



Field Modification FM26008

GV Series - Replacing NAC118* with NAC125 GV2 Controller Module

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FM26008: GV Series - Replacing NAC118*

Controller Module with NAC125

FIELD MODIFICATION

1 INTRODUCTION

This document provides instructions for customers to replace an NAC118* Controller Module with an NAC125 GV2 Controller Module.

1.1 Reason for Modification

This modification addresses the following possible issues:

- Failure of the NAC118* Controller Module, including the single board computer (Nautel Part # UB97).
- Customer desires GV2 compatibility, to eventually utilize the HD Air Chain feature (see Software Impact in paragraph 1.2.2).

1.2 Equipment Affected

1.2.1 Hardware Impact

This procedure applies to GV transmitters with controller module Nautel Part # NAC118, NAC118A, NAC118B, NAC118C or NAC118D.

1.2.2 Software Impact

Replacement of the controller module introduces new software (version GV2 SW 1.2.0 or later), which changes the appearance of the advanced user interface (AUI) from Flash-based to HTML5. See Publications Affected (paragraph 1.8) for change details.

NOTE

The details of the HD Air Chain feature are not included in this document. Using HD Air Chain with the NAC125 controller requires software version GV2 SW 1.2.0 (minimum) and additional hardware that is not part of this modification. Consult with the recommended documentation in paragraph 1.8 or Nautel Customer Service for more information on HD Air Chain.

1.3 Responsibility for Implementation of Procedure

This modification is written for qualified transmitter maintenance personnel who are familiar with GV series transmitters.

1.4 Scheduling

Implement this modification at the convenience of station maintenance personnel. The transmitter must be off-air (RF off) with ac power locked out during this procedure.

1.5 Manpower Requirements

Replacing the NAC118* Controller Module requires approximately 30 minutes to complete.



1.6 Special Tools, Equipment, Download Requirements

- # 2 Phillips screwdriver
- USB mouse, if necessary
- Information Sheet IS24005* PDF in <http://www3.nautel.com/pub/Utilities/SystemHealthEligibilityEvaluationProgram/>
- Information Sheet IS25005* PDF in http://www3.nautel.com/pub/GV2_Series/Information%20Sheets/
- Replacement 'Operating the Transmitter' documentation from http://www3.nautel.com/pub/GV2_Series/GV2_SW_1.2.0/Handbooks/
- GV2 SW 1.2.0 tgz file from http://www3.nautel.com/pub/GV2_Series/GV2_SW_1.2.0/

NOTE

Newer versions of software (e.g., after GV2 SW 1.2.0) may exist at the time of performing this procedure, in which case the link to the tgz file above may not be accurate. Refer to http://www3.nautel.com/pub/GV2_Series if a newer version is required.

1.7 Material Provided

Tables 1a and 1b list the items in the Field Modification Kit to aid in completing this procedure.

NOTE

Depending on the outcome of performing the instructions in Information Sheet 'IS24005 - GV Series: Using the System Health Eligibility Evaluation Program (SHEEP)', also referenced in paragraph 2.1 (a), you will receive one of the two kits shown below. This document is valid for either kit and contains conditional steps/procedures as required.

Table 1a: Field Mod Kit, GV Series - Replacing NAC118* Controller Module with NAC125 (Nautel Part # 219-5371)

Item	Qty	Component	Part #/Description
2	1	219-5293	QR Code Sheet
3	1	UE301	Adapter, Cable, HDMI (Type A) to VGA (D-Sub),w/Audio Out
4	1	219-5342	Cable Set Assembly, GV Controller Upgrade
5	1	NAC125	Controller Assy, GV2, w/UB127 SBC

Table 1b: Field Mod Kit, GV Series – Atmel Pod and Replacing NAC118* Controller Module with NAC125 (Nautel Part # 219-5375)

Item	Qty	Component	Part #/Description
2	1	219-5293	QR Code Sheet
3	1	UB103	Dongle, Programmer, ATMEL-ICE-BASIC
4	1	UE301	Adapter, Cable, HDMI (Type A) to VGA (D-Sub),w/Audio Out
5	1	219-5342	Cable Set Assembly, GV Controller Upgrade
6	1	NAC125	Controller Assy, GV2, w/UB127 SBC



1.8 Publications Affected

1.8.1 Hardware Impact:

The Controller Module (A4) changes from Nautel Part # NAC118* to NAC125. This change affects the following areas of the GV Troubleshooting Manual:

NOTE

There are different models of GV transmitter, each with their own technical documentation. This document includes change descriptions that impact various sections (see below), and some replacement pages.

- Parts Information section 4.2
 - Family Tree Figure 4.2, noting the specific updates:
 - A4, Controller, changes to NAC125
 - A4A1, Single-Board Computer changes to 207-8726
 - A4A3, Power Supply Distribution PWB NAPS49B
- Wiring/Connector Lists section 4.3
 - added cables W53 and W54 (part of cable set 219-5342); see included Table 2: Connector Mating Information – Cable Set Assembly, GV Controller Upgrade
 - see included Table 3: Wiring List – NAC125 GV Controller
 - see included Table 4: Connector Mating Information – NAC125 GV Controller
- Electrical Schematics section 4.4
 - see included schematic for GV Transmitter – Control/Monitor Stage (Sheet 1, where applicable)
 - see included schematic for NAC125 Controller
 - see included schematic for NAPS49B Power Supply Distribution PWB
- Mechanical Drawings section 4.5
 - see included mechanical drawing for NAC125 Controller
 - see included mechanical drawing for NAPS49B Power Supply Distribution PWB

1.8.2 Software Impact:

The overall software version changes from GV SW 4.x.y or GV SW 5.x.y to GV2 SW **1.2.0** or later (see paragraph 1.2.2). This modification introduces a new AUI interface; the local and remote AUI changes from a Flash-based menu to an HTML5-based menu. Download a new 'Operating the Transmitter' document for your GV model from the Nautel FTP site (http://www3.nautel.com/pub/GV2_Series/GV2_SW_1.2.0/Handbooks/). This document provides full details on the new AUI and is intended to replace the 'Operating the Transmitter' chapter (3.2) in your *Operation and Maintenance Manual*.

NOTE

Newer versions of software (e.g., after GV2 SW 1.2.0) may exist at the time of performing this procedure, in which case the link to the 'Handbooks' above may not be accurate. Refer to http://www3.nautel.com/pub/GV2_Series or use your login credentials to access the latest documentation on the online Nautel Users Group (<https://support.nautel.com/technical-documentation/>) if a newer version is required.

