D-7 Digital Control Surface

TECHNICAL MANUAL

Wheatstone Corporation

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D-7 Digital Control Surface Technical Manual - 1st Edition

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Attention!

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

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

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

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

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

IMPORTANT!

Cleaning the Acrylic Surface

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

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

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

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

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

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

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

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

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

D-7 Technical Manual

Table of Contents

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

Appendices

Appendix 1

Appendix 2

General Information

Chapter Contents

General Information

Introduction

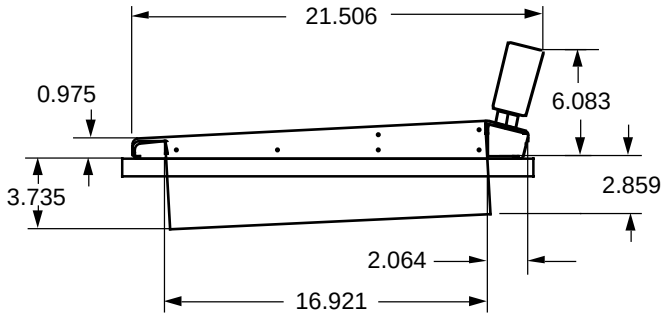
The D-7 Digital Audio Control Surface is a member of Wheatstone's line of intercompatible D-series control surfaces with the functions and control capability needed by television broadcast facilities: 5.1 digital surround, four stereo subgroup mixes, two stereo sends, mix-minus master with eight mix-minus outputs, and two mute groups. Above each fader on the input panel is a channel ON switch, an 8-character dot matrix source display, a PFL switch, eight mix-minus and four subgroup assignment displays, two stereo bus assigns, two mutes displays, two AUX encoders with ON switches, and a source select encoder. It's got four monitor outputs (each with source displays), automatic telephone support, an event recall system (with security function), and an array of user-programmable switches. Designed to integrate flawlessly with the Wheatstone BRIDGE digital audio network router, the D-7 control surface allows you to easily create large or small platform-based systems that are exceptionally user-friendly and flexible. Wheatstone BRIDGE network cages house all I/O ports and engine cards, and may be wired in tandem within a single equipment room or interconnected to separate remote locations by means of CAT5 cables to provide single wire studio integration schemes.

Once configurated, the system operates entirely independently of external computers. Configuration itself is intuitive and carried out onsite by means of user-friendly graphic interfaces provided by Wheatstone desktop software. The D-7 surface also takes full advantage of Wheatstone's exclusive VDip configuration software, so that studio functions (like mutes, fader and timer starts, tallies, etc.) are easily accomplished right at your desktop. Once completed, all settings are retained in non-volatile storage, allowing the entire system to run independently. Ethernet protocol is built in, providing interface with automation, scheduling, and hardware controllers as you require.

Control Surface Placement

The D-7 digital audio control surface is designed for simple drop-in installation in a countertop. Cutout dimensions (in inches) are shown in the drawings below for the two available frame sizes.

Do not connect the D-7 control surface to its power supply (and do not connect the power supply to the AC power line) until instructed to do so.

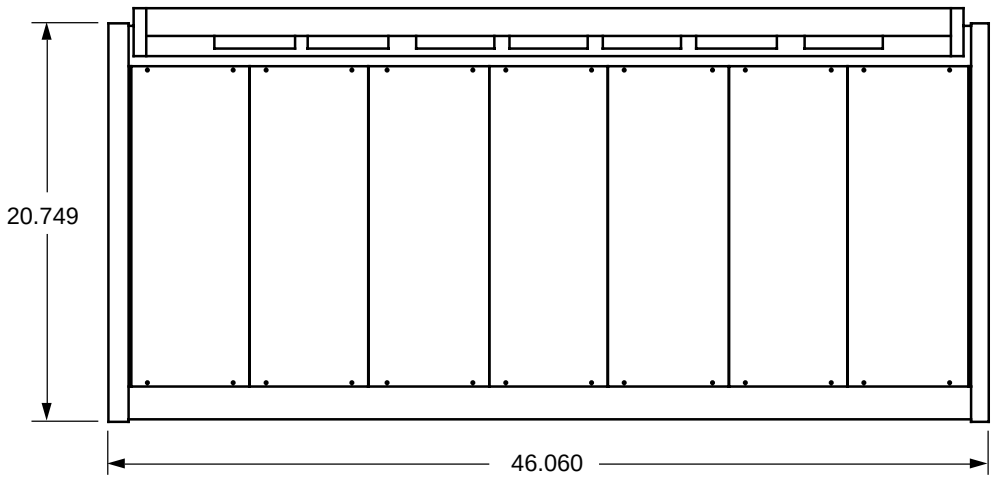


CUTOUT DIMENSIONS

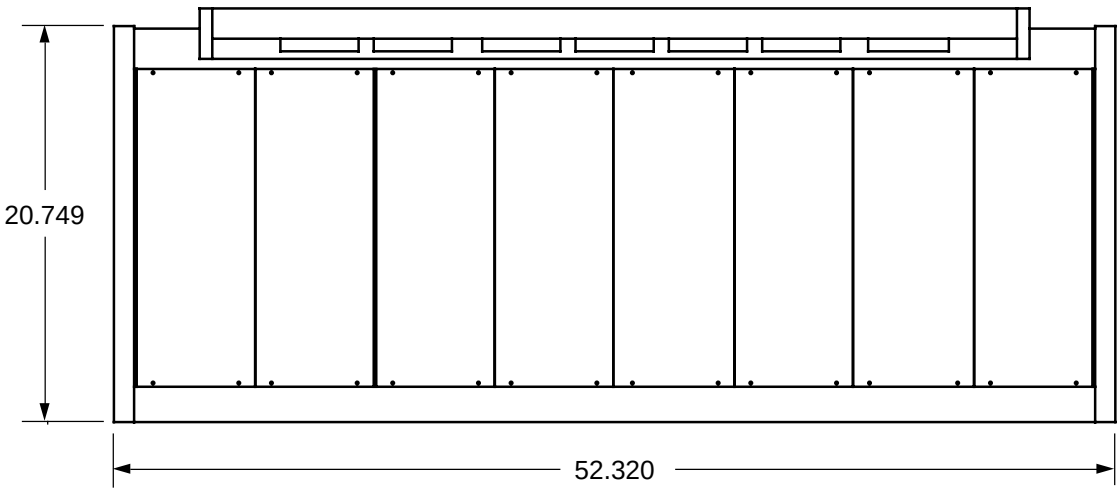
20 INPUT FRAME - 17.25" x 44.25"

24 INPUT FRAME - 17.25" x 50.50"

D7 - 20 FADER INPUT



D7 - 24 FADER INPUT



Power Supply

Front view of the PSU-1 rackmount power supply

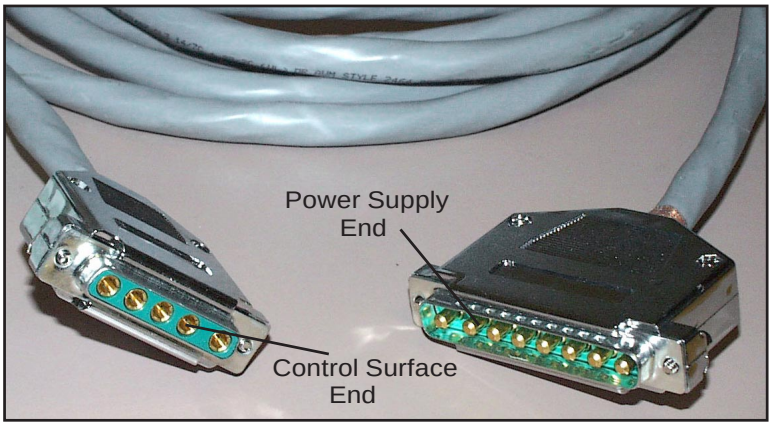
Rear view of the PSU-1 rackmount power supply

The D-7 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.

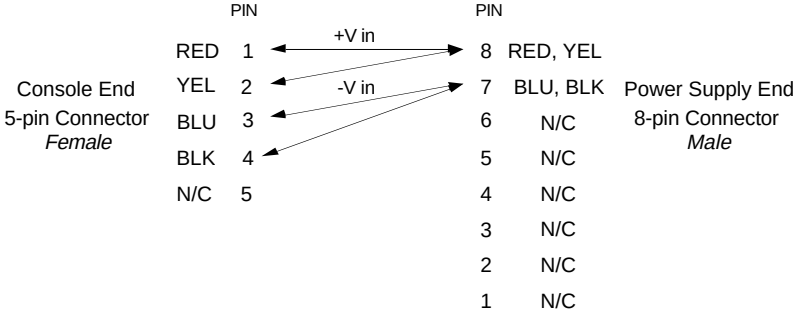
If failsafe redundant supplies have been ordered, you will be installing two PSU-1 units.

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



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

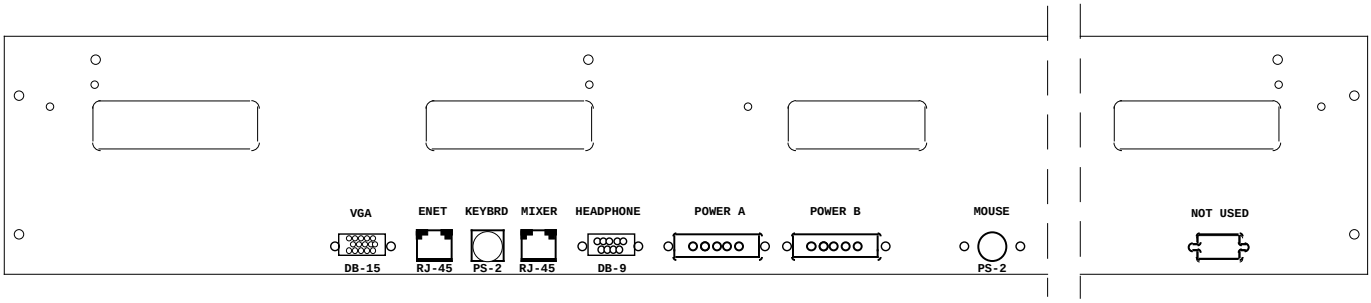
Assuming the D-7 control surface mainframe is properly placed, and its PSU-1 power supply (or supplies) correctly rackmounted and connected to the control surface, you may now energize the rackmount power supply by plugging it into the AC mains. The "GOOD" LEDs on the power supply front panel should 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.

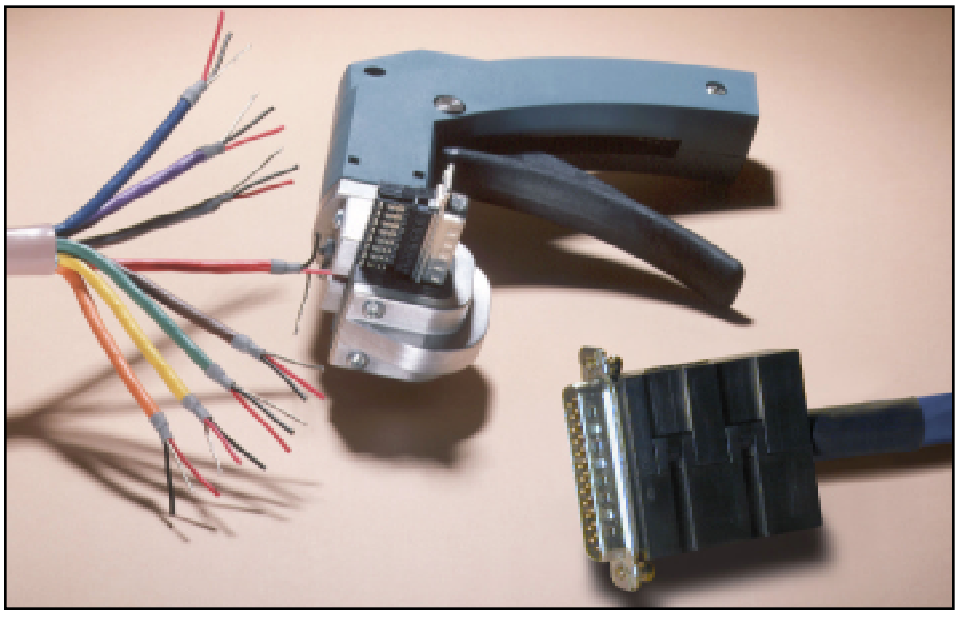
I/O Connections

All user wiring to and from the D-7 control surface is made via connectors located on the control surface's rear panel. Two 5-pin male connectors at the center of the control surface's rear are for power supply connections. Headphone signal plugs into the female DB-9 connector, located next to power supply connectors. This signal is routed to internal amplifiers that feed headphone jack, located on the front right-hand side of the surface's pan. There are two RJ-45 connectors for Ethernet (labeled ENET) and CAT-5 (labeled MIXER) connection. A DB-15 VGA monitor connector and two PS-2 connectors for keyboard and mouse round out the rear panel. The sketch below shows connector locations. For all wiring pinout connections refer to Chapter 5.



The Insulation Displacement Connector System

The I/O wiring interface system is based on insulation displacement technology. A special AMP wiring tool is included with each control surface; it is auto-indexing, and allows individual wire connections to be positively made with a single squeeze of the tool's trigger. The trigger action is ratchet controlled, and will not release until a full connection is made. Once released, the multipin connector held in the tool's jaw automatically indexes to the next connector pin. The technology is such that no stripping, soldering or tinning of wire ends is required; all that is needed is that the wires destined for the connector be snub cut and laid



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.

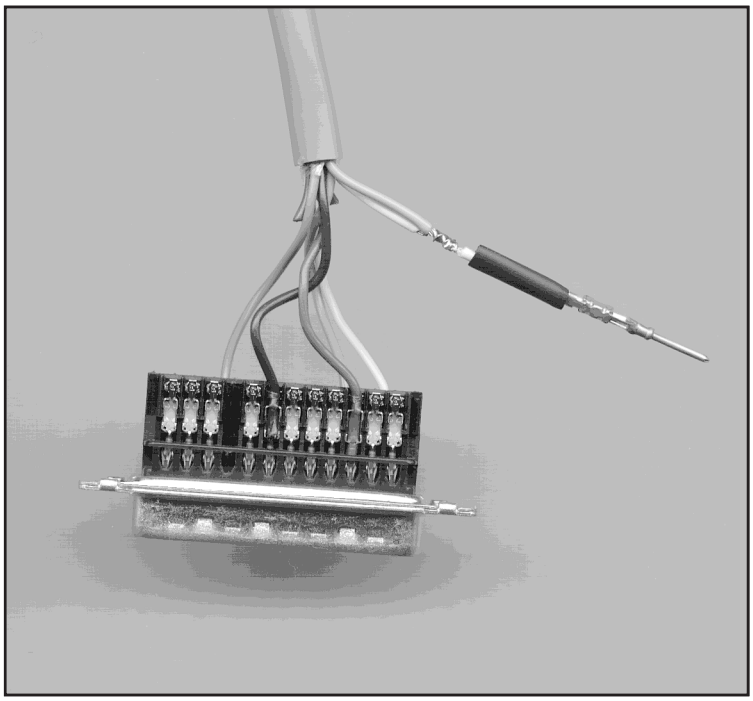
out in order (although tubing should be used on bare drain wires). An empty DB-9 connector is inserted into the tool, indexed to the first pin, and the wires are inserted one by one into the jaw and the trigger squeezed. In this way a single multipin connector can be completely wired up in a minute or 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.**

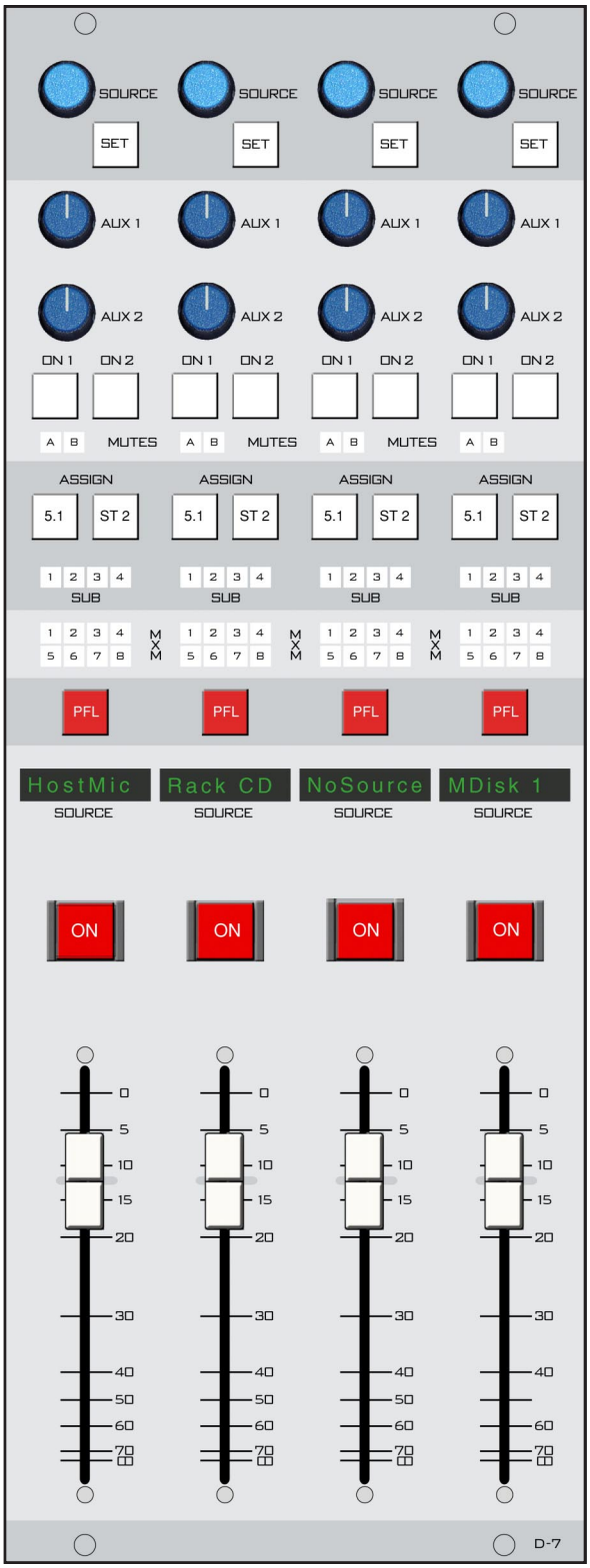
Input Panel (IS-D7)

Chapter Contents

Input Panel (IS-D7)

Controls and Functions

Each input panel of the D-7 digital audio control surface has four identical strips representing four input channels.



Input Sources

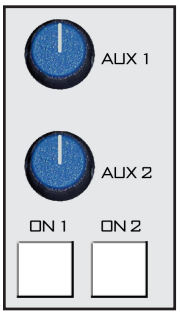
Each input panel controls four stereo sources. By turning the source selector (SOURCE knob) at the top of the panel, the available inputs are displayed in the 8-character SOURCE display. When the desired input source is scrolled into the SOURCE window, the SET button will act like a TAKE button, and pressing it will cause that source to be switched to the input of the channel. If you fail to press SET, the display will revert to its original setting after a timeout of approximately 4 seconds, and the original source remains in effect.

SET Button

This allows the operator to access various controls and displays in the EFS CONTROL panel and apply them to the selected channel. To use, press the SET button and then make your appropriate section settings in other areas of the control surface. Once a SET button has been pressed, the button lights up, and all setting changes will apply to **that input channel** until a different input SET button is pressed, or until a timeout of about 20 seconds has occurred.

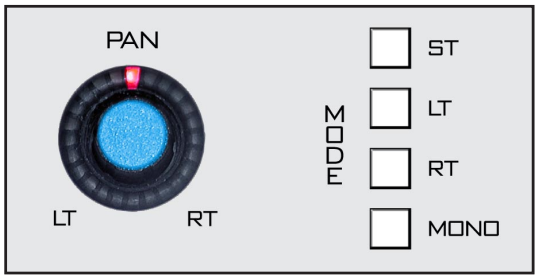
AUX

Each channel of the input panel IS-D7 has two AUX encoders (AUX1 and AUX2) to set the level of the channel's audio in the AUX SENDS. Two switches (ON1 and ON2), determine whether the channel feeds AUX1 (ON1) and/or AUX2 (ON2).



Mode Selector Indicator

MODE selection switches in the EFS panel (see Chapter 3) enable input channels to operate in Stereo, Mono, Left only, or Right only. 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 2-2).



EFS-D7 Panel

PAN/BALANCE Knob

The PAN knob (in the EFS panel) acts as a panpot in MONO, LEFT only, and RIGHT only modes, and as a balance control in STEREO mode. 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.

Mute Assign Displays

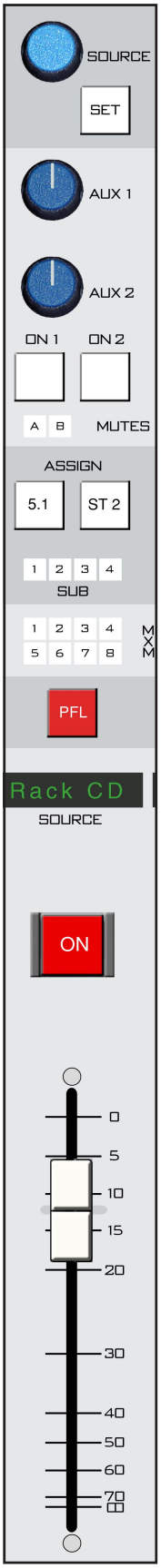
Each channel can be assigned to MUTE MASTER A and/or MUTE MASTER B. The A and/or B MUTES indicator lights to indicate the assignment. Any channel that is assigned to a MUTE MASTER will be muted when that MUTE MASTER is activated. Channels are assigned by first pressing the channel's SET button, then pressing the desired MUTE ASSIGN button(s) on the MFS-D7 panel.

Main Bus Assign

ASSIGN buttons assign the input channel signal to the two main busses: 5.1 (surround)/ST1 (stereo 1) and ST2 (stereo 2), respectively. The buttons light up to show which buses the input channel has been assigned to.

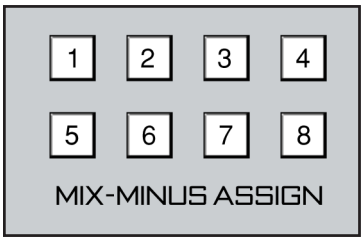
Output Assign Displays

These 4 indicators (SUB) show which group(s) the channel has been assigned to using control switches in the SUB-MIX section of the MFS-D7 panel (page 4-3). The output assigns are accessed by means of the channel SET button.



MXM Displays

Each channel can be assigned to any combination of the eight MIX-MINUS buses (EFS panel). The assigned setting is displayed in the MXM 1-8 display group. Channels are assigned to these MXMs in the following manner: press the channel SET button on the input fader section and then press the desired MIX-MINUS ASSIGN button, located on the EFS panel. Note that you are assigning the channel, and not the source, to the MXM bus.



EFS-D7 Panel

PFL(CUE) Switch

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

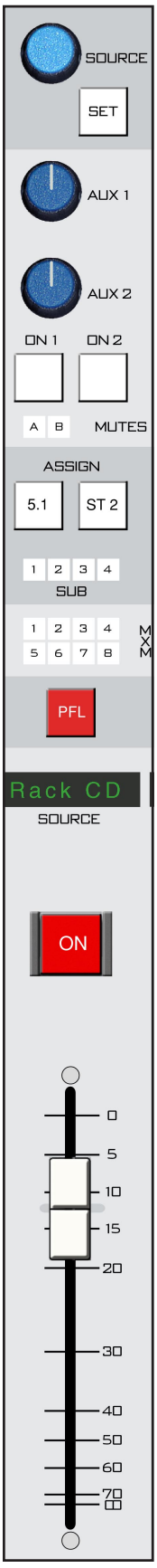
Channel ON Switch

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

Fader

Channel output level is set by a long-throw fader.

