATION displays will change accordingly. When the desired source is indicated, execute a take command by the downstroke of the TAKE button. The TAKE button will then extinguish, and the new source will now be shown in the SOURCE and LOCATION displays. Once again, the channel reverts to its previous state if TAKE has not been pressed after the SOURCE knob has been idle for 5 seconds.

NOTE 2: The GUI must provide a means of restricting possible sources for each channel.

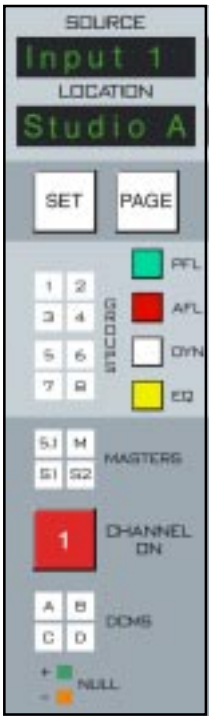


MS-5.1 Panel

Set

The SET button allows the operator to access various controls on the EFS, DS and MS panels of the control surface and apply them to the selected channel. SET can access GROUP, MIX-MINUS, DYNAMICS, EQ, BUS ASSIGN, and DCM ASSIGN functions. To use, simply hit the SET button and then make your appropriate section settings in other areas of the control surface. Once a SET button has been pressed, the button lights up, and all of the central section controls (EQ, MODE, DYNAMICS, etc.) display the current settings **for that input channel** until a different input SET button is pressed. Or, if you don't use any SET-related controls for 20 seconds, the current SET selection will time out and the SET button will go off.

Page



The PAGE function allows each physical channel strip to control two strips worth of audio. This would allow a 16 fader control surface, for example, to control 32 channels of audio. Fader #1 would control audio channel 1 when the PAGE button is off, and would control audio channel 17 when the PAGE button is on. Likewise, faders 2-16 would control audio channels 2-16 when their respective PAGE button were off, and audio channels 18-32 with the PAGE button is on. Each audio channel controlled by a fader is controllable separately via the PAGE button, yet both audio channels are available simultaneously. That is, if you have just set the level for channel 17 using fader 1 with the PAGE button on, turning the PAGE button off switches control to channel 1, but channel 17 continues to sound.

See also "PAGE BUTTONS" (in Chapter 4) which allow groups of input channels to be paged simultaneously. NOTE also that PAGE buttons can be linked into the EVENT STORAGE and RECALL function.

PFL (Cue)

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

AFL (Solo)

This switch lets the control surface operator monitor the channel's post-fader signal.

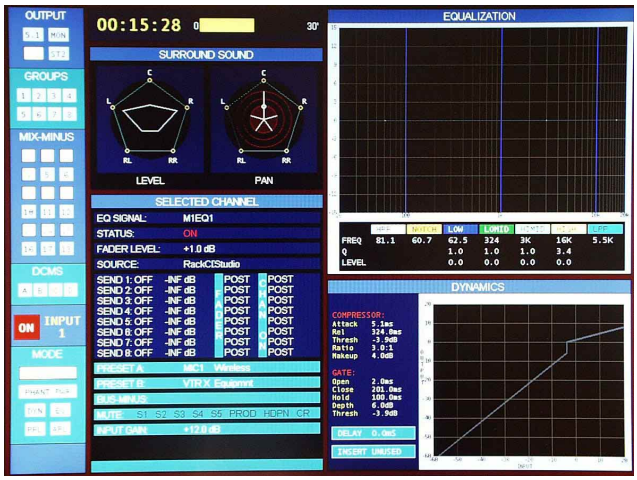
DYN (Dynamics)

This switch inserts dynamic functions that have been preset by the operator in the DCM-5.1 panel. When a knob in the dynamic section is rotated the display located next to the DYN IN button automatically shows the proper setting units and parameters for the active knob. The display is updated as the settings are changed by rotating the knob.

DS-5.1 Panel

EQ

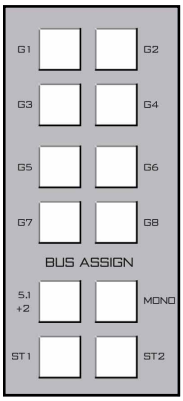
This switch inserts EQ functions that have been preset by the operator in the EQ section of the EFS-5.1 panel. When an EQ section knob is rotated, the appropriate display associated with that knob automatically shows the proper setting units and parameters for the active knob. The display is updated as the settings are changed by rotating the knob.



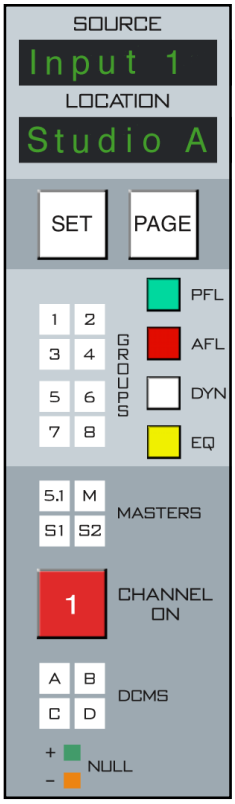
EFS-5.1 Panel

Output Assign Displays

These 12 indicators (GROUPS and MASTERS) show where the channel has been assigned to using control switches in the BUS ASSIGN section of the EFS-5.1 panel. The output assigns are accessed by means of channel SET button. Press SET, then toggle the channel assigns by toggling the appropriate BUS ASSIGN buttons on the EFS-5.1 panel.



EFS-5.1 Panel

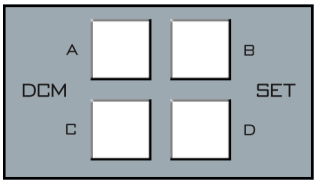


Channel ON Switches

The CHANNEL ON switch turns the channel signal ON and OFF and fires the channel ON (START)/OFF(STOP) logic. The switch LED lights to indicate the channel is ON.

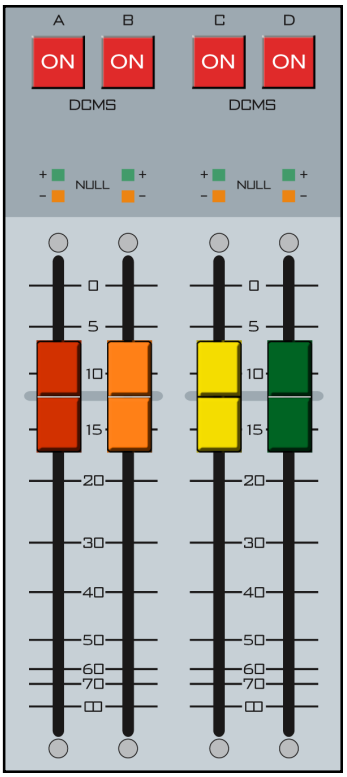
DCM (Digital Control Master) Displays

Each channel can be assigned to any combination of the four DCM masters (DCM-5.1 panel). The assigned setting is displayed in the DCMS ABCD display group. Any channel that is assigned to a DCM will have its level controlled in a subgroup manner, much like a VCA in an analog control surface. For example, all announcer voices could be on DCM A, all remotes could be assigned to DCM B, and commercial source material could be on DCM C. The channels can then be easily adjusted in groups by means of faders on the DCM-5.1 panel. Furthermore, these DCMs may be used as group mutes, to cut out or in an entire bank of faders by simply toggling the appropriate ON switch on the DCM-5.1 panel.



EFS-5.1 Panel

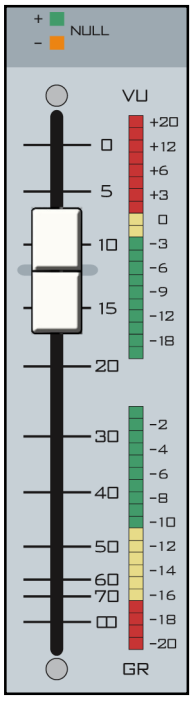
Channels are assigned to these DCMs in the following manner: press the channel SET button on the input fader section and then press the desired DCM SET assign button, located in the center of the EFS-5.1 panel.



DCM-5.1 Panel

VU

This 20-segment LED display ladder monitors the pre-fader channel signal. If the channel is in a multi-signal (i.e., non-mono) MODE, a summed version of the signal is displayed.



GR (Gain Reduction)

A 20-segment LED display ladder that monitors gain reduction as determined by preset parameters in the Dynamics Section on the DCM-5.1 panel. Ladder may light with no signal with certain GATE settings. This is normal.

FADER

Channel output level set by a long-throw fader. When the control surface has recalled a preset or is under external serial control from an automation system, the fader NULL LEDs light to show that the channel output level is actually different from what the fader indicates. The channel output level will remain at the computer directed value until the fader is moved to a matching level, after which the fader will control the level. The LED indicates which direction to move the fader to regain level control. Once the fader has been moved to the matching level the LED will turn off.

The D-5.1 control surface can be ordered with optional touch sensitive, long-throw motorized faders for automated level control.

Control Section (EFS-5.1 & SFS-5.1)

Chapter Contents

Controls and Functions 3-2
Bus Assign Section 3-2
Mode Select Section 3-3
Talkback Mic 3-3
AUX/MXM Master Outputs 3-4
Insert Section 3-4
Copy Section 3-4
To Copy Groups 3-5
To Copy One and Paste Many 3-5
To Copy One To All 3-5
DCM Set Section 3-6
EQ Section 3-6
High-Pass Filter 3-6
Notch Filter 3-7
Low-Pass Filter 3-7
Equalizer 3-7
Phase 3-7
Group Mix-Minus Assign 3-7
TB 3-8
Output Destinations Group 1 Example 3-8
PFL (Cue) 3-8
AFL (Solo) 3-8
Bus Assign Displays 3-9
Mute/ON-OFF Switch 3-9
DCM Master Displays 3-9
Submix/Group Fader 3-9

Control Section (EFS-5.1 & SFS-5.1)

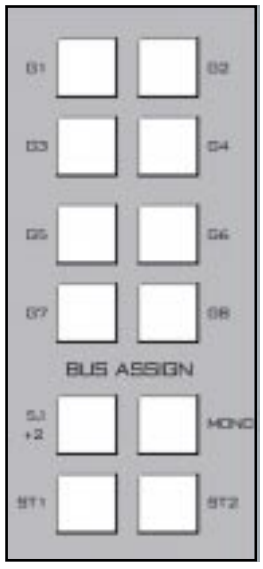
EFS-5.1 Panel

Controls and Functions

The D-5.1 digital audio control surface is equipped with one CONTROL section which consist of two panels (EFS-5.1 and SFS-5.1 with non-motorized faders, or SFSM-5.1 with motorized faders). This section houses AUX/MXM MASTER OUTPUTS, GROUP MXM ASSIGN, GAIN SET, TB, BUS ASSIGN, MODE, INSERT, DCM SET, COPY and EQ controller sections.

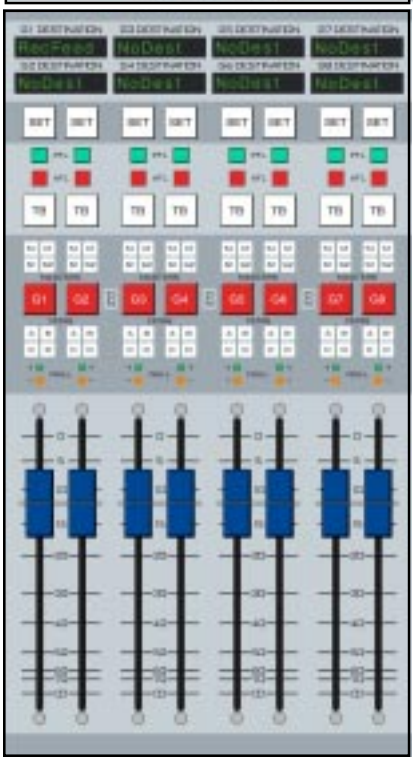
Bus Assign Section

All bus assignment is accomplished through a bank of BUS ASSIGN switches on the EFS-5.1 panel, consisting of eight group assign switches and four master 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 or group panels show the assign status for each individual source.



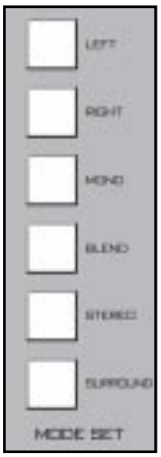
Bus assignment may be made in any combination, and is accomplished by first pressing the SET button on the desired input channel (IFS-5.1 panel) or group (SFS-5.1 panel). The switches in the EFS panel BUS ASSIGN section illuminate to show the source's current bus assignment. Press required switches to create the desired set of bus assigns. The local indicators on the IFS-5.1 or SFS-5.1 panel will change to reflect the new bus assignment.

NOTE: A non-applicable bus assign will flash rapidly to indicate error. Choose another button.



SFS-5.1 Panel

Mode Select Section



The mode selector switchbank includes LEFT, RIGHT, MONO, BLEND, STEREO, and SURROUND buttons. When pressed, the switch will light up to indicate the selected mode.

To select a MODE, press the SET button of the desired channel or mix; the SET button will illuminate and the current mode setting for that channel will be displayed on the MODE switches. 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.

Talkback Mic

The operator's talkback mic plugs into the panel mounted XLR connector located on the lower part of the TB-5.1 panel. Its gain is set by the TB encoder, located on the upper-right corner of the EFS-5.1 panel. 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, 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

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.

AUX/MXM Master Outputs

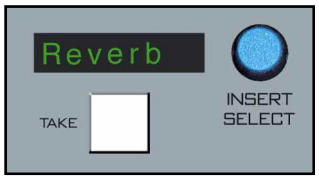
This section is used to control master GAIN, SOLO, PRE/POST FDR, PRE/POST ON, TB, MODE selection, and DESTINATION routing for the eight aux send mixes and the eighteen MXM mixes. It is comprised of a shared GAIN SET knob and its attendant 8-character display, the TB button, the SOLO button, and the PRE/POST switches. Additionally, there is a bank of eight master AUX SET buttons and a bank of 18 master MIX-MINUS SET buttons.

To set a GAIN, press any of the 8 AUX SET or 18 MIX-MINUS SET buttons and rotate the GAIN SET knob. Its display will show the level setting.

To set a SOLO, again press any of the 8 AUX SET or 18 MIX-MINUS SET buttons, and then press the SOLO button. To interrupt a signal with the TB signal, press any of the eight AUX SET or eighteen MIX-MINUS SET buttons and then press the TB button.

PRE/POST settings are all accomplished in the same manner.

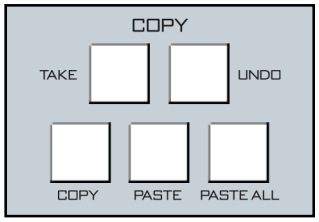
Insert Section



Inserts are devices that are placed ahead of the selected input source for each input channel. Insert devices (that is, equipment external to the control surface) by definition have both inputs and outputs. These inputs and outputs are plugged into the engine portion of the control surface, and are configured in the GUI setup, so when you have a device (such as an outboard equalizer) it is designated with a single name (say "outboard EQ 3") with its input and output mapped to specific input and output ports of the control surface system. NOTE that these devices will generally be multi-channel (stereo or even 5.1). Each device then has a name that would be displayed in the display. Because an insert is an inline device, each insert can only be used on one input channel at a time. However, multiple insert devices could be used, each being assigned to different input channel.

To assign an insert, begin by pressing the SET button of an input channel (IS-5.1 panel). The display next to the INSERT SELECT knob will show the name of the currently selected insert device, or will show "--------" if no insert device has been selected. Rotate the INSERT SELECT knob until the desired insert device is displayed. If that device has not already been assigned elsewhere, the TAKE button will be lit. Press TAKE to assign the selected insert device to the channel. If the TAKE button does not light for a given insert device, that device is already assigned to a different channel. To actually place the selected insert into the signal chain of the channel, press the INSERT button on the input channel (IS-5.1 panel). NOTE that the INSERT button can be pressed again to bypass the device, but the insert device will remain reserved and ready for reinsertion at any time unless reassigned for use elsewhere.

Copy Section

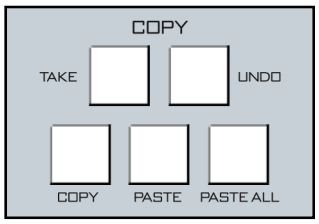


This system provides a convenient means of copying input channel settings and duplicating them to other input channels. To go into COPY MODE, press the COPY button. It will flash. Choose the desired channel to be copied by pressing its SET button (IFS panel). The SET button will then flash in concert with the COPY button. To go into PASTE mode, press the PASTE button. It will flash at a faster rate than the COPY button. 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. To accomplish the copy, press the TAKE button.

Note, the copy function does not copy source assigns, destinations, presets, or input gain.

The UNDO button is used to undo a TAKE copy. Simply press UNDO 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 (at the faster "paste" rate); 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

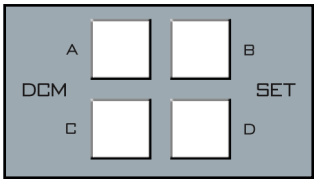
Press the COPY button, and then the desired source channel SET button; both will flash in concert. Then press the PASTE button and the target channel SET buttons, which will flash in concert with the PASTE button at the faster paste rate. To execute, press the TAKE button.

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.

DCM Set Section

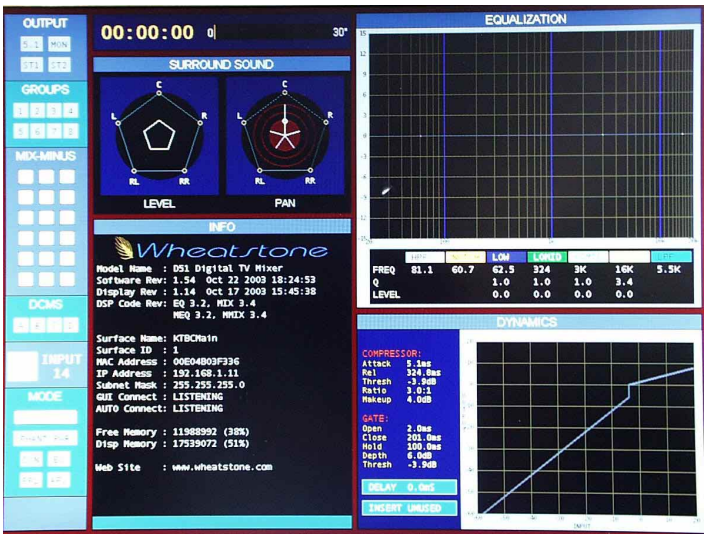


Each input channel, group, or master can be assigned to any combination of the four DCM masters (DCM-5.1 panel). Assignments are made as follows: press the SET button for the desired input channel (IFS-5.1), group (SFS-5.1 panel), or master (MFS-5.1 panel), then press the desired DCM SET buttons. The buttons will light, as will the DCM indicator LEDs on the chosen input, group, or master.

EQ Section

The EQ section consist of a bank of knobs, various associated switches, and a bank of 8-character displays. The EQ system consists of a four-band parametric EQ with low band and high band PEAK/SHELF switching, plus variable frequency high and low pass filters. There is also a seventh frequency control, a variable band notch filter. As any of the controls are adjusted, a real time graphic display is presented on the flat screen monitor panel showing the resulting frequency response curves. Also, the last knob turned in each bank will display its setting in its associated 8-character display.

To access EQ on an individual input channels, 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 IFS-5.1 panel or the master EQ IN button in the MFS-5.1 panel. The input channel's EQ button will light, and its 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 foot-

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

step 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.

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 20KHz. 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 0.2 and 3.0. The LOW and HIGH bands also have a switchable shelving function. The composite effect of any EQ adjustments, as well as text describing the equalizer settings, are shown on the screen.

Phase

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.

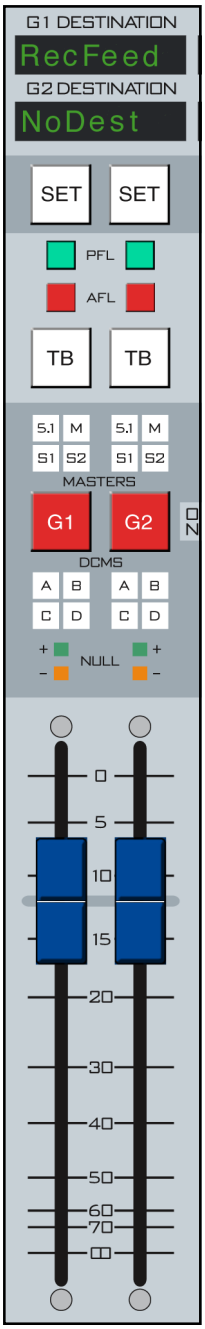
Group Mix-Minus Assign

Each of the eight groups can assign to the first eight mix-minus groups. Bus assign is accomplished directly by pressing the appropriate combination of eight buttons for each subgroup.

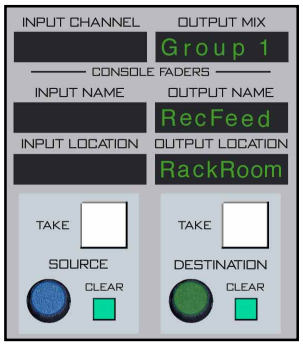
NOTE: Normal operation would illuminate a mix-minus that has been DE-assigned. However, GUI option allows a reversal of that convention.

TB

Pressing the TB button allows the announcer's mic that is plugged into mic XLR connector (or an external mic plugged into the system and triggered externally), to talk directly to the group output.



Output Destinations, Group 1 Example



MS-5.1 Panel

Output destinations are selected by pressing the SET button. The master mix channel OUTPUT MIX display (MS-5.1 panel) will be illuminated and the OUTPUT NAME display will reflect the same name as shown in the channel G1 DESTINATION display, 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"

As you rotate the DESTINATION knob in the MS-5.1 panel the names of allowable destinations will appear in the OUTPUT NAME and G1 DESTINATION displays. If G1 is not currently routed to the displayed output, the TAKE button will be lit; if G1 *is* currently routed to the displayed output, the CLEAR button will be lit. Press the TAKE button when lit to add the currently displayed output as a G1 destination, or press the CLEAR button when lit to delete that output as a G1 destination.

Destinations for the remaining groups are handled in a like manner.

Set

The SET button allows the operator to access BUS ASSIGN and DCM ASSIGN (EFS-5.1 panel) functions. To use, simply hit the SET button and then make your appropriate section settings in other areas of the control surface.

PFL (Cue)

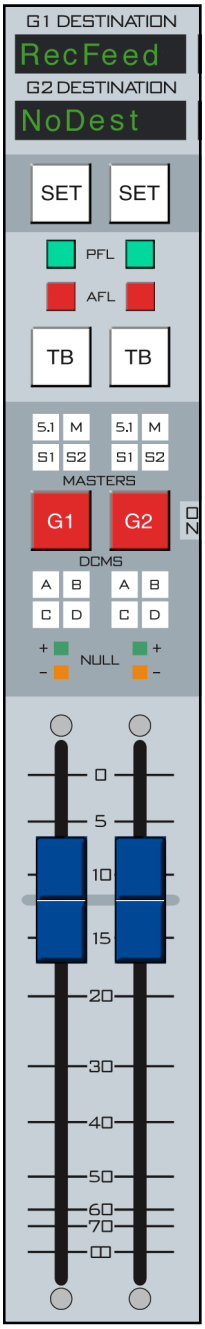
This switch lets the console operator monitor the submix channel's pre-fader signal.

AFL (Solo)

This switch lets the console operator monitor the submix channel's post-fader signal.

Bus Assign Displays

These 4 indicators show where the channel has been assigned to using BUS ASSIGN section control switches (which are called up by means of the SET button).



Mute/ON-OFF Switch

The G1-G8 switches turn the submix channel signal on and off.

DCM Master Displays

These 4 indicators show which DCM masters the submix channel has been assigned to using the DCM SET control switches. Groups are assigned to these DCMs by pressing the group SET button and then pressing the desired DCM SET assign button.

Submix/Group Fader

Generally the eight audio submixes would operate in stereo mode. They may be mixed to two duplicate mono channels by means of the channel SET button and the MONO mode button in the MODE selector section. The left and right outputs of the submixes would be identical summed outputs of the left and right signals assigned to them from the input section.

The fader sets the output level of the submix channel. When the control surface has recalled a preset or is under external serial control from an automation system, the fader NULL LEDs light to show that the submix channel output level is actually different from what the fader indicates. The submix channel output level will remain at the computer directed value until the fader is moved to a matching level, after which the fader will control the level. The LED indicates which direction to move the fader to regain level control. Once the fader has been moved to the matching level the LED will turn off.

The D-5.1 control surface can be ordered with optional touch sensitive, long-throw motorized faders for automated level control.

The audio submixes generate two-channel mixes (i.e., STEREO) from stereo inputs assigned to them, or MONO inputs panned to them, and do not support 5.1 signals through them. However, they can be assigned to the 5.1 Surround master in the MFS-5.1panel and multi-channel controlled in the MS-5.1 panel.

Master Section (MS-5.1 & MFS-5.1)

Chapter Contents

Controls and Functions 4-3
Monitors 4-3
Production and Control Room Sections 4-3
Studio Section 4-4
Headphone Section 4-5
Programming Monitor Section 4-6
Test Section 4-6
Cue (PFL)/Solo (AFL)/Mute/Dim Section 4-7
Surround/PAN System 4-8
Switched Meter Section 4-8
XY Controller Section 4-9
Selecting Input Channel Sources 4-9
Selecting Output Mix Destinations 4-9
Event Controller Section 4-10
Storing an Event 4-10
Taking an Event 4-10
Undoing an Event 4-10
Modifying the Currently Selected Event 4-10
Deleting an Event 4-11
Previewing an Event 4-11
Event Default Button 4-11
Establishing the Default Setting 4-11
Naming an Event 4-11
Mute Groups 4-12
Confidence Feed 4-12
Mix Destination 5.1 Surround 4-12
Output Destination, 5.1 Master Example 4-13
Set 4-14
PFL (Cue) 4-14
AFL (Solo) 4-14
DYN (Dynamics) 4-14
EQ 4-14
DCM Displays 4-15
Channel Master ON/OFF 4-15

5.1 Master Faders 4-15
GM (Grand Master) Assign 4-16
Grand Master ON/OFF 4-16
Function Lock 4-16
Clear PFL/AFL 4-16
Page Buttons 4-16
Timer Section 4-17

Master Section (MS-5.1 & MFS-5.1)

Controls and Functions

The D-5.1 digital audio control surface is equipped with one MASTER section which consists of two panels (MS-5.1 and MFS-5.1 with non-motorized faders, or MFSM-5.1 with motorized faders). This section houses MONITORS, CUE, XY and EVENT CONTROLLERS, TIMER, SWITCHED METERS, and FUNCTION LOCK sections.

Monitors

There are eight studio/headphone monitor outputs available. Six of them (Studio 1 thru 5 and HEADPHONE) provide for stereo outputs, while the remaining two have provision for mono, stereo or 5.1 surround monitoring environments. Additionally, these last two (PRODUCTION and CR) also have a choice of three preprogrammed speaker system feeds to compare differing listener experiences.

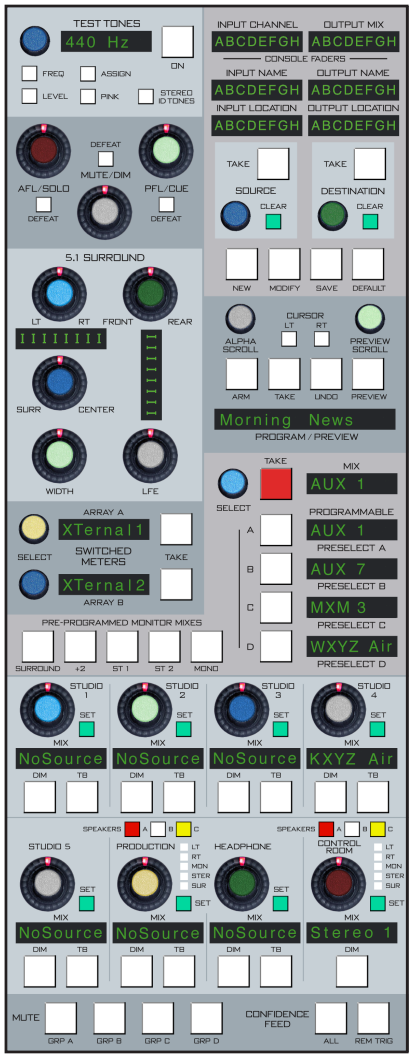
Each monitor has a level control, a SET button, an 8-character monitor display, a monitor DIM button and a TB button (the CR monitor does *not* have a TB button). PRODUCTION and CR monitors also have mono/stereo/5.1 MODE status display arrays and three SPEAKER selection buttons (A, B, C).

Production and Control Room Sections

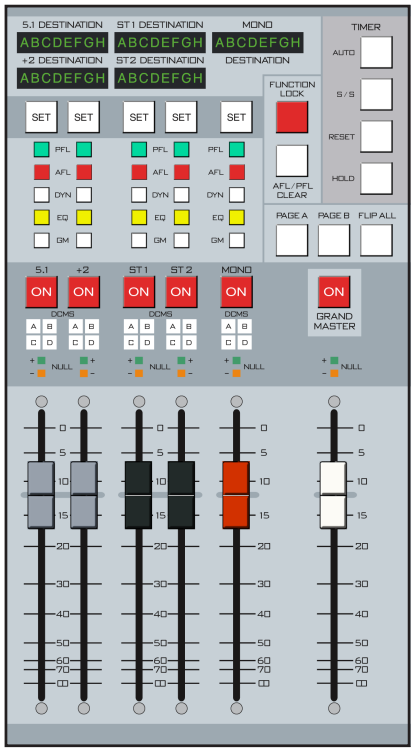
For descriptive purposes we will define the CONTROL ROOM monitor section; applicable control descriptions will also apply to the PRODUCTION monitor section, except where noted.

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 from the control surface's control room output. In addition to the control room output, the operator may also desire to listen to specific isolated faders via the cue system and the control surface's external cue speaker, or may want to listen via headphones.

CONTROL ROOM SET button - lets the operator select the source to be listened to in the control room speakers. Also provides access to MUTE, DIM, PFL, and SOLO settings.



MS-5.1 Panel

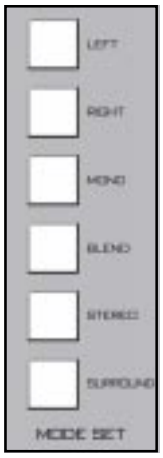


MFS-5.1 Panel

CONTROL ROOM MIX display - the eight character display shows the source that is selected for monitoring in the control room.

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

MODE LEDs - this ladder display gives local visual indication of the selected mode for that monitor (stereo, mono, etc.). Mode may be changed in the following way: Press the SET button and select the allowed MODE SET button in the EFS panel. If BLEND is pressed in the MODE section, the selection will automatically switch to STEREO. Note that SURR mode requires that the CR be configured for 6 channel operation in software. Not all systems support this mode. Consult factory for details.



EFS-5.1 Panel

SPEAKERS buttons - there are three speaker feeds each (A, B and C) for PRODUCTION and CR monitors. Each feed may be programmed with a desired MODE. To program a speaker output, press a SPEAKERS A, B, or C button, hit SET and then the desired MODE SET button, located on the EFS panel.

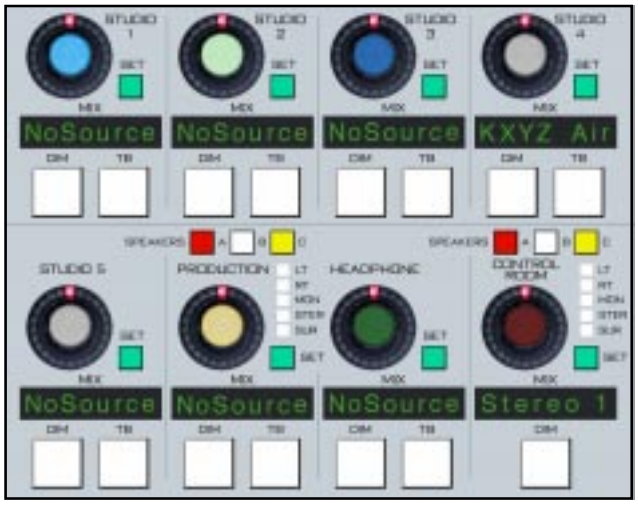
DIM button - lets the operator dim the control room speakers (drop in level). Note the DIM function also affects the talkback interrupt. The amount of dimming (that is, the audio level when in DIM) is set by the DIM control near the top of the panel.

SOLO, DIM and CUE Masters
(see folowing section for details)

TB (talkback) button (not available on the CR monitor) - takes a predefined signal, usually the mic plugged into the TB-5.1 panel's XLR connector, and feeds it to the monitor output, allowing direct communication between the operator and talent.

PFL/CUE - Adjust CUE speaker level with the PFL/CUE master.

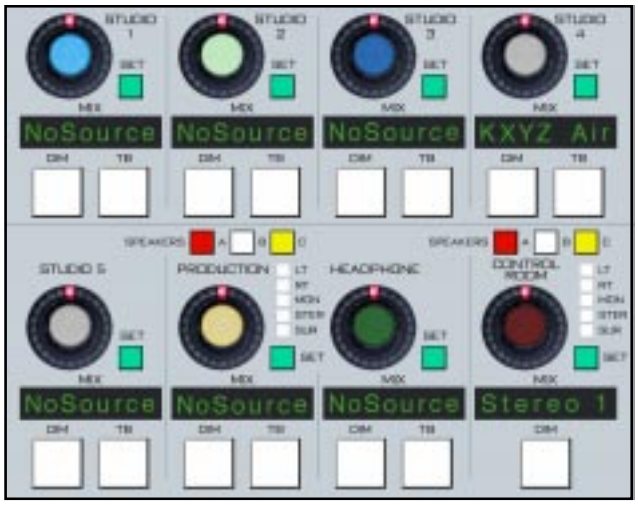
AFL/SOLO - Adjust SOLO to CR speaker level with the AFL/SOLO master.



Studio Section

In addition to the control room and production room, there are five studio rooms in which one or more performers may 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 production and control rooms, 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.

STUDIO SET button - lets the operator select the source to be listened to in the studio.

STUDIO MIX display - the eight character display shows the source that is selected for monitoring in the studio.

STUDIO level control - determines the overall loudness of the signal being monitored as it appears in the studio speakers.

DIM button - lets the operator dim the studio speakers (drop in level). Note the DIM function also affects the talkback interrupt. Note also if the studio is muted, talkback cannot be heard. However, if the studio is dimmed, talkback audio could presumably make it from the studio monitor speakers to the open studio mic.

TB (talkback) button - there may be times when the control surface operator wants to talk to one of the talent in the studio. When the TB button in the studio monitor section is pressed, a predefined signal, usually the mic plugged into the TB-5.1 panel's XLR connector, will "interrupt" the speaker feed that is normally heard in the studio.

If there is a live mic in the studio which has activated the mute feature, talkback will also be muted in the speakers.

On the top right corner of the EFS control panel is TB GAIN master level control that sets the talkback output and the level of the talkback interrupt signal. The normal studio feed, which is interrupted by the TB signal, will fall to a level set by the DIM control.

Headphone Section

HEADPHONE SET BUTTON - lets the operator select the source to be listened to in the headphones.

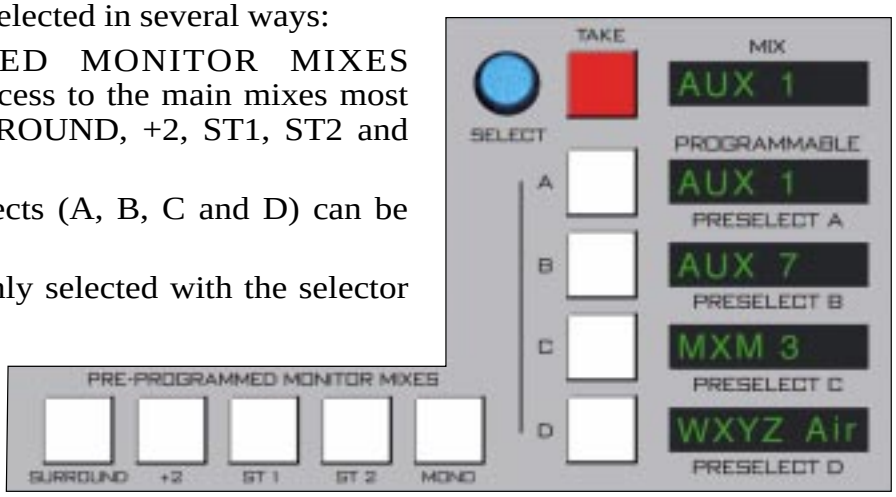
HDPN MIX display - the eight character display shows the source that is selected for monitoring in the headphones.

HEADPHONE level control - determines the overall loudness of the headphone output signal.

DIM button - lets the operator dim the headphone output signal (drop in level).

TB (talkback) button - takes the assigned TB signal and feeds it to the headphone output, allowing direct communication between the operator and talent. The normal headphone feed falls to a level set by the DIM control.

Programming Monitor Section



Monitor sources can be selected in several ways:

• PRE-PROGRAMMED MONITOR MIXES switchbank allows direct access to the main mixes most frequently monitored: SURROUND, +2, ST1, ST2 and MONO.

• A bank of four preselects (A, B, C and D) can be preprogrammed.

• Sources can be randomly selected with the selector knob (SELECT) and its attendant MIX display and TAKE button.

To program the four MONITOR PRESELECTS (A, B, C and D), rotate the SELECT knob until the desired signal is shown in the MIX display, then press and hold the desired PRESELECT button (A, B, C or D) until the name in the MIX display transfers to the matching PRESELECT display (takes about two seconds). If you stop turning the SELECT knob and fail to press a PRESELECT button or the TAKE button, the operation will time out after about five seconds.

To select an individual monitor, push the monitor's SET button and then press the appropriate button in the PRE-PROGRAMMED MONITOR MIXES switchbank. The selected source will then be displayed in the output MIX display (below the monitor knob).

Test Section

The test section, located at the top left of the MS-5.1 panel, provides adjustable frequency test signals, a pink noise source, and a stereo ID source (a 400Hz tone on the left channel, and a 1KHz tone on the right channel).

To set up the test generator, press STEREO ID TONES to select the stereo ID tones, or press PINK to select pink noise, or press FREQ and use the knob to dial up a test frequency (20Hz to 20KHz), as shown in the TEST TONES display. Once the source is set, the level can be adjusted by pressing LEVEL and turning the knob to the desired level (from 0dB down to OFF).

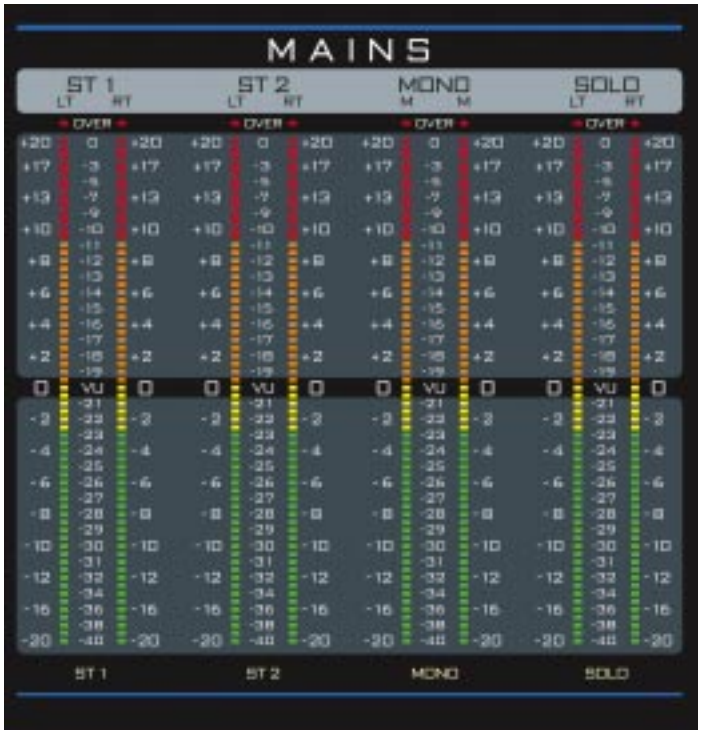
The selected test signal can then be routed to any of the AUX sends, mix-minuses (but not bus minuses), groups, masters, or monitors. Press the SET switch for the desired destination, then press the ASSIGN button. The test signal can be assigned to multiple outputs. Once the desired assignments have been made, press the ON button to turn the test generator on.

Cue (PFL)/Solo (AFL)/Mute/Dim Section

The PFL/CUE master level control, AFL/SOLO master level control, and the DIM master level control, and their associated DEFEAT switches, are located near the top left corner of the MS-5.1 panel.

The CUE signal is pre-fader, and is normally used to check signals. When a channel is CUEd, its pre-fader signal will appear in the cue speaker, and the switched meter array in the meterbridge display will show the level of the pre-fader signal if it has been so programmed. The PFL/CUE level control determines the overall loudness of the cue signal (normally wired to the external cue speaker).

Use the PFL/CUE defeat switch to prevent CUE from interrupting the main Control Room speakers.

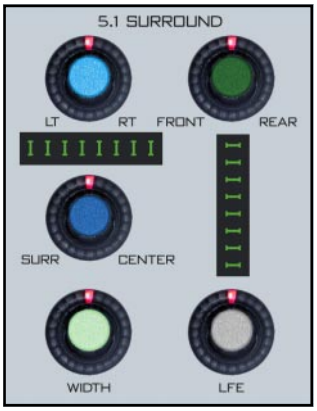


The SOLO signal is after fader, and is normally used to check a mix. When an output (such as an AUX SEND) is SOLOed, its post-fader signal will appear in the solo output (and usually, the control room speakers). The SOLO meter array in the meterbridge display will show the level of the mix. The solo defeat switch allows for disabling the control room/solo interrupt function.

The DIM level control sets the amount of attenuation applied to a monitor signal (such as control room output) when its DIM switch is engaged, and also sets the level of the normal feed when it is interrupted by the TB signal. The dim defeat switch allows for temporarily overriding the attenuation to bring all DIMmed signals back to their normal level.

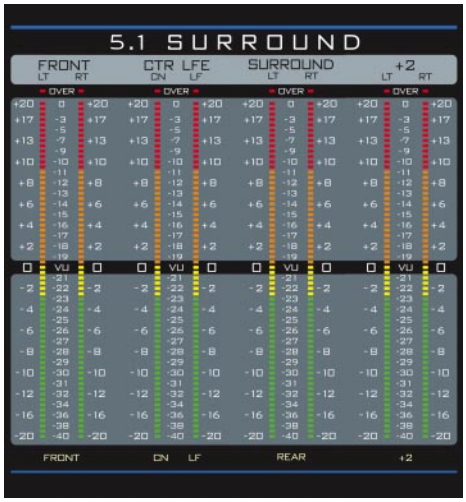
Monitor outputs are normally subject to the control surface's muting and solo/cue interrupt circuits; however, these may be defeated by using the DEFEAT buttons as described above. To defeat these functions, activate the monitor's SET button and press the AFL/SOLO DEFEAT, MUTE/DIM DEFEAT or the PFL/CUE DEFEAT button as desired.

Surround/PAN System



NOTE: The 5.1 Surround panning system is used only for those signal paths assigned to a 5.1 destination.

To program 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 BUS ASSIGN switchbank (EFS-5.1 panel). The 5.1 SURROUND section will indicate the current settings of the encoder LT/RT, FRONT/REAR, SURR/CENTER, WIDTH and LFE knobs. The relative LT/RT and FRONT/REAR information is also shown on dot matrix displays. The meterbridge display also shows 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.



Switched Meters Section

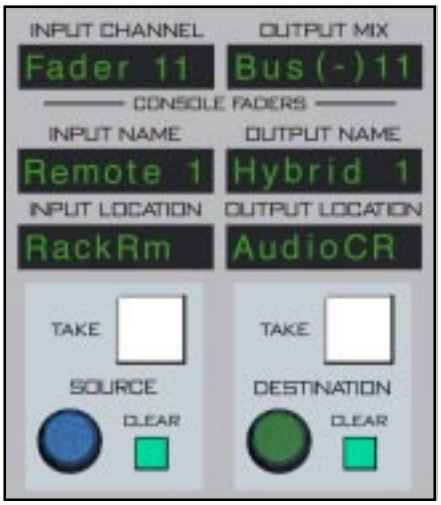
The D-5.1 control surface has provision for two switched meter arrays: Array A and Array B. Each array includes six meter columns, so they may display 5.1 Surround program. When a two-channel program is selected, of course only two of the six columns will illuminate with the program content (and so on).

To select a program to Array A rotate its SELECT encoder. Allowed content will be displayed in the ARRAY A display. When the desired program is displayed, press the TAKE button. Meter array A will then display the program as designated in the display. If, however, after a timeout period of 5 seconds, the TAKE button is not pressed, Array A will revert back to its previous selected program.

Array B is selected in the same way, only by means of a separate ARRAY B SELECT encoder, alpha display, and TAKE button.

NOTE: program content allowed for selection by these encoders is predetermined in the system setup GUI.

XY Controller Section



This section provides a means of selecting sources for input channels and destinations for output mixes.

Selecting Input Channel Sources

To select a new source for an input channel, press the channel's SET button. The INPUT CHANNEL display shows the selected channel number and the INPUT NAME and INPUT LOCATION displays will match the channel's input SOURCE and LOCATION displays. Rotate the SOURCE knob, and the INPUT NAME and INPUT LOCATION displays will change. When the desired source is indicated, press TAKE. The new source now shows in the channel's SOURCE and LOCATION displays. If the SOURCE knob has been idle for 5 seconds and the TAKE button has not been pressed, the operation cancels and the channel reverts to its previous state. You can also remove the input source from the channel by hitting the channel's SET button and then hitting the CLEAR button next to the MS-5.1 SOURCE knob; the channel's display will then show "NoSource".

Selecting Output Mix Destinations

Press the output's SET button. The OUTPUT MIX display shows the selected output number and the OUTPUT NAME and OUTPUT LOCATION displays will show the current location (the output may be routed to multiple sources but only one will show in the displays), which will match the output's DESTINATION display. As you rotate the DESTINATION knob, the CLEAR button will light if the output currently does not feed that destination, or the TAKE button will light if the output does currently feed that destination. Press the TAKE button while it is lit and the selected destination will be added to the list of destinations the output feeds. Press the CLEAR button while it is lit and the selected destination will be removed from the list. If all destinations have been removed from the list the DESTINATION display will show "NoDest". You may also "dobby" the DESTINATION knob to step thtough all of the currently routed destinations.

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

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

Event Controller Section

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

Storing an Event

When an event is stored, all of the control surface's current settings are saved and will be recalled when that event is executed through the TAKE command. To create a new event from current control surface settings, hit the NEW button (SAVE lights, NEW flashes, and a new name is generated in the PROGRAM/PREVIEW display), and then hit SAVE button. If SAVE is not pressed within about 10 seconds of pressing NEW, the operation will time out. To overwrite an existing event with the current settings, turn the PREVIEW SCROLL knob until the desired event is displayed in the PROGRAM/PREVIEW window, then quickly press MODIFY, then SAVE.

Taking an Event

Rotate the PREVIEW SCROLL encoder until the desired event is shown in the PROGRAM/PREVIEW display. To prevent accidental takes, the ARM button must be pressed to arm the function. The ARM, TAKE, UNDO, and PREVIEW buttons will flash to indicate that the panel is ready to act on a take. Then press the TAKE button to execute the EVENT. If TAKE is not pressed within about 10 seconds of pressing ARM, the operation will time out.

Undoing an Event

To recover from a premature or erroneous EVENT take, press the ARM button (ARM, TAKE, UNDO, and PREVIEW buttons all flash), then press the UNDO button. 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 (SAVE and DEFAULT light and MODIFY flashes), 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. If SAVE is not pressed within about 10 seconds of pressing MODIFY, the operation will time out.

Deleting an Event

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

Previewing an Event

Rotate the PREVIEW SCROLL encoder (push knob in while rotating for faster scrolling) and available EVENT names will be shown in the 16-character PROGRAM/ PREVIEW display. When the desired event is shown in the display, press the ARM button (ARM, TAKE, UNDO, and PREVIEW buttons all flash), then press the PREVIEW button. This will cause the entire control surface to display all settings associated with that event, without disturbing the current event. The preview status will be indicated by flashing of the PREVIEW button and 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.*** After pressing ARM, if PREVIEW is not pressed for about 10 seconds the operation will time out.

Event Default Button

This control allows rapid access to a default or home control surface setting. Push it, and the DEFAULT, TAKE, and PREVIEW buttons in the Preview section will flash. Hit the TAKE button and the default setting will be executed. Pressing the DEFAULT button again cancels the operation. If TAKE or DEFAULT is not pressed within about 10 seconds of the first DEFAULT press, the operation will time out.

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 (SAVE and DEFAULT light and MODIFY flashes), and then the DEFAULT button. The default setting is stored. If DEFAULT is not pressed within about 10 seconds of pressing MODIFY, the operation will time out.

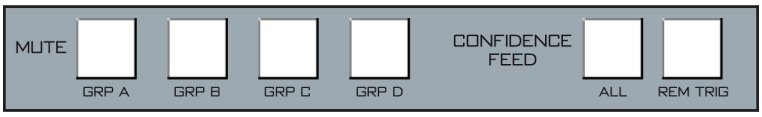
Naming an Event

When events are saved, they receive a default event designation number. In 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 in the PROGRAM/PREVIEW display. 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.

Mute Groups

This bank of four buttons duplicates the function of the DCM ON buttons, as described in Chapter 5. Note, however, that a MUTE button is lit when the associated DCM is off, whereas the DCM ON button itself would not be lit in this case.

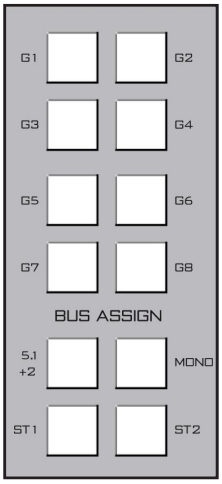


Confidence Feed

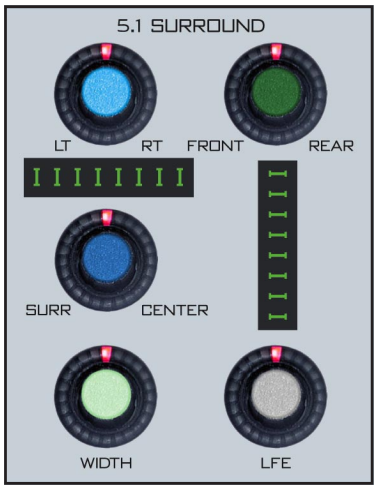
The CONFIDENCE ALL and REM TRIG switches are duplicate function of the CONF ALL and REM TRIG switches in the MIX-MINUS CONFIDENCE FEED section on the DS-5.1 panel (see Chapter 5, page 5-6).

Mix Destination 5.1 Surround

NOTE: There are five different mix destinations: 5.1 Surround, +2, Stereo 1 (ST 1), Stereo 2 (ST 2) and MONO. 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 four destinations on the MFS-5.1 panel.



EFS-5.1 Panel



MS-5.1 Panel

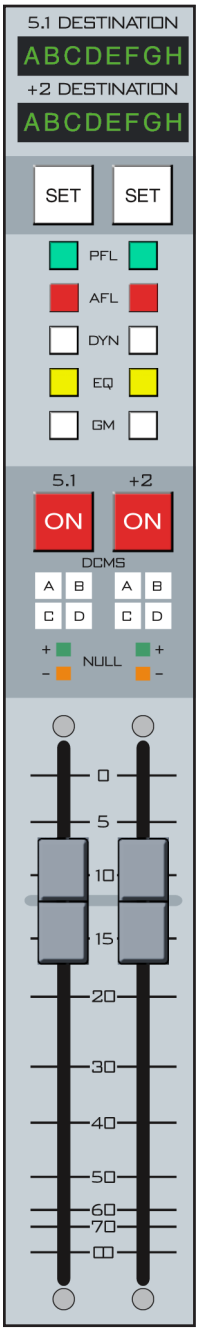
Input channels are assigned to the 5.1 Surround master by means of BUS ASSIGN button "5.1" (BUS ASSIGN section on the EFS-5.1 panel). Mono input sources would pan anywhere in the 5.1 sound field. Stereo inputs would typically route to left front/right front or be balanced to the surrounds.

