
SR-9 Digital Surround Audio Control Surface

TECHNICAL MANUAL

 *Wheatstone Corporation*

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SR-9 Digital Surround Audio 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 become brittle and eventually cause structural damage to the acrylic surface.

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



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General Information



Introduction

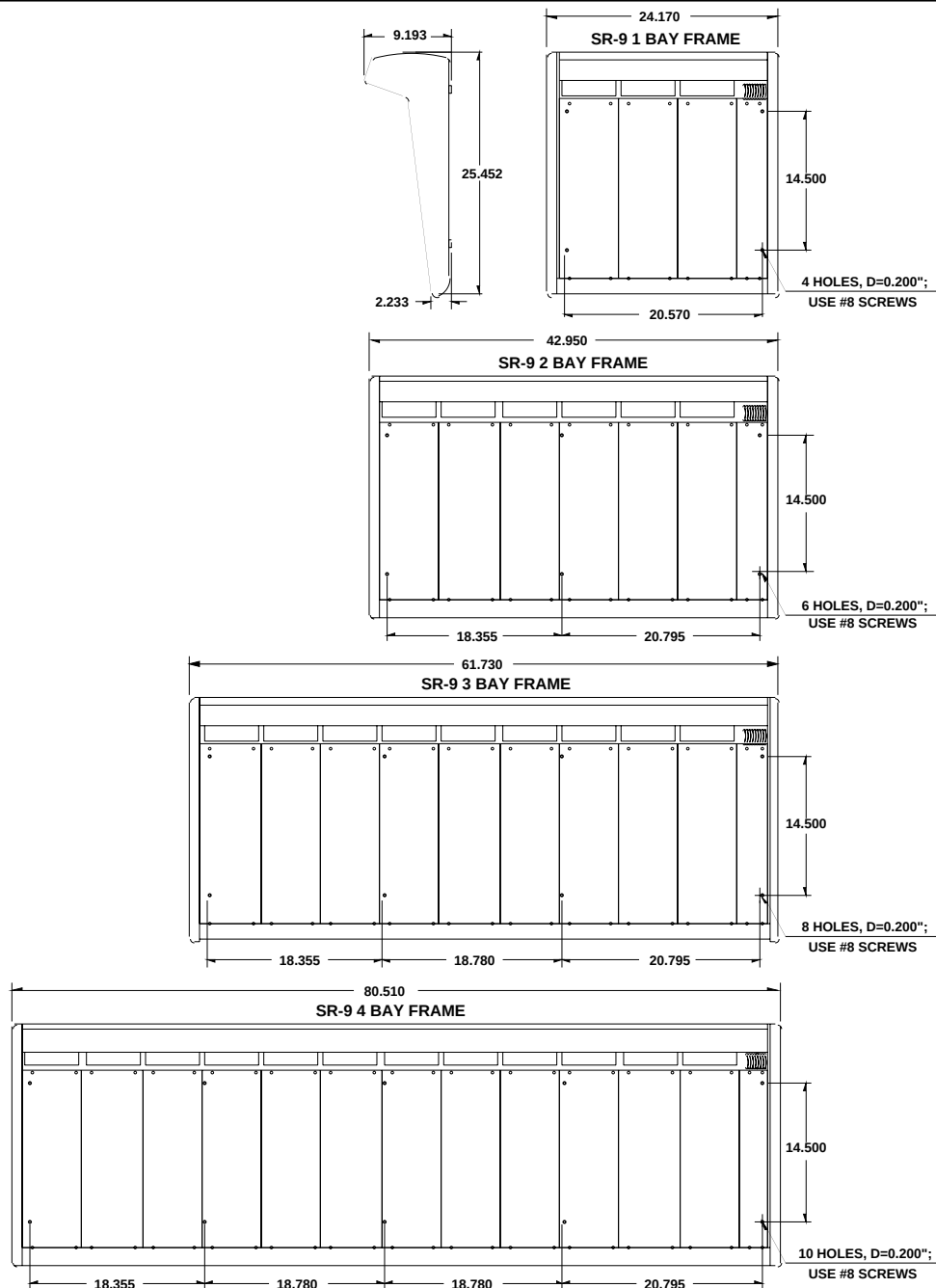
The SR-9 Surround Radio On-Air Control Surface is designed to integrate flawlessly with the Wheatstone BRIDGE digital audio network router and allows you to easily create large or small platform-based systems that are exceptionally user-friendly and flexible. Wheatstone BRIDGE network cages house all I/O ports and engine cards, and may be wired in tandem within a single equipment room or interconnected to separate remote locations by means of fiber-optic or CAT-5 cables to provide single wire studio integration schemes.

Once configured, the system operates entirely independently of external computers. Configuration itself is intuitive and carried out onsite by means of user-friendly graphic interfaces provided by Wheatstone desktop software. The SR-9 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 SR-9 digital audio control surface is designed for countertop mounting. Although the rubber feet on the bottom keep the surface from being easily moved when simply placed on the counter, holes have been provided so that screws may be used to mount the surface securely to the countertop. Carefully remove the appropriate panels from the frame, screw the mainframe to the counter top, and reinstall the removed panels. The four available frame sizes dimensions (in inches) are shown in the drawings below.

Do not connect the SR-9 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 PSU-1 rackmount power supply



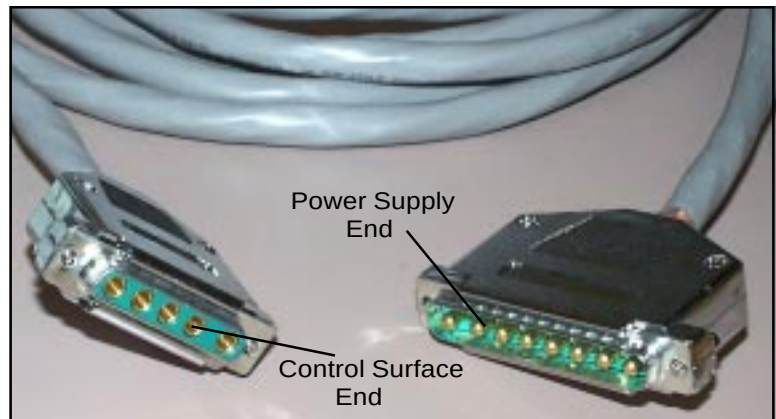
Rear view of the PSU-1 rackmount power supply

The SR-9 control surface is powered by a Wheatstone Model PSU-1 rackmount power supply. This unit occupies two 19" wide rack spaces (total height 3-1/2"). Convection cooled, it requires ample ventilation space above and below it.

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

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

Once the supply is rackmounted, it should be connected to the control surface using the factory supplied cable. The cable has two different types of connectors on it: a 5-pin female connector that connects to the control surface's power supply connector, and an 8-pin male connector that plugs into the 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



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

the control surface connectors (it doesn't matter which one). If you are using the failsafe option (two PSU-1 supplies), connect one end of a power supply cable to either control surface power connector and connect the other end of the cable to one of the two power supply connectors. Then use the other cable to connect the second power supply connector to the remaining control surface power supply connector.

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

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

Failsafe Dual Redundant Supply

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

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

Energizing

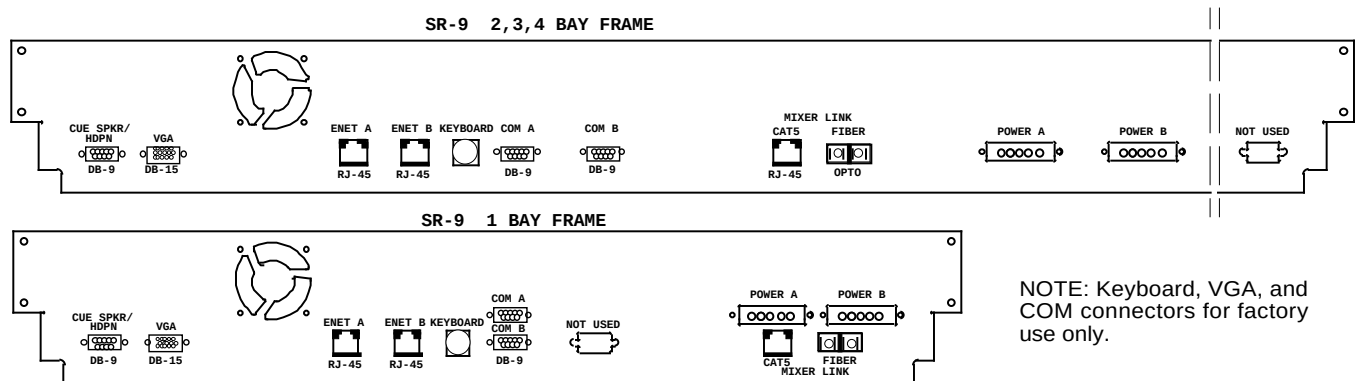
Assuming the SR-9 control surface mainframe is properly placed, and its PSU-1 power supply (or supplies) correctly rackmounted and connected to the control surface, you may now energize the rackmount power supply by plugging it into the AC mains. The "GOOD" LEDs on the power supply front panel should light up to indicate the presence of their respective voltages. The control surface's LED meters will illuminate and individual module switches will assume factory default settings.

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

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

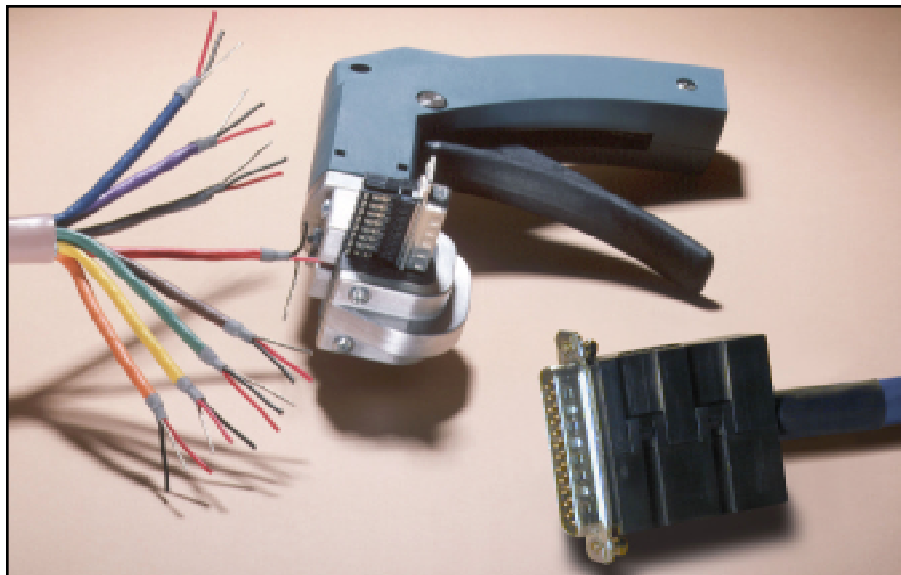
I/O Connections

All user wiring to and from the SR-9 control surface is made via connectors located on the control surface's rear panel. The female DB-9 connector at the left end of the control surface's rear connects to the internal cue speaker and headphone jack. There are also two RJ-45 connectors for main and failsafe ethernet connections. CAT-5 or multi-mode optical fiber Mixer Link connections are made via RJ-45 or SC type optical connectors. Two 5-pin male connectors are for power supply connections. VGA connections are made via the female DB-15 connector that is mounted next to the cue speaker connector. For all wiring pinout connections refer to Chapter 6. Sketches below show connector locations.



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



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.

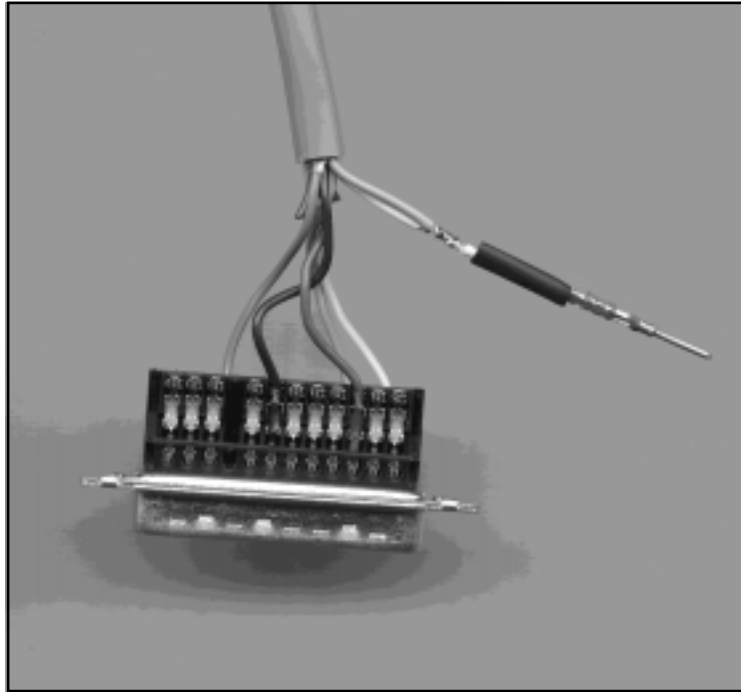
trigger action is ratchet controlled, and will not release until a full connection is made. Once released, the multipin connector held in the tool's jaw automatically indexes to the next connector pin. The technology is such that no stripping, soldering, or tinning of wire ends is required; all that is needed is that the wires destined for the connector be snub cut and laid out in order (although tubing should be used on bare drain wires). An empty DB-9 connector is inserted into the tool, indexed to the first pin, and the wires are inserted one by one into the jaw and the trigger squeezed. In this way a single multipin connector can be completely wired up in a minute or two. 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 Panel (IS-SR9)

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Input Panel (IS-SR9)

Controls and Functions

Each input panel of the SR-9 digital audio control surface has four identical strips representing four input channels.

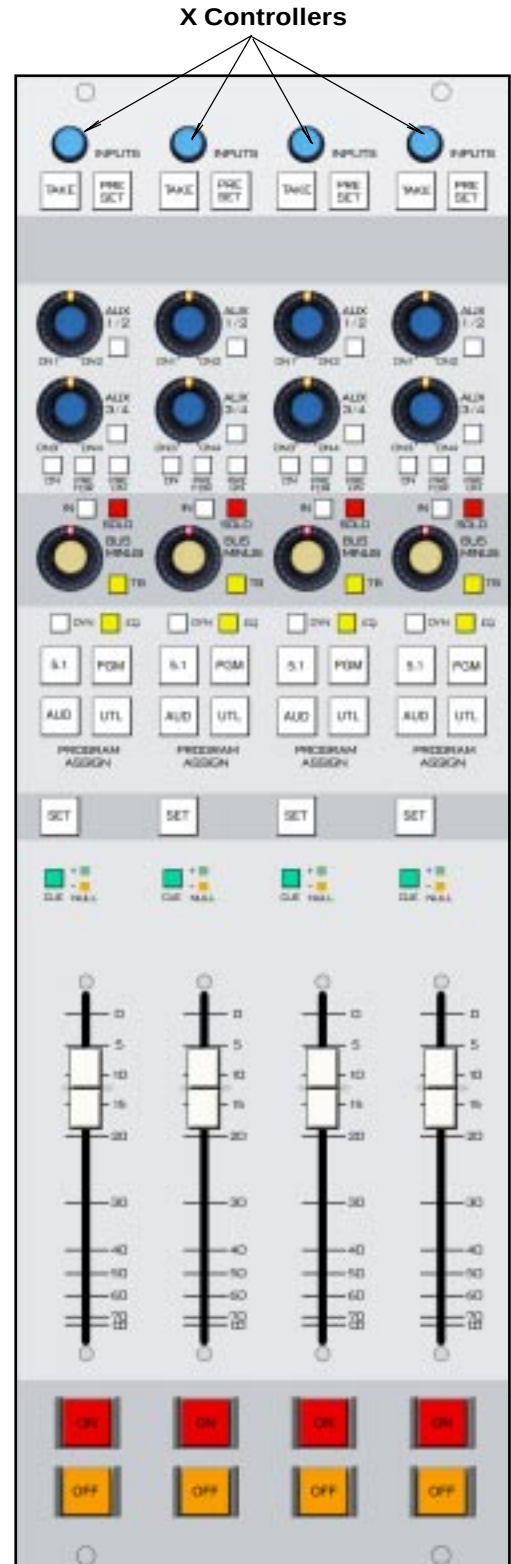
Input Sources

Each input panel controls four stereo sources. By turning input knobs, called X Controllers in the XPoint Software, the available inputs are displayed in the



SOURCE window of the LCD screen above the channel strip. When the desired input source is scrolled into the SOURCE window, pressing the TAKE button will cause that source to be switched to the input of the channel, and the source name will be displayed in the SOURCE window of the LCD screen.

A second source can be loaded into the PRESET window of the LCD screen. Scroll the INPUT knob as above until the desired source appears in the SOURCE window, then press and hold the PRESET button until this source appears in the PRESET window. Once loaded, this source can be connected at any time by pressing the PRESET button.



AUX

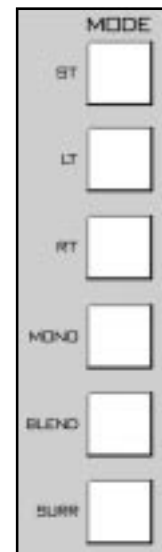
The SR-9 Control Surface has (2) AUX encoders, (2) bank select switches (AUX 1/2 and AUX 3/4), and (3) mode switches (ON, PRE FDR, and PRE ON) for controlling the (4) AUX SEND buses. Operation is as follows: first “DOBBY” or momentarily press one of the encoders to select which group of AUX SENDS (AUX 1/2 or AUX 3/4) is being worked on. The LED at the bottom center 6 o’clock position of the encoder knob will light to indicate the active group. Pressing the bank select button will select which AUX SEND within the group is being worked on. A lighted switch indicates you are working on an even numbered group (2 or 4). Once the desired AUX SEND has been selected using these controls, the ON, PRE FDR, and PRE ON switches and the encoder can be adjusted for that particular AUX SEND. Subsequently, the bank select switch can be pressed or the encoder “DOBBIED” to choose the next AUX SEND, and so on.



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

Mode Selector Indicator

MODE selection switches in the EFS CONTROL panel (see Chapter 3) enable input channels to operate in Mono, Left only, Right only, Blend, and Stereo. The switch lights up to indicate the selected mode. This feature is activated for a given channel by pressing the channel’s SET button (see page 2-4).



EFS-SR9 Control Panel

Pan/Balance Knob

The LT/RT knob (5.1 SURR section in the EFS CONTROL panel) acts as a panpot in MONO, LEFT only and RIGHT only modes, and as a balance control in STEREO mode. In BLEND, both the left and right input signals are sent to both the left and right sides of assigned stereo destinations, with the LT/RT knob acting as a mix control between the left and right inputs. Once again, this feature is activated for a given channel by pressing the channel’s SET button. To easily set the PAN to center, you can press the control twice in rapid succession, like double-clicking a mouse button.



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 functions. Each channel's input signal is omitted from the MIX at it's own direct output. A BUS MINUS encoder controls level for each of the individual IFB channel/direct outputs. A TB switch lets the control surface operator talkback to that individual IFB/direct output allowing communications between the operator and the talent receiving that mix. A SOLO switch allows the operator to solo monitor the IFB output of that individual channel's IFB feed.

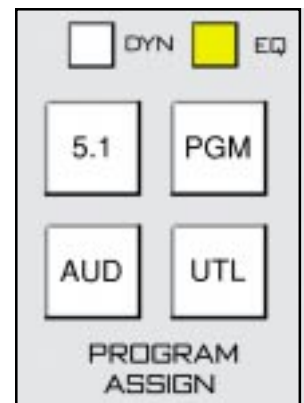


Dynamics and EQ

DYNAMICS (DYN) and EQ buttons allow dynamics and EQ functions which have been set for that channel on the DCM (see Chapter 4) and EFS (see Chapter 3) CONTROL panels to be applied or not to the input channel. The buttons light up when input channel signal processing is active on the channel. Available Dynamics functions include compression and limiting. Available Equalizer functions include 3 band parametric EQ with high-pass and low-pass filters.

Main Bus Assign

PROGRAM ASSIGN buttons assign the input channel signal to the four main busses: 5.1 (surround), PGM (program), AUD (audition), and UTL (utility) respectively. Note that the UTL bus can be set up during configuration to be pre/post fader or ON switch.



SET Button

This allows the operator to access various controls and displays on the EFS and DCM panels and apply them to the selected channel. SET can access MIX-MINUS, DYNAMICS and EQ functions. To use, press the SET button and then make your appropriate section settings in other areas of the control surface. Once a SET button has been pressed, the button lights up, and all 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 channel SET selection will time out and the SET button will go off.



CUE Switch

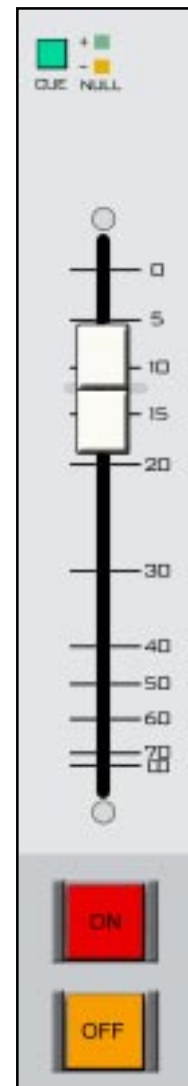
The CUE switch lets the operator monitor the channel's pre-fader signal. Once a CUE switch has been activated, the CUE CLEAR button on the EFS panel begins to flash and remains flashing until the CUE switch is turned off. Pressing the CUE CLEAR button will simultaneously turn off all cue switches on the control surface.

Fader

Channel output 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 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.

ON/OFF Switches

Channel ON (red) or OFF (orange) switches are at the bottom of the input section. The ON switch turns the channel signal ON and fires the channel ON/START logic; the switch LED lights to indicate the channel is ON. The OFF switch turns the channel signal OFF and fires the channel OFF/STOP logic; the switch LED lights to indicate the channel is OFF.



LCD Display

Each input section has an associated LCD display located above the input section in the control surface meterbridge. This display shows input level, selected source, preset source, channel number, channel status, gain reduction, and other information.



Input Level

The pre-fader level of the input signal is shown by the large vertical bargraph on the display. The level is indicated in dB on a calibrated scale beside the bargraph. If the channel is stereo, the bargraph shows the sum of left and right signals. The bargraph is colored, with green indicating lower levels and red indicating high levels. The nominal level position is in the middle of the range at the “0” scale marking, and shows as a thin blue band in the bargraph. The bargraph itself consists of a moving “DOT” over a solid “COLUMN” where the “DOT” indicates the peak value of the signal, and the “COLUMN” indicates the average value. On the SR-9 control surface the average value column has been set to VU timing characteristics. In addition, a bright yellow rectangle will light at the top of the column if digital “OVER” or clipping is detected.

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

Selected Source

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

Preset Source

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

Channel Status

Various indicators on the LCD display will show status information for the associated channel. Above the level bargraph the words “ON”, “OFF”, “ON AIR”, or “MUTE” will appear as the channel status changes. “MUTE” indicates that the channel is ON and has a mute set. “ON AIR” indicates that the channel is ON and the fader is up. The letters “EQ” will show in the display if equalizer functions are active for the channel, and a smaller bargraph indicating gain reduction will appear if signal dynamics functions (compression, limiting) are engaged.

Channel Number

A large white number shows near the center of the display area indicating the channel number.

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Control Panel (EFS-SR9)

Controls and Functions

The SR-9 digital audio control surface is equipped with one CONTROL panel. This panel contains MONITOR, CUE, SOLO, TALKBACK, EQ, 5.1 SURROUND, MODE, AUX/MXM MASTER OUTPUTS, MXM ASSIGN, EVENT, TIMER, SWITCHED METERS, and FUNCTION LOCK controller sections.

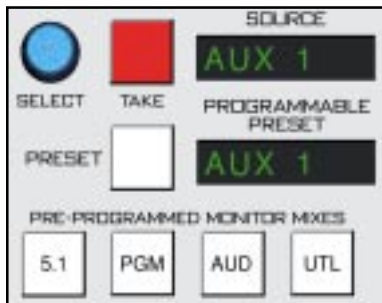
Monitors

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

Each monitor has a LEVEL control, a SET button, a DIM switch, a TB button (but the CR monitor does not have a TB button), and a MIX display that is located on the bottom section of the EFS-SR9 panel.



The CR monitor section also contains a mode indicator and two speaker select buttons.