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



Control Panel (EFS-D7)

Chapter Contents

Control Panel (EFS-D7)

Controls and Functions

The D-7 digital audio control surface is equipped with one CONTROL panel. This panel contains MONITORS, CUE/PFL, TALKBACK, MODE, MXM MASTER, MXM ASSIGN, EVENT PRESET, METER, AUX and PROGRAMMABLE 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, and a SOURCE display, located at the bottom section of the EFS panel. There are also TB buttons in the two STUDIO sections.

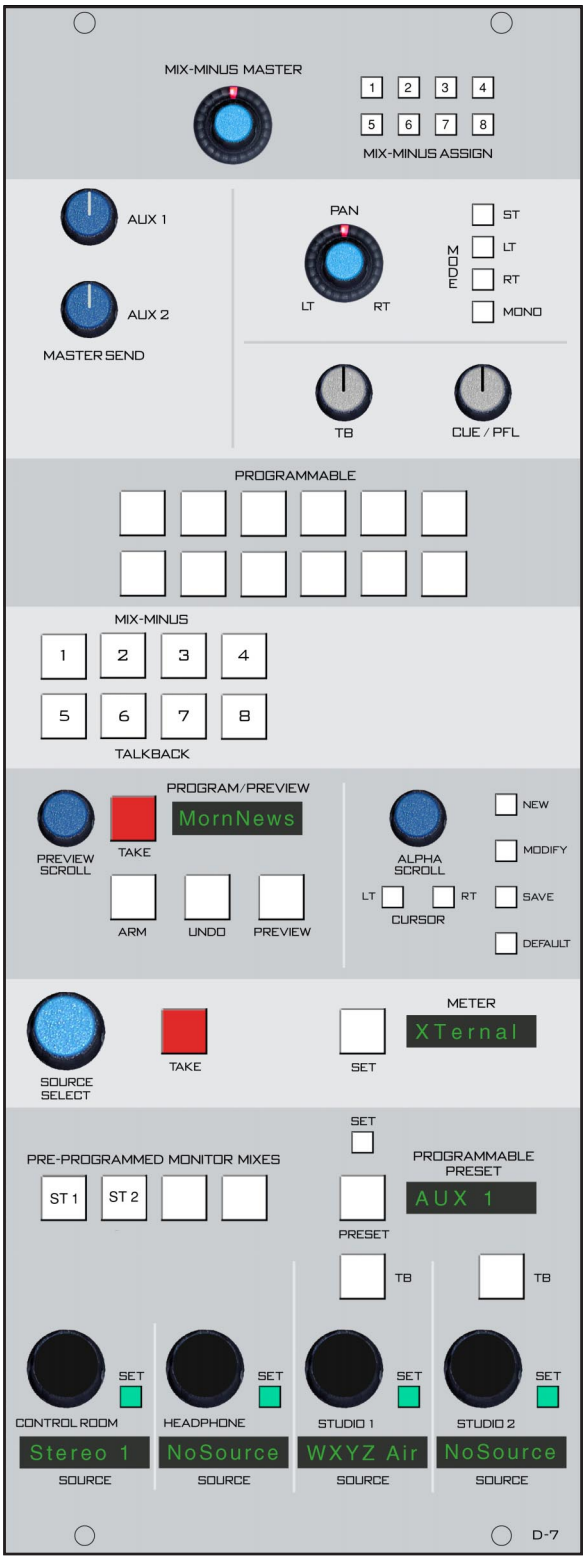
Monitor sources can be selected several ways:

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

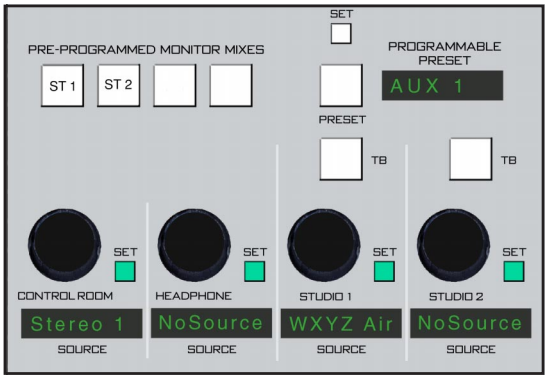
• Two PRE-PROGRAMMED MONITOR MIXES buttons (5.1/ST1 and ST2) allow direct access to the main mixes.

• An additional two unlabeled PRE-PROGRAMMED MONITOR MIXES buttons can be set to allow direct access to two additional sources. Press the SET button above the PRESET button in the monitor section on the panel, then use the SOURCE SELECT knob to dial up the desired source, shown in the PROGRAMMABLE PRESET display. Press the left or right unlabeled button and the selected source then becomes available for direct selection as a monitor source via the unlabeled button you pressed.

• A PROGRAMMABLE PRESET monitor source can also be established. Press the SET button above the PRESET button and use the SOURCE SELECT knob to dial up the desired source, shown in the PROGRAMMABLE PRESET display. Press the TAKE button and that source becomes available for direct selection as a monitor source via the PRESET button.



• To select a source for a monitor, first press the SET button next to the knob for that monitor. If the current monitor source is one of the PRE-PROGRAMMED MONITOR MIXES or the PROGRAMMABLE PRESET the corresponding button will light to indicate this. You can either press any PRE-PROGRAMMED MONITOR MIXES button or the PRESET button to make the associated source the monitor source, or you can dial up a source with the SOURCE SELECT knob and then press the TAKE button.



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 external cue speaker, or may want to listen via headphones.

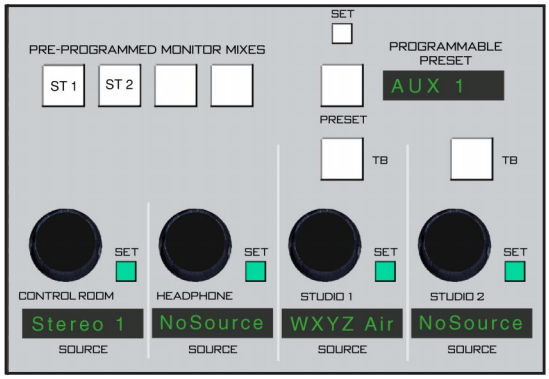
In some instances the control surface operator may also be performing talent whose voice will be heard over the radio. The operator's microphone may thus provide a part of the signal that is going out over the air. If that signal is the one being monitored with the control room speakers, there is the 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.

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 two 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.

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.

Note that the headphone jack is mounted on the right-hand bottom of the control surface's lower mainframe pan.

Talkback

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.

In the center of the EFS control panel is the TB master level control that sets the talkback output and the level of the talkback interrupt signal.

CUE/PFL Section

The CUE/PFL master level control is located in the center section of the EFS panel. The CUE/PFL signal is pre-fader, and is normally used to check signals. When a channel is CUEd, its pre-fader signal will appear in the cue speaker, and the switched meter array in the meterbridge will show the level of the pre-fader signal.

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

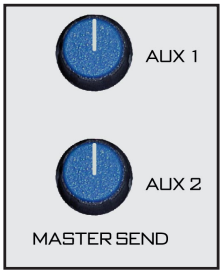
Similar to the control room speakers, the cue speaker also has the potential for feedback and should be muted (using the configuration software—VDIP menu) whenever the control room speakers are.

Switched Meters Section

The control surface has provision for a switched meter.

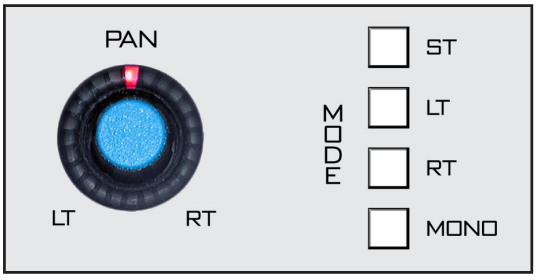
To select a signal to meter, first press the SET button, then rotate the encoder SOURCE SELECT. Available sources will be displayed in the eight character METER display. When the desired signal is displayed, press the TAKE button. The switched meter array will then display the signal level. If, however,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

AUX Master Outputs



MASTER SEND controls AUX1 and AUX2 are provided at the top of the EFS panel to set the output levels of AUX sends 1 and 2, respectively.

Mode Select Section



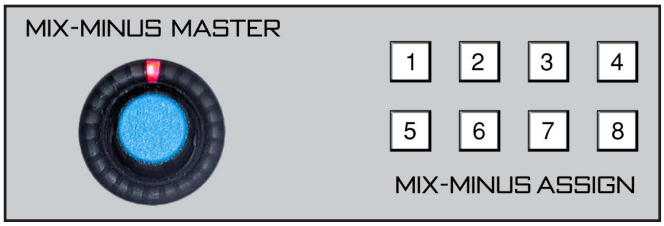
The mode selector switchbank (ST, LT, RT, and MONO buttons) and mode knob (PAN) are located at the top of the EFS panel. There are four available channel modes: STEREO, LEFT ONLY, RIGHT ONLY and MONO. When pressed, the switch will light up to indicate the selected mode.

The PAN knob acts as a panpot in MONO, LEFT ONLY and RIGHT ONLY modes, and as a balance control in STEREO mode. The PAN knob is only used with input channels, and has no effect when setting the mode of the monitor signals.

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.

MXM Master

This section is used to control the MIX-MINUS MASTER level for each of the eight MIX-MINUS outputs. Press the MIX-MINUS MASTER knob twice quickly (like double-clicking a mouse), then press a MIX-MINUS ASSIGN button, then rotate the MIX-MINUS MASTER control to set the output level for that MIX-MINUS.

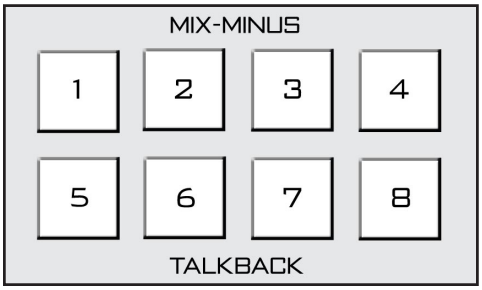


MXM Assign

These buttons are used to control the makeup of the eight MIX-MINUS buses. Press the SET button on any channel. If that channel 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 channel's signal into or out of the corresponding MXM bus. Note that you are assigning the channel, and not the source, to the MXM bus.

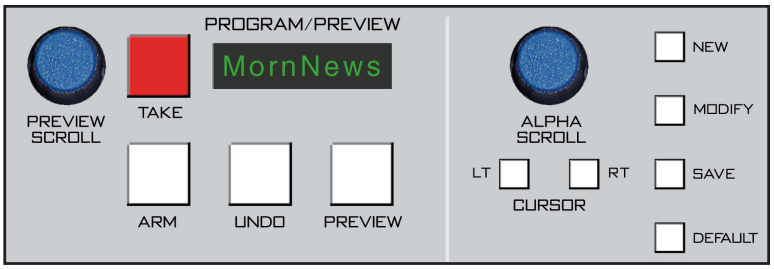
MXM Talkback

To interrupt an MXM output with the predefined TB signal, press any of the eight MIX-MINUS/TALKBACK momentary switches.



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.

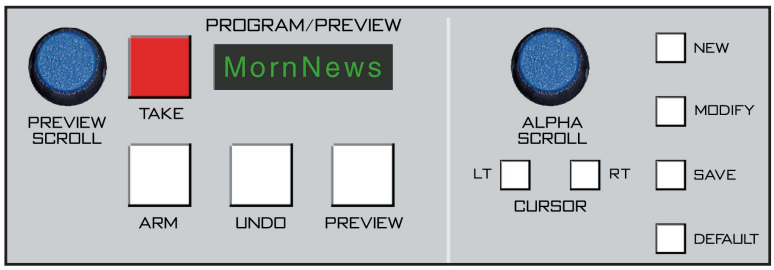


Storing an Event

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 function again will do nothing.

Modifying the Currently Selected Event

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

Deleting an Event

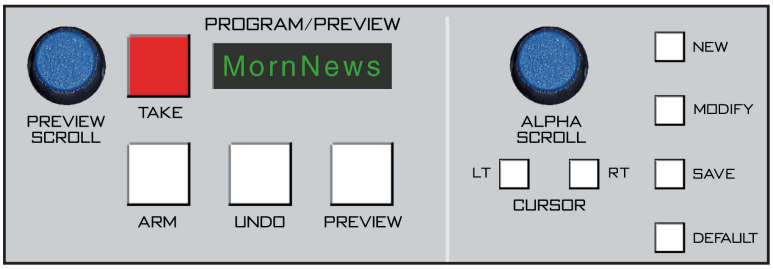
Rotate the PREVIEW SCROLL encoder until the Event to be deleted is shown in the PROGRAM/PREVIEW display. Press the Modify button, then press the PREVIEW SCROLL knob; the display will ask “DELETE?”. Press the TAKE button to delete the previously displayed Event. Do nothing and Delete mode will time out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

Previewing an Event

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

Event Default Button

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



Establishing the Default Setting

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

Naming an Event

When events are saved, they receive a default event designation number. This way events can be saved quickly without having to name them. However, an event may be custom named when saved, or at a later time. To rename the displayed event, press the ALPHA SCROLL knob. The CURSOR LT and CURSOR RT buttons will light and the cursor, indicated by a flashing character, will be at the beginning of the name. Also, the SAVE button will begin to flash. At any time you can use CURSOR LT and CURSOR RT to move to a character you want to change. Once the cursor is at the desired character, rotate the ALPHA SCROLL encoder until the desired new character is displayed. Once all desired characters have been changed, simply press SAVE to save your changes. The event is stored with the desired name. At any time you can cancel the name edit by pressing the ALPHA SCROLL knob. Also, if you stop making name changes but fail to press the SAVE button, the name edit process will automatically cancel after a delay of about 10 seconds.

Control Modes

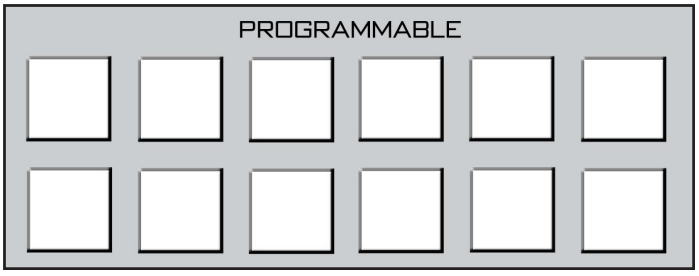
The D-7 control surface is operated in one of three modes. In Administrator mode access is allowed to all surface functions. In User mode a limited set of user functions is allowed. The set of functions allowed in User mode is set independently for each console using the Bridge XPoint software (see the Bridge Router manual for details). The third mode, Guest, blocks out MXM assign, Event takes, Event saves, and visibility changes from being controlled by the surface.

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

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

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

Programmable Buttons



These twelve (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.

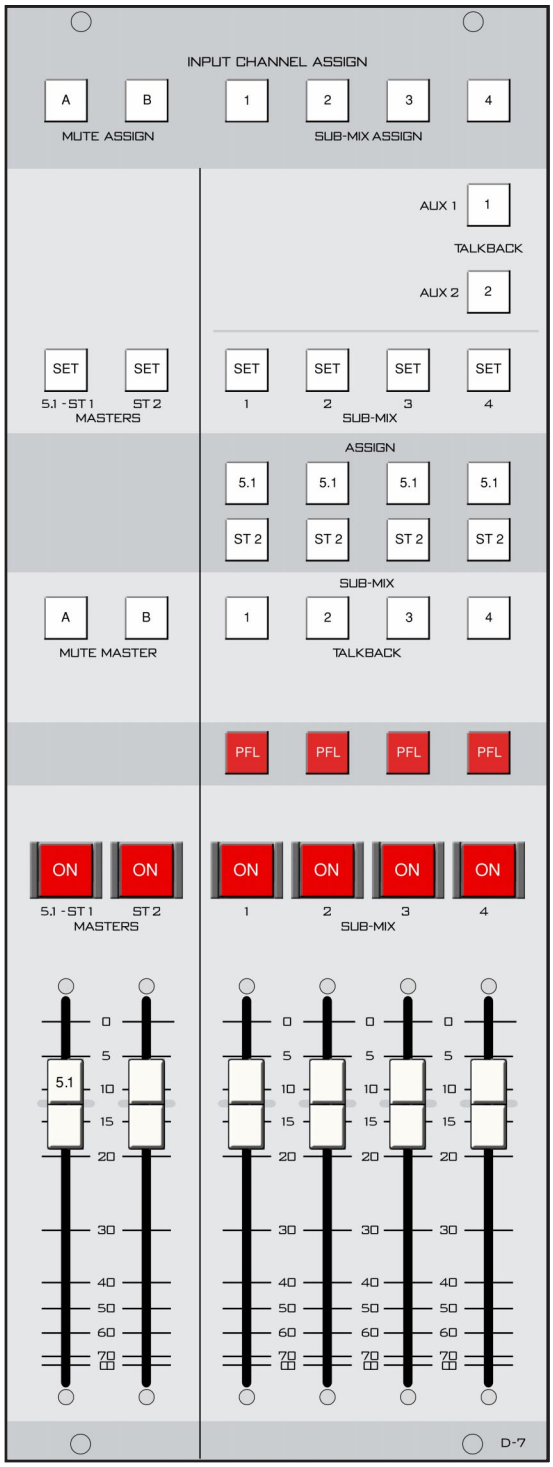
Master Panel (MFS-D7)

Chapter Contents

Master Panel (MFS-D7)

Controls and Functions

The D-7 digital audio control surface is equipped with one MASTER panel. This panel houses two master program outputs and four submix group outputs.



Master Program Outputs

Assign to Master

Input channels are assigned to the 5.1/ST1 MASTER by pressing the 5.1/ST1 button on that channel's input panel ASSIGN section. Assignment to the ST2 MASTER takes place in a similar fashion.

Likewise, the same procedure can be used to assign any submix to either or both masters.

Master Mix Destinations

To be effective, the surface outputs must be assigned to one or more destinations, which are outputs from the Bridge Router System. Please refer to the Bridge Router manual for details.

Mute Assign

Each channel, submix, and master can be assigned to MUTE MASTER A and/or MUTE MASTER B. Assignment is made by first pressing the channel's SET button, then pressing the desired MUTE ASSIGN button. Indicators on the input panels show the mute assignments.

Mute Master

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

Master SET Button

Like the SET button on the inputs, the master SET buttons are used to access other controls and apply their settings to the master. The masters may have their MODE settings changed and may be assigned to MUTE MASTER A and/or MUTE MASTER B.

Channel Master ON/OFF

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

Master Faders

These linear controls set the levels of the master channels.

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

AUX Talkback

Pressing the AUX 1 TALKBACK button will interrupt the AUX 1 output with the predefined TB signal. AUX 2 TALKBACK works in a similar manner.

Sub-Mixes (Groups) Output

Generally the 4 audio submixes would operate in stereo mode. They may be mixed to two duplicate mono channels by means of the channel SET button and mode buttons in the MODE section of the EFS panel. The current mode will be shown by the LED indicators in the MODE buttons.

Sub-Mix Talkback

Pressing the TB button will interrupt the group output with the predefined TB signal.

Sub-Mix Destinations

To be effective, the surface outputs must be assigned to one or more destinations, which are outputs from the Bridge Router System. Please refer to the Bridge Router manual for details.

Sub-Mix Assign Buttons

These buttons are used to assign input channels to the groups. Press SET on the input, then press any desired SUB-MIX ASSIGN button(s). Assignment for the channel with its SET currently active are indicated by the lighting of the four SUB-MIX ASSIGN buttons, while the SUB displays on each channel show that channel's group assignment whether its SET is active or not.

Sub-Mix Assign to Master

Each group can be assigned to either of the two main stereo output buses in the center section by using the eight ASSIGN buttons, which will light to indicate assignment is made.

ON (1-4) Switch

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

PFL(Cue)

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

Sub-Mix (Group) Faders

These linear controls set the output levels of the submix channels.

Host CPU (HC-3)

Chapter Contents

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

Host Controller (HC-3)

Overview

The host controller card used in the D-7 incorporates a PC/104 computer mounted on the HC-3 PCB. The host computer utilizes RAM, a flash disk (which emulates a standard IDE hard drive), and an Ethernet port. There is no hard disk drive. A video port is provided for the user-provided VGA monitor, and a keyboard port is for factory use only.

The purpose of the host controller is to provide control of the D-7 control surface. The HC-3 communicates to the XPoint Configuration PC via TCP/IP over Ethernet through a standard ethernet hub or switch. It also communicates to the Bridge Router system via a special mixer link connection.

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

HC-3 BIOS Settings/Format

BIOS Setup and formatting of the Host CPU is completed prior to the testing of your D-7 control surface at the Wheatstone factory. There are no user adjustable settings.

Ethernet IP Addressing

The Wheatstone D-7 control surface ships with the host controller IP address set. Stand-alone systems (not interfaced to a station's existing network) require no IP address changes.

Ethernet Interface Wiring

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

Mixer Link Wiring

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

Internal Programming Options

All internal programming options are made via PCB mounted switches.

Switch Settings

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

SW1 Position 1 - Sample Rate

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

SW1 Positions 2 and 3 - Not Used

These dipswitch positions are reserved for future use.

SW1 Position 4 - CAT5 Enable

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

Hook-Ups

All user wiring to and from the host controller is made via I/O connectors located on the control surface rear. There are two RJ-45 connectors: one is for Ethernet connection, and the other is for the CAT5 Mixer Link connection. There is also a female DB-9 connector for feeding line level signals to the internal amplifiers that feed the headphone jack. The pinout drawing on page 5-6 shows all wiring connections at a glance.