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

DESTINATION +2 NOTE: The +2 output is a compatible composite output that's derived (see following paragraph) from the surround output. In a typical application the 5.1 surround output would go to the DTV signal chain, and the +2 signal would go to the SDTV chain, such that the audience experiences the same program content.

There are two possible ways to handle +2 compatibility. The choice is established in GUI and hardware configuration within the engine system. In the most desirable case the 5.1 signal that has been routed through the control surface and to the master output fader is then remixed by an internal algorithm within the control surface system that generates a second compatible stereo mix automatically; this mix will appear on the +2 fader.

The second case, which involves dedicating more engine hardware, provides for a broadcast network pre-established +2 system, whereby the network transmits the 5.1 signal and the +2 signal pre-derived; in this case, when a 5.1 signal is selected for an input channel, the control surface is in fact also selecting and routing the two channel +2 signal. This signal would then be routed to the +2 mix engine and appear on the +2 fader.



Output Destinations, 5.1 Master Example

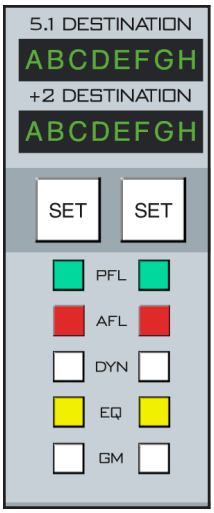
Output destinations are selected by pressing the SET button. The master mix channel OUTPUT MIX display (MS-5.1panel) will be illuminated and the OUTPUT NAME display will reflect the same name as shown in the 5.1 DESTINATION display, which will be the most *recent* output destination assigned. It should 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".

As you rotate the DESTINATION knob in the MS-5.1 panel the names of allowable destinations will appear in the OUTPUT NAME and 5.1 DESTINATION displays. If 5.1 is not currently routed to the displayed output, the TAKE button will be lit; if 5.1 *is* currently routed to the displayed output, the CLEAR button will be lit. Press the TAKE button when lit to add the currently displayed output as a 5.1 destination, or press the CLEAR button when lit to delete that output as a 5.1 destination.

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

Set

The SET button allows the operator to access various controls in other sections of the control surface and apply them to the master channel in question. SET can access DYNAMICS section (DS-5.1 panel), EQ section (EFS-5.1 panel), and GRAND MASTER ASSIGN (MFS-5.1 panel). To use, simply hit the SET button and then make desired section settings in other areas of the control surface.



PFL (Cue)

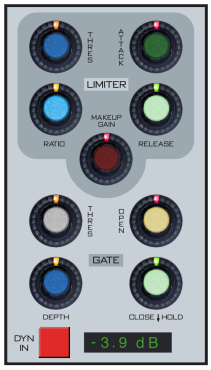
This switch lets the control surface operator monitor the channel's pre-fader signal.

AFL (Solo)

This switch lets the control surface operator monitor the channel's post-fader signal.

DYN (Dynamics)

This switch inserts dynamic functions that have been preset by the operator in the DCM-5.1 panel. When a knob in the dynamic section is rotated the display located next to the DYN IN button automatically shows the proper setting units and parameters for the active knob. The display is updated as the settings are changed by rotating the knob.

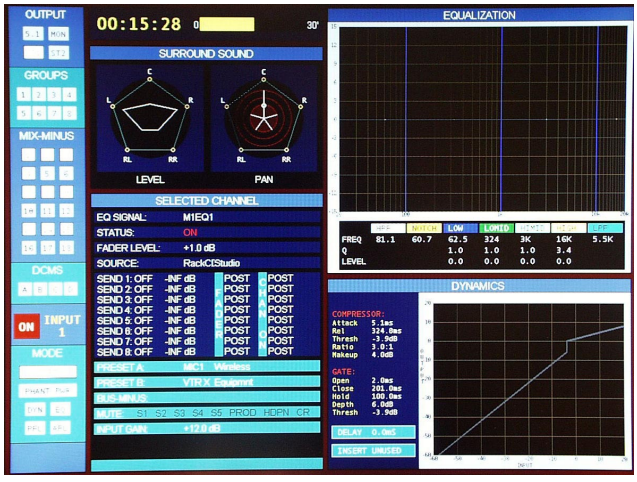


DS-5.1 Panel

EQ

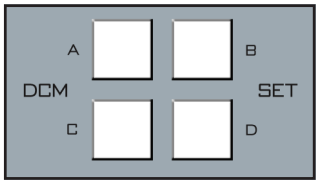
This switch inserts EQ functions that have been preset by the operator in the EQ section of the EFS-5.1 panel. When an EQ section knob is rotated, the appropriate display associated with that knob automatically shows the proper setting units and parameters for the active knob. The display is updated as the settings are changed by rotating the knob.

EFS-5.1 Panel

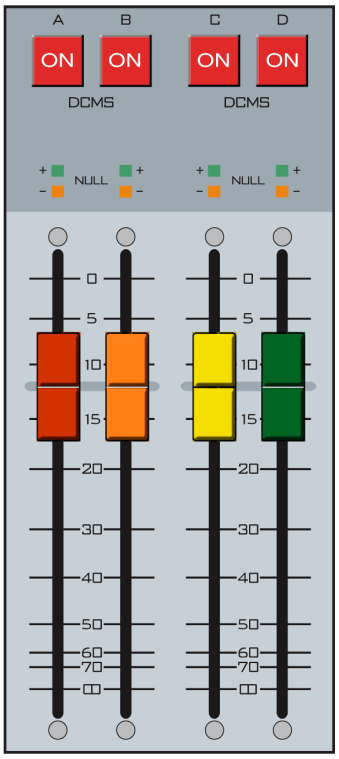


DCM (Digital Control Master) Displays

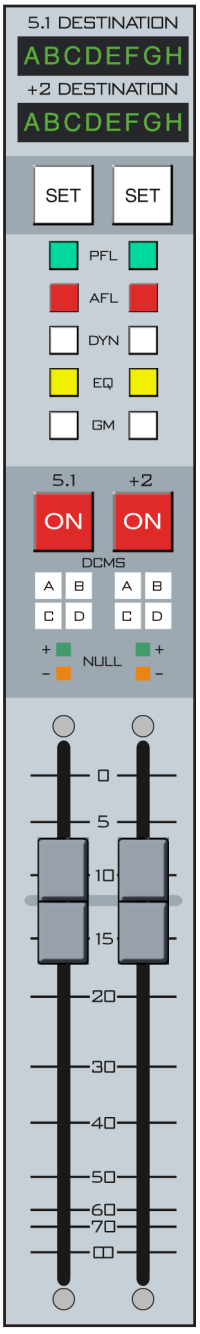
These 4 indicators show which DCM masters the output has been assigned to using the DCM SET control switches. Outputs are assigned to these DCMs by pressing the output SET button and then pressing the desired DCM SET assign button.



EFS-5.1 Panel



DCM-5.1 Panel



Channel Master ON/OFF

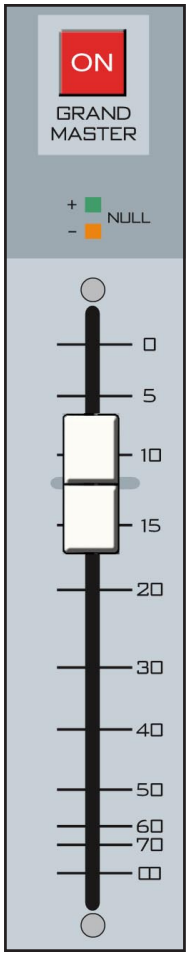
The MASTER ON switch turns the output signal ON and OFF. The switch LED lights to indicate the channel is ON.

5.1 Master Faders

These controls set the levels of the master channels. When the control surface has recalled a preset or is under external serial control from an automation system, the fader NULL LEDs light to show that the master output level is actually different from what the fader indicates. The master output level will remain at the computer directed value until the fader is moved to a matching level, after which the fader will control the level. The LED indicates which direction to move the fader to regain level control. Once the fader has been moved to the matching level the LED will turn off.

The D-5.1 control surface can be ordered with optional touch sensitive, long-throw motorized faders for automated level control.

GM (Grand Master) Assign



The grand master assign acts like a VCA type grand master control for the surround, +2, stereo 1, stereo 2 and mono master outputs. All output masters that are assigned to the grand master fader will have their levels adjusted simultaneously in a gang-like manner. Assignment is made by simply pressing the GM button on the appropriate master output.

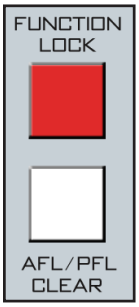
Grand Master ON/OFF

This switch acts as a master mute for any master mix that has been linked to the grand master.

Function Lock

It is a necessity under some circumstances that non-technical personnel be prevented from adjusting a control surface's signal processing; even with qualified personnel at the helm, locking out the controls can prevent an inadvertent mid-show disaster.

This is achieved by the FUNCTION LOCK switch on the MFS-5.1 panel. The control surface operator can lock out functions that may be undesirable to accidentally activate. To lock out a function, first press the FUNCTION LOCK button. This causes the FUNCTION LOCK button to flash. Then press the control you wish to lock out. If you fail to press a target control within about five seconds, the operation will be canceled.



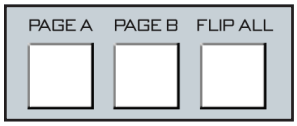
When you press a locked control, the FUNCTION LOCK button flashes to let you know you have tried to access a locked control. To unlock the control, press the FUNCTION LOCK button once. The locked control is released. If you fail to press the FUNCTION LOCK button within about five seconds of pressing the locked control, the operation will time out and the control will remain locked.

Clear PFL/AFL

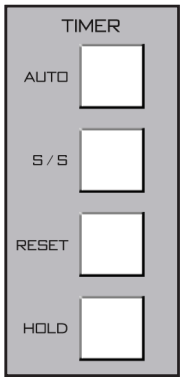
When any PFL (Cue) or AFL (Solo) on the control surface is pressed, its light will be illuminated and should flash slowly. The AFL/PFL CLEAR button will also flash synchronously with any inputs or mixes that have been soloed or cued. Any channel can be released from cue/solo by pressing its individual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

Page Buttons

These three buttons are used to simultaneously toggle groups of individual input channel PAGE buttons at once. The PAGE A button places all input channels in Page A mode, the PAGE B button places all input channels in B Mode, and the FLIP ALL button toggles each individual input channel page button to its opposite state (i.e., A becomes B, B becomes A). This is useful for instant LIVE to BREAK setups.



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 to zero and start a new count (if the timer is currently running), allowing the announcer to easily track his own pace. This is enabled by pressing the AUTO button, which lights when the timer is in auto-restart mode.

The S/S 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. The S/S button is lit while the timer is running.

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.

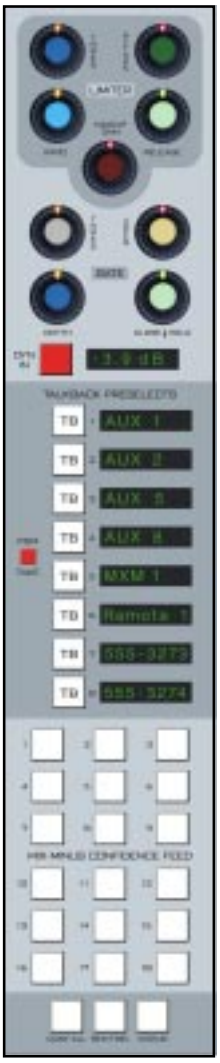
The HOLD button allows you to hold the display for a longer viewing duration, while still allowing the counter to continue in the background. Releasing the button will then display the current count.

Dynamics Processing Control Section (DS-5.1 & DCM-5.1)

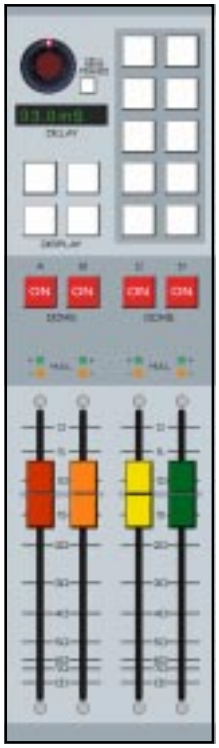
Chapter Contents

Controls and Functions 5-2
Dynamics Section 5-2
Compressor/Limiter 5-2
Dyn In 5-3
Threshold 5-3
Attack 5-3
Ratio 5-4
Release 5-4
Makeup Gain 5-4
Gate 5-4
Talkback Preselects 5-5
MXM Confidence Feed 5-6
Audio Delay 5-6
DCM Section 5-7
DCM ON 5-7
Fader 5-7
Programmable Buttons 5-7
Display Buttons 5-8

Dynamics Processing Control Section (DS-5.1 & DCM-5.1)



DS-5.1 Panel



DCM-5.1 Panel

Controls and Functions

The D-5.1 digital audio control surface is equipped with one DYNAMICS PROCESSING CONTROL section which consist of two panels (DS-5.1 and DCM-5.1 with non-motorized faders, or DCMM-5.1 with motorized faders). This section houses DYNAMICS, TALKBACK PRESELECTS, MXM CONFIDENCE FEED, AUDIO DELAY, DCM, DISPLAY and PROGRAMMABLE BUTTONS sections.

Dynamics Section

This section provides compression, limiting, expansion and gating functions for individual input channels. The section can be accessed by means of the SET buttons on the desired input channels. As you turn the knobs in this section, the LED display next to the DYN IN button displays the current settings of that knob for the channel currently in SET mode. The last knob adjusted will show its actual adjusted setting in the display. The knobs may also be pressed to obtain a display reading without actually turning them. Any current settings of the active channel will also be graphically shown in real time on the flat panel display.

COMPRESSOR/LIMITER

The compressor algorithm used in the D-5.1 control surface is designed to:

- allow smooth, inaudible, and unobtrusive level control on uneven sources;

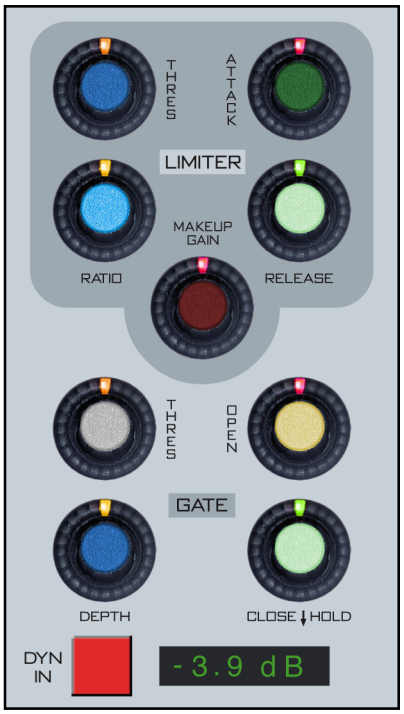
- be able to act as a peak limiter for inadvertent overload control;

- enable deep effects if required.

The DCM-9 panel 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 ad-

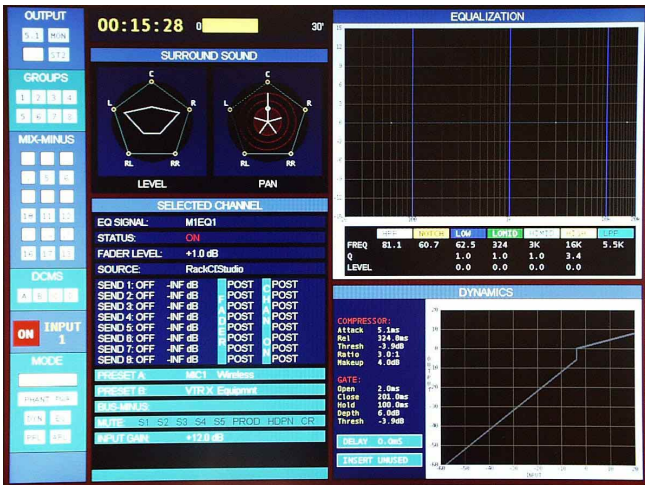
justable between 0.1mS and 330mS ("Attack" control). At the slower end of its range, by itself it achieves a nouveau-classic "dbx" style syllabic-rate level control. As the time-constant is shortened, it becomes progressively shorter in relation to the lower audio frequencies themselves; the effect is 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:



DYN IN

A DYN IN button toggles the settings in and out of the signal path. Each input channel also has its own "DYN" button to allow engaging these functions directly from the input panel. Whenever dynamic functions are engaged, the flat screen display will show a gain reduction bargraph meter, indicating both that the dynamics functions are active, and the amount of gain reduction being generated.

THRESHOLD

The THRES 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 THRES 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 THRES 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 THRES knob; the LIMITER THRES cannot be set lower then the GATE THRES.

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 100.0mS.

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

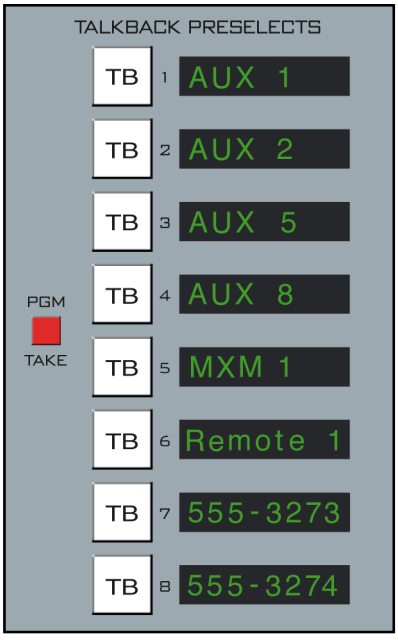
The CLOSE↓HOLD knob serves a dual purpose. Turning the knob without pressing it down determines how quickly the gate closes once the incoming signal falls below the GATE THRES level. Turning the knob while pressing it determines how long the gate will stay open after the signal falls below the GATE THRES level before it begins to close.

Talkback Preselects

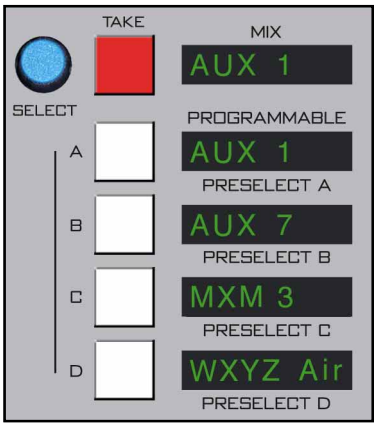
These eight switches allow for a dedicated Bridge Router output to be designated as a destination for the talkback signal. Once a specific output has been programmed into the preselector, the talkback signal can be sent to that output at any time by pressing the corresponding switch.

Each of the eight TB buttons can be individually programmed, and then the entire programmed bank of eight can be stored and recalled in the EVENTS section (see Chapter 4, pages 4-10 to 4-12). Each individual TB button is programmed as follows: press the PGM/TAKE button (this button will light), then press the TB button you want to program (the TB button and its associated display will flash). Then rotate the MIX SELECT knob (programmable section on the MS-5.1 panel) and available destinations will be shown in the MIX display. When the desired channel is shown, press the TAKE button located next to SELECT knob (MS-5.1 panel), and the appropriate TB PRESELECTS display will then match what is shown in the MIX display on the MS-5.1 panel. Repeat this procedure for each of the eight 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 eight TB preselects as displayed at the time of the EVENT SAVE action will be also stored and can be recalled with that EVENT.



DS-5.1 Panel

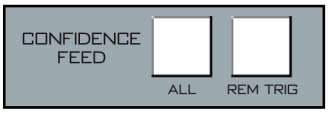


MS-5.1 Panel

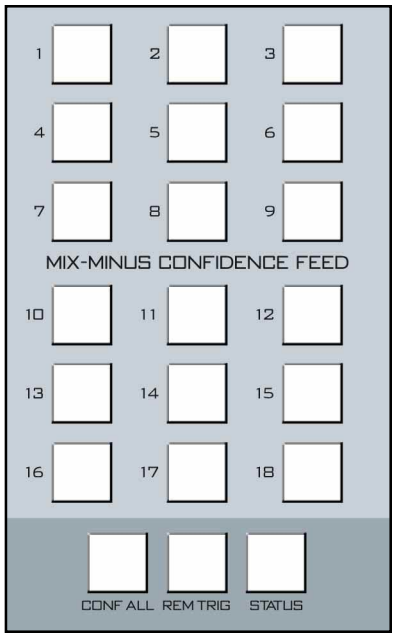
MXM Confidence Feed

This system provides a means of sending an external signal to any or all of the 18 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.)

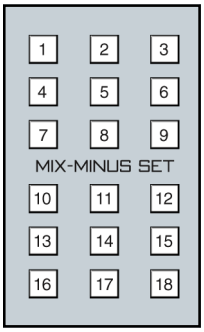
A bank of 18 buttons allows individual activation of confidence feeds to any of the MXM outputs. Each feed can be unique. Additionally, all 18 outputs can be put into confidence mode by means of a CONFIDENCE ALL switch (on the DS-5.1 or MS-5.1 panel). Also, the CONFIDENCE ALL feed function can be triggered from an external contact closure and armed for such action by means of the REM TRIG button (on the DS-5.1 or MS-5.1 panel). All Confidence Feed programming is included in the EVENT storage.



MS-5.1 Panel

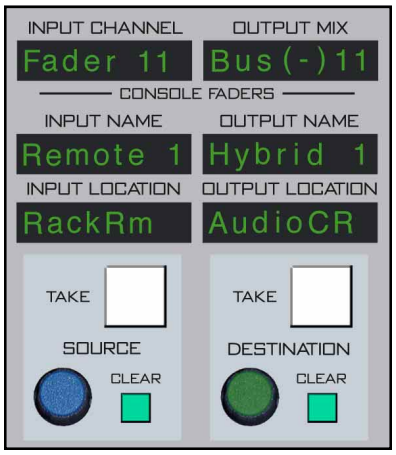


DS-5.1 Panel



EFS-5.1 Panel

To set and store a confidence feed signal, go to the MIX-MINUS SET section of the EFS-5.1 panel and hit the corresponding button to establish a programming mode. Select the desired source in the XY Controller section of the MS-5.1 panel by rotating the SOURCE knob until the desired signal is shown in the INPUT NAME 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 18 MXM outputs in the MIX-MINUS SET section on the EFS-5.1 panel.



MS-5.1 Panel

To DEselect a source, select that source by means of the SOURCE knob, and press the CLEAR button.

After a timeout period of 5 seconds the INPUT NAME display will revert to the current channel that's in the SET mode elsewhere on the console.

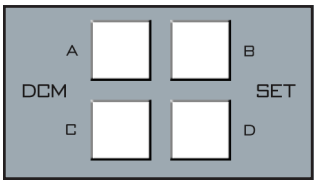
Audio Delay

Audio delay is shown in the 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 667.5) or frames (0.0 to 20.0 in 0.5 frame steps) by means of the MICRO SECS/FRAMES button.

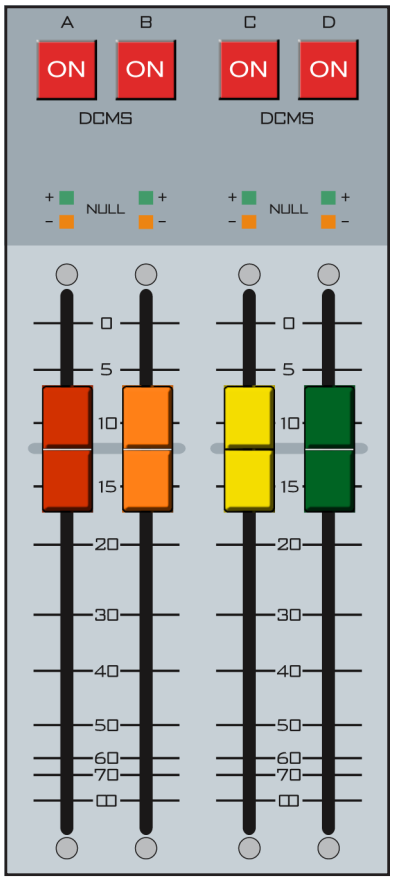
Delay settings are vitally important, permitting audio time delay adjustments to allow for video processor delays or satellite-to-terrestrial link audio/video timing discrepancies.

DCM Section

To assign a DCM to an input, submix or master, place the input, submix or master channel in the SET MODE and press any combination of the DCM ASSIGN BUTTONS on the EFS-5.1 panel. The appropriate DCM display cluster (on the IFS-5.1, SFS-5.1 or MFS-5.1 panel) on the inputs, submixes, or masters respectively, will be illuminated, as well as the assign buttons.

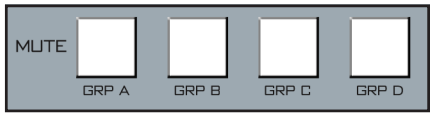


EFS-5.1 Panel



DCM ON

The ON switch provides a rapid way to mute a group of signals. Any signals that are assigned to a DCM will be muted when the DCM ON switch is turned off. Note that there are also four matching MUTE buttons at the bottom of the MS-5.1 panel; these MUTE buttons are lit (to indicate a group is MUTEd) when the matching DCM ON button is off, and vice versa. Either set of buttons may be used to control the DCMs at any time.



MS-5.1 Panel

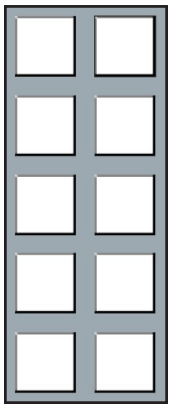
FADER

DCM level is set by a long-throw fader. When the control surface has recalled a preset or is under external serial control from an automation system, the fader NULL LEDs light to show that the DCM level is actually different from what the fader indicates. The DCM level will remain at the computer directed value until the fader is moved to a matching level, after which the fader will control the level. The LED indicates which direction to move the fader to regain level control. Once the fader has been moved to the matching level the LED will turn off.

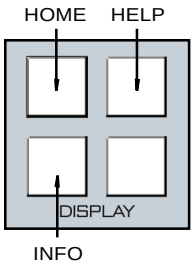
The D-5.1 control surface can be ordered with optional touch sensitive, long-throw motorized faders for automated level control.

Programmable Buttons

These 10 momentary switches and indicating LEDs are designed for user accessible external functions (GPIs). They can be mapped with the configuration software to any available logic I/O ports within the Bridge Router system, and used to control external devices.



Display Buttons



There are four display buttons on the DCMS fader panel. These buttons access various VGA display modes. To revert to normal panel display, press the upper left HOME DISPLAY button.

HOME - Default; Press this switch to have VGA monitor follow SET buttons.

HELP - Press this switch to activate the built in user Help system. The HELP system uses the DELAY knob and MILLISEC/FRAMES switch to navigate various topics.

INFO - Beneath the Surround graphic panel on the VGA display is a panel that normally shows information about the selected input or mix. By pressing the lower left INFO Display button, the VGA monitor panel will change to INFO and show information about the CPU, installed surface and DSP software revisions, and memory use.

BLANK - not used at this time.

Host CPU (HC-5.1)

Chapter Contents

Overview **6-2**

HC-5.1 BIOS Settings/Format **6-2**

Ethernet IP Addressing **6-2**

Ethernet Interface Wiring **6-2**

Mixer Link Wiring **6-3**

Internal Programming Options **6-3**

Switch Settings **6-3**

SW5-SW8 - CAT5 vs. Fiber & Transceiver Select 6-3
SW9 - Master Reset 6-3
SW10 - CPU Reset 6-3
SW11 Position 1 - Sample Rate 6-3
SW11 Position 3 - Redundant CPU 6-4
SW11 Position 4 - CAT5 vs. Fiber 6-4

Hook-Ups **6-4**

"ETH A" RJ-45 - Main Ethernet Connector 6-4
"ETH B" RJ-45 - Optional Redundant Computer Ethernet Connector 6-4
"CAT5" RJ-45 - Mixer Link Connector 6-4

Typical Ethernet Cable **6-5**

Typical Crossover Cable **6-5**

Optical Fiber Interface **6-6**

Optical Transceiver 6-6
Connectors Type 6-6
Optical Fiber Cable 6-6

HC-9 Pinouts Drawing **6-7**

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

Host Controller (HC-5.1)

Overview

The host controller card used in the D-5.1 incorporates a PC/104 computer mounted on the HC-5.1 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 provide control of the D-5.1 control surface. The HC-5.1 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-5.1 card and is restored at power up or reset. This configuration information provides details to the host application running on the HC-5.1, such as the specific audio hardware available and serial port allocation. The HC-5.1 host controller card can be fitted with an optional 2nd PC/104 computer for redundancy.

HC-5.1 BIOS Settings/Format

BIOS Setup and formatting of the Host CPU is completed prior to the testing of your D-5.1 control surface at the Wheatstone factory. There are no user adjustable settings.

Ethernet IP Addressing

The Wheatstone D-5.1 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 via a straight (pin to pin) CAT-5 cable. Typical CAT-5 cable pinouts are included in the "Hook-Ups" section near the end of this chapter. These connections are for communicating with the configuration computer; a separate ethernet connection should be provided for each control surface.

Mixer Link Wiring

This RJ-45 (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 CAT-5 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 - 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 CAT 5 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 CAT 5 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 SW11 pos 4 (see below) must be made to the same selection. The Mixer Link is either CAT5 or FIBER.

SW9 - 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.

SW10 - 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.

SW11 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!

SW11 Position 2 - Not Used

This dipswitch position is reserved for future use.

SW11 Position 3 - Redundant CPU

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

SW11 Position 4 - CAT5 vs. Fiber

The mixer link can be connected via CAT5 cable or fiber optic cable. Set position 4 of SW11 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 SW11 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 6-7 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

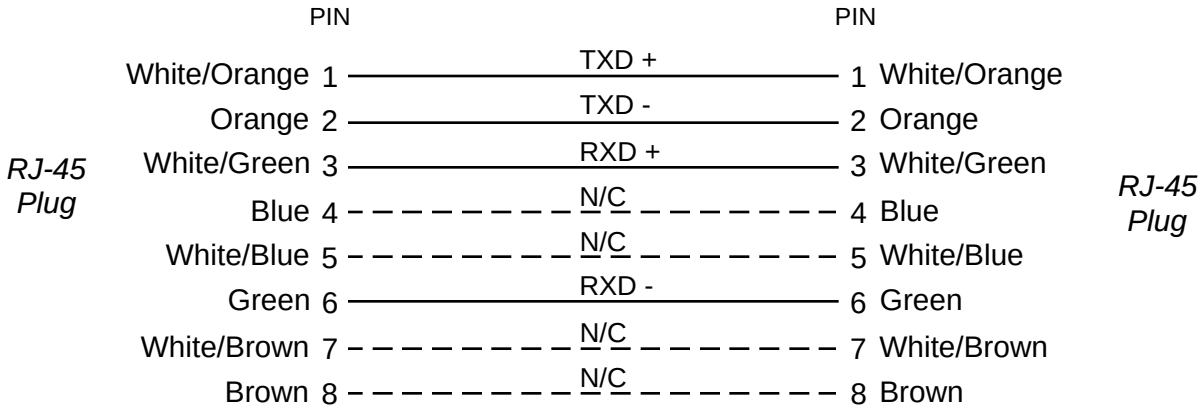
"ETH B" RJ-45—Optional Redundant Computer Ethernet Connector

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

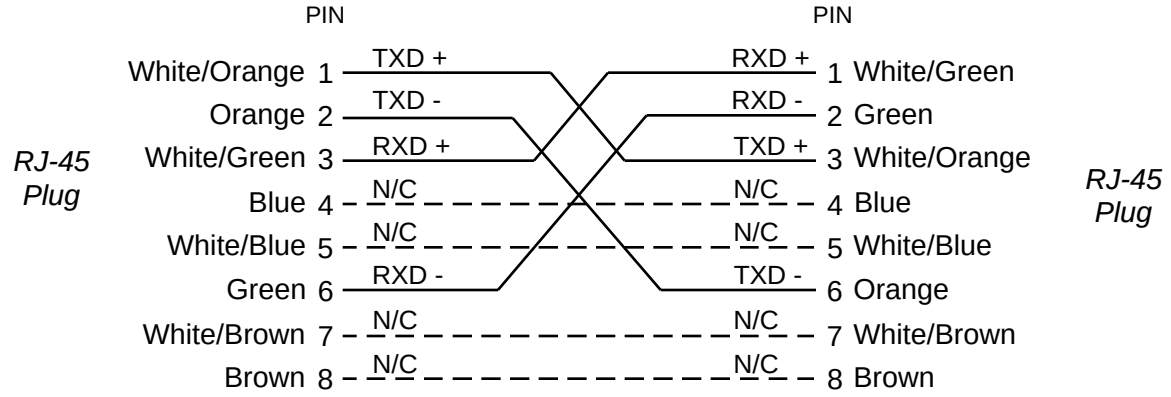
Pin 1 – TXD +
Pin 2 – TXD -
Pin 3 – RXD +
Pin 4 – N/C
Pin 5 – N/C
Pin 6 – RXD -
Pin 7 – N/C
Pin 8 – N/C

TYPICAL ETHERNET CABLE



USED FOR CONNECTING THE HOST CONTROLLER TO YOUR NETWORK HUB.

TYPICAL CROSSOVER CABLE

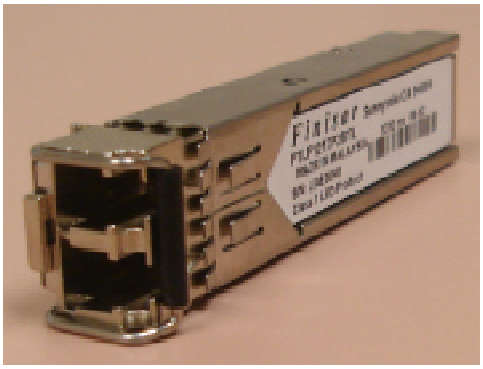


USED FOR MIXER LINK CONNECTOR.

Optical Fiber Interface

The D-5.1 control surface supports an optional fiber connection to the Bridge Router. The D-5.1 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 Transceiver

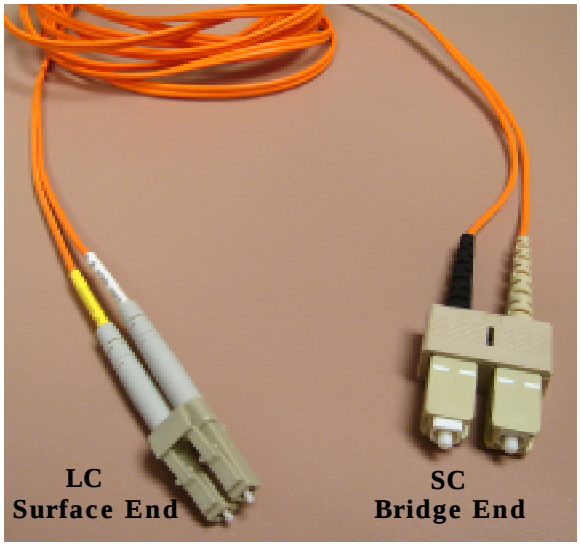
Optical Transceivers convert physical signals from electrical to optical (and vice-versa) in a network and couple the optical signals into (and out of) optical fiber. Small form factor pluggable (SFP) transceivers, used in the D-5.1 surface, are designed to be hot-swappable in industry standard cages and connectors (for easy field repair), and offer high speed and physical compactness.

Connectors Type

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



Optical Fiber Cable

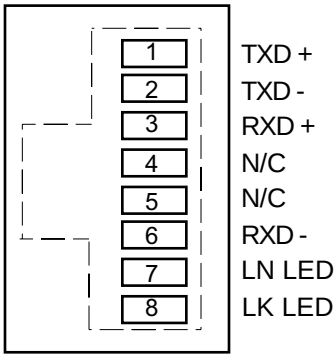
The SC-LC optical fiber cable required in this application is a multimode duplex fiber optic patch cable with a core/cladding size *62.5/125 micron* suitable for low-to-moderate-speed data links (≤100Mbps). The following Fiber Instrument Sales, Inc. part number X2YLM3FISC may be used to reference the 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 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.*

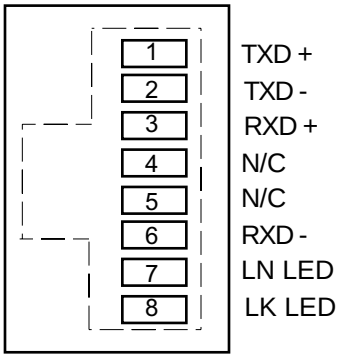
HC-5.1 Host Controller I/O Connections

Ethernet Connections

"A" Main Ethernet Connector (RJ-45)

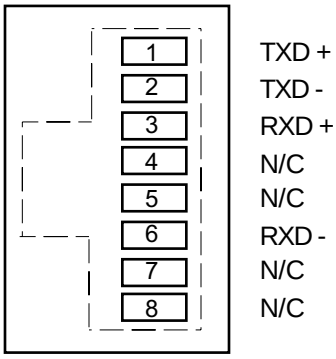


"B" Optional Redundant Computer Ethernet Connector (RJ-45)



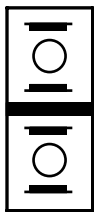
Mixer Link Connections

CAT5 Connector (RJ-45)



(crossover)

Optional Optical FIBER (LC Connector)



Schematic and Load Sheet Drawings

Chapter Contents

IS-5.1 4 Inputs Panel Switch Card
Schematic 7-3
Load Sheet 7-11

IFS-5.1 4 Inputs Fader Panel Switch Card
Schematic 7-12
Load Sheet 7-16

EFS-5.1 Control Panel Switch Card
Schematic 7-17
Load Sheet 7-24

SFS-5.1 4 Outputs Fader Panel Switch Card
Schematic 7-25
Load Sheet 7-28

MS-5.1 Master Panel Switch Card
Schematic 7-29
Load Sheet 7-35

MFS-5.1 Master Fader Panel Switch Card
Schematic 7-36
Load Sheet 7-39

DS-5.1 Dynamics Panel Switch Card
Schematic 7-40
Load Sheet 7-46

DCM-5.1 Dynamics Fader Panel Switch Card
Schematic 7-47
Load Sheet 7-50

HC-5.1 Host Controller Card
Schematic 7-51
Load Sheet 7-57

MG-5.1 Main Gate Card
Schematic 7-58
Load Sheet 7-60

BP-5.1 Back Plane Card
Schematic 7-61
Load Sheet 7-62

BPR-5.1 Back Plane Repeater Card

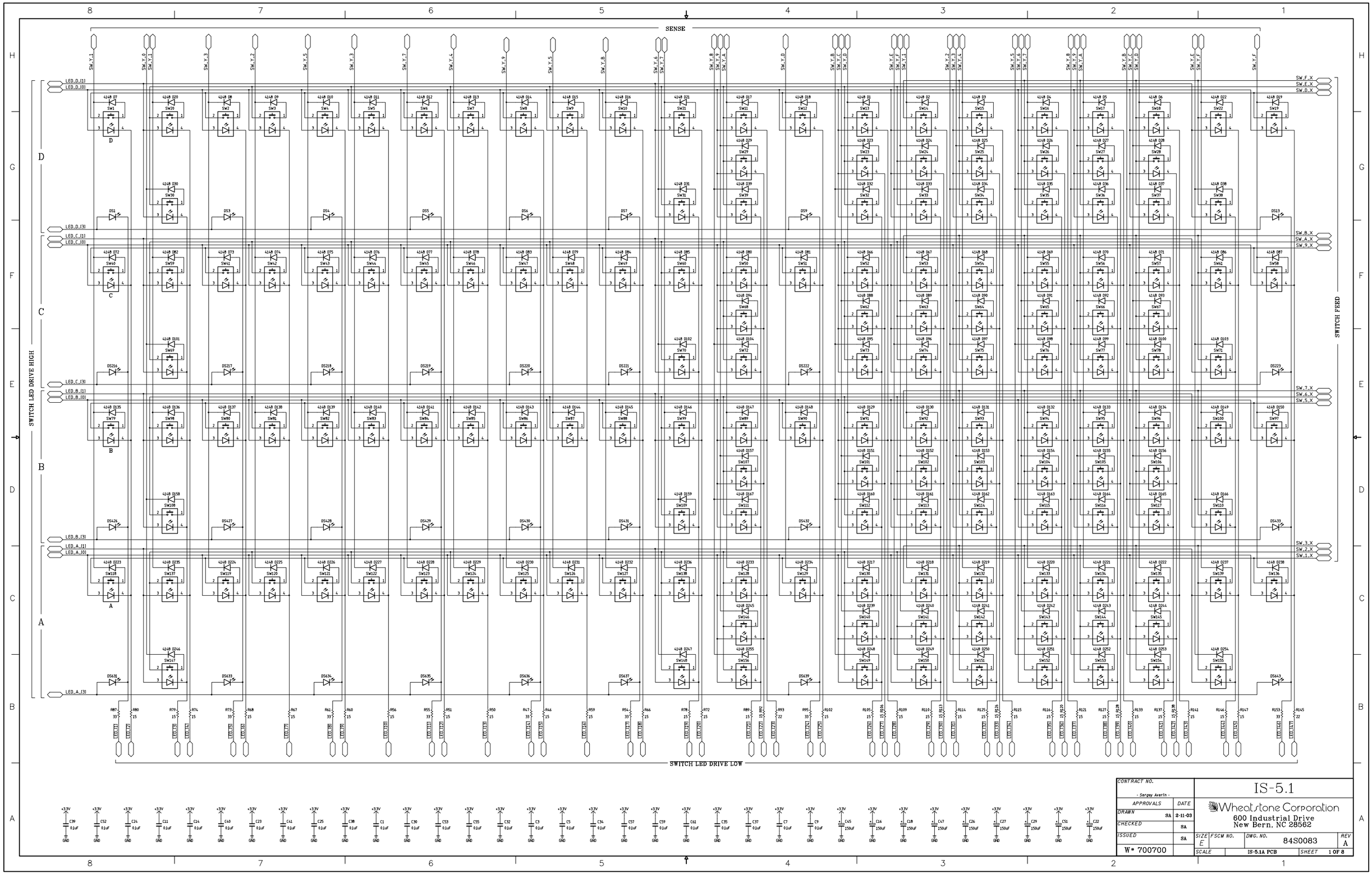
Schematic 7-63
Load Sheet 7-64

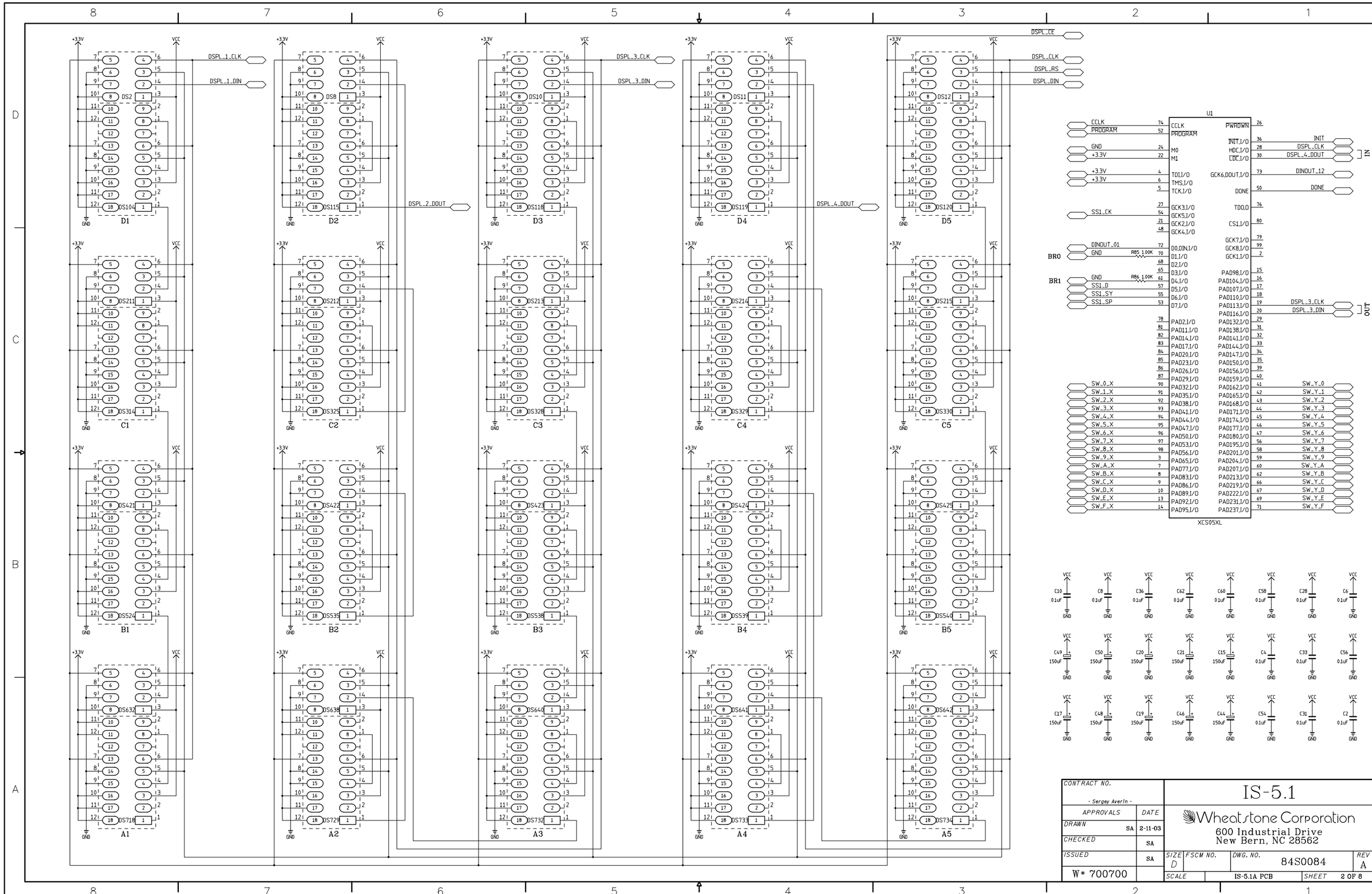
LVU-5.1 LED VU Card

Schematic 7-65
Load Sheet 7-74

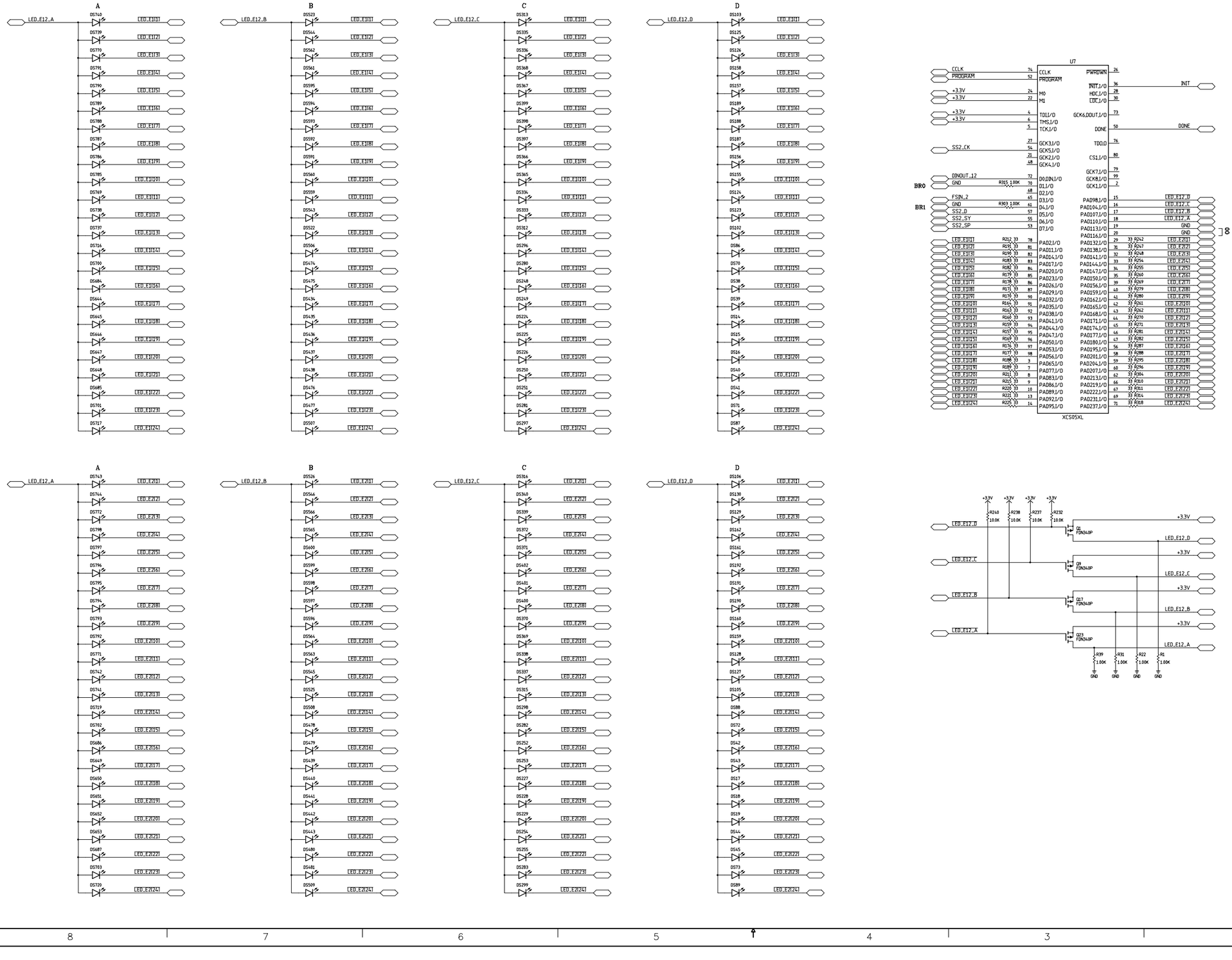
PWI-5.1 Power Interface Card

Schematic 7-75
Load Sheet 7-76

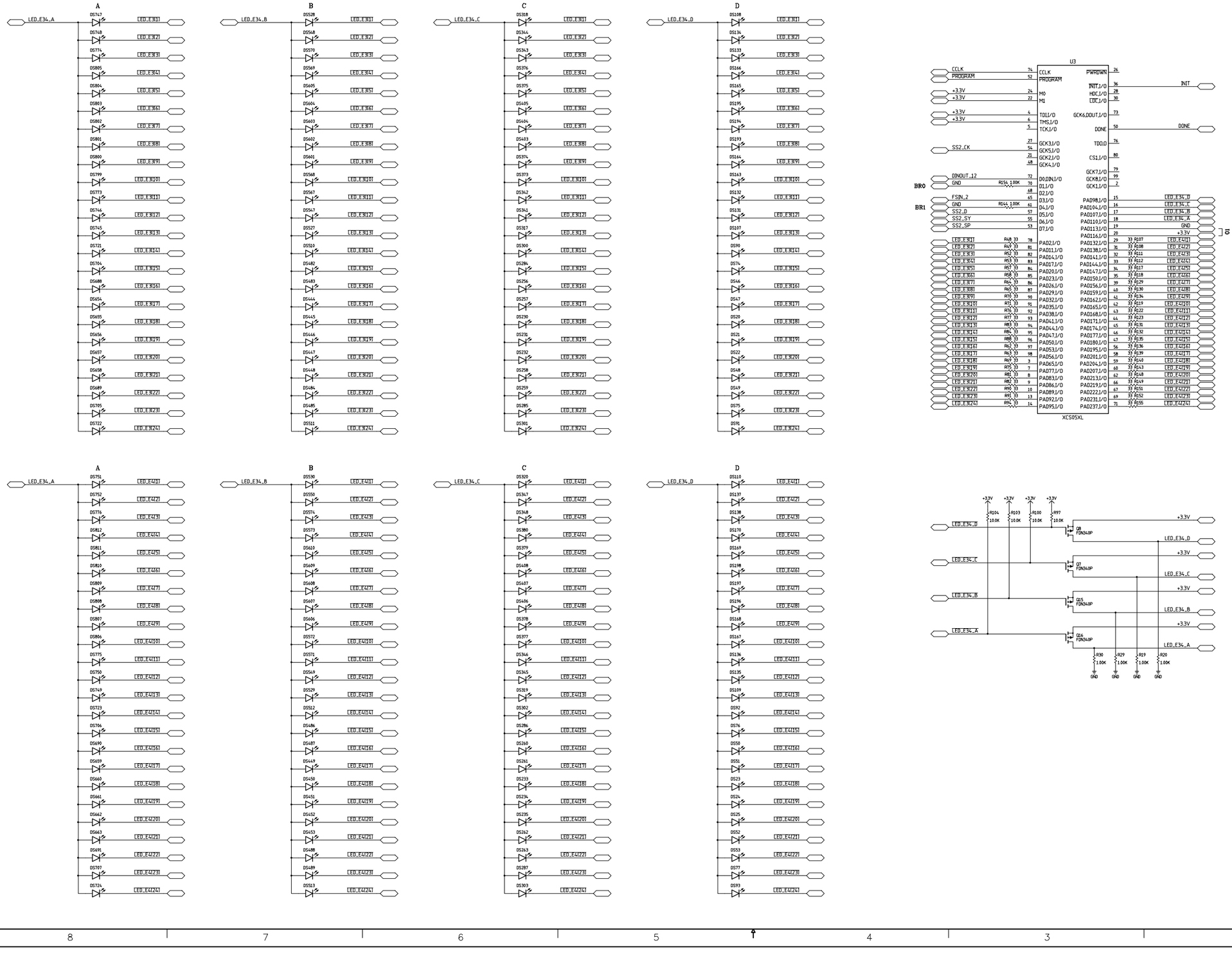

SENSE
SWITCH LED DRIVE HIGH
SWITCH LED DRIVE LOW
SWITCH FEED
LED_D_[1]
LED_D_[0]
LED_D_[3]
LED_C_[1]
LED_C_[0]
LED_C_[3]
LED_B_[1]
LED_B_[0]
LED_B_[3]
LED_A_[1]
LED_A_[0]
LED_A_[3]
SW_F_X
SW_E_X
SW_D_X
SW_B_X
SW_A_X
SW_9_X
SW_7_X
SW_6_X
SW_5_X
SW_3_X
SW_2_X
SW_1_X
CONTRACT NO.
- Sergey Averin -
APPROVALS
DRAWN SA 2-11-03
CHECKED SA
ISSUED SA
W* 700700
IS-5.1
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE E
FSCM NO.
DWG. NO. 84S0083
REV A
SCALE
IS-5.1A PCB
SHEET 1 OF 8



