Field Modification FM13016F

NX15 to NX400 Transmitters - Replacing the Single-Board Computer

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FM13016F: NX15 to NX400 Transmitters - Replacing the Single-Board Computer (SBC)

Field Modification

1 INTRODUCTION

This document provides instructions for Nautel customers or their appointed agents to modify the subject equipment in the field.

1.1 Reason for Modification

A new generic SBC (Nautel Part # 207-8720-01) must be used as the replacement if the original fails. The new SBC is electrically compatible, but depending on the vintage being replaced, there are physical differences in the connector locations/styles.

1.2 Equipment Affected

This modification affects the following NX series AM broadcast transmitters:

- Models with Nautel Part # 207-8710, 207-8710-01, 207-8710-02, 207-8998, 207-8998-01 SBC installed (containing UB97).
- Models with the original Door Computer assembly Nautel Part # 207-8708 or 207-8708-01 (containing UB66).
- Models with any one of Field Modification FM13016 through FM13016E installed.

If your transmitter or spare NAPC160* PWB was shipped between May 2019 and November 2021, please perform IS21007* – NX Series – Upgrading Controller Firmware (NX SW 5.0) prior to this procedure.

1.2.1 Minimum Software Required

Replacing the SBC requires that your NX transmitter have software version 4.0 (or 4.7 for NX15), as a minimum. If the transmitter is operating with software version NX SW3.x or earlier, follow the instructions in Information Sheet IS13005* in the latest software directory located in www3.nautel.com/NX_Series/ to complete the required software update.

1.3 Responsibility for Implementation

This modification is written for qualified transmitter maintenance personnel.

1.4 Scheduling

Implement this procedure at the convenience of station maintenance personnel noting that the transmitter will be “off-air” if a software upgrade is required.

1.5 Manpower Requirements

Completing this modification requires approximately one (1) hour.

1.6 Special Tools/Test Equipment

- Standard Phillips screwdriver
- 7 mm nut-driver/socket
- USB mouse for touch-screen calibration
- USB Keyboard along with IS18005* (may be required for initial startup of the transmitter - visit www3.nautel.com/NX_Series/ to obtain this IS document)

1.7 Materials

The parts required for this modification are contained in the provided Field Modification kit (Nautel Part # 207-9005-07), see Table 1.

Table 1: Field Mod Kit – UB118 NX SBC Replacement (Nautel Part # 207-9005-07)

Qty	Component	Description
1	207-5160-02	QR Code Sheet_PRINT ME
1	219-2131	SSD Mod, Programmed
1	207-8720-01	Generic ULT5 SBC Assy, w/SATA SSD, w/Virtualization
1	UE301	Adapter, Cable, HDMI (Type A) to VGA (D-sub), w/Audio Out
1	207-5060-02	Cableset for NX/NV UB118 SBC (Field Mod)
1	206-8110	Mounting Bracket
1	206-8091	SBC Mounting Bracket
1	207-8292-04	SBC Cover
1	207-8999-02	Label Set, Single Board Computer
6	HE22	Screw, Pan, Phil,6-32 x 3/8 Stainless Steel
6	HM13	Washer, Split, 6 Stainless Steel
6	HM36	Washer, Plain, Min, 6Stainless Steel
6	HMSF08	Screw, Flat, 90, Phil, 6-32 x 8 Lg, SS
4	HMSP08F	Screw, Pan, Phil, M3 X 0.5 X 6LG, SS, C/W Split & Flat

1.8 Identifying Modified Assemblies/Parts

Identifying modified assemblies informs future maintainers of the current configuration. Mark the transmitter with "**FM13016F**" next to the serial number label using indelible ink to indicate it has been modified.

1.9 Publications Affected

The Single Board Computer Assembly (A40A1 – NX15 to NX50, or A65A1 for NX100 to NX300, or A62A1 for NX400) has been replaced with Nautel part # 207-8720-01. Make the following changes to the NX Troubleshooting manual:

NOTE

Strikethrough text in the following tables indicates existing information in the Troubleshooting manual that requires editing. The text after is the new information to be added *(i.e.,* ~~P33-6~~ is now P33-1).

NX15 to NX25

Section 2 – Parts Lists: note the following Part List changes:

- Change A40A1 to 207-8720-01 in Figure 2.1 – NX15/25 Family Tree

Section 3 – Wiring/Connector Lists:

- Make the following changes to Table 3.3 – NX25 Transmitter - Wiring List:

SOURCE	DESTINATION	WIRE #	COLOUR	SIZE	REMARKS
A48U1TB3-18	A46K1-Chassis	229	Shield		
~~P33-6~~ P33-1	A11A1TB1-11	~~233~~ 232	Centre	24	
~~P33-8~~ P33-2	A11A1TB1-12	~~233~~ 232	Shield		
U3-(V-)	U4-(V-)	~~234~~ 233	Black	10	
Line 1-2	P35-1	~~235~~ 234	Red	14	
Line 2-2	P35-2	~~236~~ 235	Brown	14	
Line 3-2	P35-3	~~237~~ 236	Gray	14	
GND Near A48	P35-4	~~238~~ 237	Grn/Ylw	14	
P102-1	P101-4	238A	Black	24	
P102-6	P101-3	238B	Red	24	
P102-8		238	Shield	24	

- Make the following changes to Table 3.4 – NX25 Transmitter - Connector Mating Information:

Connector	Mate	Comments
P30	~~A40A1U1CPU12V1~~ A40A1U1PWR2	
P33	~~A40A1U1F_PANEL1~~ A40A1U1RST_BTN1	
P36	A40A1UCOM3	Streaming Bus
W66P2	~~A40A1U1COM3~~ A40A1U1P102	
W67P2	~~A40A1U1COM1~~ A40A1U1COM2	

NX50

Section 2 – Parts Lists: note the following Part List changes:

- Change A40A1 to 207-8720-01 in Figure 2.1 – NX50 Family Tree

Section 3 – Wiring/Connector Lists:

- Make the following changes to Table 3.3 – Wiring List – NX50 Transmitter:

SOURCE	DESTINATION	WIRE #	COLOUR	SIZE	REMARKS
A48U1TB3-18	A46K1-Chassis	229	Shield		
~~P33-6~~ P33-1	A11A1TB1-11	~~231~~ 230	Centre	24	
~~P33-8~~ P33-2	A11A1TB1-12	~~231~~ 230	Shield	—	
Line 1-2	P35-1	~~232~~ 231	Red	14	
Line 2-2	P35-2	~~233~~ 232	Brown	14	
Line 3-2	P35-3	~~234~~ 233	Gray	14	
GND Near A48	P35-4	~~235~~ 234	Grn/Ylw	14	
P102-1	P101-4	235A	Black	24	
P102-6	P101-3	235B	Red	24	
P102-8	-	235	Shield	24	

- Make the following changes to Table 3.4 – NX50 Transmitter - Connector Mating Information:

Connector	Mate	Comments
P30	~~A40A1U1CPU12V1~~ A40A1U1PWR2	
P33	~~A40A1U1F_PANEL1~~ A40A1U1RST_BTN1	
P36	A40A1UCOM3	Streaming Bus
W66P2	~~A40A1U1COM3~~ A40A1U1P102	
W67P2	~~A40A1U1COM1~~ A40A1U1COM2	

NX100

Section 2 – Parts Lists: note the following Part List changes:

- Change A65A1 to 207-8720-01 in Figure 2.1 – NX100 Family Tree

Section 3 – Wiring/Connector Lists:

- Make the following changes to Table 3.3 – Wiring List – NX100 Transmitter:

SOURCE	DESTINATION	WIRE #	COLOUR	SIZE	REMARKS
A72U1TB3-18	A70K1-Chassis	229	Shield		
~~P35-6~~ P35-1	A11A1TB1-11	~~231~~ 230	Centre	24	
~~P35-8~~ P35-2	A11A1TB1-12	~~231~~ 230	Shield	—	
P102-1	P101-4	231A	Black	24	
P102-6	P101-3	231B	Red	24	
P102-8	-	231	Shield	24	

- Make the following changes to Table 3.4 – NX100 Transmitter - Connector Mating Information

Connector	Mate	Comments
P30	~~A65A1U1CPU12V1~~ A65A1U1PWR2	
P35	~~A65A1U1F_PANEL1~~ A40A1U1RST_BTN1	
P36	A40A1UCOM3	Streaming Bus
W66P2	~~A65A1U1COM3~~ W66P2(P102)	
W67P2	~~A65U1COM1~~ W67P2(A40A1U1COM2	

NX200 and NX300

Section 2 (NX200), Section 3 (NX300) – Parts Lists: note the following Part List changes:

- Change A65A1 to 207-8720-01

Section 3 (NX200), Section 4 (NX300) – Wiring/Connector Lists: make the following changes to:

- Table 3.3: NX200 Transmitter – Rack 1 (Control Cabinet)
- Table 4.3: NX300 Transmitter - Rack 1 (Control Cabinet)

SOURCE	DESTINATION	WIRE #	COLOUR	SIZE	REMARKS
~~P35-6~~ P35-1	A11A1TB1-11	232	Centre	24	
~~P35-8~~ P35-2	A11A1TB1-12	232	Shield	—	
P102-1	P101-4	231A	Black	24	
P102-6	P101-3	231B	Red	24	
P102-8	-	231	Shield	24	

Make the following changes to:

- Table 3.5: NX200 Transmitter Rack 1 - Connector Mating Table
- Table 4.6: NX300 Transmitter - Rack 1 - Connector Mating Information

Connector	Mate	Comments
P30	~~A65A1U1CPU12V1~~ A65A1U1PWR2	
P35	~~A65A1U1F_PANEL1~~ A65A1U1RST_BTN1	
P36	A65A1UCOM3	Streaming Bus
W66P2	~~A65A1U1COM3~~ W66P2(P102)	
W67P2	~~A65U1COM1~~ W67P2(A65A1U1COM2	

NX400

Section 2.2 – Parts Lists: note the following Part List changes:

- Change A62A1 to 207-8720-01

Section 3.3 – Wiring/Connector Lists: make the following changes to:

- Table 3.3: Wiring List - NX400 Transmitter - Cabinet 1 (Control Cabinet)

SOURCE	DESTINATION	WIRE #	COLOUR	SIZE	REMARKS
~~P35-6~~ P35-1	A11A1TB1-11	232	Centre	24	
~~P35-8~~ P35-2	A11A1TB1-12	232	Shield	—	
P102-1	P101-4	231A	Black	24	
P102-6	P101-3	231B	Red	24	
P102-8	-	231	Shield	24	

Make the following changes to:

- Table 3.7: Connector Mating Information - NX400 Transmitter - Cabinet 1 (Control)

Connector	Mate	Comments
P30	~~A62A1U1CPU12V1~~ A62A1U1PWR2	
P35	~~A62A1U1F_PANEL1~~ A62A1U1RST_BTN1	
P36	A62A1UCOM3	Streaming Bus
W66P2	~~A62A1U1COM3~~ W66P2(P102)	
W67P2	~~A62U1COM1~~ W67P2(A62A1U1COM2	

All NX Models:

Section 4 (NX15 to NX200 and NX400), Section 5 (NX300) – Electrical Schematics

- Insert the applicable replacement Electrical Schematic included in this document and discard the old schematic:

  Electrical Schematic SD-3 - Control/Monitor Stage in the NX Troubleshooting Manual with the applicable schematic provided with this document.

2 REPLACEMENT PROCEDURE

IMPORTANT

Inserting a new SSD will prompt a software upgrade which requires the transmitter to be "off-air". Various settings (i.e.; User Accounts, Network Setup, Email Configuration, Notifications, NTP Servers) and logged data will not be saved in the transmitter when you replace the SSD or compact flash card.

Remove the SBC as follows:

NOTE

The replacement SBC assembly is static sensitive and can be damaged by electrostatic discharge (ESD). Observe the static precautions described in the NX series technical documentation.

(a) Set the transmitter to **RF Off** and switch off its ac power source. Apply any local lockout or tag out procedures that may be required to ensure ac power cannot be applied while working on the equipment.

(b) Open the front door of the NX transmitter to access the SBC.

(c) Remove the old SBC cover (Nautel part # 207-8292*) using a 7-mm nut-driver/socket to remove the seven (7) M4 hardware, which holds the SBC's protective cover to the front door of the transmitter. Retain hardware. See Figure 1.

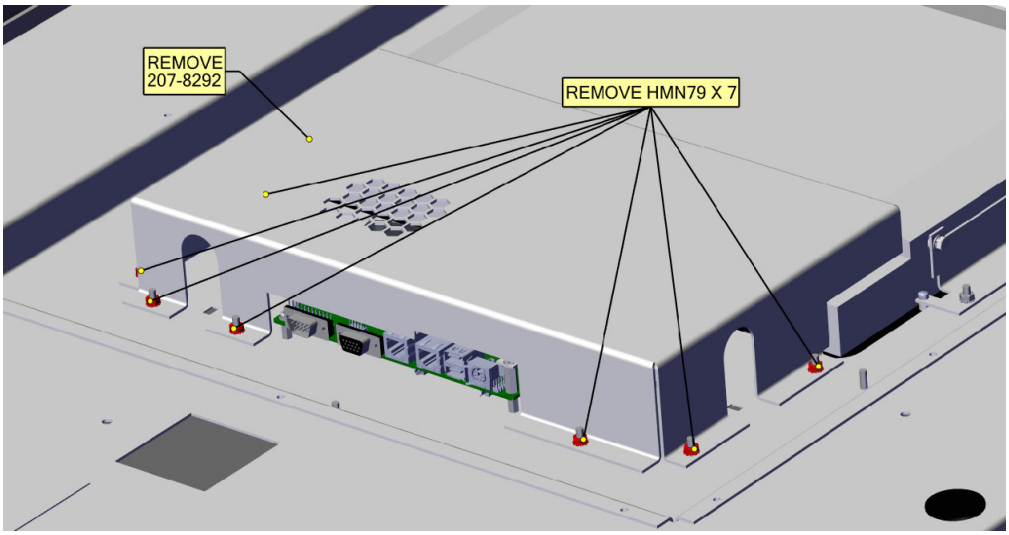

Figure 1: SBC Cover Removal

(d) Disconnect the power connector (P30) from the original SBC.