"ETH" RJ-45—Main Ethernet Connector

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

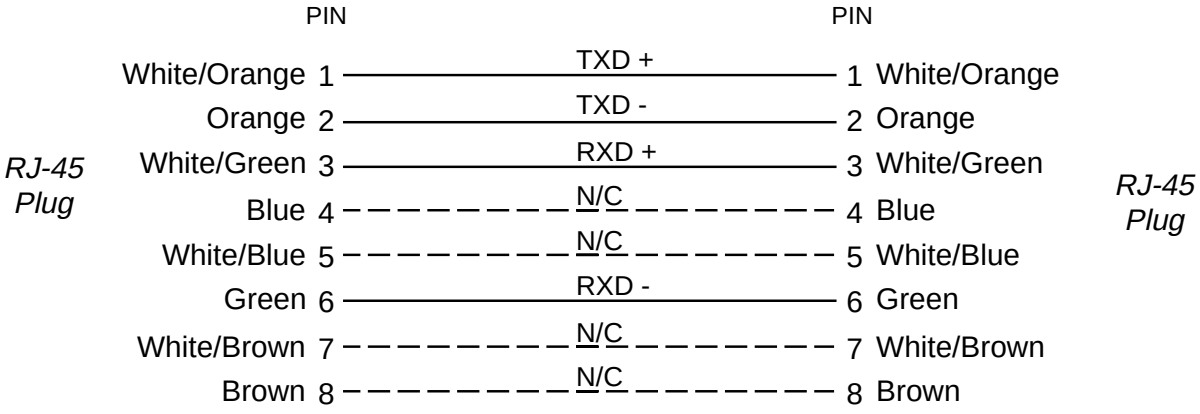
"CAT5" RJ-45—Mixer Link Connector

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

"HEADPHONE" DB-9—Headphone Connector

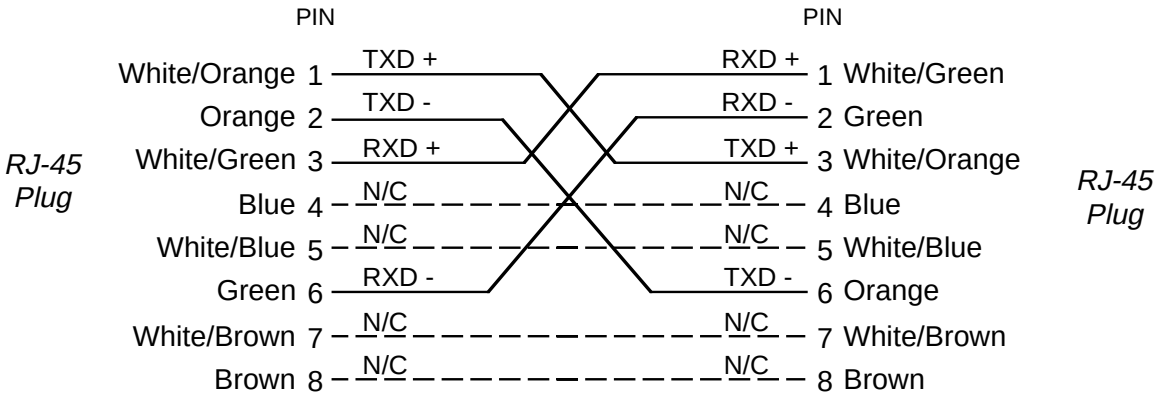
Pin 4 – HDPN LT HI
Pin 5 – HDPN LT SH
Pin 9 – HDPN LT LO
Pin 7 – HDPN RT HI
Pin 8 – HDPN RT SH
Pin 3 – HDPN RT LO
Pin 1 – N/C
Pin 2 – N/C
Pin 6 – N/C

TYPICAL ETHERNET CABLE



USED FOR CONNECTING THE HOST CONTROLLER TO YOUR NETWORK HUB.

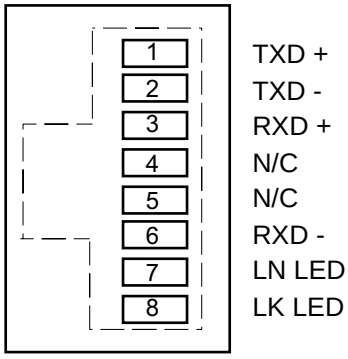
TYPICAL CROSSOVER CABLE



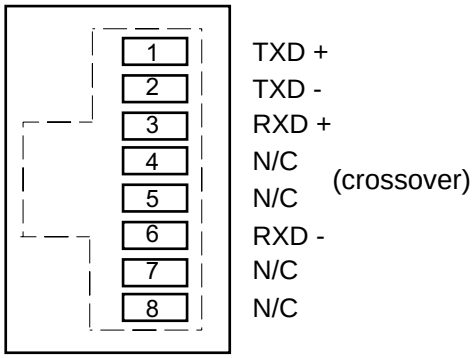
USED FOR MIXER LINK CONNECTOR.

HC-3 Host Controller I/O Connections

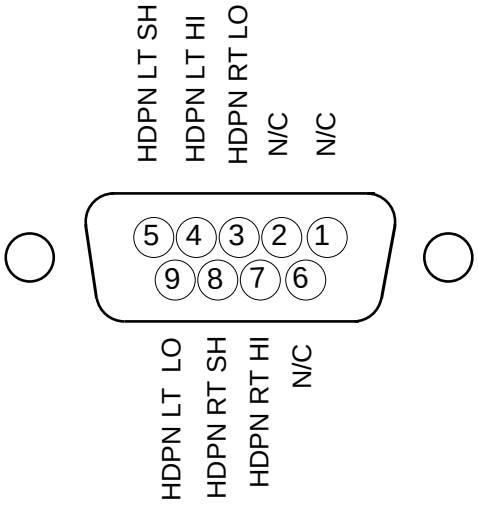
Ethernet Connector (RJ-45)



Mixer Link CAT5 Connector (RJ-45)



"HEADPHONE" Female DB-9



These are line level inputs to the internal amplifiers that feed the surface's headphone jack.

Meterbridge

Chapter Contents

Meterbridge

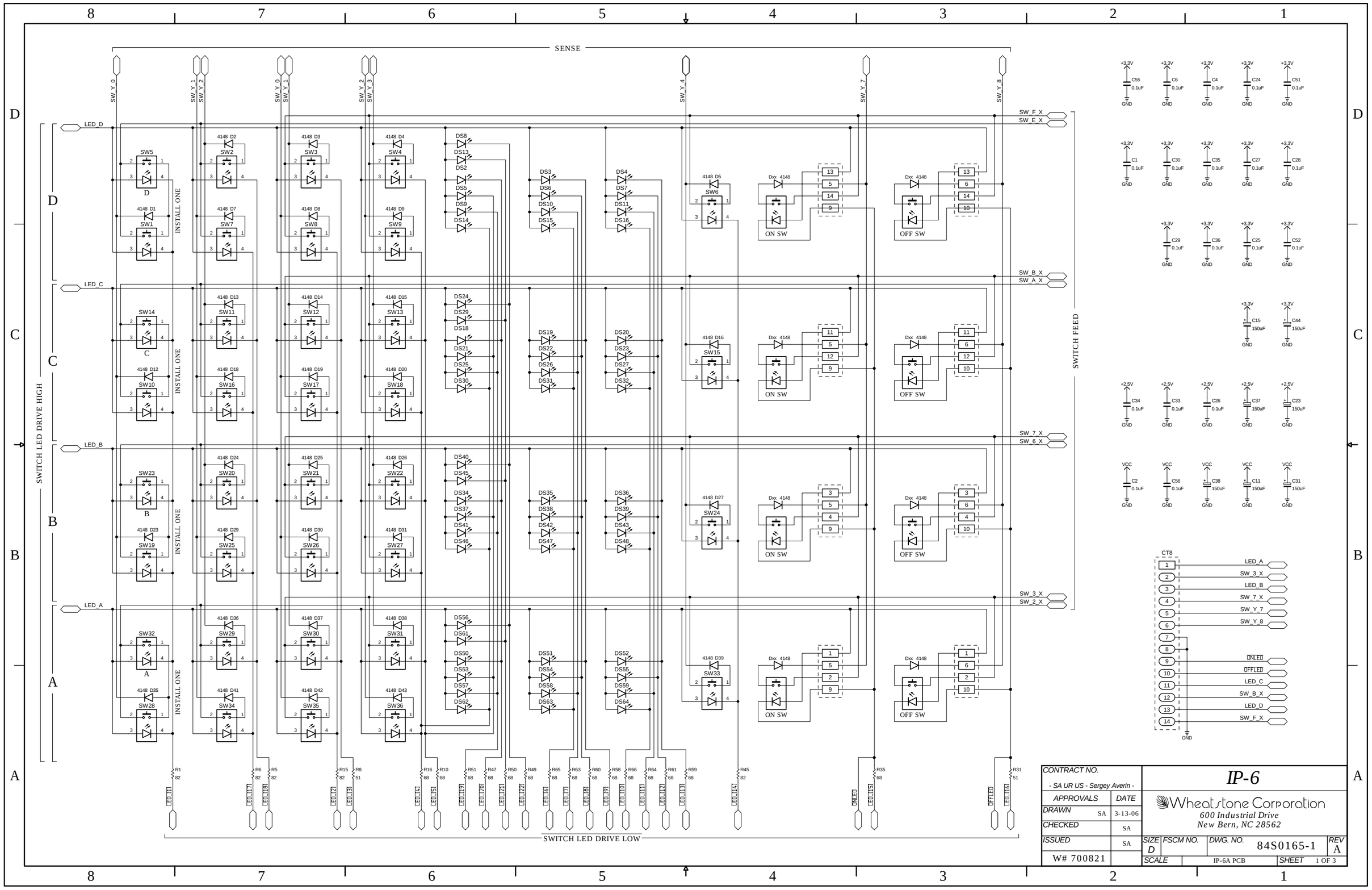
Overview

The D-7 control surface's meterbridge houses seven pairs of left-right LED meters: Master 1, Master 2, Sub-Mix 1, Sub-Mix 2, Sub-Mix 3, Sub-Mix 4, and Switched.

The control surface's LED metering system provides dual readouts showing both calibrated VU (average) and full scale digital peak (Peak).

Schematic and Load Sheet Drawings

Chapter Contents



CONTRACT NO.	*IP-6*
- SA UR US - Sergey Averin -	
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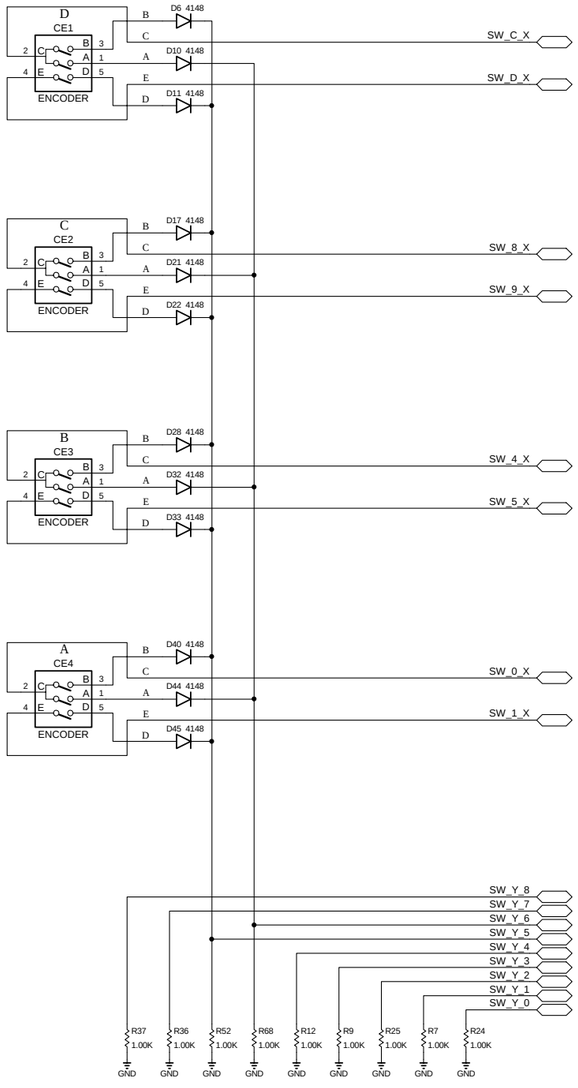
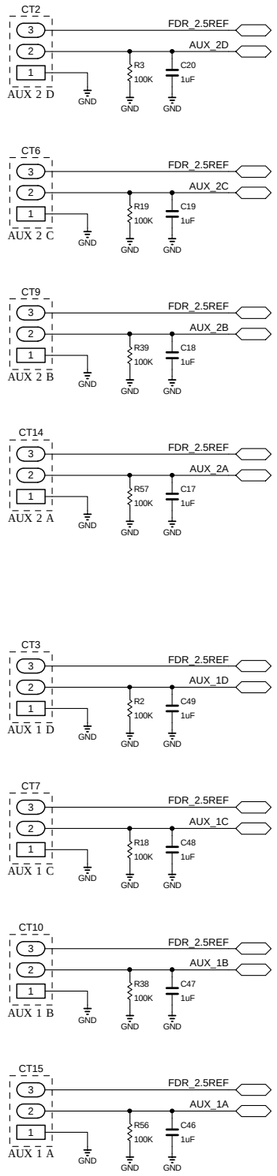
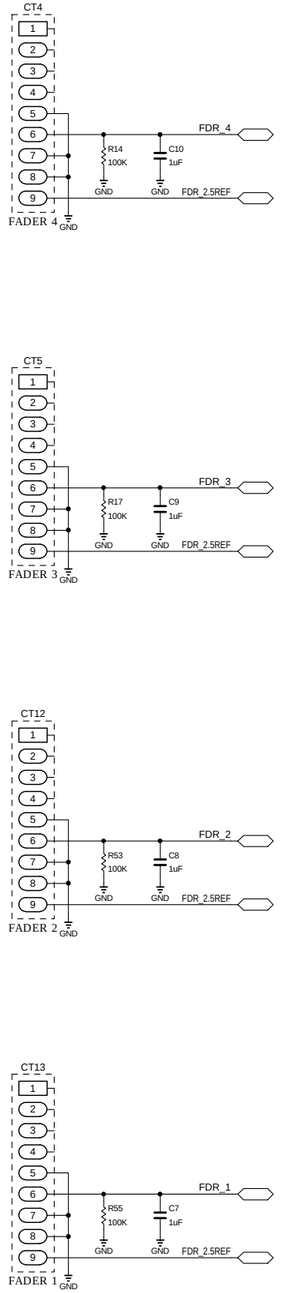
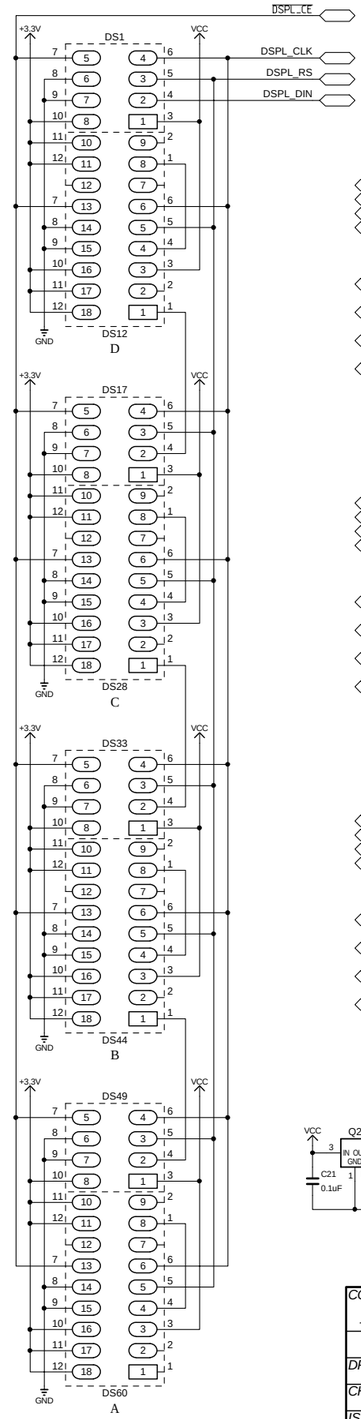
DRAWN SA 3-13-06	600 Industrial Drive
CHECKED SA	New Bern, NC 28562
ISSUED SA	SIZE D · FSCM NO. · DWG. NO. 84S0165-1 · REV A
W# 700821	SCALE · IP-6A PCB · SHEET 1 OF 3

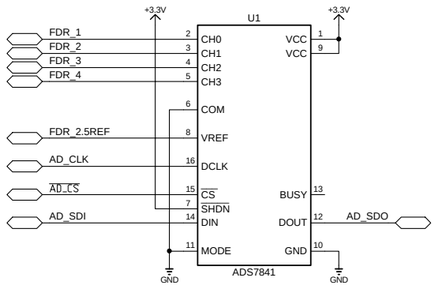
ENCODERS

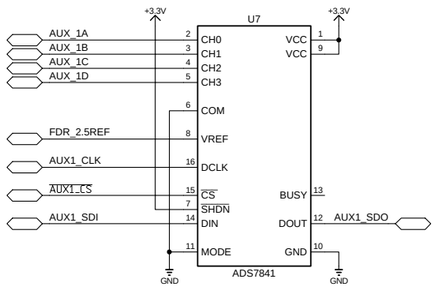


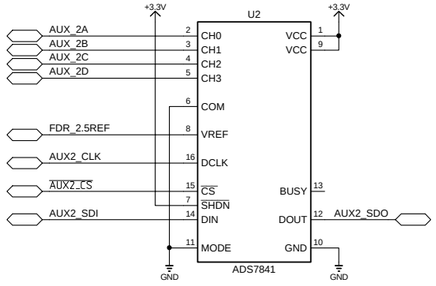


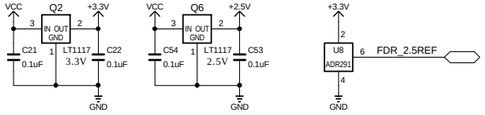


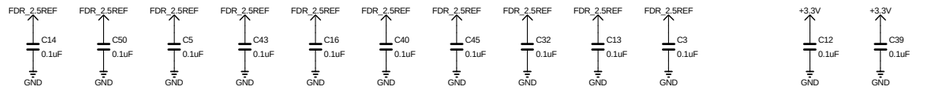












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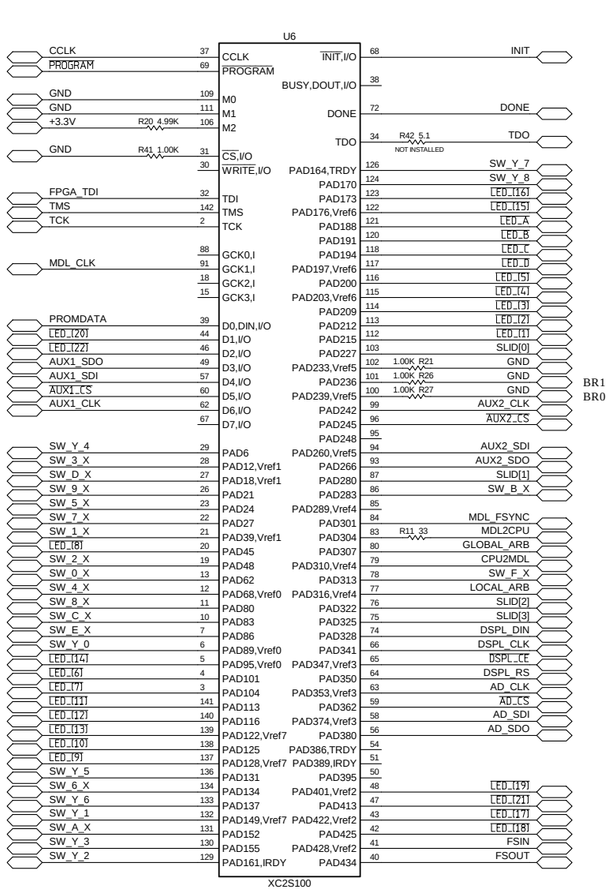
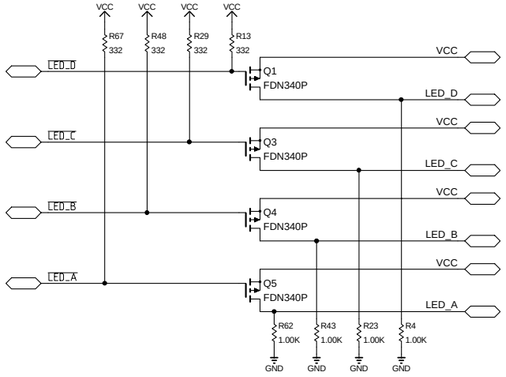
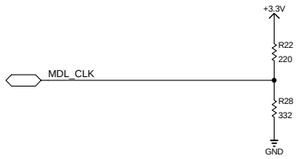
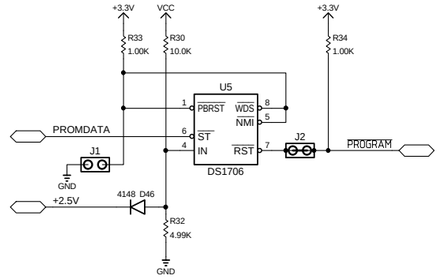
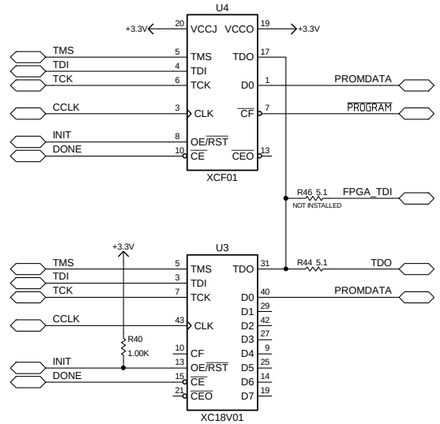
CHECKED	SA		
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0165-2 / REV A	
W# 700821		SCALE / IP-6A PCB / SHEET 2 OF 3	

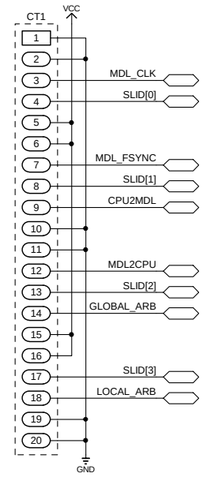


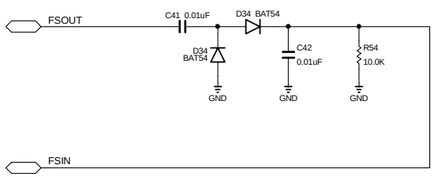


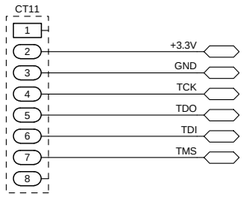




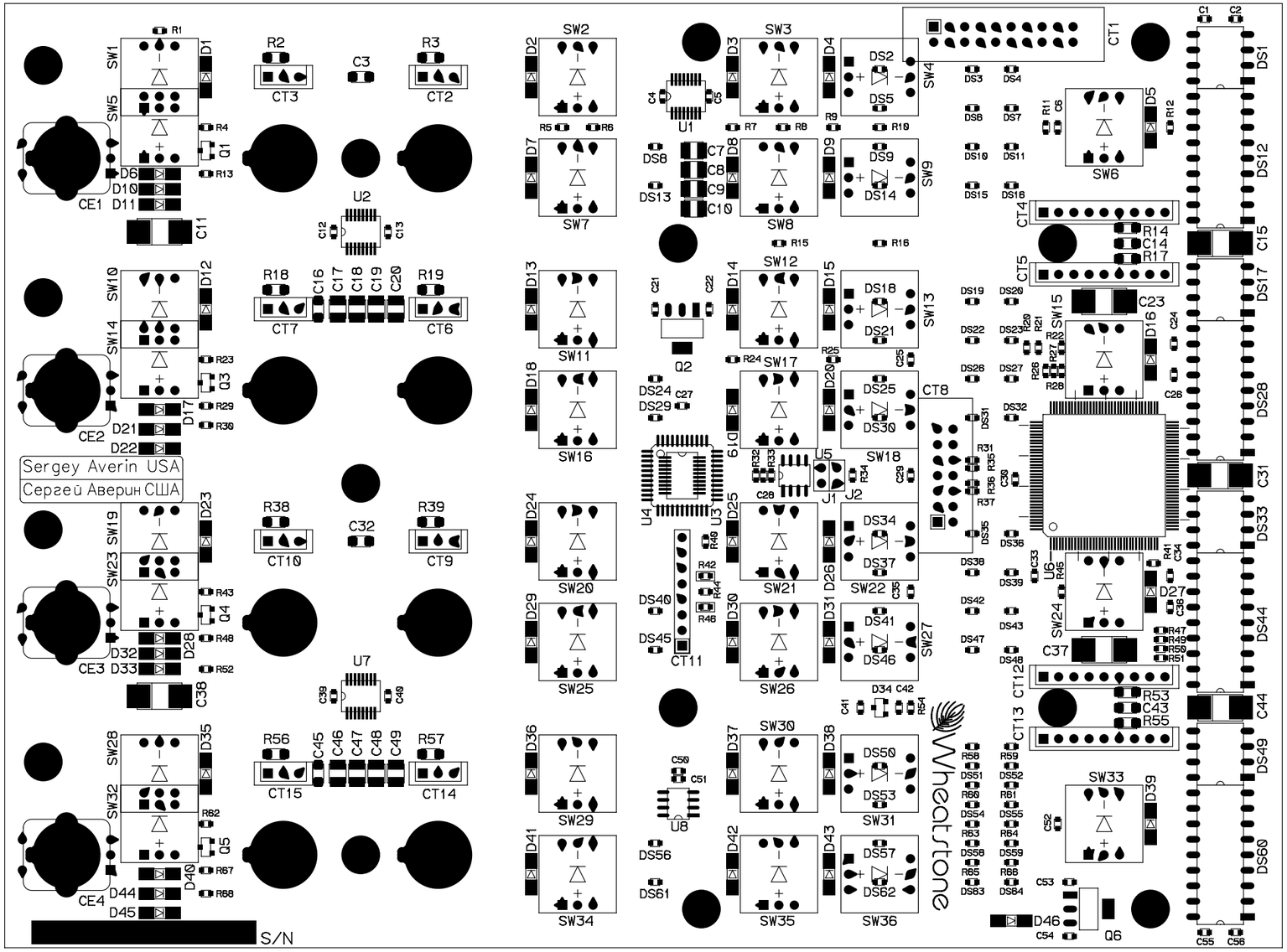


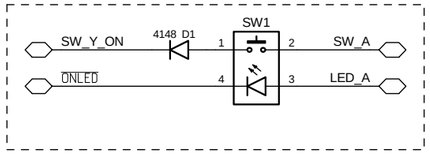


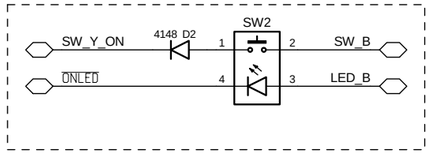


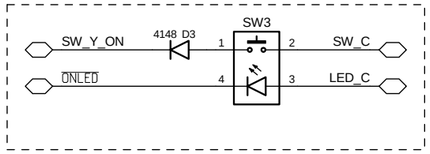


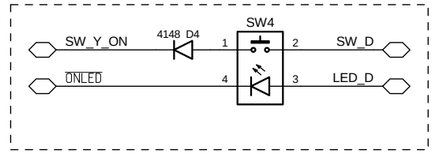
CONTRACT NO. - SA UR US - Sergey Averin -		IP-6	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	3-13-06		
CHECKED	SA		
ISSUED	SA		
W# 700821		SIZE D / FSCM NO. / DWG. NO. 84S0165-3 / REV A	
		SCALE / IP-6A PCB / SHEET 3 OF 3	