1.9 Identification of Modified Assemblies/Parts

Identifying modified assemblies informs future maintainers of the current configuration. Mark the transmitter with “**FM26008**” next to the serial number label using indelible ink to indicate it has been modified.



2 PRELIMINARY TASKS

2.1 Evaluating the Transmitter for Software Eligibility

Some GV series transmitters are unable to complete certain software upgrades due to issues related to entering and exiting bootloader mode at the rack level. Before receiving one of the two Field Modification Kits in Table 1a or Table 1b, you would have been prompted by Nautel to verify if the GV series transmitter is eligible for the software upgrade provided with this Field Modification document. This verification involves performing the procedure in Information Sheet document 'IS24005 - GV Series: Using the System Health Eligibility Evaluation Program (SHEEP)'.

- (a) Ensure that 'IS24005 - GV Series: Using the System Health Eligibility Evaluation Program (SHEEP)' has been performed. If necessary, download IS24005 from <http://www3.nautel.com/pub/Utilities/SystemHealthEligibilityEvaluationProgram/>.
- If the evaluation was successful, continue to paragraphs 2.2 and 2.3, then complete paragraph 3.
 - If the evaluation was not successful, obtain and perform *IS25005 – GV/NVLT Series: Upgrading Backplane Firmware* from http://www3.nautel.com/pub/GV2_Series/Information%20Sheets/.

2.2 Recording Settings

NOTE

There are various settings and logged data that will not be saved in your transmitter when you remove the controller module. Nautel recommends that you record these settings and logged data [see step (a)], as desired, before removing the controller module so that you may re-enter them after installing the replacement controller module.

- (a) With the transmitter on, record and retain the existing settings in the AUI pages listed below. Record settings manually or use the laptop/Nautel Legacy App and LAN cable to remotely connect to the transmitter to create screen images. Refer to your existing *GV Operations and Maintenance Manual*, if necessary, to navigate to these AUI pages.
- | | |
|-----------------------|----------------------|
| • Logs | • Notifications |
| • User Accounts | • Engine Settings |
| • Network Setup | • NTP Servers |
| • Email Configuration | • SNMP Configuration |
- (b) Review the presets in the AUI's Presets page. For any presets that show Audio Player as their Audio Source, change the Audio Source to something other than Audio Player.

NOTE

Audio Player functionality is not available in software version GV2 SW 1.2.0, but is planned for a future release. Nautel recommends recording all Audio Player related preset settings so that they can be restored when that functionality is available.

- (c) On the controller's front panel UI, navigate to the **Main Menu -> System Settings -> HW Config -> RF Probe** menu, if available.
- If the **RF Probe** menu is not available, or if the displayed setting is Version 0, this setting can be ignored when the new controller is installed.
 - If the displayed setting is Version 1, record this setting and **be careful not to alter the setting**. You will need to re-establish this setting in the new controller later.



2.3 Disabling the Watchdog Feature

- (a) From the controller UI, go to the **System Settings -> Host Watchdog** screen. Ensure that the setting is set to **OFF** (disabled).

3 CONTROLLER MODULE REPLACEMENT

Perform the following steps to replace the NAC118* Controller Module with an NAC125:

- (a) Press RF Off. Turn off and lock out the transmitter's main ac power. Disconnect the UPS power source, if installed.
- (b) Gain access to the controller module (see Figure 1) by opening the front door and removing the upper, rear panel. For GV30N, GV30 and GV40 models, remove the right-hand, upper, rear panel (as viewed from the rear).

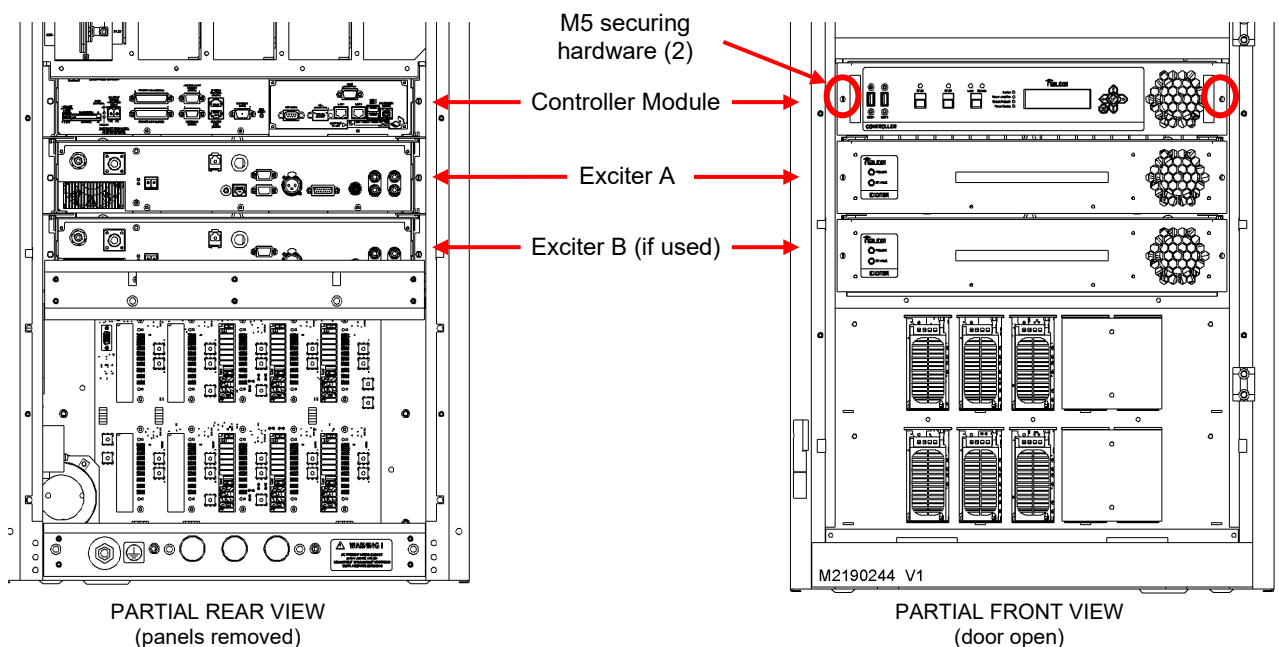


Figure 1: Controller Module and Exciter Locations (GV5/GV3.5 shown for reference)

- (c) From the rear of the transmitter, disconnect the mating connectors from the controller module (A4).
- (d) From the front of the transmitter, use a # 2 Phillips screwdriver to remove the two M5 screws that secure the controller module to the transmitter (see Figure 1), and pull out the controller module. Retain the M5 screws.
- (e) Obtain the NAC125 Controller Module from the Field Modification kit and install it by reversing the instructions in steps (d) and (e). Leave connector W33P1 disconnected at this time.
- (f) Obtain the HDMI adapter cable (U50, Nautel Part # UE301) from the Field Modification kit and install it as follows:
- Connect P1 of the HDMI adapter cable to the controller module's rear panel **HDMI (TO MONITOR)** port.
 - Connect W33P1 to J1 of the HDMI adapter cable.