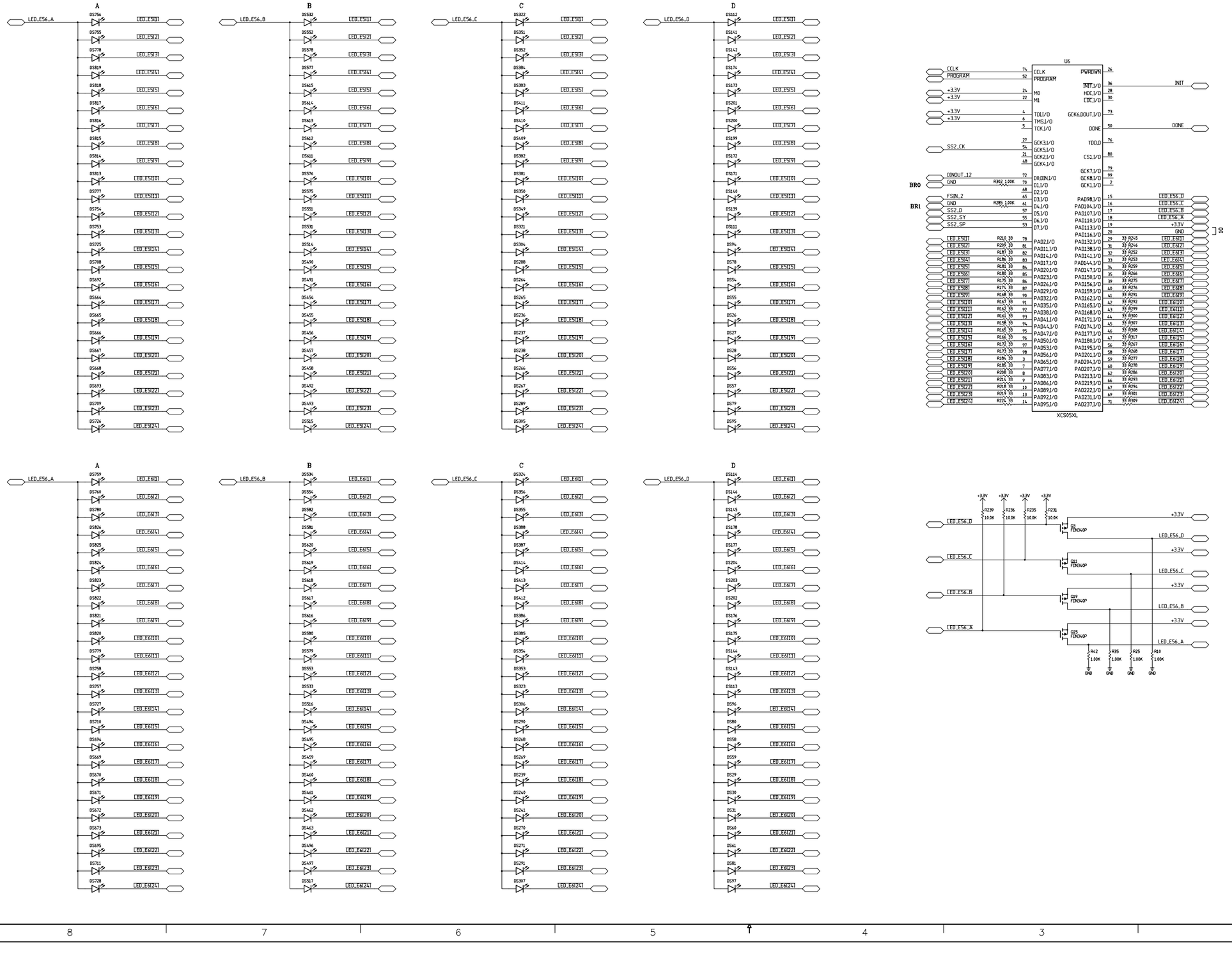
CONTRACT NO.		IS-5.1	
- Sergey Averin -			
APPROVALS	DATE	Wheatstone Corporation	
DRAWN SA	2-11-03	600 Industrial Drive New Bern, NC 28562	
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0084 / REV A	
W# 700700		SCALE IS-5.1A PCB / SHEET 2 OF 8	



CONTRACT NO. - Sergey Averin -		IS-5.1	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN	SA 2-11-03		
CHECKED	SA		
ISSUED	SA	SIZE E / FSCM NO. / DWG. NO. 84S0085 / REV A	
W# 700700		SCALE / IS-5.1A PCB / SHEET 3 OF 8	



CONTRACT NO. - Sergey Averin -		IS-5.1	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN	SA 2-11-03		
CHECKED	SA		
ISSUED	SA	SIZE E / FSCM NO. / DWG. NO. 84S0086 / REV A	
W# 700700		SCALE / IS-5.1A PCB / SHEET 4 OF 8	


A
B
C
D
LED_E56_A
LED_E56_B
LED_E56_C
LED_E56_D
LED_E5[1]
LED_E5[2]
LED_E5[3]
LED_E5[4]
LED_E5[5]
LED_E5[6]
LED_E5[7]
LED_E5[8]
LED_E5[9]
LED_E5[10]
LED_E5[11]
LED_E5[12]
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LED_E5[15]
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LED_E6[6]
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LED_E6[8]
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LED_E6[13]
LED_E6[14]
LED_E6[15]
LED_E6[16]
LED_E6[17]
LED_E6[18]
LED_E6[19]
LED_E6[20]
LED_E6[21]
LED_E6[22]
LED_E6[23]
LED_E6[24]
U6
XCS05XL
CCLK
PROGRAM
+3.3V
M0
M1
TDI1/O
TMS1/O
TCK1/O
GCK3/O
GCK5I/O
GCK2I/O
GCK4I/O
SS2_CK
DINOUT_12
GND
R302 100K
FSIN_2
R285 100K
SS2_D
SS2_SY
SS2_SP
PWRDWN
INIT1/O
HDC1/O
LDC1/O
GCK6,DOUT1/O
DONE
TDO1/O
CS1I/O
GCK7I/O
GCK8I/O
GCK11/O
D0,DIN1/O
D1I/O
D2I/O
D3I/O
D4I/O
D5I/O
D6I/O
D7I/O
PAD98I/O
PAD104I/O
PAD107I/O
PAD110I/O
PAD113I/O
PAD116I/O
PAD121/O
PAD131/O
PAD141/O
PAD144I/O
PAD147I/O
PAD150I/O
PAD156I/O
PAD159I/O
PAD162I/O
PAD165I/O
PAD168I/O
PAD171I/O
PAD174I/O
PAD177I/O
PAD180I/O
PAD195I/O
PAD201/O
PAD204I/O
PAD207I/O
PAD213I/O
PAD219I/O
PAD222I/O
PAD231I/O
PAD237I/O
INIT
DONE
LED_E56_D
LED_E56_C
LED_E56_B
LED_E56_A
+3.3V
GND
BR0
BR1
D1
R210 33
R209 33
R187 33
R186 33
R185 33
R180 33
R175 33
R174 33
R168 33
R167 33
R162 33
R161 33
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R172 33
R173 33
R184 33
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R214 33
R213 33
R212 33
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R239
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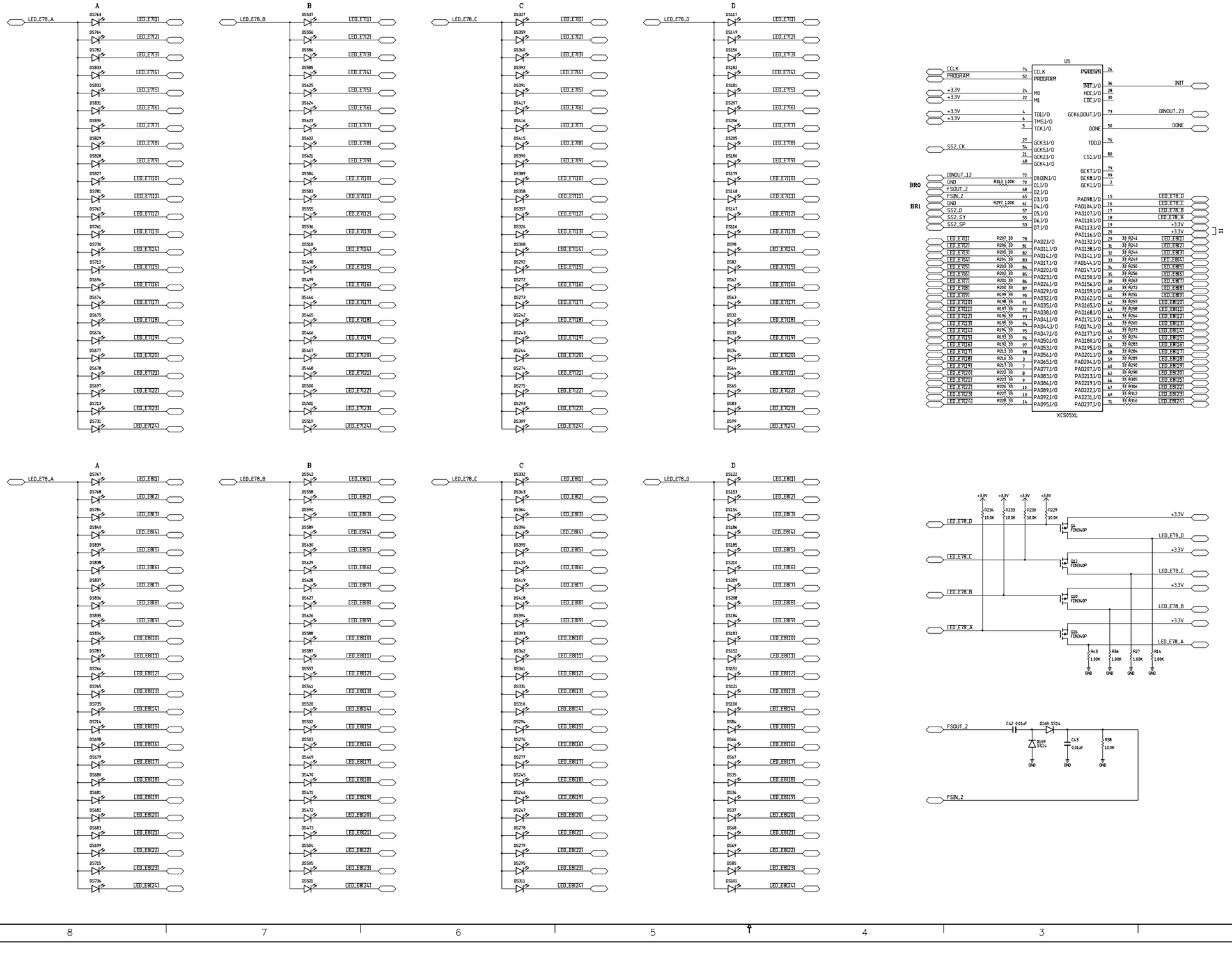
R235
R231
10.0K
Q3
FDN340P
Q11
Q19
Q25
R42
R35
R25
R19
1.00K
CONTRACT NO.
- Sergey Averin -
APPROVALS
DRAWN
SA
2-11-03
CHECKED
SA
ISSUED
SA
W# 700700
IS-5.1
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE
E
FSCM NO.
DWG. NO.
84S0087
REV
A
SCALE
IS-5.1A PCB
SHEET
5 OF 8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LED_E78_B
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DS763
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DS831
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LED_E7[23]
LED_E7[24]
U5
CCLK
PROGRAM
+3.3V
M0
M1
TDI1/O
TMS1/O
TCK1/O
GCK3I/O
GCK5I/O
GCK2I/O
GCK4I/O
SS2_CK
DINOUT_12
GND
FSOUT_2
FSIN_2
SS2_D
SS2_SY
SS2_SP
R313 100K
R297 100K
BR0
BR1
DIN1/O
D11/O
D21/O
D31/O
D41/O
D51/O
D61/O
D71/O
PWRDWN
INIT1/O
HDC1/O
LDC1/O
GCK6,DOUT1/O
DONE
TDO1/O
CS1I/O
GCK7I/O
GCK8I/O
GCK11/O
PAD98I/O
PAD104I/O
PAD107I/O
PAD110I/O
PAD113I/O
PAD116I/O
PAD21/O
PAD111/O
PAD141/O
PAD171/O
PAD201/O
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INIT
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R198 33
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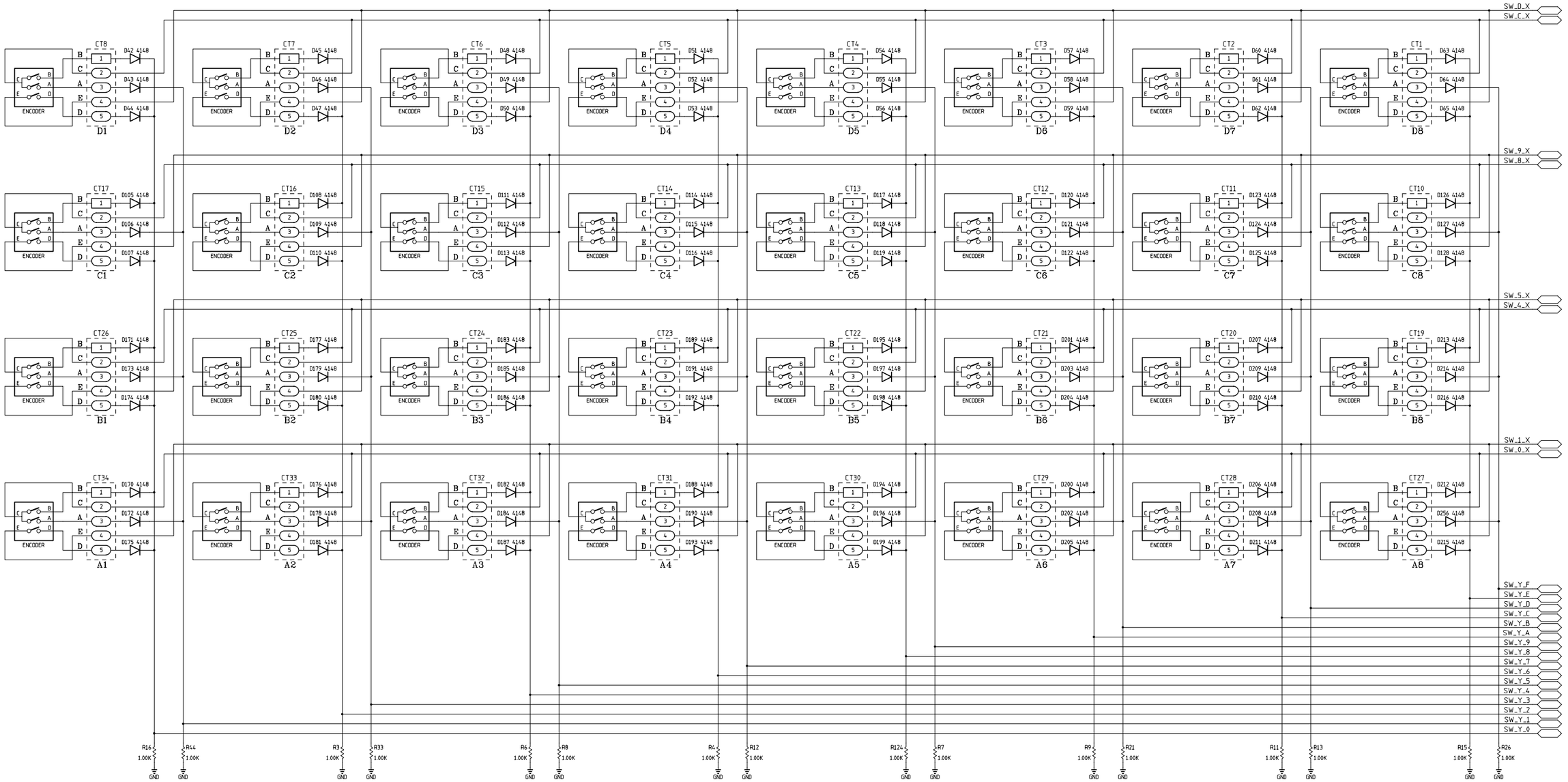
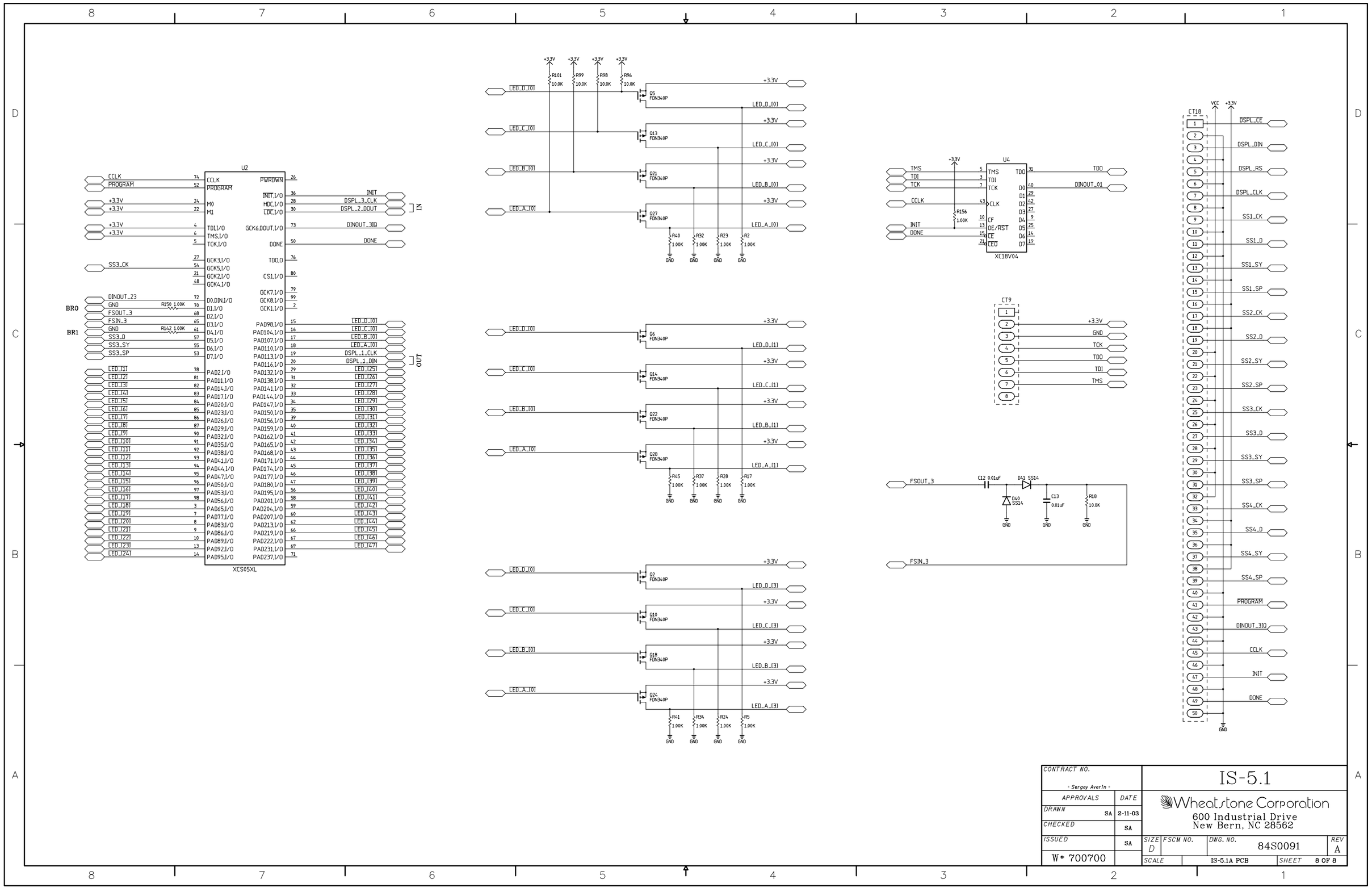
R289
R290
R298
R305
R306
R312
R314
R234 10.0K
R233 10.0K
R230 10.0K
R229 10.0K
Q4 FDN340P
Q12 FDN340P
Q20 FDN340P
Q26 FDN340P
R43 1.00K
R36 1.00K
R27 1.00K
R14 1.00K
GND
C42 0.01uF
D168 SS14
D169 SS14
C43 0.01uF
R38 10.0K
FSOUT_2
FSIN_2
CONTRACT NO.
- Sergey Averin -
APPROVALS
DATE
DRAWN
SA
2-11-03
CHECKED
SA
ISSUED
SA
W* 700700
IS-5.1
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE
E
FSCM NO.
DWG. NO.
84S0088
REV
A
SCALE
IS-5.1A PCB
SHEET
6 OF 8

ENCODERS

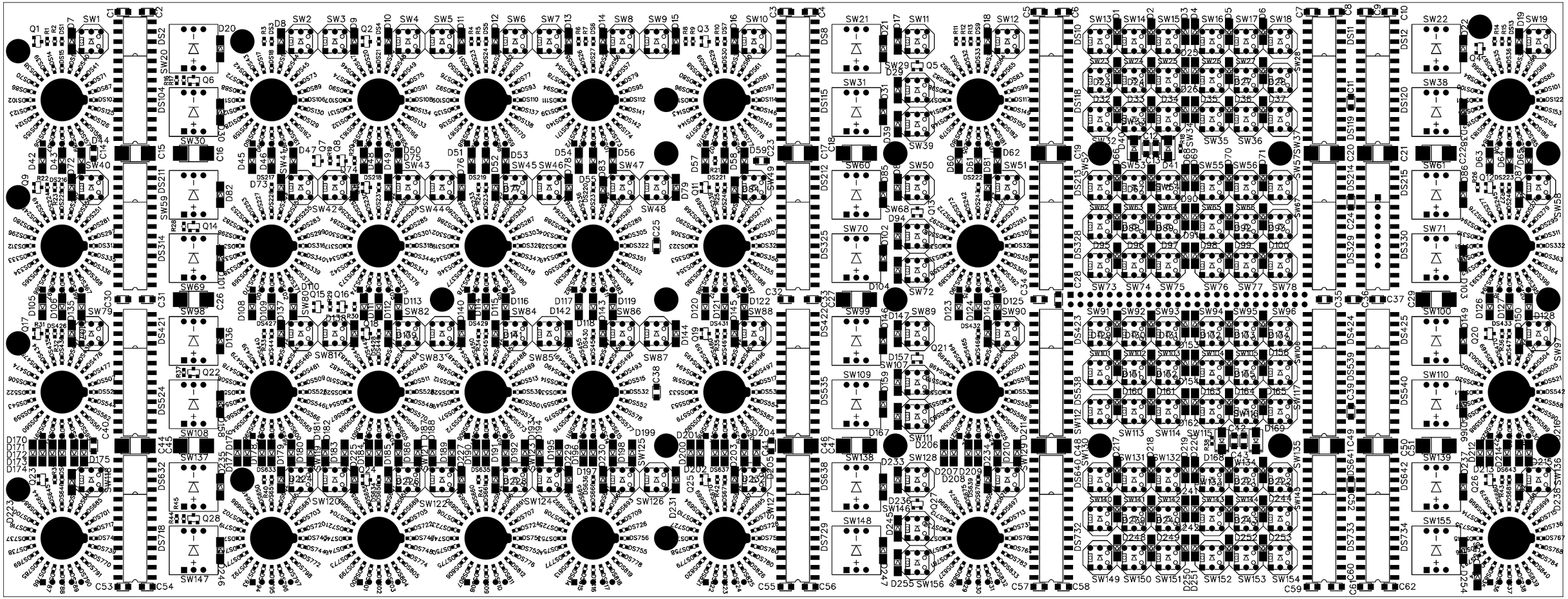


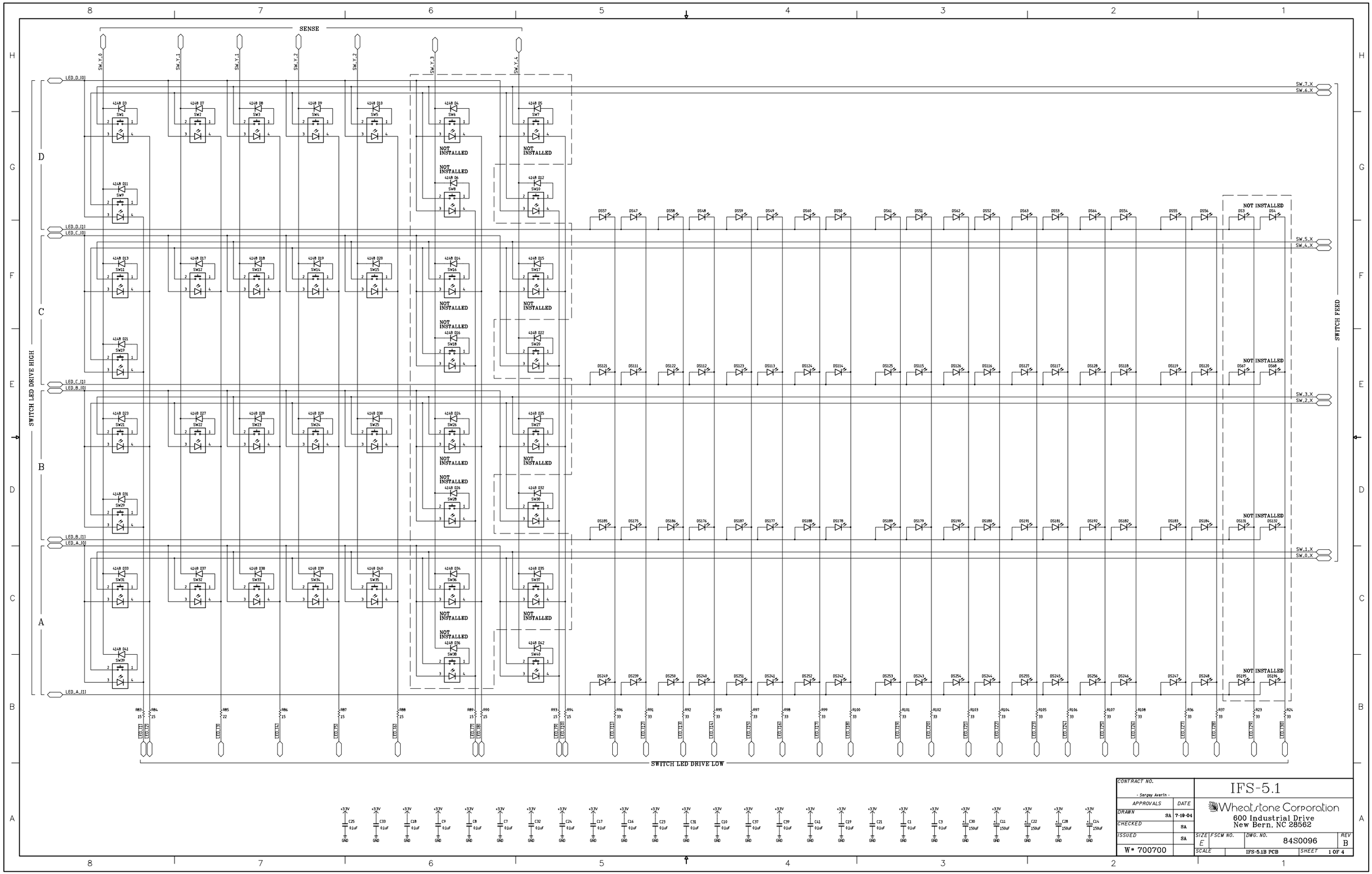
CONTRACT NO. - Sergey Averin -		IS-5.1
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562
DRAWN SA	2-11-03	
CHECKED SA		
ISSUED SA		SIZE D · FSCM NO. · DWG. NO. 84S0089 · REV A
W# 700700		SCALE · IS-5.1A PCB · SHEET 7 OF 8

IS-5.1 4 Inputs Panel Switch Card Schematic - Sheet 7 of 8

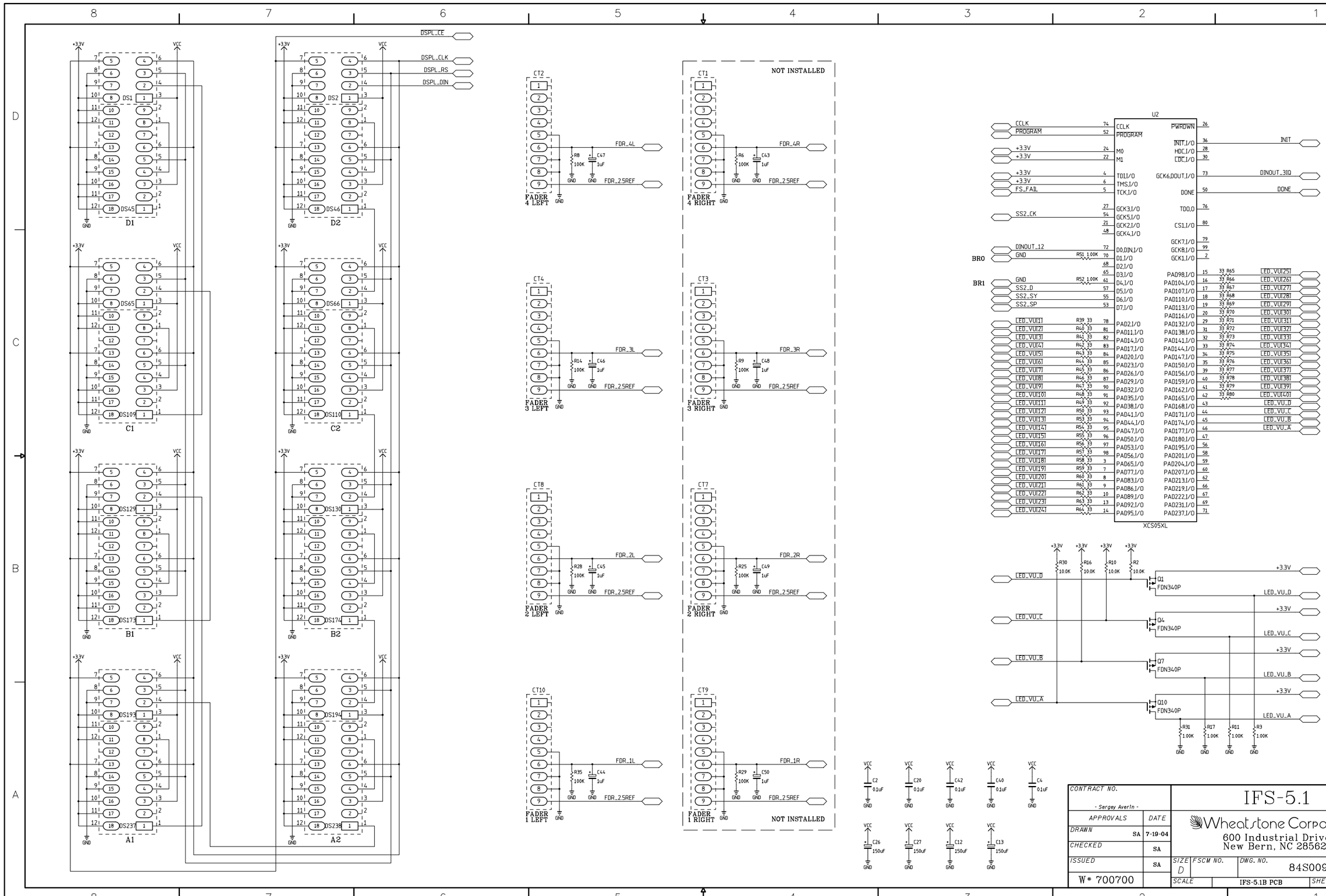


CONTRACT NO.		IS-5.1
- Sergey Averin -		
APPROVALS	DATE	Wheatstone Corporation
DRAWN SA	2-11-03	600 Industrial Drive
CHECKED SA		New Bern, NC 28562
ISSUED SA		SIZE D · FSCM NO. · DWG. NO. 84S0091 · REV A
W# 700700		SCALE IS-5.1A PCB · SHEET 8 OF 8



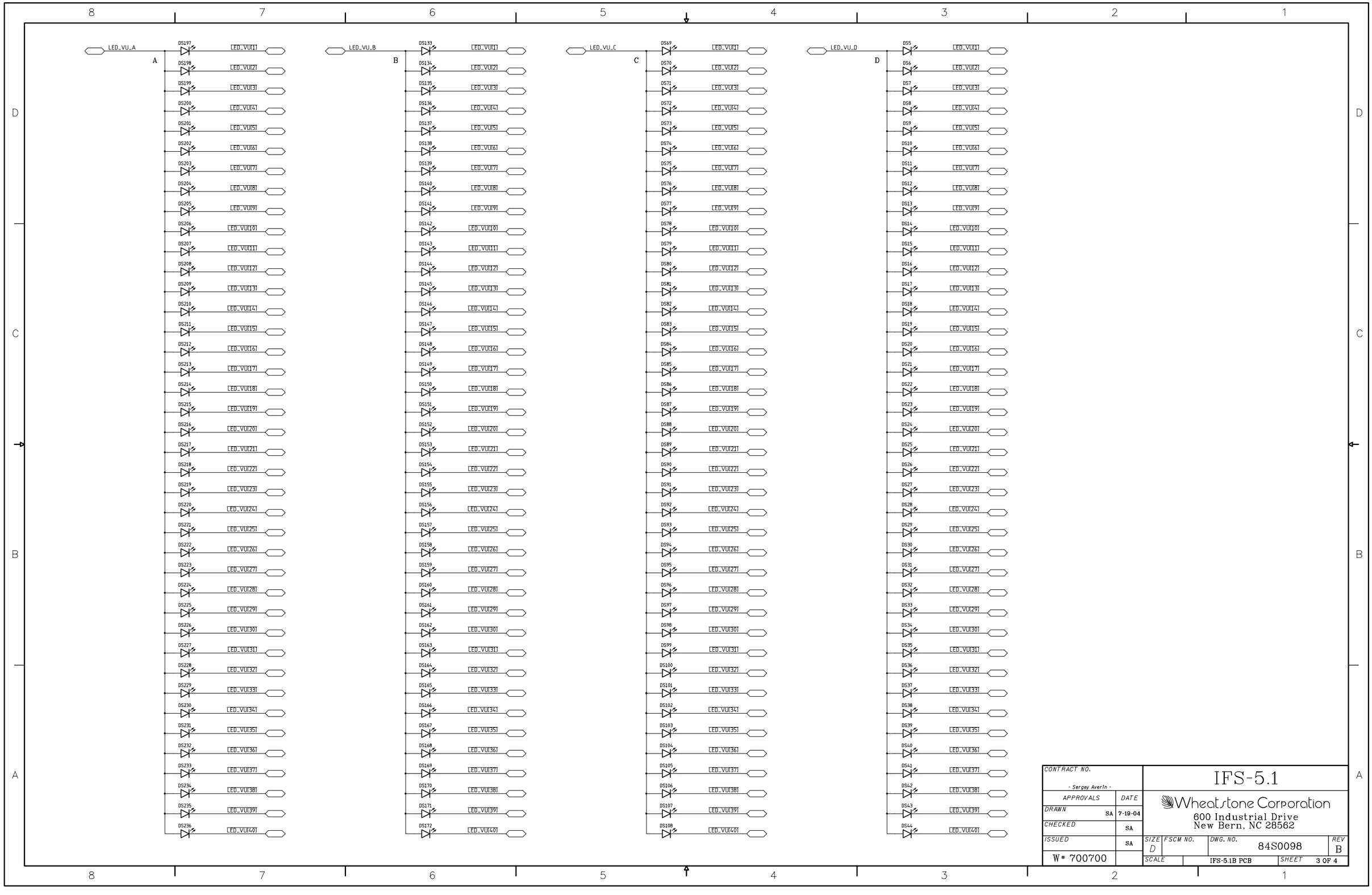


CONTRACT NO.		IFS-5.1	
- Sergey Averin -			
APPROVALS	DATE	Wheatstone Corporation	
DRAWN	SA 7-10-04	600 Industrial Drive	
CHECKED	SA	New Bern, NC 28562	
ISSUED	SA	SIZE E / FSCM NO. / DWG. NO. 84S0096 / REV B	
W# 700700		SCALE / IFS-5.1B PCB / SHEET 1 OF 4	

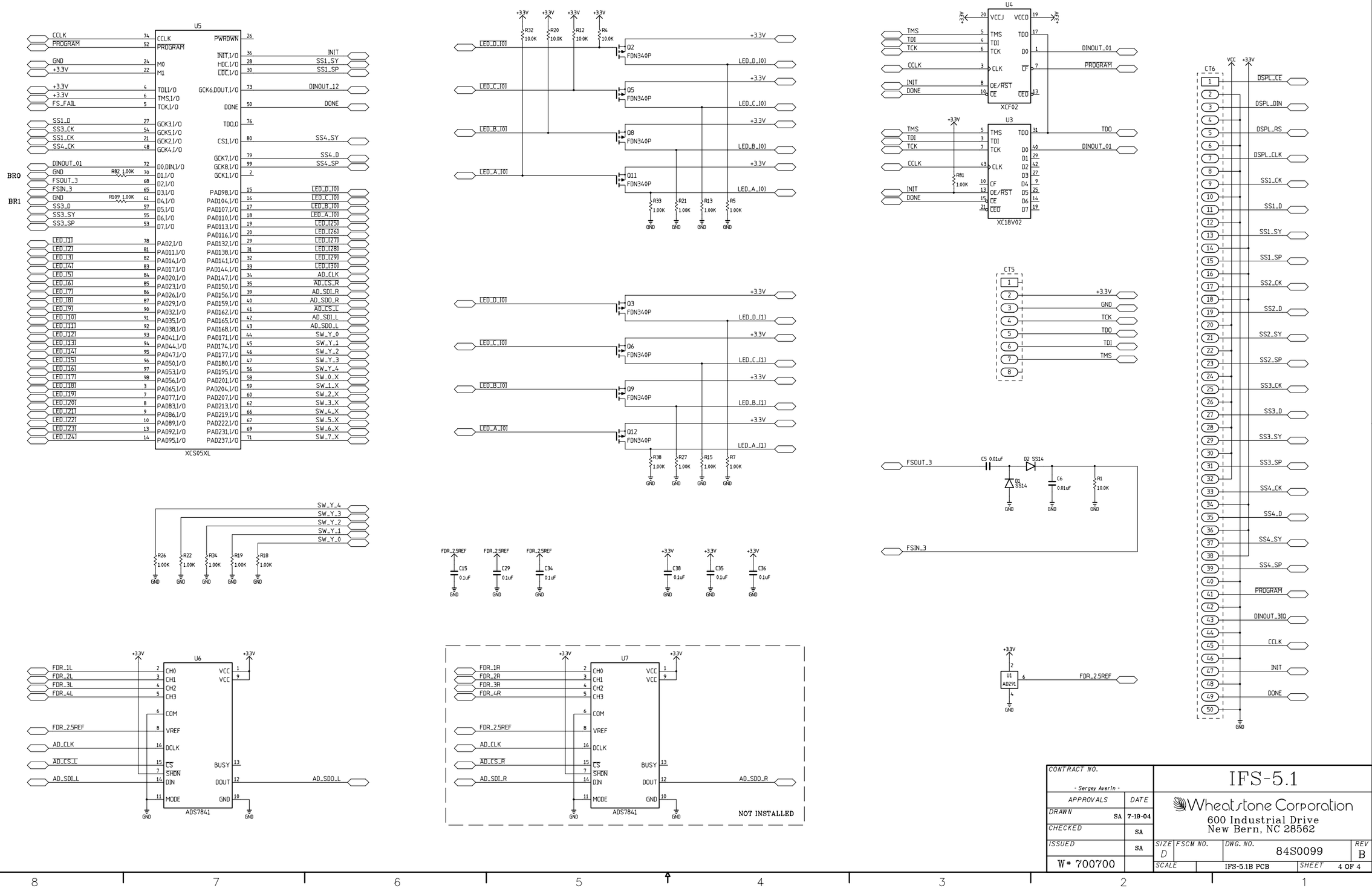


CONTRACT NO.	IFS-5.1
- Sergey Averin -	
APPROVALS / DATE	Wheatstone Corporation
DRAWN SA 7-19-04	600 Industrial Drive
CHECKED SA	New Bern, NC 28562
ISSUED SA	SIZE D · FSCM NO. · DWG. NO. 84S0097 · REV B
W# 700700	SCALE · IFS-5.1B PCB · SHEET 2 OF 4

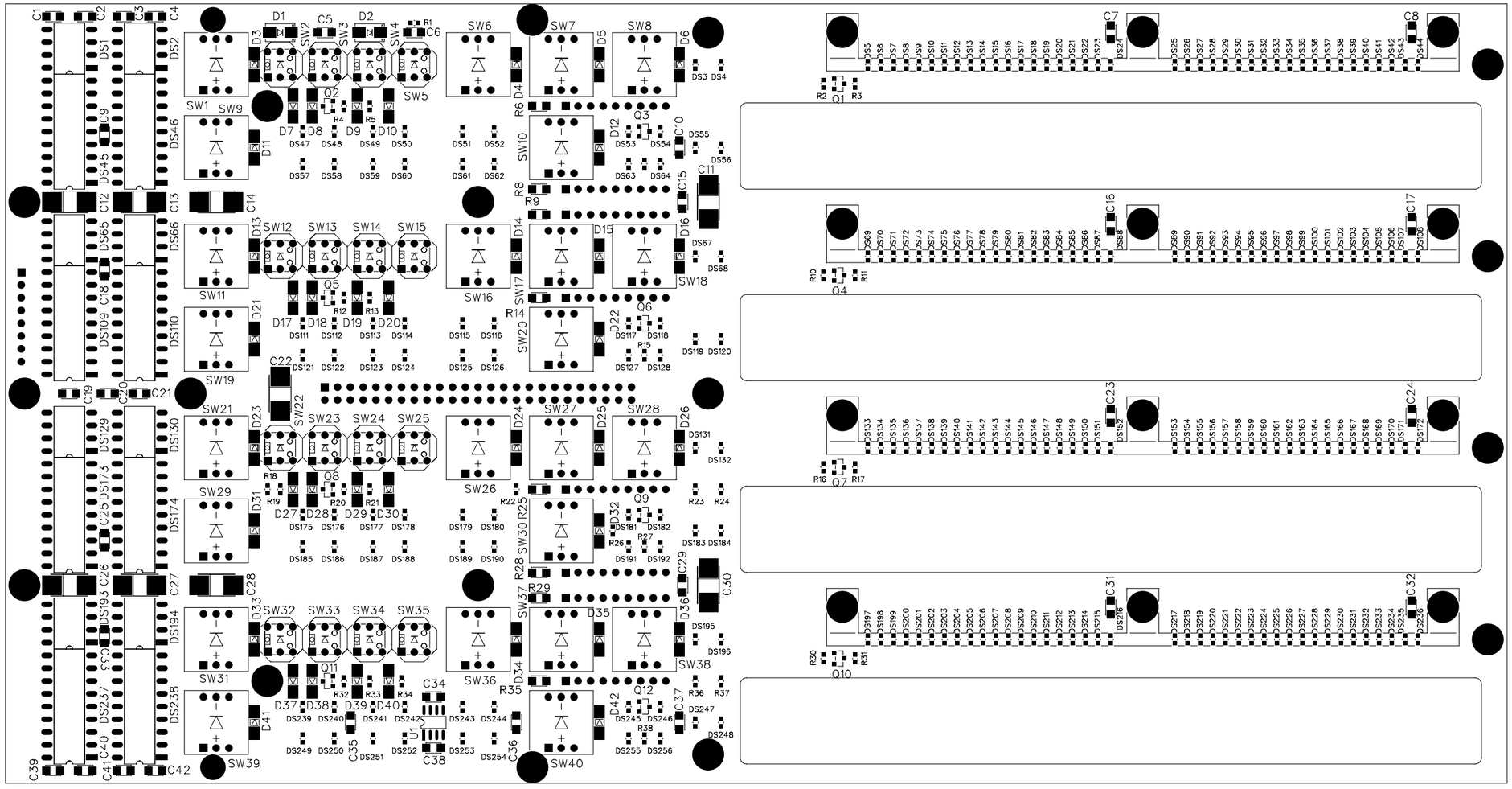
IFS-5.1 4 Inputs Fader Panel Switch Card Schematic - Sheet 2 of 4