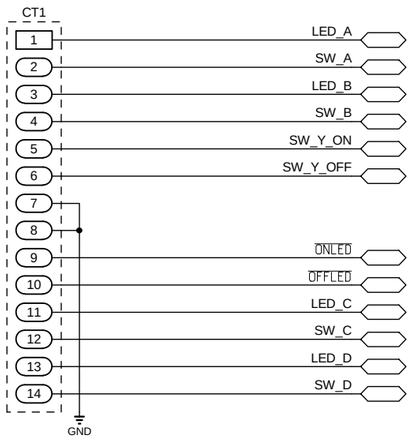

Sergey Averin USA
Сергей Аверин США
S/N
Wheatstone





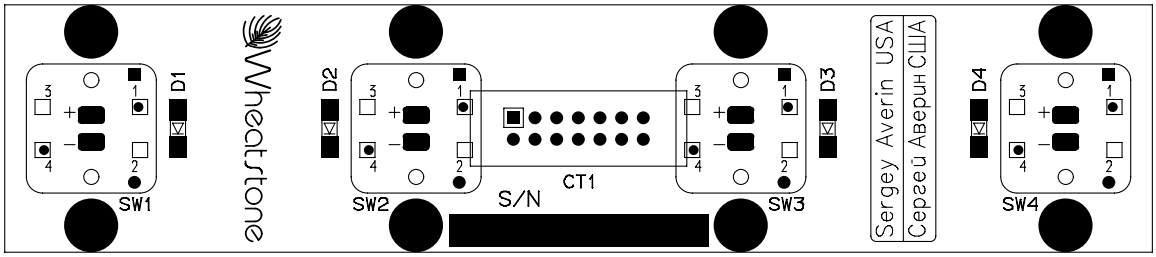




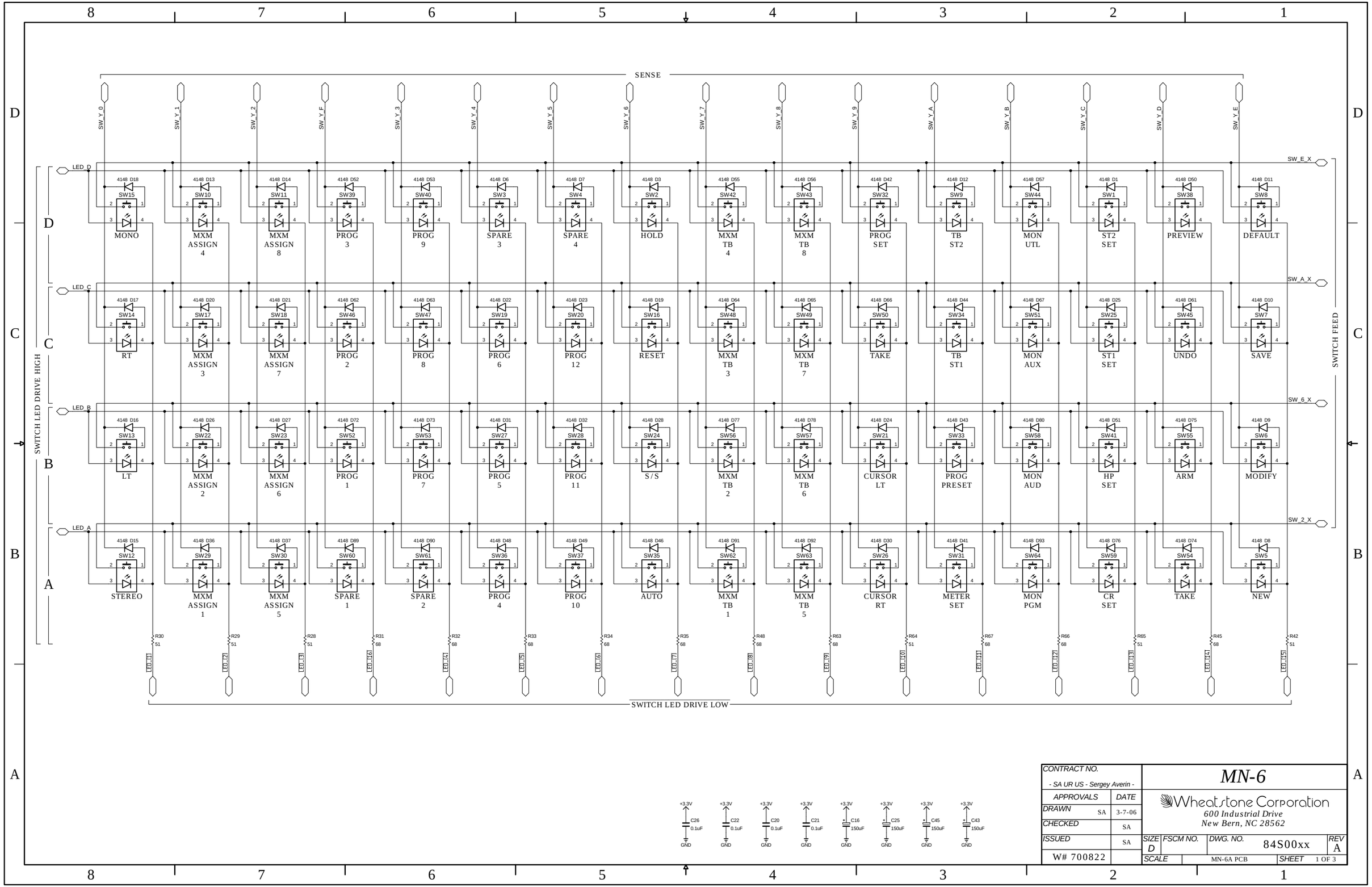


CONTRACT NO. - SA UR US - Sergey Averin -		ONS-7	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	3-21-06		
CHECKED	SA		
ISSUED	SA		
W# 700873		SIZE C / FSCM NO. / DWG. NO. 84S0167 / REV –	
		SCALE ONS-7 PCB / SHEET 1 of 1	

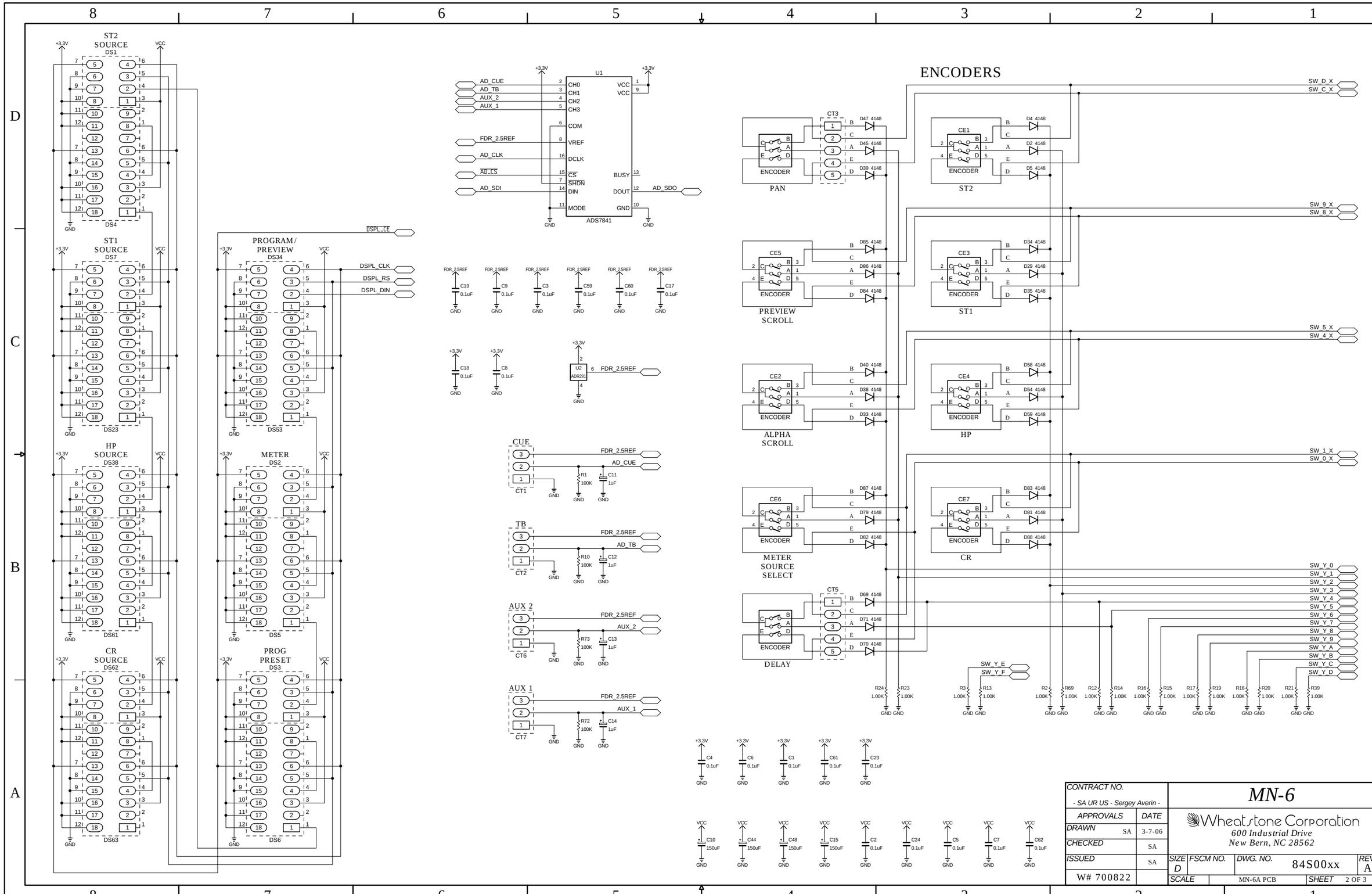
4 Input Panel On/Off Switch Card Schematic - Sheet 1 of 1



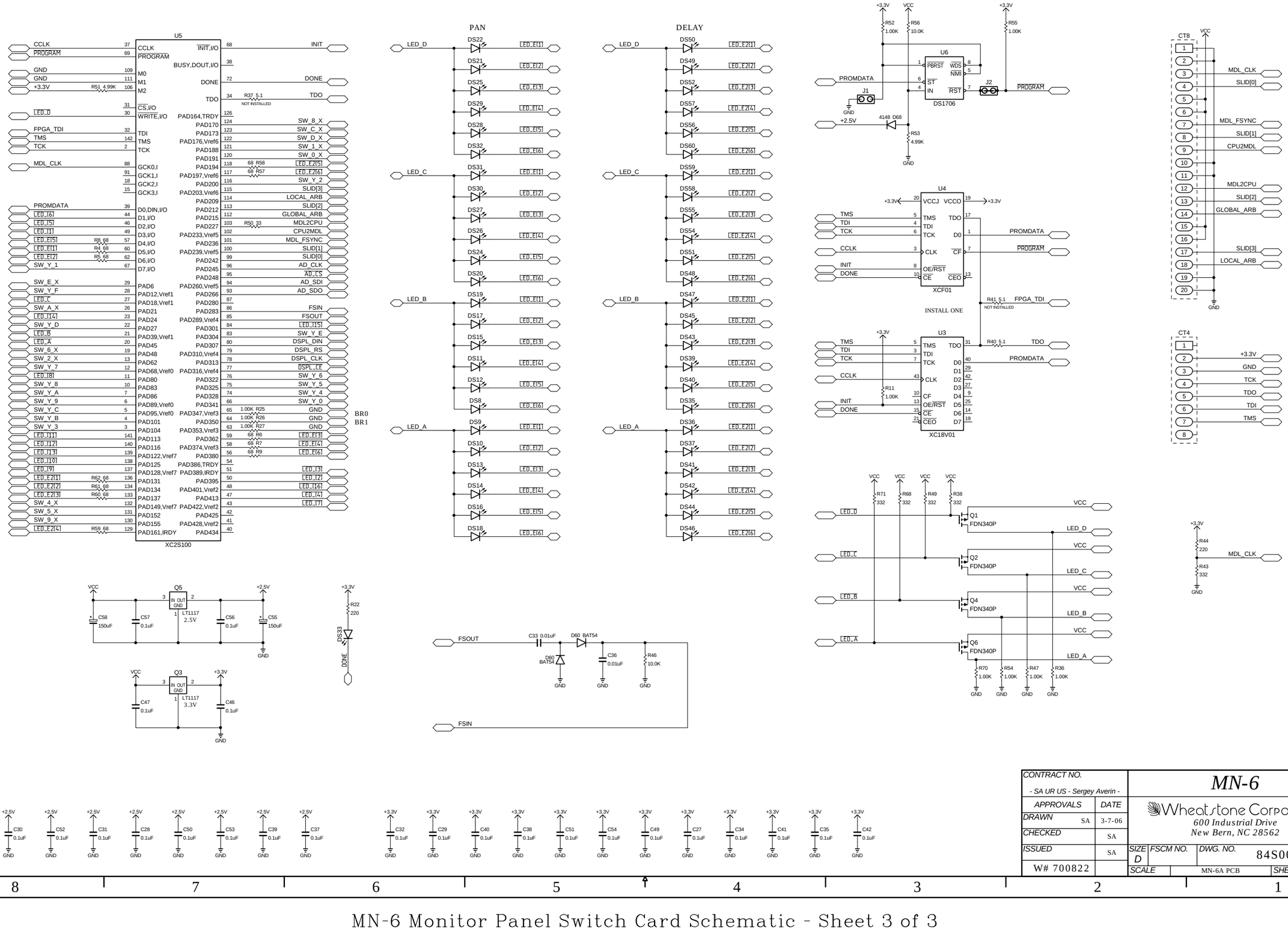
ONS-7 4 Inputs Panel On/Off Switch Load Sheet



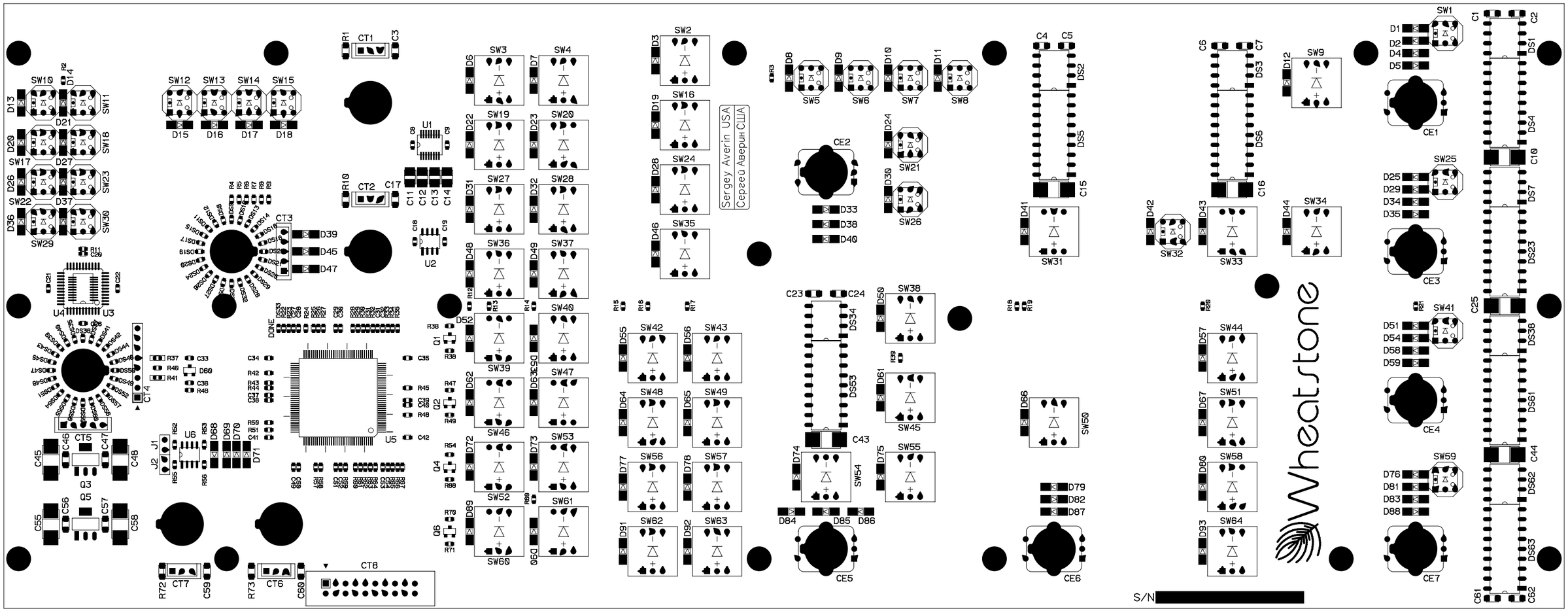
CONTRACT NO. - SA UR US - Sergey Averin -		MN-6
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562
DRAWN SA	3-7-06	
CHECKED	SA	
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S00xx / REV A
W# 700822		SCALE / MN-6A PCB / SHEET 1 OF 3

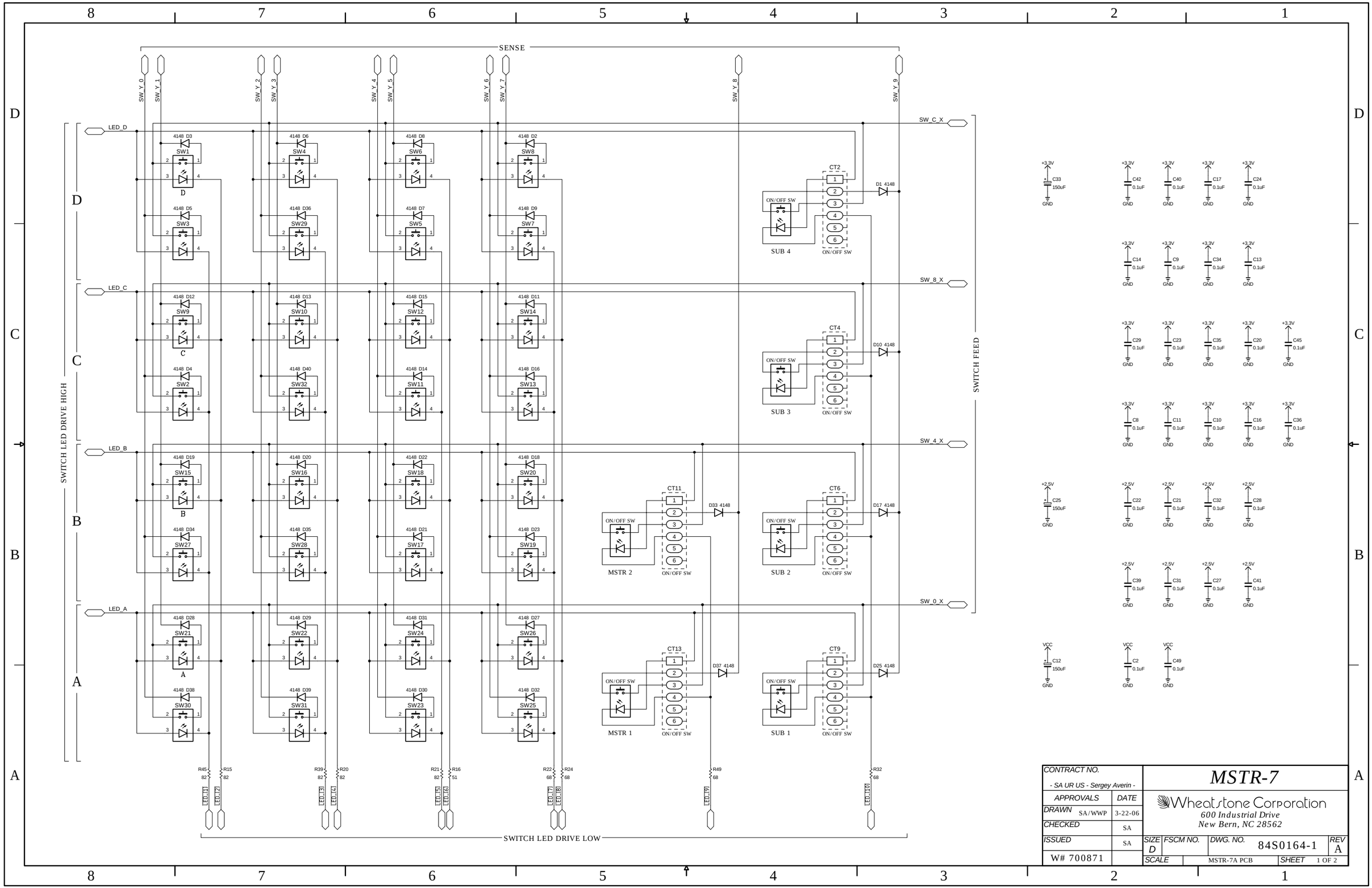


CONTRACT NO.		*MN-6*	
- SA UR US - Sergey Averin -			
APPROVALS	DATE	Wheatstone Corporation	
DRAWN SA	3-7-06	600 Industrial Drive	
CHECKED	SA	New Bern, NC 28562	
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S00xx / REV A	
W# 700822		SCALE MN-6A PCB	SHEET 2 OF 3