- (g) Obtain the USB Cable Set Assembly (Nautel Part # 219-5342) from the Field Modification kit, which contains cables W53 and W54. Install cables W53 and W54 as follows:

NOTE

The USB Cable Set Assembly contains two cables (W53 and W54). These cables permit 'HD Air Chain' compatibility, as applicable. If your exciter(s) does (do) not support HD Air Chain (i.e., does not have LAN/USB port U1J2 and front panel software-based Air Chain label), Nautel recommends you connect the cables to the Controller Module and tie them back for possible future use.

- Connect W53 between the controller module's rear panel **USB 1A** port (W53P1) and exciter A's **LAN/USB** port (W53P2). Tie back W53P2 if the exciter is not HD Air Chain compatible in the NOTE above.
- Connect W54 between the controller module's rear panel **USB 1B** port (W54P1) and exciter B's **LAN/USB** port (W54P2). Tie back W54P2 if the exciter is not HD Air Chain compatible in the NOTE above, or if there is no exciter B.

- (h) Turn on the transmitter's main ac power and UPS power source (if installed), leaving **RF off**.

CAUTION!

There are two possible configurations for the controller module being installed, each with a potentially different effect on transmitter operation.

- A "blank" controller module, which is the typical configuration shipped by Nautel, will take on the transmitter's profile (transmitter type, calibration data, etc.) upon installation. It should require no additional configuration or setup.
- A "configured" controller module is one that has been configured for a specific customer's transmitter. Upon installation, the transmitter will take on the controller's profile. If this controller was not configured for the transmitter it was installed in, your transmitter's operational characteristics may change. If this occurs, contact Nautel to restore proper operation.

IMPORTANT!

Installing the new controller module introduces a new overall software version (GV2 SW 1.2.0 or later), which changes the local and remote AUI interface from a Flash-based menu to an HTML5-based menu. This procedure references AUI pages and functions in the new AUI. See the updated Operations Manual (OPS) PDF on the Nautel FTP site for complete details.

- (i) The local AUI will display the Nautel splash screen (animated Nautel logo with a white background) while firmware updates occur. Observe the progress of the firmware upgrades on the controller's front panel UI. The controller front panel UI will display that:
- Exciter A firmware is being updated with a percentage-based indicator.
 - Exciter B (if installed) firmware is being updated with a percentage-based indicator.
 - Rack 1 firmware is being updated with a percentage-based indicator.
 - Rack 2 through 8 (transmitter model dependent, as applicable) firmware is being updated with a percentage-based indicator



NOTE

The controller firmware will take approximately five (5) minutes. The exciter firmware will take approximately 10 to 15 minutes per exciter. The rack firmware will take approximately five (5) minutes for each rack.

- (j) Once the final rack has completed its firmware update, "**Upgrade successful**" will appear on the controller front panel UI.
- (k) Wait one (1) minute, then disable the transmitter's main ac power source (e.g., wall breaker, etc.) and UPS power source. Wait 30 seconds, then re-enable the transmitter's main ac power source and UPS power source. This will reboot the controller.
- (l) When the controller front panel UI has rebooted, navigate to **System Settings** -> **Hardware Configuration** -> **GV Family** and select GV2 Air Chain.
- (m) The controller front panel UI will indicate that it is rebooting the host.
- (n) Wait two (2) minutes and the on the local AUI Nautel splash screen will be replaced by the upgraded local AUI.

NOTE

If there are any failures during the firmware upgrade process, perform a software update by following the instructions in the Routine Maintenance section of the Operation and Maintenance Manual.

- (o) Click the remote AUI's Main Menu icon (☰) in the top right of the AUI dashboard to display the main menu options (see Figure 2). Select **Software**, then the **Software Versions** page to view the Details of the installed software. Upgrade software as required. See the Operations & Maintenance Manual and any applicable Nautel-supplied Information Sheets for detailed instructions.

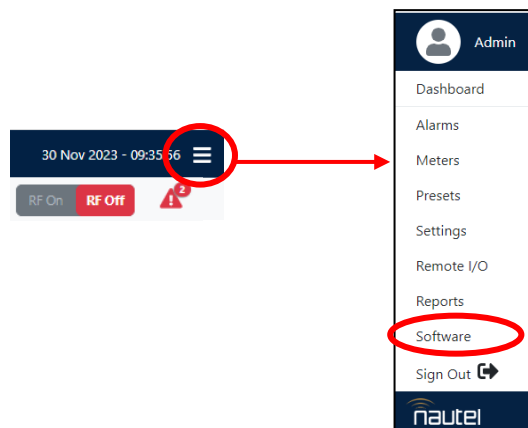


Figure 2: Main Menu for HTML5-based Remote AUI

- (p) Restore all custom user settings recorded in step 2.2 (a) via the local and remote AUI (noting the new user interface), or via the controller front panel UI.
- (q) Ensure the transmitter configuration is restored in the Controller's UI **HW Config** menu by selecting **Installed Exciter (A/B)**, **LVPS Hardware** (correct number of LVPS modules) and **UPS Installed** (yes/no). See the Operations & Maintenance Manual for detailed instructions.



- (r) If in step 2.2 (c) the controller's front panel UI's **Main Menu -> System Settings -> HW Config -> RF Probe** setting was Version 1, navigate to the **Main Menu -> System Settings -> HW Config -> RF Probe** menu again and set for Version 1.
- (s) With RF off and the system interlock circuit intact (closed), use the controller's front panel UI to initiate a Xmtr PA Bias routine (see **Main Menu -> System Settings -> Factory Settings -> Calibration**; refer to the Operations and Maintenance Manual for more details).
- (t) The modification is complete. Close the transmitter's front door and install the upper, rear panel.
- (u) Restore the transmitter to the desired operational state.