(e) Disconnect the remaining connectors from the SBC as follows:

- No label – VGA
- No label – COM
- W66P2 – SBC Streaming Bus
- W67P2 – SBC External Serial
- P33 (NX25/NX50) or P35 (NX100 to NX400) – SBC Reset

(f) Using the label set (Nautel Part # 207-8999-02) provided with the Field Modification kit, replace where applicable or apply new mating labels to connectors P30, P33 (or P35), P36, P37, COM2, VGA, U10HDMI, W67P2 and W66P2 to reflect their new mating connectors as shown in Table 2. Label both ends of COM2 and P101/P102 cable.

NOTE: Use labels "A40" for NX25/NX50 (e.g., A40A1U1PWR2). Use labels "A65" for NX100 to NX300 (e.g., A65A1U1PWR2). Use labels “A62 for NX400 (e.g., A62A1U1PWR2).

Table 2: Mating Connections

Connector	**Connects to:**
P30	A**A1U1PWR2
P33 or P35	A**A1U1RST_BTN1
P101	A**A1U1COM3
W66P2	P102
P102	W66P2
COM2	A**A1U1COM2
COM2	W67P2
W67P2	COM2
VGA	A**U10VGA
A**U10HDMI	A**A1U1HDMI
COM (unlabeled)	A**A1U1COM1
** - Reference designation prefix is transmitter dependent (A40, A65, A62); see **NOTE** above	

(g) If no SSD is installed, skip to step (i). Disconnect the cables from the SSD (Nautel part # UX174), noting destinations.

(h) Remove the three (3) M3 screws securing the SSD and retain. Refer to Figure 2.

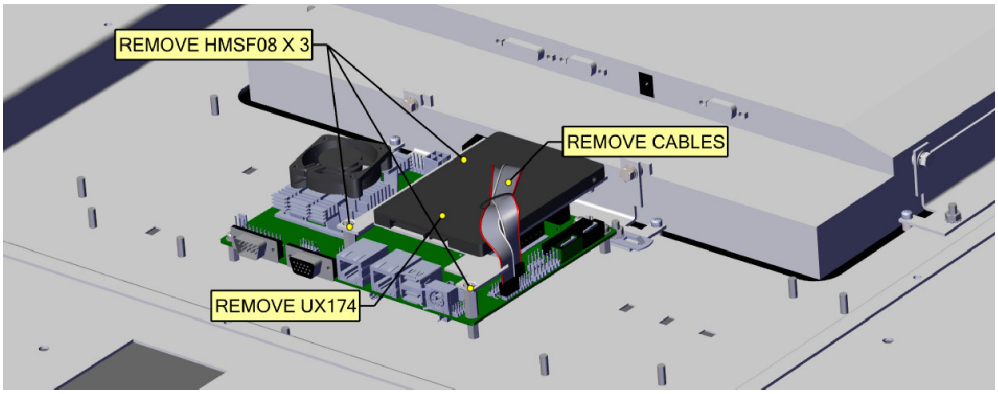

Figure 2: SSD Removal

(i) Remove the four (4) M3 screws and the three (3) M3 pillars (Nautel part # HPM45) securing the SBC to the chassis. See Figure 3.

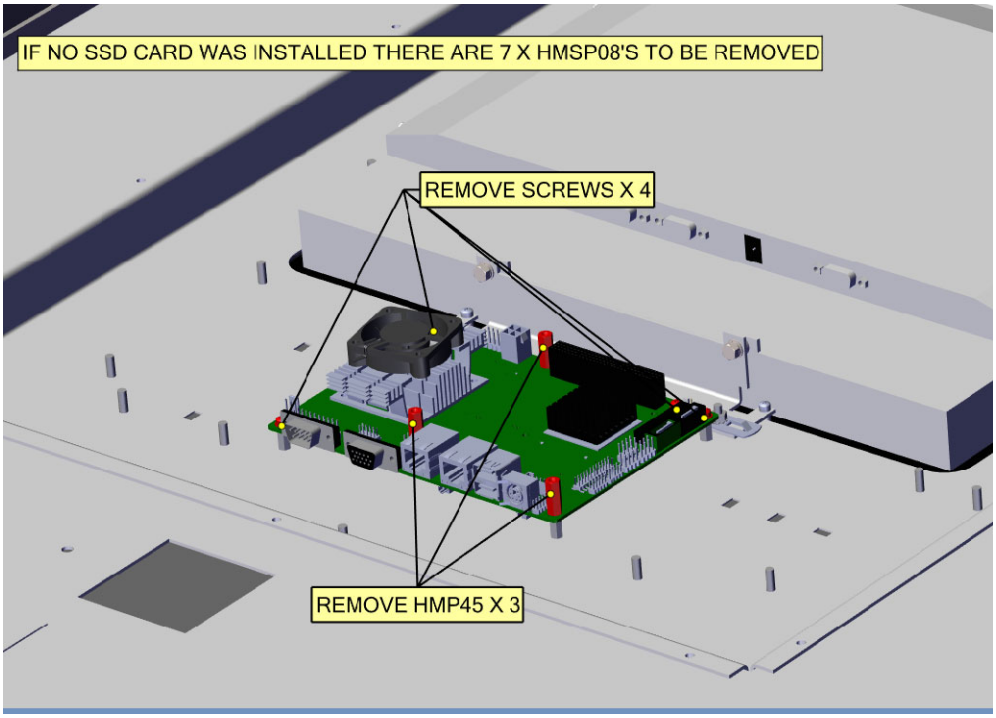

Figure 3: SBC Hardware Removal

(j) Remove the SBC and discard. See Figure 4.