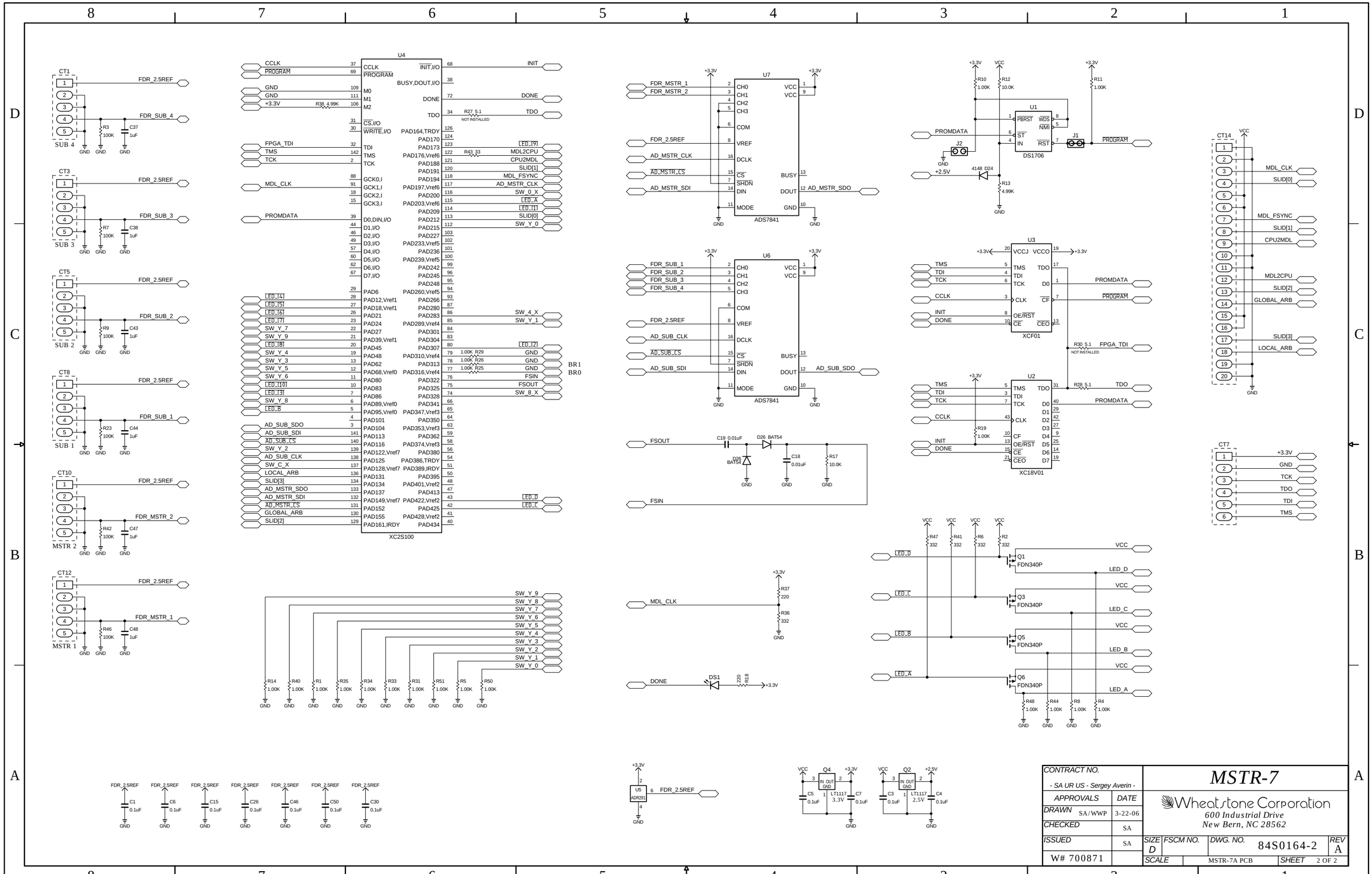
CONTRACT NO. - SA UR US - Sergey Averin -		MN-6
APPROVALS	DATE	Wheatstone Corporation, 600 Industrial Drive, New Bern, NC 28562
DRAWN SA	3-7-06	
CHECKED	SA	
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S00xx / REV A
W# 700822		SCALE MN-6A PCB / SHEET 3 OF 3


Sergey Averin USA
Сергей Аверин США
Wheatstone
S/N

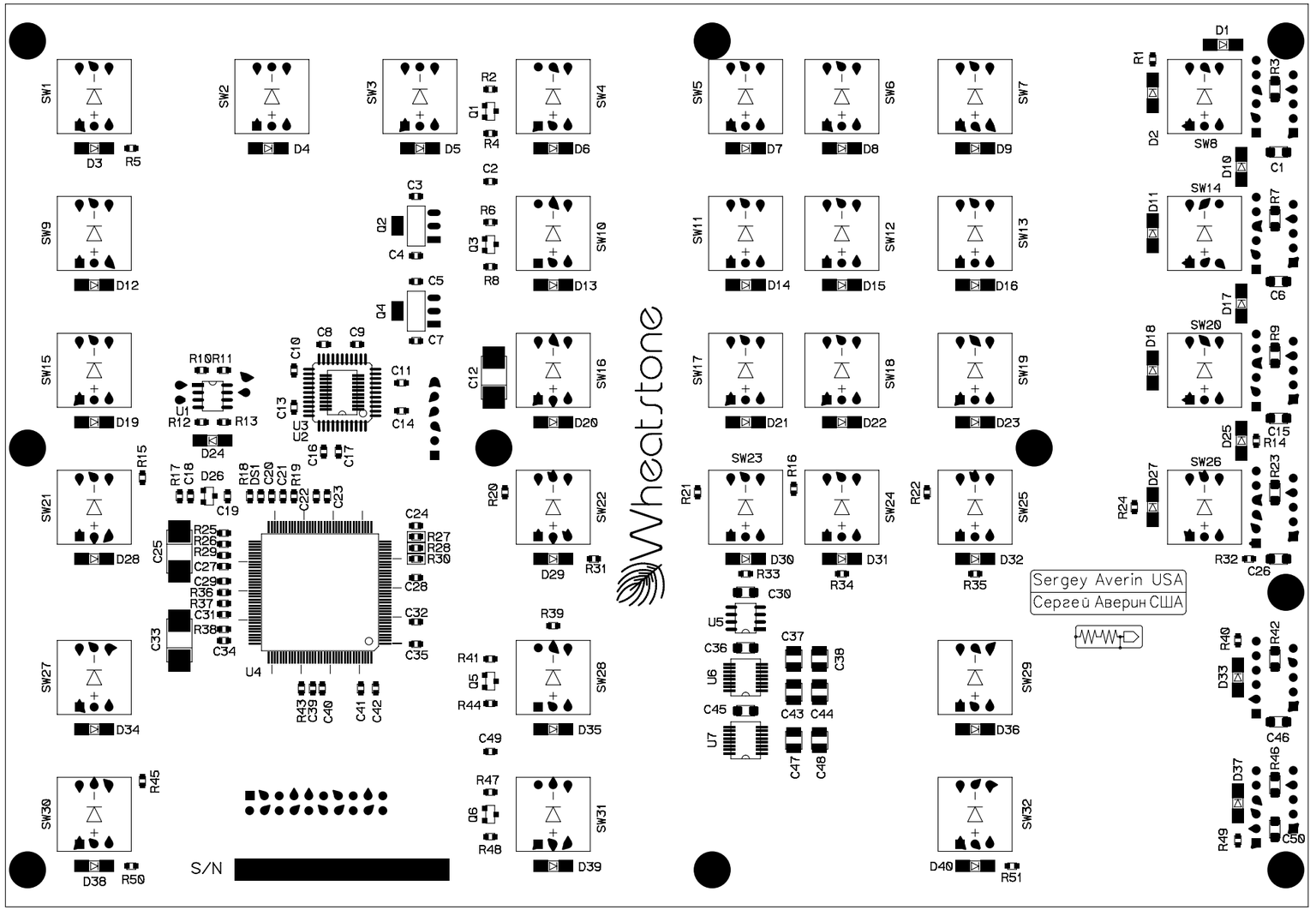


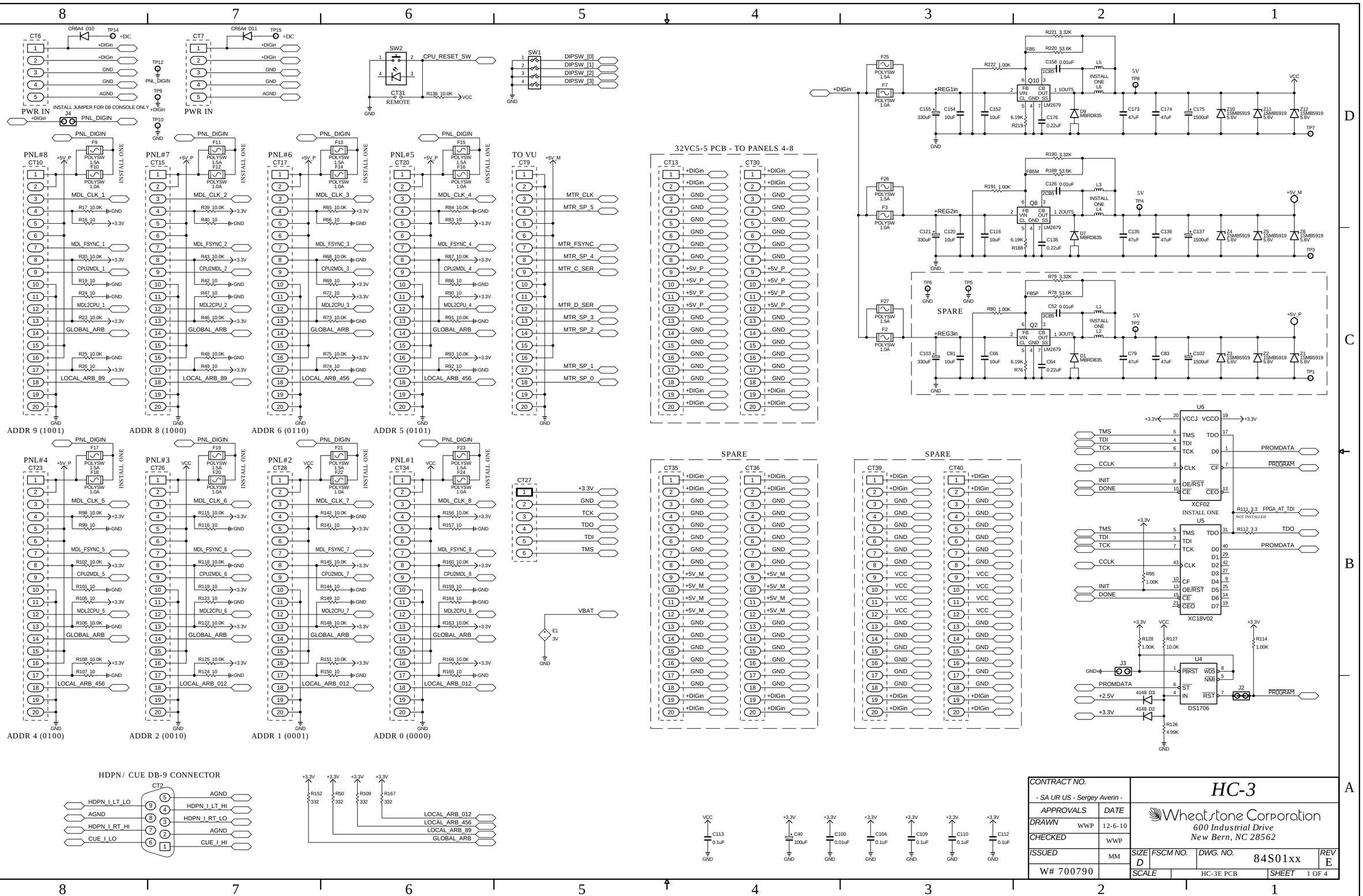
CONTRACT NO. - SA UR US - Sergey Averin -		MSTR-7
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562
DRAWN SA/WWP	3-22-06	
CHECKED	SA	
ISSUED	SA	SIZE D / FSCM NO. / DWG. NO. 84S0164-1 / REV A
W# 700871		SCALE / MSTR-7A PCB / SHEET 1 OF 2

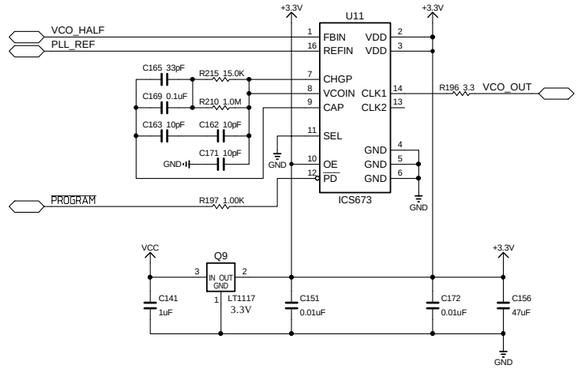
MSTR-7 Master Panel Switch Card Schematic - Sheet 1 of 2

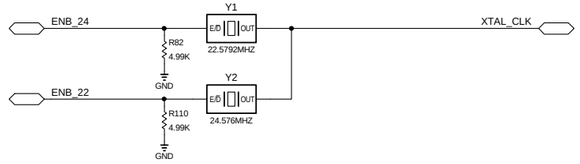


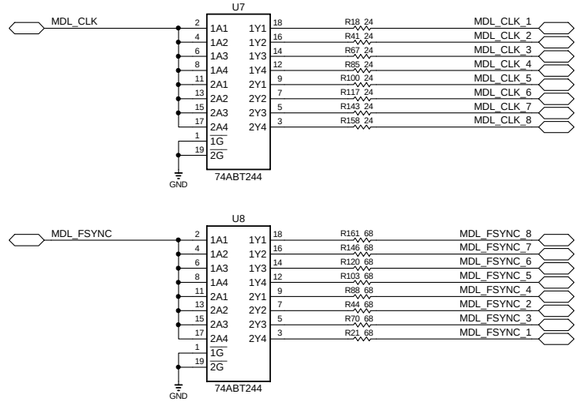
CONTRACT NO. - SA UR US - Sergey Averin -		MSTR-7
APPROVALS	DATE	Wheatstone Corporation, 600 Industrial Drive, New Bern, NC 28562
DRAWN SA/WWP	3-22-06	
CHECKED	SA	
ISSUED	SA	SIZE D · FSCM NO. · DWG. NO. 84S0164-2 · REV A
W# 700871		SCALE · MSTR-7A PCB · SHEET 2 OF 2

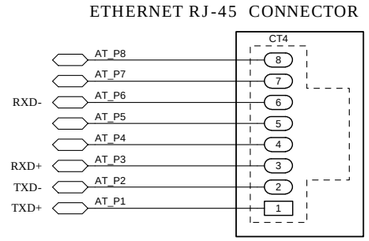

Wheatstone
Sergey Averin USA
Сергей Аверин США
S/N

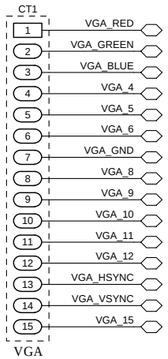

CT6
CR6A4 D10
TP14
+DC
+DIGin
GND
AGND
TP12
PNL_DIGIN
TP9
TP10
INSTALL JUMPER FOR D8 CONSOLE ONLY
PWR IN
J4
CT7
CR6A4 D11
TP15
SW2
CPU_RESET_SW
CT31
REMOTE
R136 10.0K
VCC
SW1
DIPSW_[0]
DIPSW_[1]
DIPSW_[2]
DIPSW_[3]
PNL#8
CT10
PNL#7
CT15
PNL#6
CT17
PNL#5
CT20
INSTALL ONE
+5V_P
MDL_CLK_1
MDL_CLK_2
MDL_CLK_3
MDL_CLK_4
MDL_FSYNC_1
MDL_FSYNC_2
MDL_FSYNC_3
MDL_FSYNC_4
CPU2MDL_1
CPU2MDL_2
CPU2MDL_3
CPU2MDL_4
MDL2CPU_1
MDL2CPU_2
MDL2CPU_3
MDL2CPU_4
GLOBAL_ARB
LOCAL_ARB_89
LOCAL_ARB_456
TO VU
CT9
+5V_M
MTR_CLK
MTR_SP_5
MTR_FSYNC
MTR_SP_4
MTR_C_SER
MTR_D_SER
MTR_SP_3
MTR_SP_2
MTR_SP_1
MTR_SP_0
ADDR 9 (1001)
ADDR 8 (1000)
ADDR 6 (0110)
ADDR 5 (0101)
32VC5-5 PCB - TO PANELS 4-8
CT13
CT30
SPARE
CT35
CT36
CT39
CT40
PNL#4
CT23
PNL#3
CT26
PNL#2
CT28
PNL#1
CT34
VCC
MDL_CLK_5
MDL_CLK_6
MDL_CLK_7
MDL_CLK_8
MDL_FSYNC_5
MDL_FSYNC_6
MDL_FSYNC_7
MDL_FSYNC_8
CPU2MDL_5
CPU2MDL_6
CPU2MDL_7
CPU2MDL_8
MDL2CPU_5
MDL2CPU_6
MDL2CPU_7
MDL2CPU_8
LOCAL_ARB_012
CT27
TCK
TDO
TDI
TMS
VBAT
E1
3V
ADDR 4 (0100)
ADDR 2 (0010)
ADDR 1 (0001)
ADDR 0 (0000)
HDPN/ CUE DB-9 CONNECTOR
CT2
HDPN_I_LT_LO
HDPN_I_LT_HI
HDPN_I_RT_LO
HDPN_I_RT_HI
CUE_I_LO
CUE_I_HI
+DIGin
+REG1in
+REG2in
+REG3in
F25
F26
F27
F7
F3
F2
POLYSW 1.5A
POLYSW 1.0A
R221 3.32K
R220 53.6K
R222 1.00K
R219 6.19K
R189 53.6K
R191 1.00K
R188 6.19K
R78 53.6K
R80 1.00K
R76 6.19K
Q10
Q8
Q2
LM2679
1OUT5
2OUT5
3OUT5
D9 MBRD835
D7 MBRD835
D1 MBRD835
L5
L3
L1
INSTALL ONE
SPARE
5V
+5V_M
+5V_P
VCC
U6
VCCJ
VCCO
TMS
TDI
TCK
TDO
D0
CCLK
CLK
CF
INIT
DONE
OE/RST
CE
CEO
XCF02
PROMDATA
PROGRAM
FPGA_AT_TDI
NOT INSTALLED
U5
XC18V02
R95 1.00K
U4
DS1706
PBRST
WDS
NMI
ST
IN
RST
J3
J2
4148 D3
4148 D2
+2.5V
+3.3V
R128 1.00K
R127 10.0K
R114 1.00K
R126 4.99K
R152 332
R50 332
R109 332
R167 332
C113 0.1uF
C40 100uF
C100 0.01uF
C104 0.1uF
C109 0.1uF
C110 0.1uF
C112 0.1uF
CONTRACT NO.
- SA UR US - Sergey Averin -
APPROVALS
DATE
DRAWN
WWP
12-6-10
CHECKED
WWP
ISSUED
MM
W# 700790
HC-3
Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562
SIZE
D
FSCM NO.
DWG. NO.
84S01xx
REV
E
SCALE
HC-3E PCB
SHEET
1 OF 4