If you have any questions or require additional assistance, please contact Nautel's Customer Service Department at:

Telephone: 1-877-662-8835

Email: support@nautel.com



Table 2: Connector Mating Information – Cable Set Assembly, GV Controller Upgrade

CONNECTOR	MATE	REMARKS
W53P1	A4A1 - USB 1A	
W53P2	A5U1J2 - LAN/USB	
W54P1	A4A1 - USB 1B	
W54P2	A6U1J2 - LAN/USB	

Table 3: Wiring List – NAC125 Controller

SOURCE	DESTINATION	WIRE #	COLOUR	SIZE	REMARKS
P1-1	P2-1	1	White	22	
P1-2	P2-2	2	White	22	
P1-3	P2-11	3	White	22	
P1-4	P2-12	4	White	22	
P1-5	P2-16	5	White	22	
P1-6	P2-15	6	Black	22	
P1-7	P2-10	7	White	22	
P1-8	P2-9	8	White	22	
P1-9	P2-13	9	White	22	
P3-1	P4-1	10	White	22	
P3-2	P4-2	11	White	22	+12V Sample (A)
P3-3	P5-4	12	White	22	+12V SBC
P3-4	P5-2	13	Black	22	Gnd
P3-12	P5-3	14	White	22	+12V SBC
P3-6	P5-1	15	Black	22	Gnd
P3-5	P4-5	16	White	22	+12V Sample (B)
P3-7	P4-7	17	White	22	
P3-8	P4-8	18	Black	22	
P3-9	P4-9	19	White	22	
P3-10	P4-10	20	White	22	
P3-11	P4-11	21	White	22	
-	-	22	Not Used	-	
P3-14	P4-14	23	White	22	
P3-15	P4-15	24	Black	22	
P6-6	P7-1	25	White	26	SBC Reset +
P6-8	P7-2	26	Black	26	SBC Reset -
P8-1	P9-1	-	Black	24	2-Conductor
P8-6	P9-3	-	Red	24	2-Conductor
P8-8	-	27	Shield	24	Shield
P11-3	P10-5	28	White	28	RS232 TXD
P11-2	P10-3	29	White	28	RS232 RXD
P11-5	P10-9	30	White	28	RS232 GND
W4P3-1	W4P2-1	31	White	22	SBC to NAPC163
W4P3-3	W4P2-3	32	White	22	SBC to NAPC163
W4P3-5	W4P2-5	33	White	22	SBC to NAPC163
W4P3-7	W4P2-7	34	Black	22	SBC to NAPC163
W4P1-4	W4P2-2	-	Black	22	USB Panel to SBC
W4P1-3	W4P2-4	-	Green	28	USB Panel to SBC
W4P1-2	W4P2-6	-	White	28	USB Panel to SBC
W4P1-1	W4P2-8	-	Black	22	USB Panel to SBC



Table 4: Connector Mating Information – NAC125 Controller

CONNECTOR	MATE	REMARKS
P1	A4J2	UI Interface to Display
P2	U1H1	UI Interface to Display
P3	A3J4	Power Supply Distribution
P4	A2J1	Power Supply Distribution
P5	A1U1_PWR1	SBC Power
P6	A2J13	SBC Reset
P7	A1U1_RST_BTN1	SBC Reset
P8	A2J4	SBC Streaming Bus
P9	A1U1_COM5	SBC Streaming Bus
P10	A1U1_COM2	SBC Serial Bus
P11	A2J3	SBC Serial Bus
W3P1	A2J2	Controller to UI Interface
W3P2	A4J1	Controller to UI Interface
W4P1	USB	USB (Front Panel Mount)
W4P2	A1U1_USB2_1A	SBC USB 2_1A (Red Wire Pin 8)
W4P2	A1U1_USB2_1B	SBC USB 2_1B
W4P3	A2J14	USB
W7P1	U2J1	SSD SATA+ Power
W7P2	A1U1_SATA1	SBC to SSD SATA
W7P3	A1U1_SATA_PWR1	SBC to SSD Power
W8P1	A1U1_COM1	Monitor COM Port (W8P2 secured to rear panel COM clearance hole)
B1P1	A3J3	Module Fan