IFS-5.1 4 Inputs Fader Panel Switch Card Schematic - Sheet 3 of 4



IFS-5.1 4 Inputs Fader Panel Switch Card Schematic - Sheet 4 of 4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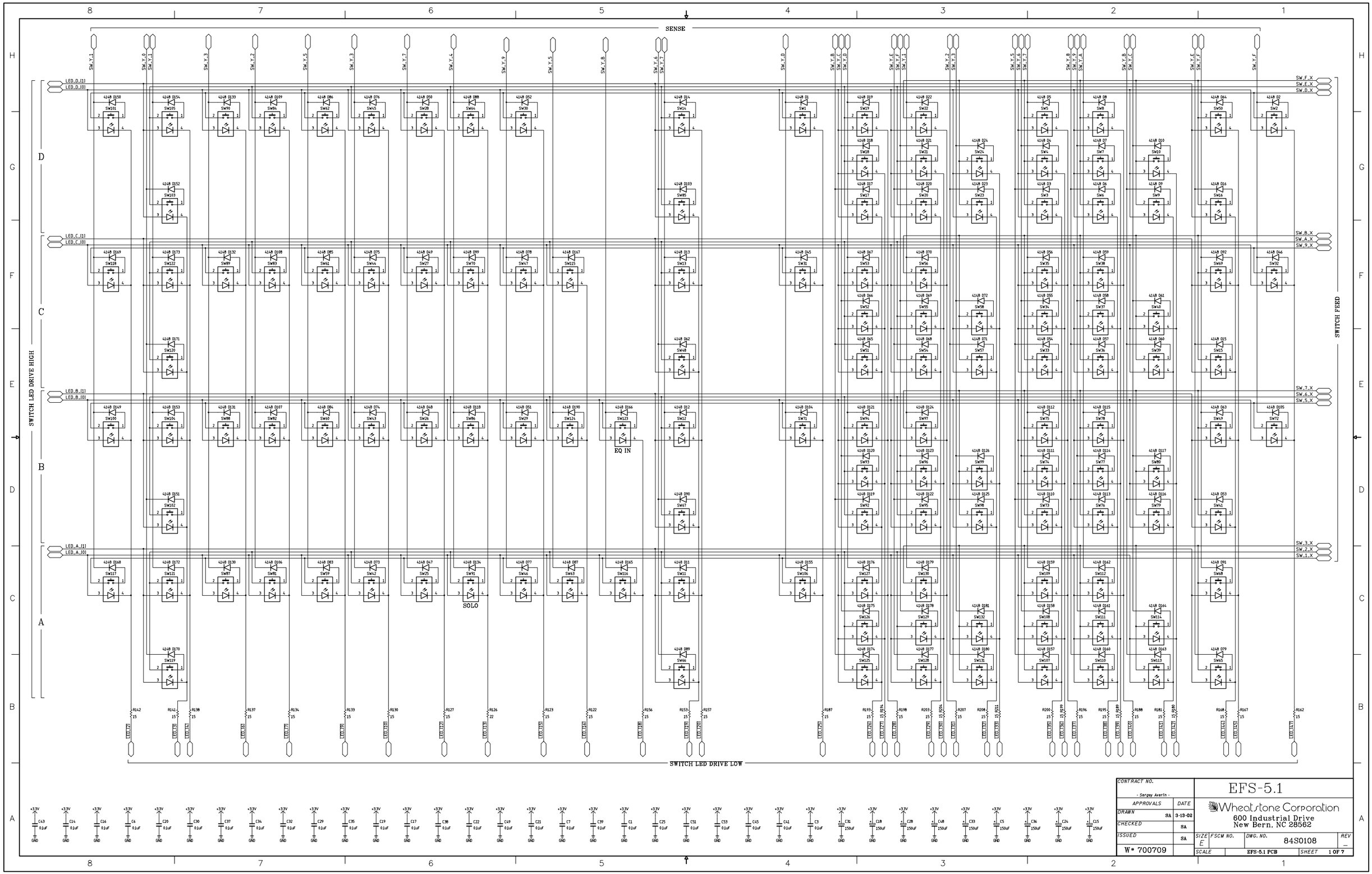
D1 D2
C5 C6
R1
SW1 SW2 SW3 SW4 SW5 SW6 SW7 SW8 SW9
D3 D4 D5 D6
Q1 Q2 Q3
R2 R3 R4 R5 R6
C7 C8
C9 C10 C11
R8 R9
DS1 DS2 DS45 DS46
DS3 DS4 DS5 DS6 DS7 DS8 DS9 DS10 DS11 DS12 DS13 DS14 DS15 DS16 DS17 DS18 DS19 DS20 DS21 DS22 DS23 DS24 DS25 DS26 DS27 DS28 DS29 DS30 DS31 DS32 DS33 DS34 DS35 DS36 DS37 DS38 DS39 DS40 DS41 DS42 DS43 DS44
D7 D8 D9 D10 D11 D12
DS47 DS48 DS49 DS50 DS51 DS52 DS53 DS54 DS55 DS56 DS57 DS58 DS59 DS60 DS61 DS62 DS63 DS64
C12 C13 C14 C15 C16 C17
R10 R11
Q4
SW10 SW11 SW12 SW13 SW14 SW15 SW16 SW17 SW18
D13 D14 D15 D16
R12 R13 R14
Q5 Q6
DS65 DS66 DS109 DS110
DS67 DS68 DS69 DS70 DS71 DS72 DS73 DS74 DS75 DS76 DS77 DS78 DS79 DS80 DS81 DS82 DS83 DS84 DS85 DS86 DS87 DS88 DS89 DS90 DS91 DS92 DS93 DS94 DS95 DS96 DS97 DS98 DS99 DS100 DS101 DS102 DS103 DS104 DS105 DS106 DS107 DS108
D17 D18 D19 D20 D21 D22
DS111 DS112 DS113 DS114 DS115 DS116 DS117 DS118 DS119 DS120 DS121 DS122 DS123 DS124 DS125 DS126 DS127 DS128
C18 C19 C20 C21 C22
R15
SW19 SW20 SW21 SW22 SW23 SW24 SW25 SW26 SW27 SW28 SW29
D23 D24 D25 D26
R18 R19 R20 R21 R22 R23 R24
Q8 Q9
C23 C24
R16 R17
DS129 DS130 DS173 DS174
DS131 DS132 DS133 DS134 DS135 DS136 DS137 DS138 DS139 DS140 DS141 DS142 DS143 DS144 DS145 DS146 DS147 DS148 DS149 DS150 DS151 DS152 DS153 DS154 DS155 DS156 DS157 DS158 DS159 DS160 DS161 DS162 DS163 DS164 DS165 DS166 DS167 DS168 DS169 DS170 DS171 DS172
C25 C26 C27 C28 C29 C30
D27 D28 D29 D30 D31 D32
DS175 DS176 DS177 DS178 DS179 DS180 DS181 DS182 DS183 DS184 DS185 DS186 DS187 DS188 DS189 DS190 DS191 DS192
R25 R26 R27 R28 R29
SW30 SW31 SW32 SW33 SW34 SW35 SW36 SW37 SW38
D33 D34 D35 D36
Q11 Q12
R30 R31
C31 C32
Q10
DS193 DS194 DS237 DS238
DS195 DS196 DS197 DS198 DS199 DS200 DS201 DS202 DS203 DS204 DS205 DS206 DS207 DS208 DS209 DS210 DS211 DS212 DS213 DS214 DS215 DS216 DS217 DS218 DS219 DS220 DS221 DS222 DS223 DS224 DS225 DS226 DS227 DS228 DS229 DS230 DS231 DS232 DS233 DS234 DS235 DS236
D37 D38 D39 D40 D41 D42
DS239 DS240 DS241 DS242 DS243 DS244 DS245 DS246 DS247 DS248 DS249 DS250 DS251 DS252 DS253 DS254 DS255 DS256
R32 R33 R34 R35 R36 R37 R38
C33 C34 C35 C36 C37 C38
U1
C39 C40 C41 C42
SW39 SW40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SWITCH LED DRIVE HIGH
SWITCH LED DRIVE LOW
SWITCH FEED
EQ IN
SOLO
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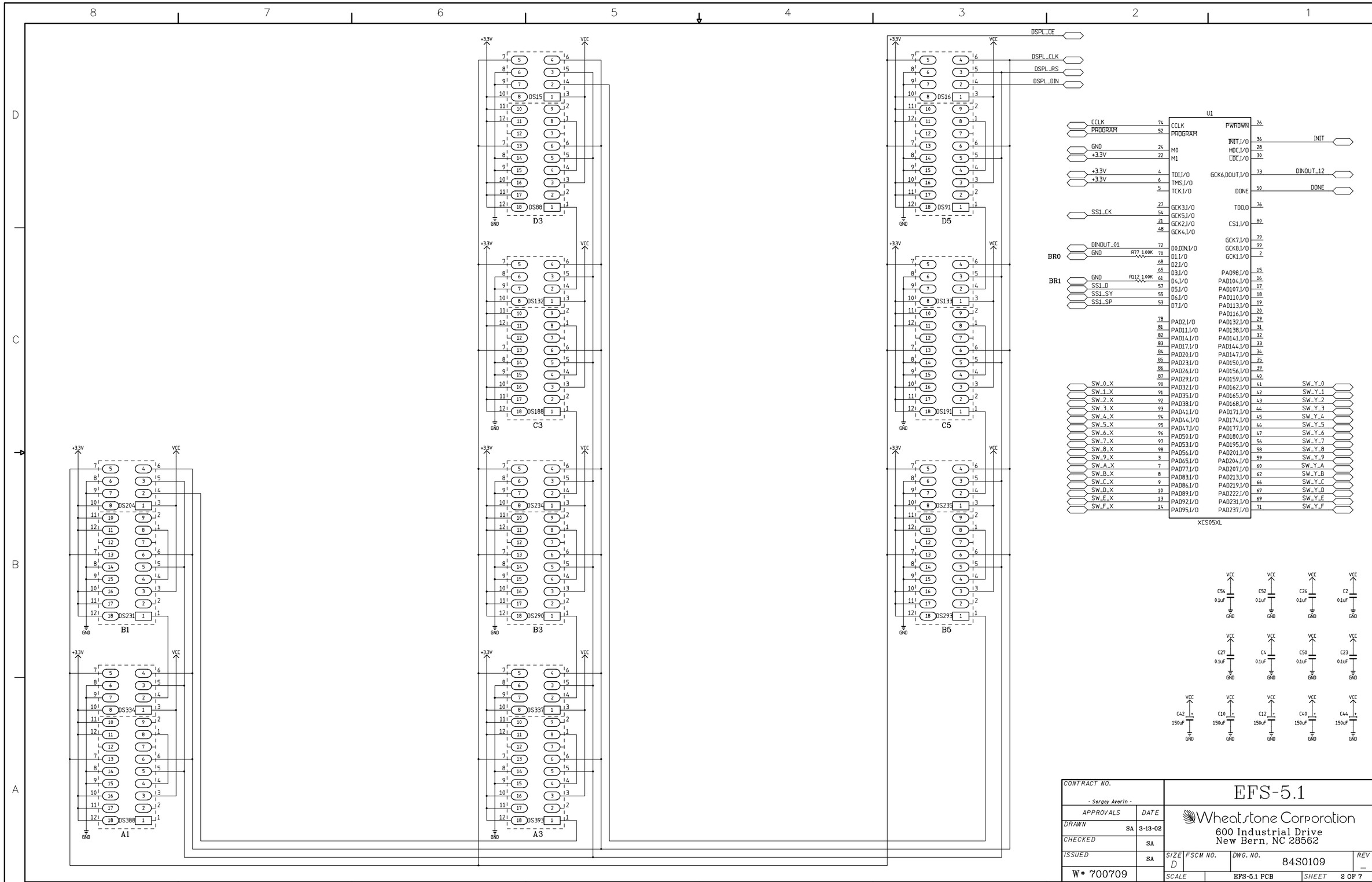
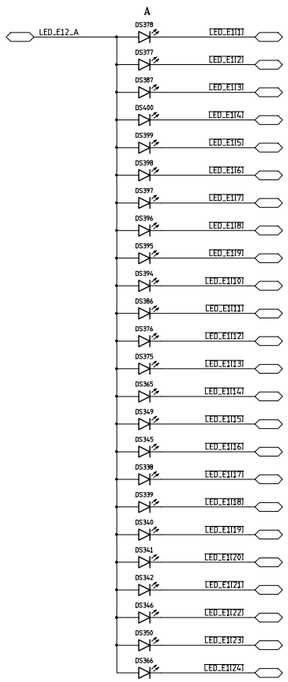
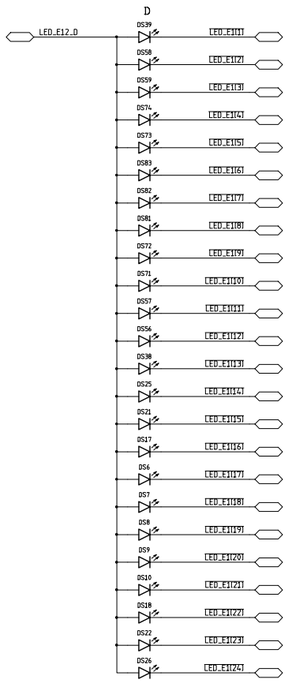
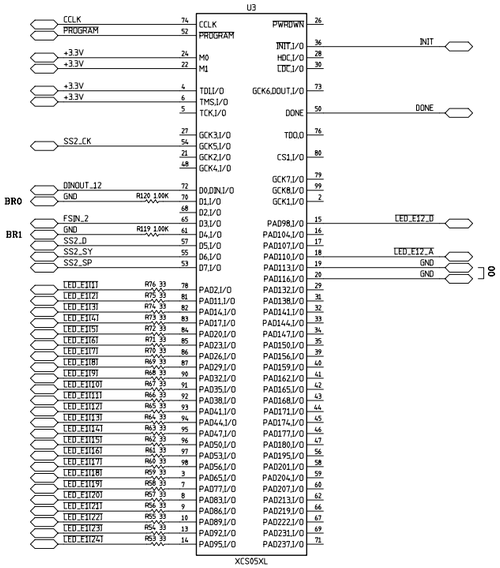
LED_D_[0]
LED_C_[1]
LED_C_[0]
LED_B_[1]
LED_B_[0]
LED_A_[1]
LED_A_[0]
SW_F_X
SW_E_X
SW_D_X
SW_B_X
SW_A_X
SW_9_X
SW_7_X
SW_6_X
SW_5_X
SW_3_X
SW_2_X
SW_1_X
D
C
B
A
CONTRACT NO.
- Sergey Averin -
APPROVALS
DRAWN SA 3-13-02
CHECKED SA
ISSUED SA
W* 700709
EFS-5.1
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE E
FSCM NO.
DWG. NO. 84S0108
REV –
SCALE
EFS-5.1 PCB
SHEET 1 OF 7

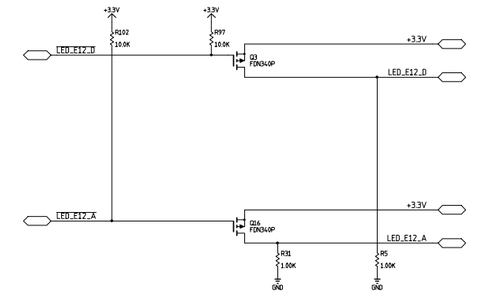


CONTRACT NO.		EFS-5.1
- Sergey Averin -		
APPROVALS	DATE	Wheatstone Corporation
DRAWN SA	3-13-02	600 Industrial Drive, New Bern, NC 28562
CHECKED	SA	
ISSUED	SA	SIZE D · FSCM NO. · DWG. NO. 84S0109 · REV —
W# 700709		SCALE · EFS-5.1 PCB · SHEET 2 OF 7

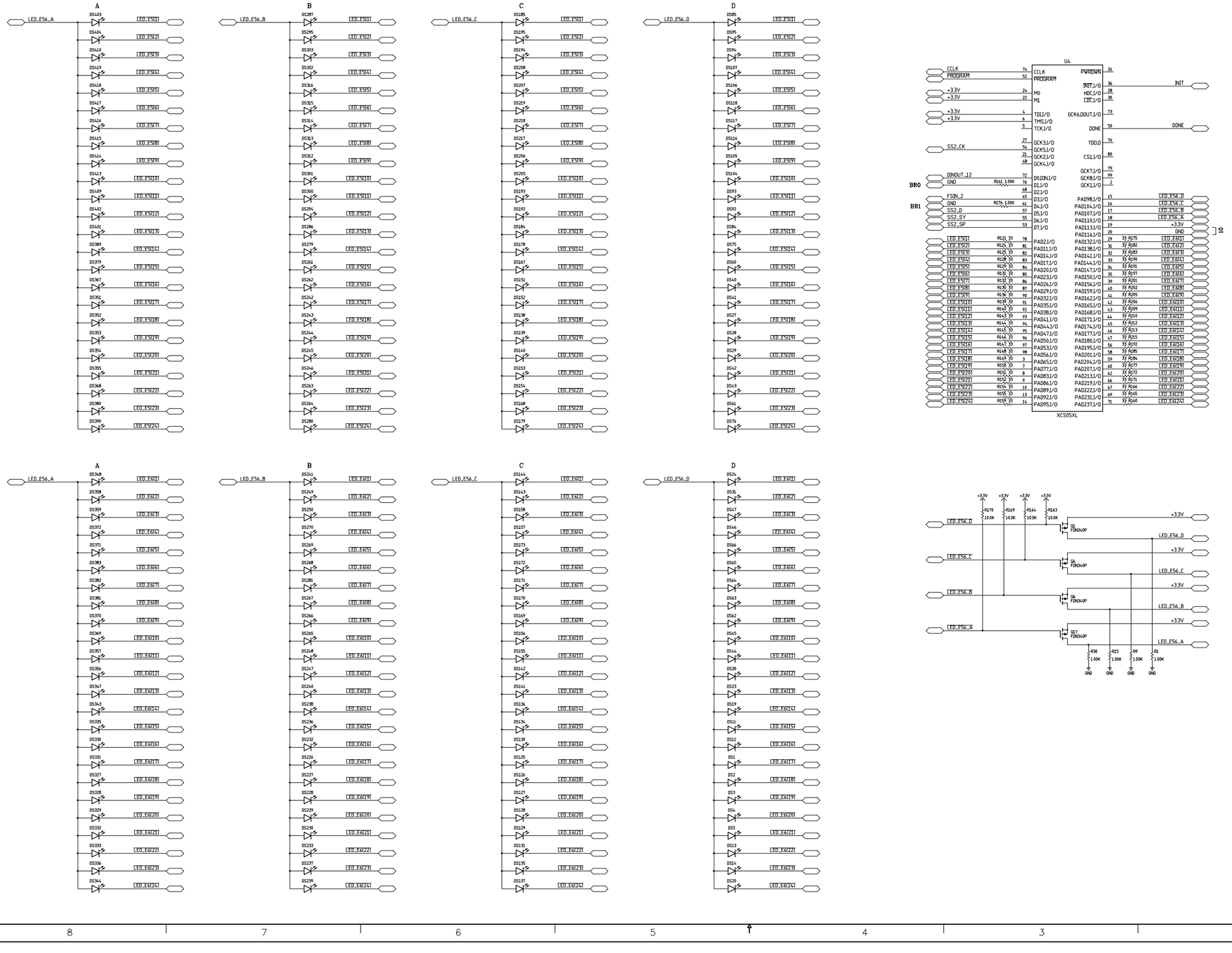








CONTRACT NO. - Sergey Averin -		EFS-5.1	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	3-13-02		
CHECKED SA			
ISSUED SA		SIZE E / FSCM NO. / DWG. NO. 84S0110 / REV –	
W# 700709		SCALE / EFS-5.1 PCB / SHEET 3 OF 7	


A
B
C
D
LED_E56_A
LED_E56_B
LED_E56_C
LED_E56_D
DS403
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DS105
DS104
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LED_E56[1:24]
U4
XCS05XL
CCLK
PROGRAM
+3.3V
SS2_CK
DINOUT_12
GND
FSIN_2
SS2_D
SS2_SY
SS2_SP
BR0
BR1
INIT
DONE
+3.3V
R161 100K
R176 100K
R121 33
R124 33
R125 33
R128 33
R129 33
R131 33
R132 33
R135 33
R136 33
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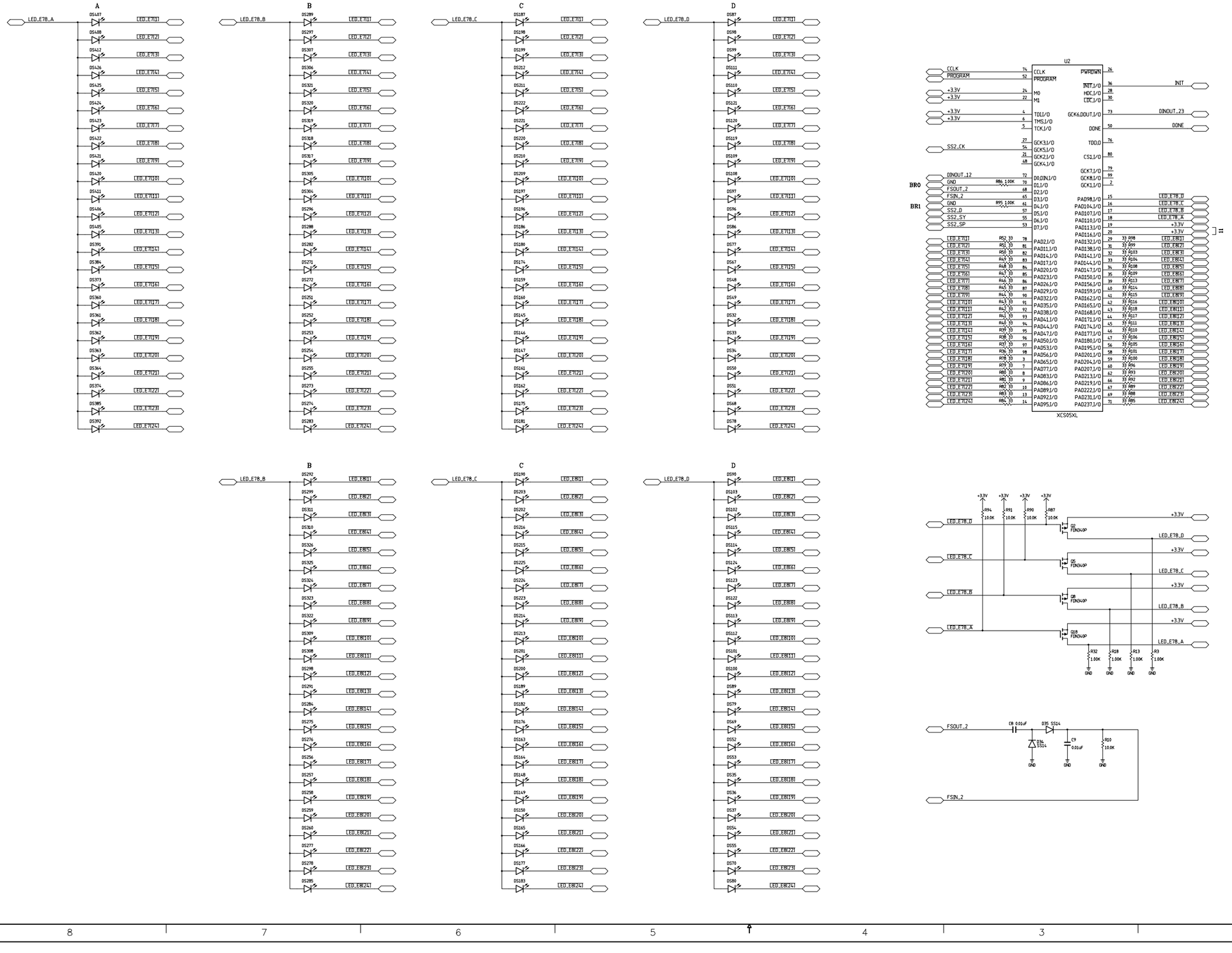
R140 33
R143 33
R144 33
R145 33
R146 33
R147 33
R148 33
R149 33
R150 33
R151 33
R152 33
R154 33
R156 33
R159 33
R170 10.0K
R169 10.0K
R164 10.0K
R163 10.0K
Q1 FDN340P
Q4 FDN340P
Q6 FDN340P
Q17 FDN340P
R30 1.00K
R15 1.00K
R9 1.00K
R1 1.00K
GND
CONTRACT NO.
- Sergey Averin -
APPROVALS
DATE
DRAWN
SA 3-13-02
CHECKED
SA
ISSUED
SA
W# 700709
EFS-5.1
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE E
FSCM NO.
DWG. NO. 84S0111
REV –
SCALE
EFS-5.1 PCB
SHEET 4 OF 7



CONTRACT NO.		EFS-5.1	
- Sergey Averin -			
APPROVALS	DATE	Wheatstone Corporation	
DRAWN	SA 3-13-02	600 Industrial Drive New Bern, NC 28562	
CHECKED	SA		
ISSUED	SA	SIZE E / FSCM NO. / DWG. NO. 84S0112 / REV –	
W# 700709		SCALE / EFS-5.1 PCB / SHEET 5 OF 7	

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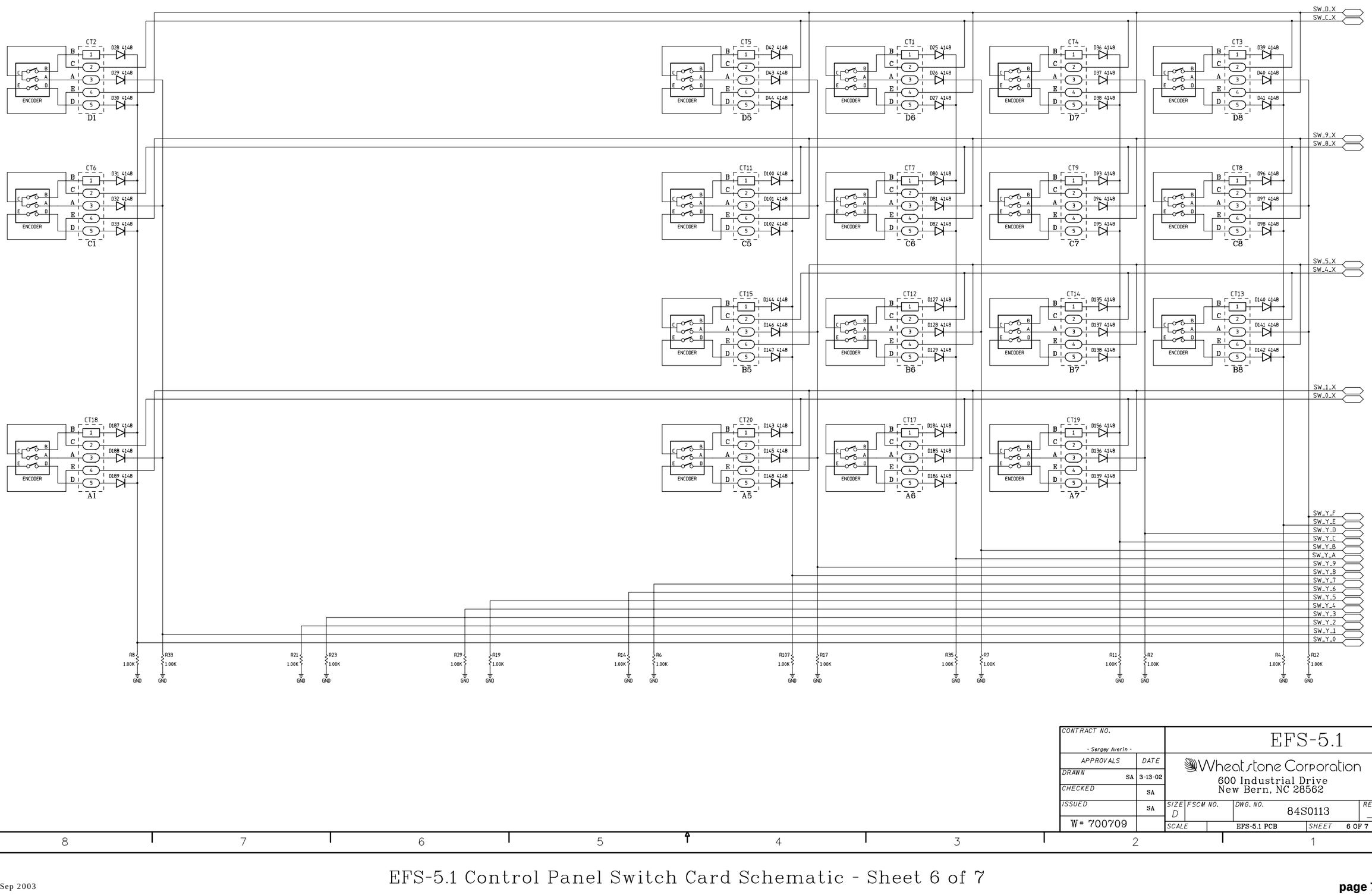

CONTRACT NO. - Sergey Averin -		EFS-5.1	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
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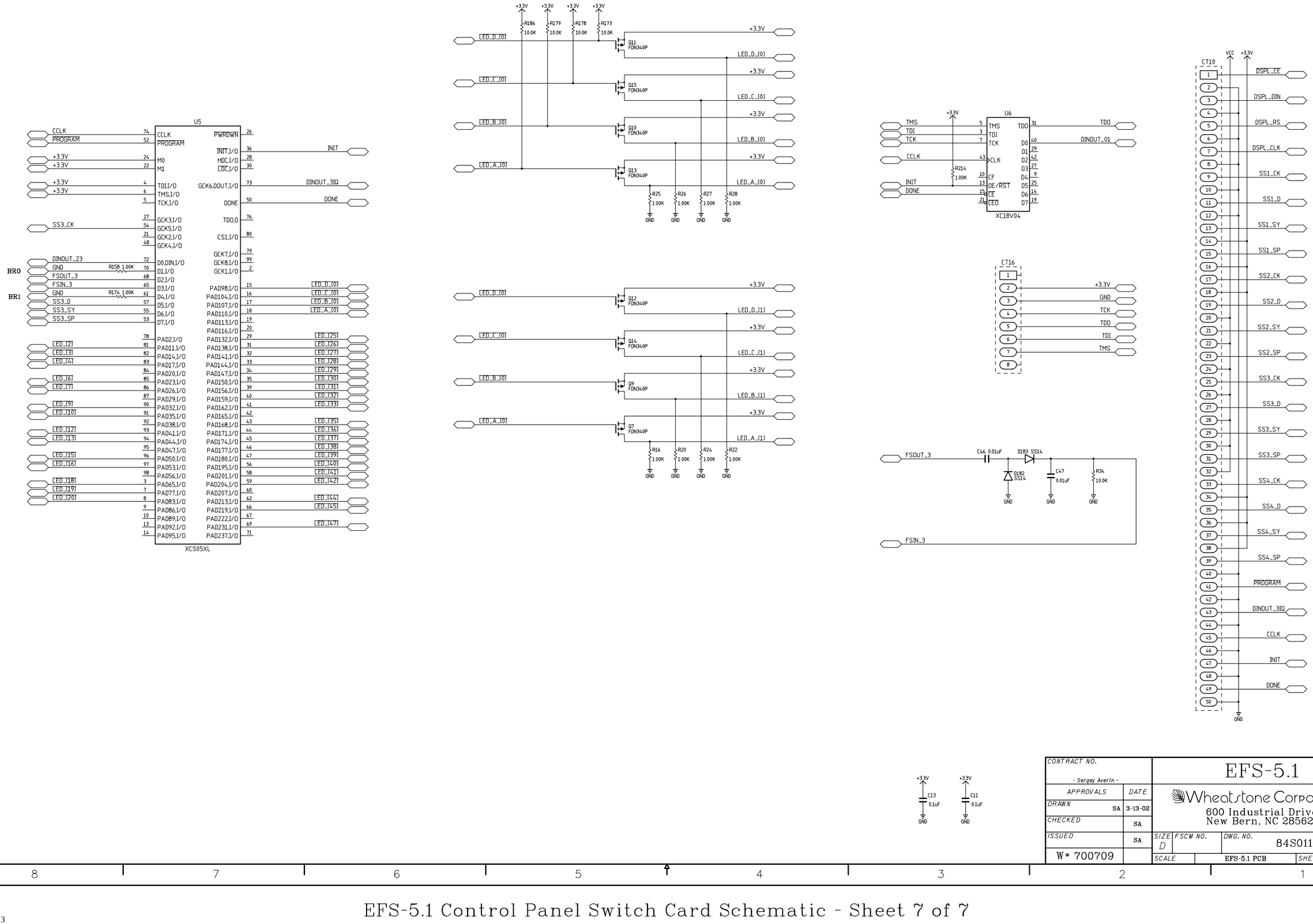
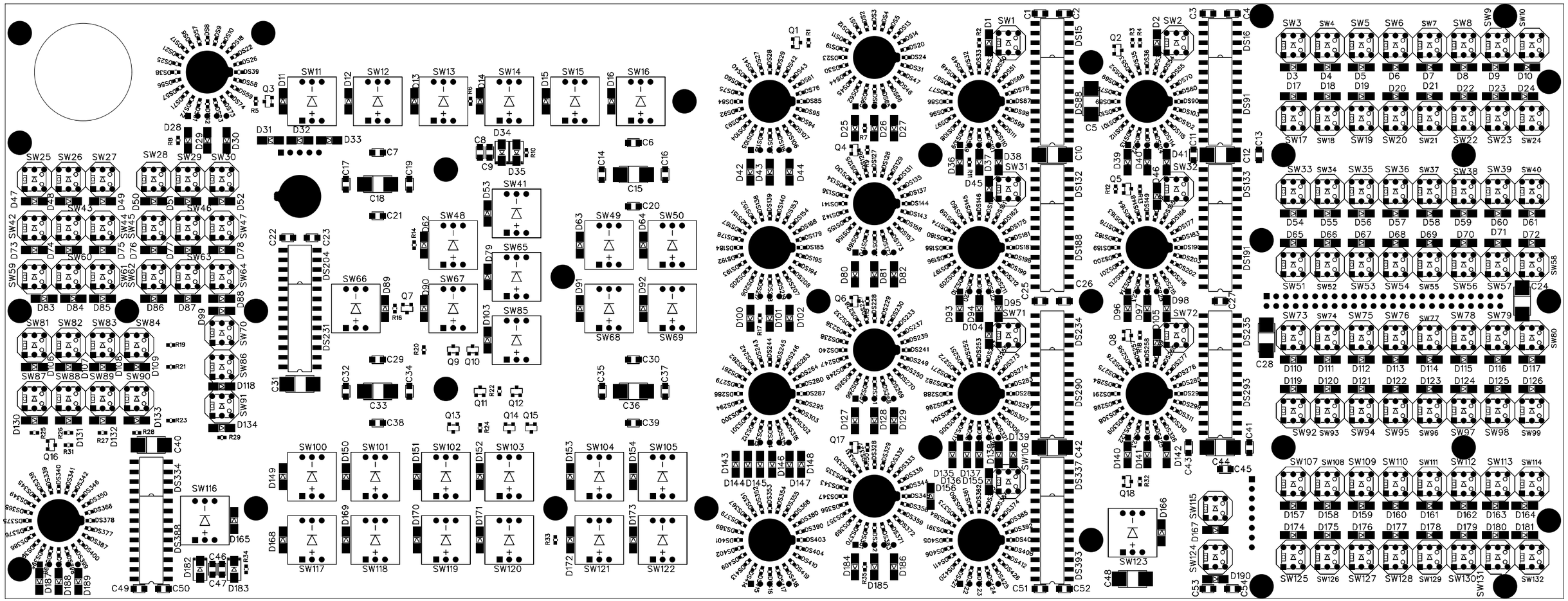
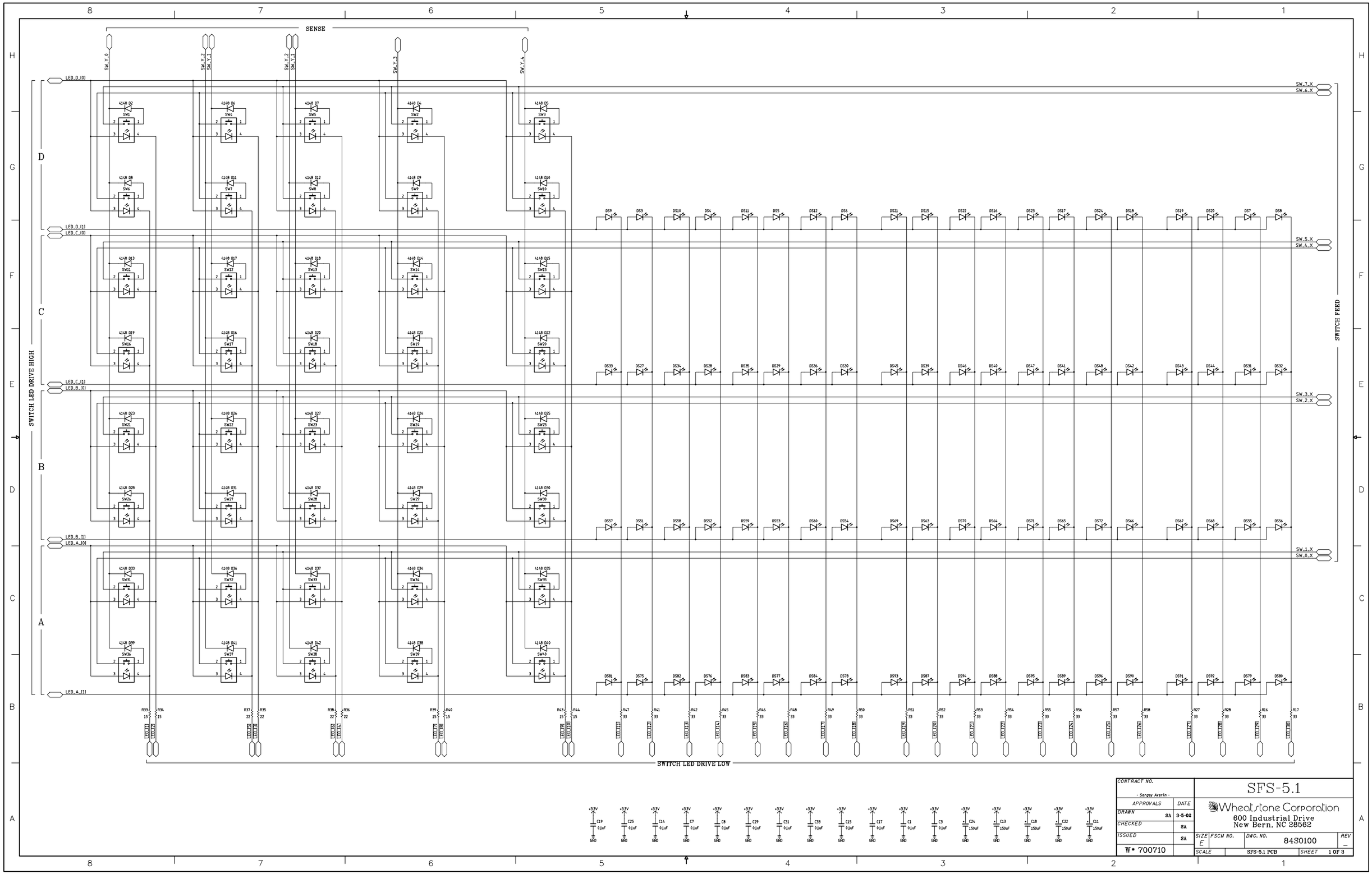
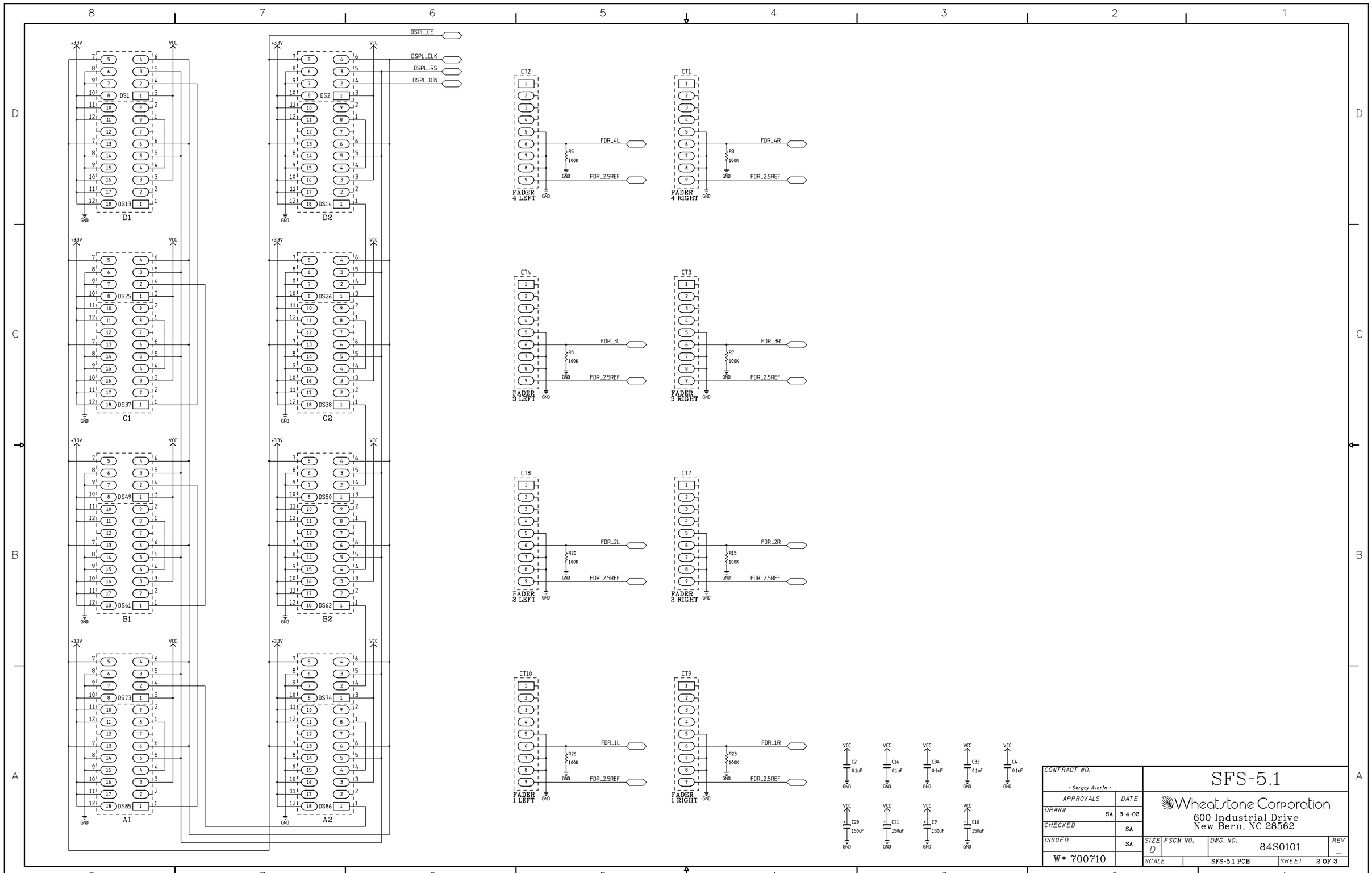
ISSUED SA		SIZE D / FSCM NO. / DWG. NO. 84S0113 / REV —	
W# 700709		SCALE / EFS-5.1 PCB / SHEET 6 OF 7	



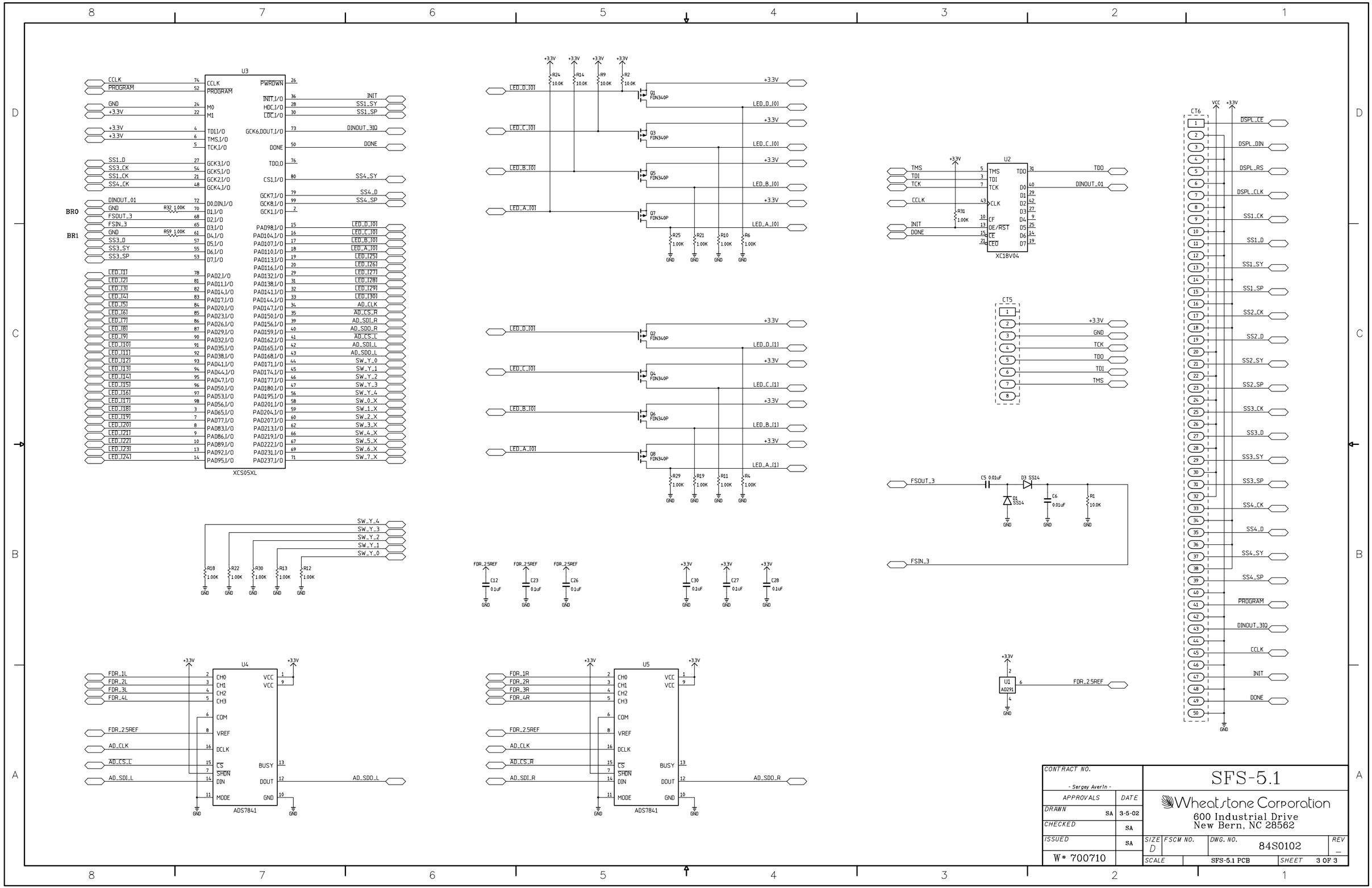
CONTRACT NO. - Sergey Averin -		EFS-5.1	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	3-13-02		
CHECKED SA			
ISSUED SA		SIZE D / FSCM NO. / DWG. NO. 84S0114 / REV –	
W# 700709		SCALE / EFS-5.1 PCB / SHEET 7 OF 7	



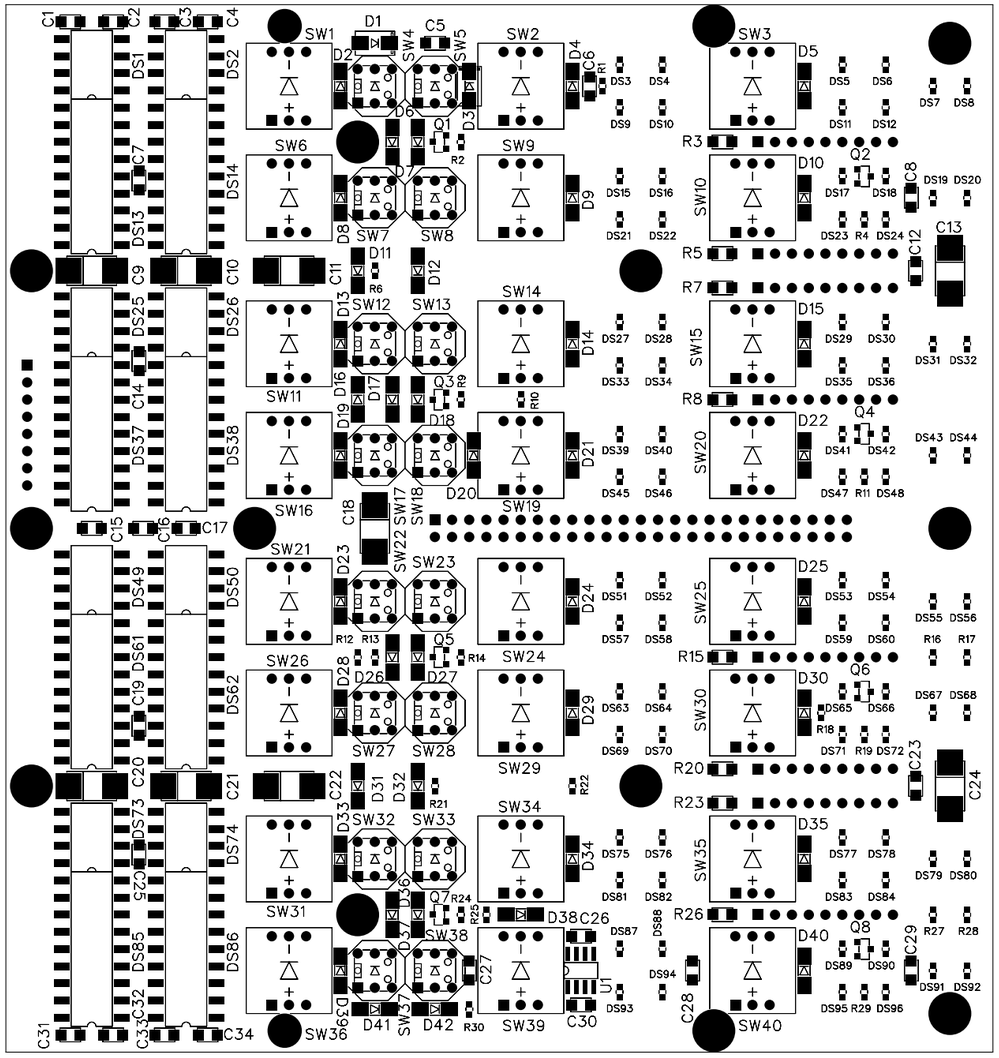

SENSE
SW_Y_0
SW_Y_2
SW_Y_1
SW_Y_3
SW_Y_4
SWITCH LED DRIVE HIGH
SWITCH FEED
SWITCH LED DRIVE LOW
LED_D_[0]
LED_D_[1]
LED_C_[0]
LED_C_[1]
LED_B_[0]
LED_B_[1]
LED_A_[0]
LED_A_[1]
SW_7_X
SW_6_X
SW_5_X
SW_4_X
SW_3_X
SW_2_X
SW_1_X
SW_0_X
+3.3V
GND
CONTRACT NO.
- Sergey Averin -
APPROVALS
DATE
DRAWN
SA
3-5-02
CHECKED
SA
ISSUED
SA
W* 700710
SFS-5.1
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE
E
FSCM NO.
DWG. NO.
84S0100
REV
SCALE
SFS-5.1 PCB
SHEET
1 OF 3

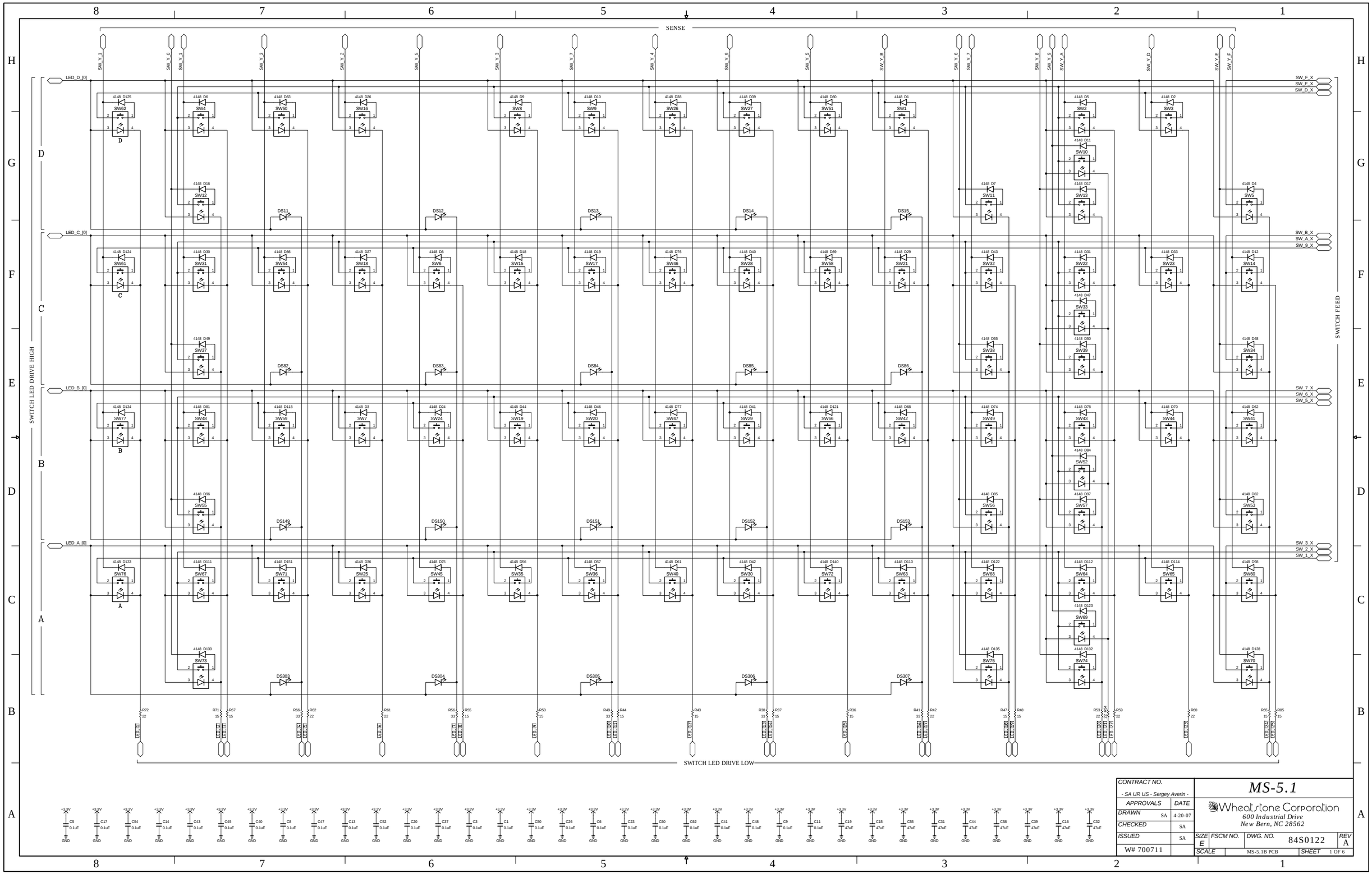


CONTRACT NO.		SFS-5.1	
- Sergey Averin -			
APPROVALS	DATE	Wheatstone Corporation	
DRAWN SA	3-4-02	600 Industrial Drive New Bern, NC 28562	
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0101 / REV —	
W# 700710		SCALE / SFS-5.1 PCB / SHEET 2 OF 3	