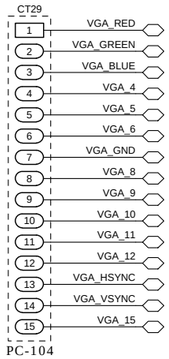


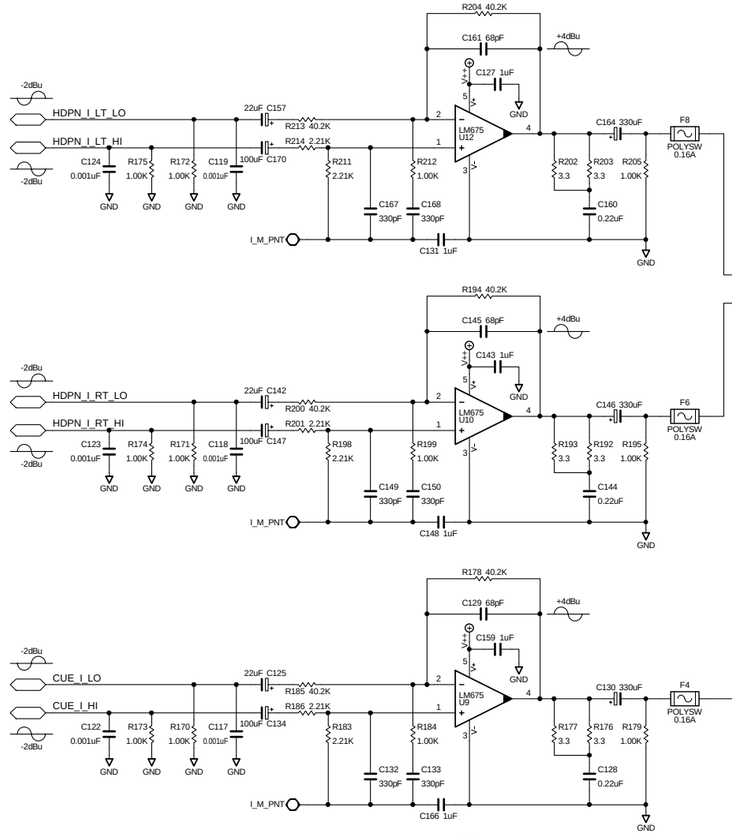


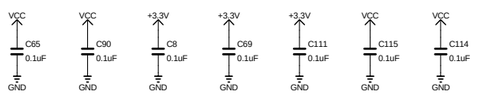


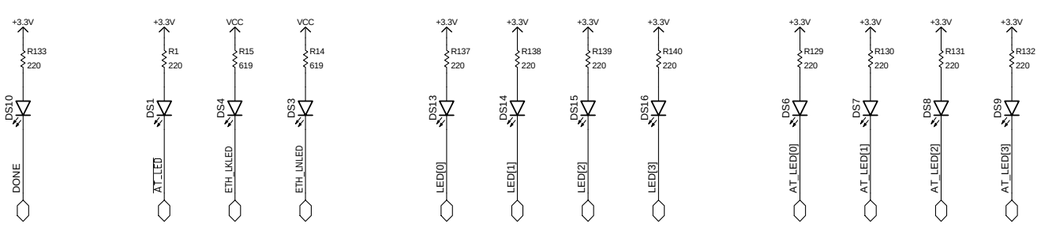


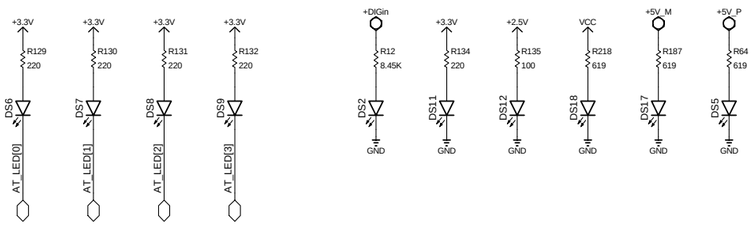




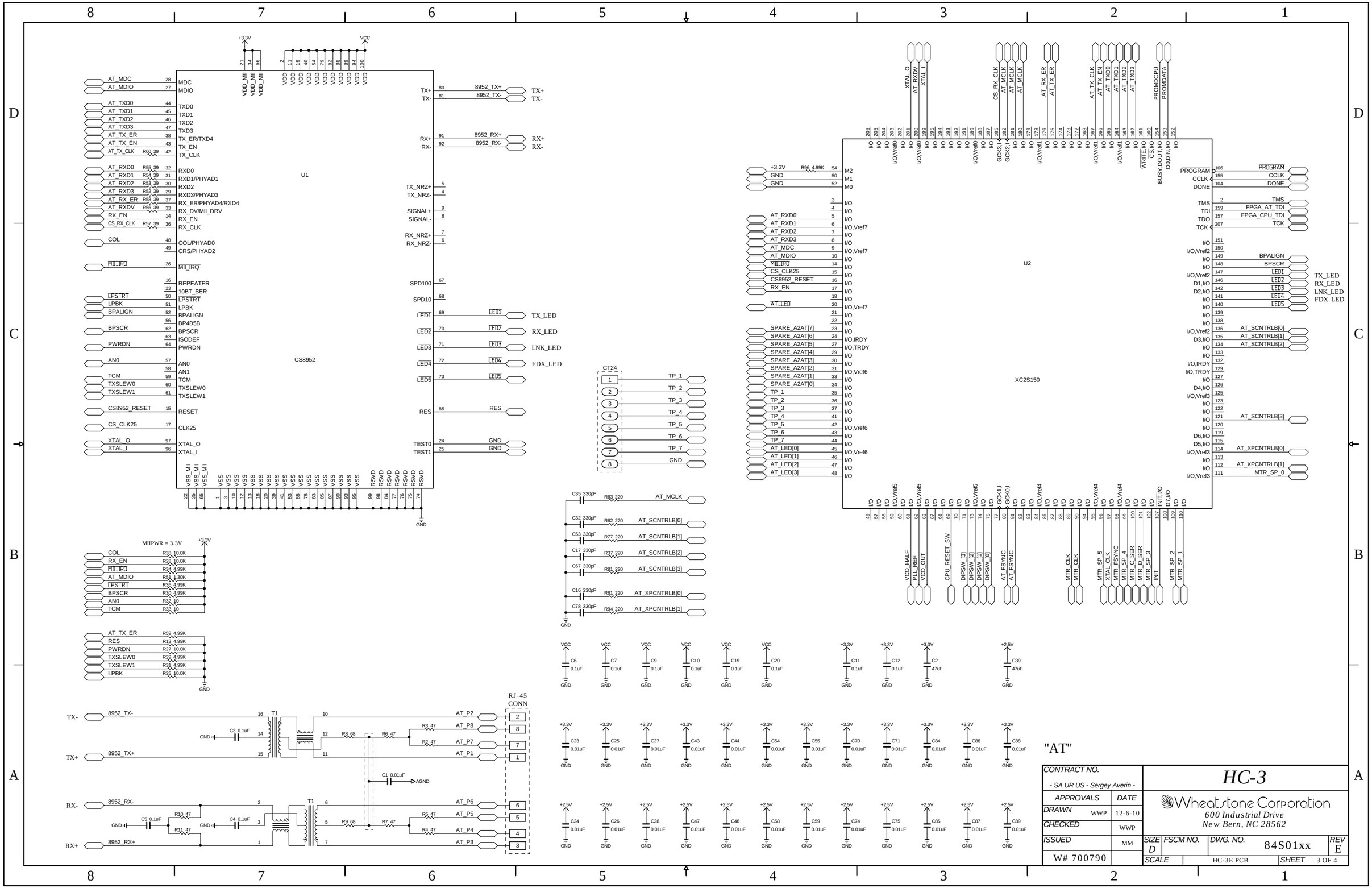




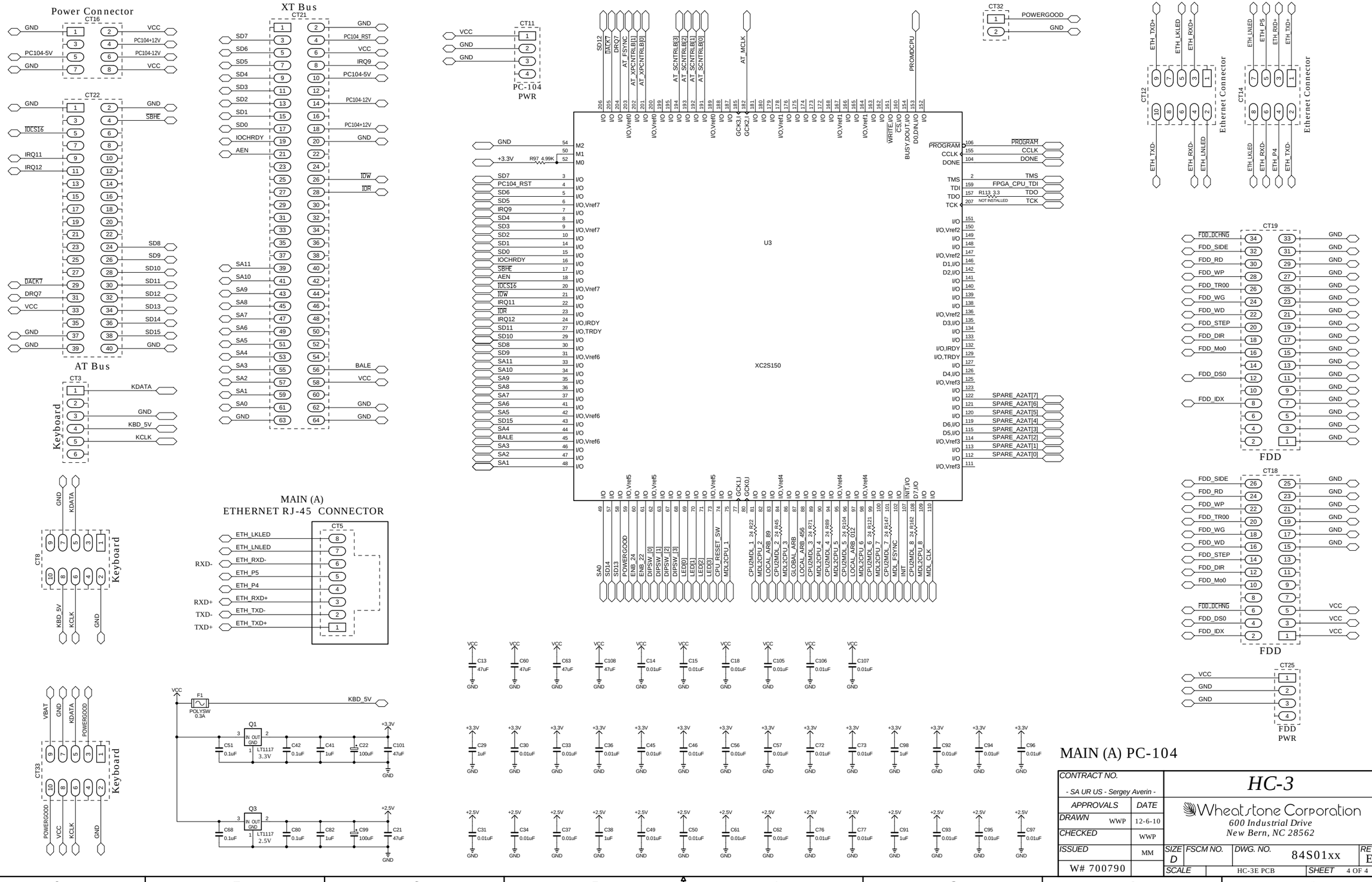




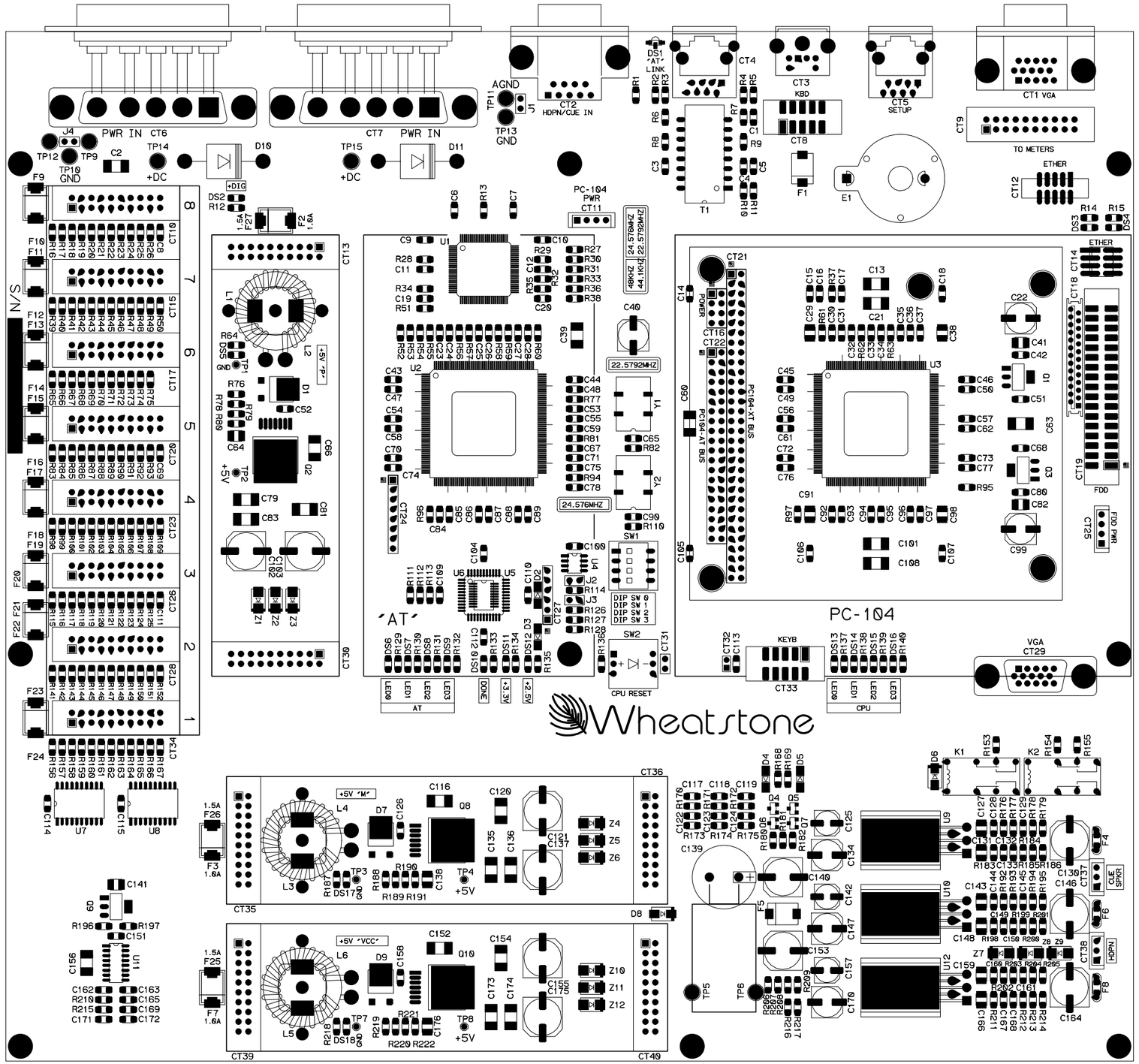
CONTRACT NO. - SA UR US - Sergey Averin -		HC-3
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562
DRAWN WWP	12-6-10	
CHECKED	WWP	
ISSUED	MM	SIZE D / FSCM NO. / DWG. NO. 84S01xx / REV E
W# 700790		SCALE HC-3E PCB / SHEET 2 OF 4



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



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



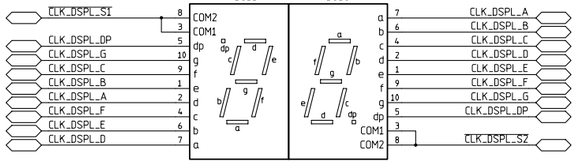
HC-3 Host Controller Card - Load Sheet

CLOCK

HOURS

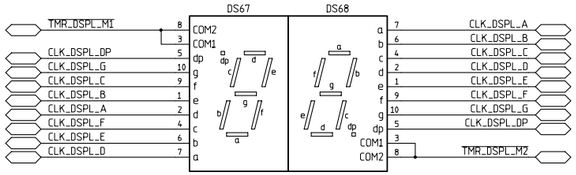
MINUTES

SECONDS

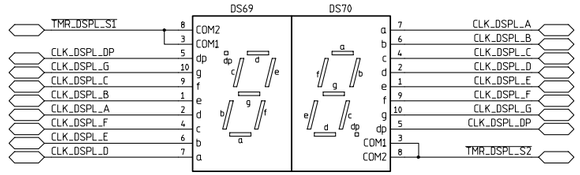


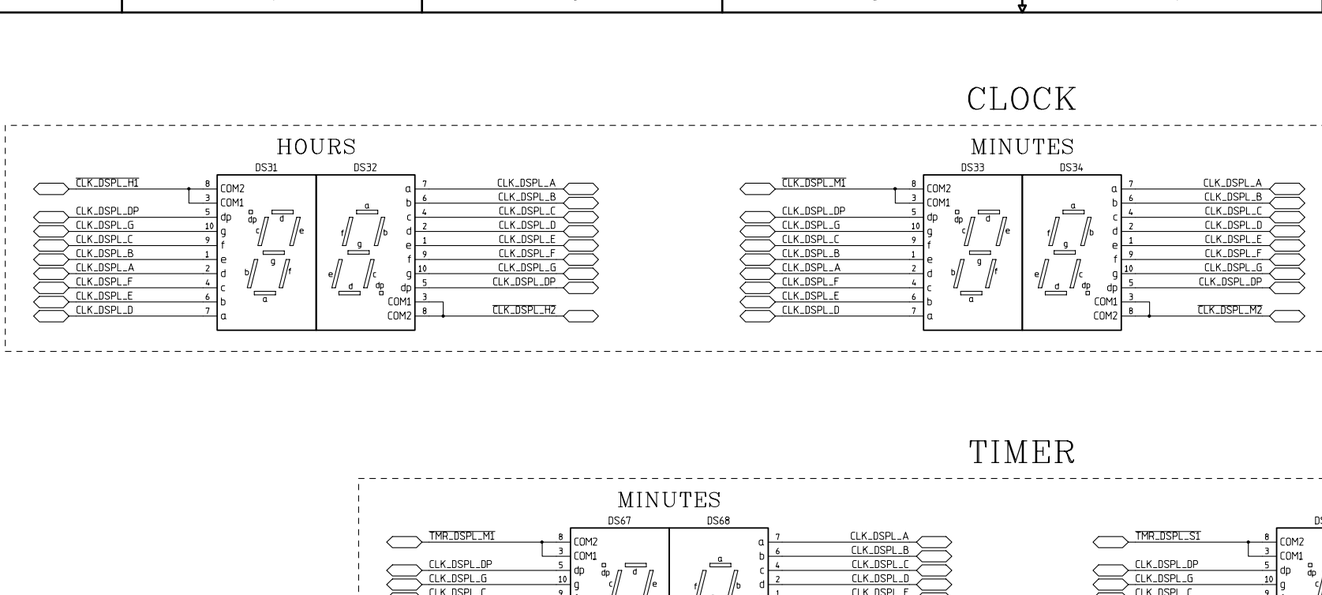
TIMER

MINUTES

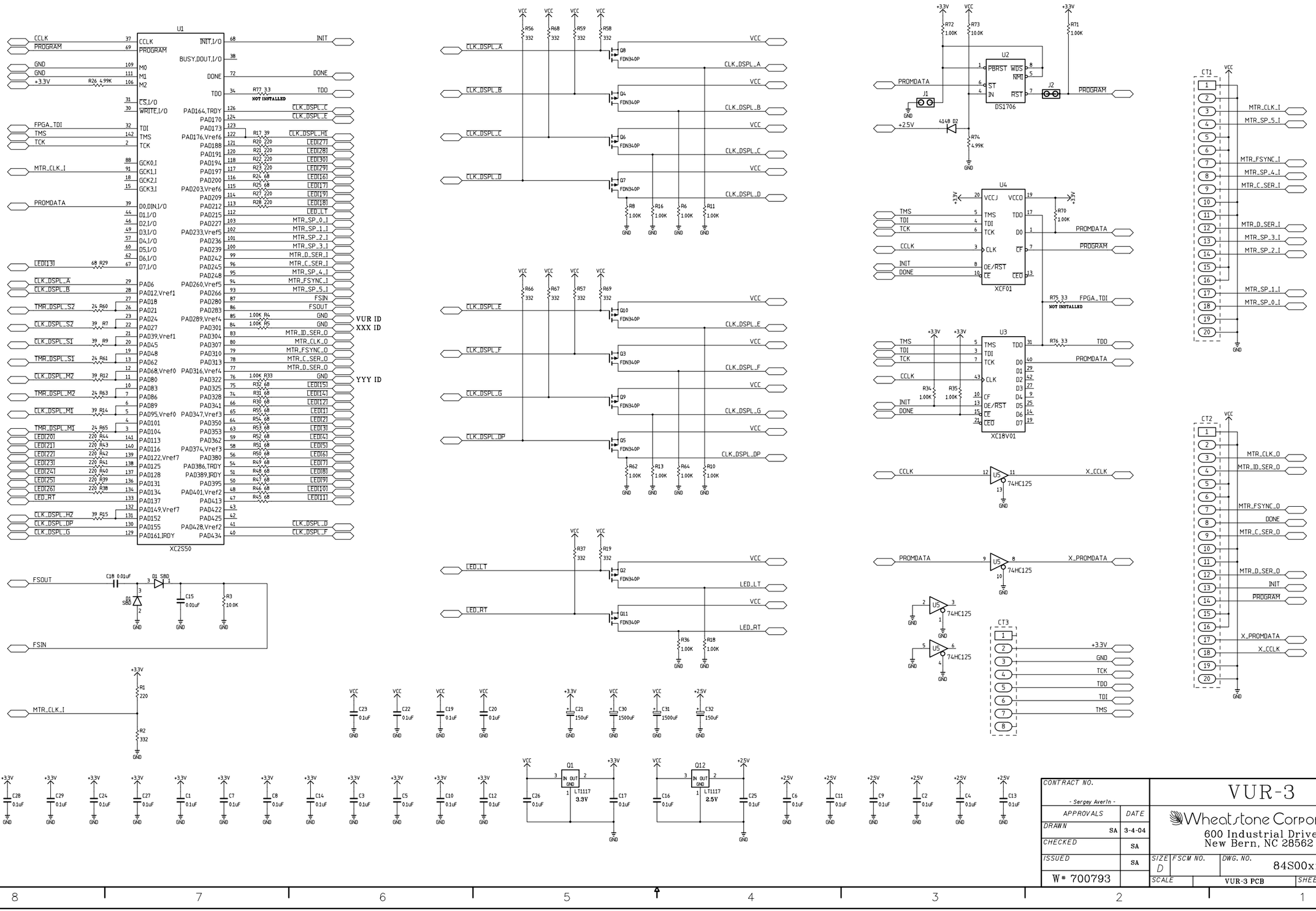


SECONDS





CONTRACT NO. - Sergey Averin -		VUR-3	
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562	
DRAWN SA	3-4-04		
CHECKED SA			
ISSUED SA		SIZE D / FSCM NO. / DWG. NO. 84S00xx / REV –	
W# 700793		SCALE / VUR-3 PCB / SHEET 1 OF 2	