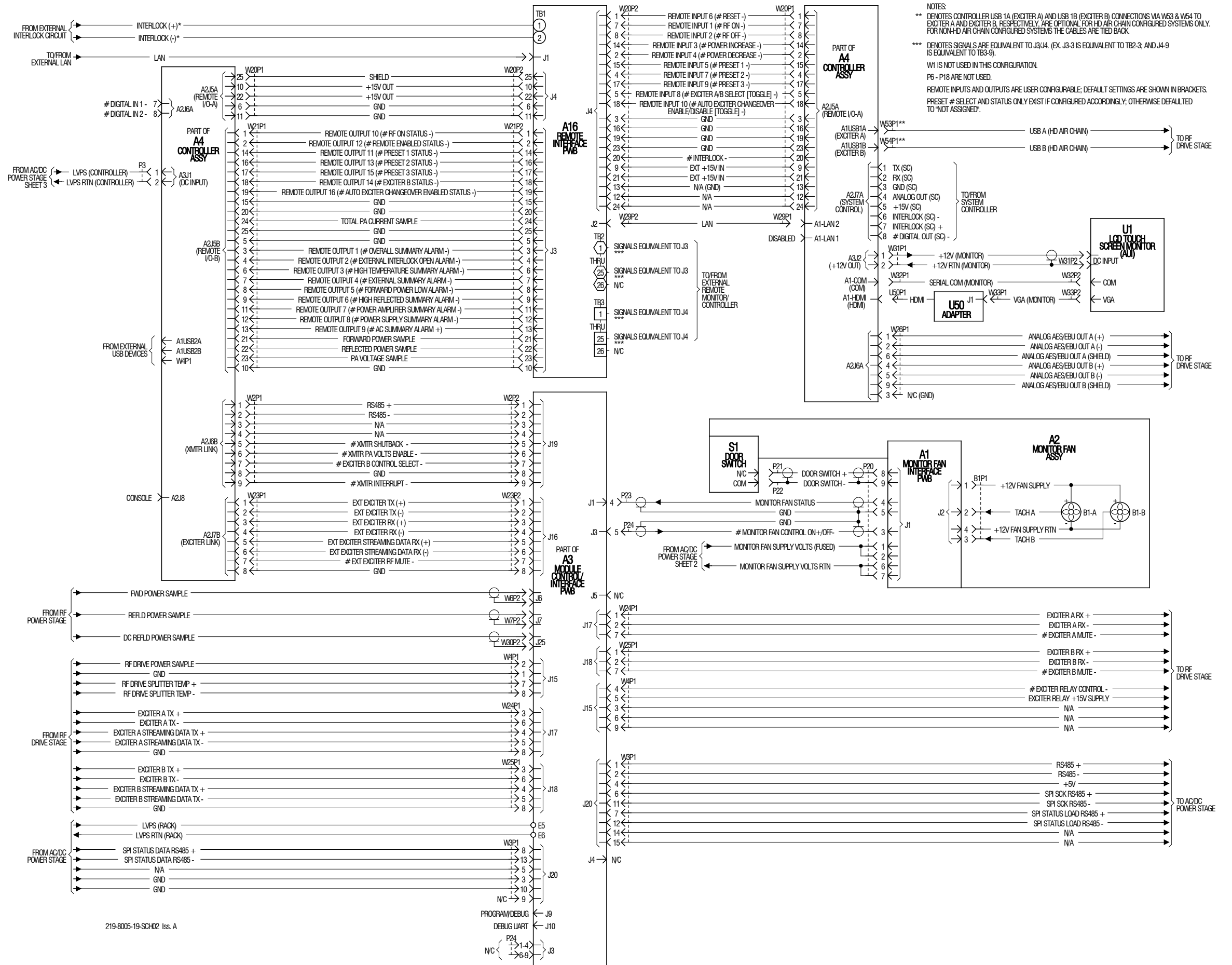


Figure SD-2: GV5/GV3.5 Transmitter – Control/Monitor Stage



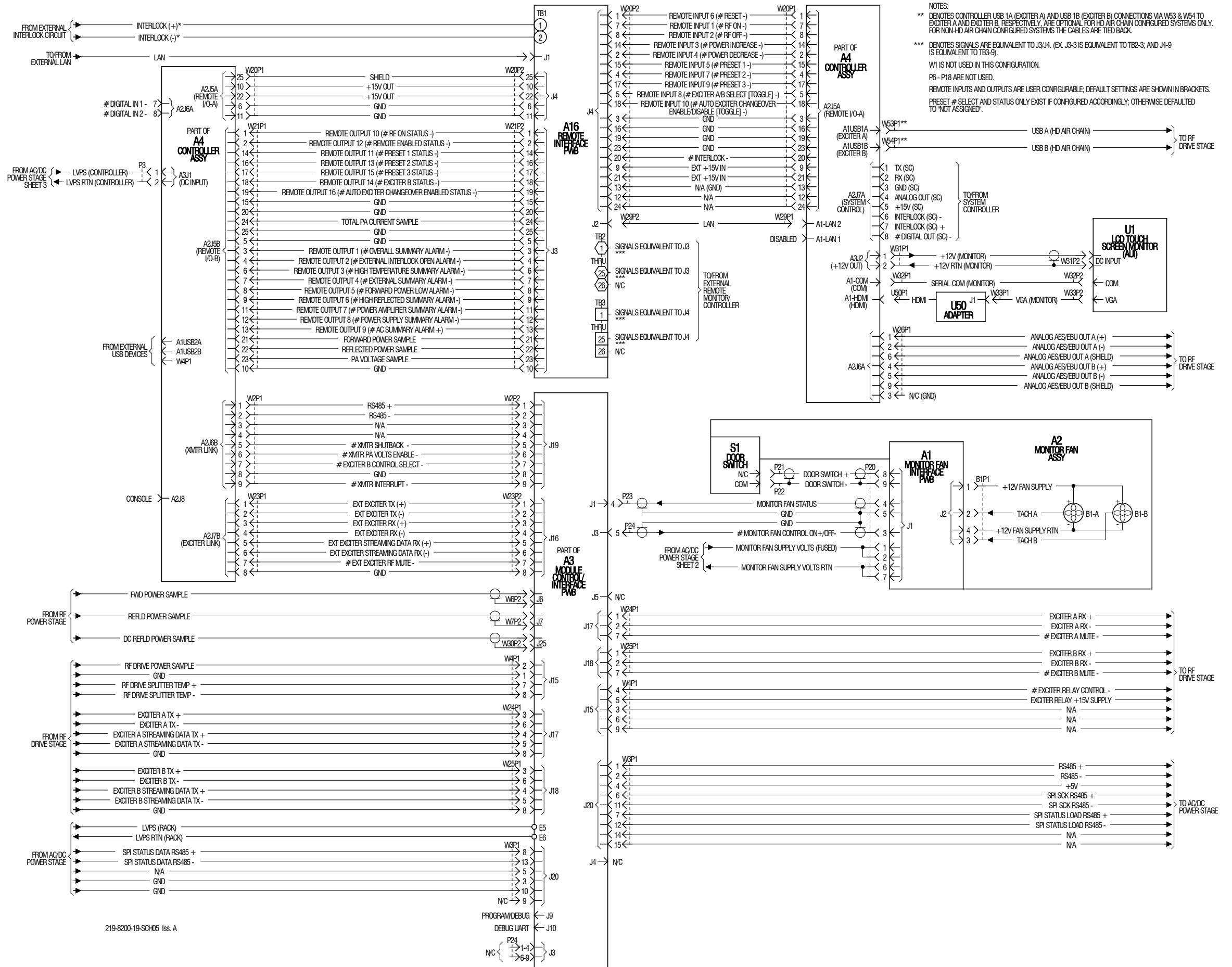


Figure SD-3: GV20/GV15 Transmitter – Control/Monitor Stage (Sheet 1 of 2)