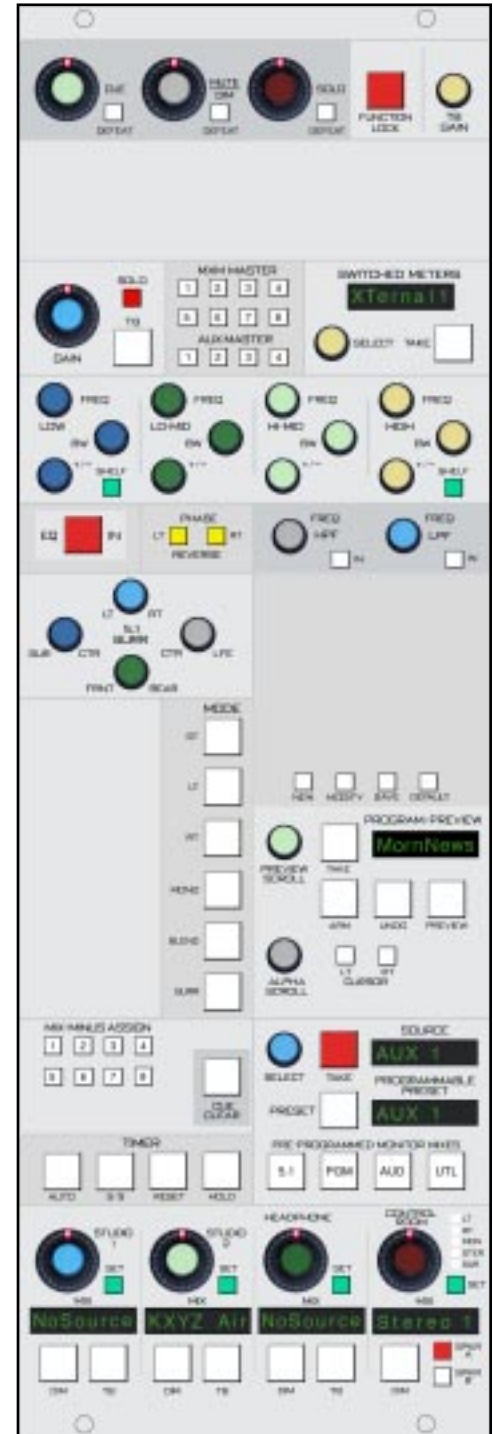


Monitor sources can be selected several ways:

- Four PRE-PROGRAMMED MONITOR MIX switches (5.1, PGM, AUD, and UTL) allow direct access to the main mixes most frequently monitored.

- Sources can be randomly selected with the

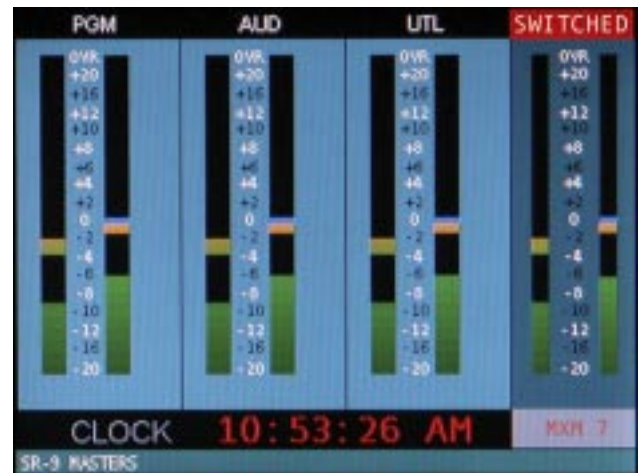
SELECT knob and its attendant SOURCE display and TAKE button.



- A source can also be loaded as a monitor preset by first selecting it with the SELECT knob and the SOURCE display, and then holding the PRESET button down until the source shows in the PROGRAMMABLE PRESET display. That source can then be monitored by pressing the PRESET button.

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

The knob controls the level of the monitor signal.



Control Room Section

In a typical radio application the control surface is located in the audio control room. Speakers in the control room allow the control surface operator to listen to the various control surface bus outputs to be assured that the control surface is performing as desired. These speakers are fed by a stereo signal routed 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 internal or external cue speaker, or may want to listen via headphones.

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

CR SET BUTTON - lets the operator select the source to be listened to in the control room speakers.

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

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

DIM BUTTON - lets the operator "dim" the control room speakers (drop in level). Note the DIM function also affects the talkback interrupt. Actual DIM level is set by the DIM encoder at the top of this panel.

MODE INDICATOR - a set of five LEDs indicates which mode, LEFT, RIGHT, MONO, STEREO, or SURROUND, the CR signal is operating in (see also page 3-5).

SPKR A, SPKR B - these two switches are used to determine which of two outputs will be fed by the CR signal. Each feed may have its mode programmed separately.



Studio Section

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

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

ST SET BUTTON - lets the operator select the source to be listened to in the studio.

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

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

DIM BUTTON - lets the operator "dim" the studio speakers (drop in level). Actual DIM level is set by the DIM encoder at the top of this panel. 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.

TALKBACK (TB) 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 operator's mic, 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

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

HDPN 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). Actual DIM level is set by the DIM encoder at the top of this panel.

Note: The headphone jack is mounted on the right-hand front of the control surface's lower mainframe pan.

TALKBACK (TB) 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.

Monitors outputs are normally subject to the control surface's muting and solo/cue interrupt circuits; however, these may be defeated by front panel switching (DEFEAT button - see below and page 3-6).

Mode Control and Indicators

These switches and LEDs give local visual control and indication of the selected mode for the various monitors (stereo, mono, left only, right only or surround). Note that the mode status of the CR monitor can always be seen on its mode indicator LEDs next to the CR level control.

Mode may be changed in the following way: press the SET button for the desired monitor and select the allowed MODE button in the center of the panel. Similarly, the mode of an input source is selected by these controls by first pressing the SET button for the desired input channel.

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.



Surround/PAN System

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

PROGRAMMING A CHANNEL FOR SURROUND SOUND:
Select the channel you wish to program by pressing its SET button. Assign it to the 5.1 destination by means of the BUS ASSIGN switchbank. The 5.1 SURROUND section will indicate the current settings of the encoder LT/RT, FRNT/REAR, SUR/CTR, and CTR/LFE knobs. The meterbridge display will also show a multi-color graphic representation of this system. The system can generate 5.1 signals from MONO or STEREO sources, and can modify the 5.1 signal of existing 5.1 input sources. Double-clicking any of the encoders will return that parameter to its default setting (for example, LT/RT returns to center).



CUE/MUTE/DIM/SOLO Section

The CUE master level control and defeat switch are located on the top section of the EFS 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 master LCD display will show the level of the pre-fader signal.



The CUE level control determines the overall loudness of the cue signal (normally wired to the cue speaker in the meterbridge).

Similar to the control room speakers, the cue speaker also has the potential for feedback and should be muted (using the configuration software—VDIP menu) whenever the control room speakers are. The cue mute defeat switch allows for temporarily overriding, or cancelling, the mute function.

The SOLO master level control and defeat switch are also located on the top of the EFS panel. 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 switched meter array in the master LCD display will show the level of the mix. The solo defeat switch allows for disabling the control room solo interrupt function.

The DIM master level control and defeat switch are also located on the top of the EFS panel. 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.



CUE Clear

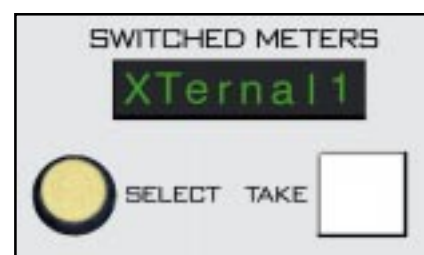
Whenever a CUE or SOLO is activated anywhere on the control surface, the CUE CLEAR button begins flashing and remains flashing as long as any CUE or SOLO on the surface is active. Pressing the CUE CLEAR button will cancel all active CUE and SOLO selections on the entire control surface.



Switched Meters Section

The control surface has provision for a switched meter.

To select a signal to meter, rotate the encoder SELECT. Available sources will be displayed in the eight character SWITCHED METERS display. When the desired signal is displayed, press the TAKE button. The switched meter array will then display the signal level. If, however, after a timeout period of 5 seconds, the TAKE button is not pressed, the array will revert back to its previous selected program.



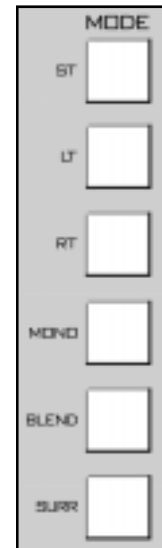
Any time a channel SOLO/CUE button is pressed, the SOLO/CUE level will be temporarily shown in the switched meter display until the SOLO/CUE button is deactivated.

Mode Select Section

The mode selector switchbank (ST, LT, RT, MONO, BLEND, and SURR buttons) and LT/RT knob are located in the center of the Control panel. There are six available channel modes: STEREO, LEFT ONLY, RIGHT ONLY, MONO, BLEND, and SURROUND. When pressed, the switch will light up to indicate the selected mode.

The LT/RT knob acts as a panpot in MONO, LEFT ONLY and RIGHT ONLY modes, and as a balance control in STEREO mode. In BLEND mode, where both the left and right signals are sent to both the left and right sides of assigned stereo destinations, the LT/RT knob acts as a mix control between the left and right inputs. The LT/RT knob is only used with input channels, and has no effect when setting the mode of the monitor signals.

Mode selection is set centrally. 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.



AUX/MXM Master Outputs

This section is used to control the master GAIN, SOLO, TB, Mode selection, and DESTINATION routing (see Event Section) for the four AUX SEND mixes and the eight MXM mixes. It is comprised of a shared GAIN knob, TB button and SOLO switch. Additionally, there is a bank of four AUX MASTER buttons and a bank of eight MXM MASTER buttons.

To set a GAIN, press any of the four AUX MASTER or eight MXM MASTER buttons and rotate the GAIN knob.

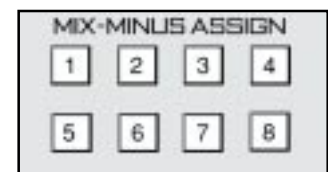
To set a SOLO, again press any of the four AUX MASTER or eight MXM MASTER buttons and then press the SOLO button.

To interrupt a signal with the TB signal, press any of the four AUX MASTER or eight MXM MASTER buttons and then press the TB button.



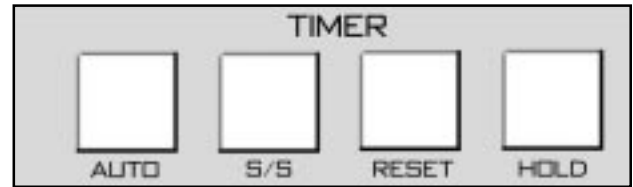
MIX-MINUS Assign

These buttons are used to control the makeup of the eight MIX-MINUS buses. Press the SET button on any input. If that input is assigned to feed an MXM bus, the corresponding MIX-MINUS ASSIGN switch will be lit. Pressing a MIX-MINUS ASSIGN switch will toggle that input's signal into or out of the corresponding MXM bus.



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.



The START/STOP button halts the timer, holds the last count, and then restarts and accumulates the count when depressed again—perfect for compiling tapes of desired duration.

RESET has a dual-mode capability:

- if you depress it while the timer is counting, the display will instantly reset to zero and start a fresh count;
- if the timer is already stopped, depressing this button will reset the timer to zero, where it will hold until start is pressed.

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

Time of Day Clock

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

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, and then hit the SAVE button. To overwrite an existing event with the current settings, turn the PREVIEW SCROLL knob until the desired event is displayed in the PROGRAM/PREVIEW window, then quickly press MODIFY, then SAVE.



Taking an Event

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

Undoing an Event

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

Modifying the Currently Selected Event

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

Deleting an Event

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

Previewing an Event

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



Event Default Button

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

Establishing the Default Setting

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

Naming an Event

When events are saved, they receive a default event designation number. This way events can be saved quickly without having to name them. However, an event may be custom named when saved, or at a later time. To rename the displayed event, press the ALPHA SCROLL knob. The CURSOR LT and CURSOR RT buttons will light and the cursor, indicated by a flashing character, will be at the beginning of the name. Also, the SAVE button will begin to flash. At any time you can

use CURSOR LT and CURSOR RT to move to a character you want to change. Once the cursor is at the desired character, rotate the ALPHA SCROLL encoder until the desired new character is displayed. Once all desired characters have been changed, simply press SAVE to save your changes. The event is stored with the desired name. At any time you can cancel the name edit by pressing the ALPHA SCROLL knob. Also, if you stop making name changes but fail to press the SAVE button, the name edit process will automatically cancel after a delay of several seconds.

Control Modes

The SR-9 control surface is operated in one of three modes. In Administrator mode access is allowed to all surface functions. In User mode a limited set of user functions is allowed. The set of functions allowed in User mode is set independently for each console using the Bridge XPoint software (see the Bridge Router manual for details). The third mode, Guest, blocks out MXM level, MXM assign, Event takes, and visibility changes from being controlled by the surface.

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

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

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



EQ Section

The EQ section consist of a bank of knobs and various associated switches. The EQ system consists of a four-band parametric EQ with low band and high band PEAK/SHELF switching, plus variable frequency high and low pass filters. As any of the controls are adjusted, a real time color-coordinated graphic display is presented on the LCD monitor panel showing the resulting frequency response curves.

To access EQ on 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 EQ IN button. The input channel's EQ button will light, and its LCD display will show "EQ". Either the input channel EQ switch or the master EQ switch on the EFS panel can be used to engaged/disengaged the EQ functions on a channel.



EQ Status Indicator

High-Pass Filter

This is a 24dB/octave variable high-pass filter with Butterworth characteristics, tunable between 16Hz 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-step impacts) with minimal effect on the required program.

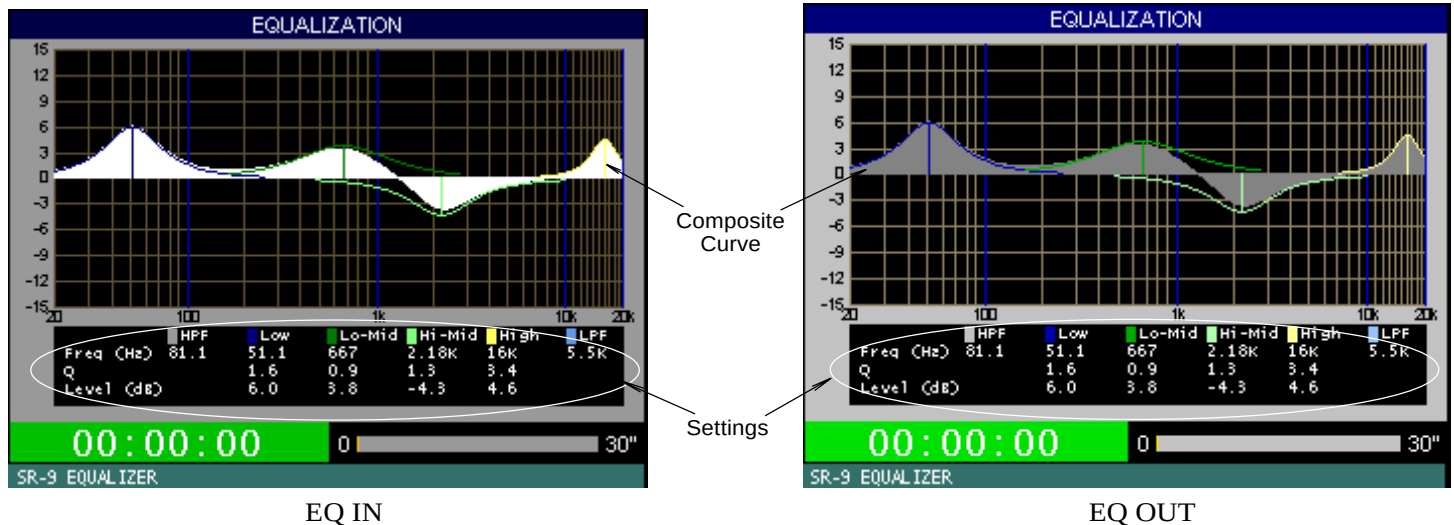
Low-Pass Filter

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.

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

Equalizer

This consists of four bands of parametric control used for modifying the sonic qualities of a signal. Each band has $\pm 14\text{dB}$ of BOOST/CUT capabilities ($\pm$ knob), sweepable center frequency over the range of 20Hz to 20kHz, and with a filter “Q” or sharpness [BW (Band Width) knob] sweepable between 0.3 and 4.0 octaves. The LOW and HIGH bands also have a shelving function. The composite effect of any EQ adjustments, as well as text describing the equalizer settings, are shown on the LCD screen.



Phase

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

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 located on the upper right corner of the EFS 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, then press the control you wish to lock out. Both the target control and FUNCTION LOCK button will flash rapidly. To activate the lock, press the FUNCTION LOCK button again.

When you press a locked control, both that control and the FUNCTION LOCK button will flash rapidly in unison to let you know you have accessed a locked control. To unlock, press the FUNCTION LOCK button once. The locked control is released.

NOTE: Certain controls **cannot** be locked. These include the FUNCTION LOCK button itself and all TALKBACK buttons.

Dynamics Processing Control Panel (DCM-G9)

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Dynamics Processing Control Panel (DCM-G9)

Controls and Functions

The DCM panel provides compression and limiting functions for individual input channels. This 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 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.

This panel also contains the talkback preselects section, and the display and programmable buttons.

Compressor/Limiter

The compressor algorithm used in the SR-9 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-G9 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 adjustable between 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:



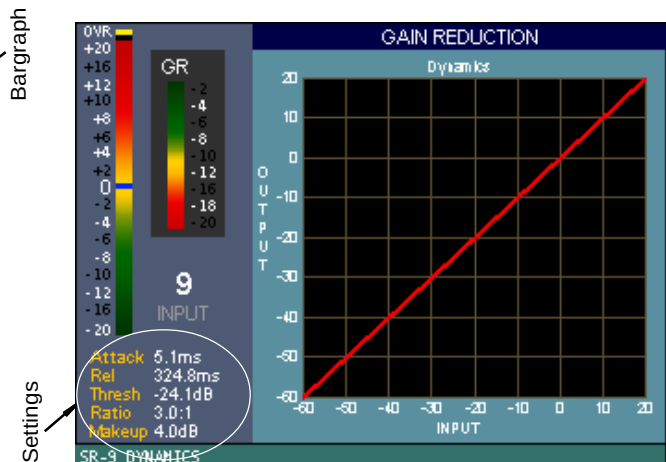
DYN IN

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 input channel LCD display will show a gain reduction bargraph meter, indicating both that the dynamics functions are active, and the amount of gain reduction being generated.

In addition, the DCM master LCD display will show a diagram of the gain reduction functions and text for the various knob settings.



Input LCD Display



Dynamics LCD Display

THRESHOLD

Sets the level at which the compressor is fully into compression of whatever ratio is set.

ATTACK

Determines how quickly (between nominally 1mS and 300mS) 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

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 change by 4dB. Normal usage is between approximately 2:1 and 4:1; anything greater than, say, 7:1 may be considered "limiting".

RELEASE

Determines the nominal time the compressor takes to recover after excitation (between 33mS and 3.3 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 14dB of output gain is available to allow this.

Talkback Preselects

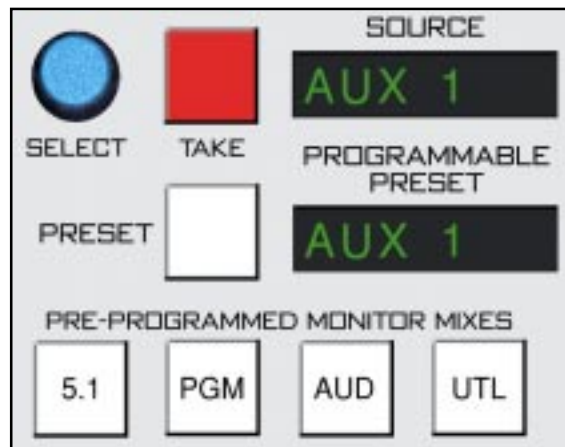
These four switches allow for a dedicated Bridge Router output to be designated as a destination for the talkback signal. Once a specific output has been programmed into the preselector, the talkback signal can be sent to that output at any time by pressing the corresponding switch.

Each of the four TB buttons can be individually programmed, and then the entire programmed bank of four can be stored and recalled in the EVENT CONTROLLER section (see pages 3-9 to 3-11). Each individual TB button is programmed as follows: press the PGM/TAKE button, then press the TB button you want to program. Then rotate the SELECT knob (programmable section on the EFS-SR9 panel) and available destinations will be shown in the SOURCE display. When the desired channel is shown, press TAKE button located next to the SELECT knob (EFS-SR9 panel), and the appropriate TB PRESELECTS display will then match what is shown in the SOURCE display on the EFS-SR9 panel. Repeat this procedure for each of the four TB buttons.

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



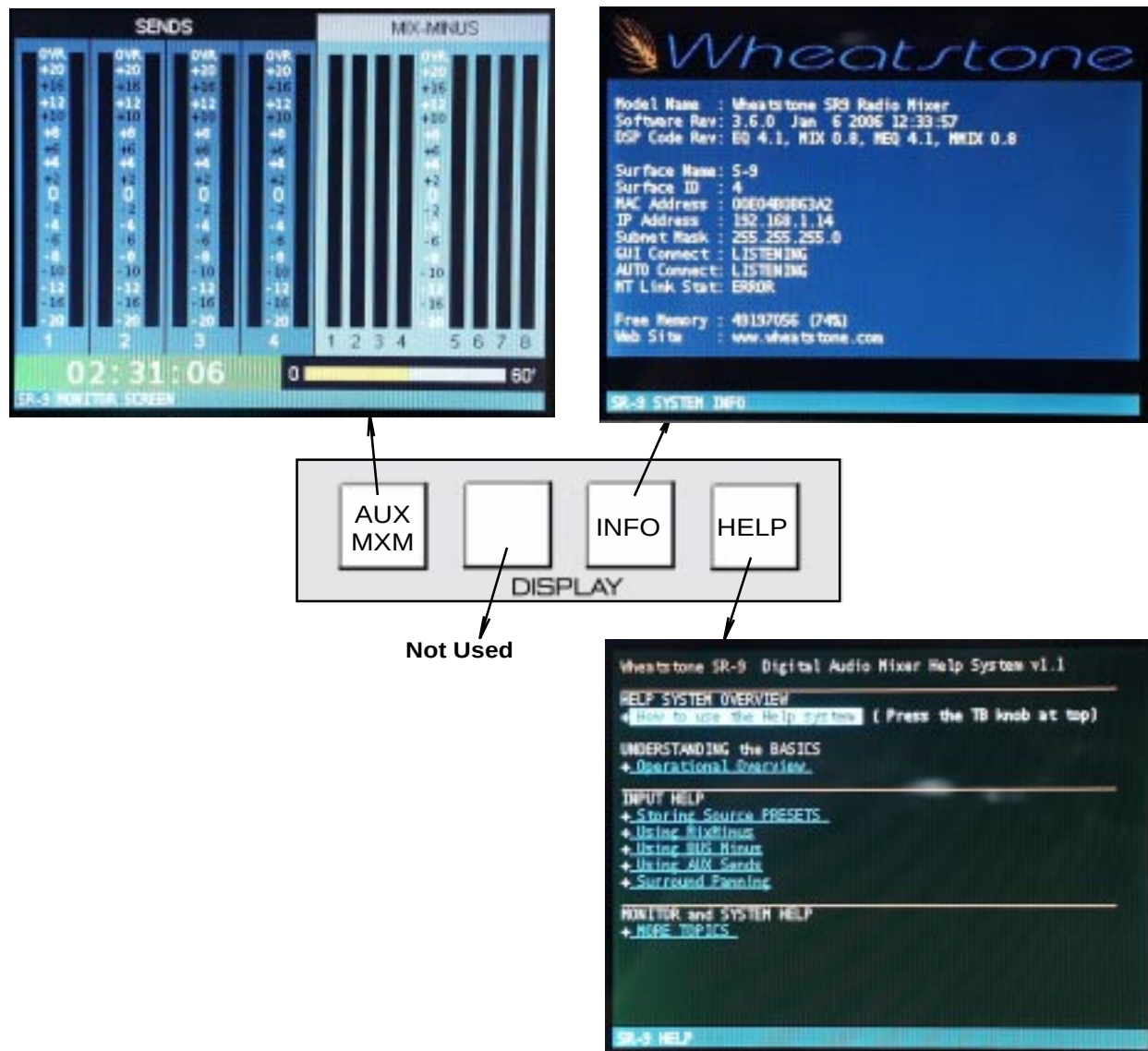
DCM-SR9 Panel



EFS-SR9 Panel

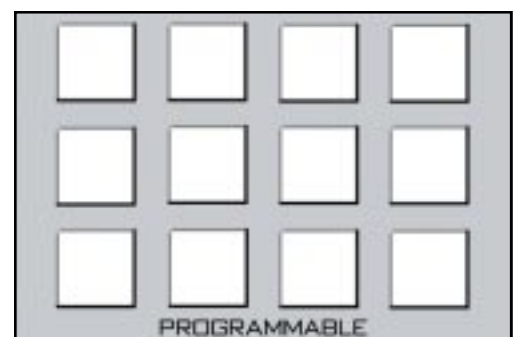
Display Buttons

These switches control the display modes for the LCD monitor.