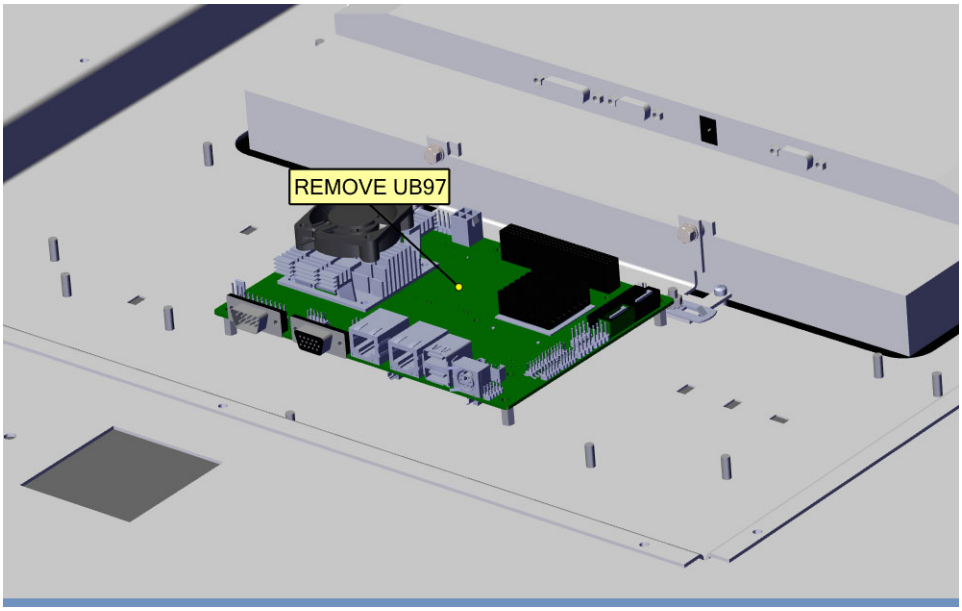

Figure 4: SBC Removal

(k) Install the new SBC Mounting Bracket (Nautel part # 206-8091) using the seven (7) M4 screws (Nautel part # HMSF08). See Figure 5.

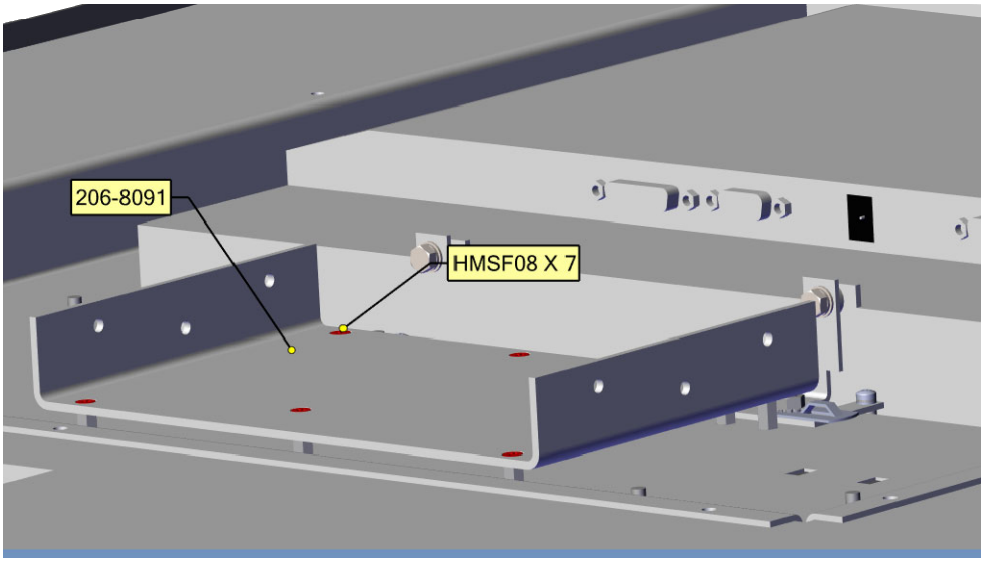

Figure 5: SBC Bracket Installation

(l) Install the new SBC (Nautel part # 207-8720-01) to the SBC Mounting Bracket using the six (6) sets of 6-32 hardware. Leave the two indicated screws loose for SSD installation in step (m). See Figure 6.

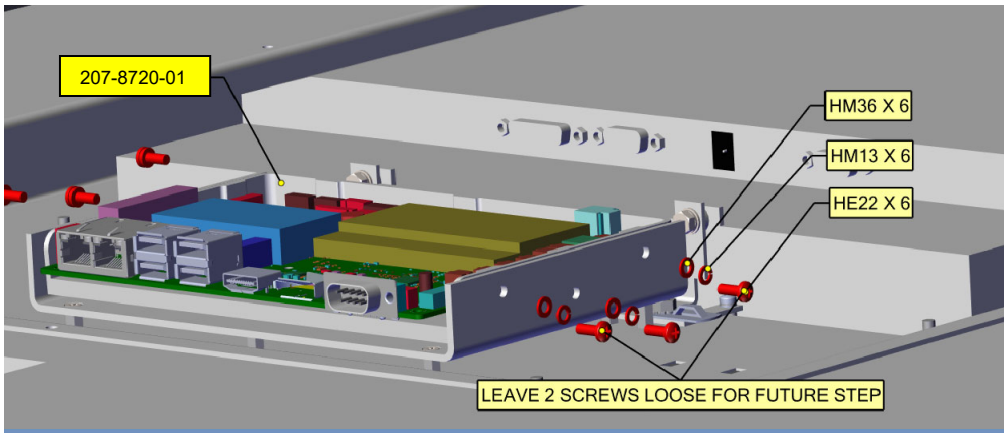

Figure 6: SBC installation

(m) Mount the SSD (Nautel part # 219-2131) to the Mounting Bracket (Nautel part # 206-8110) using the four (4) M3 screws. See Figure 7.

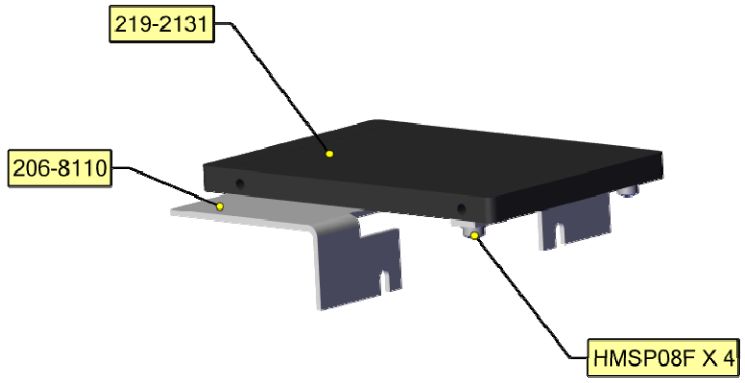

Figure 7: SSD Drive Mounting

(n) Mount the SSD assembly from step (l) to the SBC Mounting Bracket by sliding the assembly over the loosened screws from step (k). Tighten the two screws. See Figure 8.