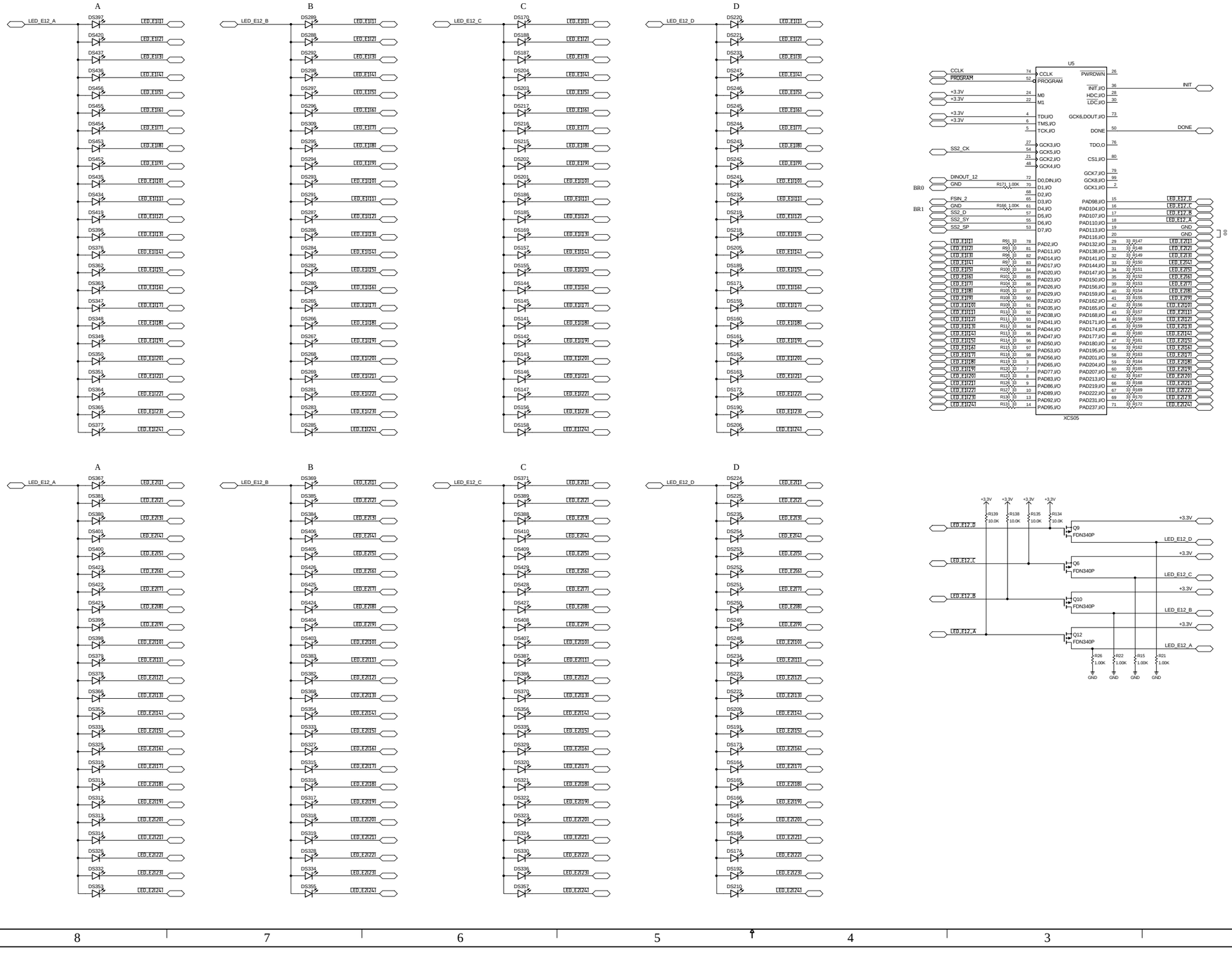


SFS-5.1 4 Outputs Fader Panel Switch Card Schematic - Sheet 3 of 3

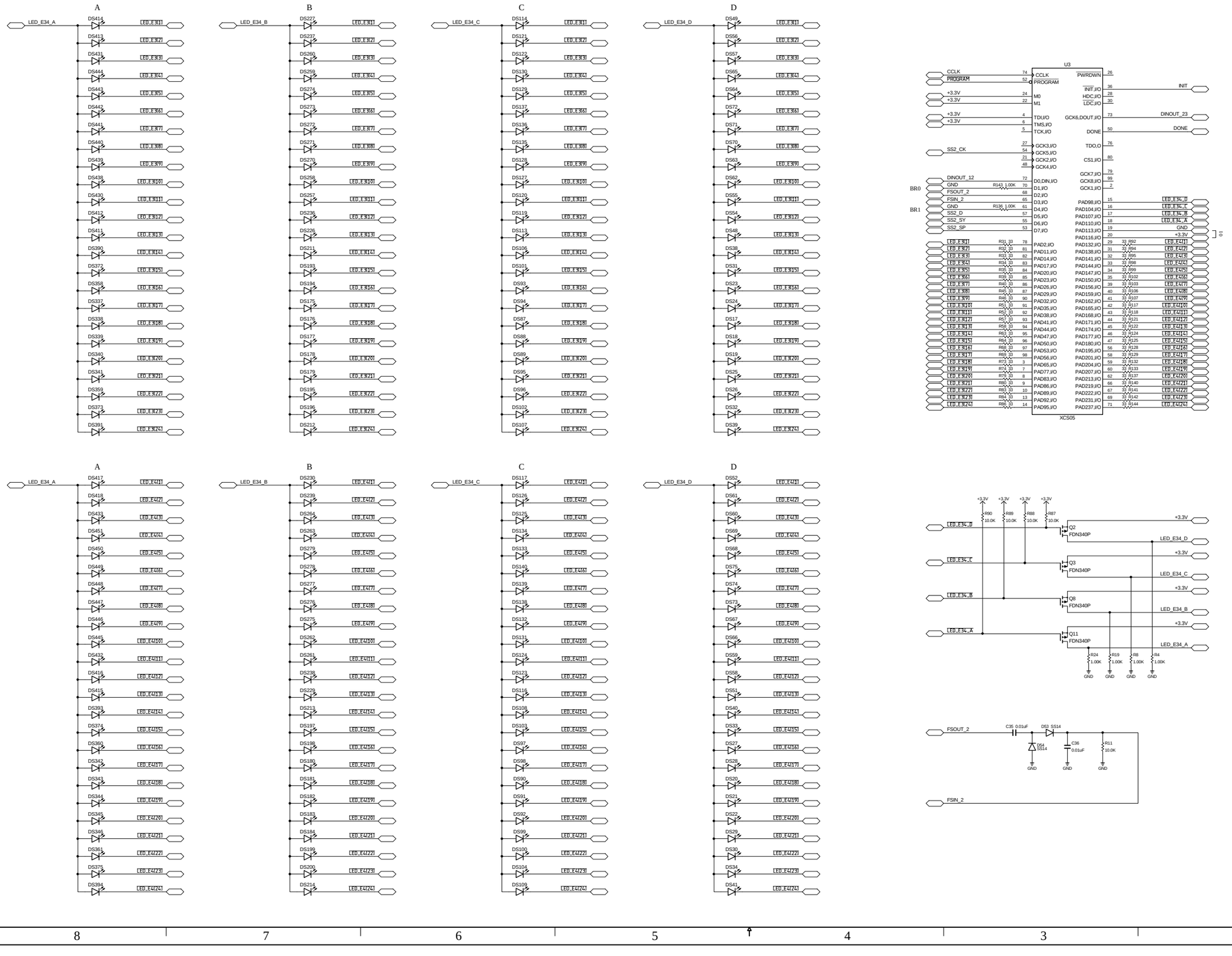

C1 C2 C3 C4
SW1 D1 C5 SW2 SW3
D2 SW4 SW5 D4 C6 R1 D5
DS1 DS2 DS3 DS4 DS5 DS6 DS7 DS8
D6 D3 DS9 DS10 DS11 DS12
Q1 R3
SW6 SW9 Q2
R2 C8 DS19 DS20
C7 DS13 DS14 D7 D8 D9 D10
DS15 DS16 DS17 DS18
SW7 SW8 SW10 DS21 DS22 DS23 R4 DS24
C13
D11 D12 C12
C9 C10 C11 R5
R6 R7
SW12 SW13 SW14 D15
DS25 DS26 D13 D14 DS27 DS28 DS29 DS30 DS31 DS32
SW15
C14 DS33 DS34 DS35 DS36
D16 D17 Q3 R9 R10 R8
SW11 D18 D22 Q4
DS37 DS38 D19 D21 DS39 DS40 DS41 DS42 DS43 DS44
SW17 SW18 SW20
D20 DS45 DS46 DS47 R11 DS48
C18 SW19
C15 C16 C17 SW16
SW21 SW22 SW23 D25
DS49 DS50 D23 D24 DS51 DS52 DS53 DS54 DS55 DS56
SW25
DS57 DS58 DS59 DS60 R16 R17
R12 R13 Q5 R14 R15 Q6
SW24
SW26 D28 D26 D27 D30
DS61 DS62 C19 D29 DS63 DS64 DS65 DS66 DS67 DS68
SW30
DS69 DS70 DS71 R19 DS72 R18
SW27 SW28 SW29 C23
C20 C21 C22 D31 D32 R22 R20 C24
DS73 DS74 R21 R23
SW32 SW33 SW34 D35
C25 D33 D34 DS75 DS76 DS77 DS78 DS79 DS80
SW35
DS81 DS82 DS83 DS84
D36 Q7 R24 R26 Q8
SW31 SW38 D38 C26 DS87 DS88 R27 R28
DS85 DS86 D39 C27 DS89 DS90 C29
SW37 DS94 DS91 DS92
C32 C28 D40
C31 C33 C34 SW36 D41 D42 R30 SW39 C30 DS93 DS95 R29 DS96
SW40


SENSE
SWITCH LED DRIVE HIGH
SWITCH LED DRIVE LOW
SWITCH FEED
LED_D_[0]
LED_C_[0]
LED_B_[0]
LED_A_[0]
SW_F_X
SW_E_X
SW_D_X
SW_B_X
SW_A_X
SW_9_X
SW_7_X
SW_6_X
SW_5_X
SW_3_X
SW_2_X
SW_1_X
CONTRACT NO.
- SA UR US - Sergey Averin -
APPROVALS
DRAWN SA 4-20-07
CHECKED SA
ISSUED SA
W# 700711
MS-5.1
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE E
FSCM NO.
DWG. NO. 84S0122
REV A
SCALE
MS-5.1B PCB
SHEET 1 OF 6

MS-5.1 Master Panel Switch Card Schematic - Sheet 2 of 6

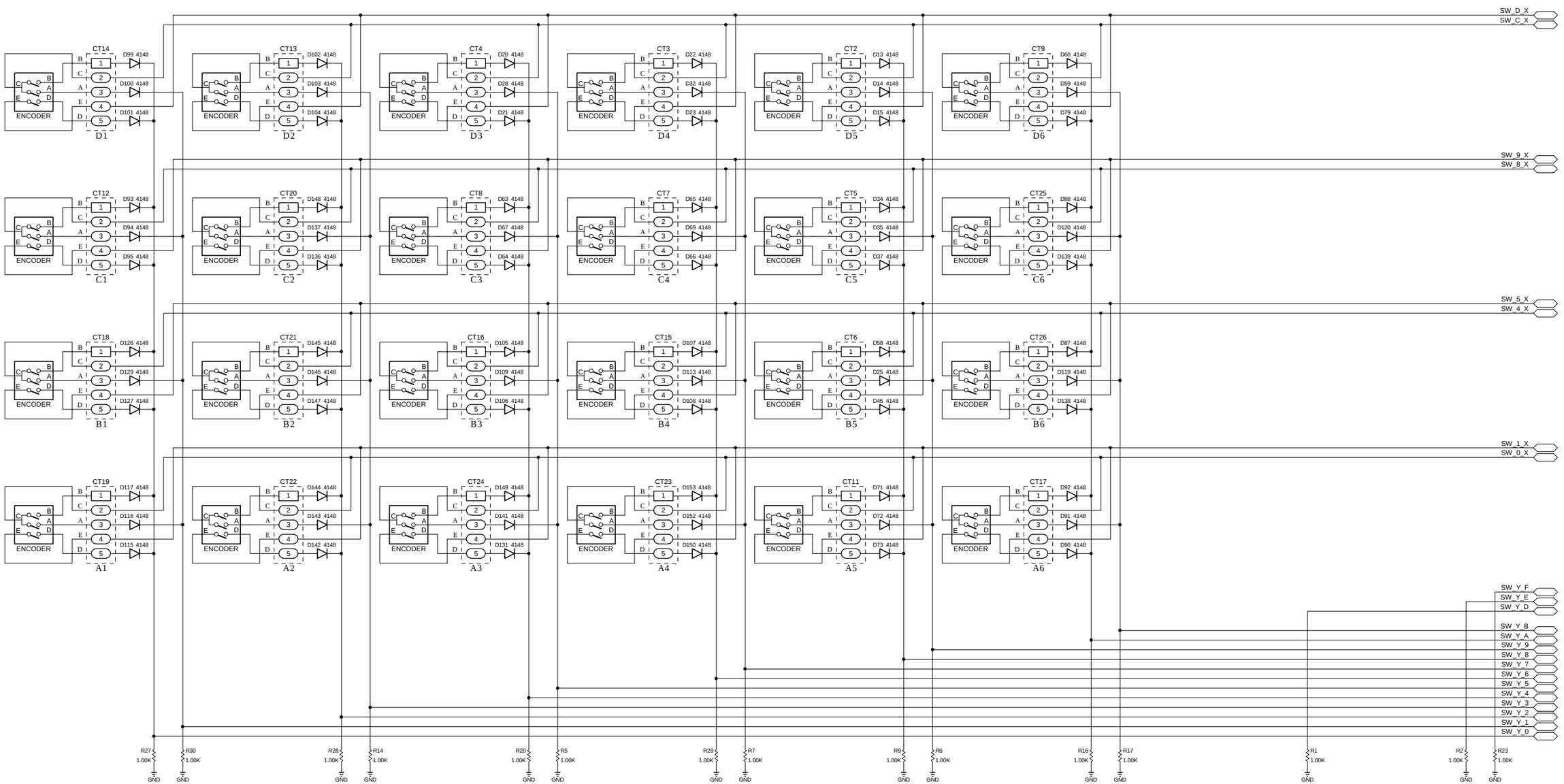


CONTRACT NO. - SA UR US - Sergey Averin -		MS-5.1	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	4-20-07		
CHECKED SA			
ISSUED SA		SIZE E / FSCM NO. / DWG. NO. 84S0124 / REV A	
W# 700711		SCALE MS-5.1B PCB / SHEET 3 OF 6	



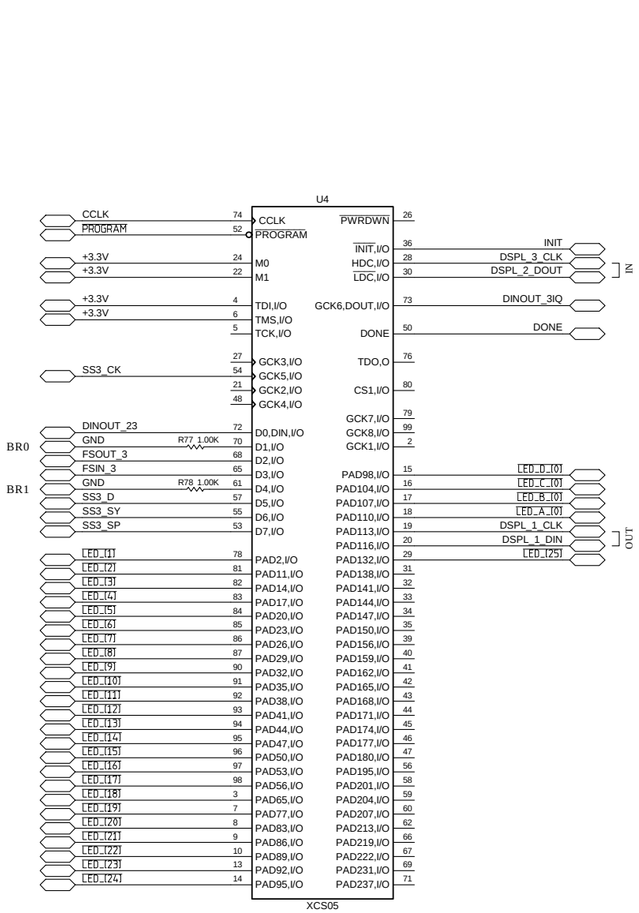
CONTRACT NO.		MS-5.1	
- SA UR US - Sergey Averin -			
APPROVALS	DATE	Wheatstone Corporation	
DRAWN	SA 4-20-07	600 Industrial Drive	
CHECKED	SA	New Bern, NC 28562	
ISSUED	SA	SIZE E / FSCM NO. / DWG. NO. 84S0125 / REV A	
W# 700711		SCALE MS-5.1B PCB / SHEET 4 OF 6	

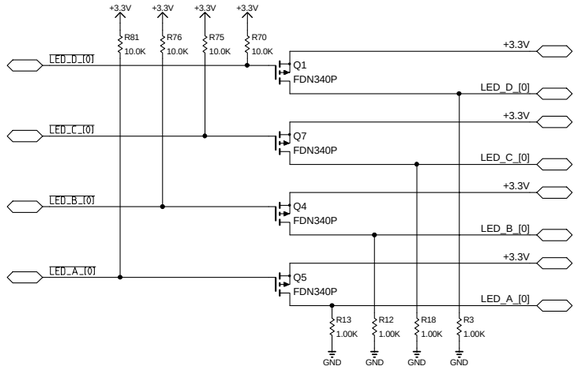
ENCODERS

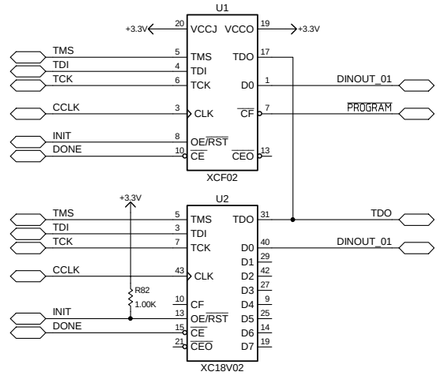


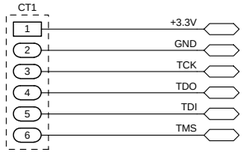
CONTRACT NO. - SA UR US - Sergey Averin -		MS-5.1
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562
DRAWN SA	4-20-07	
CHECKED	SA	
ISSUED	SA	SIZE D · FSCM NO. · DWG. NO. 84S0126 · REV A
W# 700711		SCALE · MS-5.1B PCB · SHEET 5 OF 6

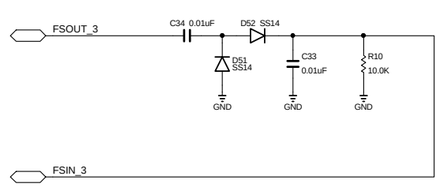
MS-5.1 Master Panel Switch Card Schematic - Sheet 5 of 6

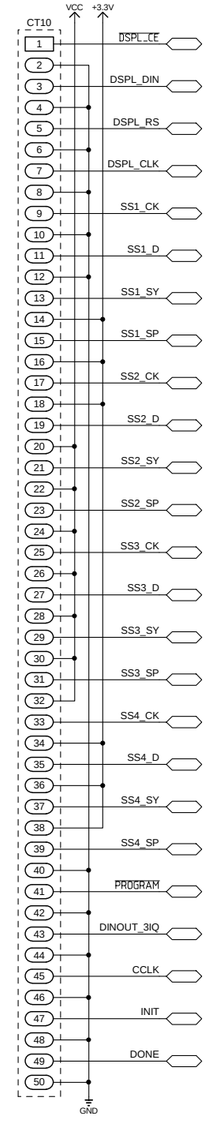


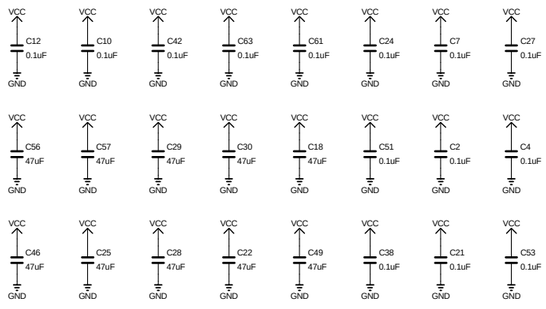




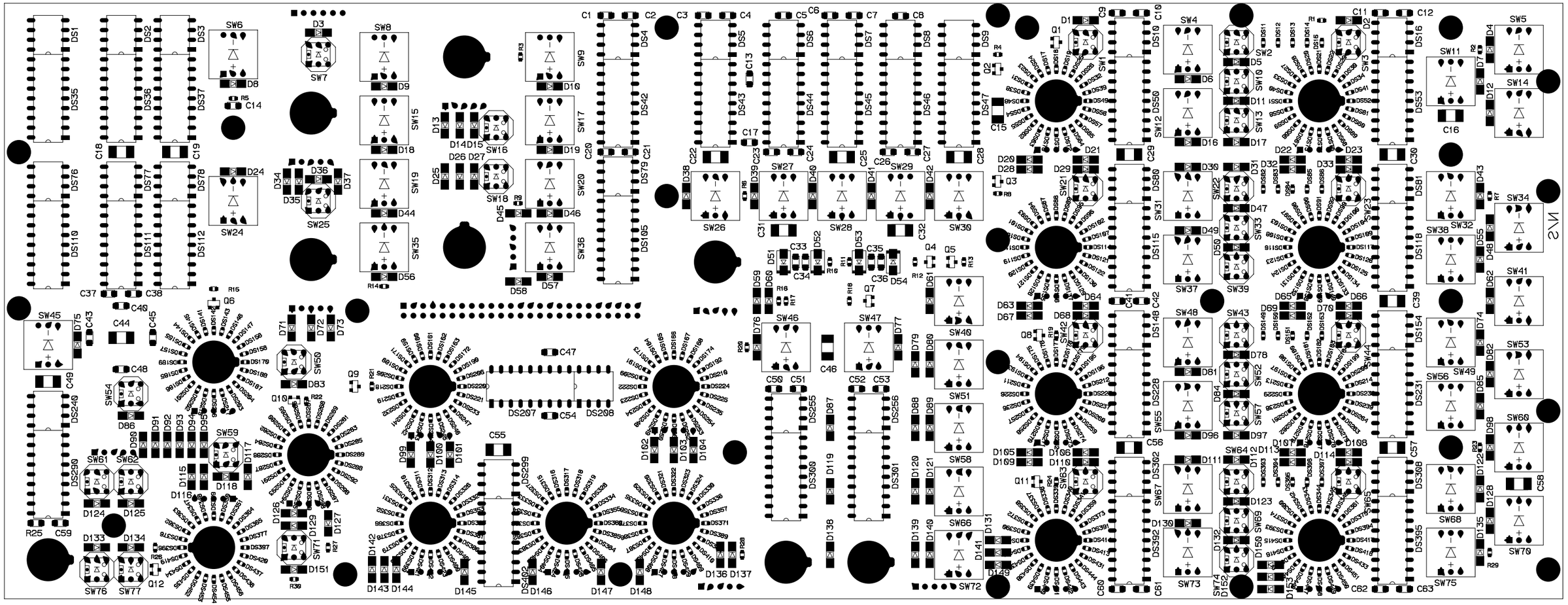


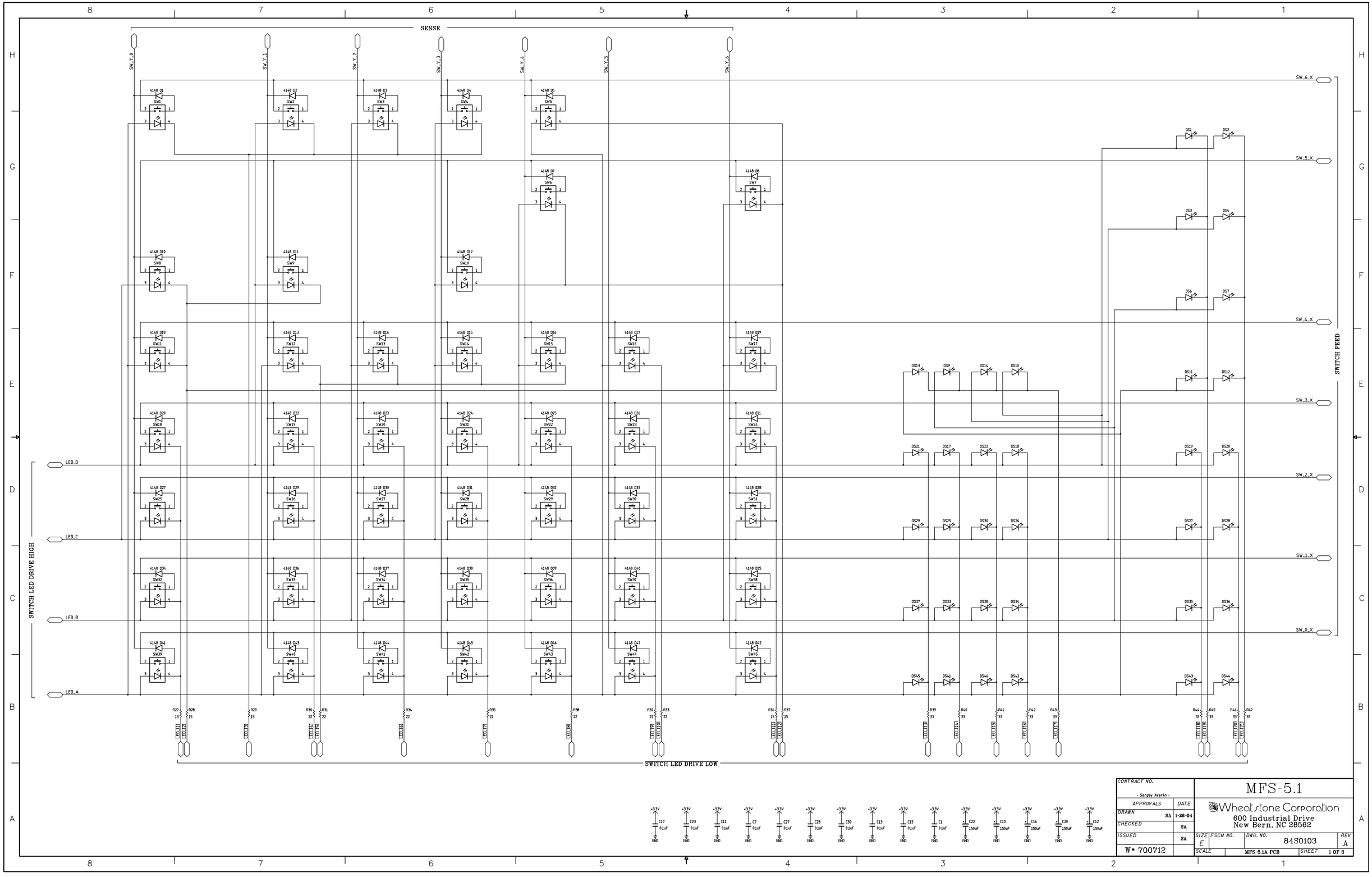




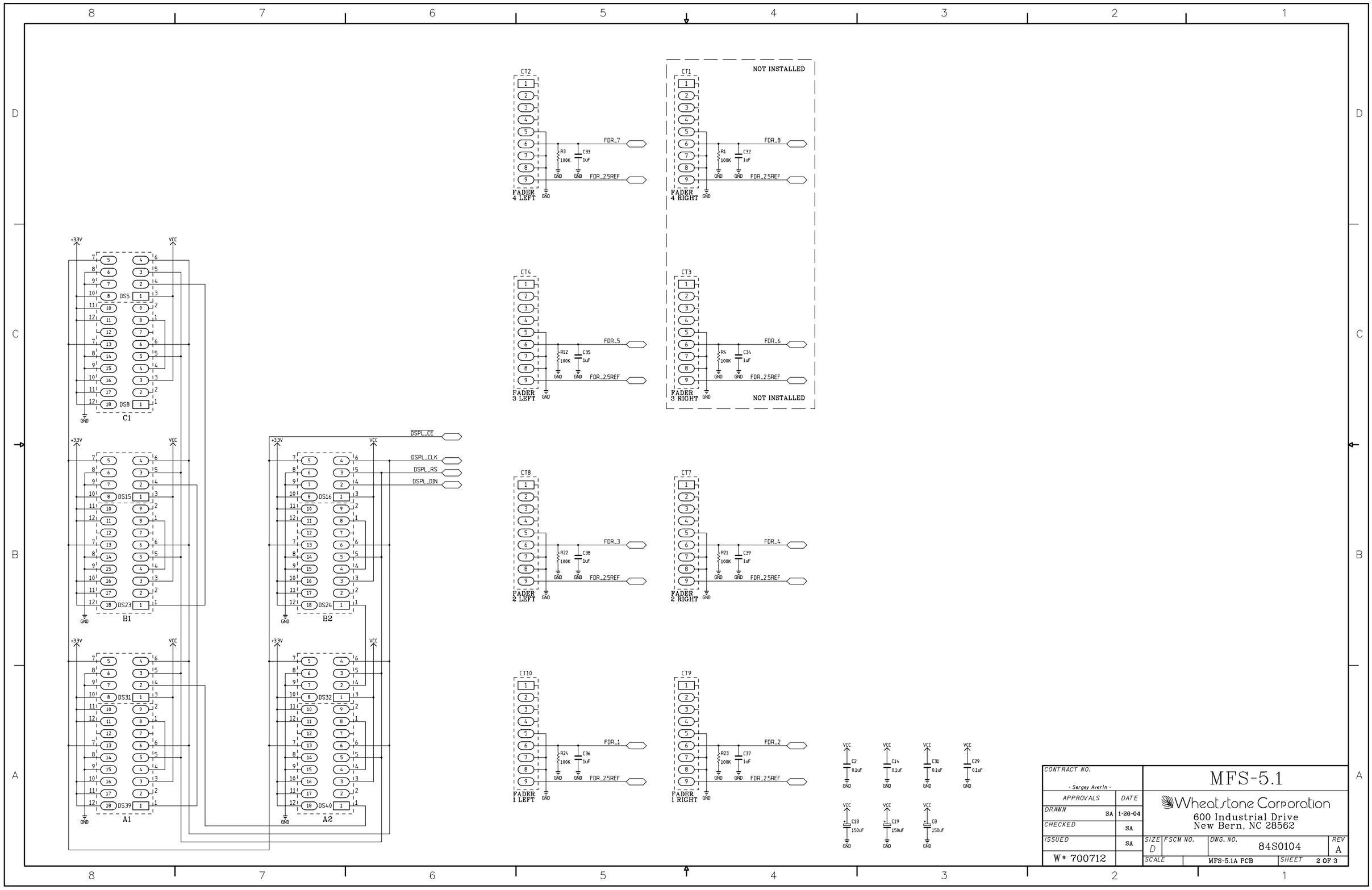


CONTRACT NO. - SA UR US - Sergey Averin -		*MS-5.1*
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562
DRAWN SA	4-20-07	
CHECKED	SA	
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0127 / REV A
W# 700711		SCALE MS-5.1B PCB / SHEET 6 OF 6

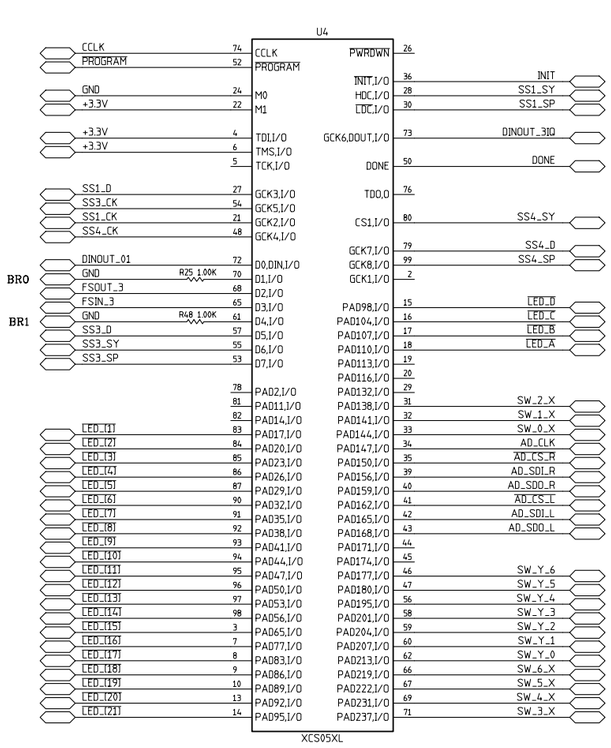


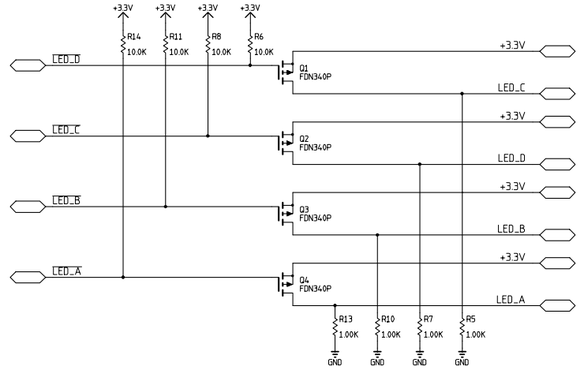


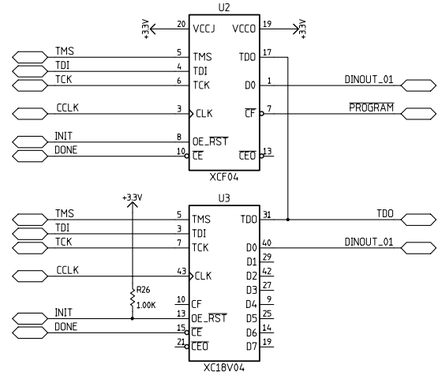
CONTRACT NO. - Sergey Averin -		MFS-5.1	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	1-26-04		
CHECKED SA			
ISSUED SA		SIZE E / FSCM NO. / DWG. NO. 84S0103 / REV A	
W# 700712		SCALE / MFS-5.1A PCB / SHEET 1 OF 3	

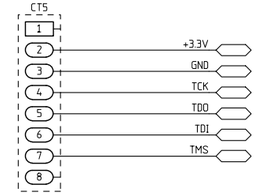


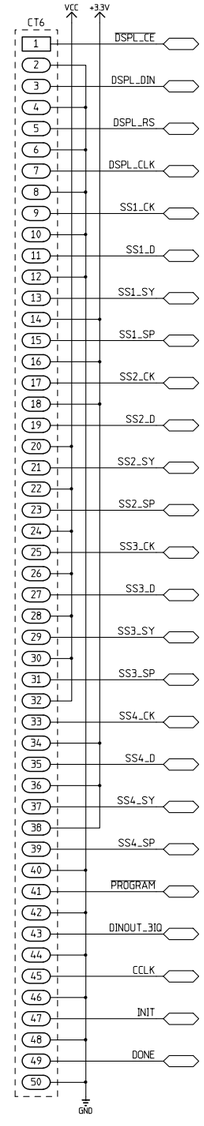
MFS-5.1 4 Master Fader Panel Switch Card Schematic - Sheet 2 of 3

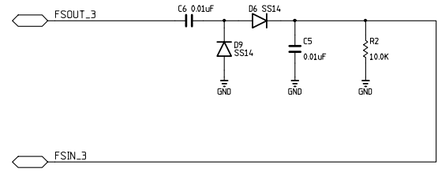


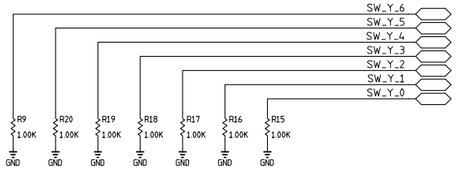


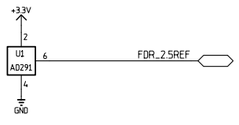


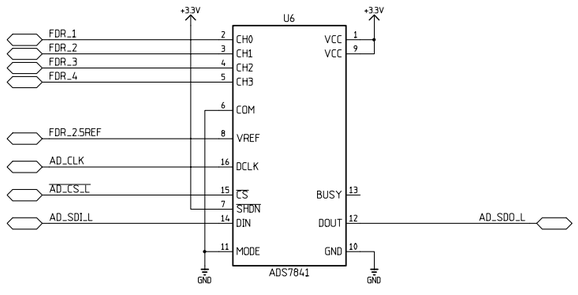


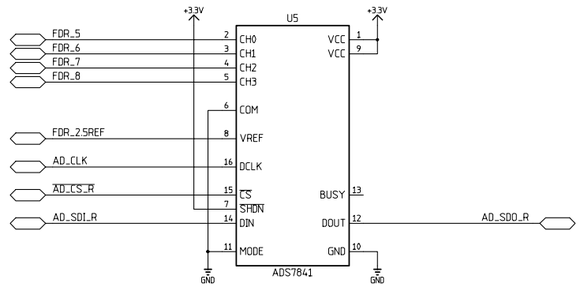






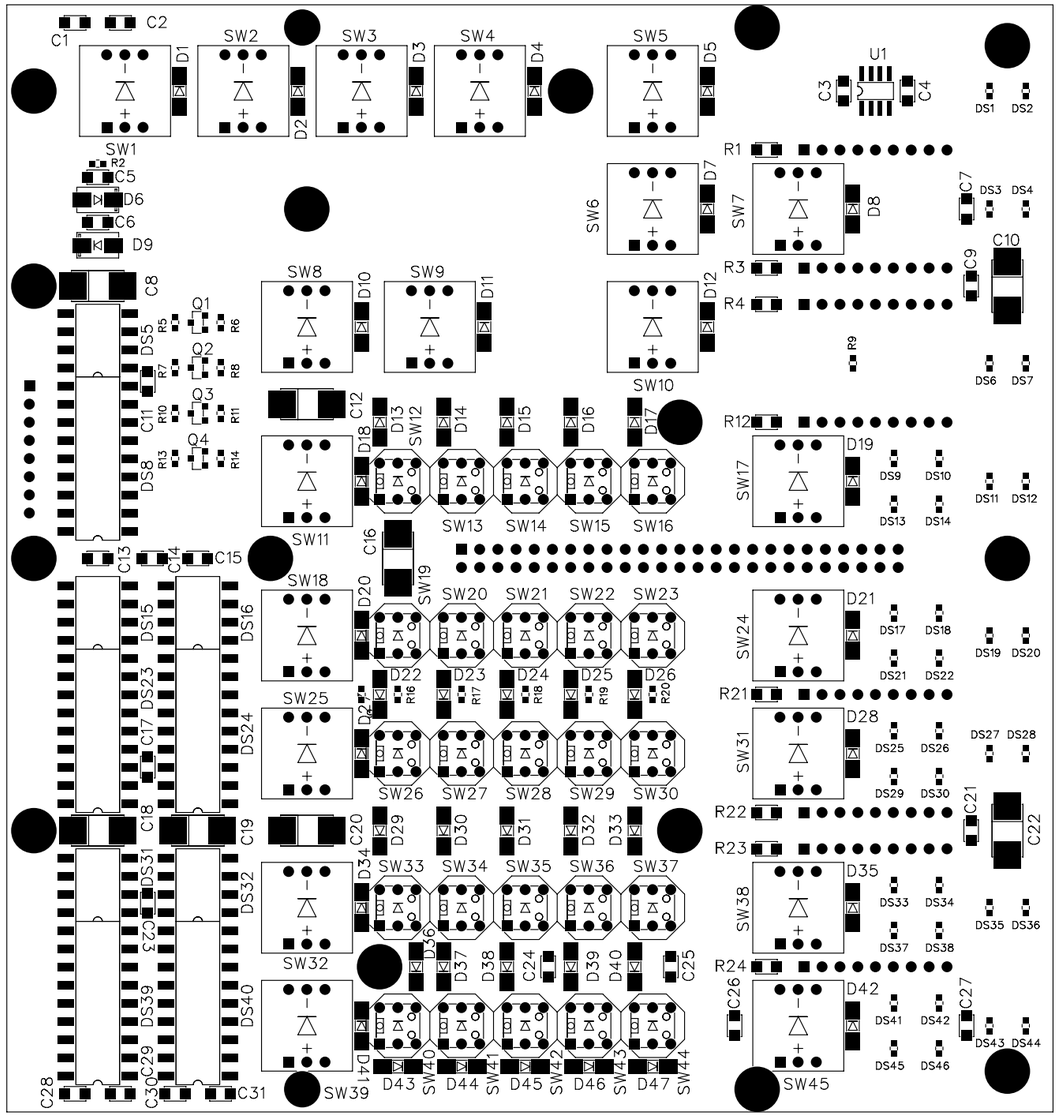






CONTRACT NO.		MFS-5.1	
- Sergey Averin -			
APPROVALS	DATE	Wheatstone Corporation	
DRAWN SA	1-26-04	600 Industrial Drive	
CHECKED	SA	New Bern, NC 28562	
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0105 / REV A	
W# 700712		SCALE / MFS-5.1A PCB / SHEET 3 OF 3	

MFS-5.1 4 Master Fader Panel Switch Card Schematic - Sheet 3 of 3


C1
C2
SW1
R2
C5
D6
C6
D9
SW2
SW3
SW4
SW5
D1
D2
D3
D4
D5
U1
C3
C4
DS1
DS2
R1
SW6
SW7
D7
D8
C7
DS3
DS4
C10
C9
R3
R4
R9
DS6
DS7
C8
SW8
SW9
D10
D11
D12
Q1
Q2
Q3
Q4
R5
R6
R7
R8
R10
R11
R13
R14
DS5
DS8
C11
SW10
C12
D13
D14
D15
D16
D17
D18
SW12
SW13
SW14
SW15
SW16
SW11
R12
SW17
D19
DS9
DS10
DS11
DS12
DS13
DS14
C13
C14
C15
C16
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D24
D25
D26
R16
R17
R18
R19
R20
SW25
D27
R21
D28
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DS26
DS27
DS28
DS29
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SW28
SW29
SW30
C18
C19
C20
C21
C22
D29
D30
D31
D32
D33
D34
R22
R23
SW33
SW34
SW35
SW36
SW37
D35
SW38
DS31
DS32
DS33
DS34
DS35
DS36
DS37
DS38
C23
SW32
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D37
D38
C24
D39
D40
C25
R24
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C28
C29
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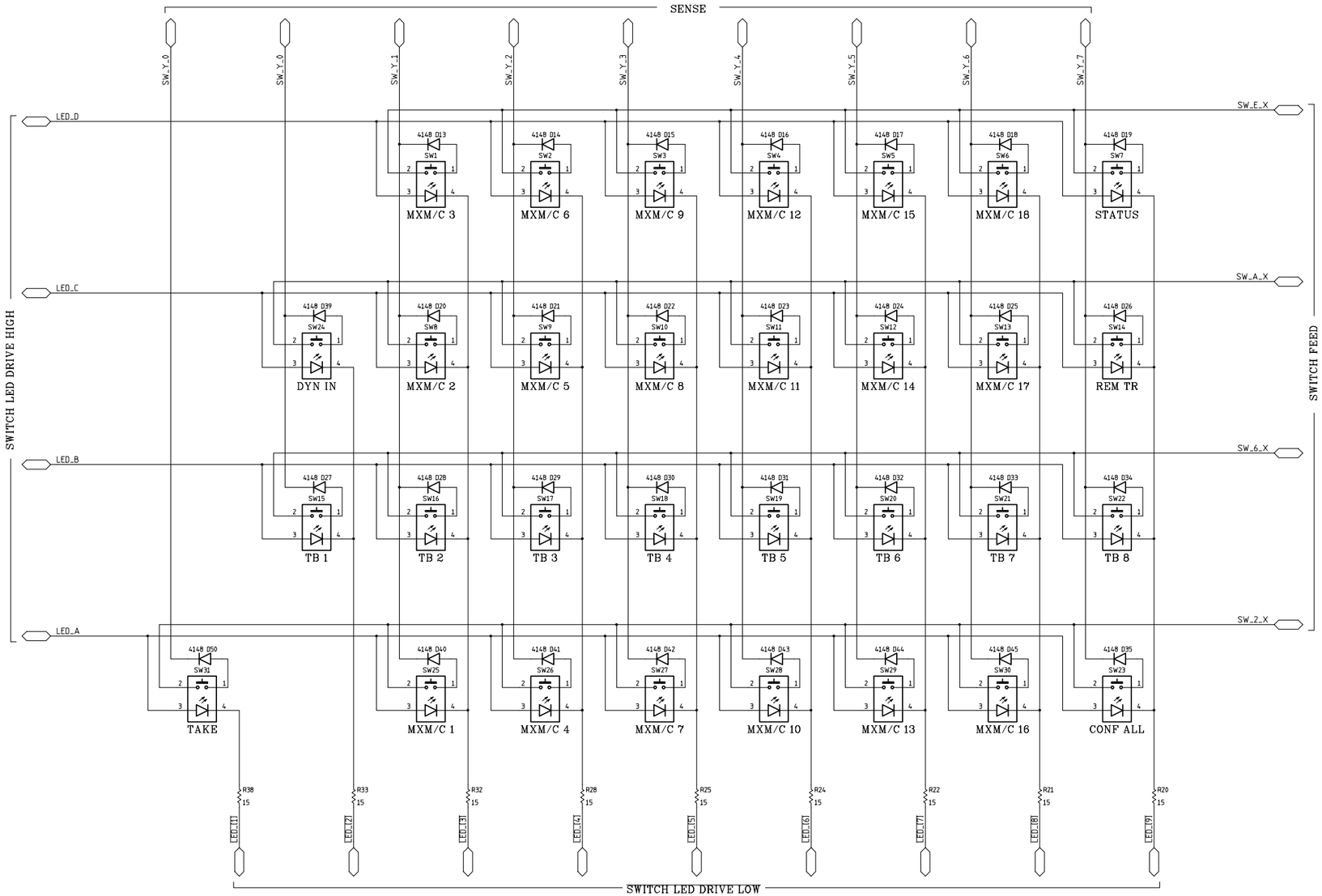
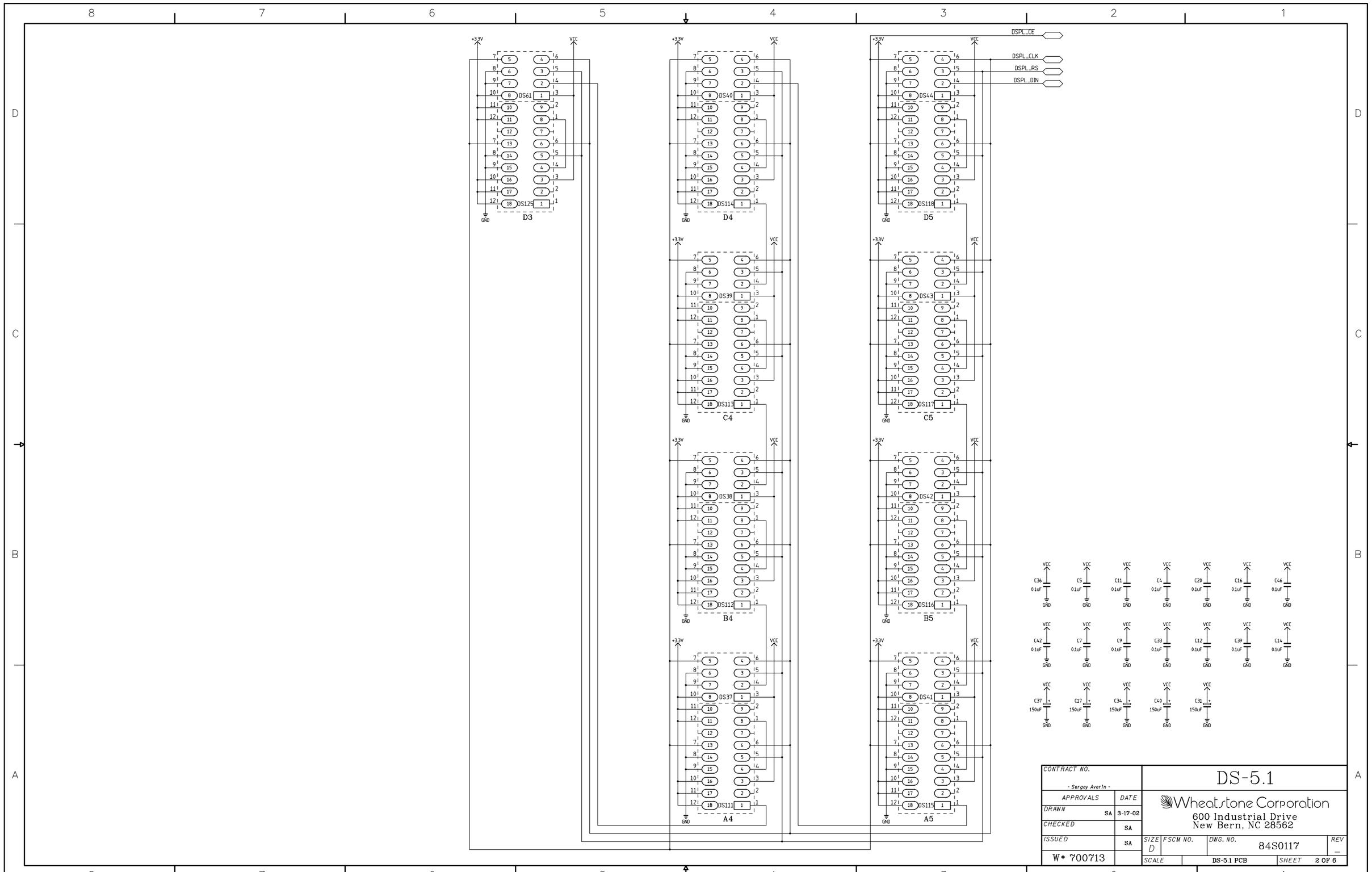


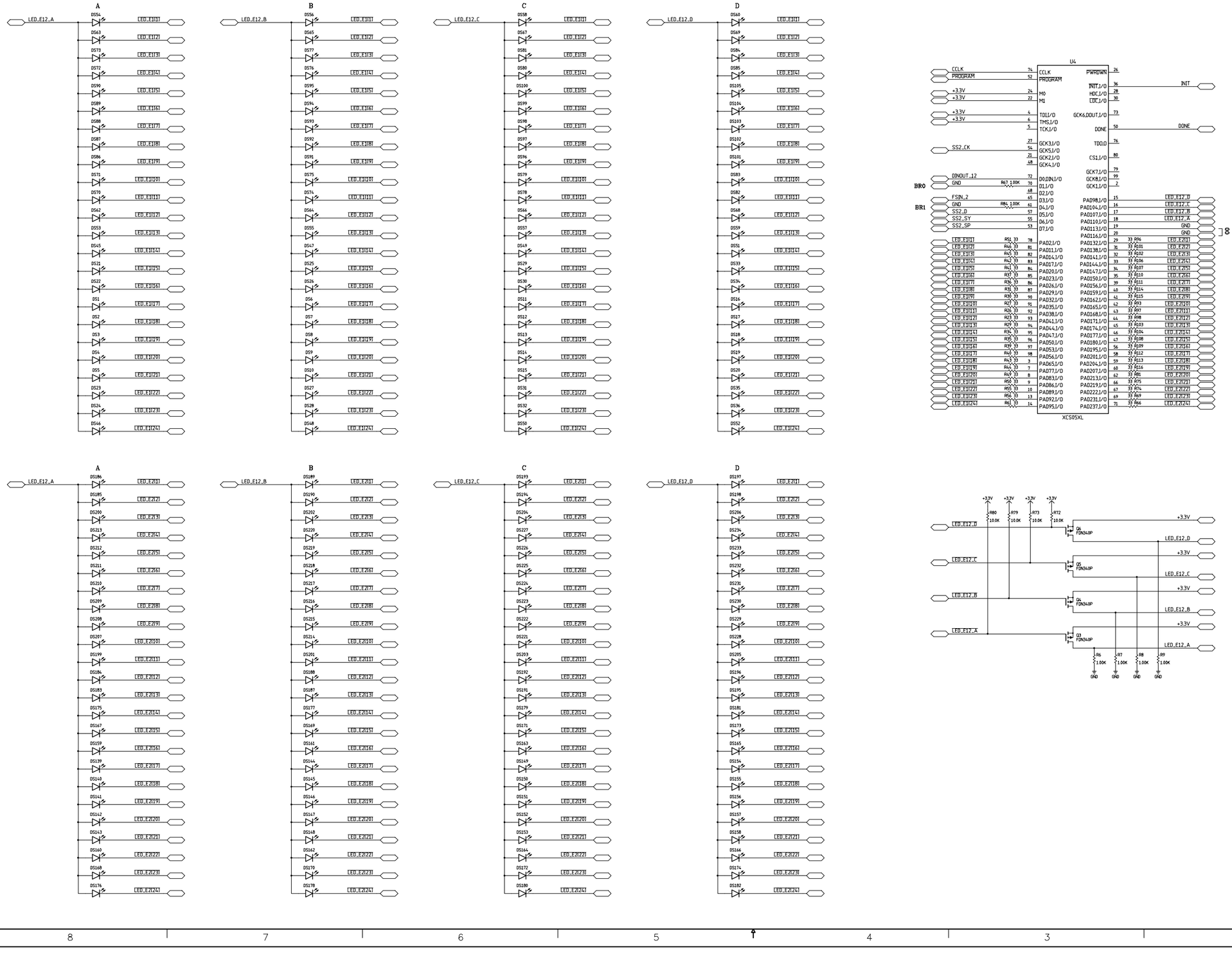
CONTRACT NO. - Sergey Averin -		DS-5.1
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562
DRAWN SA	3-17-02	
CHECKED	SA	
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0116 / REV –
W# 700713		SCALE / DS-5.1 PCB / SHEET 1 OF 6

DS-5.1 Dynamic Panel Switch Card Schematic - Sheet 1 of 6

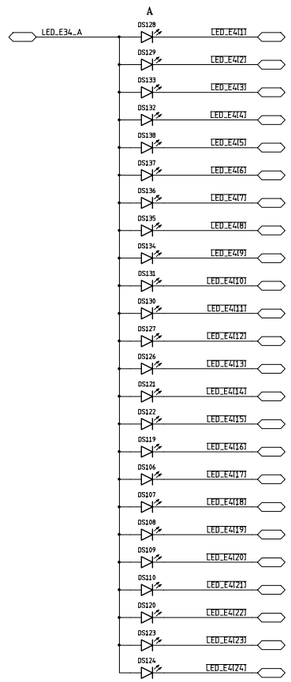


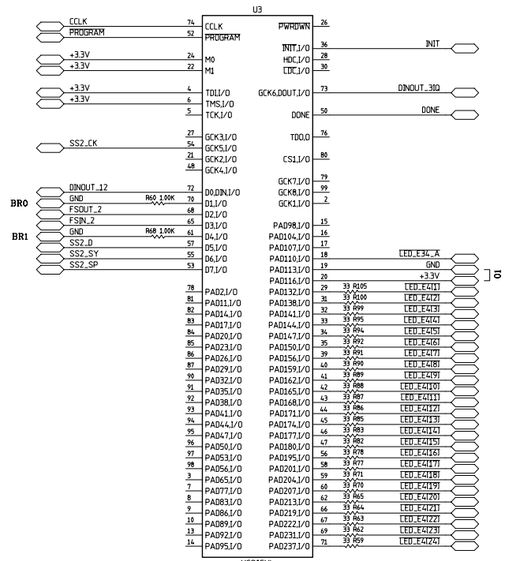
CONTRACT NO. - Sergey Averin -		DS-5.1
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562
DRAWN SA	3-17-02	
CHECKED	SA	
ISSUED	SA	SIZE D · FSCM NO. · DWG. NO. 84S0117 · REV —
W# 700713		SCALE · DS-5.1 PCB · SHEET 2 OF 6