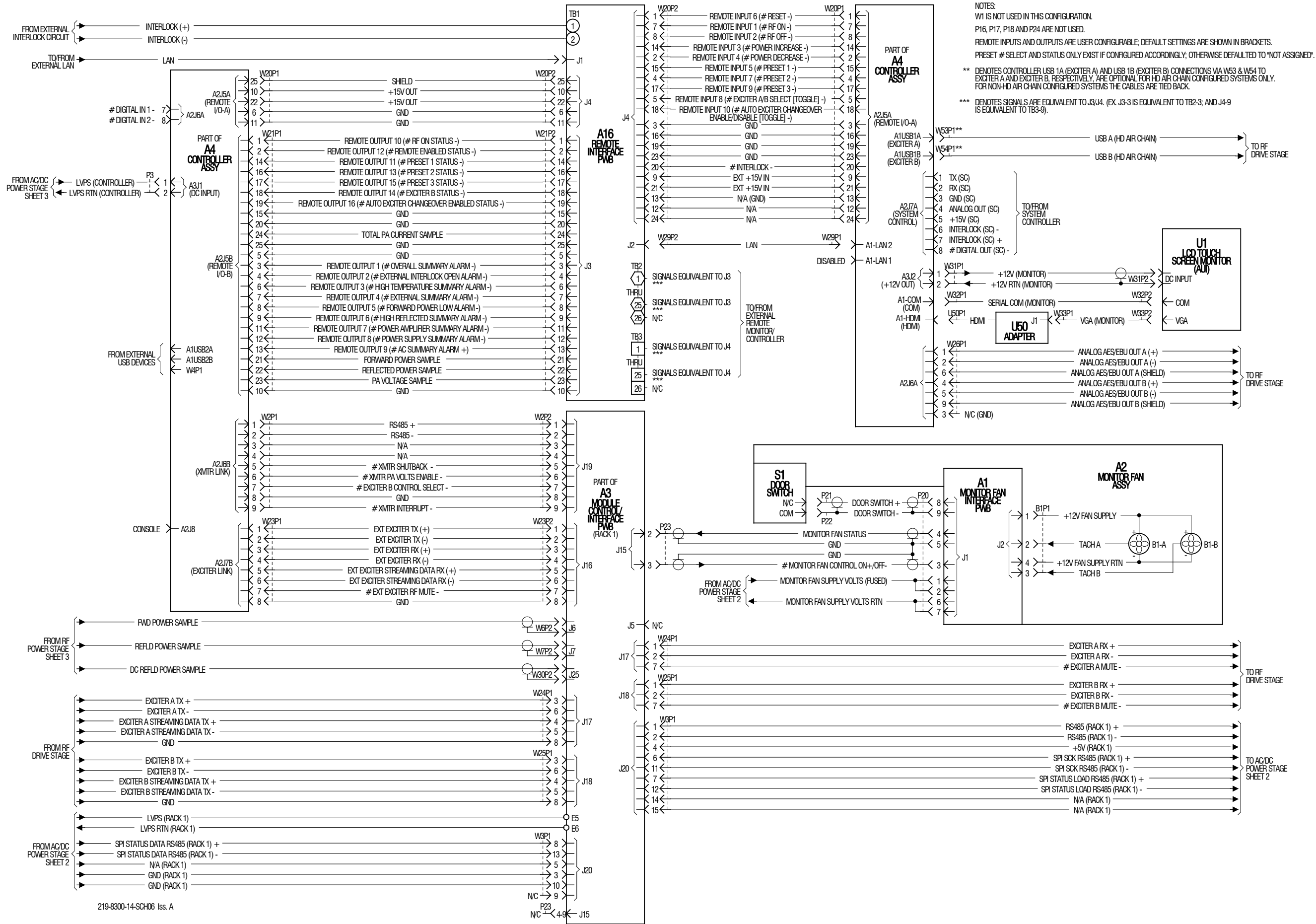
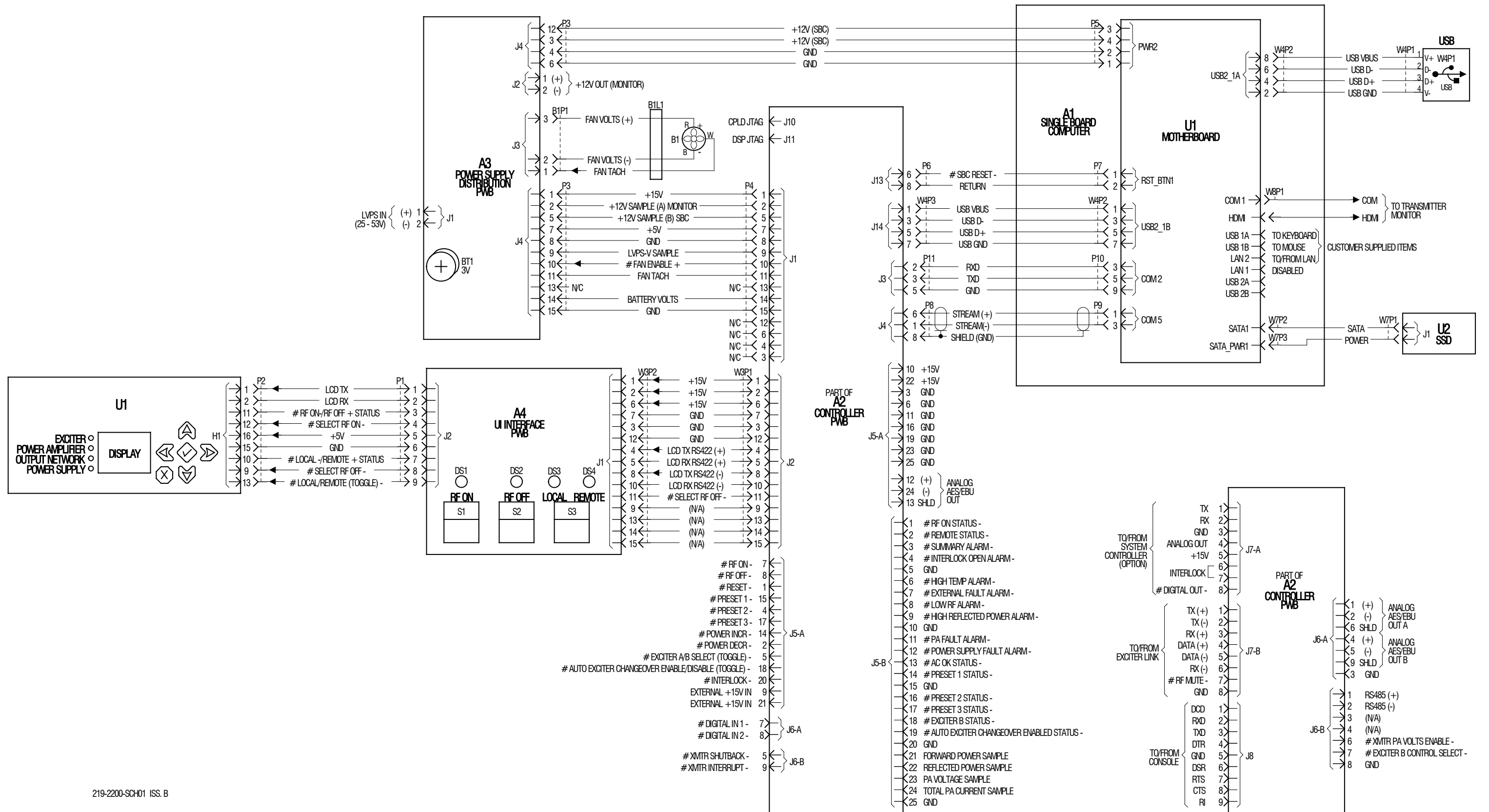