Programmable Buttons

These (12) momentary switches and indicating LEDs are designed for user accessible external functions (GPIs). With these switches the user can fire Salvos or make a temporary crosspoint without having to wire any physical logic ports. These switches may also be mapped to control physical Logic card output ports, and the LEDs on the Spare buttons may also be lit by a remote device connected to a Logic card input port. See the Bridge Router manual for details.



Phone Panel (TEL-SR9)

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Phone Panel (TEL-SR9)

Controls and Functions

The TEL panel is used for telephone call-ins. Each panel can handle four callers. Caller signals enter the control surface's associated Bridge Router from your station hybrid; each caller has his own fader. Output switches assign callers to any combination of the control surface's four stereo outputs: 5.1 (surround), PGM (program), AUD (audition), and/or UTL (utility).

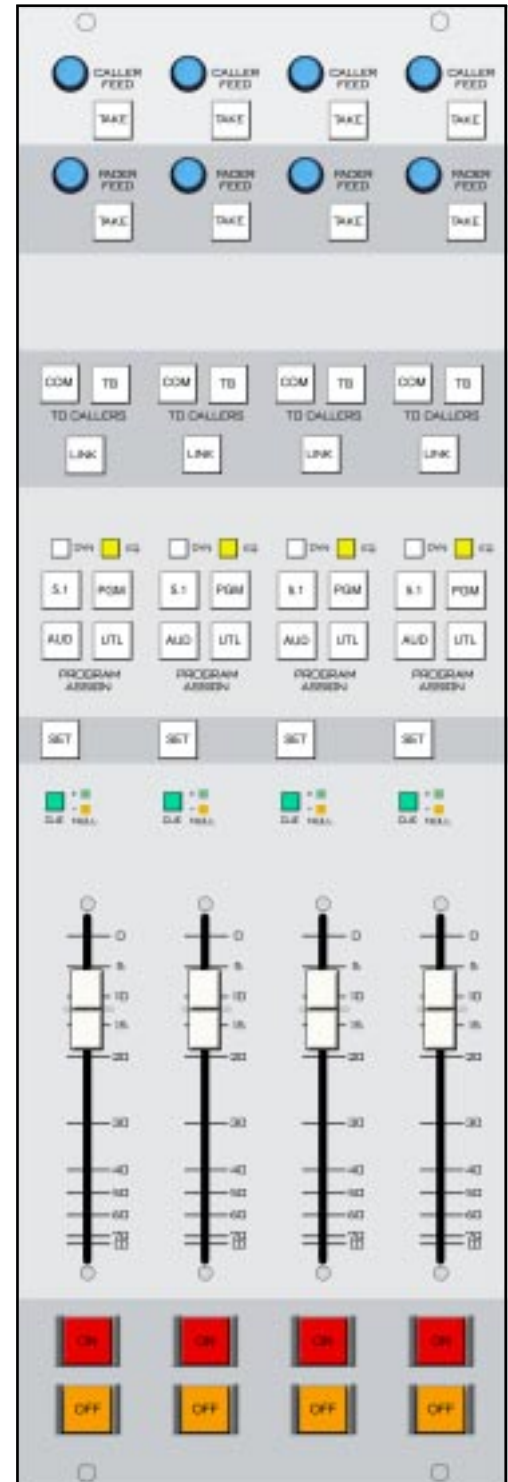
Input Sources

By turning the FADER FEED knob the LCD display will show various sources available to use for inputs on the fader. When the desired source name appears, pressing the TAKE button routes that source to the fader.



Caller Outputs

By turning the CALLER FEED knob the LCD display will show various signals available for the caller feed output. When the desired signal name appears, pressing the TAKE button routes the signal to the caller feed destination. This caller output is the sum of the selected signal and the other caller channels, provided that the LINK button has been pressed. The caller himself is subtracted from this sum. If the LINK button has not been pressed, then only the selected signal is sent to caller.



The LINK button acts to conference two or more caller together. For example, if you have callers on 1, 2, and 3, and you want 1 and 3 to hear each other but 2 to remain isolated from 1 and 3, press the LINK buttons on 1 and 3.

Caller Preview and Talkback

Pressing the COM button toggles the caller's pre on, post fader signal into SOLO and the control surface operator's talkback signal to the caller feed, thus enabling off air communications between caller and operator. The TB button provides the same function, but only while the button is held.

Dynamics and EQ

These buttons allow dynamics and EQ functions, which have been set on the CONTROL panel, to be applied or not to the caller channel. The buttons light up when the processing is active.

Main Bus Assign

As on input channels, these buttons are used to assign the caller signal into any or all of the main stereo mixes: 5.1, PGM, AUD, and/or UTL. Note that the UTL bus can be set up during configuration to be pre/post fader and ON switch.

SET Switch

The SET button allows the operator to access controls in other sections of the control surface, such as EQ, Dynamics, MODE, etc., and apply them to the caller channel in question.

CUE Switch

This switch allows the control surface operator to monitor the caller's pre on, pre fader signal. Once a CUE switch has been activated, the CUE CLEAR button on the EFS panel begins to flash and remains flashing until the CUE switch is turned off. Pressing the CUE CLEAR button will simultaneously turn off all cue switches on the control surface.

Fader

Channel output 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 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.

ON/OFF Switches

Channel ON (red) or OFF (orange) switches are at the bottom of the phone section. The ON switch turns the caller signal ON and fires the channel ON/START logic; the switch LED lights to indicate the channel is ON. The OFF switch turns the caller signal OFF and fires the channel OFF/STOP logic; the switch LED lights to indicate the channel is OFF.

LCD Display

The phone section has an associated LCD display located above the phone section in the control surface meterbridge. This display shows caller level, selected input source, caller feed output mix, channel number, channel status, gain reduction, and other information.



Input Level

The pre-fader level of the caller signal is shown by the large vertical bargraph on the display. The level is indicated in DB on a calibrated scale beside the bargraph. If the channel is stereo, the bargraph shows the sum of the left and right. The bargraph is colored, with green indicating lower levels and red indicating high levels. The nominal level position is in the middle of the range at the “0” scale marking, and shows as a thin blue band in the bargraph. The bargraph itself consists of a moving “DOT” over a solid “COLUMN” where the “DOT” indicates the peak value of the signal, and the “COLUMN” indicates the average value. On the SR-9 control surface the average value column has been set to VU timing characteristics. In addition, a bright yellow rectangle will light at the top of the column if digital “OVER” or clipping is detected.

Caller Feed Output Mix

The currently loaded caller feed output mix name shows on the LCD display underneath the level bargraph. This is the 8-character name as defined in the Wheatstone Bridge Router.

Selected Source

The currently selected source name shows on the LCD display underneath the caller feed output mix. Once again, this is the 8-character name as defined in the Wheatstone Bridge Router configuration.

Channel Status

Various indicators on the LCD display will show status information for the associated channel. Above the level bargraph the words “ON”, “OFF”, or “MUTED” will appear as the channel status changes. “MUTE” indicates that the channel is turned ON and has a mute set. The letters “EQ” will show in the display if equalizer functions are active for the channel, and a smaller bargraph indicating gain reduction will appear if signal dynamics functions (compression, limiting) are engaged.

Channel Number

A large white number shows near the center of the display area indicating the channel number.

Host CPU (HC-9)

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Host Controller (HC-9)

Overview

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

The purpose of the host controller is to provide control of the SR-9 control surface. The HC-9 communicates to the XPoint Configuration PC via TCP/IP over Ethernet through a standard ethernet hub or switch. It also communicates to the Bridge Router system via a special mixer link connection.

Hardware and software configuration, as well as real time crosspoint information, is saved in non-volatile storage on the HC-9 card and is restored at power up or reset. This configuration information provides details to the host application running on the HC-9, such as the specific audio hardware available and serial port allocation. The HC-9 host controller card can be fitted with an optional 2nd PC/104 computer for redundancy.

HC-9 BIOS Settings/Format

BIOS Setup and formatting of the Host CPU is completed prior to the testing of your SR-9 control surface at the Wheatstone factory. There are no user adjustable settings. Please contact customer support with questions regarding the PC/104 SBC BIOS settings or flash disk formatting.

Ethernet IP Addressing

The Wheatstone SR-9 control surface ships with the host controller IP address set. Stand-alone systems (not interfaced to a station's existing network) require no IP address changes.

Ethernet Interface Wiring

Networked systems are connected to the network hub or switch via a straight (pin to pin) 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 - SW5 - Not Used

The four positions of dipswitches SW1-SW5 are reserved for future use.

SW6 - 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.

SW7 - 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.

SW8 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.

SW8 Position 2 - Not Used

This dipswitch position is reserved for future use.

SW8 Position 3 - Redundant CPU

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

SW8 Position 4 - CAT5 vs. Fiber

The mixer link can be connected via CAT5 cable or fiber optic cable. Set position 4 of SW8 on if you are using CAT5 or off if you are using fiber.

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 SC 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

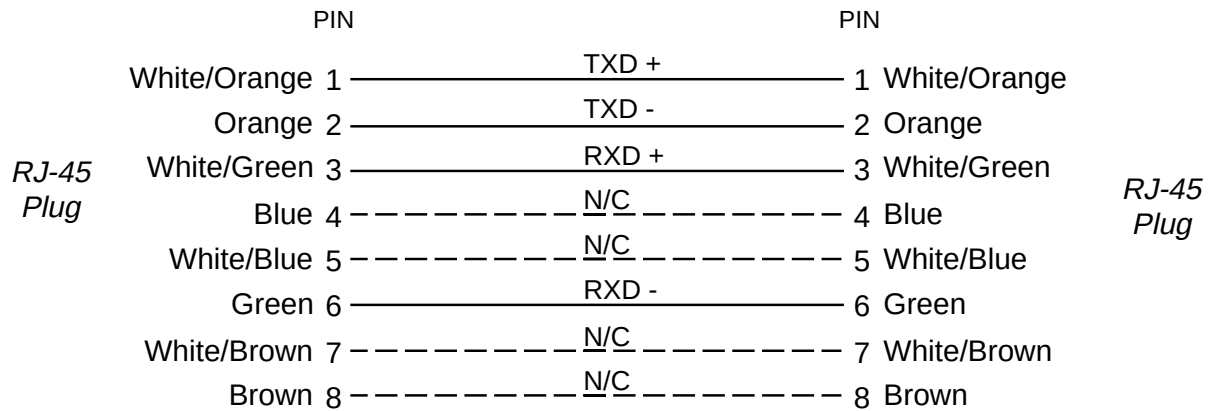
“ETH B” RJ-45—OPTIONAL REDUNDANT COMPUTER ETHERNET CONNECTOR

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

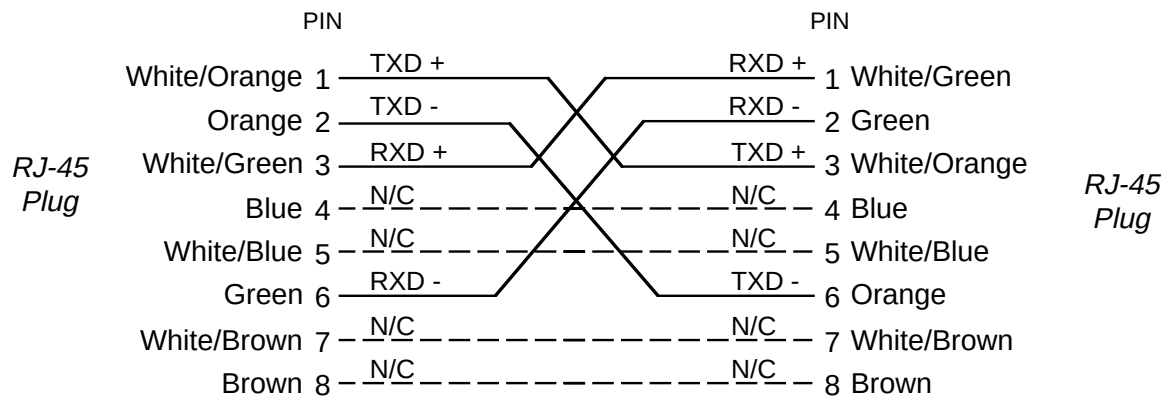
Pin 1 – TXD +
 Pin 2 – TXD -
 Pin 3 – RXD +
 Pin 4 – N/C
 Pin 5 – N/C
 Pin 6 – RXD -
 Pin 7 – N/C
 Pin 8 – N/C

TYPICAL ETHERNET CABLE



USED FOR CONNECTING THE HOST CONTROLLER TO YOUR NETWORK HUB.

TYPICAL CROSSOVER CABLE



USED FOR MIXER LINK CONNECTOR.

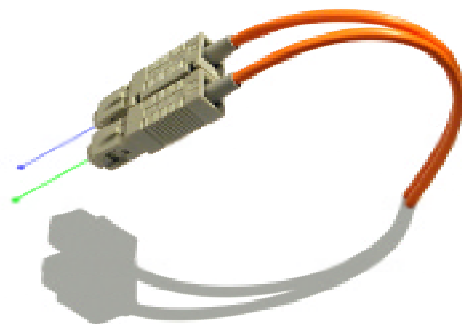
Optical Fiber Interface

The SR-9 control surface supports an optional fiber connection to the Bridge Router.

Connector Type

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

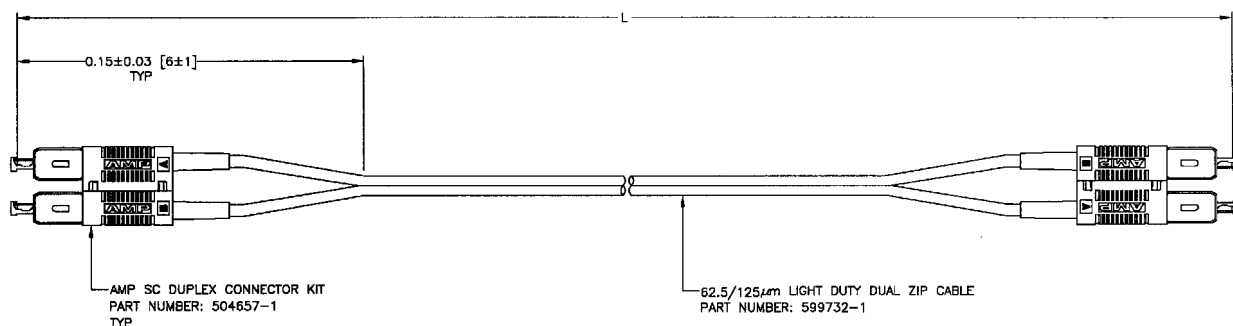
AMP SC Duplex connector Kit Part Number:
504657-1



Optical Fiber Cable

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

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

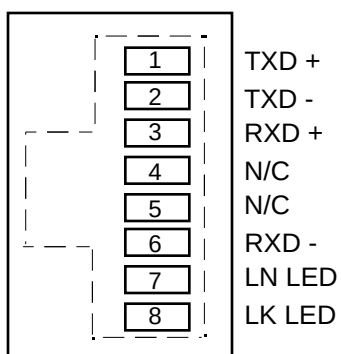


DIMENSIONS IN [] ARE IN INCHES.

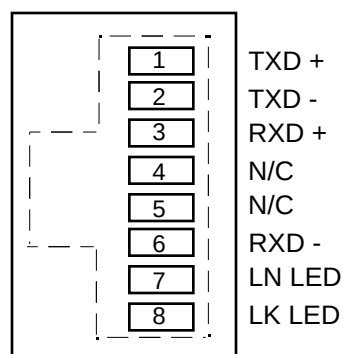
HC-9 Host Controller I/O Connections

Ethernet Connections

**"A" Main Ethernet
Connector
(RJ-45)**

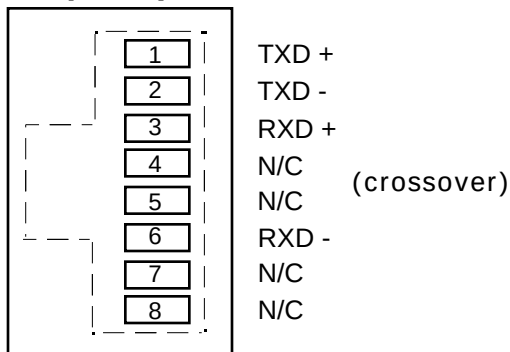


**"B" Optional Redundant Computer
Ethernet Connector
(RJ-45)**



Mixer Link Connections

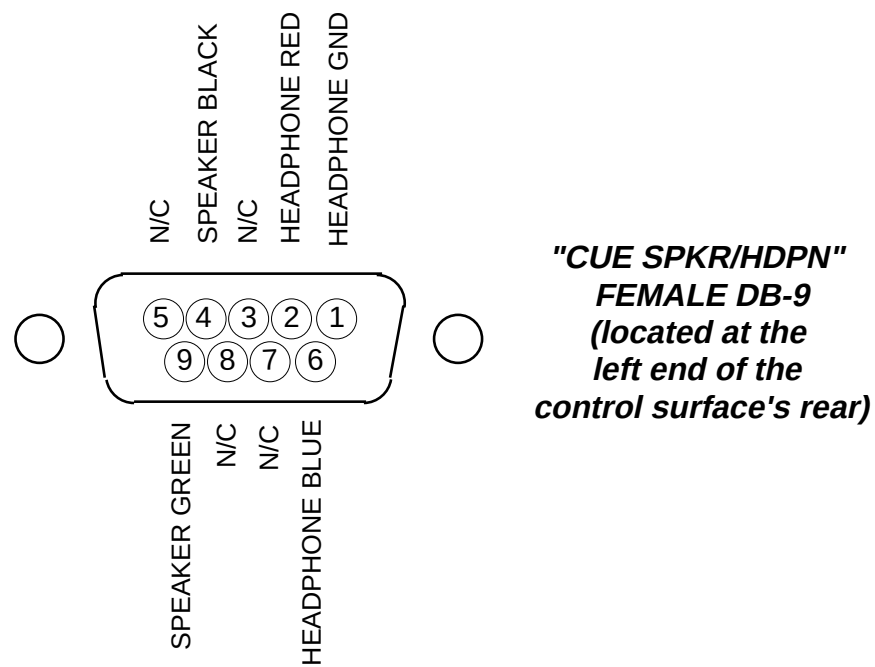
**CAT5
Connector
(RJ-45)**



**Optional Optical
FIBER
(SC Connector)**



Cue Speaker /Headphone Pinouts



Schematic and Load Sheet Drawings

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IQ-9 IQ Card

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Load Sheet	7-10

MN-9 Control Panel Switch Card

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DCM-9 DCM Panel Switch Card

Schematic	7-17
Load Sheet	7-20

SP-9 4 Phones Panel Switch Card

Schematic	7-21
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HC-9 Host Controller Card

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BP-9 Back Plane Card

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BPR-9 Back Plane Repeater Card

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32VC5-5 +5V DC to DC Converter Card

Schematic	7-37
Load Sheet	7-38

VU-9 VU Receiver Card

Schematic	7-39
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SW2-700 Switch Card