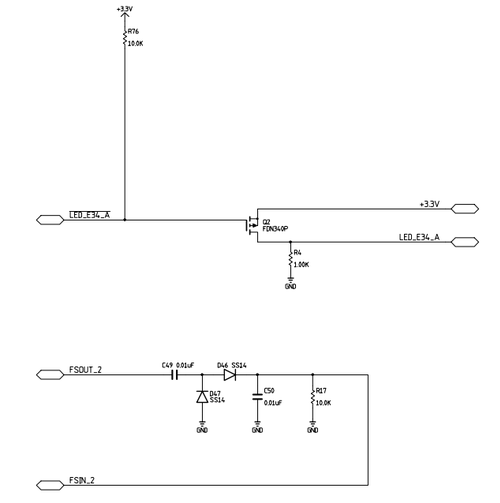
DS-5.1 Dynamic Panel Switch Card Schematic - Sheet 2 of 6



CONTRACT NO. - Sergey Averin -		DS-5.1
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562
DRAWN SA	3-17-02	
CHECKED SA		
ISSUED SA		SIZE E · FSCM NO. · DWG. NO. 84S0118 · REV –
W# 700713		SCALE · DS-5.1 PCB · SHEET 3 OF 6

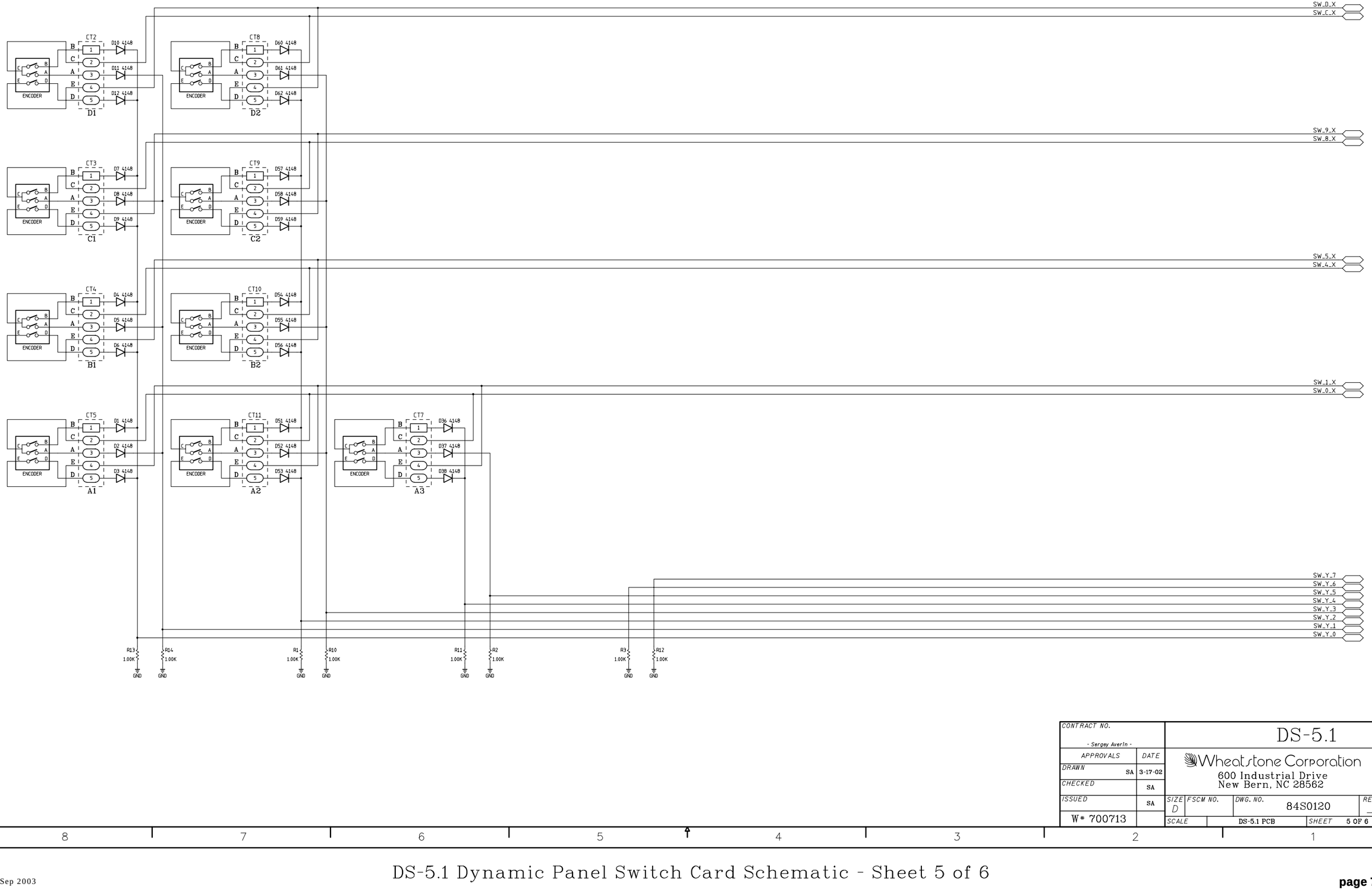




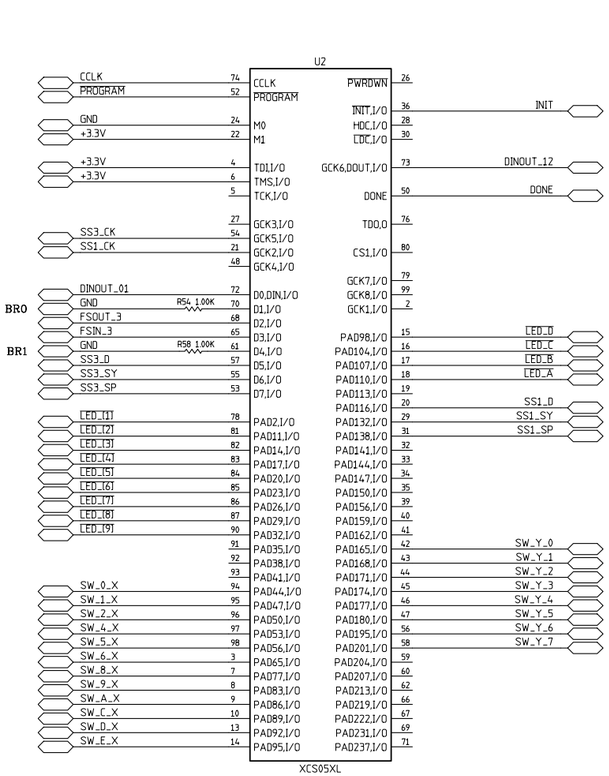


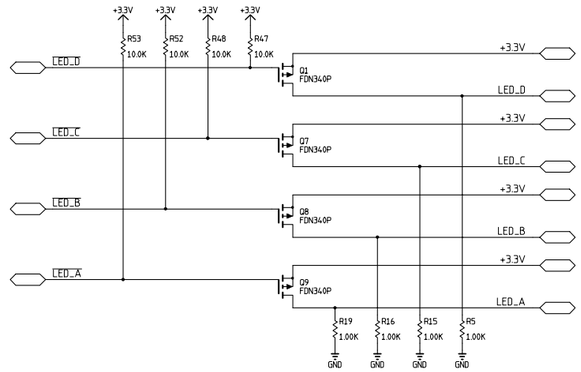
CONTRACT NO.		DS-5.1	
- Sergey Averin -			
APPROVALS	DATE	Wheatstone Corporation	
DRAWN	SA 3-17-03	600 Industrial Drive New Bern, NC 28562	
CHECKED	SA		
ISSUED	SA	SIZE E / FSCM NO. / DWG. NO. 84S0119 / REV –	
W# 700713		SCALE / DS-5.1 PCB / SHEET 4 OF 6	

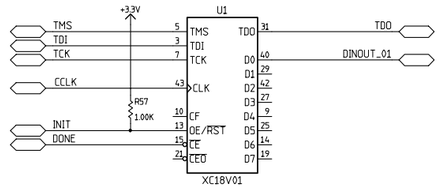
ENCODERS

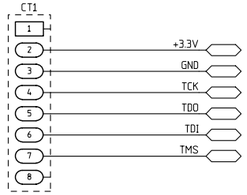


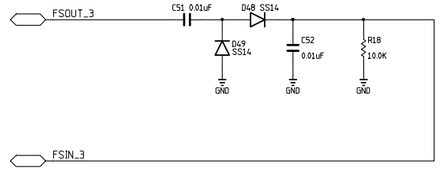
CONTRACT NO. - Sergey Averin -		DS-5.1	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	3-17-02		
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0120 / REV —	
W# 700713		SCALE / DS-5.1 PCB / SHEET 5 OF 6	

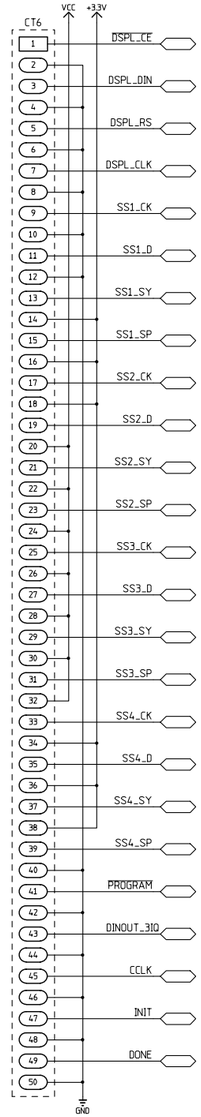




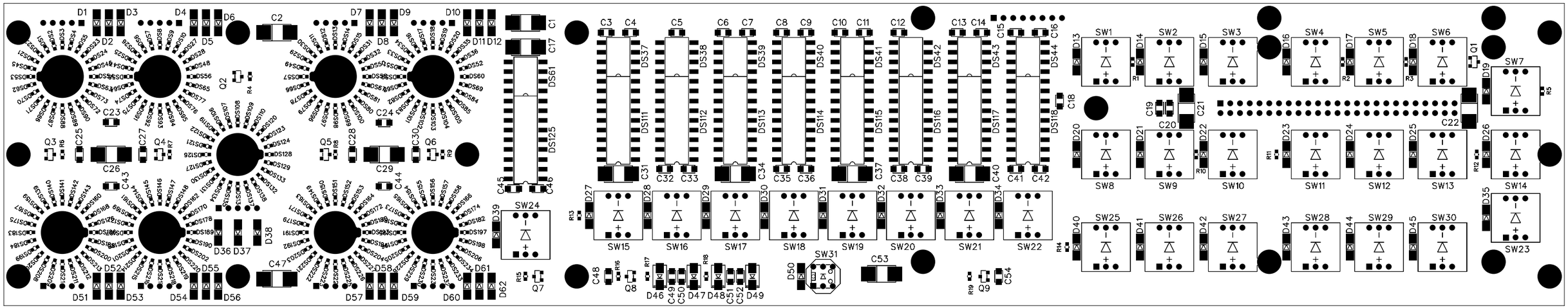


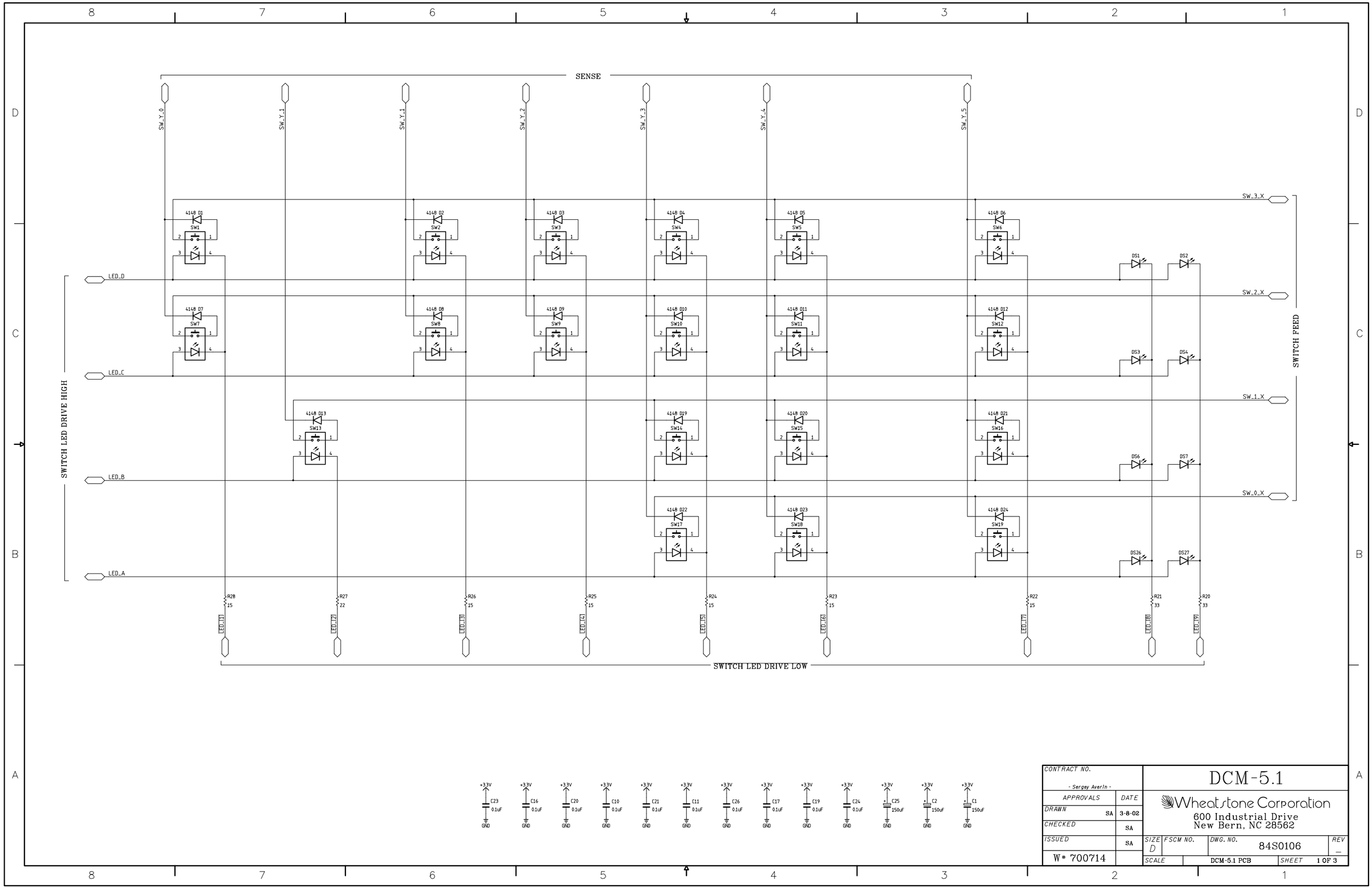






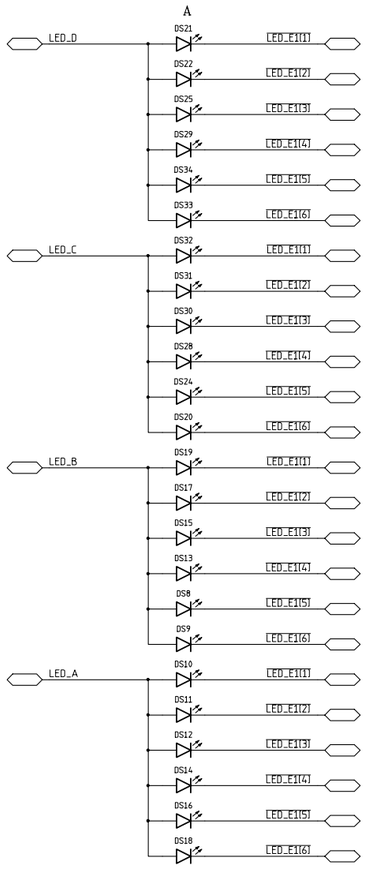
CONTRACT NO. - Sergey Averin -		DS-5.1
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562
DRAWN SA	3-17-02	
CHECKED SA		
ISSUED SA		SIZE D / FSCM NO. / DWG. NO. 84S0121 / REV —
W# 700713		SCALE / DS-5.1 PCB / SHEET 6 OF 6

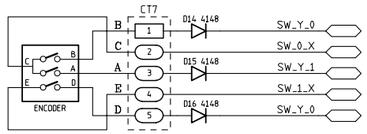

D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12
C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C30 C31 C32 C33 C34 C35 C36 C37 C38 C39 C40 C41 C42 C43 C44 C45 C46 C47 C48 C49 C50 C51 C52 C53 C54
Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9
R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R16 R17 R18 R19
SW1 SW2 SW3 SW4 SW5 SW6 SW7 SW8 SW9 SW10 SW11 SW12 SW13 SW14 SW15 SW16 SW17 SW18 SW19 SW20 SW21 SW22 SW23 SW24 SW25 SW26 SW27 SW28 SW29 SW30 SW31
D13 D14 D15 D16 D17 D18 D19 D20 D21 D22 D23 D24 D25 D26 D27 D28 D29 D30 D31 D32 D33 D34 D35 D36 D37 D38 D39 D40 D41 D42 D43 D44 D45 D46 D47 D48 D49 D50 D51 D52 D53 D54 D55 D56 D57 D58 D59 D60 D61 D62
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 DS30 DS31 DS32 DS33 DS34 DS35 DS36 DS37 DS38 DS39 DS40 DS41 DS42 DS43 DS44 DS45 DS46 DS47 DS48 DS49 DS50 DS51 DS52 DS53 DS54 DS55 DS56 DS57 DS58 DS59 DS60 DS61 DS62 DS63 DS64 DS65 DS66 DS67 DS68 DS69 DS70 DS71 DS72 DS73 DS74 DS75 DS76 DS77 DS78 DS79 DS80 DS81 DS82 DS83 DS84 DS85 DS86 DS87 DS88 DS89 DS90 DS91 DS92 DS93 DS94 DS95 DS96 DS97 DS98 DS99 DS100 DS101 DS102 DS103 DS104 DS105 DS106 DS107 DS108 DS109 DS110 DS111 DS112 DS113 DS114 DS115 DS116 DS117 DS118 DS119 DS120 DS121 DS122 DS123 DS124 DS125 DS126 DS127 DS128 DS129 DS130 DS131 DS132 DS133 DS134 DS135 DS136 DS137 DS138 DS139 DS140 DS141 DS142 DS143 DS144 DS145 DS146 DS147 DS148 DS149 DS150 DS151 DS152 DS153 DS154 DS155 DS156 DS157 DS158 DS159 DS160 DS161 DS162 DS163 DS164 DS165 DS166 DS167 DS168 DS169 DS170 DS171 DS172 DS173 DS174 DS175 DS176 DS177 DS178 DS179 DS180 DS181 DS182 DS183 DS184 DS185 DS186 DS187 DS188 DS189 DS190 DS191 DS192 DS193 DS194 DS195 DS196 DS197 DS198 DS199 DS200 DS201 DS202 DS203 DS204 DS205 DS206 DS207 DS208 DS209 DS210 DS211 DS212 DS213 DS214 DS215 DS216 DS217 DS218 DS219 DS220 DS221 DS222 DS223 DS224 DS225 DS226 DS227 DS228 DS229 DS230

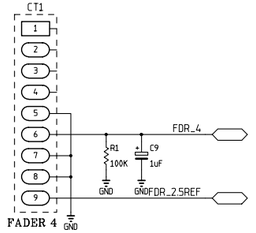


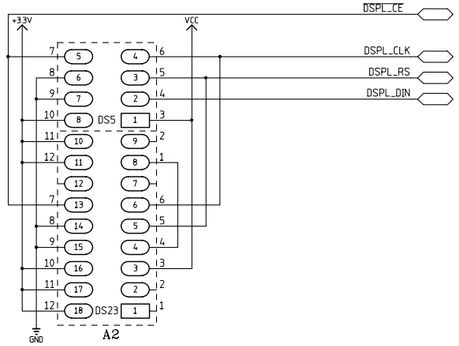
CONTRACT NO.		DCM-5.1	
- Sergey Averin -			
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN	SA 3-8-02		
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0106	REV –
W# 700714		SCALE / DCM-5.1 PCB / SHEET 1 OF 3	

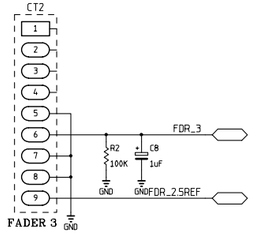
DCM-5.1 Dynamics Fader Panel Switch Card Schematic - Sheet 1 of 3

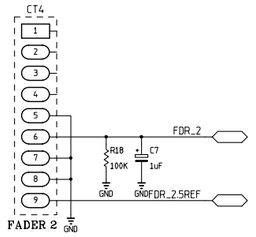


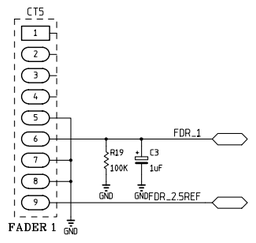


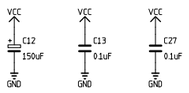






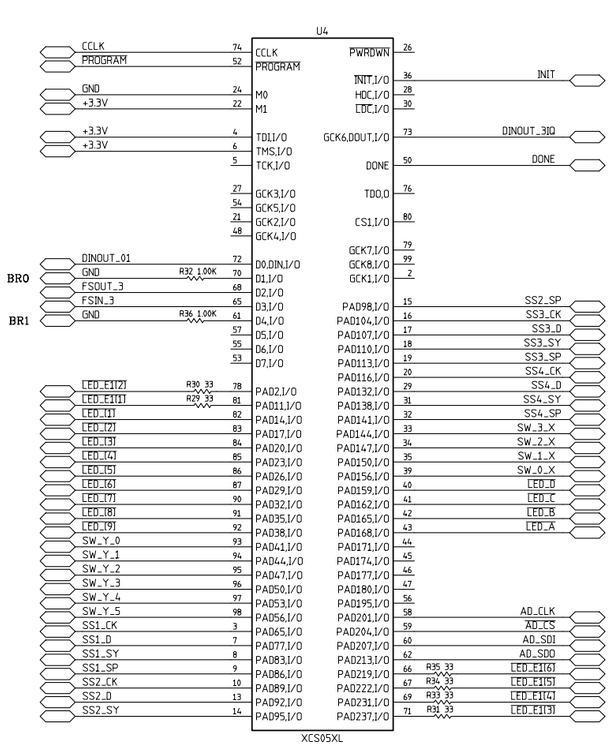






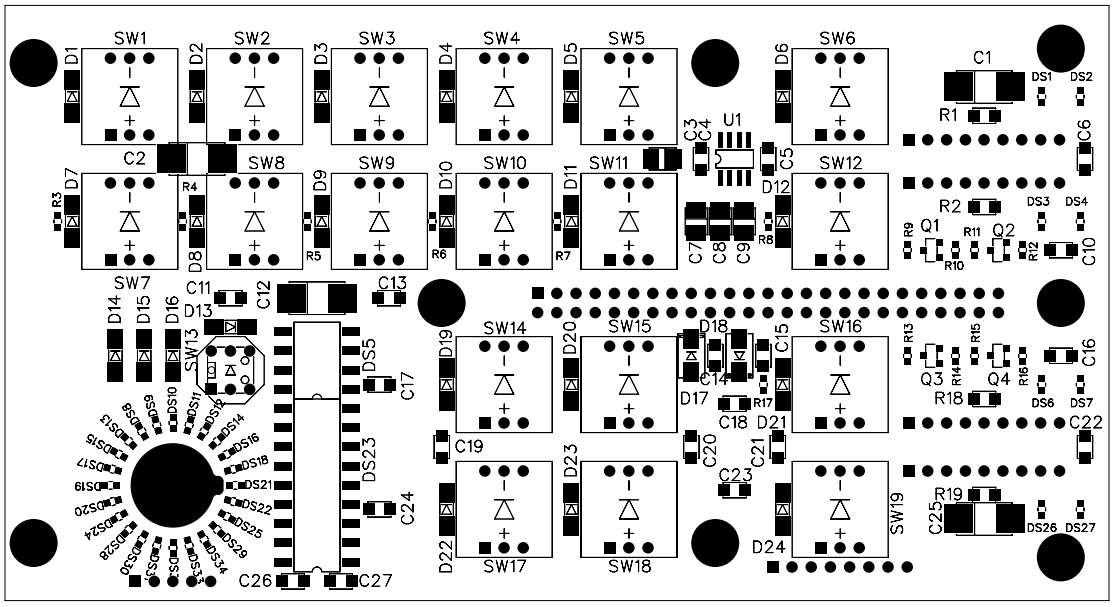
CONTRACT NO. - Sergey Averin -		DCM-5.1	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	3-8-02		
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0107 / REV —	
W# 700714		SCALE / DCM-5.1 PCB / SHEET 2 OF 3	

DCM-5.1 Dynamics Fader Panel Switch Card Schematic - Sheet 2 of 3

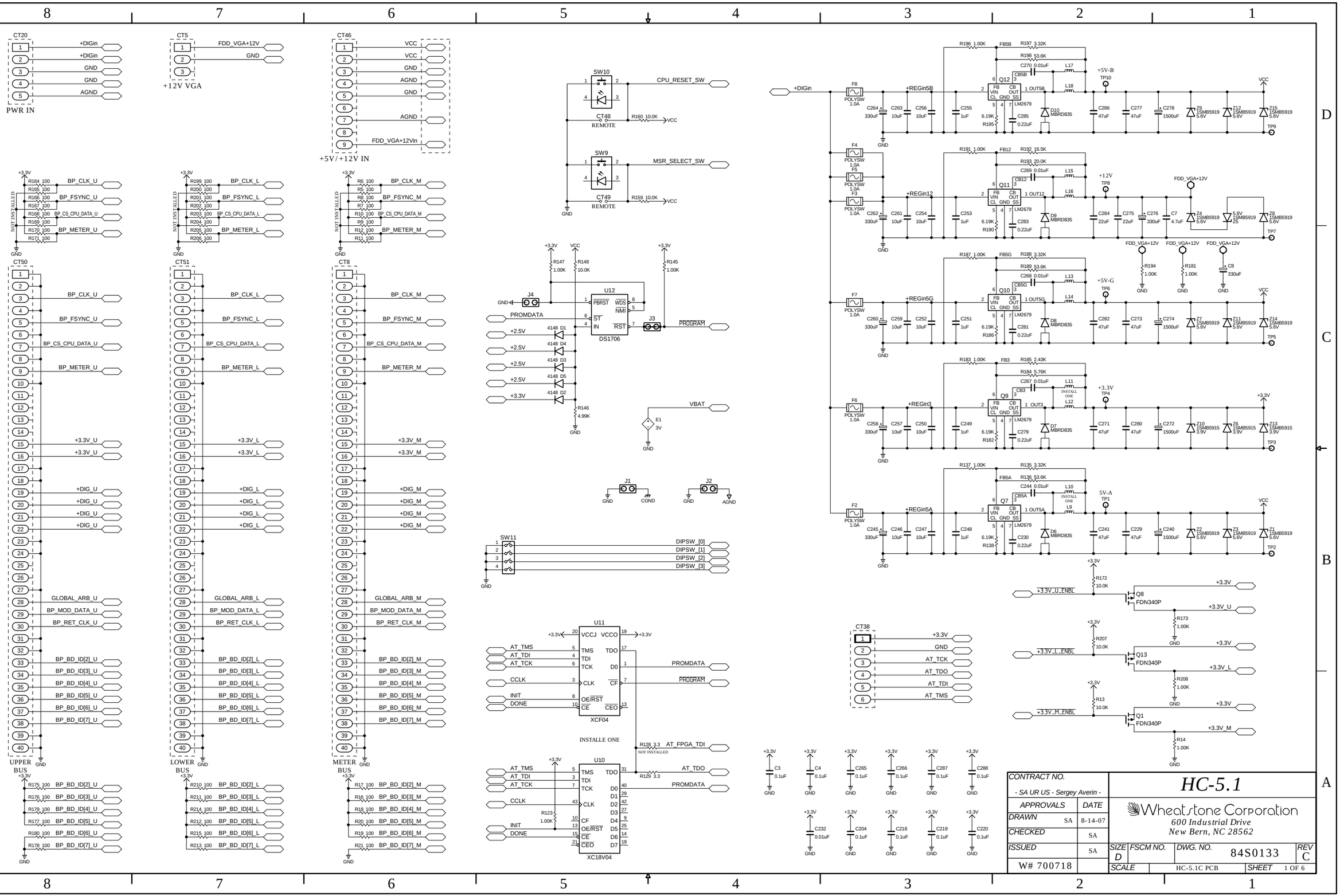


CONTRACT NO. - Sergey Averin -		DCM-5.1	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	3-8-02		
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0108 / REV —	
W# 700714		SCALE / DCM-5.1 PCB / SHEET 3 OF 3	

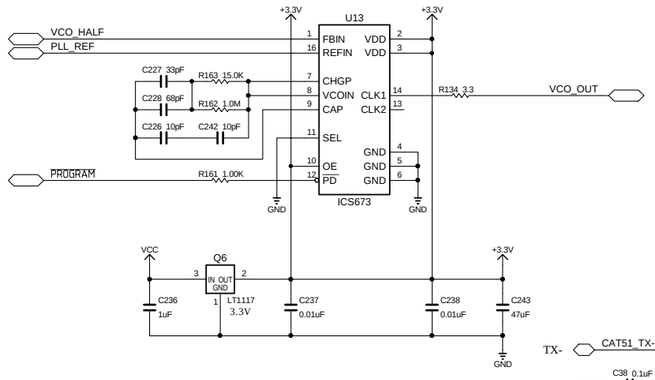
DCM-5.1 Dynamics Fader Panel Switch Card Schematic - Sheet 3 of 3

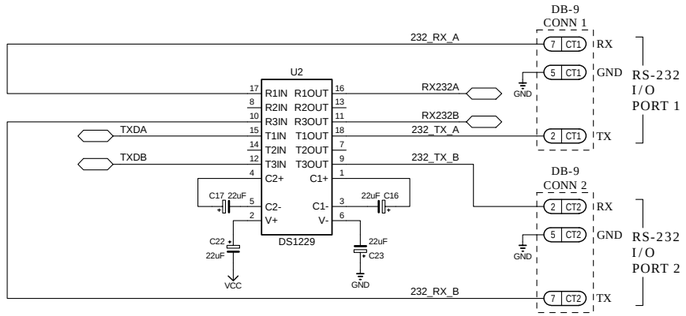


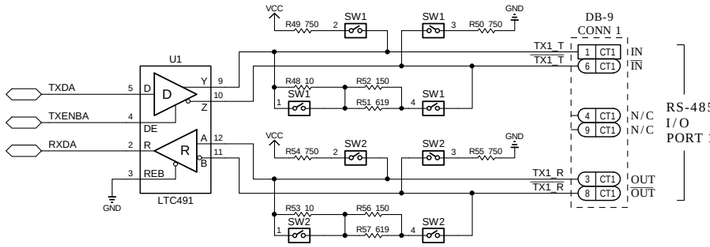
DCM-5.1 Dynamics Fader Panel Switch Card Load Sheet

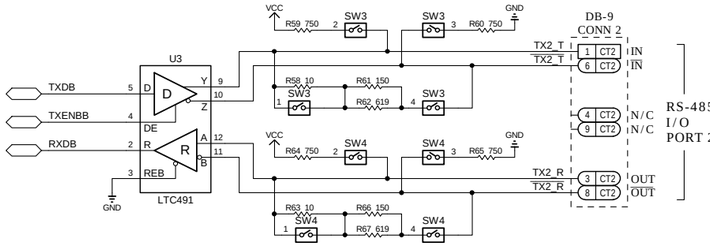


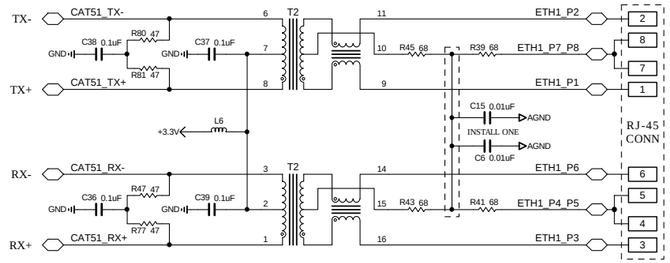
HC-5.1 Host Controller Module Schematic - Sheet 1 of 6

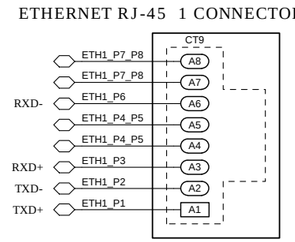


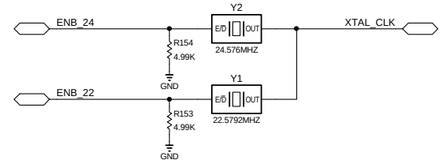


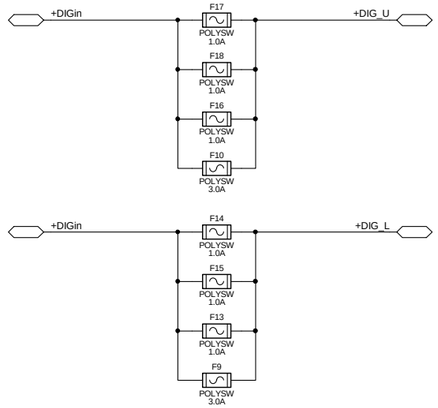


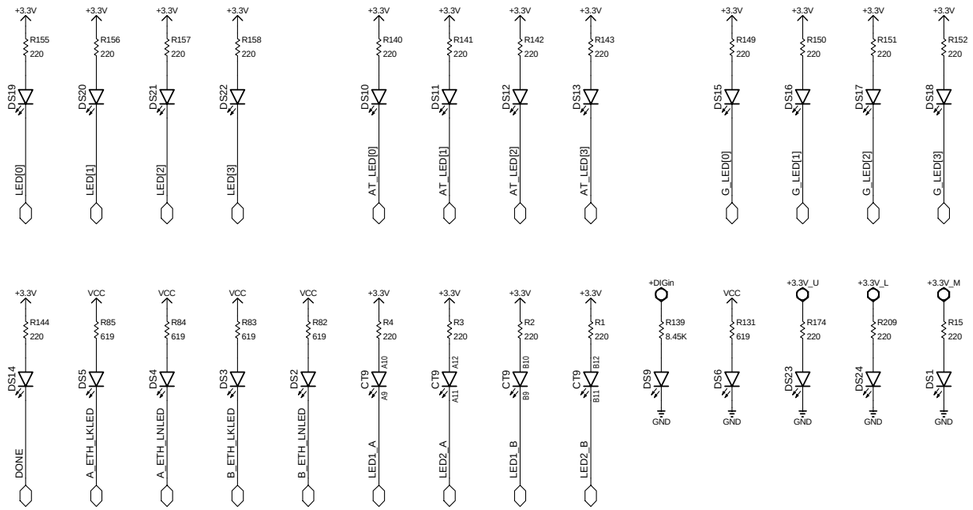


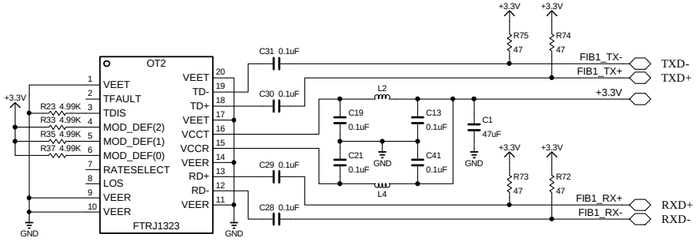


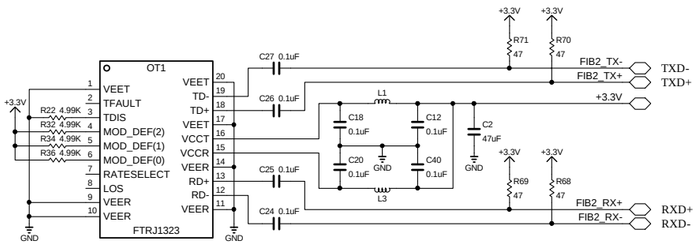




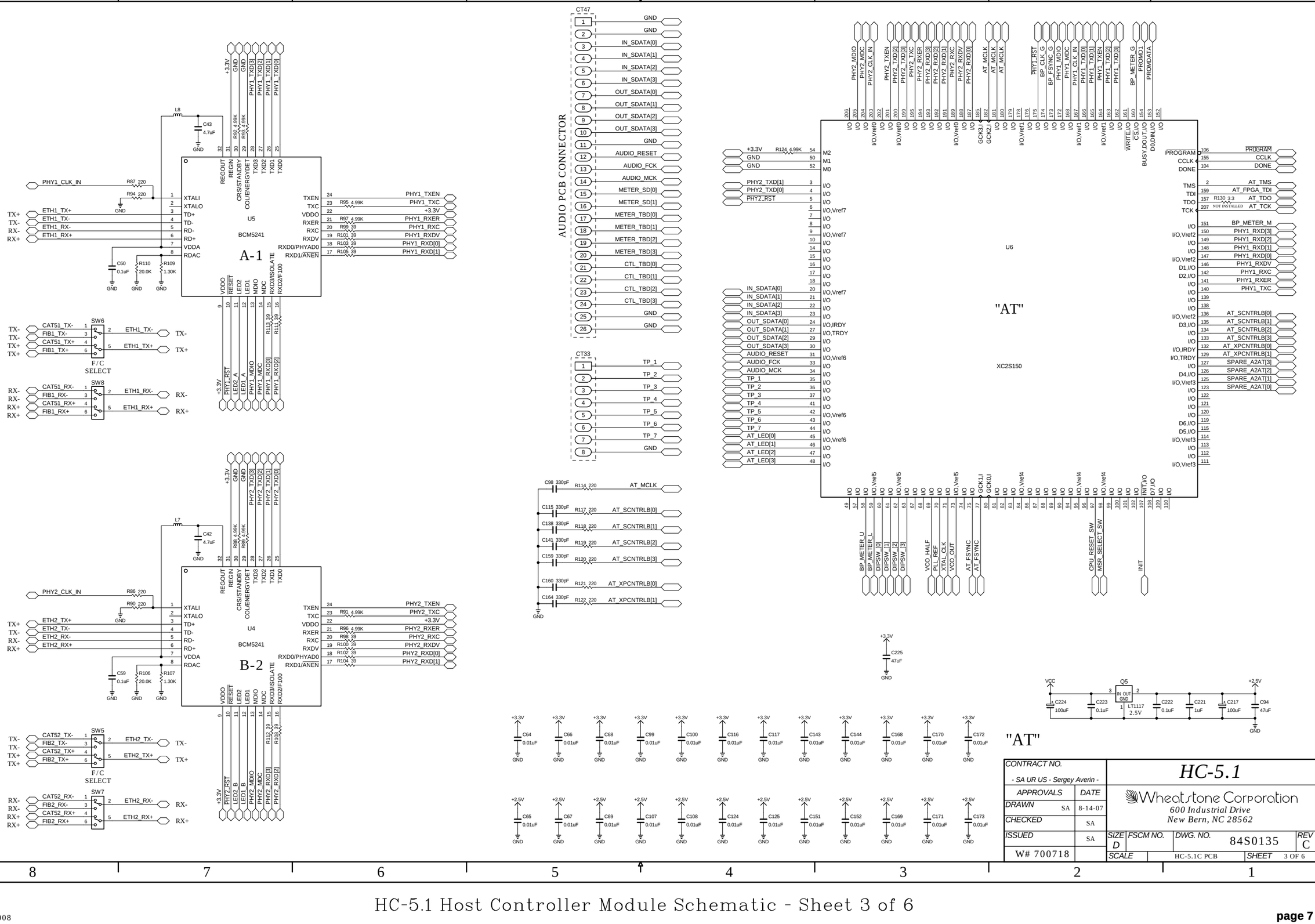




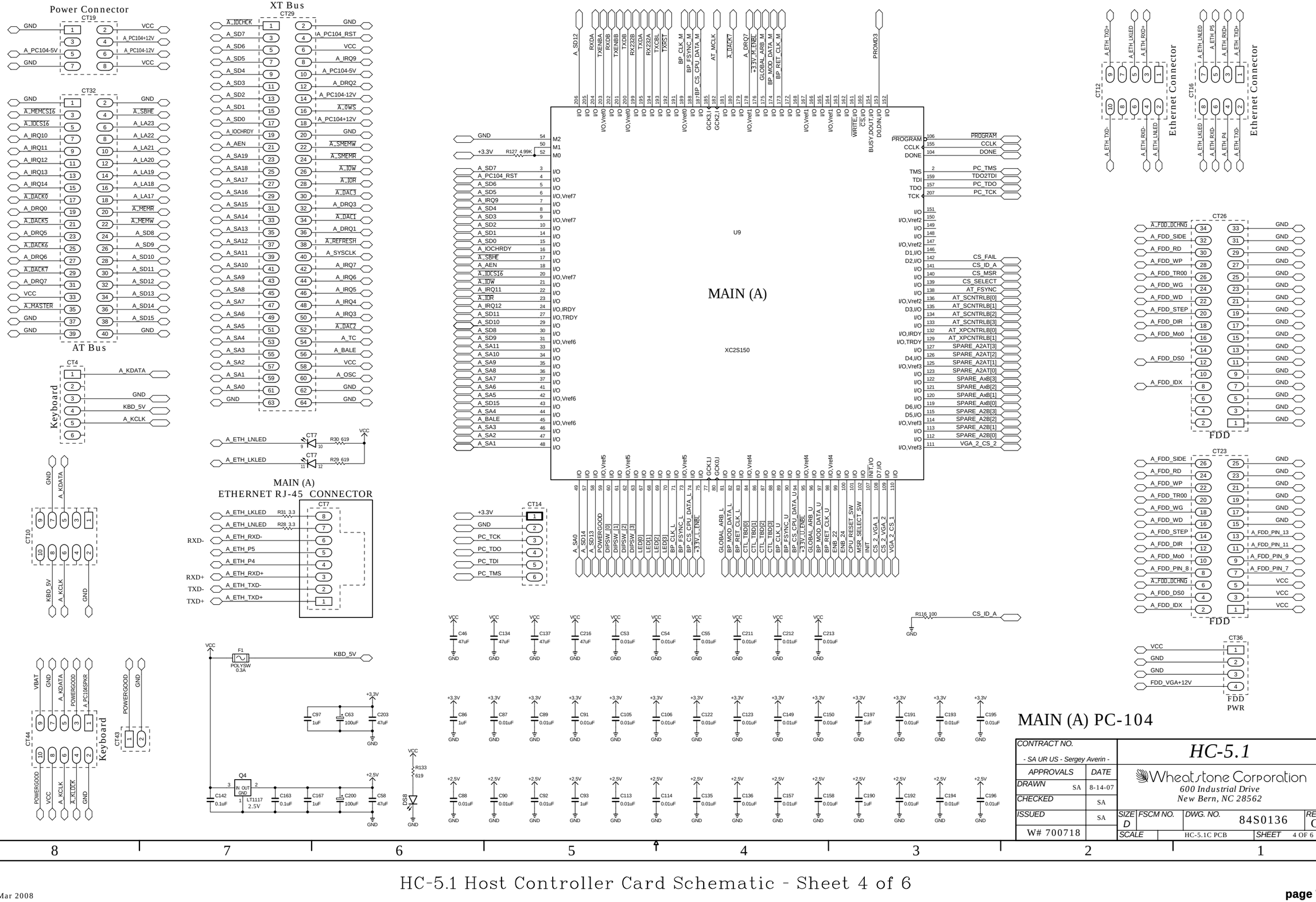




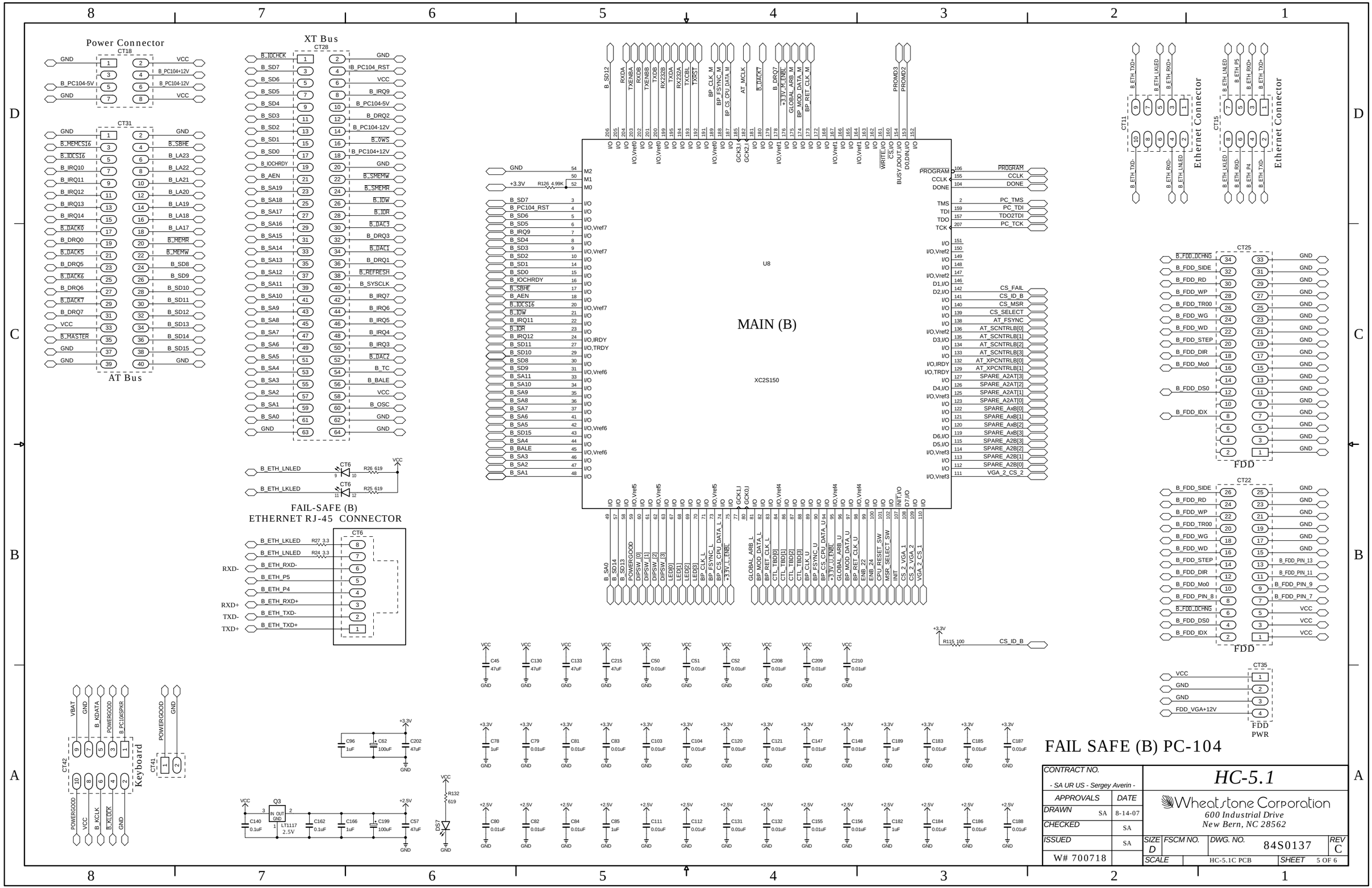
CONTRACT NO. - SA UR US - Sergey Averin -		HC-5.1	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	8-14-07		
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0134 / REV C	
W# 700718		SCALE HC-5.1C PCB / SHEET 2 OF 6	



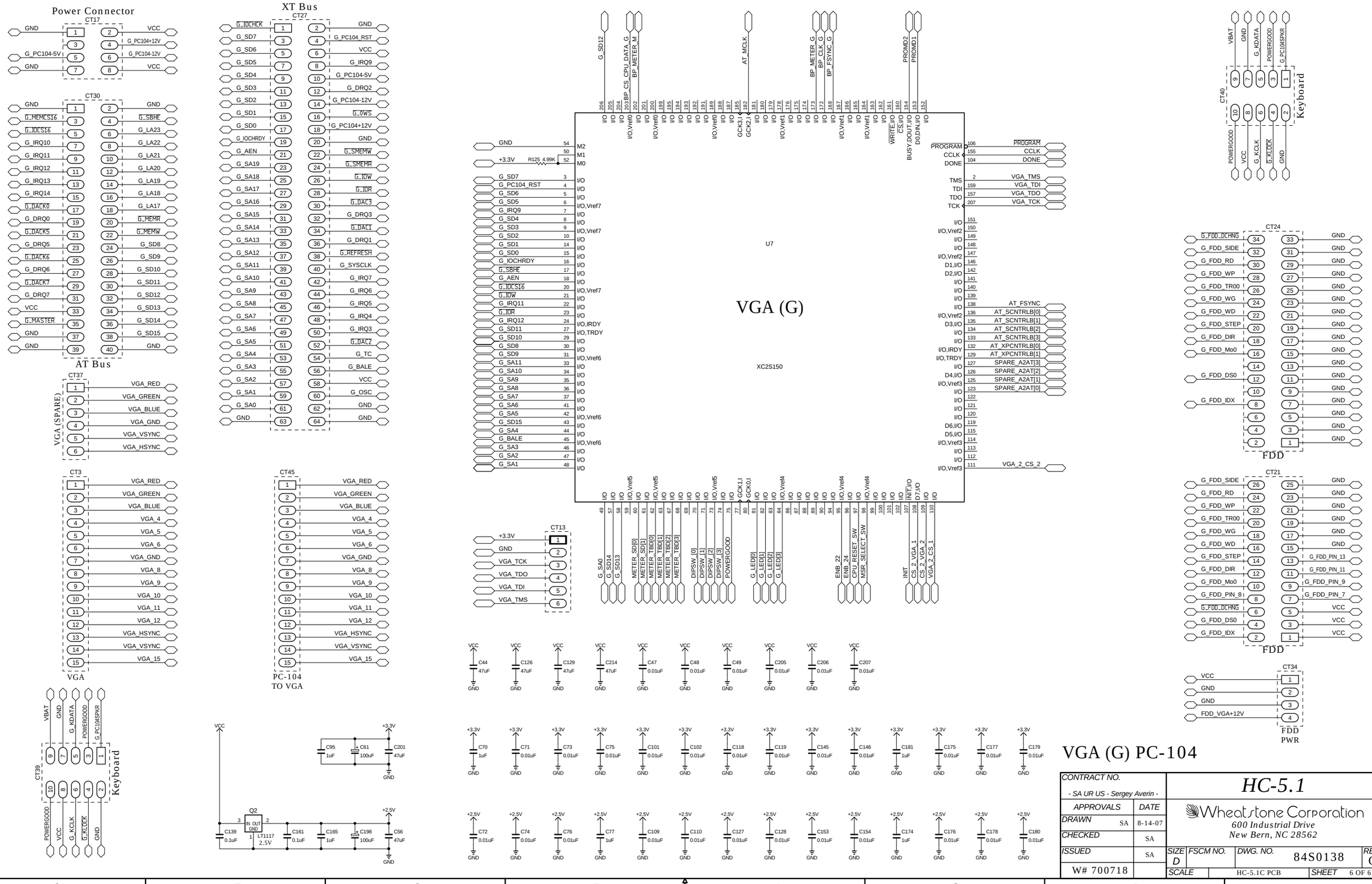
HC-5.1 Host Controller Module Schematic - Sheet 3 of 6