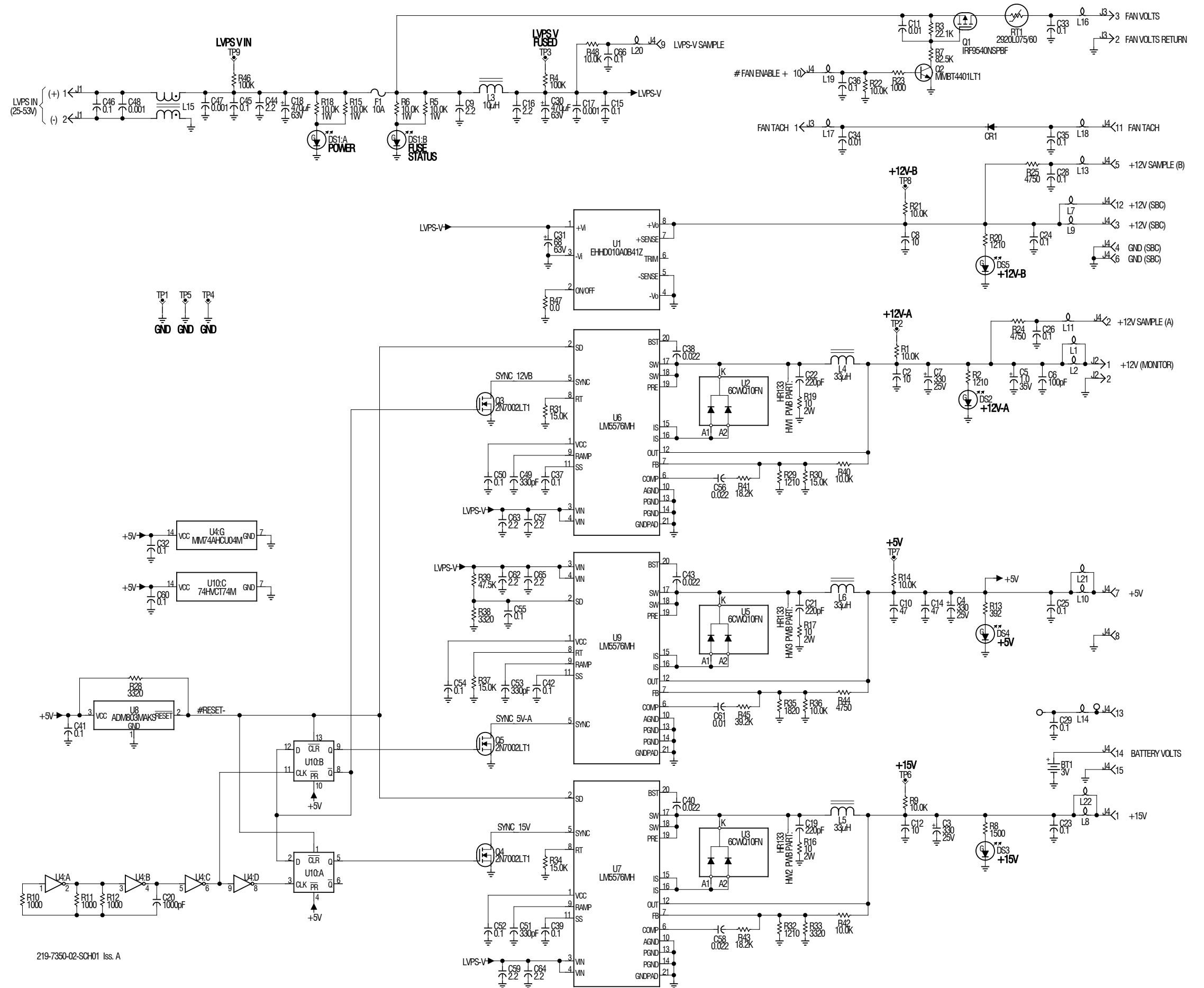
Figure SD-4: GV30N Transmitter – Control/Monitor Stage (Sheet 1 of 2)