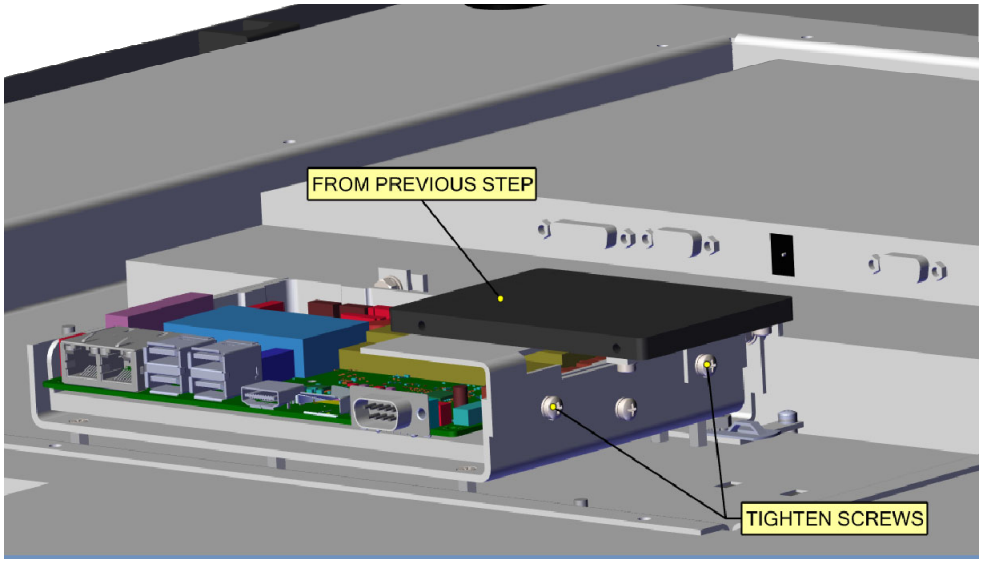

Figure 8: Attaching the SSD assembly to the SBC

(o) Using Table 2 and Figures 9 and 10, connect cables to the new SBC. COM3 and COM2 are keyed connections so they cannot be inserted incorrectly. Connect the unlabeled COM cable to COM1 on the new SBC.

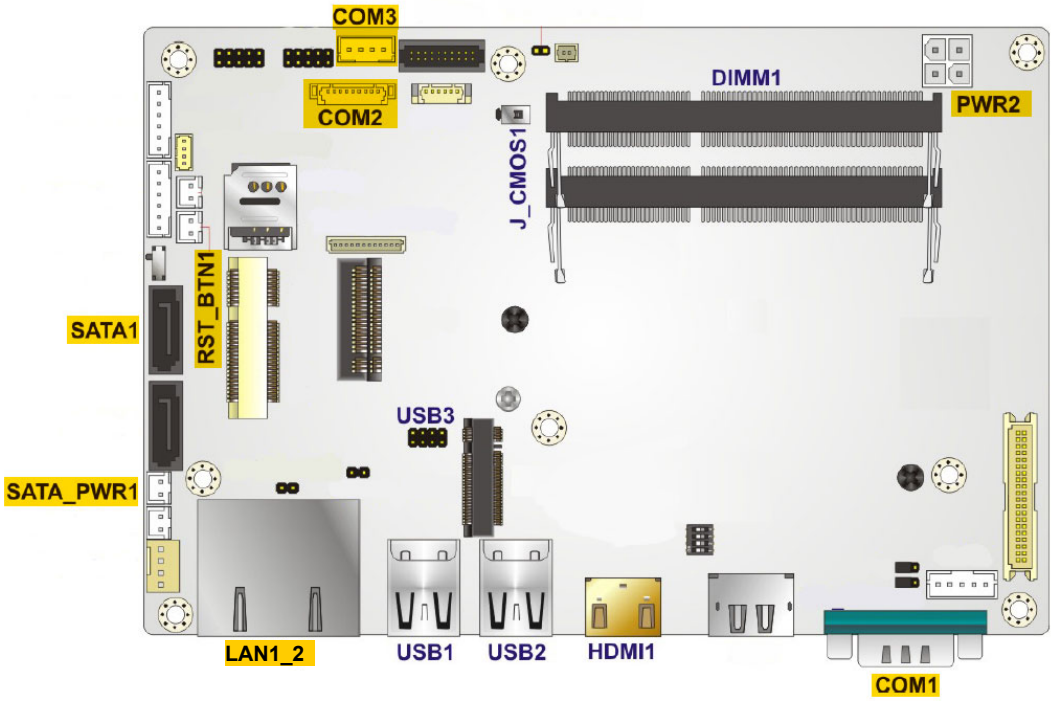

Figure 9: SBC Connections

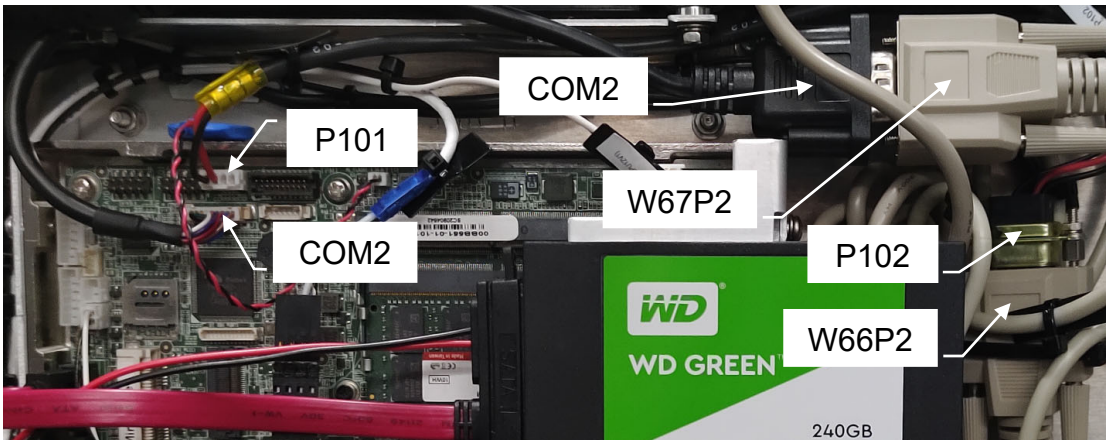

Figure 10: SBC COM Connections

(p) Locate the multi-connector cable (Nautel Part # UA406) in the 207-5060-02 Cableset, provided with the Field Modification kit. Mate the largest connector with J1 of the SSD installed in step (m). Connect the other ends to the SATA1 and SATA_PWR1 connectors on the SBC (see Figure 9).

(q) If Field Modification FM13016 or FM13016A was previously applied to the transmitter, the UB97 Reset Adapter Assy PWB (207-5760) can be disconnected from P33 or P35, then P33 or P35 can be connected directly to A1U1RST_BTN1. Otherwise, connect P104 to P33 (NX15/25/50 only) or P35 (for NX100 to NX400) and P103 to A1U1RST_BTN1 on the SBC. See Figure 11.