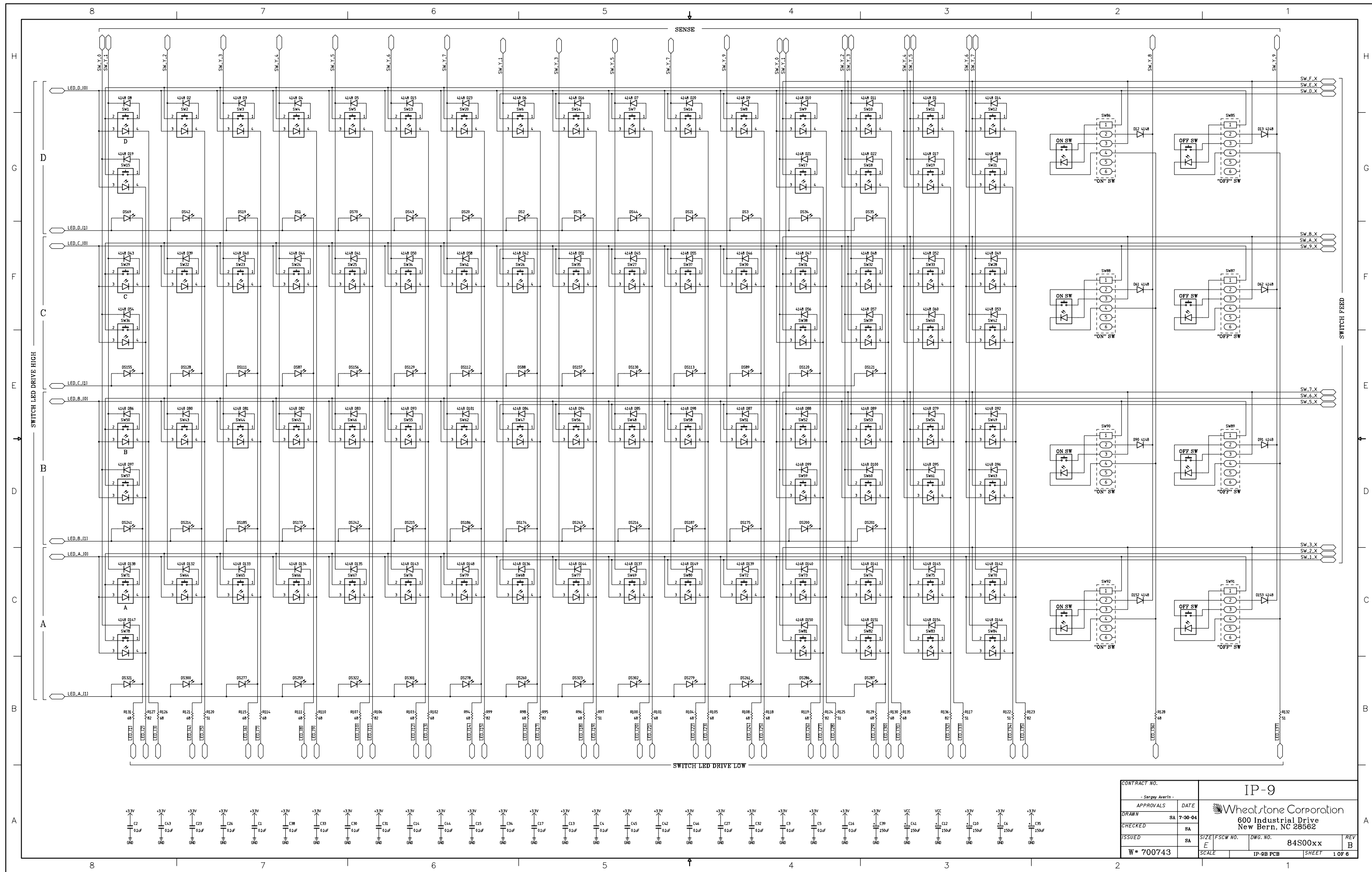
Schematic	7-41
Load Sheet	7-42

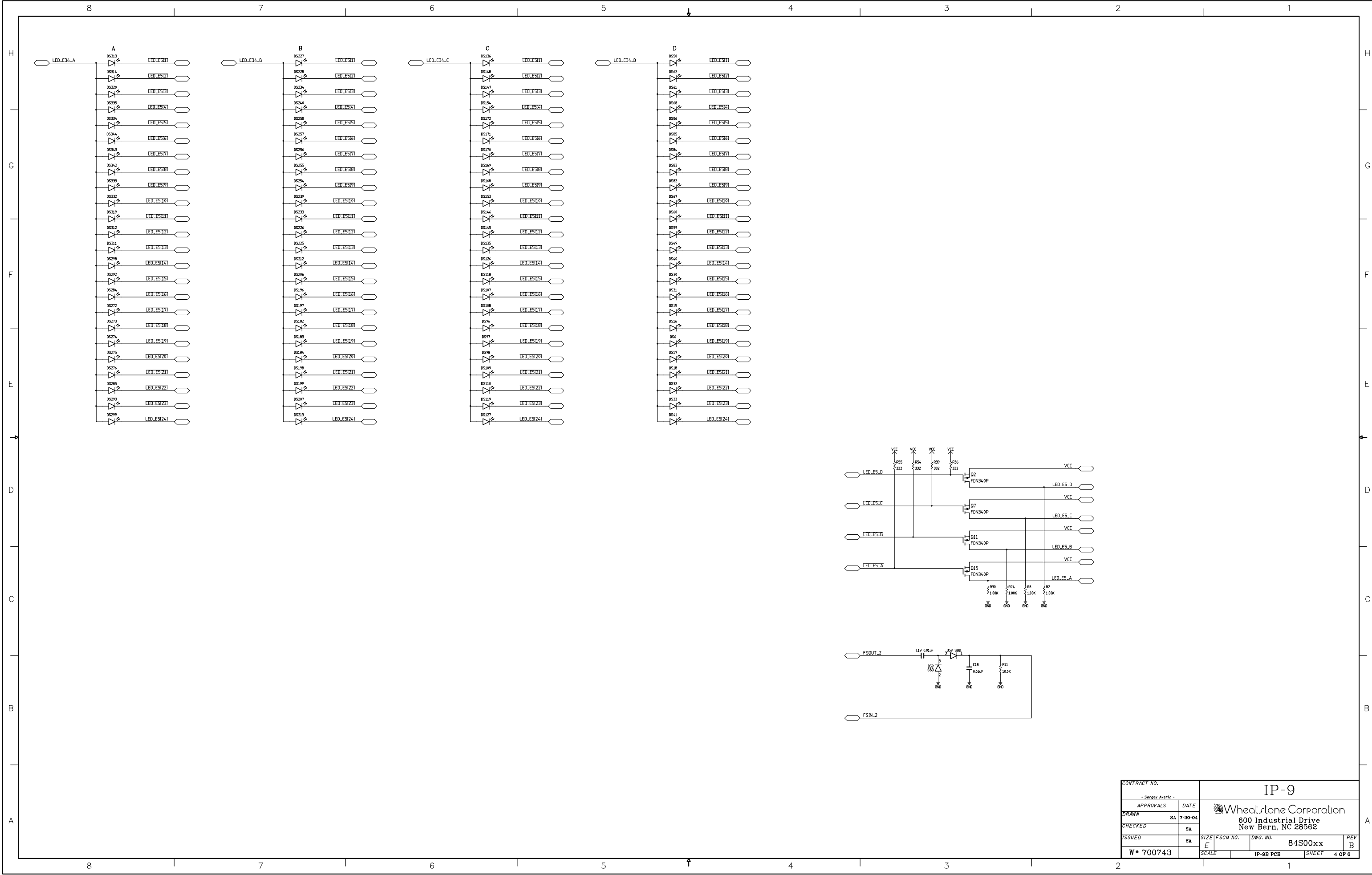
PWI-5.1 Power Interface Card

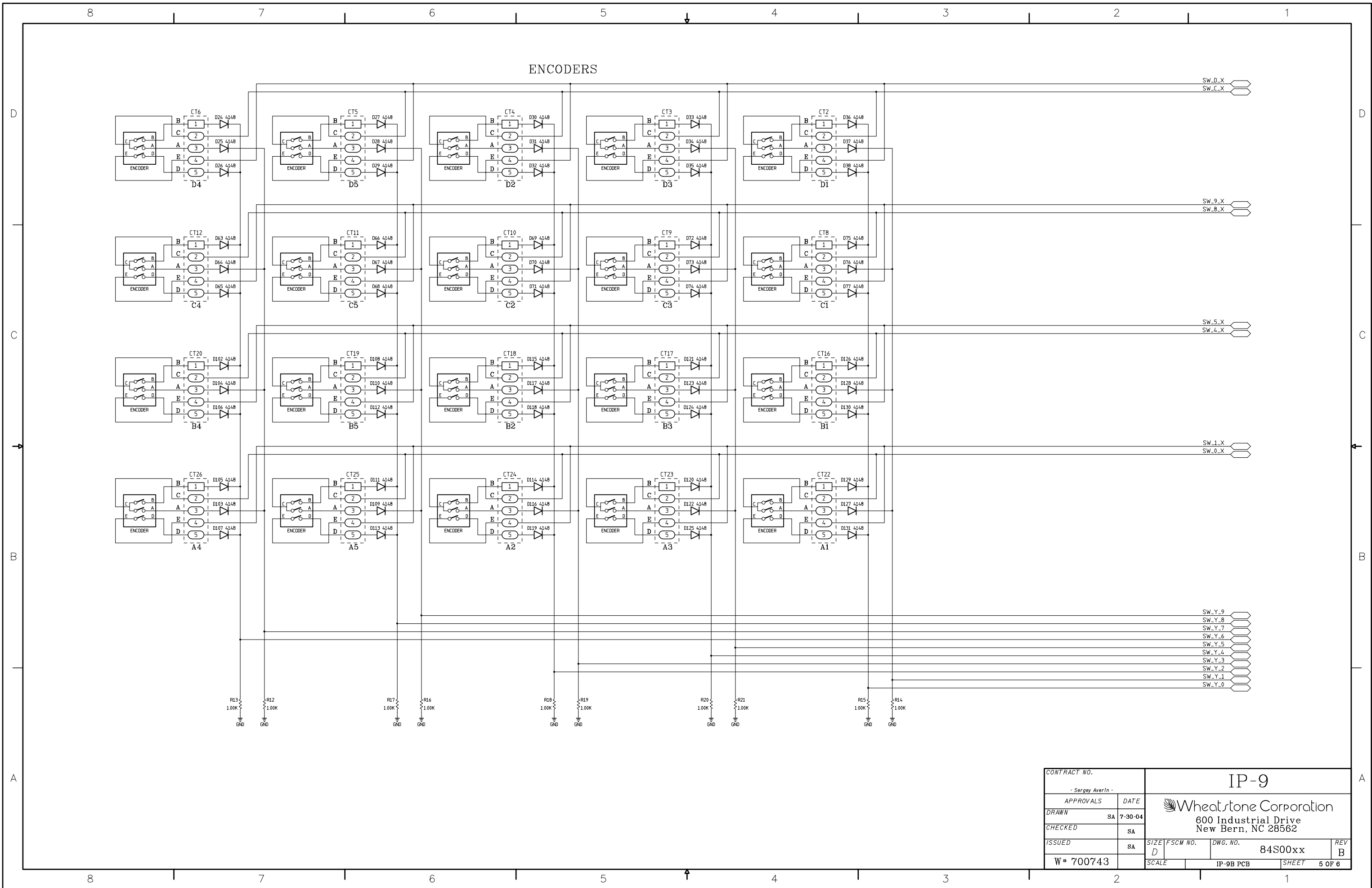
Schematic	7-43
Load Sheet	7-44

PSU-1 Power Supply

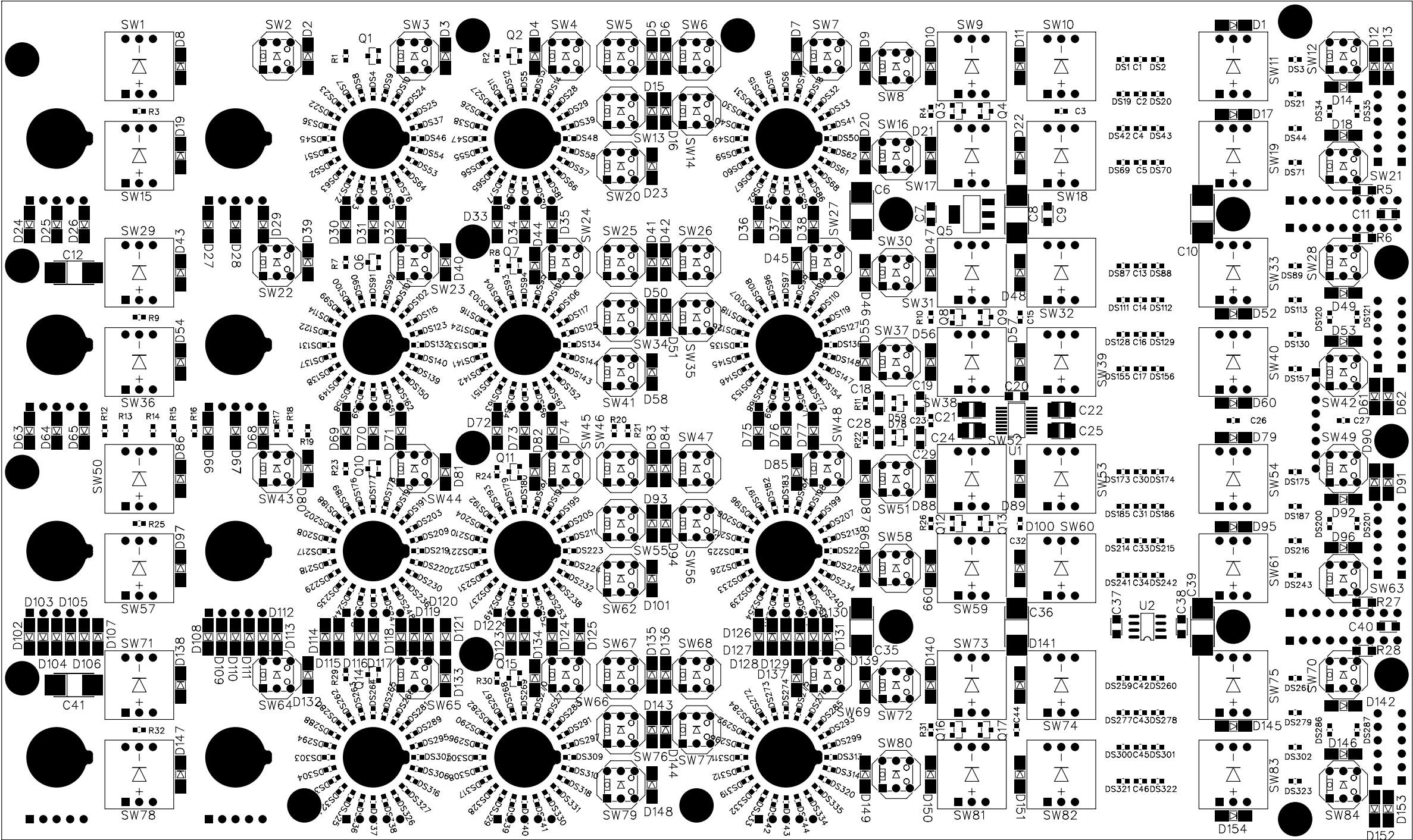
Schematic	7-45
Load Sheet	7-46

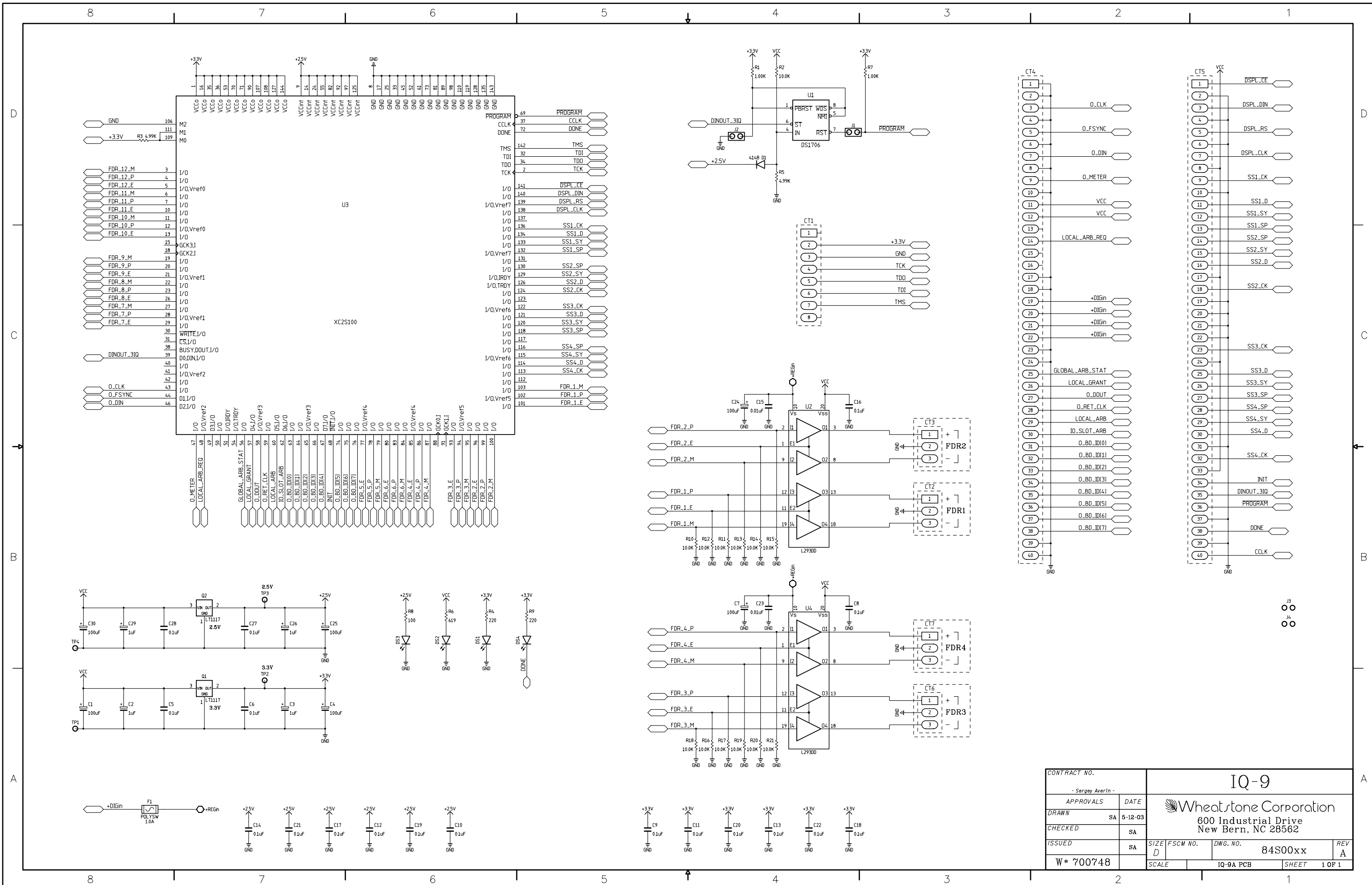




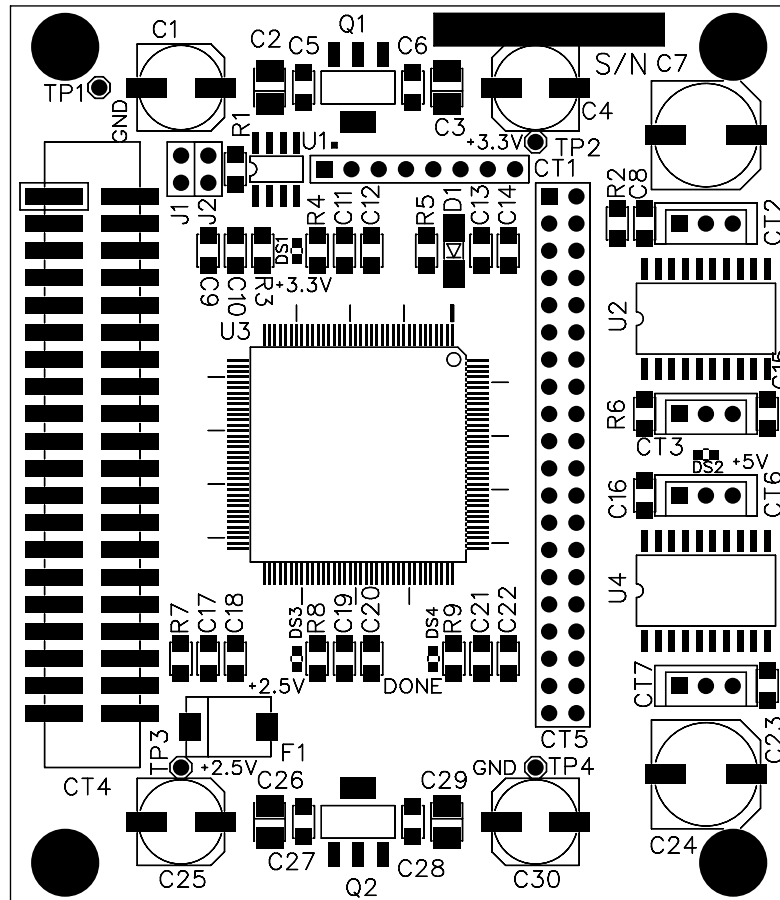


IP-9 4 Input Panel Switch Card Schematic - Sheet 5 of 6