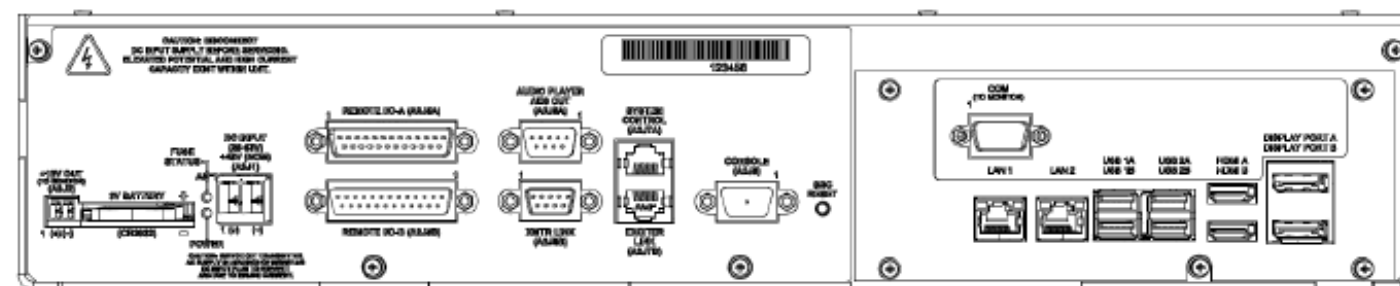


219-2200-SCH01 ISS. B

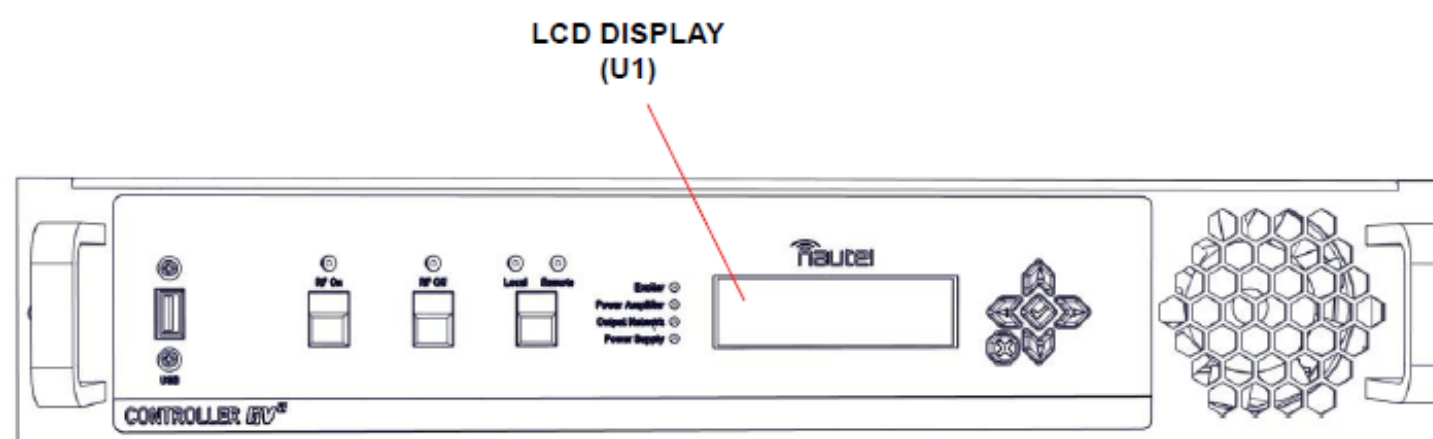
Electrical Schematic: NAC125 Controller



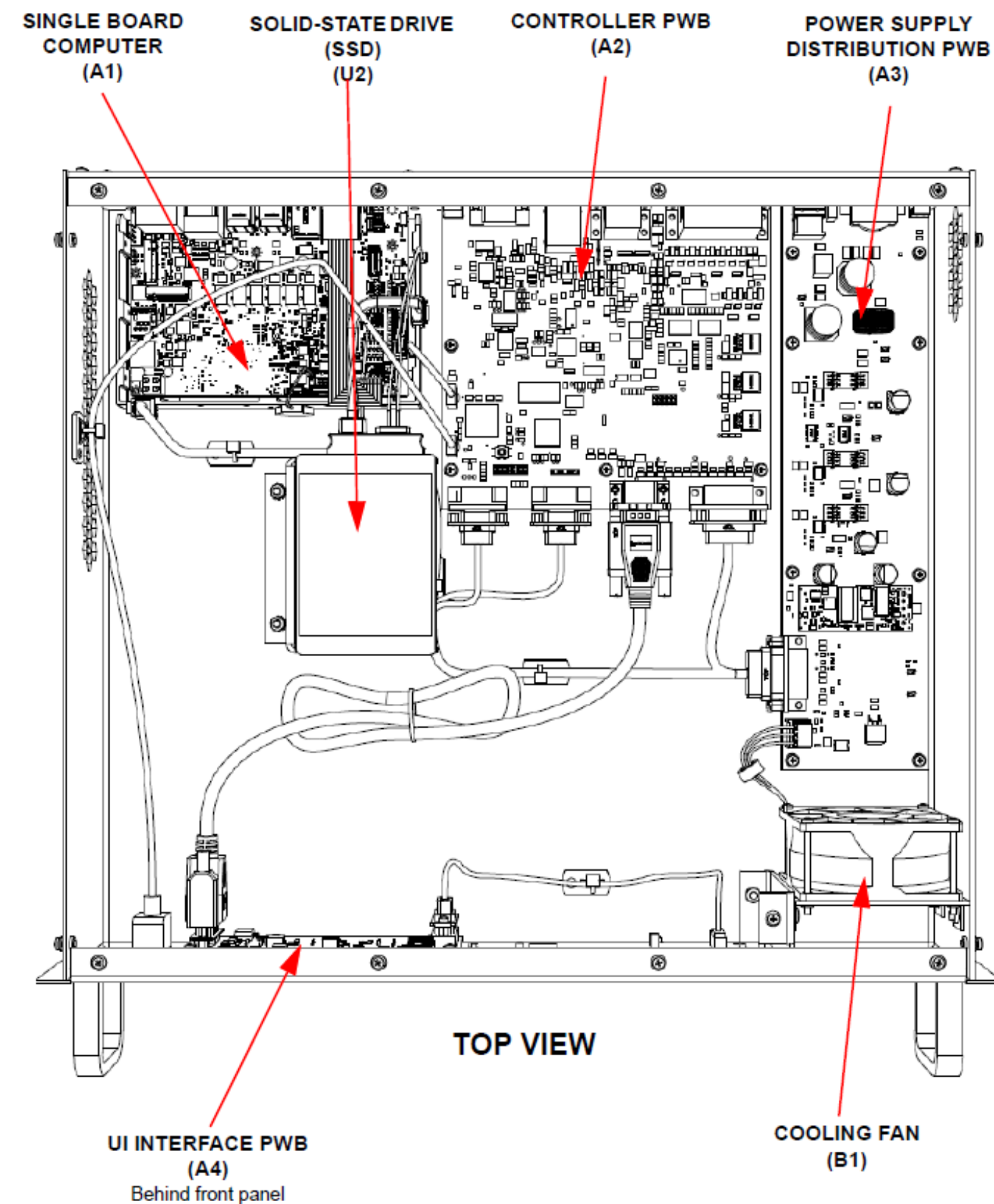
Electrical Schematic: NAPS49B Power Supply Distribution PWB



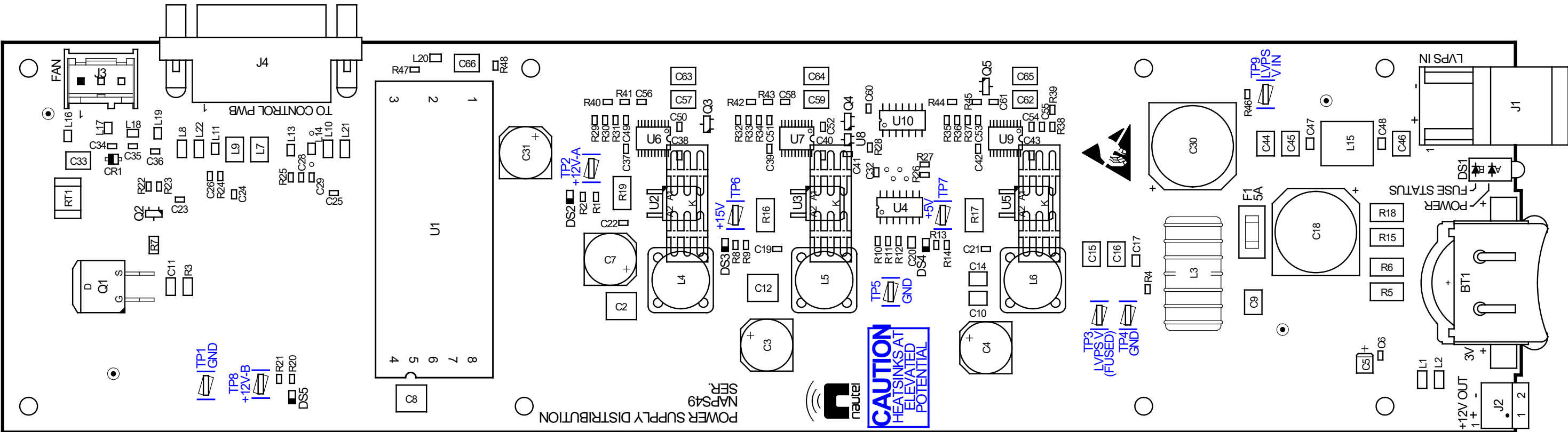
REAR VIEW



FRONT VIEW



TOP VIEW



219-7350-02 MCH01 V1

Mechanical Drawing: NAPS49B Power Supply Distribution PWB