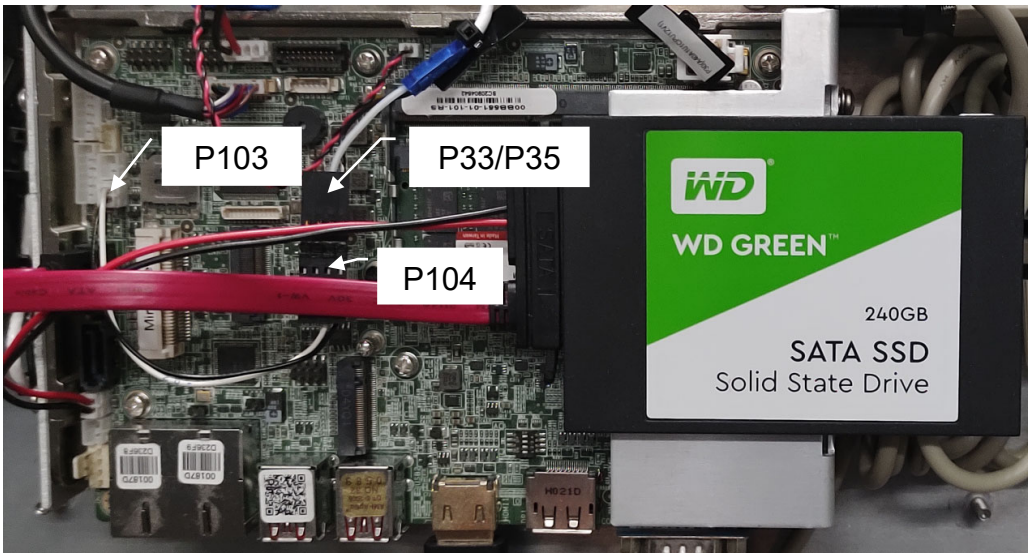

Figure 11: RST_BTN1 Connection

(r) Attach the new SBC Cover (Nautel part # 207-8292-04) using the M4 hardware retained in step (b). See Figure 12.

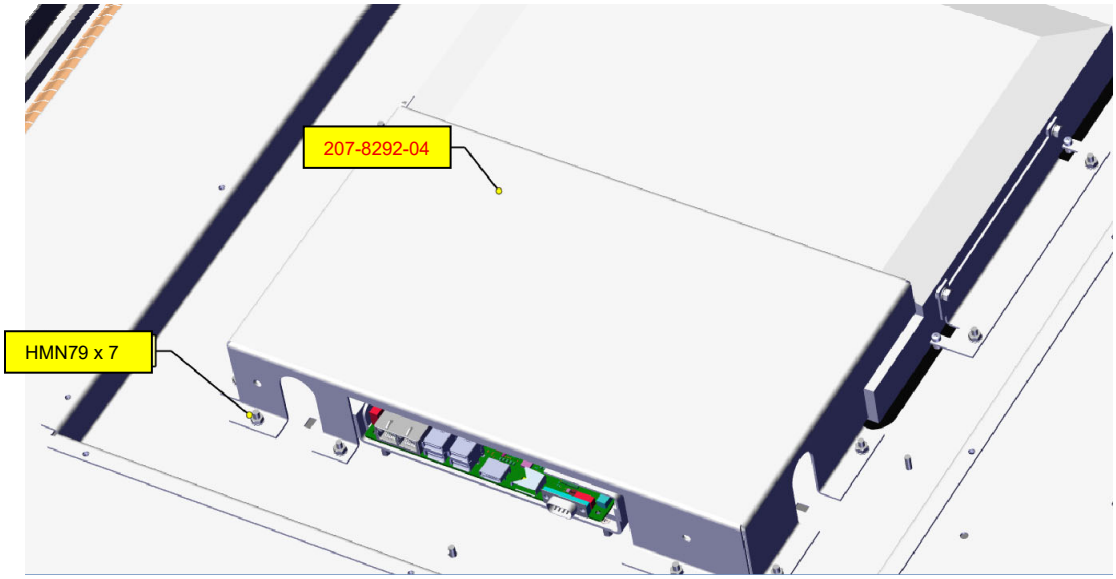

Figure 12: Attaching the New SBC Cover

3 REBOOT & TOUCHSCREEN CALIBRATION

NOTE

The OS password document, provided with the transmitter, should be kept in a secure location for future reference. This password is needed in the event access is required to the transmitter's operating system.

(a) Remove any lockout or tag out for the ac power and turn on the ac to the transmitter.

(b) The touchscreen monitor will turn on and a screen will appear prompting you to perform a software upgrade. The AUI will not navigate away from this page until it has been completed. Plug in the USB mouse and begin the upgrade. Refer to the Non-standard Maintenance section of the transmitter's Operations and Maintenance Manual if you require assistance with installing the software.

(c) Perform a touch screen calibration through the AUI (in Menu ► System Settings ► Screen Configuration). Use the USB mouse to navigate to the touch screen calibration page and then use your finger to touch the targets.

(d) Do an ac power cycle after the software upgrade and touch screen calibration is finished.

(e) Unplug the USB mouse and reconfigure the network settings in the Network Setup page (in Menu ► User Settings).

(f) As applicable, reconfigure the User Accounts settings (in Menu ► User Accounts), Email Configuration, Notifications, NTP Servers, Nautel Phone Home, SNMP Configuration settings (in Menu ► User Settings) and Audio Player settings (in Menu ► Audio Player, then enable in Presets menu).

NOTE

When connecting the transmitter to the Local Area Network, use the LAN 2 connector on the SBC for the remote IP control. LAN 1 cannot be used.

(g) Turn RF On and return to normal operation.

The modification is complete.