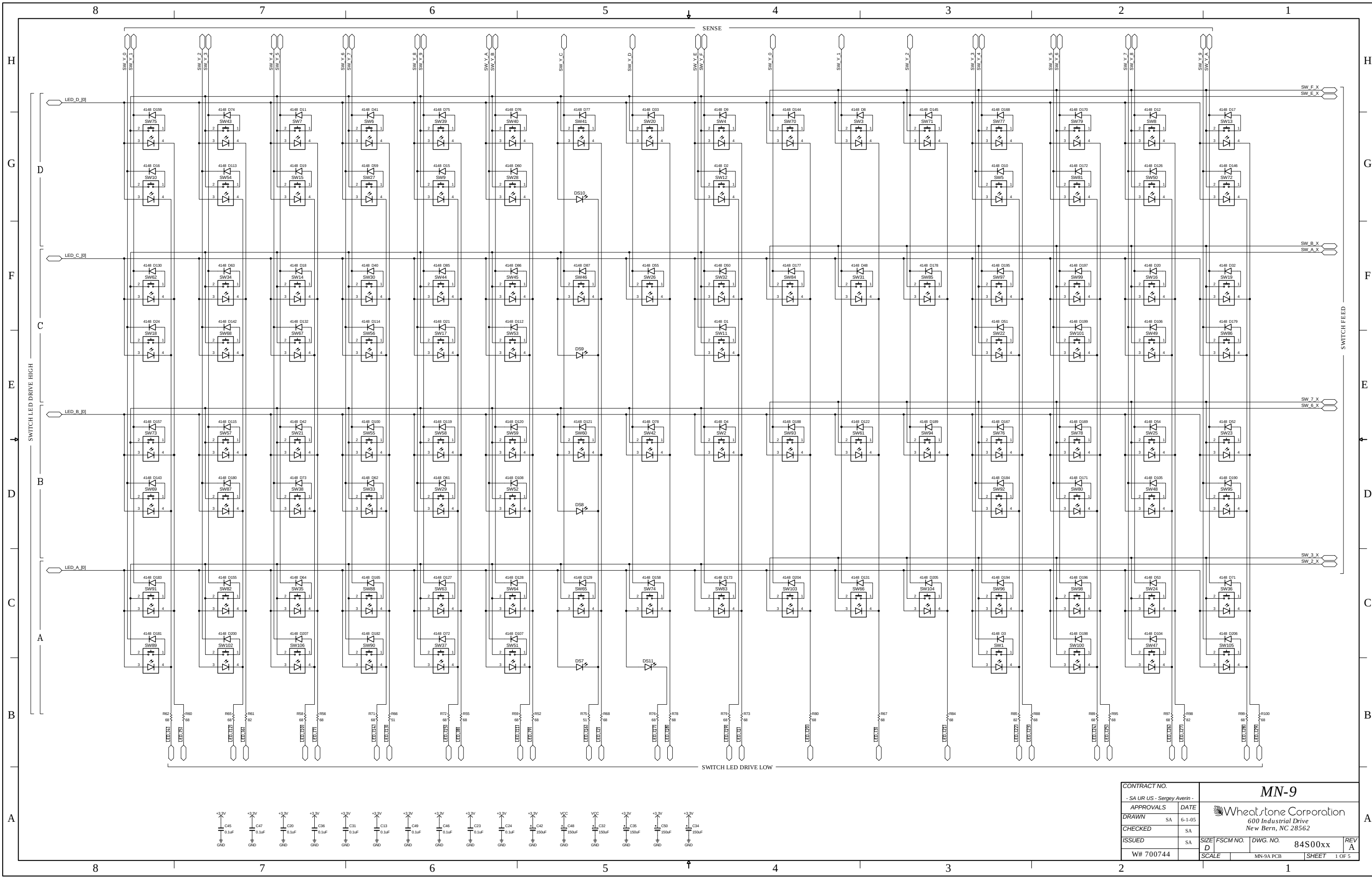


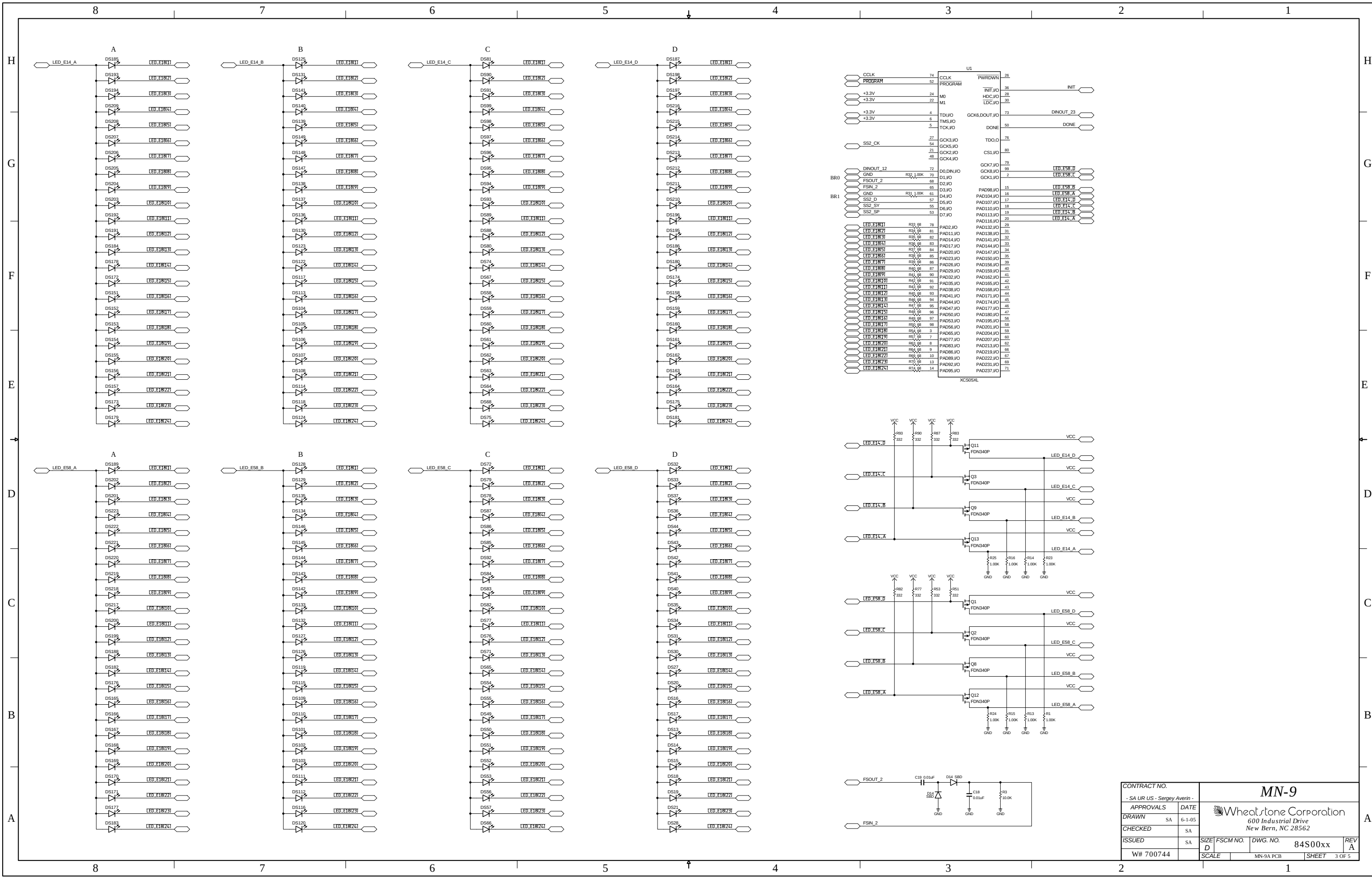


IQ-9 IQ Card Schematic - Sheet 1 of 1



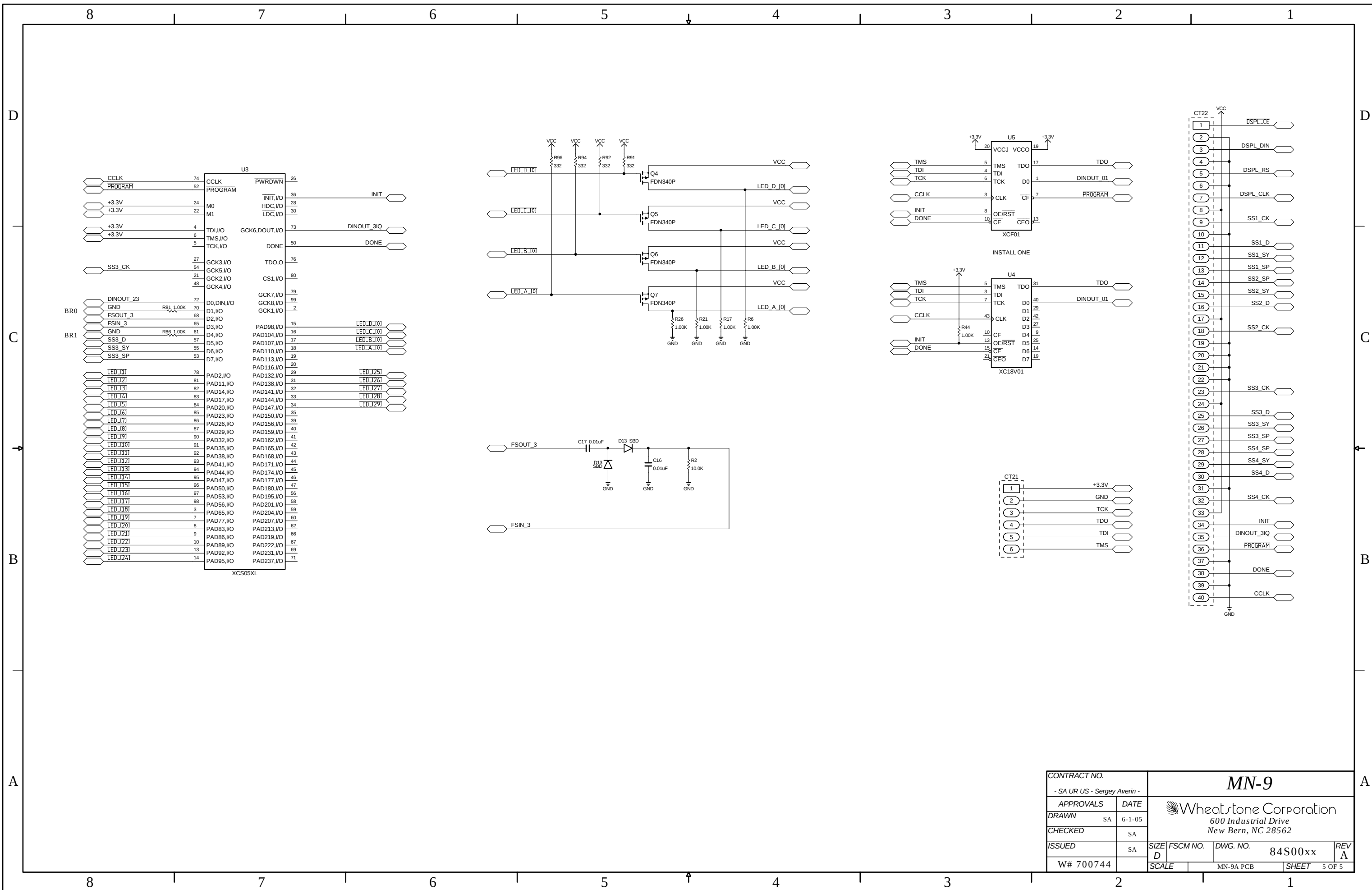
IQ-9 IQ Card Load Sheet

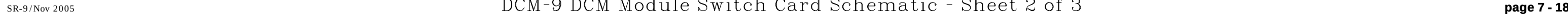


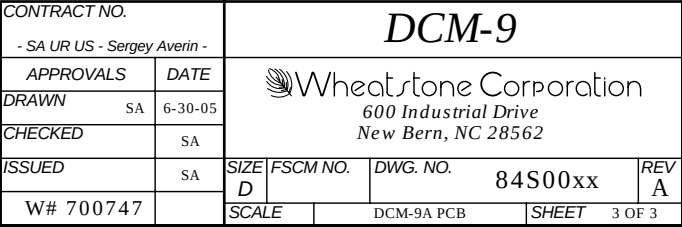




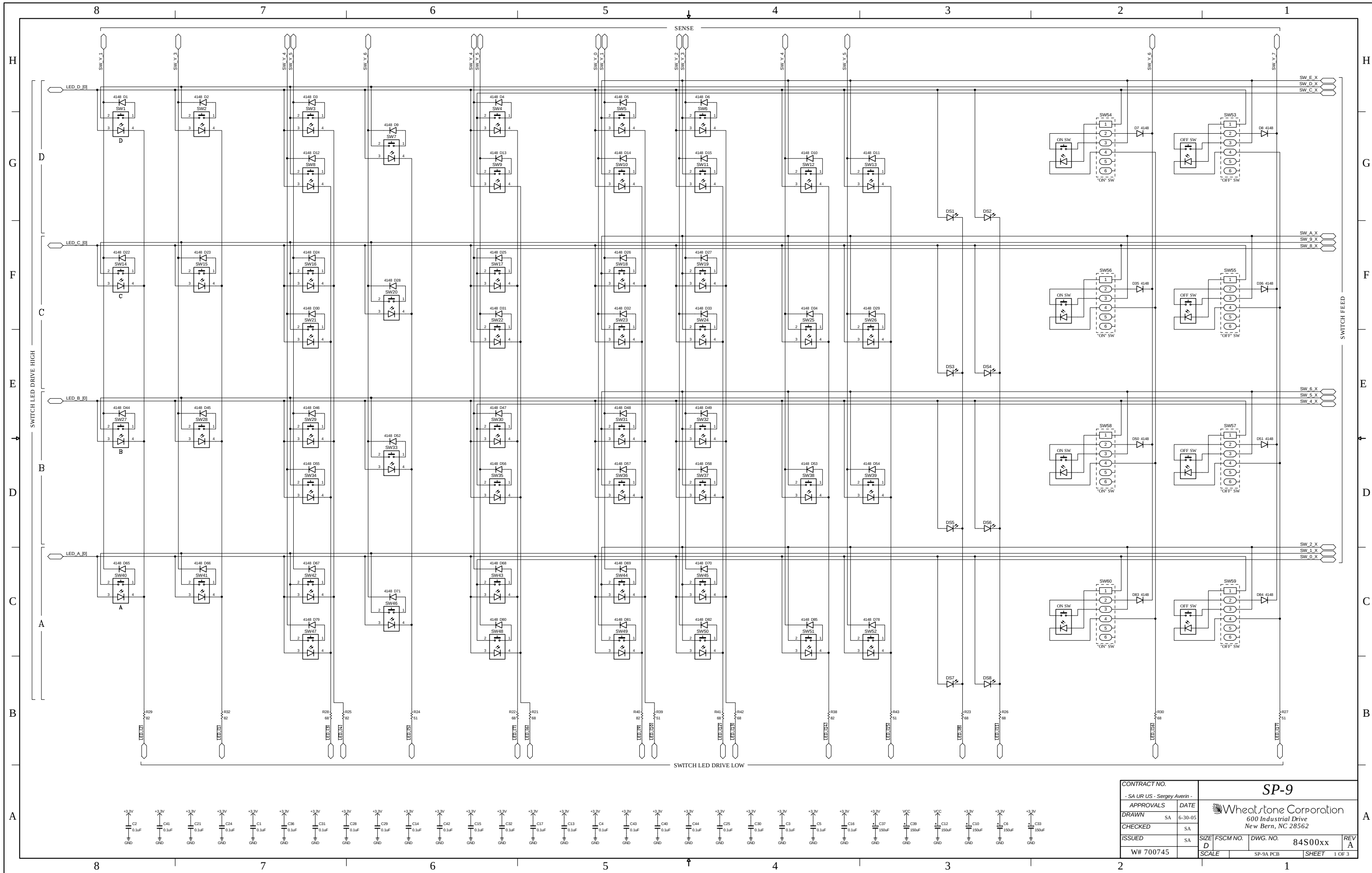
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ISSUED SA			
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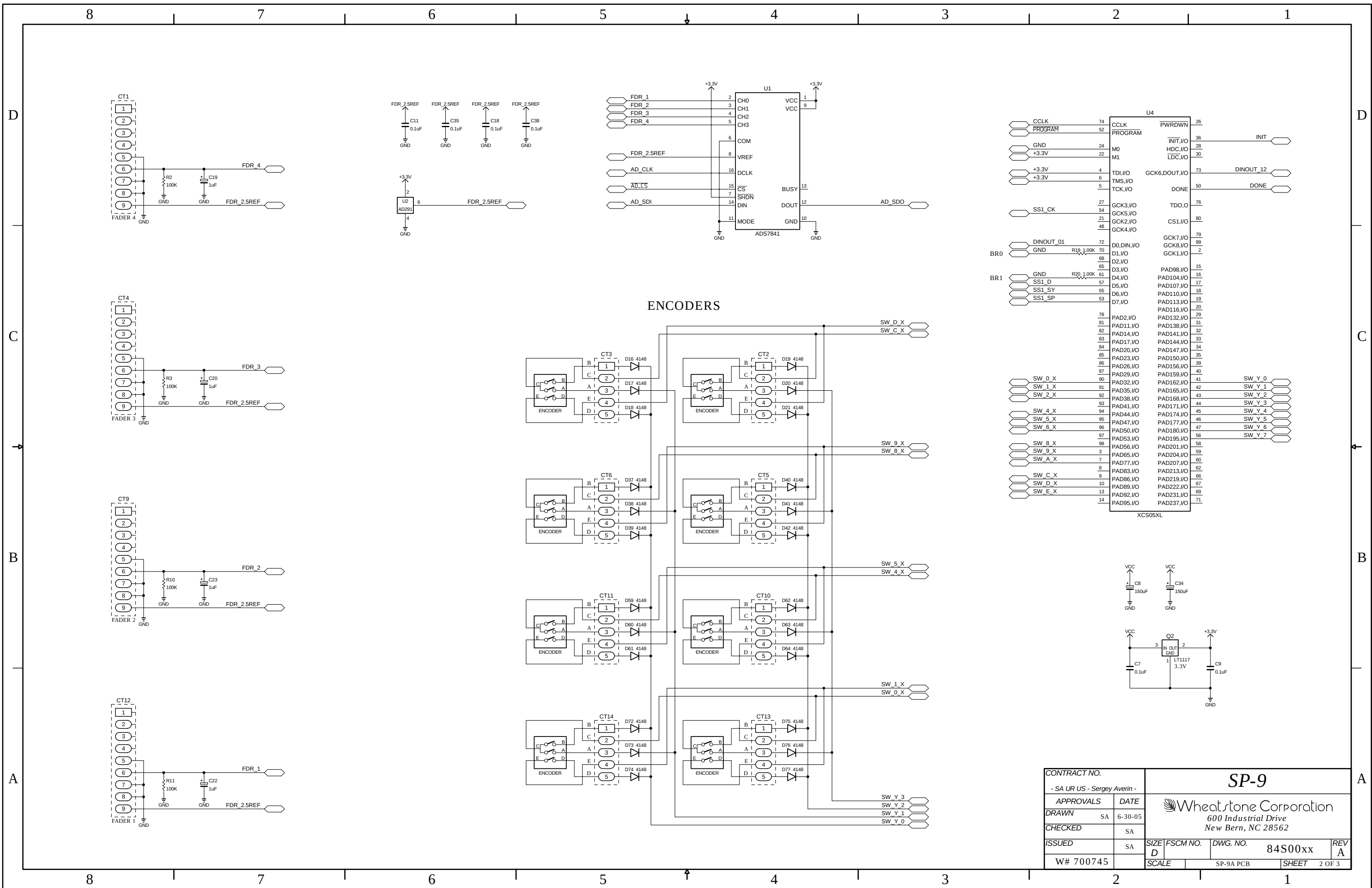