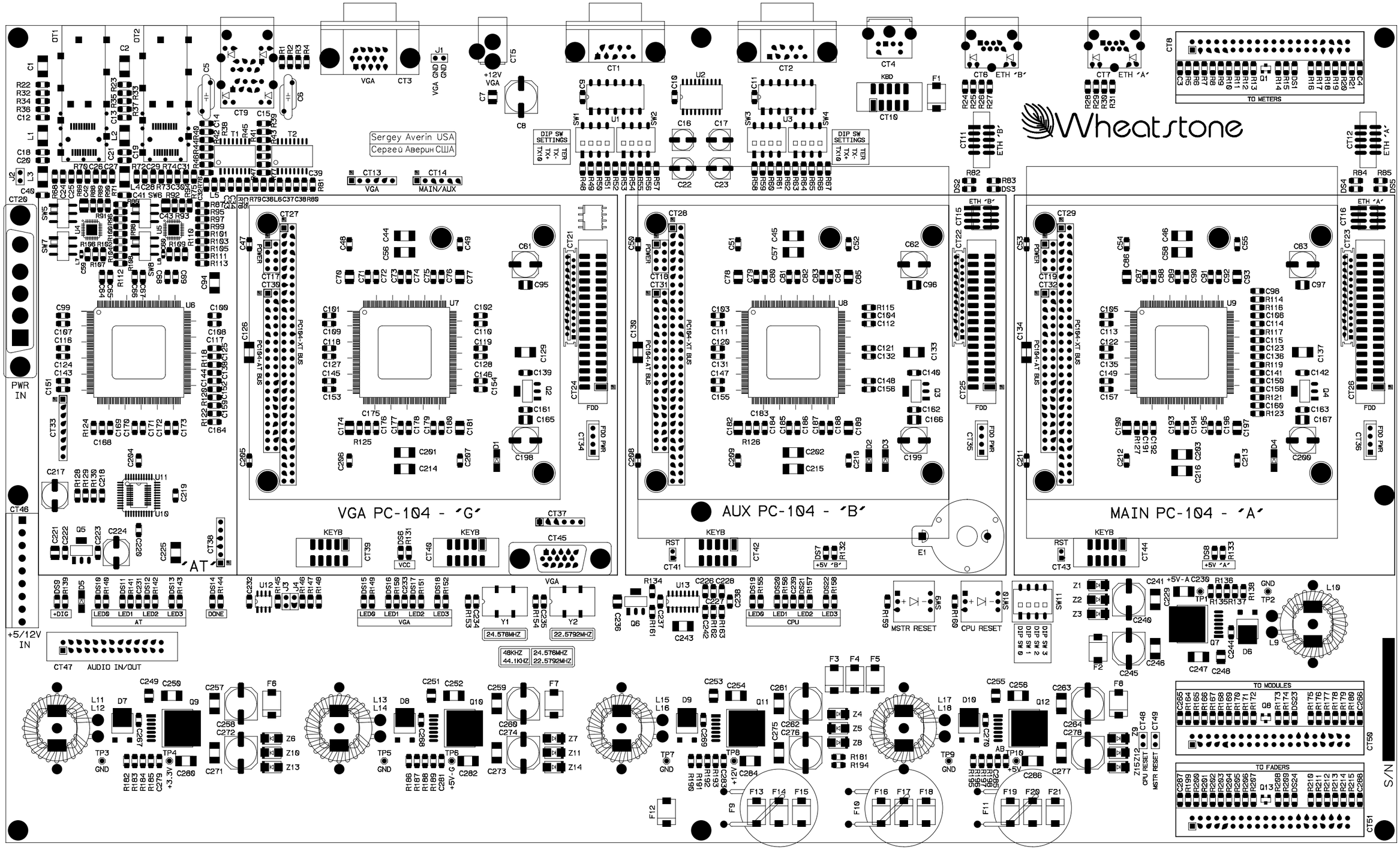
HC-5.1 Host Controller Card Schematic - Sheet 4 of 6



HC-5.1 Host Controller Card Schematic - Sheet 5 of 6



HC-5.1 Host Controller Card Schematic - Sheet 6 of 6


Sergey Averin USA
Сергей Аверин США
Wheatstone
VGA PC-104 - 'G'
AUX PC-104 - 'B'
MAIN PC-104 - 'A'
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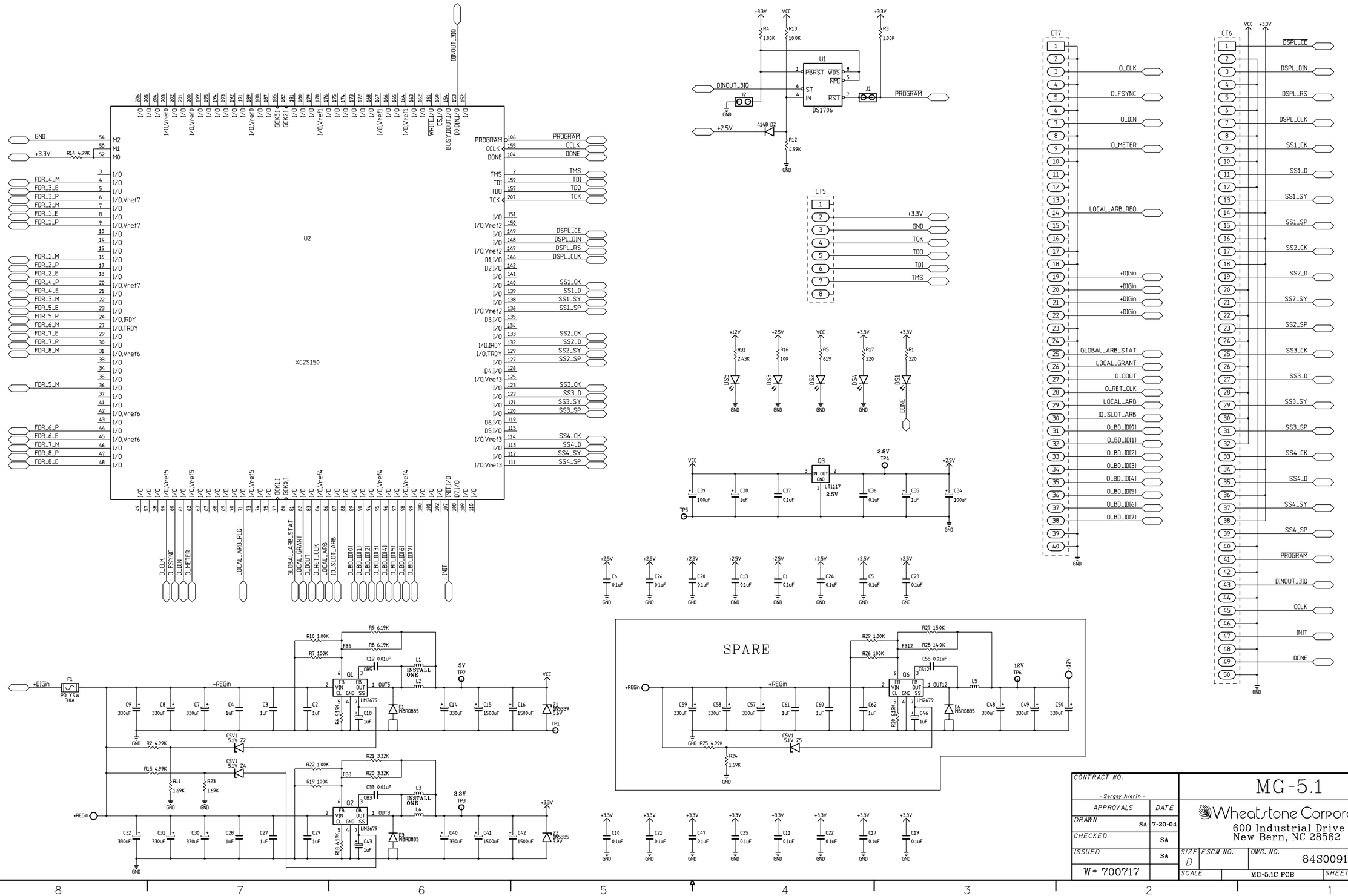
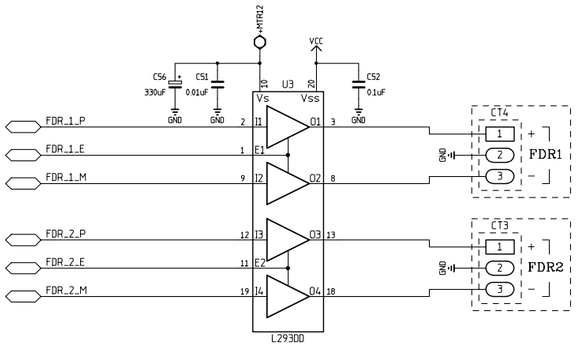
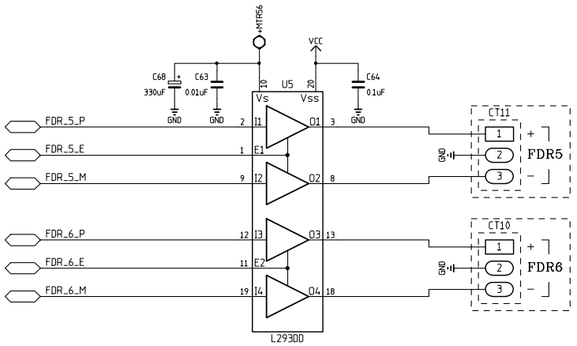
+5/12V IN
AUDIO IN/OUT
MSTR RESET
CPU RESET
TO METERS
TO MODULES
TO FADERS
S/N

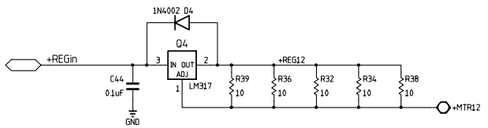


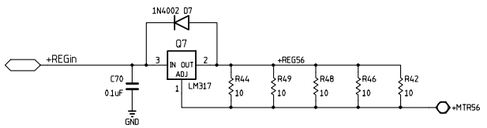
CONTRACT NO.		MG-5.1
- Sergey Averin -		
APPROVALS	DATE	Wheatstone Corporation
DRAWN SA	7-20-04	600 Industrial Drive
CHECKED	SA	New Bern, NC 28562
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0091 / REV C
W# 700717		SCALE / MG-5.1C PCB / SHEET 1 OF 2

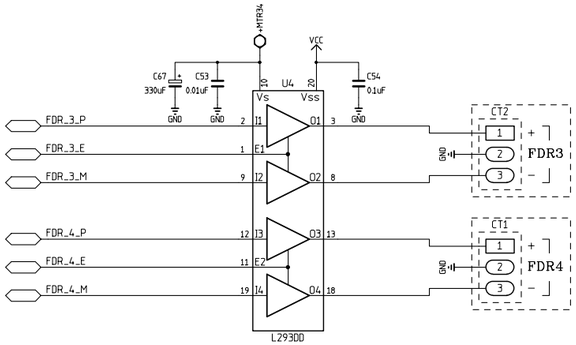
MG-5.1 4 Main Gate (IQ) Card Schematic - Sheet 1 of 2

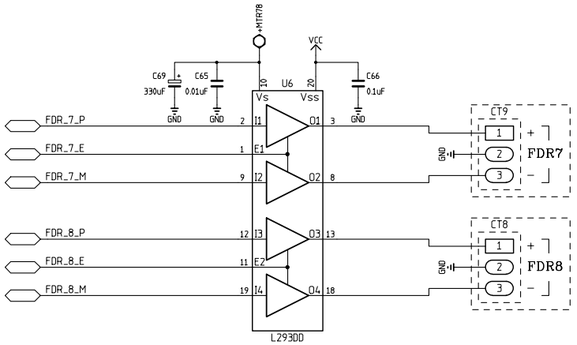


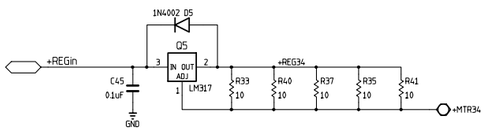


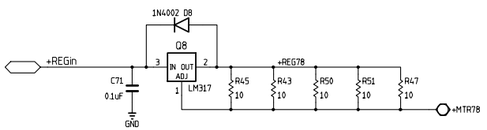






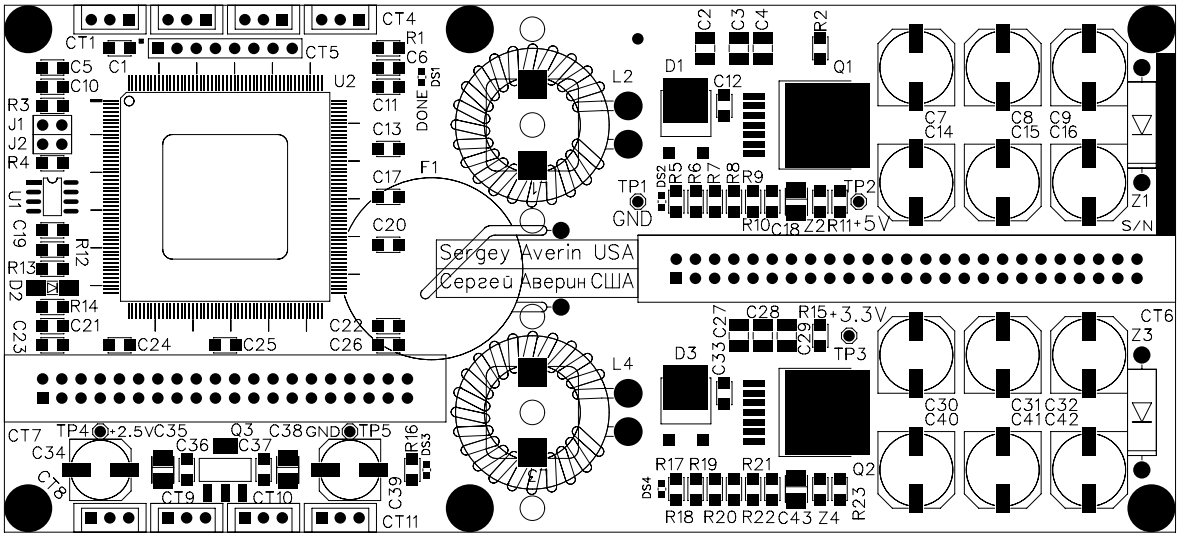




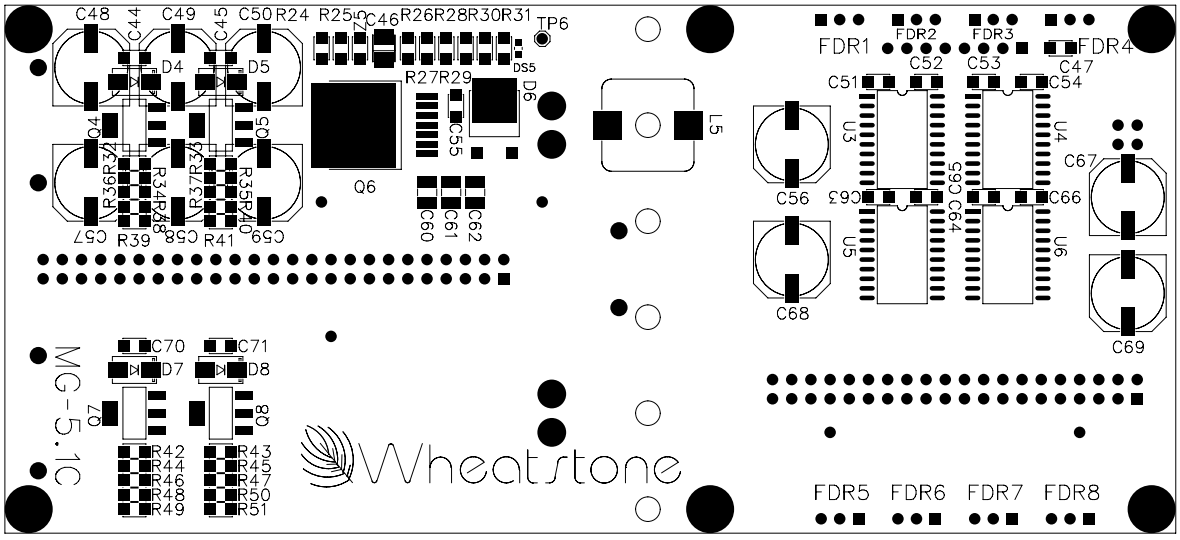


CONTRACT NO. - Sergey Averin -		MG-5.1	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	7-20-04		
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S00xx / REV C	
W# 700717		SCALE MG-5.1C PCB / SHEET 2 OF 2	

MG-5.1 4 Main Gate (IQ) Card Schematic - Sheet 2 of 2

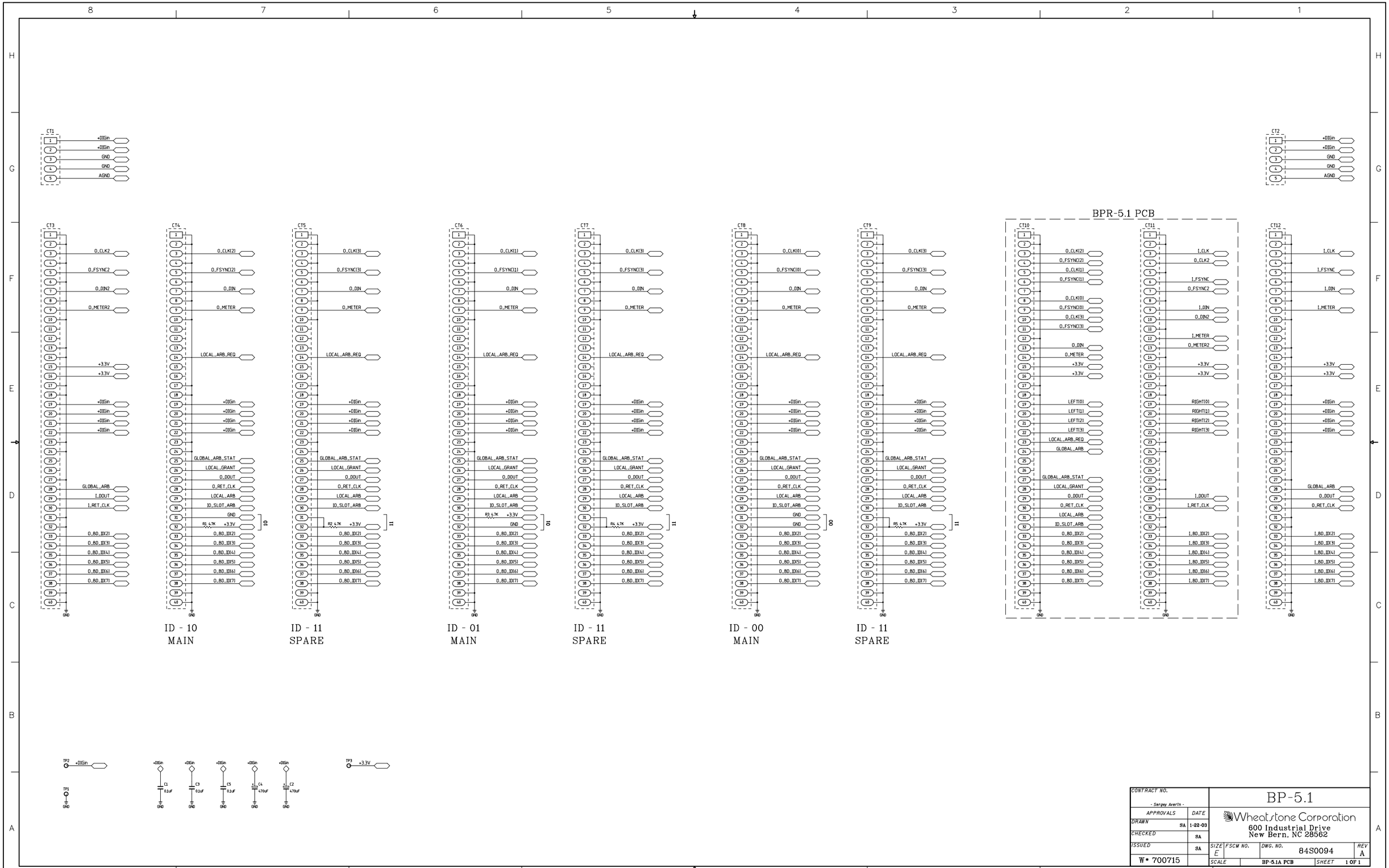


Top

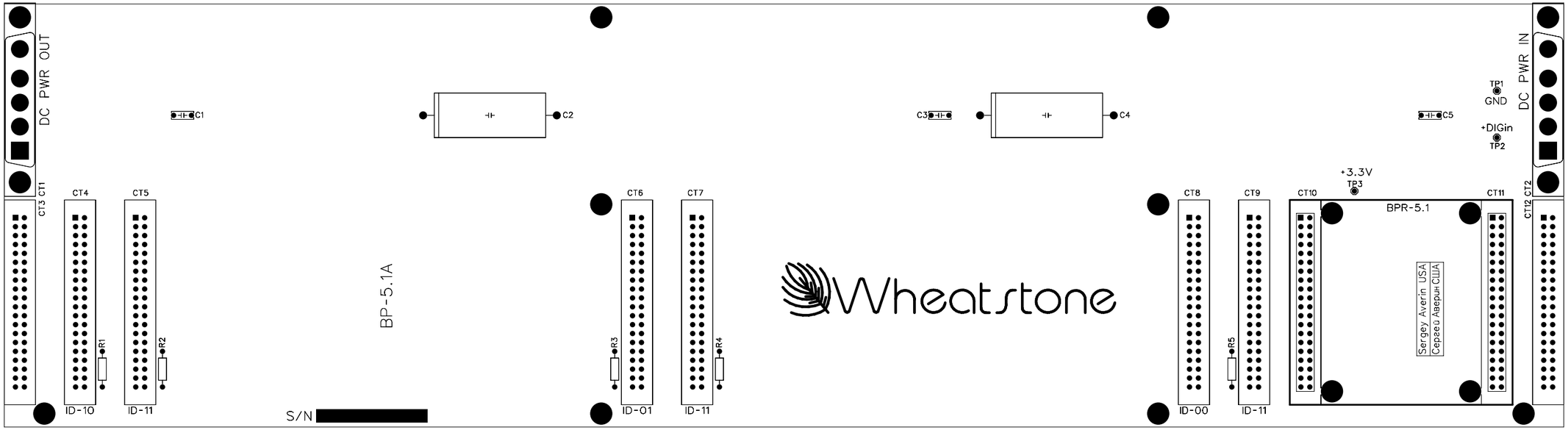


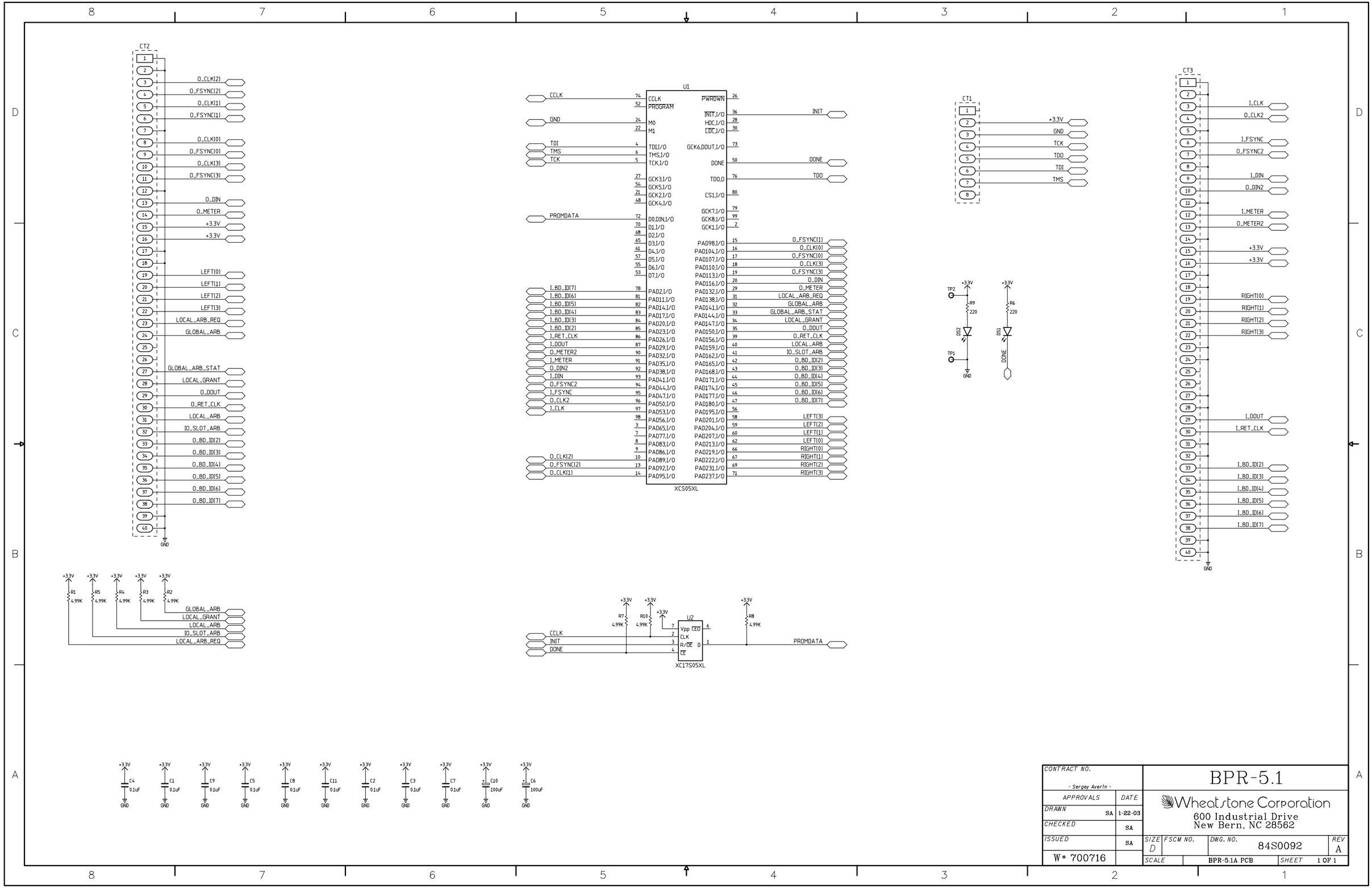
Bottom

MG-5.1 Main Gate Card Load Sheet



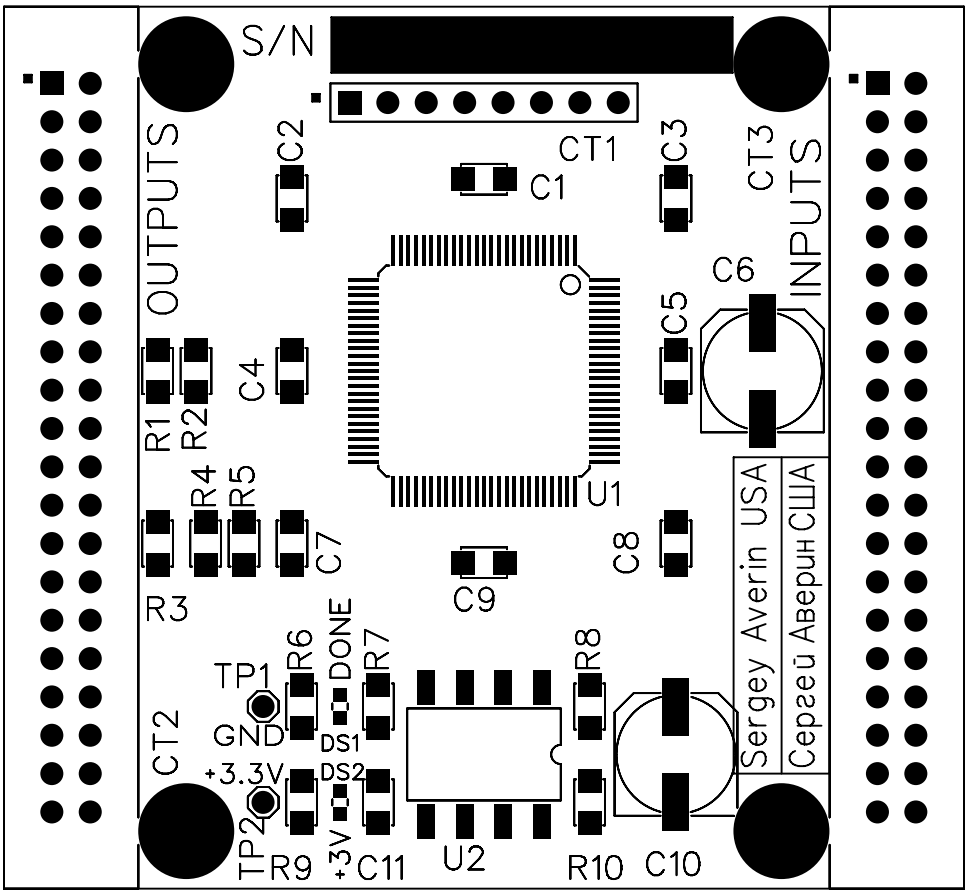
BP-5.1 Back Plane Card Schematic - Sheet 1 of 1


DC PWR OUT
DC PWR IN
CT1
CT2
CT3
CT4
CT5
CT6
CT7
CT8
CT9
CT10
CT11
CT12
C1
C2
C3
C4
C5
R1
R2
R3
R4
R5
TP1
GND
+DIGin
TP2
+3.3V
TP3
BPR-5.1
BP-5.1A
S/N
ID-10
ID-11
ID-01
ID-11
ID-00
ID-11
Wheatstone
Sergey Averin USA
Сергей Аверин США

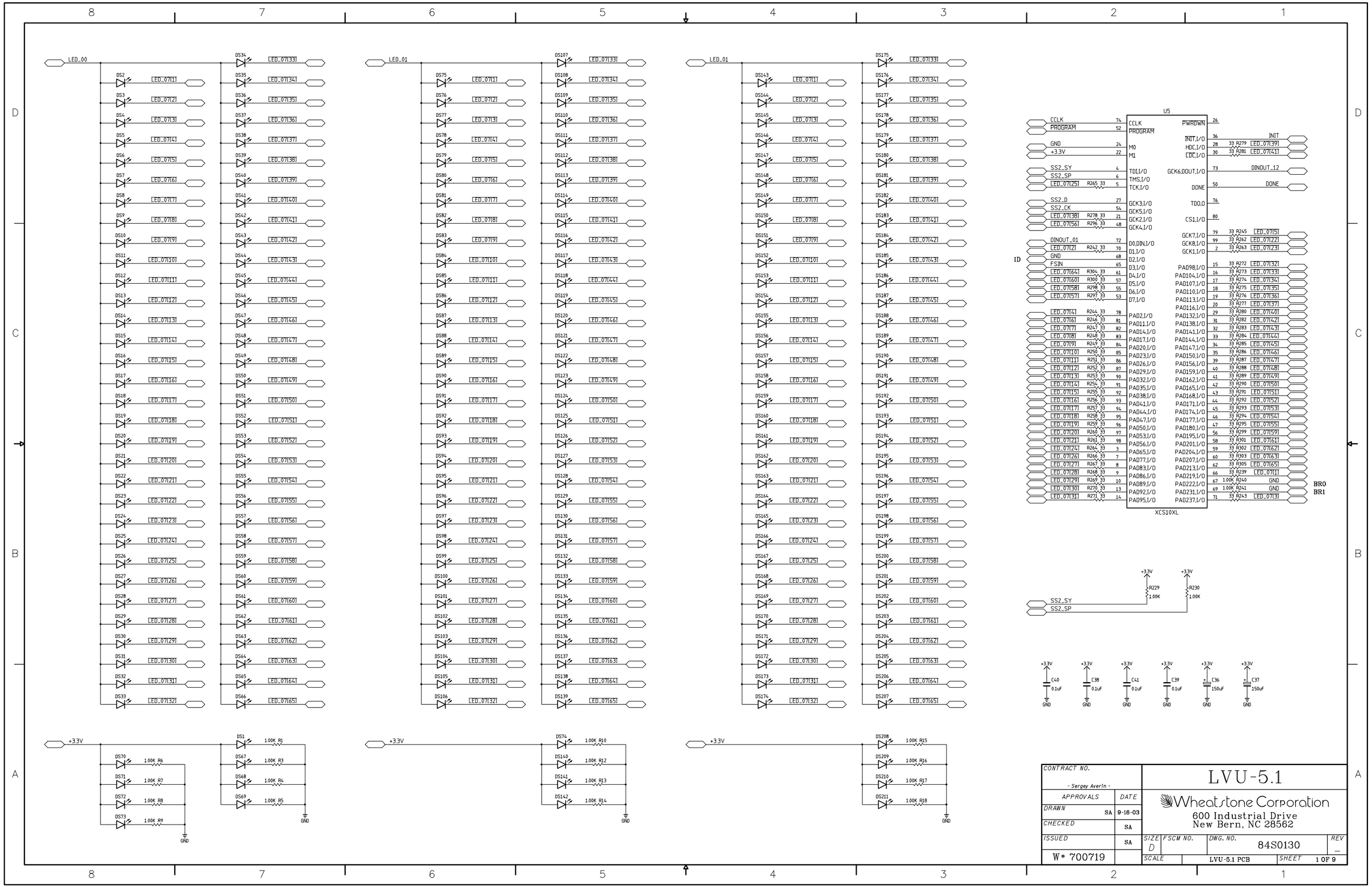


CONTRACT NO.		BPR-5.1	
- Sergey Averin -			
APPROVALS	DATE	Wheatstone Corporation	
DRAWN SA	1-22-03	600 Industrial Drive New Bern, NC 28562	
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0092 / REV A	
W# 700716		SCALE / BPR-5.1A PCB / SHEET 1 OF 1	

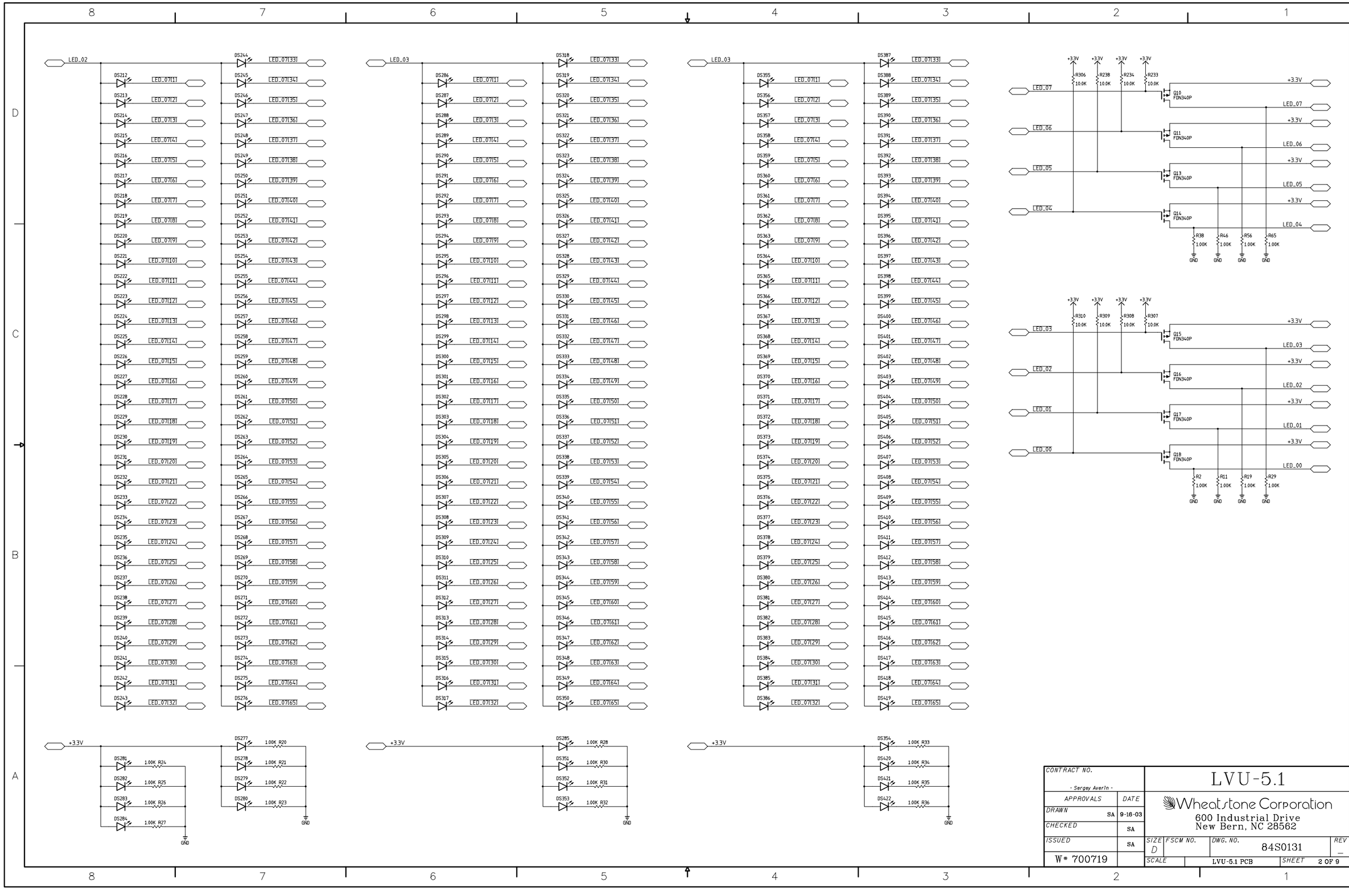
BPR-5.1 Back Plane Repeater Card Schematic - Sheet 1 of 1

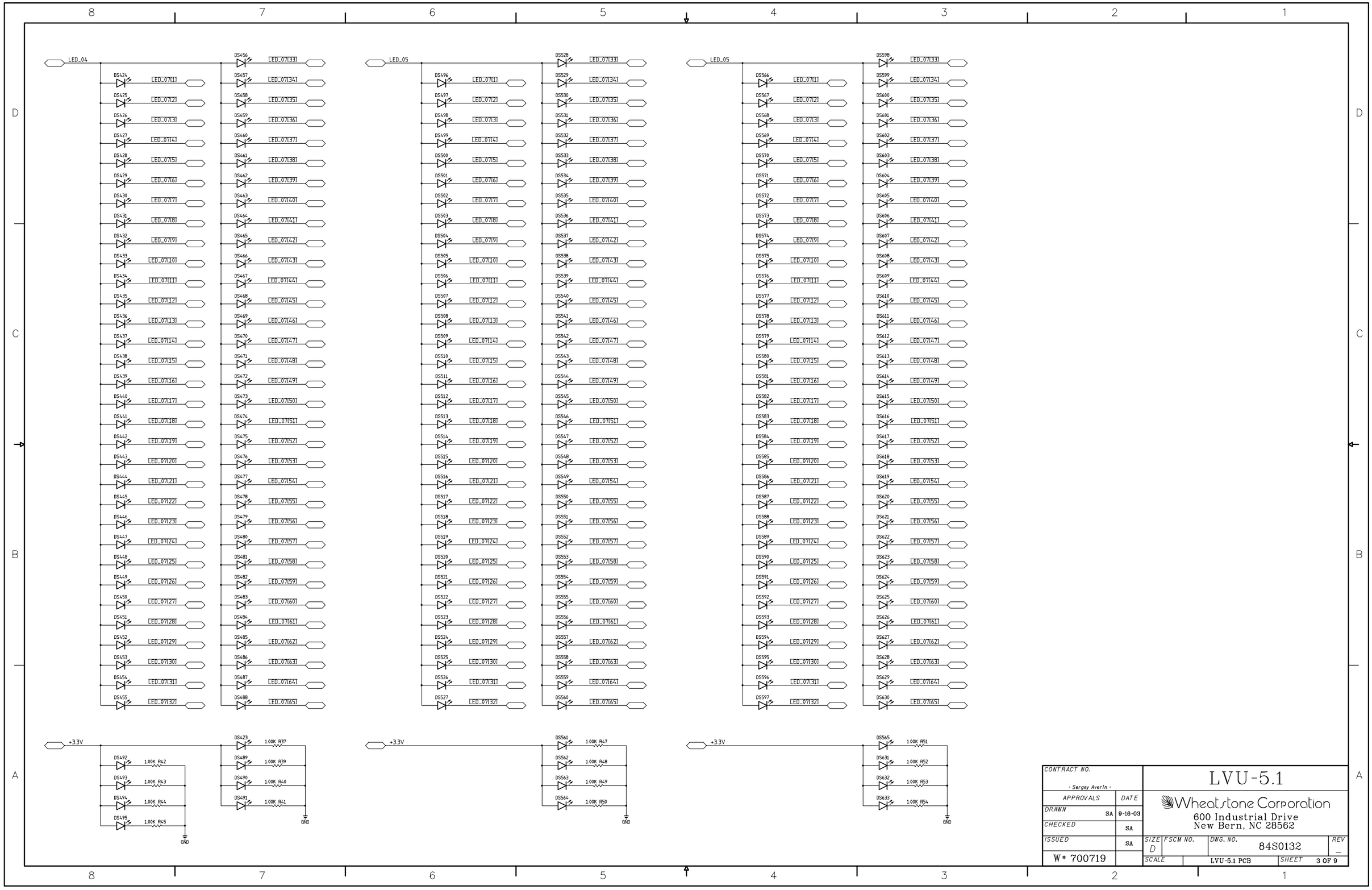


BPR-5.1 Back Plane Repeater Card Load Sheet

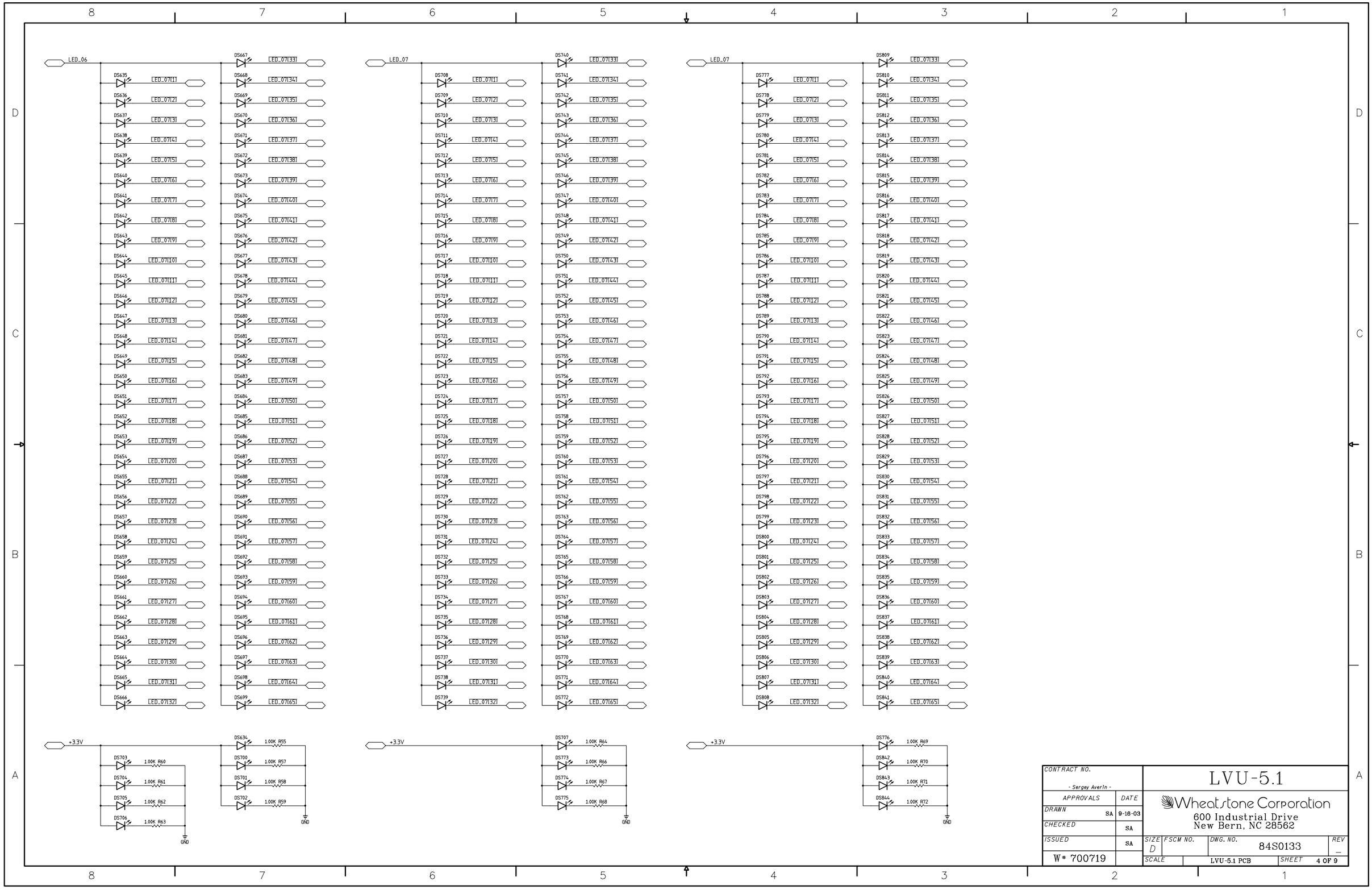


LVU-5.1 LED VU Card Schematic - Sheet 1 of 9

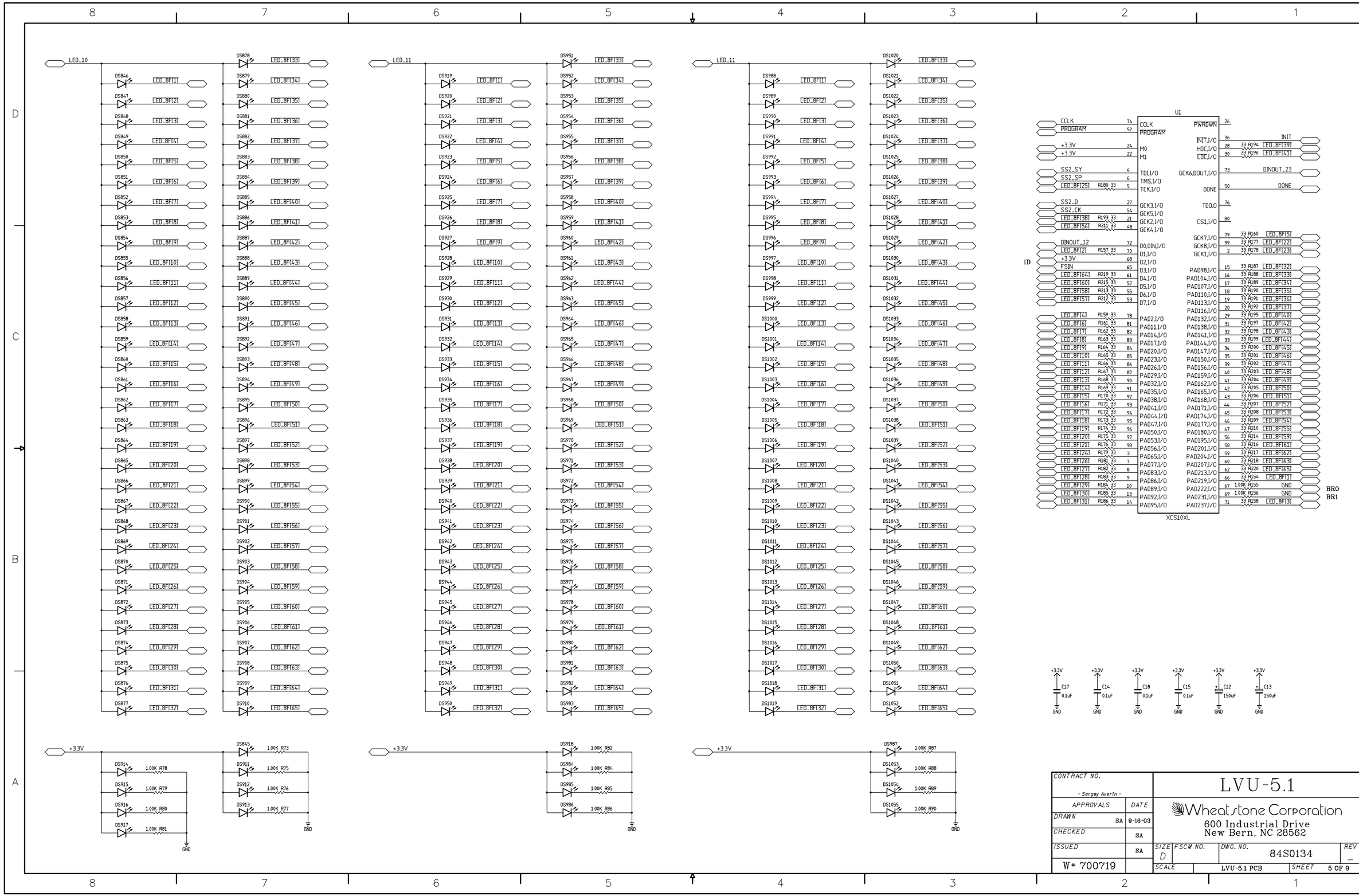

LED_02
LED_03
LED_03
DS212 DS213 DS214 DS215 DS216 DS217 DS218 DS219 DS220 DS221 DS222 DS223 DS224 DS225 DS226 DS227 DS228 DS229 DS230 DS231 DS232 DS233 DS234 DS235 DS236 DS237 DS238 DS239 DS240 DS241 DS242 DS243
DS244 DS245 DS246 DS247 DS248 DS249 DS250 DS251 DS252 DS253 DS254 DS255 DS256 DS257 DS258 DS259 DS260 DS261 DS262 DS263 DS264 DS265 DS266 DS267 DS268 DS269 DS270 DS271 DS272 DS273 DS274 DS275 DS276
DS286 DS287 DS288 DS289 DS290 DS291 DS292 DS293 DS294 DS295 DS296 DS297 DS298 DS299 DS300 DS301 DS302 DS303 DS304 DS305 DS306 DS307 DS308 DS309 DS310 DS311 DS312 DS313 DS314 DS315 DS316 DS317
DS318 DS319 DS320 DS321 DS322 DS323 DS324 DS325 DS326 DS327 DS328 DS329 DS330 DS331 DS332 DS333 DS334 DS335 DS336 DS337 DS338 DS339 DS340 DS341 DS342 DS343 DS344 DS345 DS346 DS347 DS348 DS349 DS350
DS355 DS356 DS357 DS358 DS359 DS360 DS361 DS362 DS363 DS364 DS365 DS366 DS367 DS368 DS369 DS370 DS371 DS372 DS373 DS374 DS375 DS376 DS377 DS378 DS379 DS380 DS381 DS382 DS383 DS384 DS385 DS386
DS387 DS388 DS389 DS390 DS391 DS392 DS393 DS394 DS395 DS396 DS397 DS398 DS399 DS400 DS401 DS402 DS403 DS404 DS405 DS406 DS407 DS408 DS409 DS410 DS411 DS412 DS413 DS414 DS415 DS416 DS417 DS418 DS419
LED_07[1] LED_07[2] LED_07[3] LED_07[4] LED_07[5] LED_07[6] LED_07[7] LED_07[8] LED_07[9] LED_07[10] LED_07[11] LED_07[12] LED_07[13] LED_07[14] LED_07[15] LED_07[16] LED_07[17] LED_07[18] LED_07[19] LED_07[20] LED_07[21] LED_07[22] LED_07[23] LED_07[24] LED_07[25] LED_07[26] LED_07[27] LED_07[28] LED_07[29] LED_07[30] LED_07[31] LED_07[32]
LED_07[33] LED_07[34] LED_07[35] LED_07[36] LED_07[37] LED_07[38] LED_07[39] LED_07[40] LED_07[41] LED_07[42] LED_07[43] LED_07[44] LED_07[45] LED_07[46] LED_07[47] LED_07[48] LED_07[49] LED_07[50] LED_07[51] LED_07[52] LED_07[53] LED_07[54] LED_07[55] LED_07[56] LED_07[57] LED_07[58] LED_07[59] LED_07[60] LED_07[61] LED_07[62] LED_07[63] LED_07[64] LED_07[65]
+3.3V
DS277 DS278 DS279 DS280 DS281 DS282 DS283 DS284 DS285 DS351 DS352 DS353 DS354 DS420 DS421 DS422
1.00K R20 1.00K R21 1.00K R22 1.00K R23 1.00K R24 1.00K R25 1.00K R26 1.00K R27 1.00K R28 1.00K R30 1.00K R31 1.00K R32 1.00K R33 1.00K R34 1.00K R35 1.00K R36
GND
LED_07 LED_06 LED_05 LED_04
R306 R238 R234 R233 10.0K
Q10 FDN340P Q11 FDN340P Q13 FDN340P Q14 FDN340P
R38 R46 R56 R65 1.00K
LED_03 LED_02 LED_01 LED_00
R310 R309 R308 R307 10.0K
Q15 FDN340P Q16 FDN340P Q17 FDN340P Q18 FDN340P
R2 R11 R19 R29 1.00K
CONTRACT NO.
- Sergey Averin -
APPROVALS DATE
DRAWN SA 9-16-03
CHECKED SA
ISSUED SA
W# 700719
LVU-5.1
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE D
FSCM NO.
DWG. NO. 84S0131
REV –
SCALE
LVU-5.1 PCB
SHEET 2 OF 9