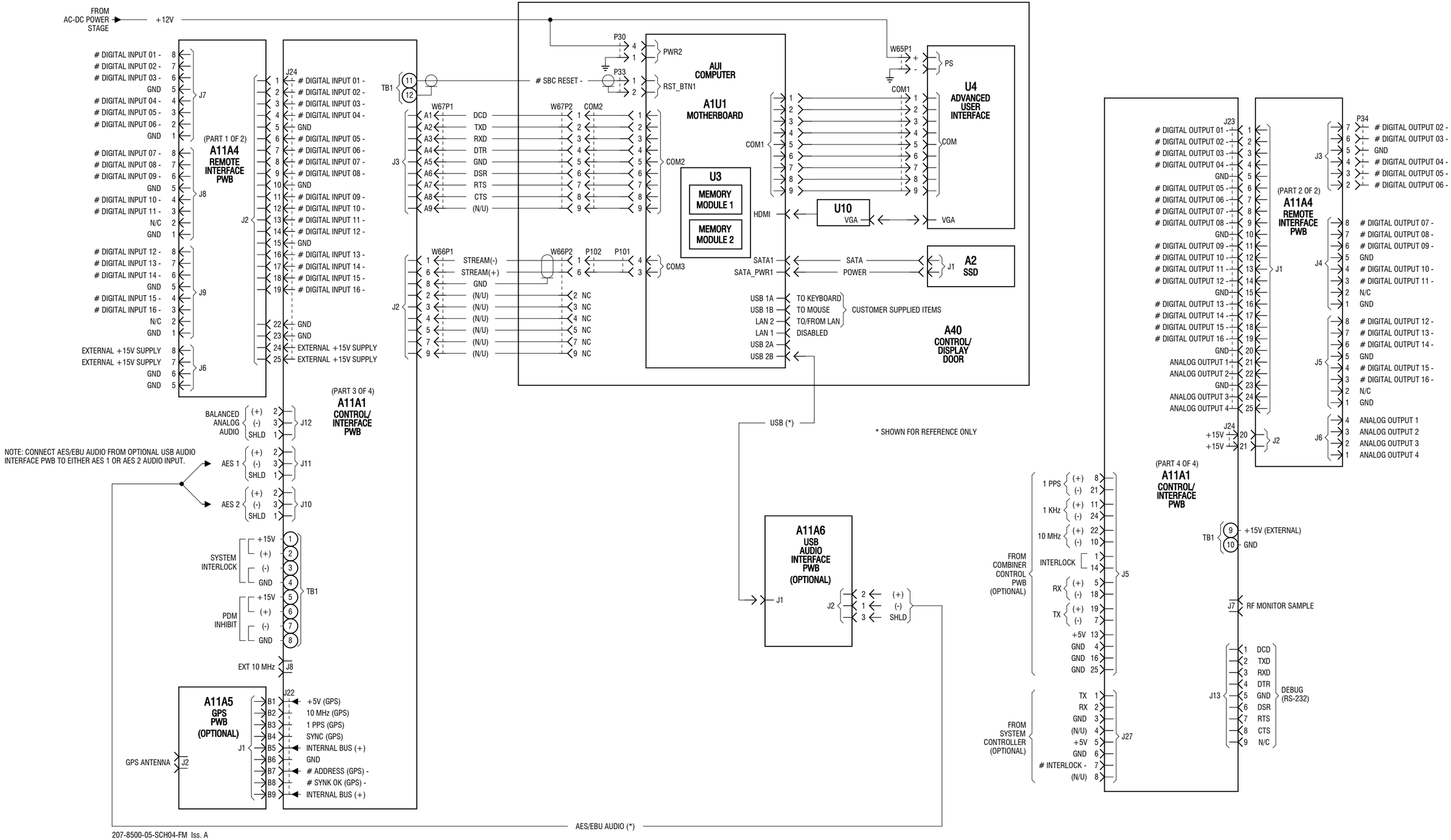

Figure SD-3: NX15/NX25/NX50 Transmitter – Control/Monitor Stage

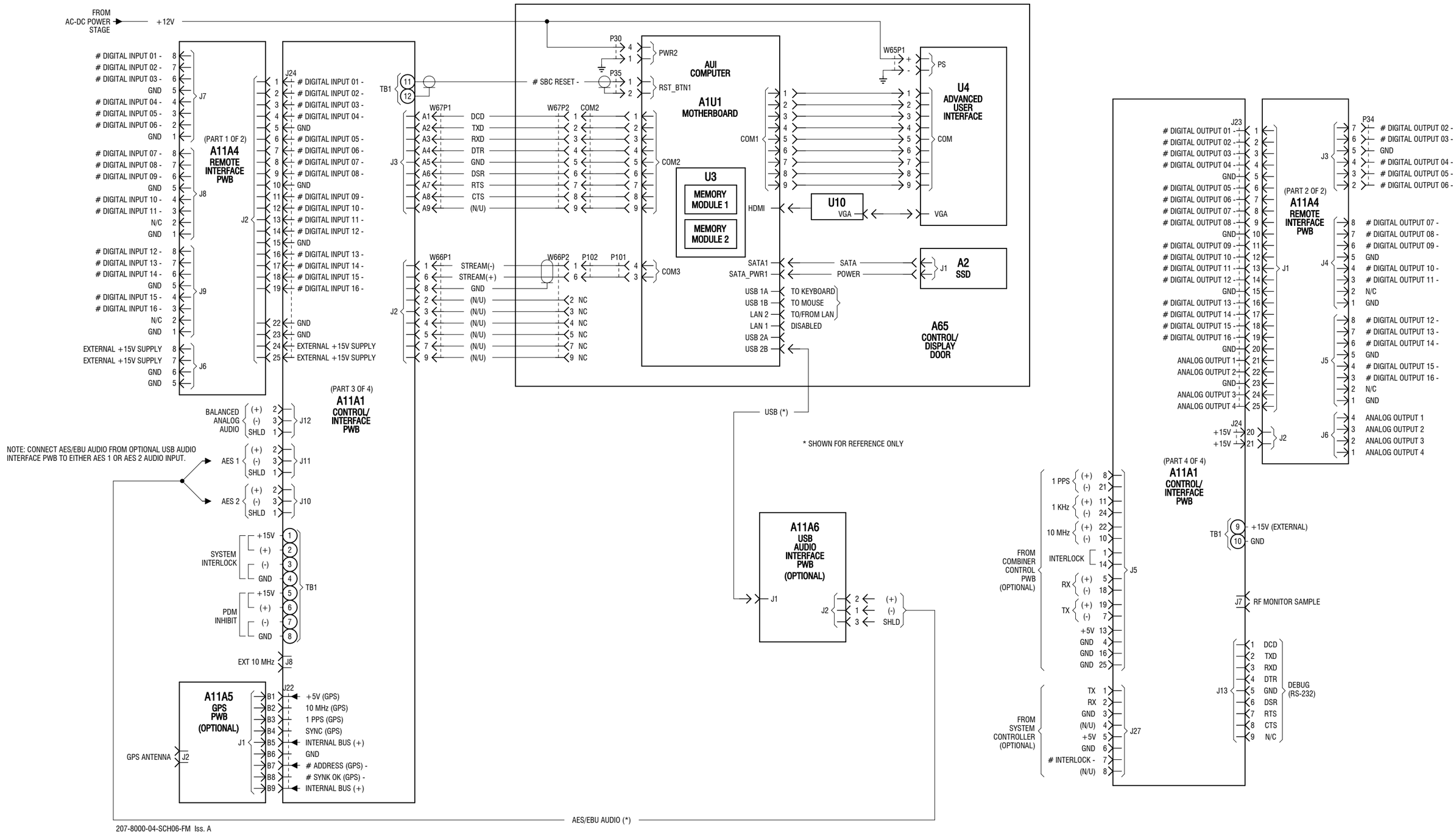

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Figure SD-3: NX100 Transmitter – Control/Monitor Stage