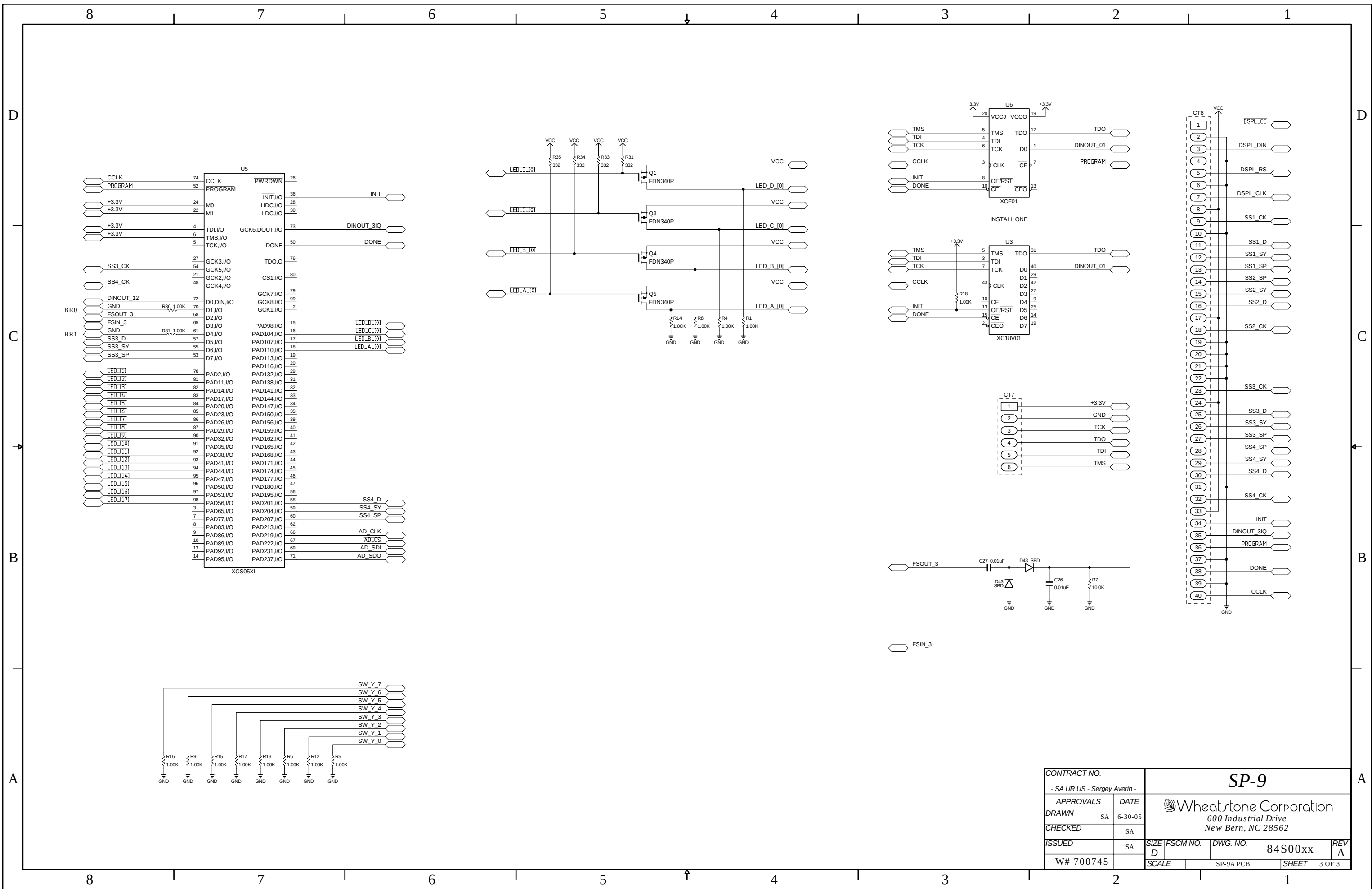




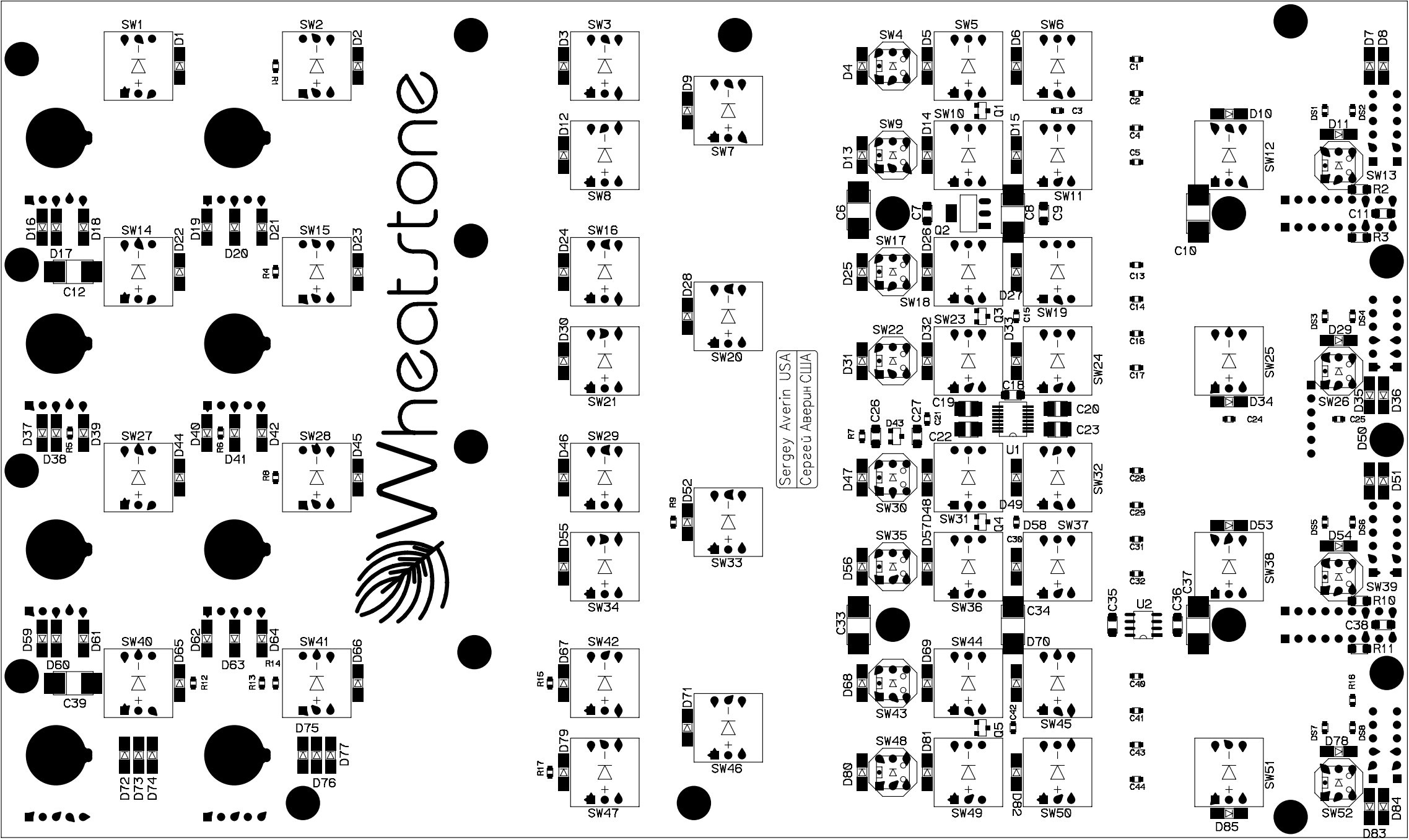
SR-9 / Nov 2009

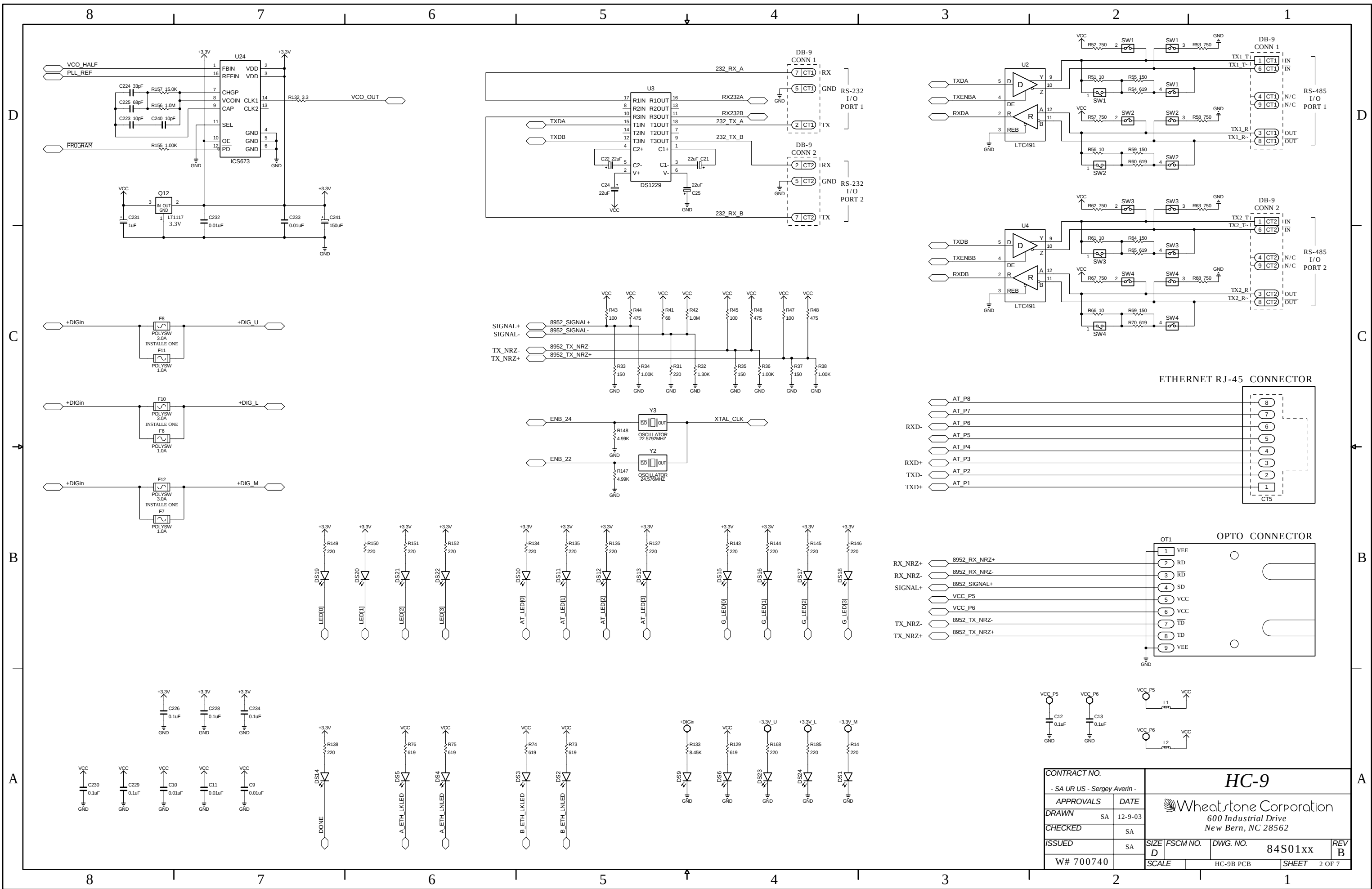




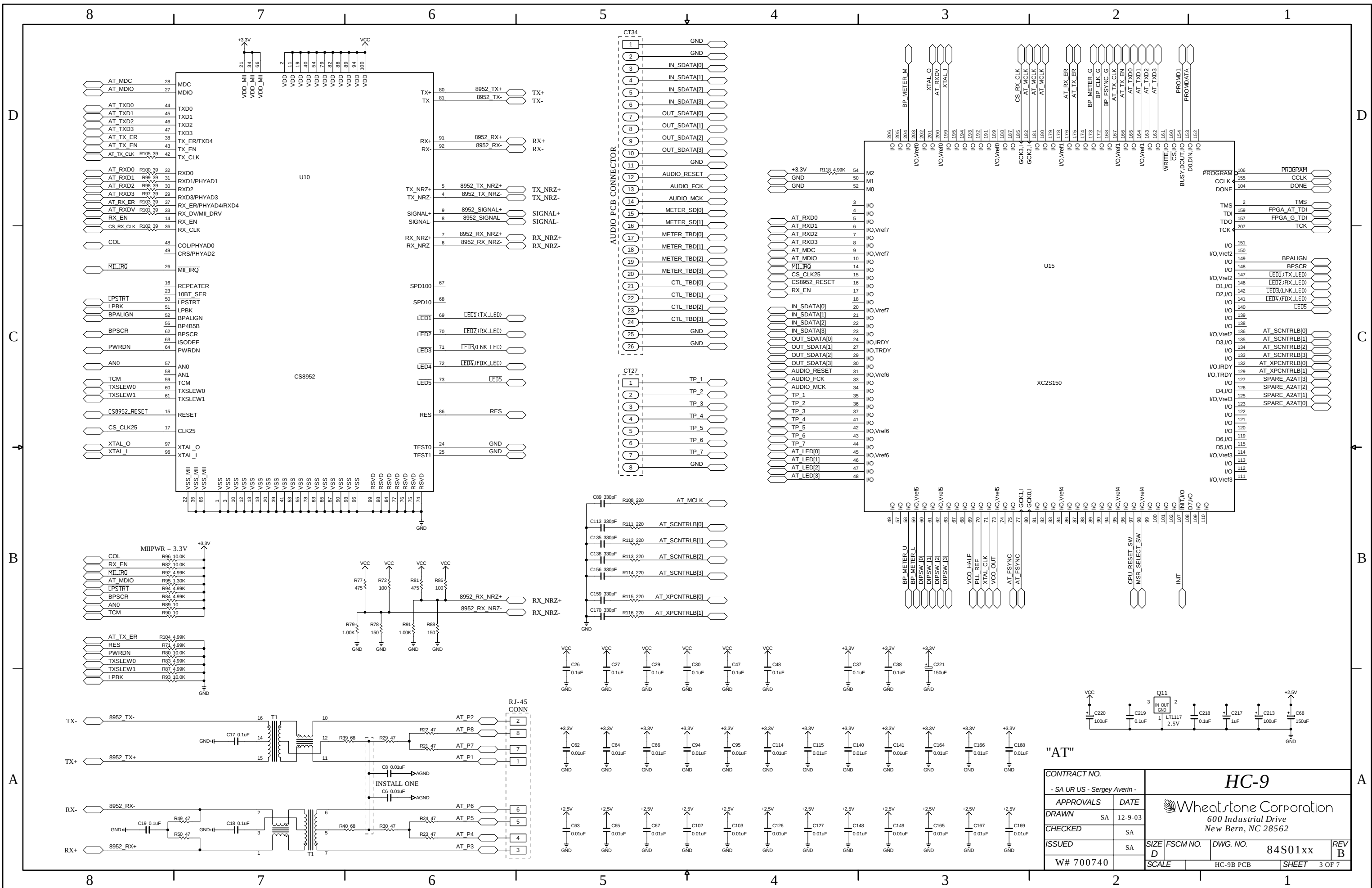


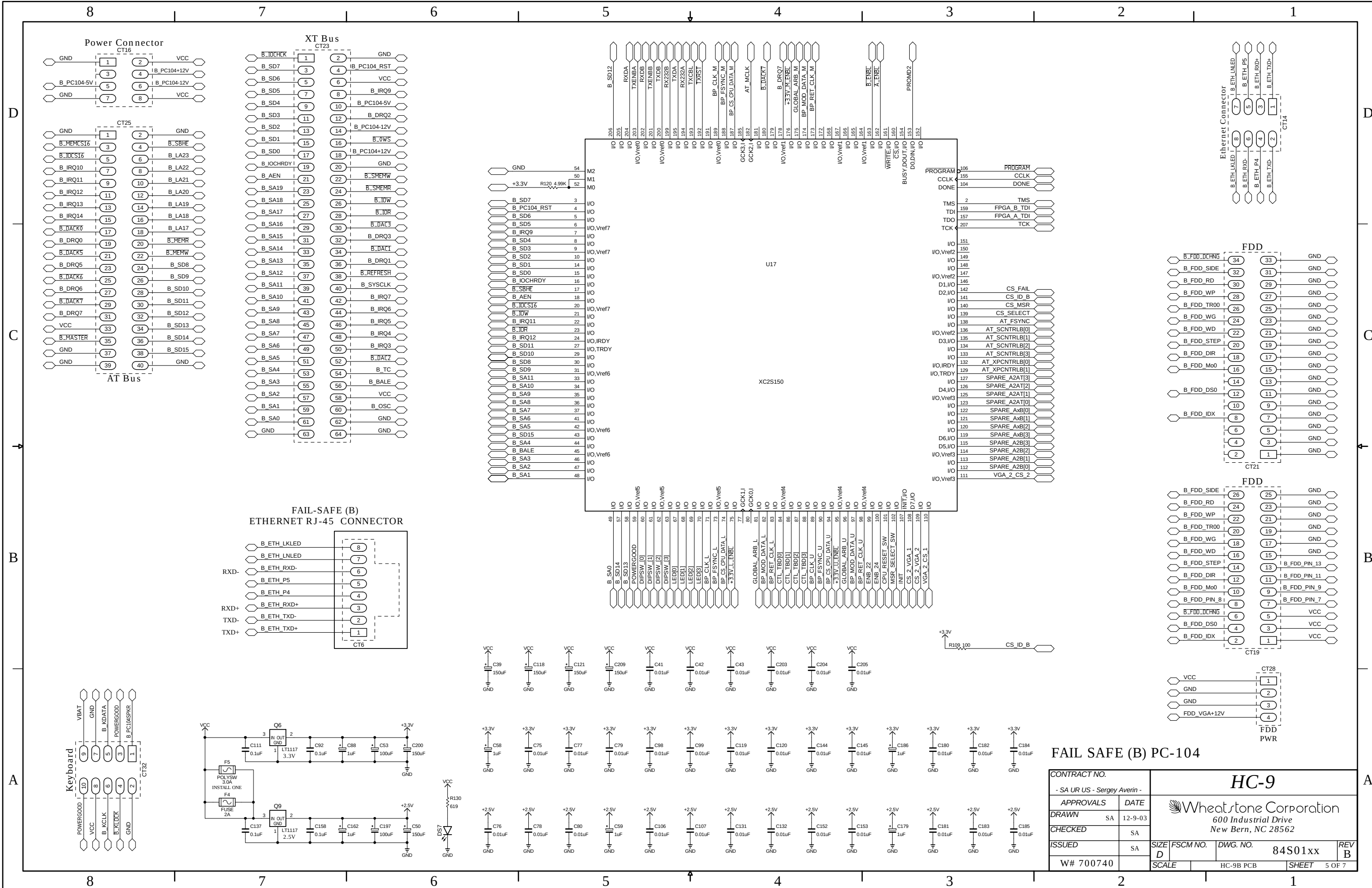
SP-9 4 Super Phone Module Switch Card Schematic - Sheet 3 of 3



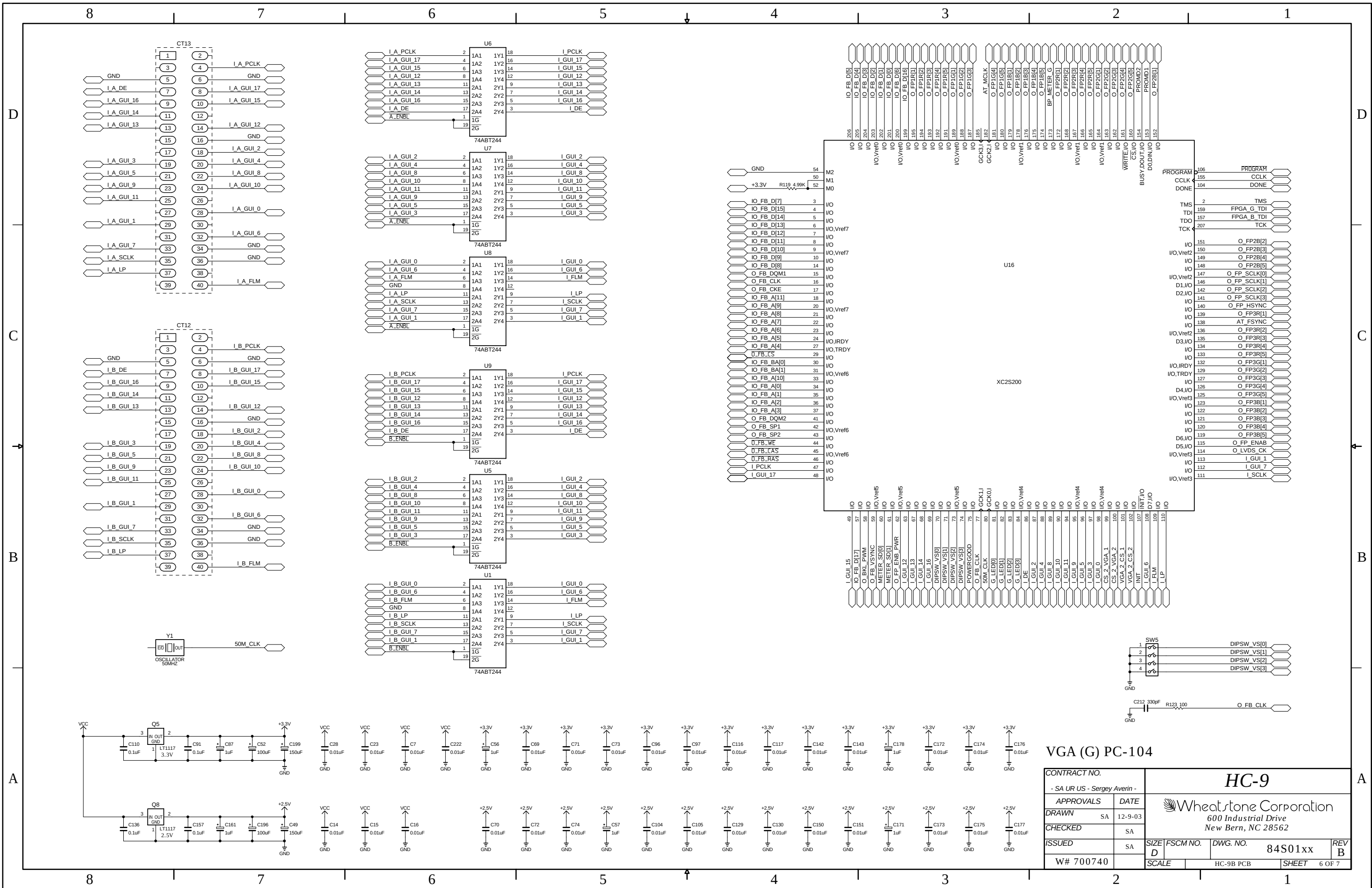


HC-9 Host Controller Module Schematic - Sheet 2 of 7

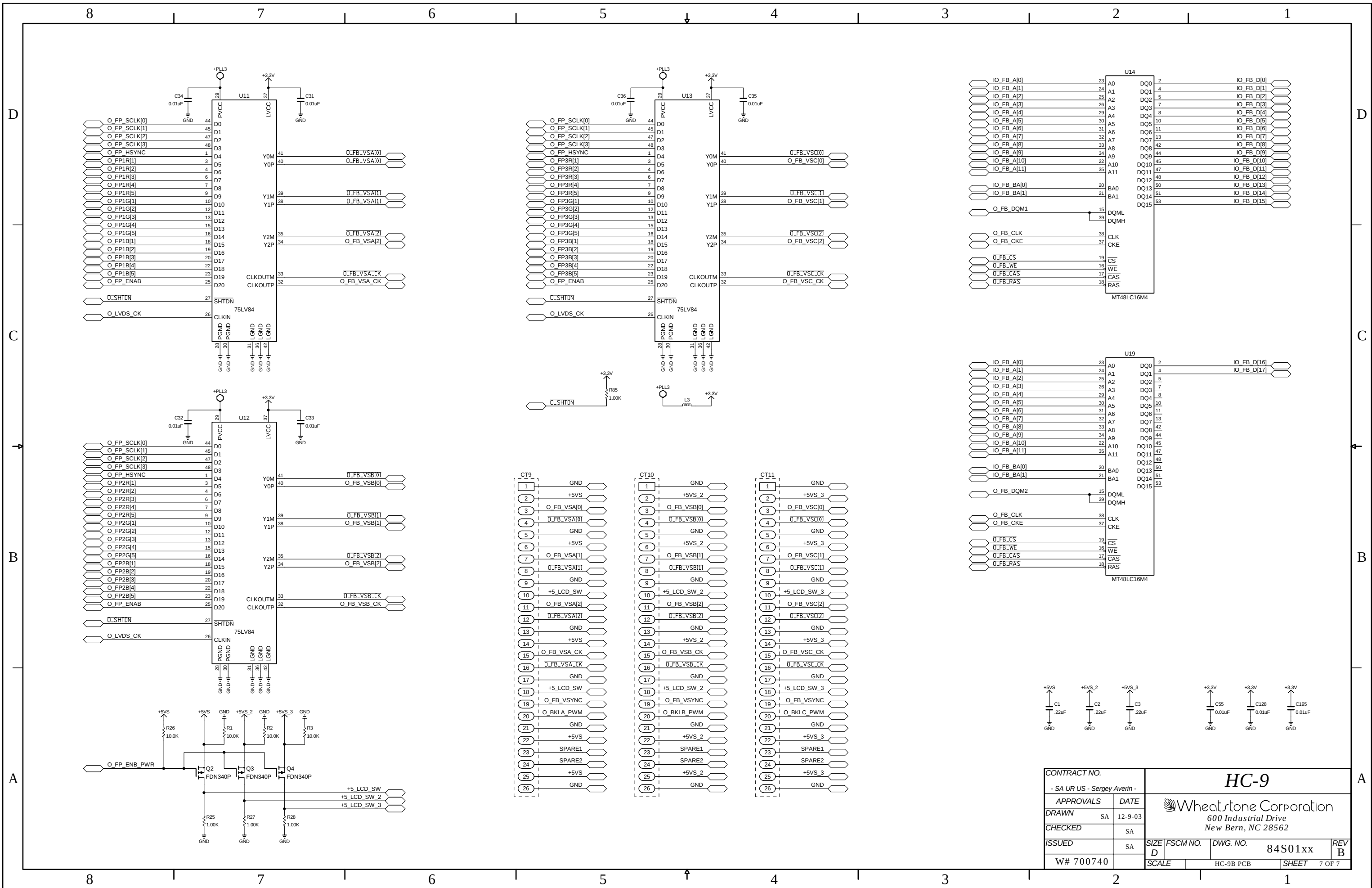


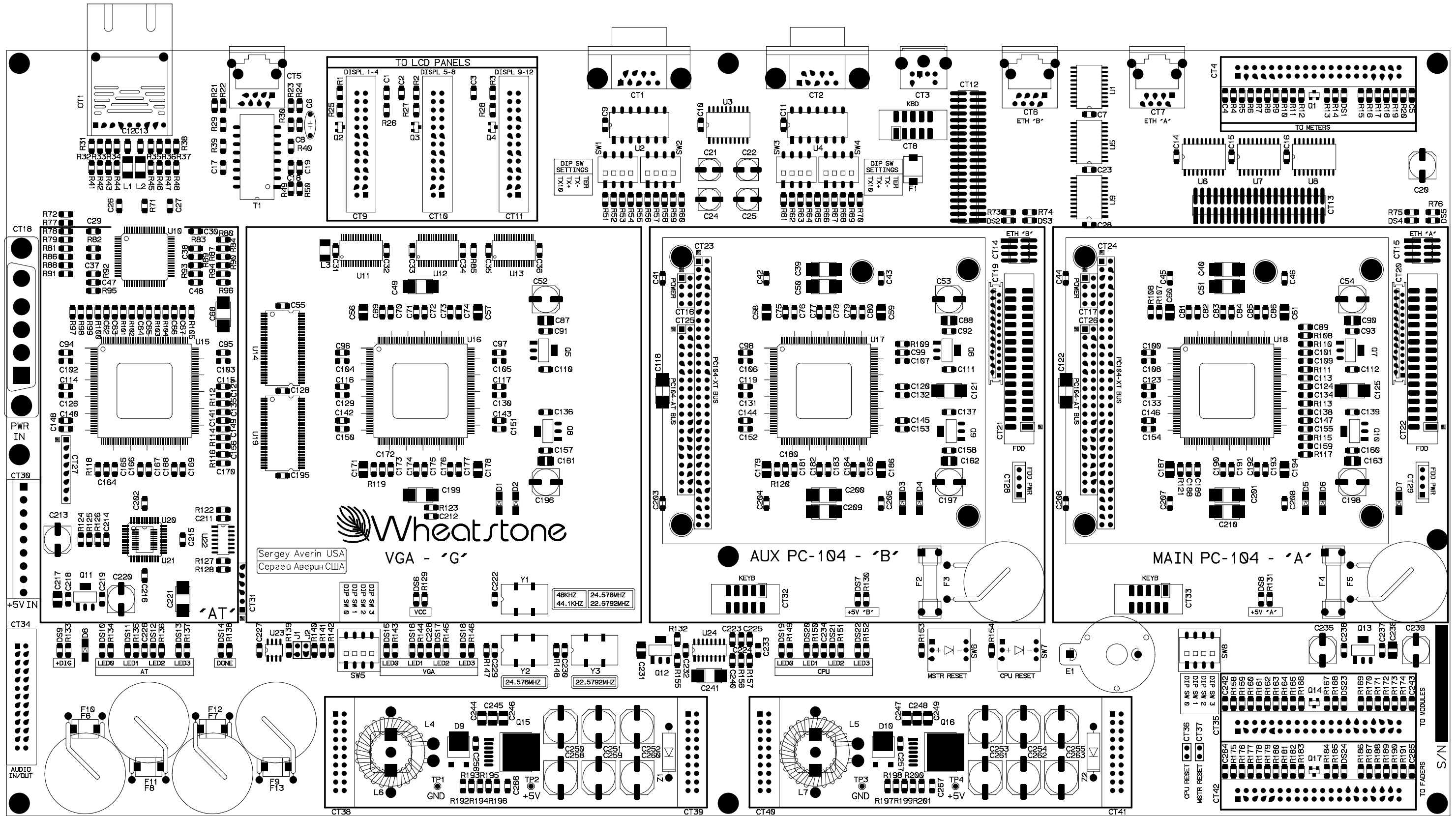


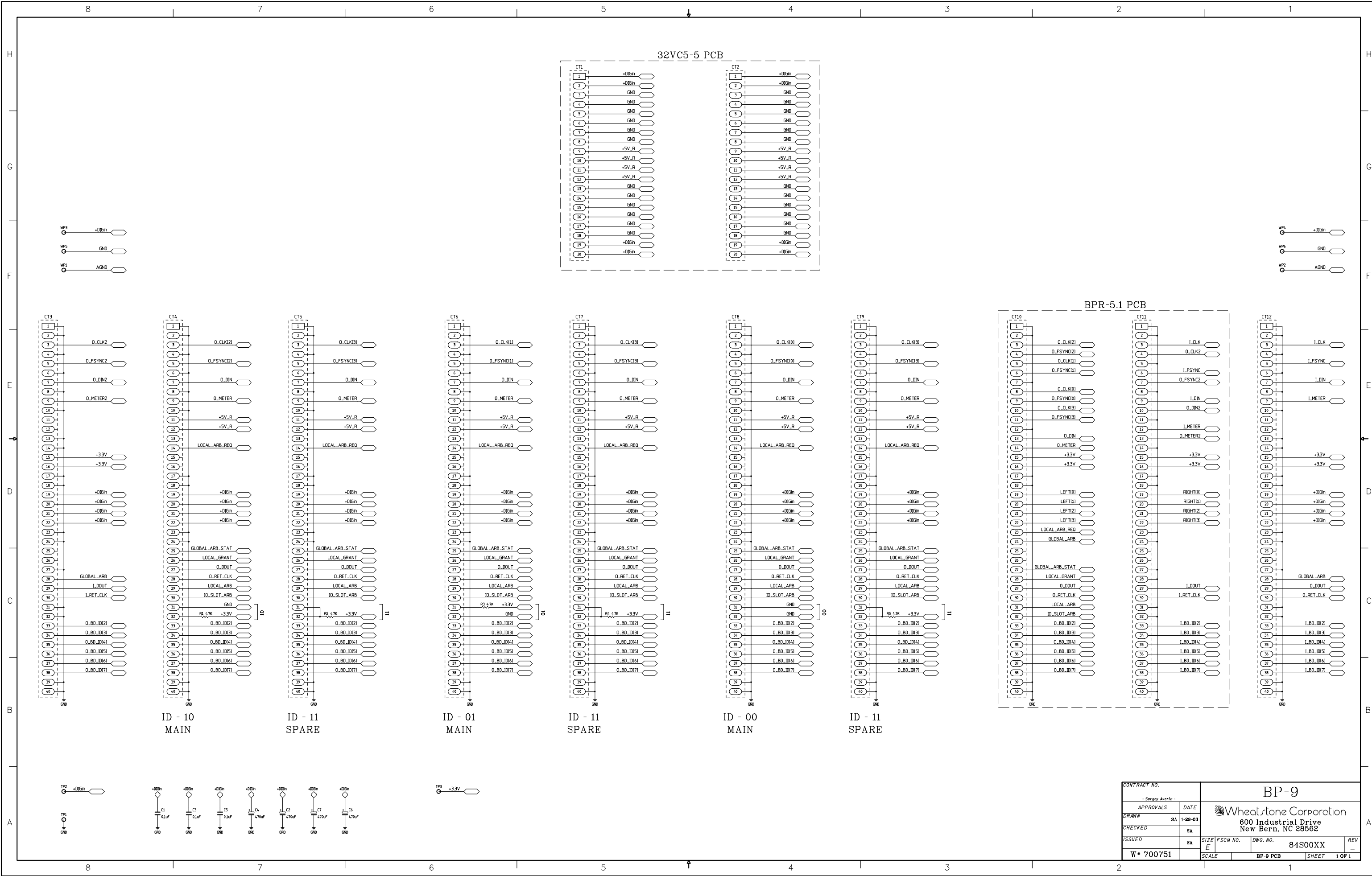
CONTRACT NO.		HC-9	
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ISSUED	SA	DWG. NO.	84S01xx
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		SHEET	5 OF 7

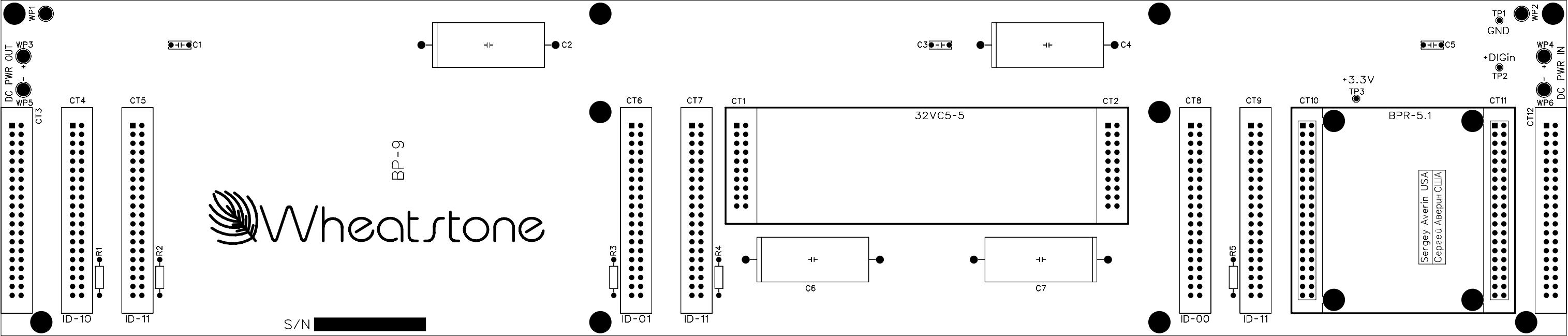


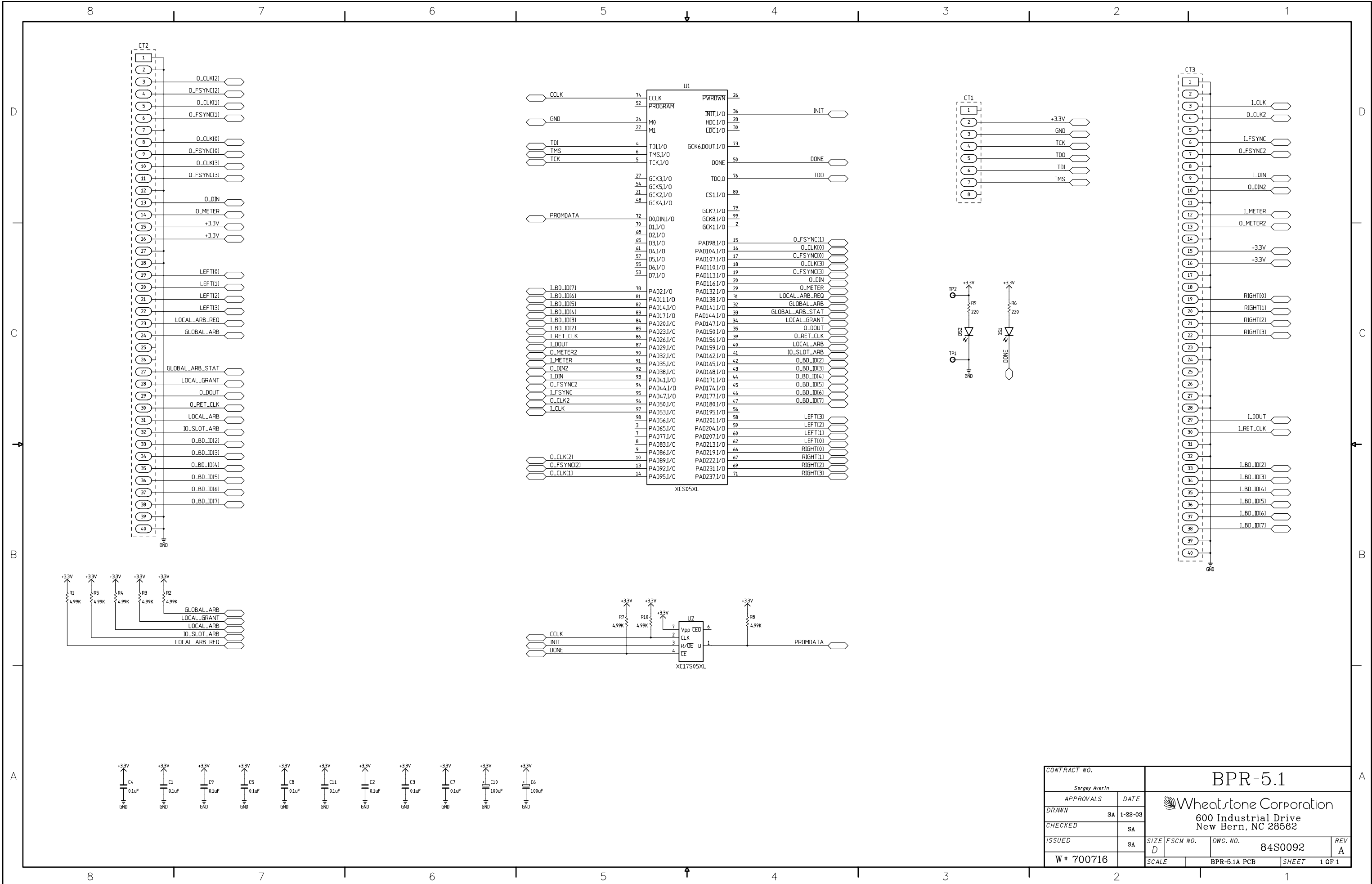
HC-9 Host Controller Module Schematic - Sheet 6 of 7