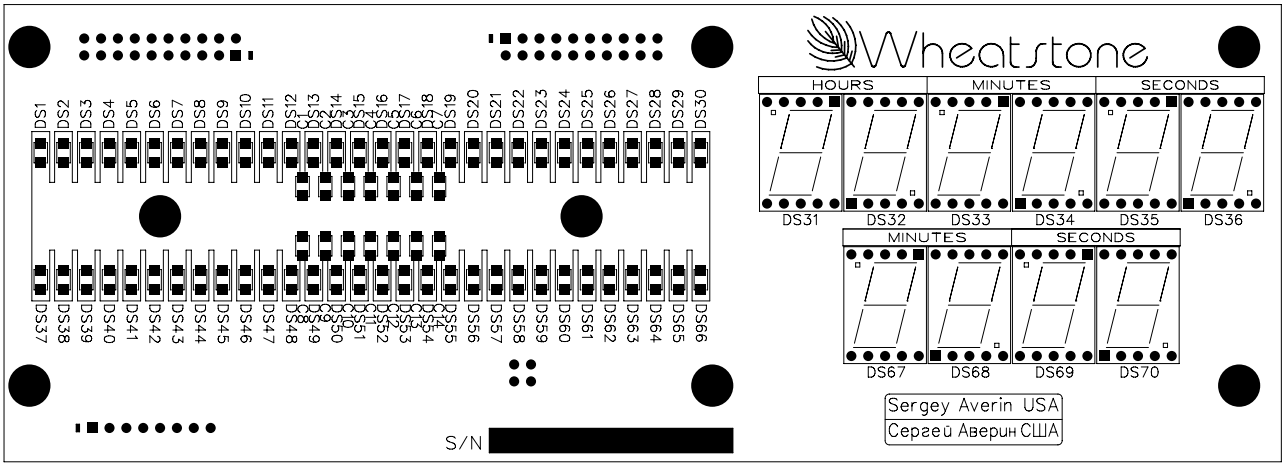
CONTRACT NO. - Sergey Averin -

APPROVALS	DATE
DRAWN SA	3-4-04
CHECKED SA	
ISSUED SA	
W# 700793	

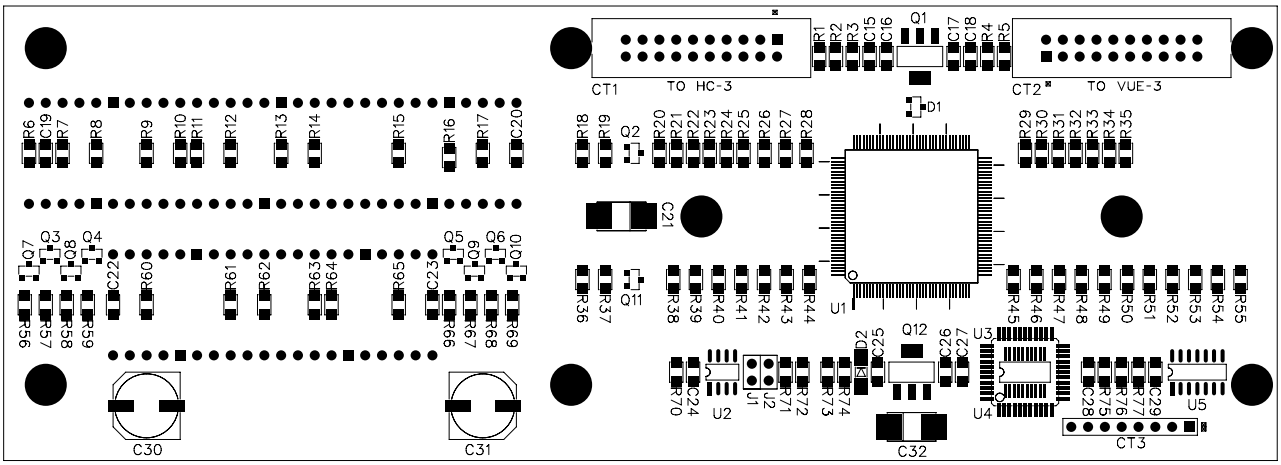
VUR-3

Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562

SIZE	FSCM NO.	DWG. NO.	REV
D		84S00xx	—
SCALE	VUR-3 PCB	SHEET	2 OF 2

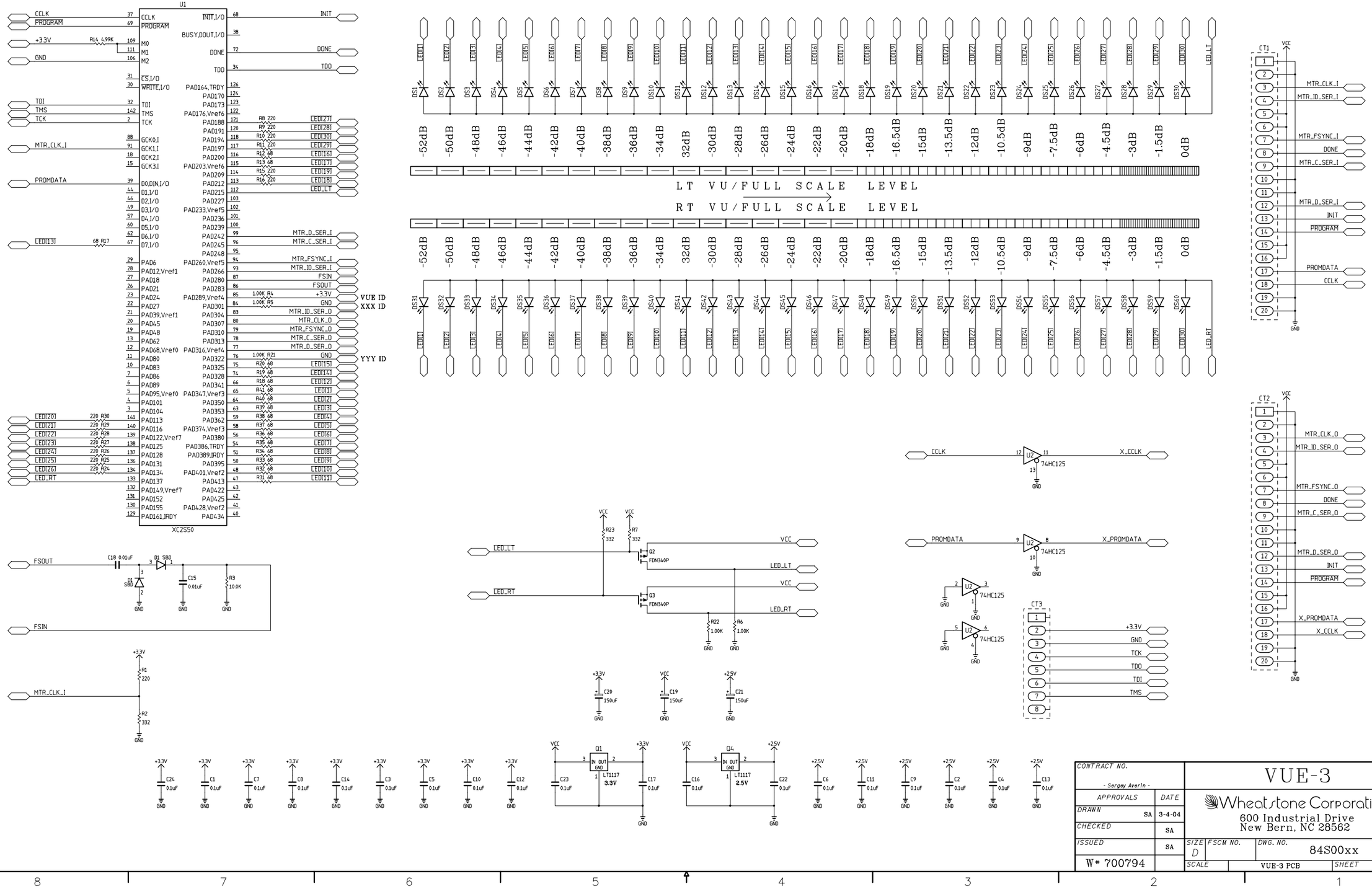


Top

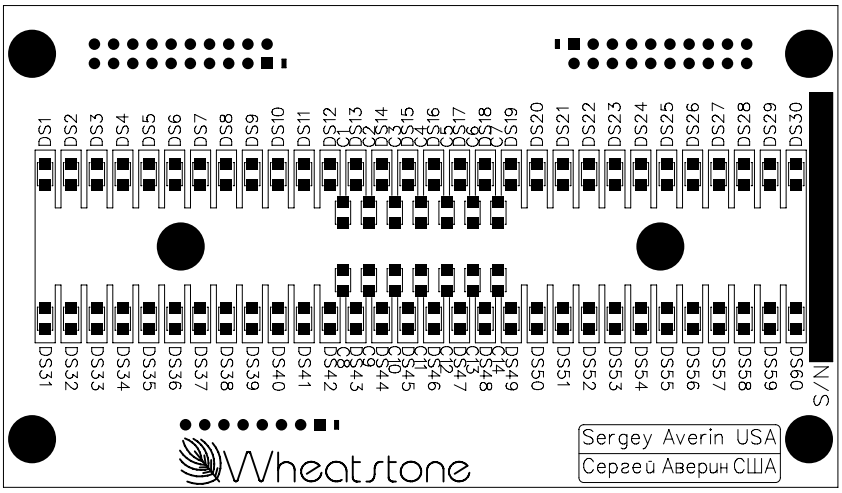


Bottom

VUR-3 Right VU Card Load Sheet



VUE-3 Extender VU Card Schematic - Sheet 1 of 1



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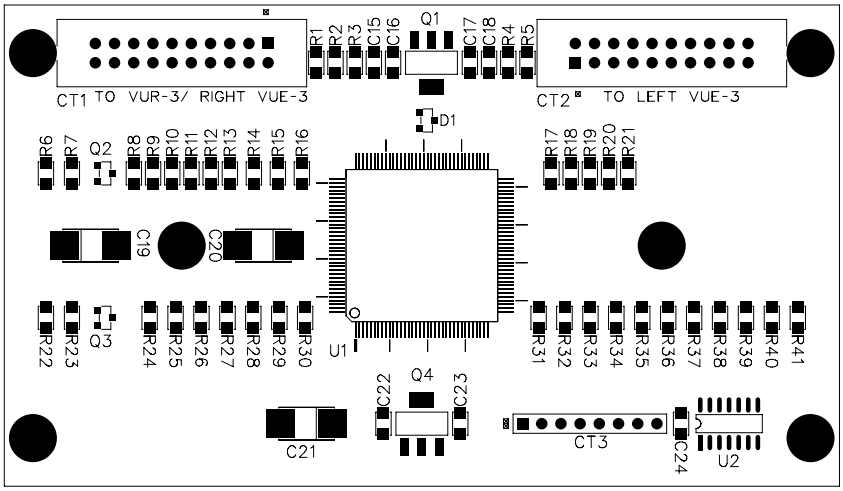

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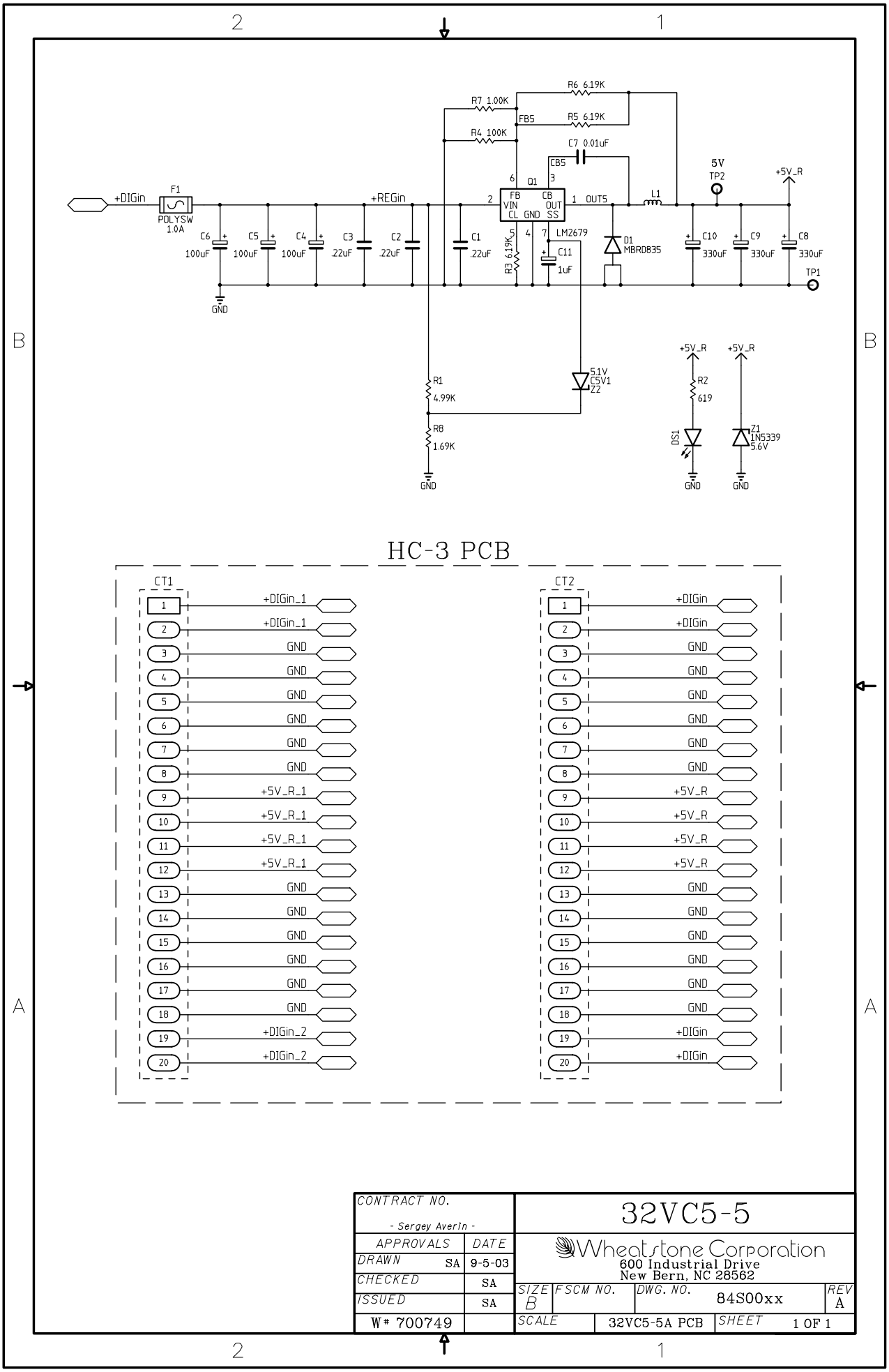
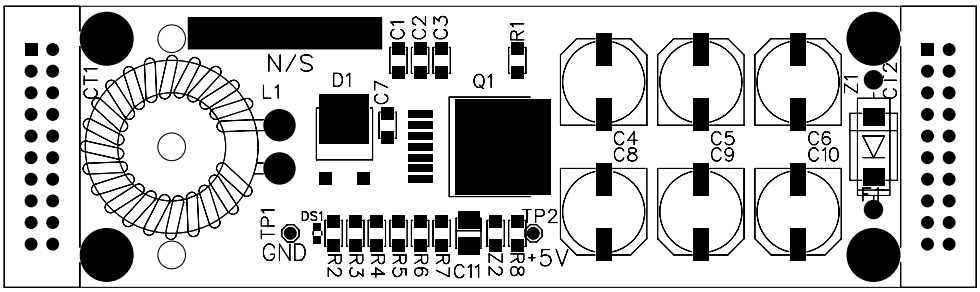
VUE-3 Extender VU Card Load Sheet

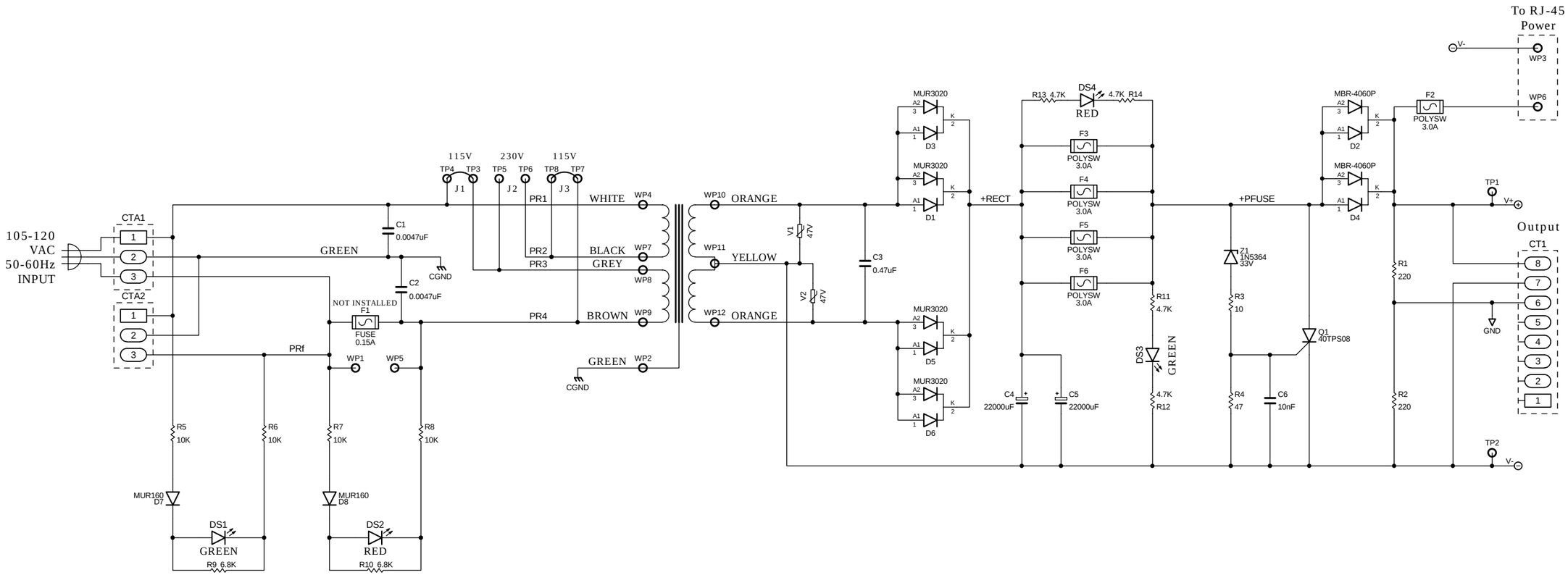


CONTRACT NO. - Sergey Averin -		32VC5-5
APPROVALS	DATE	Wheatstone Corporation 600 Industrial Drive New Bern, NC 28562
DRAWN SA	9-5-03	
CHECKED	SA	
ISSUED	SA	SIZE B / FSCM NO. / DWG. NO. 84S00xx / REV A
W* 700749		SCALE / 32VC5-5A PCB / SHEET 1 OF 1

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



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



CONTRACT NO. - SA UR US - Sergey Averin -		PSU-1	
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DRAWN SA	2-3-06		
CHECKED	SA		
ISSUED	SA		
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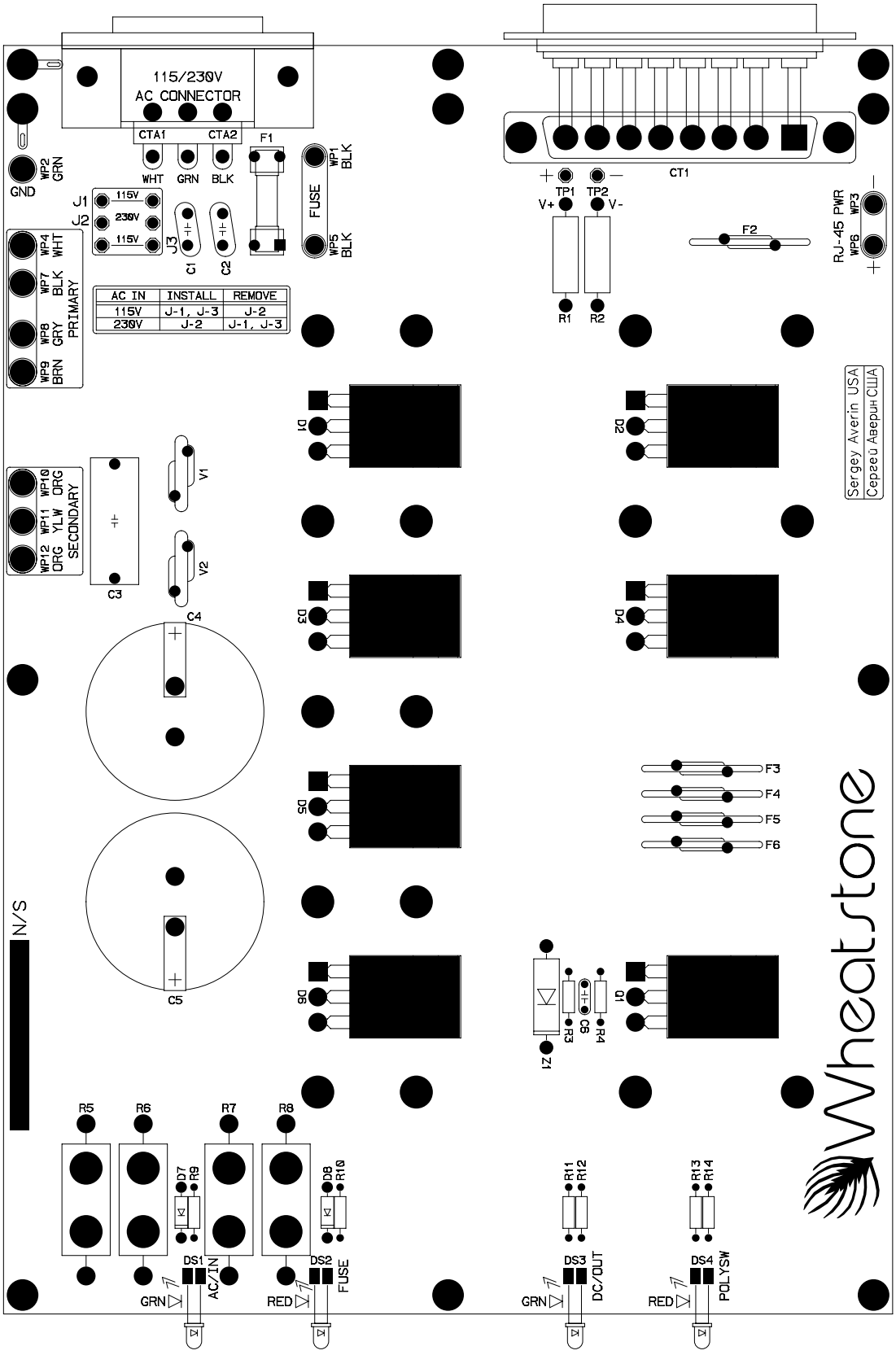
		SCALE / PSU-1B PCB / SHEET 1 OF 1	



PSU-1 Power Supply Load Sheet

Dynamics Processing Control GUI

Chapter Contents

Dynamics Processing Control GUI

Getting Started

The D-7 control surface is supplied with a custom Graphical User Interface (GUI) program, intended to be straightforward in use, controlling and displaying the 4-Band Parametric EQ, Expansion/Compression, and Input settings.

Connecting the D-7 and the GUI

The D-7 should be installed, powered-up, and verified to be operating normally. Plug in the flat panel monitor display (user supplied) and mouse to the DB-15 "MONITOR" and DB-9 "MOUSE" connectors on the control surface's rear panel.

Using the GUI

Multiple processing screens allow full control of 4-Band Parametric Equalizer, Expansion/Compression, and Input settings. Each screen has a Title Bar, a Control Area, the Dynamics Displays, the Side Bar buttons, and the Channel buttons. First choose the channel by clicking the appropriate button on the bottom of the monitor display. Alternatively, you can press the desired channel's SET button to bring that channel's settings up on the screen. Clicking a Side Bar button on the right side of the monitor display brings the respective management screen (its name shown in the title bar window) and gains access to the controls for that portion of the signal processing.

To operate the controls and faders in the Control Area, click on the control, and slide the mouse to move the control - up increases the control's indicated position, down decreases it.

Visually, the most important element on the main screen, dominating the lower half of it, is a large graphical display; the standard audio frequency of 20Hz – 20kHz is ranged in logarithmic form across this graph with gradations at salient frequencies. The vertical axis scale range is -15dB - +15dB, with gradations every 3dB.

On the right bottom side of the monitor screen there are a number of bargraph level meters that indicate average signal levels of elements in the signal path:

5.1 Signal
- left front input signal level
- center input signal level
- right front input signal level
- subwoofer input signal level
- left surround input signal level
- right surround input signal level

ST2 Signal
- left input signal level
- right input signal level

Input Settings

This screen shows input gain control, polarity, and filter settings.

Gain Control

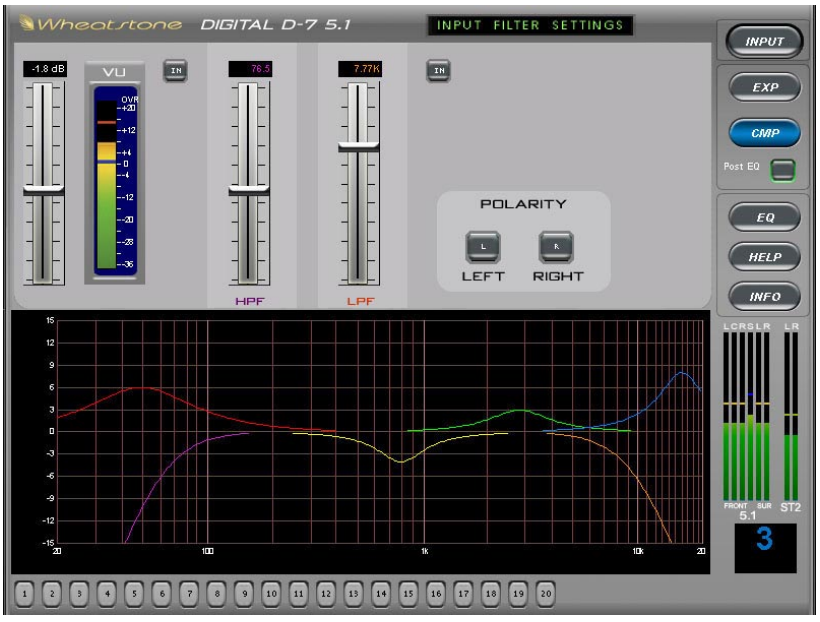
Adjust input signal gain between -18.0dB - +12.0dB to compensate for:

(+) inadequate incoming level on a source,

(-) depression of input signal to retain headroom if large amounts of equalizer boost is incurred.

VU Meter

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



Filter

HPF (High-Pass Filter) - This is a 24dB/octave variable high-pass filter with Butterworth characteristics, tunable between 16.1Hz and 500Hz, and with a separate in/out switch ("HPF IN" switch, near the top of the screen and to the left of the HPF slider control). The relatively high order of filter is necessary to allow definite and decisive removal of unwanted low-frequency artifacts (air-conditioning rumble, line hum, traffic, or footstep impacts) with minimal effect on the required program.