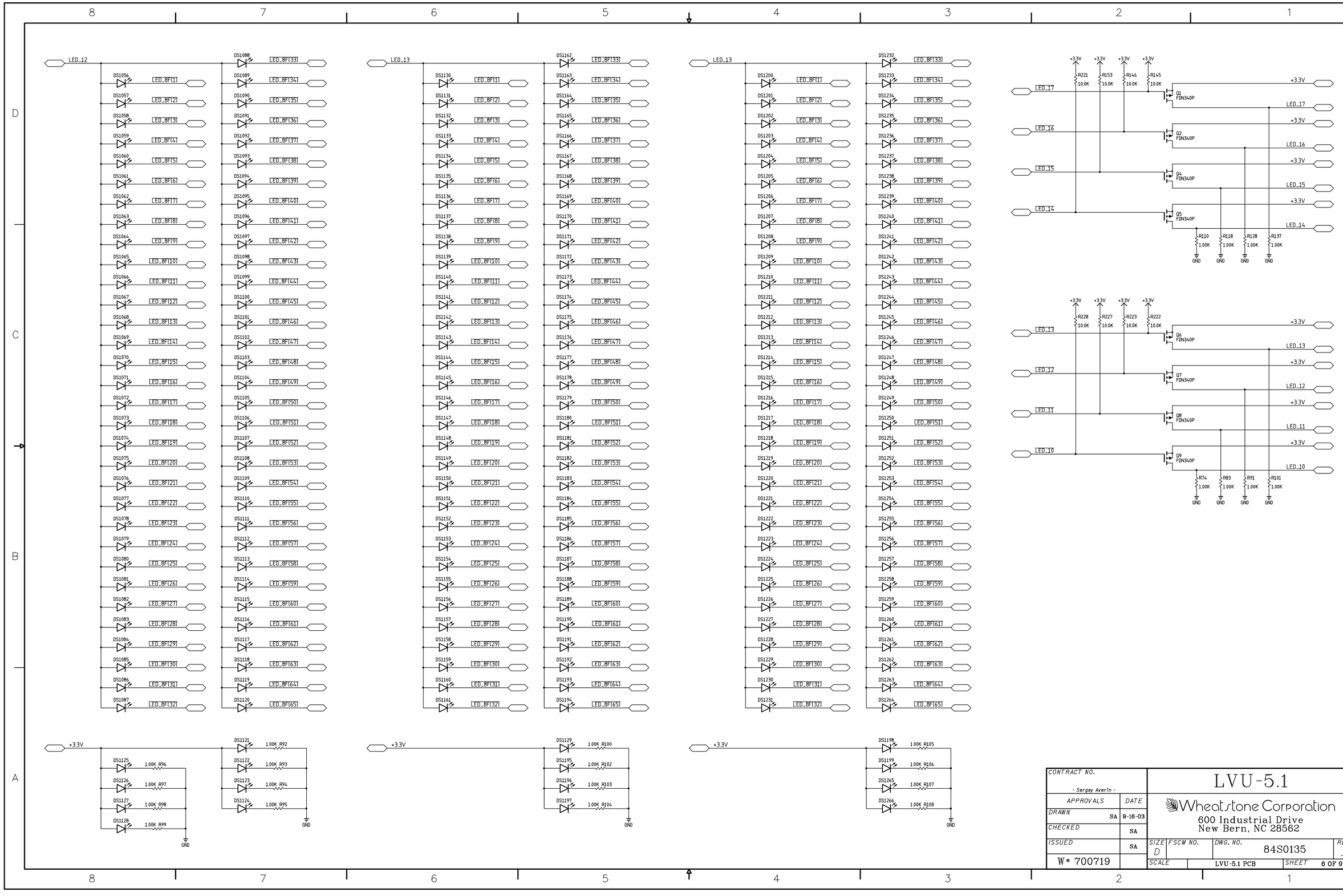


LVU-5.1 LED VU Card Schematic - Sheet 3 of 9

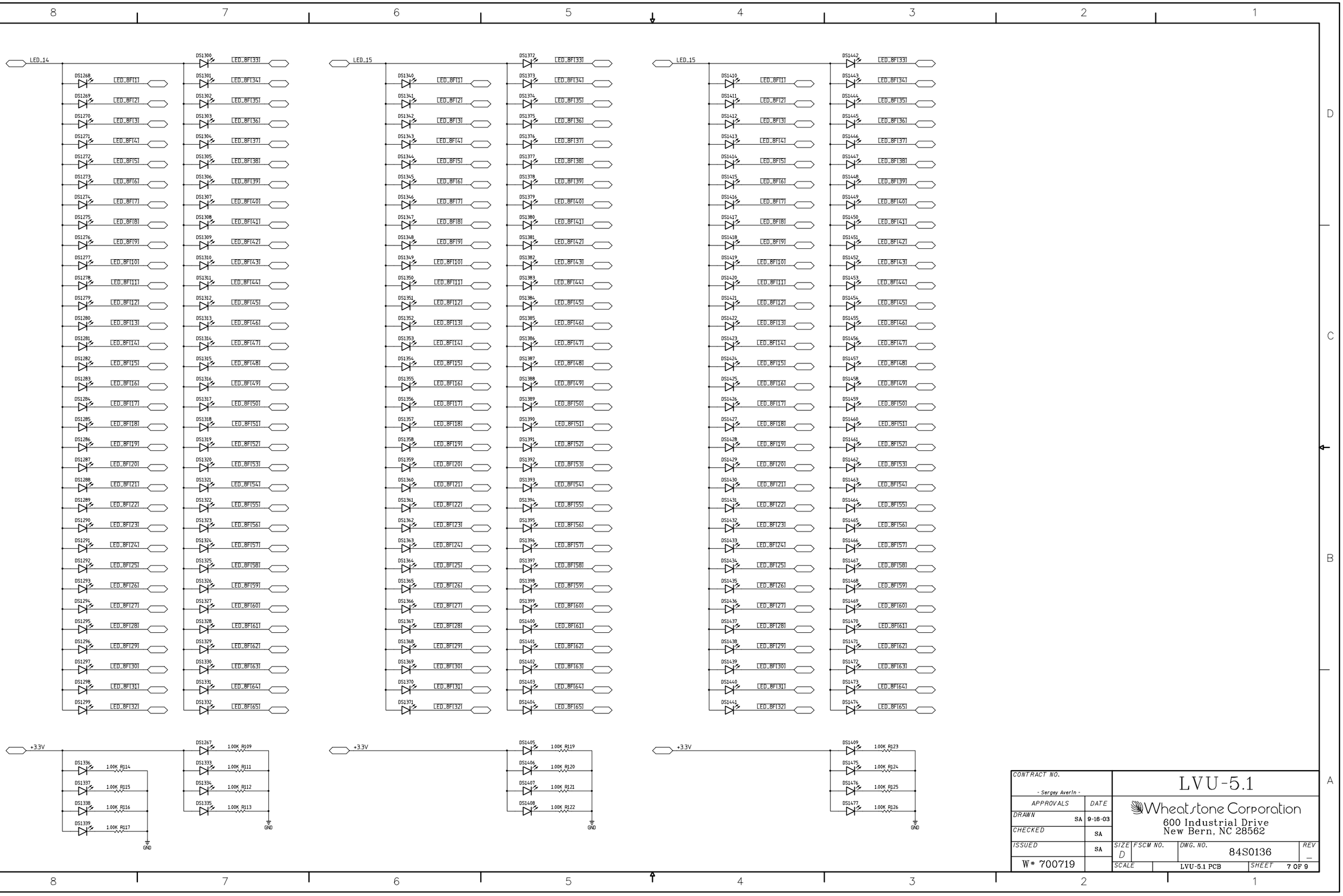


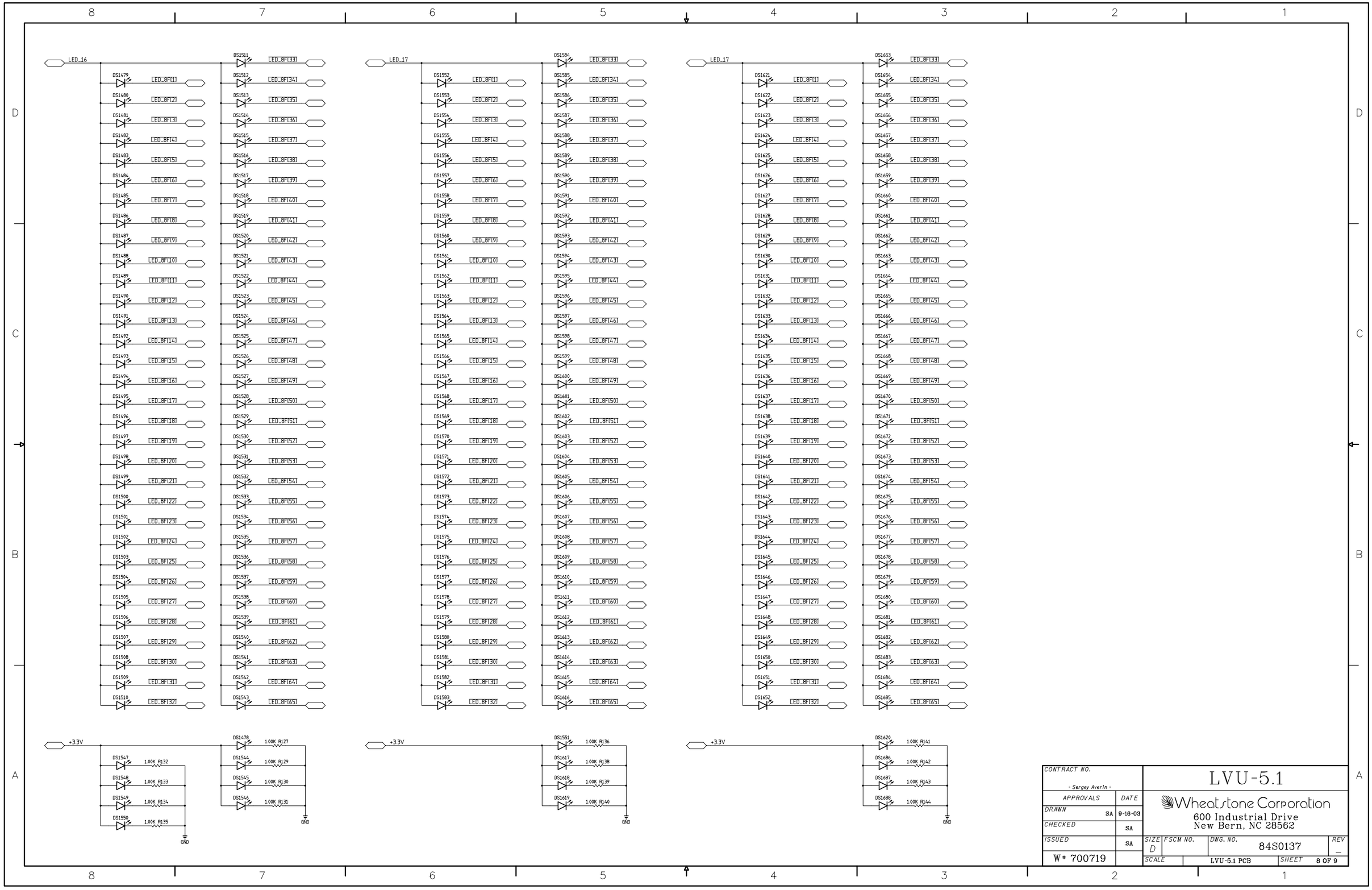
LVU-5.1 LED VU Card Schematic - Sheet 4 of 9


LED_10
LED_11
LED_11
DS846 DS847 DS848 DS849 DS850 DS851 DS852 DS853 DS854 DS855 DS856 DS857 DS858 DS859 DS860 DS861 DS862 DS863 DS864 DS865 DS866 DS867 DS868 DS869 DS870 DS871 DS872 DS873 DS874 DS875 DS876 DS877
DS878 DS879 DS880 DS881 DS882 DS883 DS884 DS885 DS886 DS887 DS888 DS889 DS890 DS891 DS892 DS893 DS894 DS895 DS896 DS897 DS898 DS899 DS900 DS901 DS902 DS903 DS904 DS905 DS906 DS907 DS908 DS909 DS910
DS919 DS920 DS921 DS922 DS923 DS924 DS925 DS926 DS927 DS928 DS929 DS930 DS931 DS932 DS933 DS934 DS935 DS936 DS937 DS938 DS939 DS940 DS941 DS942 DS943 DS944 DS945 DS946 DS947 DS948 DS949 DS950
DS951 DS952 DS953 DS954 DS955 DS956 DS957 DS958 DS959 DS960 DS961 DS962 DS963 DS964 DS965 DS966 DS967 DS968 DS969 DS970 DS971 DS972 DS973 DS974 DS975 DS976 DS977 DS978 DS979 DS980 DS981 DS982 DS983
DS988 DS989 DS990 DS991 DS992 DS993 DS994 DS995 DS996 DS997 DS998 DS999 DS1000 DS1001 DS1002 DS1003 DS1004 DS1005 DS1006 DS1007 DS1008 DS1009 DS1010 DS1011 DS1012 DS1013 DS1014 DS1015 DS1016 DS1017 DS1018 DS1019
DS1020 DS1021 DS1022 DS1023 DS1024 DS1025 DS1026 DS1027 DS1028 DS1029 DS1030 DS1031 DS1032 DS1033 DS1034 DS1035 DS1036 DS1037 DS1038 DS1039 DS1040 DS1041 DS1042 DS1043 DS1044 DS1045 DS1046 DS1047 DS1048 DS1049 DS1050 DS1051 DS1052
LED_8F[1] LED_8F[2] LED_8F[3] LED_8F[4] LED_8F[5] LED_8F[6] LED_8F[7] LED_8F[8] LED_8F[9] LED_8F[10] LED_8F[11] LED_8F[12] LED_8F[13] LED_8F[14] LED_8F[15] LED_8F[16] LED_8F[17] LED_8F[18] LED_8F[19] LED_8F[20] LED_8F[21] LED_8F[22] LED_8F[23] LED_8F[24] LED_8F[25] LED_8F[26] LED_8F[27] LED_8F[28] LED_8F[29] LED_8F[30] LED_8F[31] LED_8F[32]
LED_8F[33] LED_8F[34] LED_8F[35] LED_8F[36] LED_8F[37] LED_8F[38] LED_8F[39] LED_8F[40] LED_8F[41] LED_8F[42] LED_8F[43] LED_8F[44] LED_8F[45] LED_8F[46] LED_8F[47] LED_8F[48] LED_8F[49] LED_8F[50] LED_8F[51] LED_8F[52] LED_8F[53] LED_8F[54] LED_8F[55] LED_8F[56] LED_8F[57] LED_8F[58] LED_8F[59] LED_8F[60] LED_8F[61] LED_8F[62] LED_8F[63] LED_8F[64] LED_8F[65]
+3.3V
DS914 DS915 DS916 DS917 1.00K R78 1.00K R79 1.00K R80 1.00K R81
DS845 DS911 DS912 DS913 1.00K R73 1.00K R75 1.00K R76 1.00K R77
GND
+3.3V
DS918 DS984 DS985 DS986 1.00K R82 1.00K R84 1.00K R85 1.00K R86
GND
+3.3V
DS987 DS1053 DS1054 DS1055 1.00K R87 1.00K R88 1.00K R89 1.00K R90
GND
U1
XCS10XL
CCLK 74
PROGRAM 52
+3.3V 24
+3.3V 22
SS2_SY 4
SS2_SP 6
LED_8F[25] R180 33 5
SS2_D 27
SS2_CK 54
LED_8F[38] R193 33 21
LED_8F[56] R211 33 48
DINOUT_12 72
LED_8F[2] R157 33 70
+3.3V 68
FSIN 65
LED_8F[64] R219 33 61
LED_8F[60] R215 33 57
LED_8F[58] R213 33 55
LED_8F[57] R212 33 53
LED_8F[4] R159 33 78
LED_8F[6] R161 33 81
LED_8F[7] R162 33 82
LED_8F[8] R163 33 83
LED_8F[9] R164 33 84
LED_8F[10] R165 33 85
LED_8F[11] R166 33 86
LED_8F[12] R167 33 87
LED_8F[13] R168 33 90
LED_8F[14] R169 33 91
LED_8F[15] R170 33 92
LED_8F[16] R171 33 93
LED_8F[17] R172 33 94
LED_8F[18] R173 33 95
LED_8F[19] R174 33 96
LED_8F[20] R175 33 97
LED_8F[21] R176 33 98
LED_8F[24] R179 33 3
LED_8F[26] R181 33 7
LED_8F[27] R182 33 8
LED_8F[28] R183 33 9
LED_8F[29] R184 33 10
LED_8F[30] R185 33 13
LED_8F[31] R186 33 14
TDI,I/O
TMS,I/O
TCK,I/O
GCK3,I/O
GCK5,I/O
GCK2,I/O
GCK4,I/O
D0,DIN,I/O
D1,I/O
D2,I/O
D3,I/O
D4,I/O
D5,I/O
D6,I/O
D7,I/O
PAD2,I/O
PAD11,I/O
PAD14,I/O
PAD17,I/O
PAD20,I/O
PAD23,I/O
PAD26,I/O
PAD29,I/O
PAD32,I/O
PAD35,I/O
PAD38,I/O
PAD41,I/O
PAD44,I/O
PAD47,I/O
PAD50,I/O
PAD53,I/O
PAD56,I/O
PAD65,I/O
PAD77,I/O
PAD83,I/O
PAD86,I/O
PAD89,I/O
PAD92,I/O
PAD95,I/O
M0
M1
GCK6,DOUT,I/O
DONE
TDO,O
CS1,I/O
PWRDWN 26
INIT,I/O 36
HDC,I/O 28
LDC,I/O 30
DINOUT_23 73
DONE 50
GCK7,I/O 79
GCK8,I/O 99
GCK1,I/O 2
PAD98,I/O 15
PAD104,I/O 16
PAD107,I/O 17
PAD110,I/O 18
PAD113,I/O 19
PAD116,I/O 20
PAD132,I/O 29
PAD138,I/O 31
PAD141,I/O 32
PAD144,I/O 33
PAD147,I/O 34
PAD150,I/O 35
PAD156,I/O 39
PAD159,I/O 40
PAD162,I/O 41
PAD165,I/O 42
PAD168,I/O 43
PAD171,I/O 44
PAD174,I/O 45
PAD177,I/O 46
PAD180,I/O 47
PAD195,I/O 56
PAD201,I/O 58
PAD204,I/O 59
PAD207,I/O 60
PAD213,I/O 62
PAD219,I/O 66
PAD222,I/O 67
PAD231,I/O 69
PAD237,I/O 71
INIT
HDC 33 R194 LED_8F[39]
LDC 33 R196 LED_8F[41]
DONE
GCK7 33 R160 LED_8F[5]
GCK8 33 R177 LED_8F[22]
GCK1 33 R178 LED_8F[23]
PAD98 33 R187 LED_8F[32]
PAD104 33 R188 LED_8F[33]
PAD107 33 R189 LED_8F[34]
PAD110 33 R190 LED_8F[35]
PAD113 33 R191 LED_8F[36]
PAD116 33 R192 LED_8F[37]
PAD132 33 R195 LED_8F[40]
PAD138 33 R197 LED_8F[42]
PAD141 33 R198 LED_8F[43]
PAD144 33 R199 LED_8F[44]
PAD147 33 R200 LED_8F[45]
PAD150 33 R201 LED_8F[46]
PAD156 33 R202 LED_8F[47]
PAD159 33 R203 LED_8F[48]
PAD162 33 R204 LED_8F[49]
PAD165 33 R205 LED_8F[50]
PAD168 33 R206 LED_8F[51]
PAD171 33 R207 LED_8F[52]
PAD174 33 R208 LED_8F[53]
PAD177 33 R209 LED_8F[54]
PAD180 33 R210 LED_8F[55]
PAD195 33 R214 LED_8F[59]
PAD201 33 R216 LED_8F[61]
PAD204 33 R217 LED_8F[62]
PAD207 33 R218 LED_8F[63]
PAD213 33 R220 LED_8F[65]
PAD219 33 R154 LED_8F[1]
GND 1.00K R155
GND 1.00K R156
LED_8F[3] 33 R158
BR0
BR1
ID
+3.3V C17 0.1uF GND
+3.3V C14 0.1uF GND
+3.3V C18 0.1uF GND
+3.3V C15 0.1uF GND
+3.3V C12 150uF GND
+3.3V C13 150uF GND
CONTRACT NO.
- Sergey Averin -
APPROVALS
DRAWN SA 9-16-03
CHECKED SA
ISSUED SA
W# 700719
LVU-5.1
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE D
FSCM NO.
DWG. NO. 84S0134
REV –
SCALE
LVU-5.1 PCB
SHEET 5 OF 9

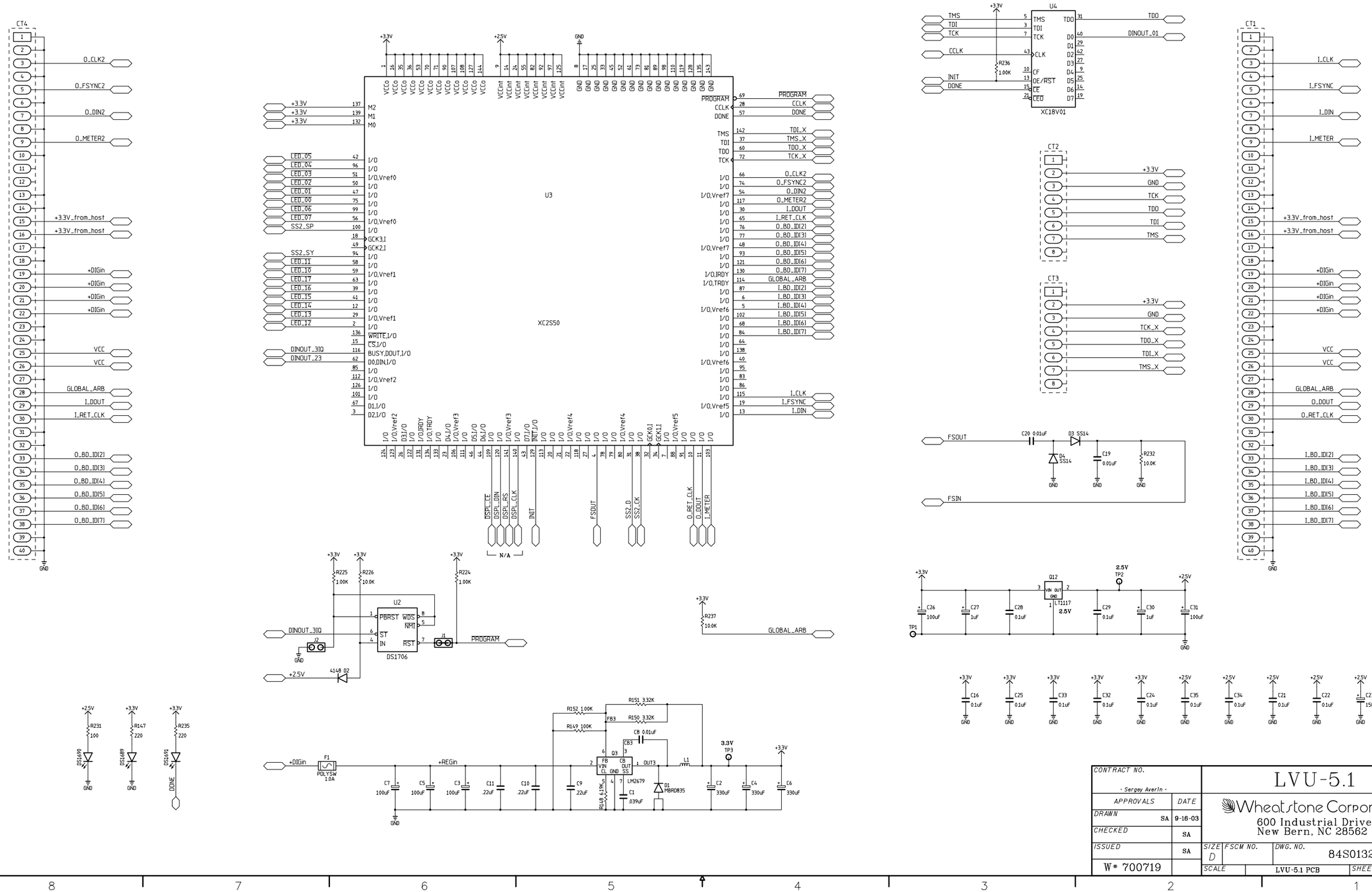


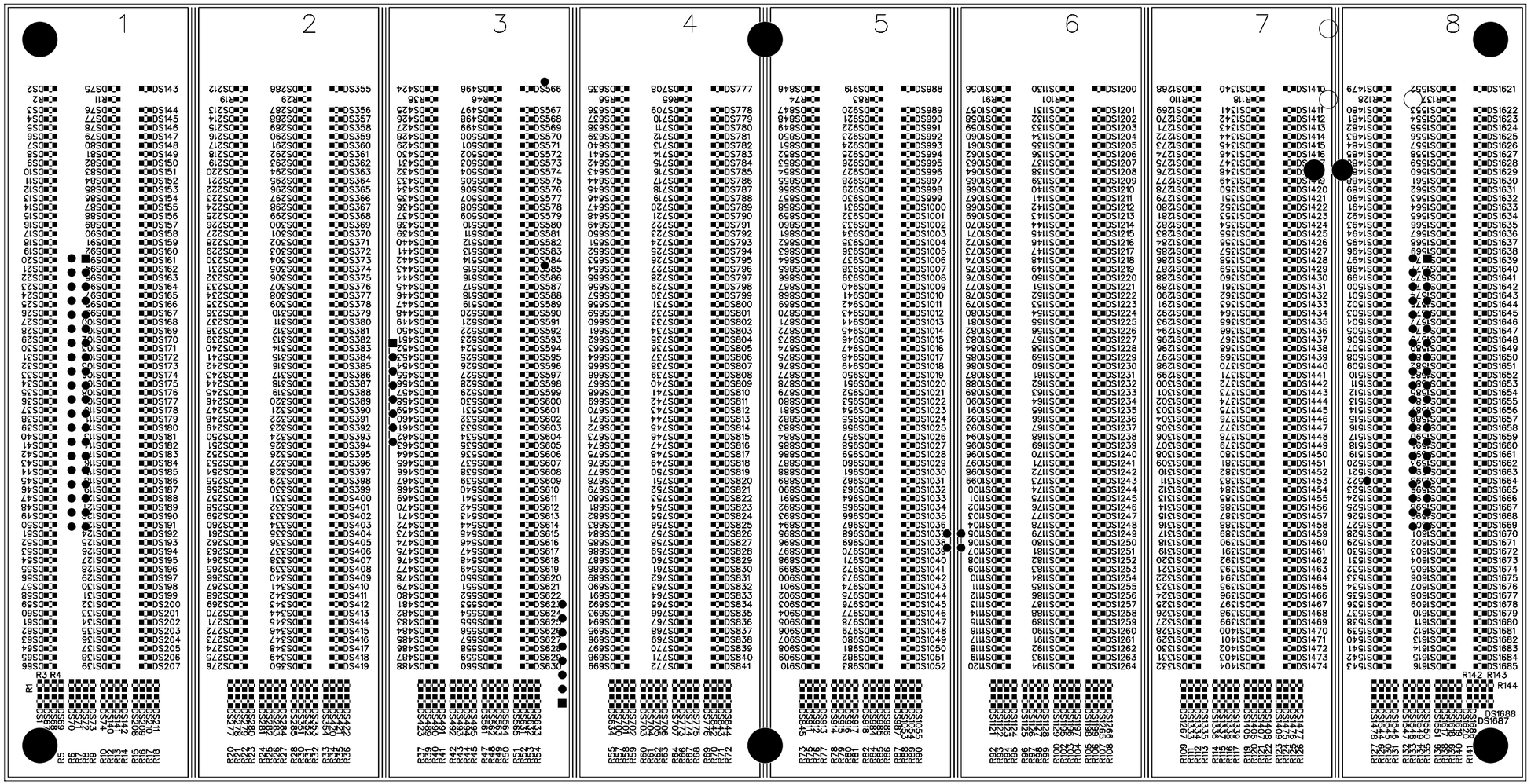
LVU-5.1 LED VU Card Schematic - Sheet 6 of 9


LED_14
LED_15
LED_15
+3.3V
+3.3V
+3.3V
GND
GND
GND
1.00K R109
1.00K R111
1.00K R112
1.00K R113
1.00K R114
1.00K R115
1.00K R116
1.00K R117
1.00K R119
1.00K R120
1.00K R121
1.00K R122
1.00K R123
1.00K R124
1.00K R125
1.00K R126
CONTRACT NO.
- Sergey Averin -
APPROVALS
DATE
DRAWN
SA
9-16-03
CHECKED
SA
ISSUED
SA
W# 700719
LVU-5.1
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE
D
FSCM NO.
DWG. NO.
84S0136
REV
—
SCALE
LVU-5.1 PCB
SHEET
7 OF 9



LVU-5.1 LED VU Card Schematic - Sheet 8 of 9


CT4
O_CLK2
O_FSYNC2
O_DIN2
O_METER2
+3.3V_from_host
+3.3V_from_host
+DIGin
+DIGin
+DIGin
+DIGin
VCC
VCC
GLOBAL_ARB
I_DOUT
I_RET_CLK
O_BD_ID(2)
O_BD_ID(3)
O_BD_ID(4)
O_BD_ID(5)
O_BD_ID(6)
O_BD_ID(7)
GND
U3
XC2S50
+3.3V
+2.5V
GND
M2
M1
M0
LED_05
LED_04
LED_03
LED_02
LED_01
LED_00
LED_06
LED_07
SS2_SP
SS2_SY
LED_11
LED_10
LED_17
LED_16
LED_15
LED_14
LED_13
LED_12
DINOUT_31Q
DINOUT_23
WRITE,I/O
CS,I/O
BUSY,DOUT,I/O
D0,DIN,I/O
D1,I/O
D2,I/O
DSPL_CE
DSPL_DIN
DSPL_RS
DSPL_CLK
N/A
INIT
FSOUT
SS2_D
SS2_CK
O_RET_CLK
O_DOUT
I_METER
PROGRAM
CCLK
DONE
TDI_X
TMS_X
TDO_X
TCK_X
TMS
TDI
TDO
TCK
I_CLK
I_FSYNC
I_DIN
U4
XC18V01
R236
1.00K
TDO
DINOUT_01
CT2
CT3
CT1
U2
DS1706
PBRST
WDS
NMI
ST
IN
RST
J1
J2
4148 D2
R225
1.00K
R226
10.0K
R224
1.00K
R237
10.0K
PROGRAM
GLOBAL_ARB
DS1690
DS1689
DS1691
R231
100
R147
220
R235
220
DONE
F1
POLYSW
1.0A
+DIGin
+REGin
R151 3.32K
R150 3.32K
R152 1.00K
R149 100K
R148 619K
C8 0.01uF
LM2679
MBRD835
L1
OUT3
3.3V
C7 100uF
C5 100uF
C3 100uF
C11 .22uF
C10 .22uF
C9 .22uF
C1 .039uF
C2 330uF
C4 330uF
C6 330uF
FSOUT
FSIN
C20 0.01uF
D3 SS14
D4 SS14
C19 0.01uF
R232 10.0K
Q12
TJ1117
2.5V
TP1
TP2
C26 100uF
C27 1uF
C28 0.1uF
C29 0.1uF
C30 1uF
C31 100uF
C16 0.1uF
C25 0.1uF
C33 0.1uF
C32 0.1uF
C24 0.1uF
C35 0.1uF
C34 0.1uF
C21 0.1uF
C22 0.1uF
C23 150uF
CONTRACT NO.
- Sergey Averin -
APPROVALS
DATE
DRAWN
SA
9-16-03
CHECKED
SA
ISSUED
SA
W# 700719
LVU-5.1
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE
D
FSCM NO.
DWG. NO.
84S0132
REV
—
SCALE
LVU-5.1 PCB
SHEET
9 OF 9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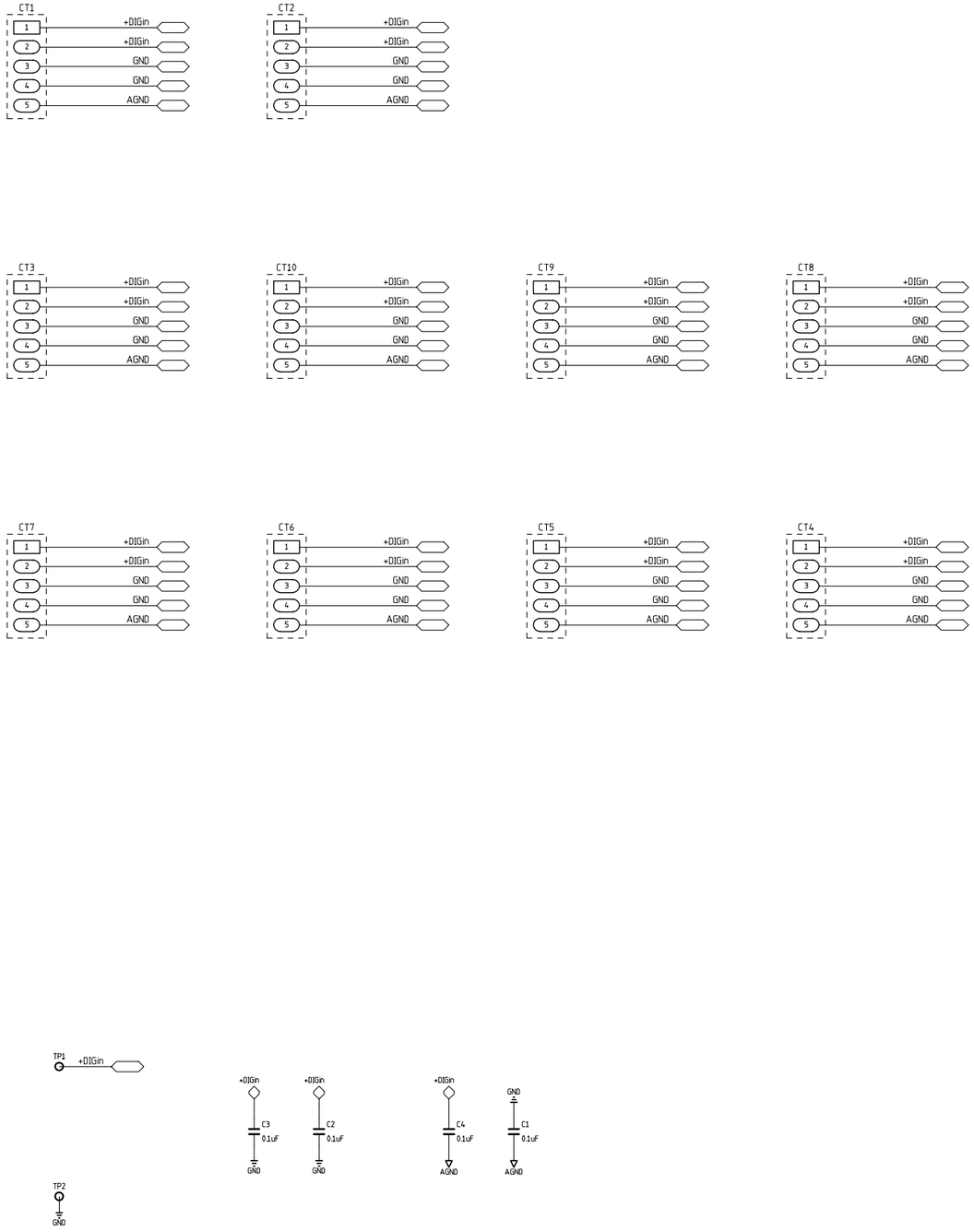
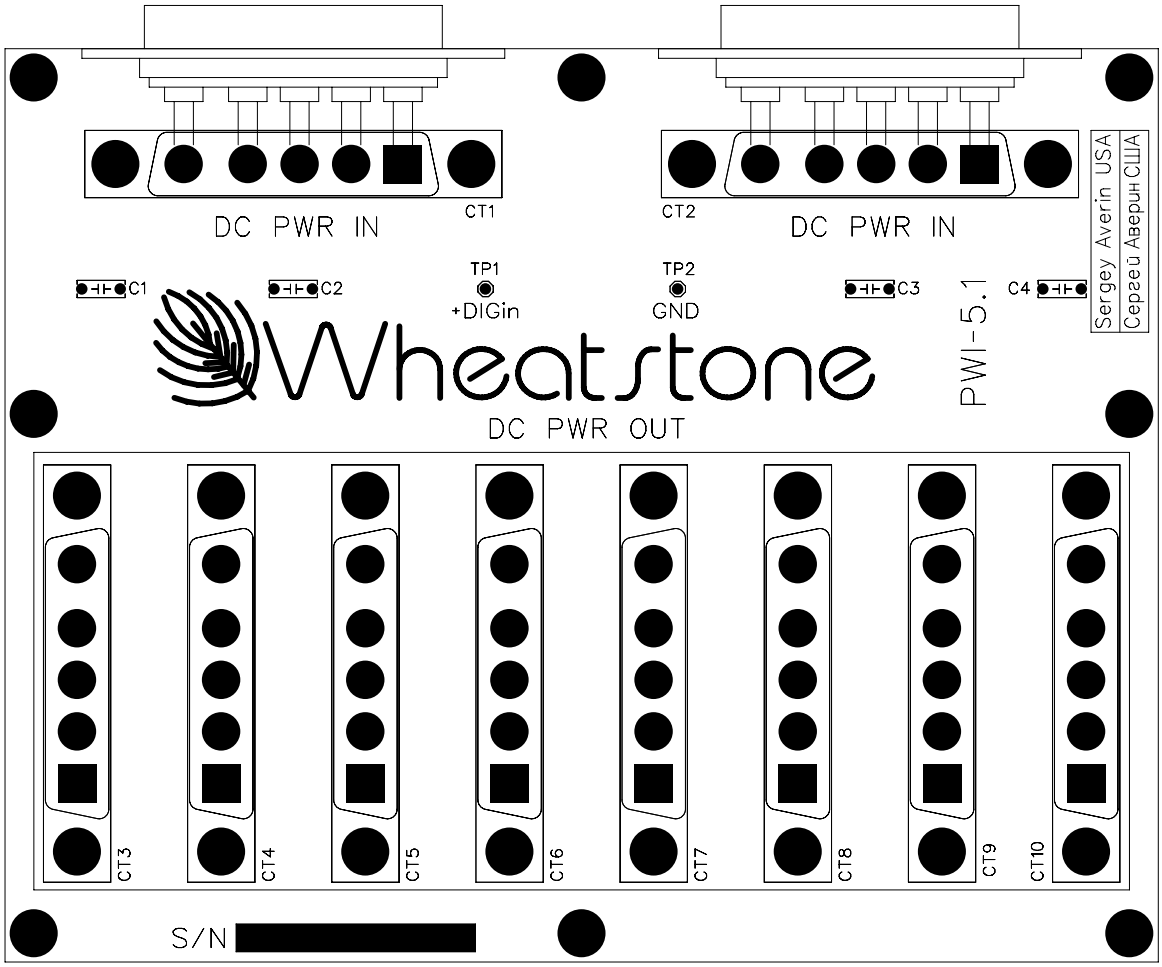


CONTRACT NO. - Sergey Averin -		PWI-5.1	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN	SA 2-25-02		
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0095 / REV –	
W* 700724		SCALE / PWI-5.1 PCB / SHEET 1 OF 1	

PWI-5.1 Power Interface Card Schematic - Sheet 1 of 1



PWI-5.1 Power Interface Card Load Sheet

Appendices

Appendix 1

Options Text File A-3
Introduction A-3
Modifying The Options Text File..... A-3
A Sample Example From The File A-4
A Second Example A-5
An Example File - Complete..... A-6

Appendix 2

Replacement Parts List A-9

Appendix 1

Contents

Options Text File A-3
Introduction A-3
Modifying The Options Text File A-3
A Sample Example From The File A-4
A Second Example A-5
An Example File - Complete A-6

Options Text File

Introduction

There are a number of operational features on the D-5.1 surface that are controlled by the contents of the Options Text File (DTV_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.

```
// --------------------------------
// SPARE OPTIONS
// --------------------------------
// Syntax: SPARE#:?
// # is the spare button number (1 - 12)
// ? is the mode (default = 2)...
//   Ø = None, Button presses are ignored
//   1 = Toggle, Button state toggles on each press
//   2 = Momentary, Button is active when held down
//   3 = 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
SPARE1Ø:2
// --------------------------------
// MISC OPTIONS
// --------------------------------
// Syntax: ALPHA_SORT:?
// ? 1 (default) enables XY controller alpha sorting, Ø = no sort.
ALPHA_SORT:1
// Syntax: USE_HELP:?
// ? 1 (default) enables help system, Ø = no help.
USE_HELP:1
// Syntax: XYC_CHECKSUM:?
// ? 1 (default) = use checksum in XYC messages, Ø no checksum.
XYC_CHECKSUM:1
// Syntax: HDW_LOGGER:?
// ? 1 = use hardware logger, Ø (default) no hardware logger.
HDW_LOGGER:Ø
// Syntax: XCHAN_VIS_DISABLE:?
// ? Ø = do not allow X visibility disable, 1 (default) allow X visibility disable.
XCHAN_VIS_DISABLE:1
// --------------------------------
// STUDIO OPTIONS
// --------------------------------
// Syntax: MUTE_METHOD:?
// ? Ø = ON button, 1 (default) = ON AIR.
MUTE_METHOD:1
```

```
// Syntax: MUTE_MASTER#:?
// Is the specified master used in mute linking logic
// # = 1 M5.1  - ? Ø (default) = no, 1 = yes.
// # = 2 M+2   - ? Ø (default) = no, 1 = yes.
// # = 3 MST1  - ? Ø = no, 1 = (default) yes.
// # = 4 MST2  - ? Ø (default) = no, 1 = yes.
// # = 5 MMONO - ? Ø (default) = no, 1 = yes.
MUTE_MASTER1:Ø
MUTE_MASTER2:Ø
MUTE_MASTER3:1
MUTE_MASTER4:Ø
MUTE_MASTER5:Ø
// Syntax: DCM_MUTE_LEVEL:?
// ? INF or -8Ø to -6 = (-6Ø default) dB level considered
//  muted for DCM assign LED indication.
DCM_MUTE_LEVEL:-6Ø
// Syntax: ACI_DISABLE_MSS:?
// ? Ø (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:Ø
// Syntax: ENABLE_IFB_CONF:?
// ? Ø (default) = do not enable IFB (Bus-Minus) conference mode,
//             1 = enable IFB (Bus-Minus) conference mode.
ENABLE_IFB_CONF:Ø
```

Appendix 2

Contents

Replacement Parts List A-9

For the most part there are no user-replaceable parts in the D-5.1 control surface. Exceptions are those controls and components that in the course of normal use may need maintenance (i.e., faders, pots, 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-5.1 CONTROL SURFACE

COMPONENT	DESCRIPTION	*WS P/N*
IS-5.1 PANEL	COMPLETE INPUT PANEL	***"005000"***
IFS-5.1 PANEL	COMPLETE INPUT FADER PANEL	***"005001"***
IFSM-5.1 PANEL	COMPLETE INPUT FADER PANEL WITH MOTORIZED FADER	***"005011"***
IFSM-5.1NP PANEL	COMPLETE INPUT FADER PANEL WITH MOTORIZED FADER MINUS PAGE	***"005018"***
EFS-5.1 PANEL	COMPLETE CONTROL PANEL	***"005002"***
SFS-5.1 PANEL	COMPLETE CONTROL FADER PANEL	***"005003"***
SFSM-5.1 PANEL	COMPLETE CONTROL FADER PANEL WITH MOTORIZED FADER	***"005013"***
MS-5.1 PANEL	COMPLETE MASTER PANEL	***"005004"***
MFS-5.1 PANEL	COMPLETE MASTER FADER PANEL	***"005005"***
MFSM-5.1 PANEL	COMPLETE MASTER FADER PANEL WITH MOTORIZED FADER	***"005015"***
DS-5.1 PANEL	COMPLETE DYNAMIC CONTROL PANEL	***"005006"***
DCM-5.1 PANEL	COMPLETE DYNAMIC CONTROL FADER PANEL	***"005007"***
DCMM-5.1 PANEL	COMPLETE DYNAMIC CONTROL FADER PANEL WITH MOTORIZED FADER	***"005017"***
TB-5.1 PANEL	COMPLETE TALKBACK PANEL	***"005004"***
BKM3-5.1 BLANK PANEL	MAIN BLANK FACEPLATE ASSEMBLY 3" WIDE	***"005109"***
BKF3-5.1 BLANK PANEL	FADER BLANK FACEPLATE ASSEMBLY 3" WIDE	***"005110"***
BKM3.25-5.1 BLANK PANEL	MAIN BLANK FACEPLATE ASSEMBLY 3.25" WIDE	***"005111"***
BKF3.25-5.1 BLANK PANEL	FADER BLANK FACEPLATE ASSEMBLY 3.25" WIDE	***"005112"***
BKM6.25-5.1 BLANK PANEL	MAIN BLANK FACEPLATE ASSEMBLY 6.25" WIDE	***"005113"***
BKF6.25-5.1 BLANK PANEL	FADER BLANK FACEPLATE ASSEMBLY 6.25" WIDE	***"005114"***
COPY TRAY	D5.1 COPY TRAY ASSEMBLY	***"005194"***
IS-5.1 LOADED CARD	INPUT PANEL LOADED CARD ASSEMBLY	***"005050"***
IFS-5.1 LOADED CARD	INPUT FADER PANEL LOADED CARD ASSEMBLY	***"005051"***
EFS-5.1 LOADED CARD	CONTROL PANEL LOADED CARD ASSEMBLY	***"005052"***
SFS-5.1 LOADED CARD	CONTROL FADER PANEL LOADED CARD ASSEMBLY	***"005053"***
MS-5.1 LOADED CARD	MASTER PANEL LOADED CARD ASSEMBLY	***"005054"***
MFS-5.1 LOADED CARD	MASTER FADER PANEL LOADED CARD ASSEMBLY	***"005055"***
DS-5.1 LOADED CARD	DYNAMICS CONTROL PANEL LOADED CARD ASSEMBLY	***"005056""***
DCM-5.1 LOADED CARD	DYNAMICS CONTROL FADER PANEL LOADED CARD ASSEMBLY	***"005057""***
MG-5.1 LOADED CARD	MAIN GATE LOADED CARD ASSEMBLY	***"005060"***
MG-5.1M LOADED CARD	MAIN GATE (MOTORIZED) LOADED CARD ASSEMBLY	***"005065"***
EI-5.1 LOADED CARD	ENCODER LOADED CARD	***"005030"***
HC-5.1 LOADED CARD	LOADED CARD ASSEMBLY WITH COMPUTER	***"005064"***
HC-5.1NC LOADED CARD	LOADED CARD ASSEMBLY W/O COMPUTER	***"005092"***
BP-5.1 LOADED CARD	LOADED CARD ASSEMBLY	***"005058"***
BPR-5.1 LOADED CARD	LOADED CARD ASSEMBLY	***"005069"***
VU8-5.1 LOADED CARD	LOADED CARD ASSEMBLY	***"005061"***
VUM-5.1 LOADED CARD	LOADED CARD ASSEMBLY	***"005062"***
VUS-5.1 LOADED CARD	LOADED CARD ASSEMBLY	***"005063"***
PWI-5.1 LOADED CARD	LOADED CARD ASSEMBLY	***"005059"***
LED-1 LOADED CARD	LOADED CARD ASSEMBLY	***"007101"***

REPLACEMENT PARTS — D-5.1 CONTROL SURFACE

COMPONENT	DESCRIPTION	*WS P/N*
PSR POWER SUPPLY RACK UNIT	RACK CAGE FOR SPS POWER SUPPLIES	***"007232"***
SPS-400	POWER SUPPLY UNIT FOR USE IN PSR RACK	***"007233"***
SPS/PWI POWER CABLE	SPS DB TO CONTROL SURFACE PWI POWER CABLE	***"007261"***
FLAT RIBBON CABLE	50 CONDUCTOR FLAT RIBBON CABLE	***"150007"***
FADER ASSEMBLY	NON-MOTORIZED FADER ASSEMBLY	***"005296"***
FADER ASSEMBLY	MOTORIZED FADER ASSEMBLY	***"005297"***
SWITCH	SINGLE POLE MOMENTARY SWITCH W/RED LED	***"510106"***
SWITCH	SINGLE POLE MOMENTARY SWITCH W/HOLES FOR LED, NO LED INSTALLED	***"510293"***
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"***
ENCODER	11MM ROTARY ENCODER, 20MM SHAFT LENGTH, ORDER W#005030	
ENCODER KNOB	11MM BLACK PUSH-ON KNOB	***"520105"***
ENCODER LIGHT PIPE	24 SEGMENT LIGHT PIPE FOR DTVM ENCODER	***"520104"***
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"***
ENCODER CAP	PLAIN BURGUNDY CAP FOR 11MM COLLET KNOB	***"530315"***
LUMA BUTTON	WHITE LUMA BUTTON	***"530274"***
LUMA BUTTON	RED LUMA BUTTON	***"530275"***
LUMA BUTTON	YELLOW LUMA BUTTON	***"530276"***
LUMA BUTTON	GREEN LUMA BUTTON	***"530277"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "1"	***"530297"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "2"	***"530298"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "3"	***"530299"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "4"	***"530300"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "5"	***"530301"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "6"	***"530302"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "7"	***"530303"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "8"	***"530304"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "9"	***"530305"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "10"	***"530306"***

REPLACEMENT PARTS — D-5.1 CONTROL SURFACE

COMPONENT	DESCRIPTION	*WS P/N*
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "11"	***"530307"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "12"	***"530308"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "13"	***"530309"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "14"	***"530310"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "15"	***"530311"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "16"	***"530312"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "17"	***"530313"***
LUMA BUTTON	STYRENE WITH UV INHIBITOR BUTTON PRINTED "18"	***"530314"***
PLUG	5 PIN PLUG FOR #26 AWG	***"230030"***
PLUG	6 PIN PLUG FOR #26 AWG	***"230031"***
PLUG	9 PIN PLUG FOR #26 AWG	***"230032"***
PLUG	50 PIN PLUG	***"250049"***
PLUG RIBBON	26 PIN RIBBON PLUG	***"250043"***
PLUG RIBBON	40 PIN RIBBON PLUG	***"250053"***
PLUG RIBBON	26 PIN RIBBON PLUG	***"250043"***
HEADER	40 PIN BOXED HEADER, STRAIGHT	***"250056"***
HEADER	5 PIN JST HEADER	***"250064"***
HEADER	6 PIN JST HEADER	***"250065"***
HEADER	9 PIN JST HEADER	***"250066"***
RECEPTACLE HOUSING	5 POSITION RECEPTACLE HOUSING	***"200113"***
POWER SOCKET	40 AMP SOLDER CUP POWER SOCKET	***"200118"***
PHONE JACK	RTS JACK	***"260005"***
XLR CONNECTOR	BLACK FEMALE XLR CONNECTOR	***"260002"***
MOLEX CONNECTOR	MOLEX CONNECTOR	***"270037A"***
MOLEX CONNECTOR	FEMALE MOLEX CONNECTOR	***"270038A"***
CONNECTOR PIN	FEMALE PIN FOR MOLEX CONNECTOR	***"270031A"***
CONNECTOR PIN	MALE PIN FOR MOLEX CONNECTOR	***"270032A"***
DISPLAY	4 SEGMENT GREEN ALPHA NUMERIC DISPLAY	***"610016"***
LED SUPERBRIGHT GREEN	GREEN LED WITH UNCUT LEADS	***"610075"***
LED SUPERBRIGHT YELLOW	YELLOW LED WITH UNCUT LEADS	***"610076"***
METER	VU METER	***"630004"***
METER LIGHT BOX	LIGHT BOX FOR VU METER WITHOUT LAMP	***"630008"***
FAN	FAN 12V DC	***"840014"***
FILTER	FAN FILTER	***"840012"***
REPLACEMENT CUE SPEAKER	REPLACEMENT CUE SPEAKER	***"960000"***
MANUAL	OWNER'S MANUAL	***"005099"***