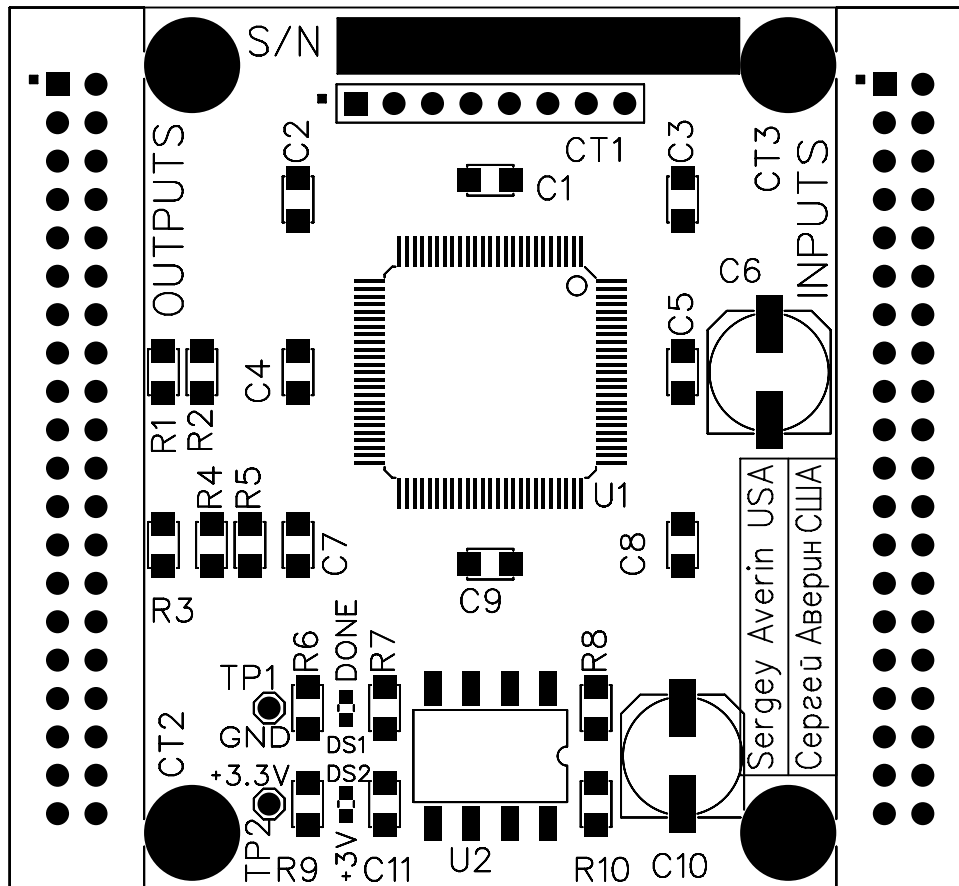




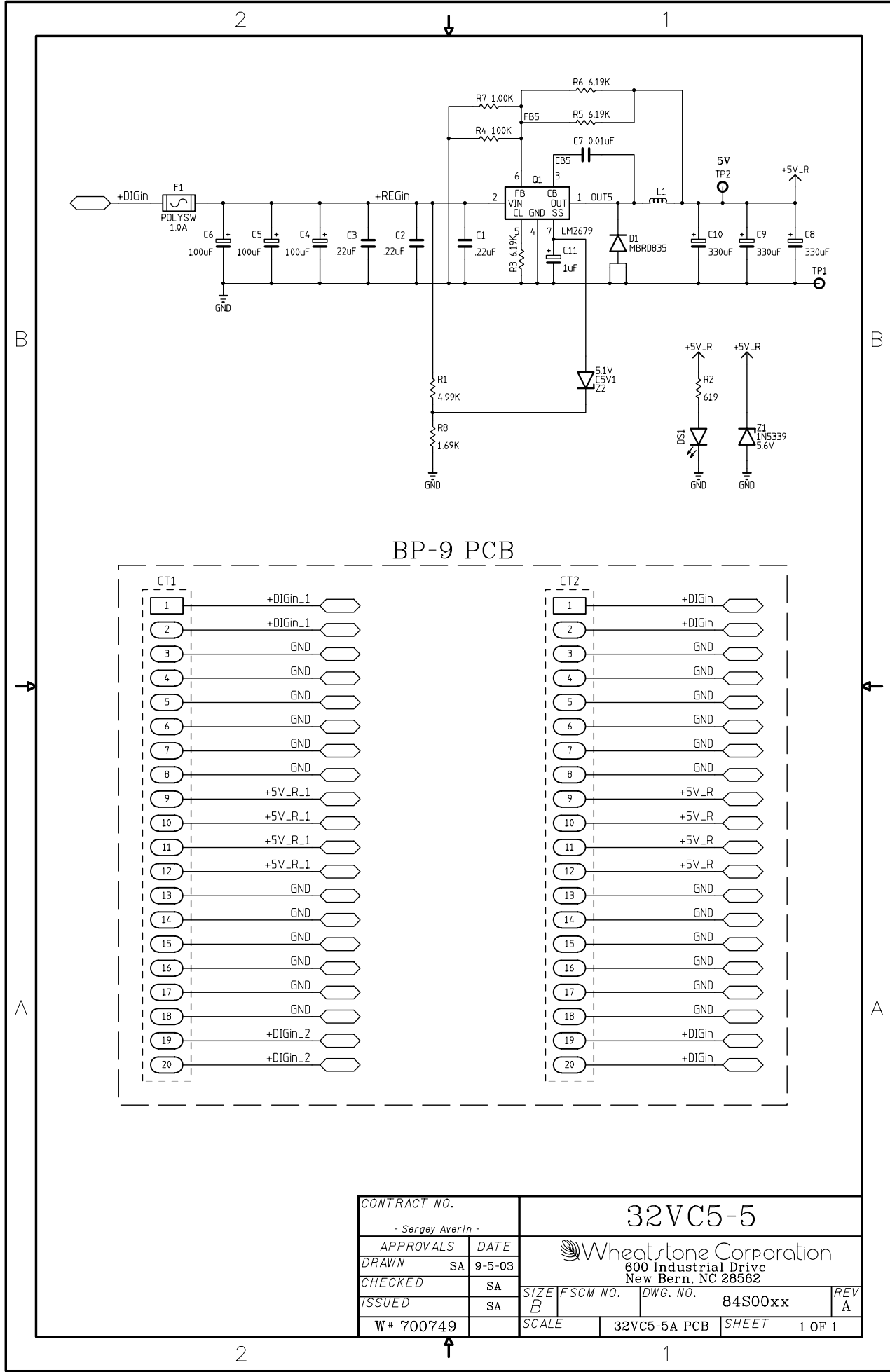


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			SHEET		1 OF 1

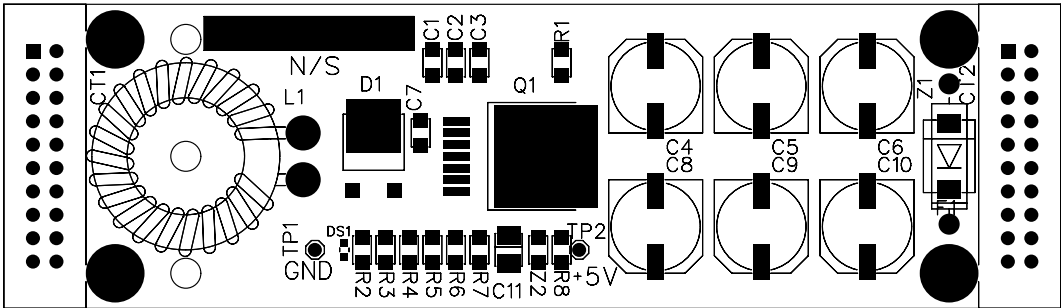
BPR-9 Back Plane Repeater Card Schematic - Sheet 1 of 1



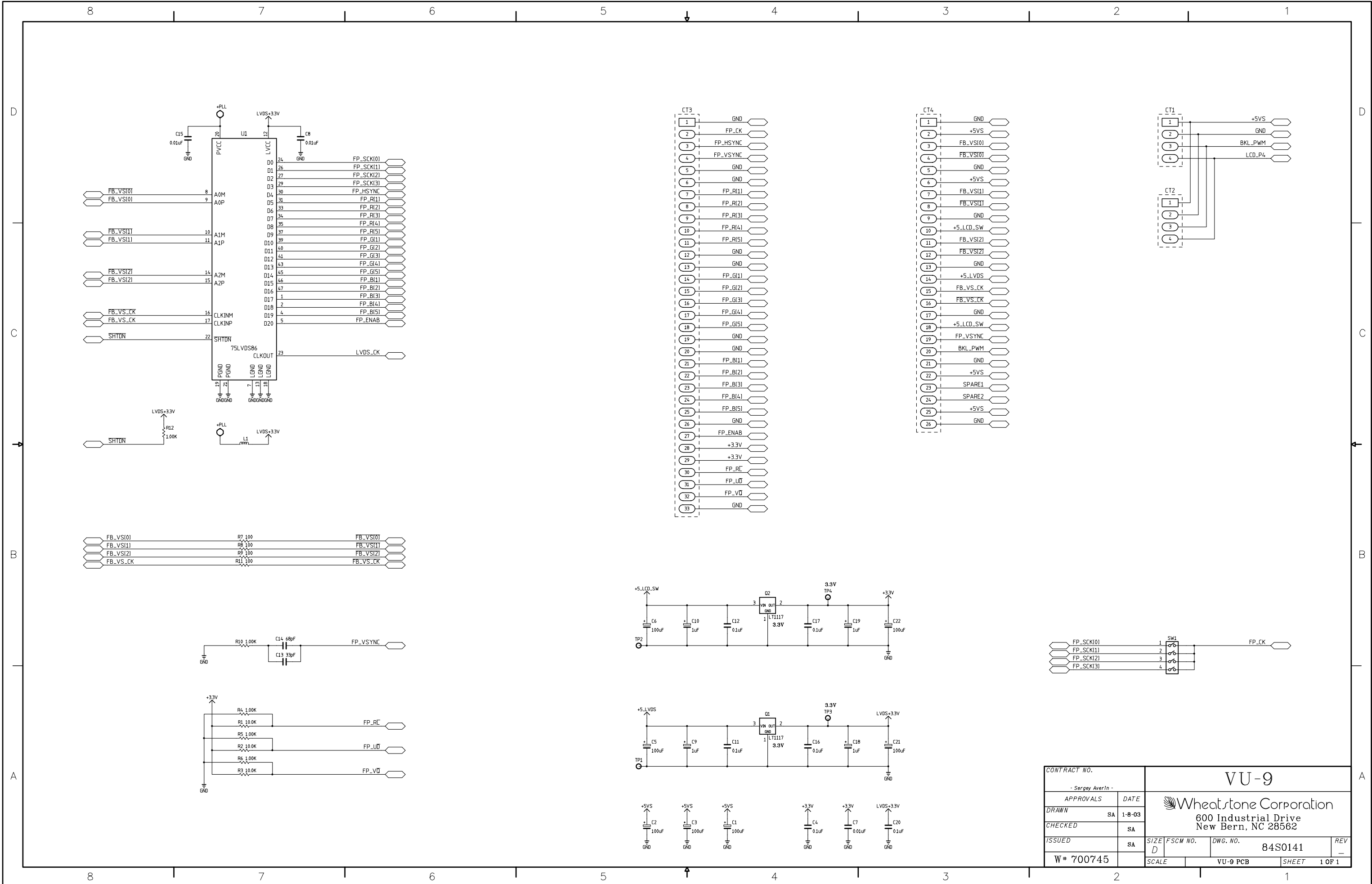
BPR-9 Back Plane Repeater Card Load Sheet



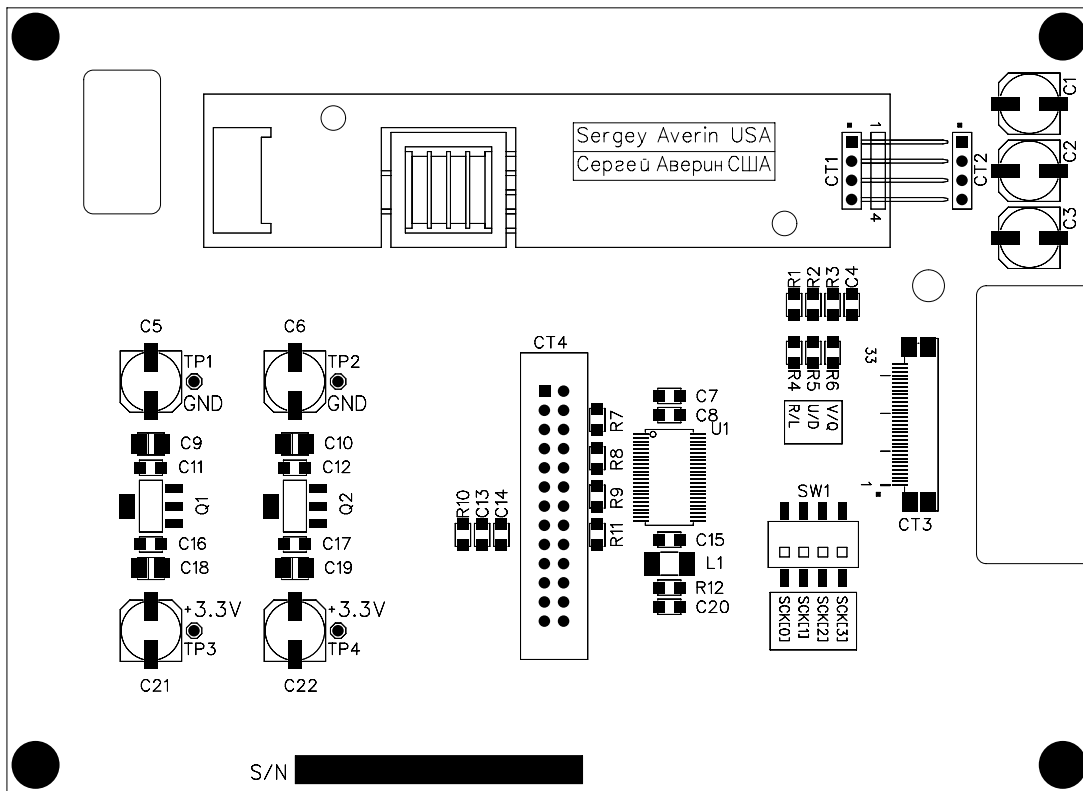
32VC5-5 +5V DC to DC Convertor Schematic - Sheet 1 of 1



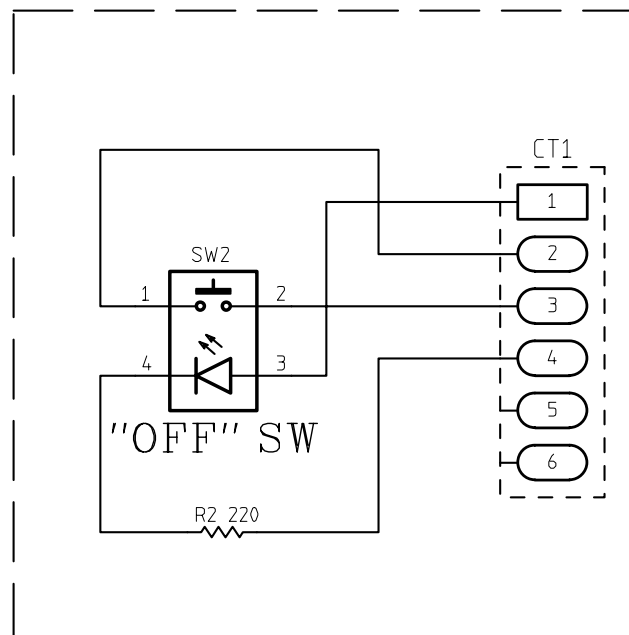
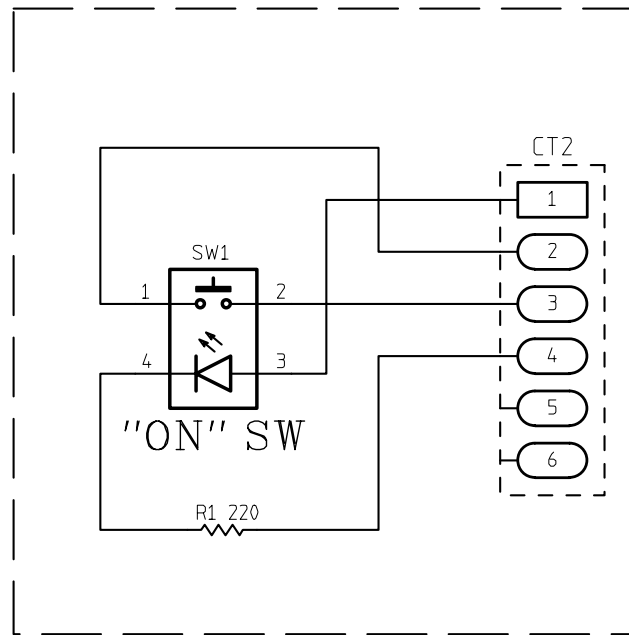
32VC5-5 +5V DC to DC Converter Card Load Sheet



VU-9 VU Receiver Card Schematic - Sheet 1 of 1

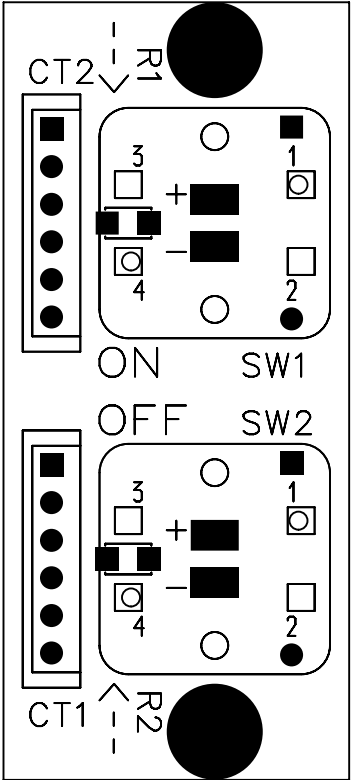


VU-9 VU Receiver Card Load Sheet

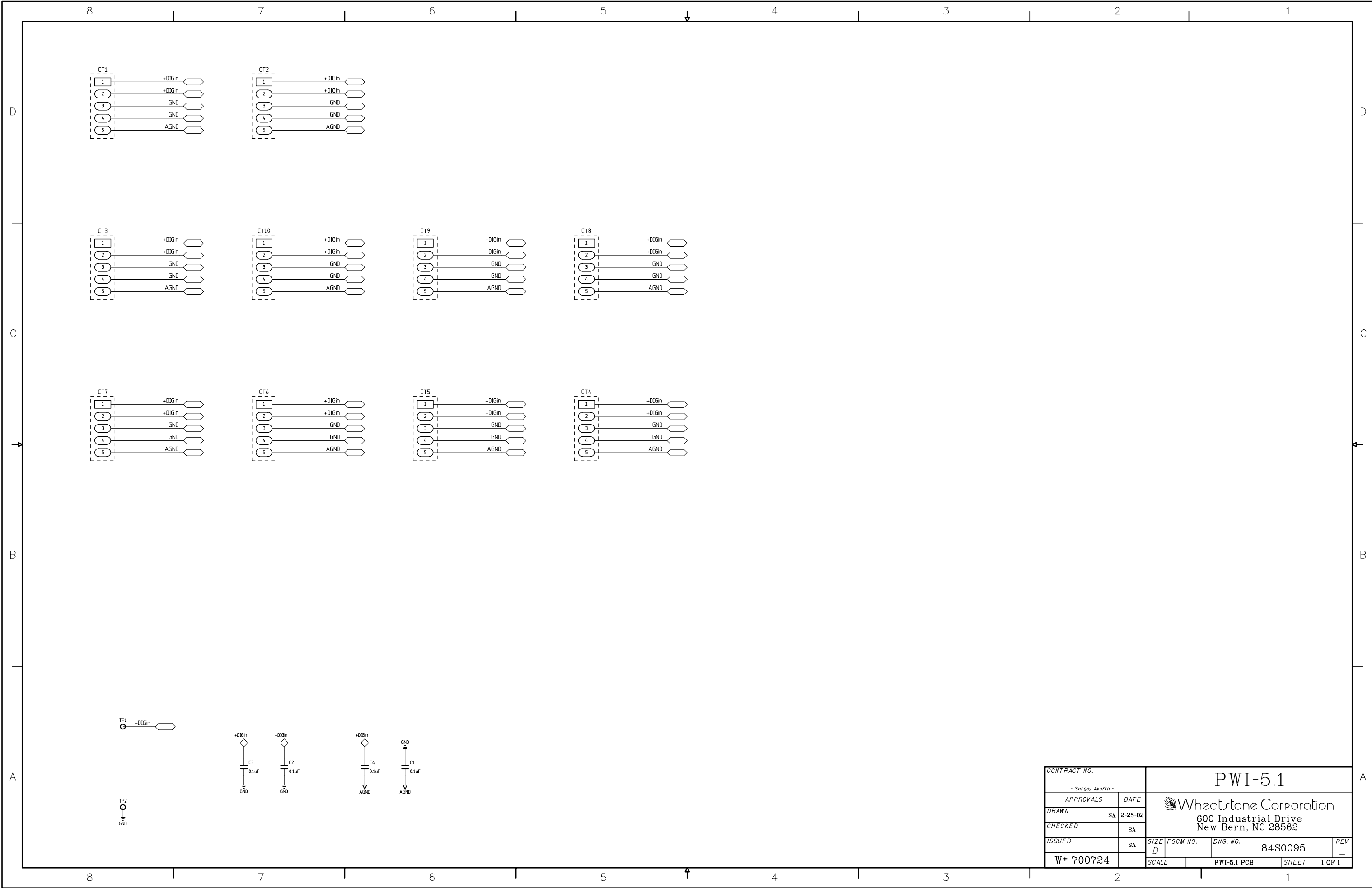


CONTRACT NO.		SW2-700			
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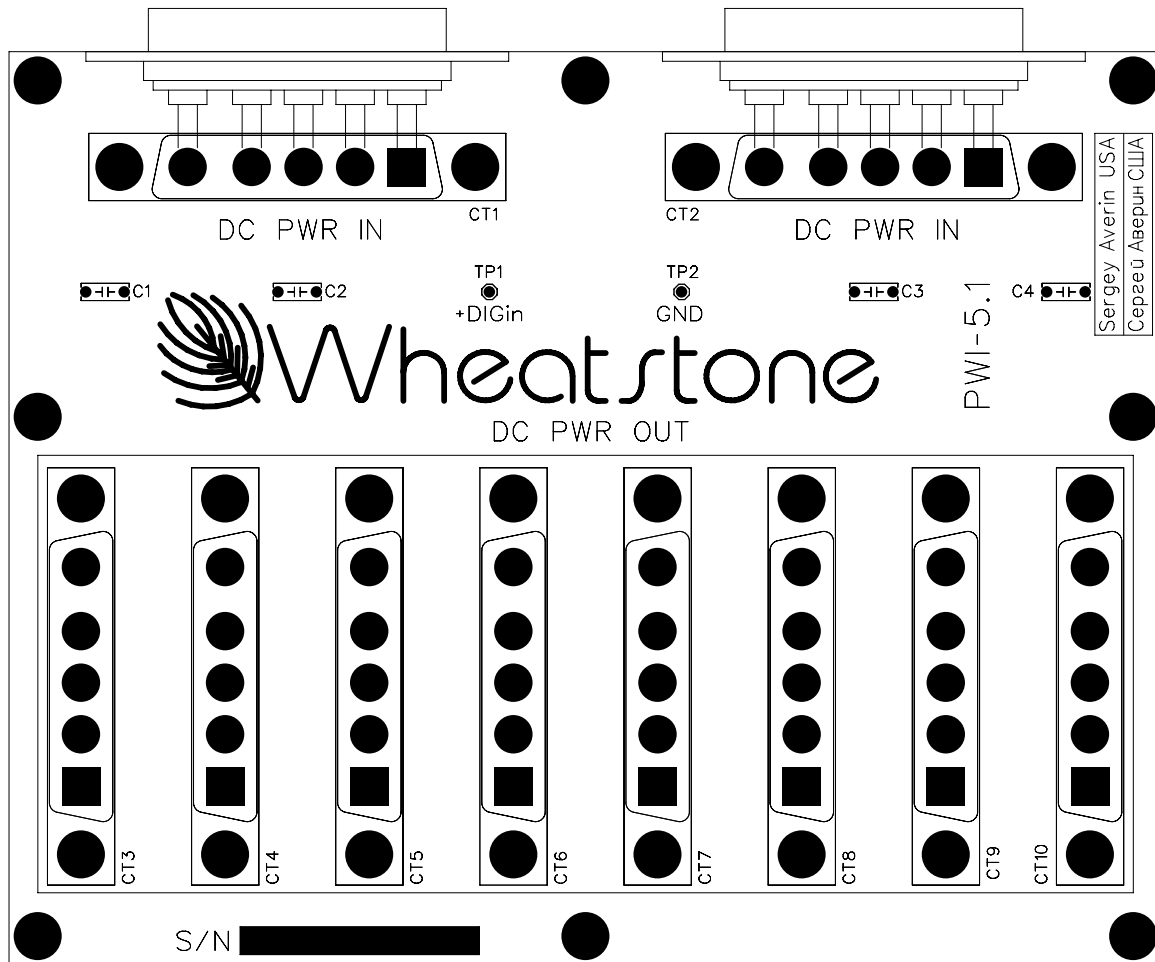
SW2-700 Switch Card Schematic - Sheet 1 of 1