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

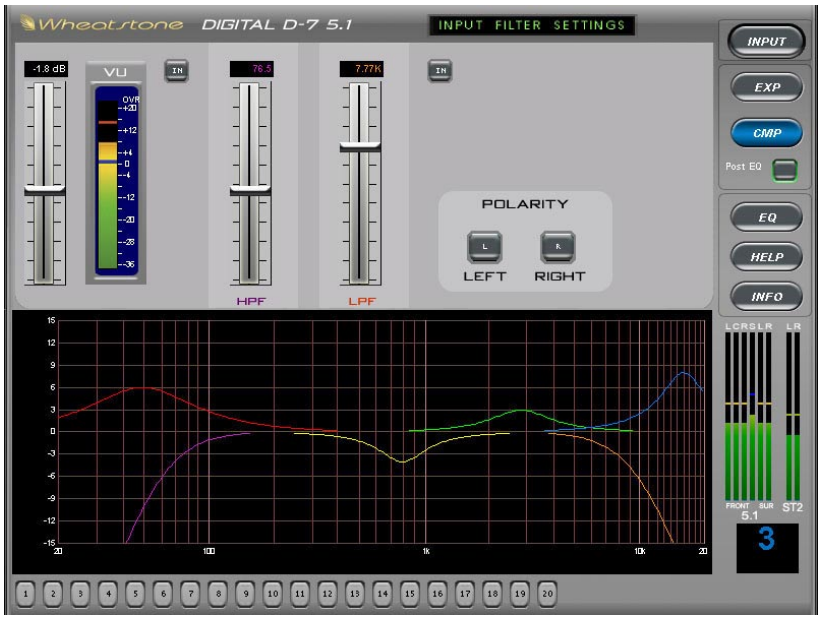
LPF (Low-Pass Filter) - This is a 24dB/octave variable low-pass filter with Butterworth characteristics, tunable between 1KHz and 20.2KHz, and with a separate in/out switch ("LPF IN" switch, to the right of the LPF slider). This filter is used to remove unwanted high frequency artifacts (noise, squeaks, etc.) with minimal effect on the required program.

Polarity

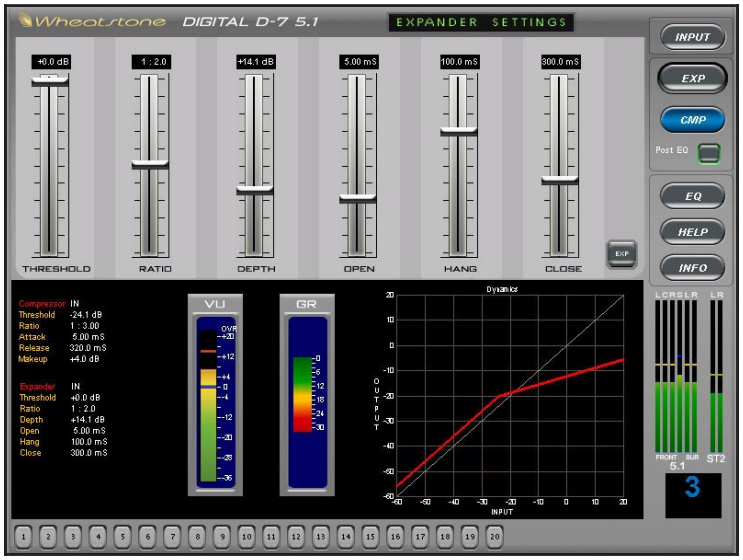
A pair of buttons, one for left and one for right, are provided to cause the reversal of absolute phase of the signal path, in case there is an inadvertent reversal elsewhere in the signal chain of which the D-7 is a part.

Frequency-Domain Graph

A Fast-Fourier Transform (FFT) based real-time spectral analysis of the selected input signal.



Expander Settings



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

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

The controls are:

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

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

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

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

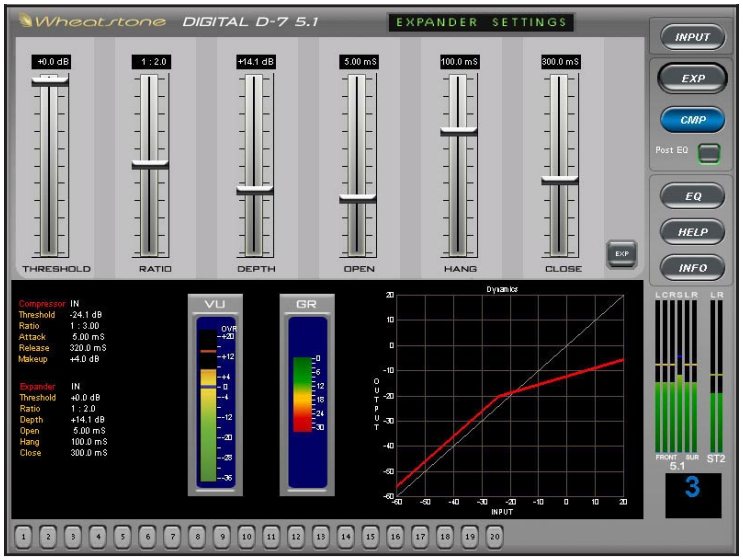
OPEN (1.00mS - 100.0mS) — The time-constant of the rate at which the expander un-attenuates, or opens; sometimes called “attack”.

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

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

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

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



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

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

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

Compressor Settings

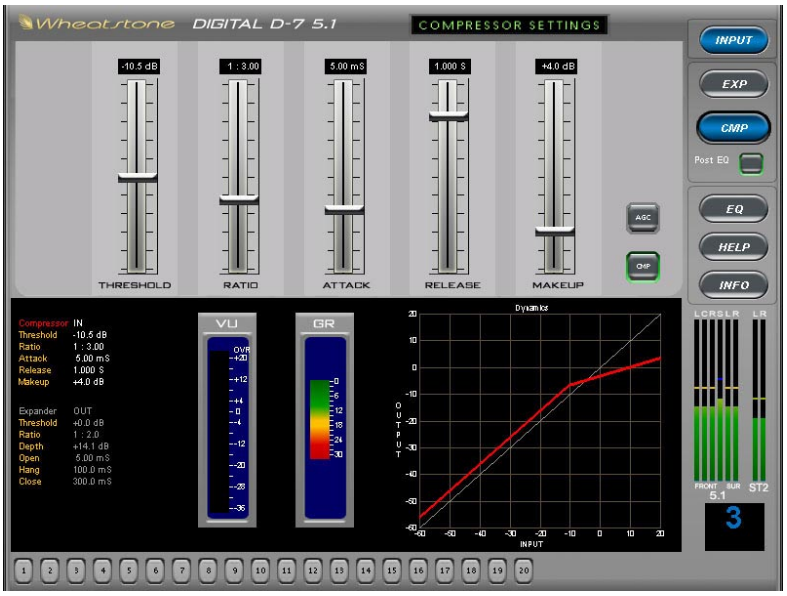
The compressor algorithm used in the D-7 is designed to:

- prevent really ghastly noises from being achieved too easily;

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

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

- enable deep effects if required.



The D-7 compressor section is a compound of many diverse dynamics elements.

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

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

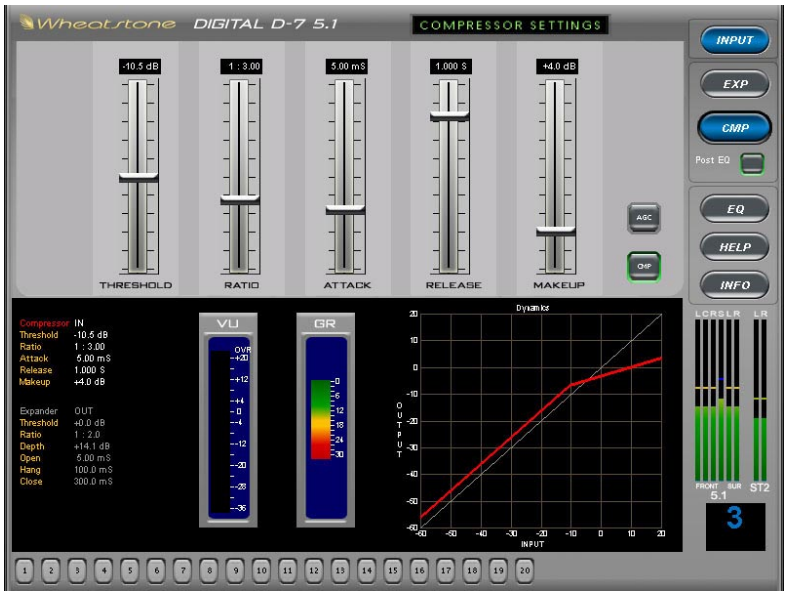
The compressor is "soft-knee", meaning the compression ratio increases slowly with increasing applied level, greatly easing the sonic transition into full compression; it helps avoid the "snatching" and "pumping" at threshold that many "hard-knee" dynamics units exhibit.

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

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

POST EQ — Determines whether the compressor is effectively inserted after the equalizer or before the equalizer. In general, pre-EQ is a better option on pre-processed program material while post-EQ allows the excesses of a "raw" source signal to be tamed prior to exciting the dynamics.

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



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

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

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

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

AGC

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

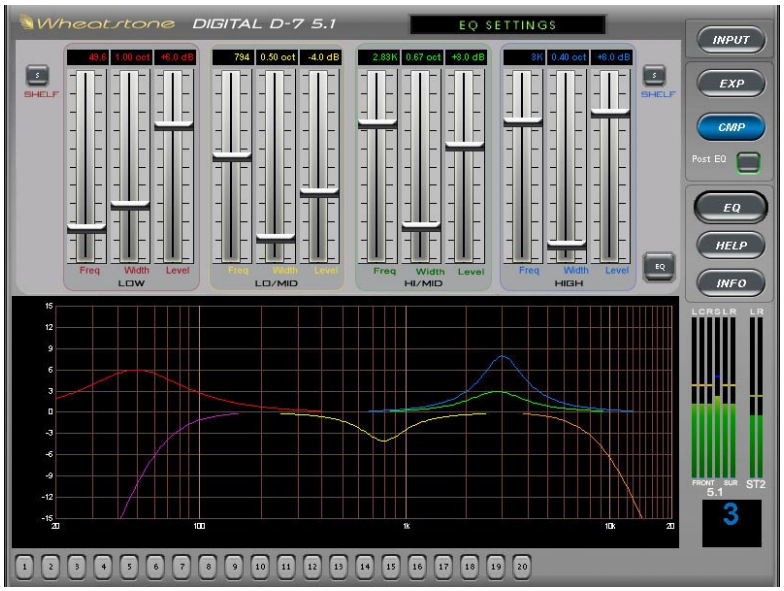
The AGC action rides "underneath" the compressor; depending on the time-constant settings and character of the program material, the AGC can follow the average long term level changes and create a gain-reduction "bed" some 12dB to 6dB under the compression gain-reduction peaks. The AGC rides the general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

On sudden application of an input signal, the faster compressor's attack captures the onslaught, with the AGC eventually catching up. On release, the effect is identical to the much-vaunted "two-slope release" of classic compressor units such as the Audio and Design F760xrs and Joemeek SC2. On departure or reduction of the input signal the usually faster

compressor release predominates until its gain-reduction contribution falls below that of the AGC, whose much slower release rate takes over. A big advantage of the compounded processes is that on normal program material, the compressor does not have to "move as far" to capture signal peaks, so reducing the "snatching" which can occur at deep compression onset.

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

EQ Settings



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

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

Low and High Shelving

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

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

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

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

INFO and HELP Screens

Clicking the INFO and HELP buttons will display windows:

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

HELP — the top level of built in user help system.

To close those windows click again on the INFO and HELP buttons.

Appendices

Appendix 1

Appendix 2

Appendix 1

Contents

Options Text File

Introduction

There are a number of operational features on the D-7 surface that are controlled by the contents of the Options Text File (D7_OPTS.TXT) that resides on the surface's flash drive. In order to configure these features it is necessary to modify this file.

Modifying The Options Text File

There are several steps involved in modifying the file:

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

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

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

A Simple Example From The File

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

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

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

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

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

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

A Second Example

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

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

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

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

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

An Example File - Complete

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

```
// -------------------------------
// METER BRIDGE OPTIONS
// -------------------------------
// Syntax: METERSRC#:?
// # is the meter index (1 right most - 7 left most)
// ? is the meter stream source
//   Ø = None, No meter stream (default for index 3 - 7)
//   1 = Switched Meter Bus    (default for index 1)
//   2 = ST1 Master Bus        (default for index 2)
//   3 = ST2 Master Bus
//   4 = Sub Master 1 Bus
//   5 = Sub Master 2 Bus
//   6 = Sub Master 3 Bus
//   7 = Sub Master 4 Bus
METERSRC1:1
METERSRC2:7
METERSRC3:6
METERSRC4:5
METERSRC5:4
METERSRC6:3
METERSRC7:2
// Syntax: METERMODE:?
// ? is the meter mode (default = Ø)
//   Ø = PEAK & AVG
//   1 = PEAK only
//   2 = AVG only
METERMODE:Ø
// -------------------------------
// MIX MINUS OPTIONS
// -------------------------------
// Syntax: MM#:?
// # is the mix minus bus number (1 - 8)
// ? is the mode (default = Ø)...
//   Ø = Post Fader, Post ON (default mode)
//   1 = Pre  Fader, Post ON
//   2 = Post Fader, Pre  ON
//   3 = Pre  Fader, Pre  ON
MM1:Ø
MM2:Ø
MM3:Ø
MM4:Ø
MM5:Ø
MM6:Ø
MM7:Ø
MM8:Ø
```

```
// -------------------------------
// AUX BUS OPTIONS
// -------------------------------
// Syntax: AUXA#:?  or  AUXB#:?
// # is the input channel number (1 - 24)
// ? is the mode (default = Ø)...
//   Ø = Post Fader, Post ON (default mode)
//   1 = Pre  Fader, Post ON
//   2 = Post Fader, Pre  ON
//   3 = Pre  Fader, Pre  ON
AUXA1:Ø
AUXB1:Ø
AUXA2:Ø
AUXB2:Ø
AUXA3:Ø
AUXB3:Ø
AUXA4:Ø
AUXB4:Ø
AUXA5:Ø
AUXB5:Ø
AUXA6:Ø
AUXB6:Ø
AUXA7:Ø
AUXB7:Ø
AUXA8:Ø
AUXB8:Ø
AUXA9:Ø
AUXB9:Ø
AUXA1Ø:Ø
AUXB1Ø:Ø
AUXA11:Ø
AUXB11:Ø
AUXA12:Ø
AUXB12:Ø
AUXA13:Ø
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AUXA14:Ø
AUXB14:Ø
AUXA15:Ø
AUXB15:Ø
AUXA16:Ø
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AUXA17:Ø
AUXB17:Ø
AUXA18:Ø
AUXB18:Ø
AUXA19:Ø
AUXB19:Ø
AUXA2Ø:Ø
AUXB2Ø:Ø
AUXA21:Ø
AUXB21:Ø
AUXA22:Ø
AUXB22:Ø
```

```
AUXA23:Ø
AUXB23:Ø
AUXA24:Ø
AUXB24:Ø
// -------------------------------
// SPARE OPTIONS
// -------------------------------
// Syntax: SPARE#:?
// # is the spare button number (1 - 12)
// ? is the mode (default = 2)...
//   Ø = 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 inter-
face
//   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
SPARE1Ø:2
SPARE11:2
SPARE12:2
// -------------------------------
// MISC OPTIONS
// -------------------------------
// Syntax: SET_TIMEOUT:?
// ? 1 (default) = 2Ø sec set button timeout enabled, Ø = no timeout.
SET_TIMEOUT:Ø
// Syntax: ALPHA_SORT:?
// ? 1 (default) = XY controller alpha sorting enabled, Ø = no sort.
ALPHA_SORT:1
// Syntax: INVERT_MM:?
// ? 1 (default) = MM button state inverted, Ø = no invert.
INVERT_MM:1
// Syntax: CUE_DEFEAT_STU1:?
// Syntax: CUE_DEFEAT_STU2:?
// Syntax: CUE_DEFEAT_HDPN:?
// Syntax: CUE_DEFEAT_CR:?
// ? 1 = cue defeat to this monitor, Ø cue enabled to this monitor.
CUE_DEFEAT_STU1:1
CUE_DEFEAT_STU2:1
CUE_DEFEAT_HDPN:1
CUE_DEFEAT_CR:1
```

```
// Syntax: MUTE_METHOD:?
// ? Ø (default) = ON button, 1 = ON AIR.
MUTE_METHOD:Ø
// Syntax: HDW_LOGGER:?
// ? 1 = use hardware logger, Ø (default) no hardware logger.
HDW_LOGGER:Ø
// Syntax: XYC_CHECKSUM:?
// ? 1 (default) = use checksum in XYC messages, Ø no checksum.
XYC_CHECKSUM:1
// Syntax: XCHAN_VIS_DISABLE:?
// ? Ø = do not allow X visibility disable, 1 (default) allow X visibility disable.
XCHAN_VIS_DISABLE:1
// Syntax: MXM_BY_SIGNAL:?
// ? Ø = (default) MxM assigns stored by fader, 1 change MxM assigns as sources change.
MXM_BY_SIGNAL:Ø
// Syntax: MXM_LVL_CTL:?
// ? Ø = (default) No Mix Minus level control on Monitor card.
//   1 Monitor card has Mix Minus control.
MXM_LVL_CTL:Ø
// Syntax: INPUT_GAIN_SLIDERS:?
// ? Ø = No input gain sliders, 1 (default) = Input gain sliders.
INPUT_GAIN_SLIDERS:1
// Syntax: VGA_CONTROLS:?
// ? Ø (default) = No VGA Controls, 1 = VGA Controls.
VGA_CONTROLS:1
// Syntax: ACI_DISABLE_MSS:?
// ? Ø (default) = send machine start/stop DIOs whenever input channels go on/off.
//   1 = supress machine start/stop DIOs when input channels on/off via ACI.
//   2 = supress machine start/stop DIOs when input channels on/off via remote on/off DIO.
//   3 = supress machine start/stop DIOs when input channels on/off via ACI and/or DIO.
ACI_DISABLE_MSS:Ø
```

Appendix 2

Contents

For the most part there are no user-replaceable parts in the D-7 control surface. Exceptions are those controls and components that in the course of normal use may need maintenance (i.e., faders, pots, ON switches, etc.). A complete list of available components is shown on the next page. Contact Wheatstone technical support for further information.

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

REPLACEMENT PARTS — D-7 CONTROL SURFACE

COMPONENT	DESCRIPTION	*WS P/N*
IS-D7 PANEL	COMPLETE INPUT PANEL	***"005930"***
EFS-D7 PANEL	COMPLETE CONTROL PANEL	***"005931"***
MFS-D7 PANEL	COMPLETE MASTER PANEL	***"005932"***
IS-D7 LOADED CARD	INPUT PANEL LOADED CARD ASSEMBLY	***"005942"***
EFS-D7 LOADED CARD	CONTROL PANEL LOADED CARD ASSEMBLY	***"005943"***
MFS-D7 LOADED CARD	MASTER PANEL LOADED CARD ASSEMBLY	***"005944"***
ONS-D7 LOADED CARD	ON/OFF SWITCH LOADED CARD ASSEMBLY	***"005946"***
HC-3 LOADED CARD	LOADED CARD ASSEMBLY WITH COMPUTER	***"005839"***
HC-3NC LOADED CARD	LOADED CARD ASSEMBLY W/O COMPUTER	***"005892"***
VUC-D7 LOADED CARD	LOADED CARD ASSEMBLY METER	***"005974"***
VU-3 LOADED CARD	LOADED CARD ASSEMBLY METER	***"005838"***
VC5-5 LOADED CARD	LOADED CARD ASSEMBLY	***"005274"***
EI-5.1 LOADED CARD	ENCODER LOADED CARD	***"005030"***
PSU-1 RACKMOUNT UNIT	POWER SUPPLY RACK UNIT	***"007330"***
SPS/PWI POWER CABLE	SPS DB TO CONTROL SURFACE POWER CABLE	***"007261"***
FLAT RIBBON CABLE	20 CONDUCTOR FLAT RIBBON CABLE	***"150201"***
REPLACEMENT FADER ASSEMBLY	WIRED FADER	***"055200"***
REPLACEMENT FADER	INPUT FADER	***"540052"***
REPLACEMENT FADER KNOB	REPLACEMENT FADER KNOB	***"520007"***
REPLACEMENT SWITCH	ON/OFF SWITCH	***"510109"***
SWITCH BLUE BUTTON	ON BUTTON	***"530343"***
SWITCH CLEAR BUTTON	OFF BUTTON	***"530346"***
BLUE LED LAMP REPLACEMENT	ON LED LAMP	***"600078"***
WHITE LED LAMP REPLACEMENT	OFF LED LAMP	***"600079"***
SWITCH	SINGLE POLE MOMENTARY SWITCH W/RED LED	***"510106"***
SWITCH	SINGLE POLE MOMENTARY SWITCH W/HOLES FOR LED, NO LED INSTALLED	***"510293"***
LED FOR SINGLE POLE MOMENTARYSWITCH	GREEN LED WITH UNCUT LEADS	***"600075"***
LED FOR SINGLE POLE MOMENTARYSWITCH	YELLOW LED WITH UNCUT LEADS	***"600076"***
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"***

REPLACEMENT PARTS — D-7 CONTROL SURFACE

COMPONENT	DESCRIPTION	*WS P/N*
ENCODER	11MM ROTARY ENCODER, 20MM SHAFT LENGTH, ORDER W# 005030	
ENCODER	11MM ROTARY ENCODER, 13.5MM SHAFT LENGTH	***"560003"***
ENCODER	11MM ROTARY ENCODER, 17MM SHAFT LENGTH	***"560004"***
ENCODER KNOB	15MM GRAY COLLET KNOB FOR 1/8" SHAFT	***"520022"***
ENCODER KNOB	21MM GRAY COLLET KNOB FOR 6MM SHAFT	***"520023"***
ENCODER KNOB	11MM BLACK PUSH-ON KNOB	***"520105"***
ENCODER KNOB	15MM GREY COLLET KNOB FOR 6MM SHAFT	***"520110"***
ENCODER CAP	11MM GRAY/99 CAP W/WHITE LINE FOR 15MM KNOB	***"530040"***
ENCODER CAP	11MM BLUE CAP W/WHITE LINE FOR 15MM KNOB	***"530045"***
ENCODER CAP	PLAIN 11MM BLUE CAP FOR 15MM KNOB	***"530278"***
ENCODER CAP	PLAIN 11MM PALE BLUE CAP FOR 15MM KNOB	***"530282"***
ENCODER CAP	PLAIN PALE BLUE CAP FOR 11MM COLLET KNOB	***"530296"***
ENCODER CAP	PLAIN BLACK CAP FOR 21MM COLLET KNOB	***"530316"***
ENCODER CAP	PLAIN PALE BLUE CAP FOR 21MM COLLET KNOB	***"530326"***
LUMA BUTTON	WHITE LUMA BUTTON	***"530274"***
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"***
PLUG	3 PIN PLUG FOR #26 AWG	***"230028"***
PLUG	4 PIN PLUG FOR #26 AWG	***"230029"***
PLUG	9 PIN PLUG FOR #26 AWG	***"230032"***
PLUG RIBBON	14 PIN DIP RIBBON PLUG	***"250034"***
PLUG RIBBON	20 PIN RIBBON PLUG	***"250041"***
HEADER	3 PIN JST HEADER	***"250062"***
HEADER	9 PIN JST HEADER	***"250066"***
HEADER	14 PIN BOXED HEADER, STRAIGHT	***"250073"***
HEADER	20 PIN BOXED HEADER, STRAIGHT	***"250074"***
DB25 COVER	COVER FOR DB25 CONNECTOR	***"200126"***
PHONE JACK	RTS JACK	***"260005"***
DISPLAY	4 SEGMENT GREEN ALPHA NUMERIC DISPLAY	***"610016"***
MANUAL	OWNER'S MANUAL	***"005998"***