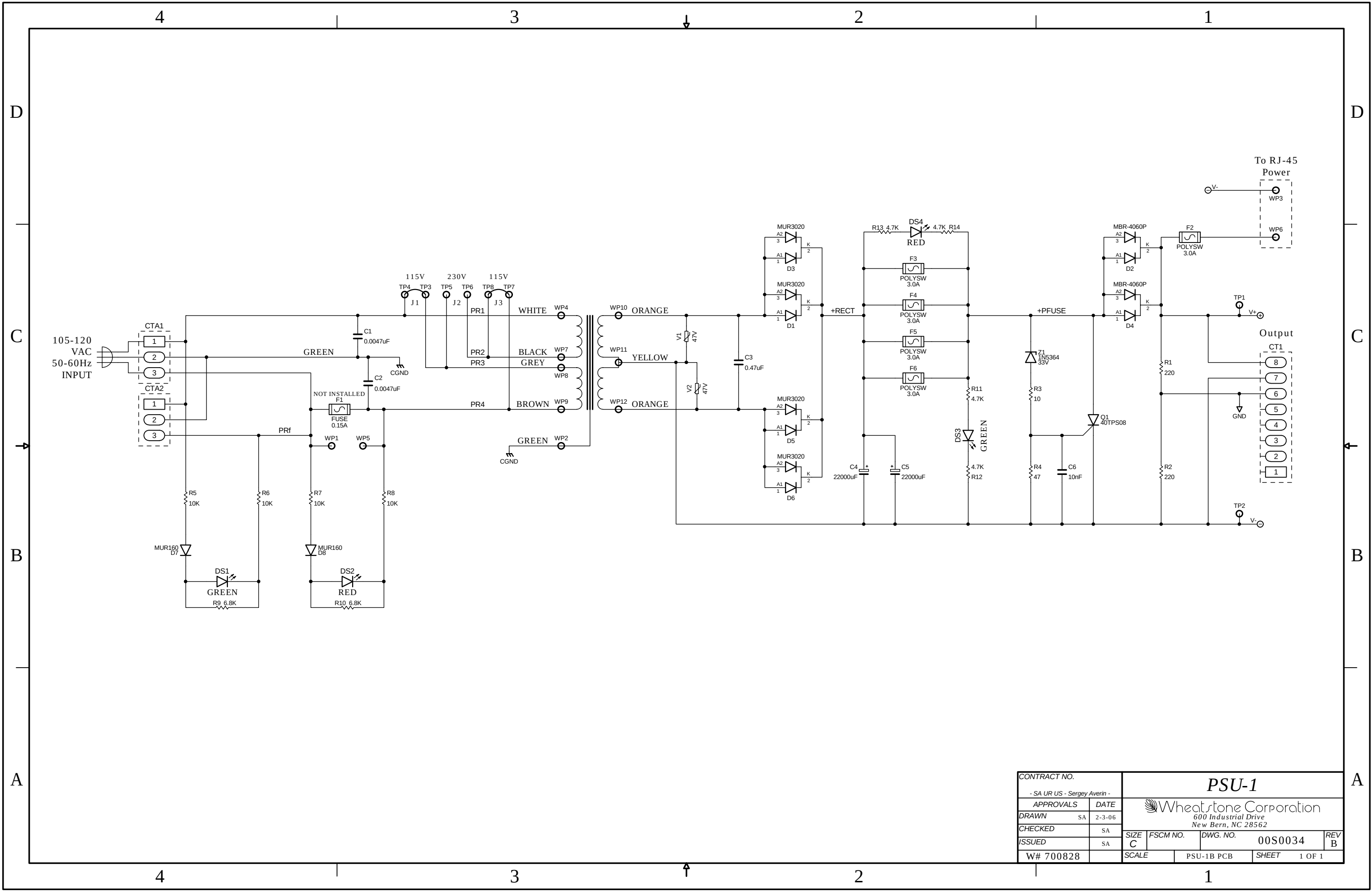
SW2-700 Switch Card Load Sheet



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

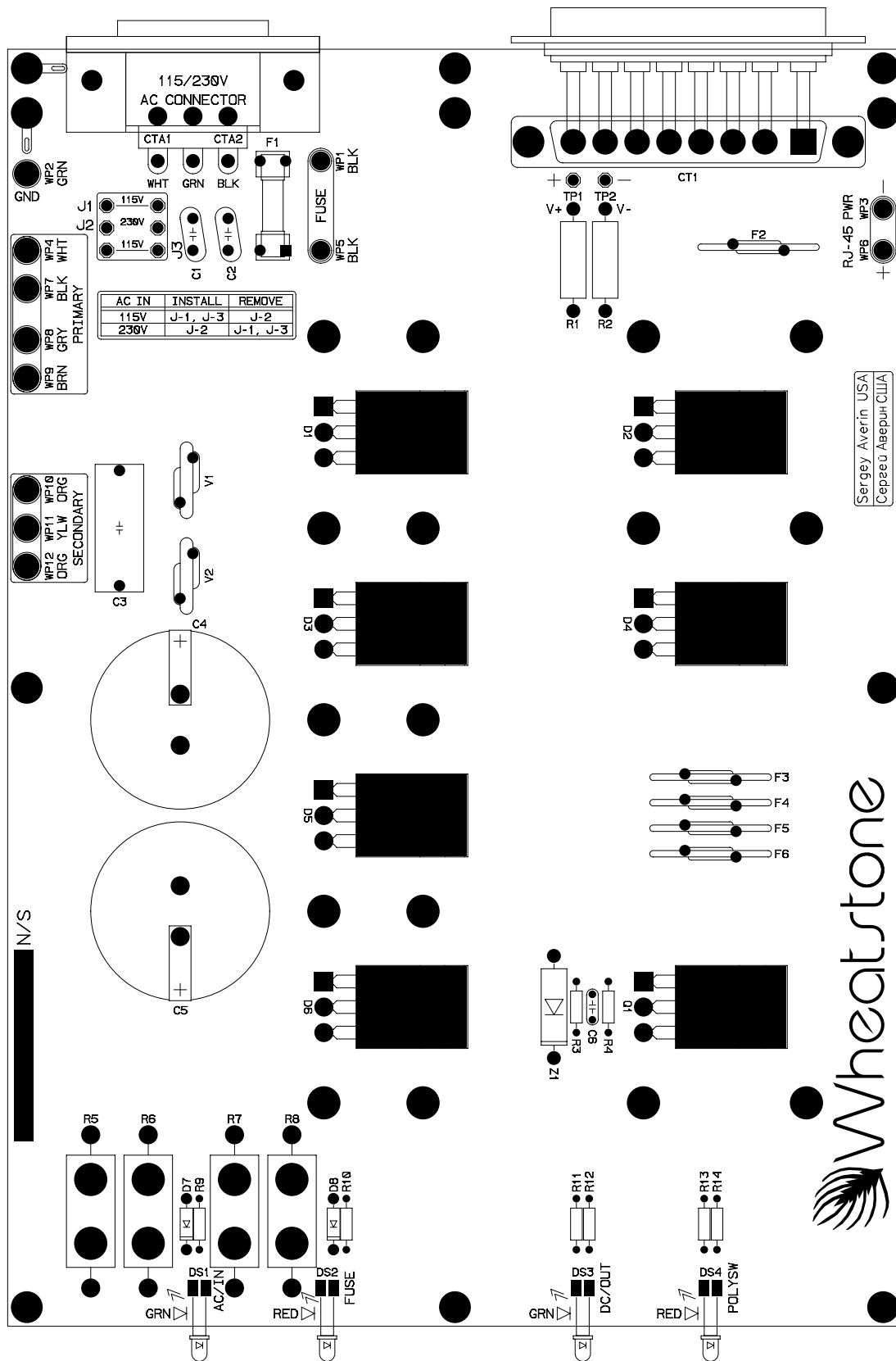


PWI-5.1 Power Interface Card Load Sheet



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

PSU-1 Power Supply Schematic - Sheet 1 of 1



PSU-1 Power Supply Load Sheet

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Appendix 1

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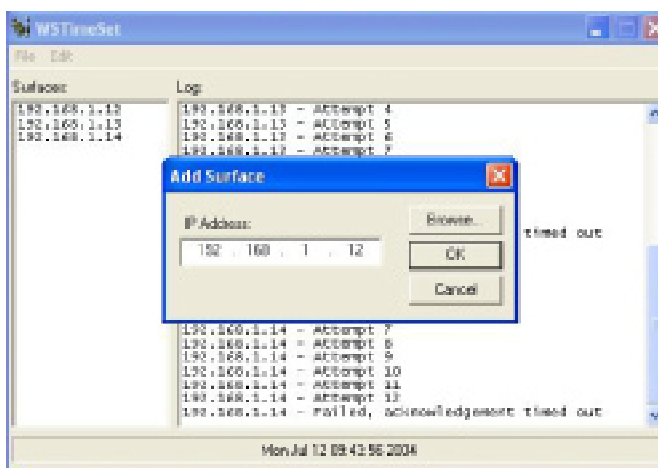
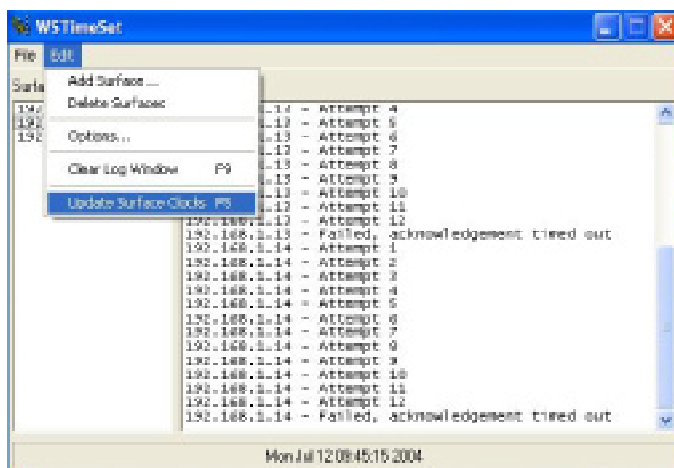
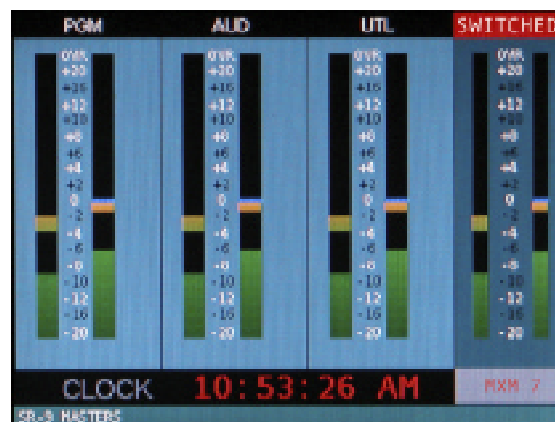
Control Surface Clock

The display of a time of day clock located on the bottom of the MASTER LCD screen.

Setting the Time

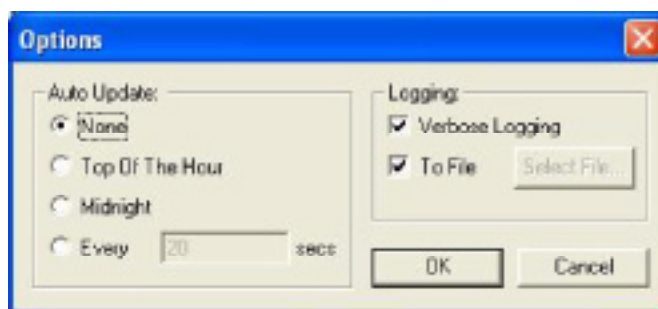
Setting the time of the control surface's clock is made via the Wheatstone Surface Time Manager software:

1. Select *Edit / Add Surface...* from the Main Menu, which will display the following form.
2. Enter an IP address of the control surface.
3. Select *Edit / Update Surface Clocks* or press *F5* key to update all surface clocks.



Update Options

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

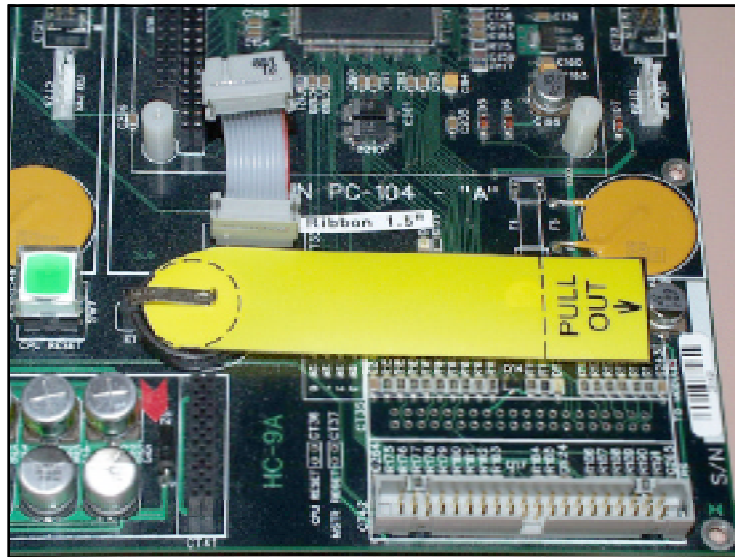


Synchronize

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

Battery Backup

At the bottom-right of the Host Controller HC-9 PCB there is a nickel-sized round Duracell DL2032/3V long-life lithium battery (it goes into the socket negative side in). Note that the battery does NOT light up the clock display; it powers the clock to keep it from losing count (it will do this for 3 to 4 weeks). To activate battery backup of the control surface's clock simply pull out the yellow strip from the HC-9 board, as shown on the picture below.



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Options Text File

Introduction

There are a number of operational features on the SR-9 surface that are controlled by the contents of the Options Text File (S9_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, let's look at something a little more involved. Once again, scroll through the Options Text File to find the following code (please note that some surfaces may have a different number of code lines in this section; the following is just for the purposes of example):

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

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

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

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

An Example File - Complete

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

```
// -----
// MIX MINUS OPTIONS
// -----
// Syntax: MM#:?
// # is the mix minus bus number (1 - 8)
// ? is the mode (default = 0)...
// 0 = Post Fader, Post ON (default mode)
// 1 = Pre Fader, Post ON
// 2 = Post Fader, Pre ON
// 3 = Pre Fader, Pre ON
MM1:0
MM2:0
MM3:0
MM4:0
MM5:0
MM6:0
MM7:0
MM8:0
// -----
// SPARE OPTIONS
// -----
// Syntax: SPARE#:?
// # is the spare button number (1 - 12)
// ? is the mode (default = 2)...
// 0 = None, Button presses are ignored, LED controlled by DIO
// 1 = Toggle, Button state toggles on each press, LED controlled by Surface
// 2 = Momentary, Button is active when held down, LED controlled by Surface
// 3 = Momentary, Button is active when held down, LED controlled by DIO
// 4 = Automation, Button & LED are controlled by automation interface
// 5 = Preset Select, Button selects pre-configured preset, LED controlled by Surface
SPARE1:2
SPARE2:2
SPARE3:2
SPARE4:2
SPARE5:2
SPARE6:2
SPARE7:2
SPARE8:2
SPARE9:2
SPARE10:2
SPARE11:2
SPARE12:2
```

```
// -----  
// BUS MINUS OPTIONS  
// -----  
// Syntax: DIRECT_OUT#:?  
// # is the input fader number (1 - 40)  
// ? is the mode (default = 0)...  
// 0 = Normal bus minus mode  
// 1 = Fader direct mode  
DIRECT_OUT1:0  
DIRECT_OUT2:0  
DIRECT_OUT3:0  
DIRECT_OUT4:0  
DIRECT_OUT5:0  
DIRECT_OUT6:0  
DIRECT_OUT7:0  
DIRECT_OUT8:0  
DIRECT_OUT9:0  
DIRECT_OUT10:0  
DIRECT_OUT11:0  
DIRECT_OUT12:0  
DIRECT_OUT13:0  
DIRECT_OUT14:0  
DIRECT_OUT15:0  
DIRECT_OUT16:0  
DIRECT_OUT17:0  
DIRECT_OUT18:0  
DIRECT_OUT19:0  
DIRECT_OUT20:0  
DIRECT_OUT21:0  
DIRECT_OUT22:0  
DIRECT_OUT23:0  
DIRECT_OUT24:0  
DIRECT_OUT25:0  
DIRECT_OUT26:0  
DIRECT_OUT27:0  
DIRECT_OUT28:0  
DIRECT_OUT29:0  
DIRECT_OUT30:0  
DIRECT_OUT31:0  
DIRECT_OUT32:0  
DIRECT_OUT33:0  
DIRECT_OUT34:0  
DIRECT_OUT35:0  
DIRECT_OUT36:0  
DIRECT_OUT37:0  
DIRECT_OUT38:0  
DIRECT_OUT39:0  
DIRECT_OUT40:0
```

```

// -----
// MISC OPTIONS
// -----
// Syntax: SET_TIMEOUT:?
// ? 1 (default) = 20 sec set button timeout enabled, 0 = no timeout.
SET_TIMEOUT:1
// Syntax: ALPHA_SORT:?
// ? 1 (default) = XY controller alpha sorting enabled, 0 = no sort.
ALPHA_SORT:1
// Syntax: USE_HELP:?
// ? 1 (default) help system enabled, 0 = no help.
USE_HELP:1
// Syntax: ONE_VIS:?
// ? 1 = one visibility for all presets, 0 (default) visibility stored for each preset.
ONE_VIS:1
// Syntax: XCHAN_VIS_DISABLE:?
// ? 0 = do not allow X visibility disable, 1 (default) allow X visibility disable.
XCHAN_VIS_DISABLE:1
// Syntax: ONE_VDIP:?
// ? 1 = one vdip config for all presets, 0 (default) vdip config stored for each preset.
ONE_VDIP:1
// Syntax: XYC_CHECKSUM:?
// ? 1 (default) = use checksum in XYC messages, 0 no checksum.
XYC_CHECKSUM:1
// Syntax: VU_RANGE:?
// ? 0 (default) = -20 to 20db, 1 = -40 to 20db.
VU_RANGE:0
// Syntax: MUTE_METHOD:?
// ? 0 (default) = ON button, 1 = ON AIR.
MUTE_METHOD:0
// Syntax: HDW_LOGGER:?
// ? 1 = use hardware logger, 0 (default) no hardware logger.
HDW_LOGGER:0
// Syntax: CLOCK_24HR:?
// ? 0 (default) = 12 hour clock, 1 = 24 hour clock.
CLOCK_24HR:0
// Syntax: MXM_BY_SIGNAL:?
// ? 0 = (default) MxM assigns stored by fader, 1 change MxM assigns as sources change.
MXM_BY_SIGNAL:0

```

Appendix 3

Contents

Replacement Parts List	A-13
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For the most part there are no user-replaceable parts in the SR-9 control surface. Exceptions are those controls and components that in the course of normal use may need maintenance (i.e., faders, pots, ON/OFF 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 "email@wheatstone.com".

REPLACEMENT PARTS — SR-9 CONTROL SURFACE		
COMPONENT	DESCRIPTION	WS P/N
IS-SR9 PANEL	COMPLETE INPUT PANEL	"005234"
EFS-SR9 PANEL	COMPLETE CONTROL PANEL	"005236"
DCM-G9 PANEL	COMPLETE DYNAMICS CONTROL PANEL	"005202"
TEL-SR9 PANEL	COMPLETE PHONE PANEL	"005235"
BK3.12 BLANK PANEL	FACEPLATE ASSEMBLY	"005318"
BK6.25 BLANK PANEL	FACEPLATE ASSEMBLY	"005319"
G9 DISPLAY BLANK	BLANK FOR LCD DISPLAY IN METERBRIDGE	"005369"
IS-G9 LOADED CARD	INPUT PANEL LOADED CARD ASSEMBLY	"005240"
EFS-SR9 LOADED CARD	CONTROL PANEL LOADED CARD ASSEMBLY	"005249"
DCM-G9 LOADED CARD	DYNAMICS CONTROL PANEL LOADED CARD ASSEMBLY	"005242"
TEL-G9 LOADED CARD	PHONE PANEL LOADED CARD ASSEMBLY	"005243"
IQ-G9 LOADED CARD	IQ LOADED CARD ASSEMBLY	"005275"
EI-5.1 LOADED CARD	ENCODER LOADED CARD	"005030"
SW-G9 LOADED CARD	LOADED SWITCH CARD	"005268"
HC-9 LOADED CARD	LOADED CARD ASSEMBLY WITH COMPUTER	"005270"
HC-9NC LOADED CARD	LOADED CARD ASSEMBLY W/O COMPUTER	"005294"
BP-9 LOADED CARD	LOADED CARD ASSEMBLY	"005272"
BPR-9 LOADED CARD	LOADED CARD ASSEMBLY	"005278"
VU-9 LOADED CARD	LOADED CARD ASSEMBLY	"005271"
VC5-5HC LOADED CARD	LOADED CARD ASSEMBLY	"005262"
VC5-5 LOADED CARD	LOADED CARD ASSEMBLY	"005274"
PWI-5.1 LOADED CARD	LOADED CARD ASSEMBLY	"005059"
PSU-1 RACKMOUNT UNIT	POWER SUPPLY RACKMOUNT UNIT	"007330"
SPS/PWI POWER CABLE	SPS DB TO CONTROL SURFACE PWI POWER CABLE	"007261"
FLAT RIBBON CABLE	50 CONDUCTOR FLAT RIBBON CABLE	"150007"
FLAT RIBBON CABLE	26 CONDUCTOR FLAT RIBBON CABLE	"150083"
REPLACEMENT FADER ASSEMBLY	WIRED FADER	"055200"
REPLACEMENT FADER	INPUT/PHONE FADER	"540052"
REPLACEMENT FADER KNOB	WHITE FADER KNOB	"520007"

REPLACEMENT PARTS — SR-9 CONTROL SURFACE		
COMPONENT	DESCRIPTION	WS P/N
REPLACEMENT SWITCH	ON/OFF SWITCH	"510109"
SWITCH RED BUTTON	ON BUTTON	"530344"
SWITCH AMBER BUTTON	OFF BUTTON	"530345"
RED LED LAMP REPLACEMENT	ON LED LAMP	"600027"
YELLOW LED LAMP REPLACEMENT	OFF LED LAMP	"600031"
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	"560002"
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"

REPLACEMENT PARTS — SR-9 CONTROL SURFACE		
COMPONENT	DESCRIPTION	WS P/N
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 RIBBON	26 PIN RIBBON PLUG	"250043"
PLUG RIBBON	40 PIN RIBBON PLUG	"250053"
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"
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"
LCD DISPLAY	5.7" TFT 320 X 240 6 BIT DIGITAL INPUT DISPLAY	"940028"
REPLACEMENT CUE SPEAKER	REPLACEMENT CUE SPEAKER	"960000"
MANUAL	OWNER'S MANUAL	"005298"