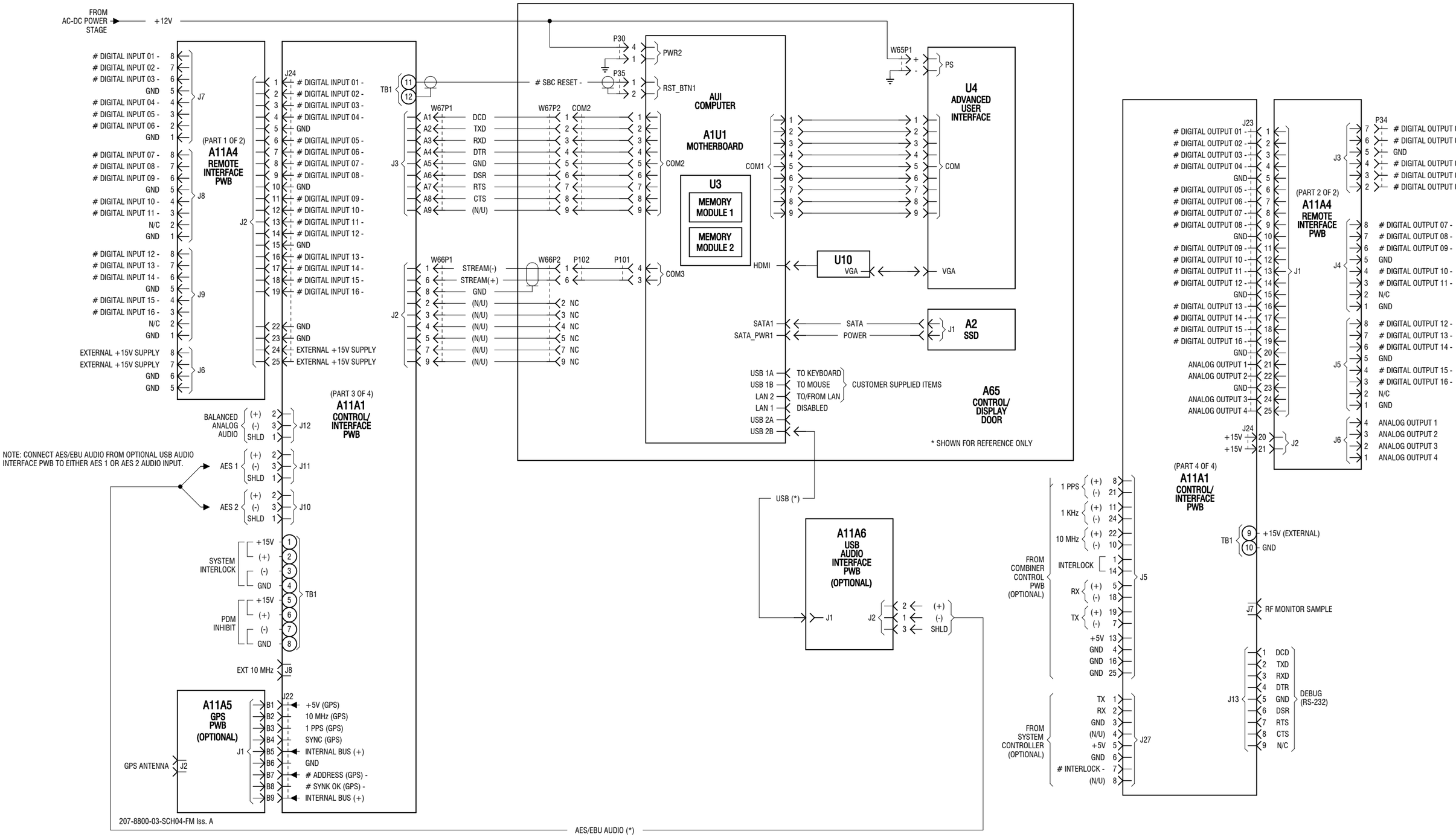

Figure SD-3: NX200 Transmitter – Control/Monitor Stage

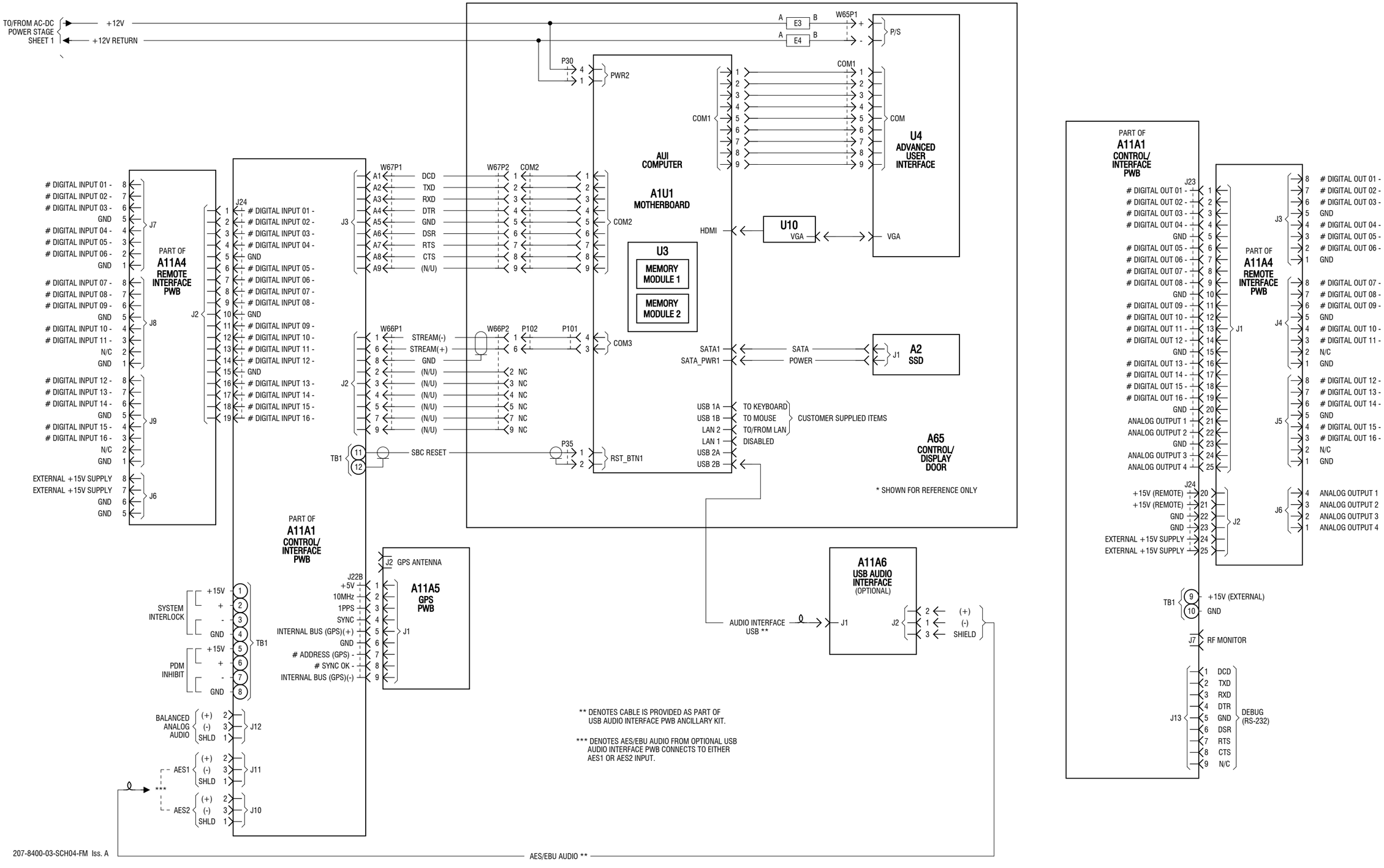

Figure SD-4: NX300 Transmitter – Control/Monitor Stage

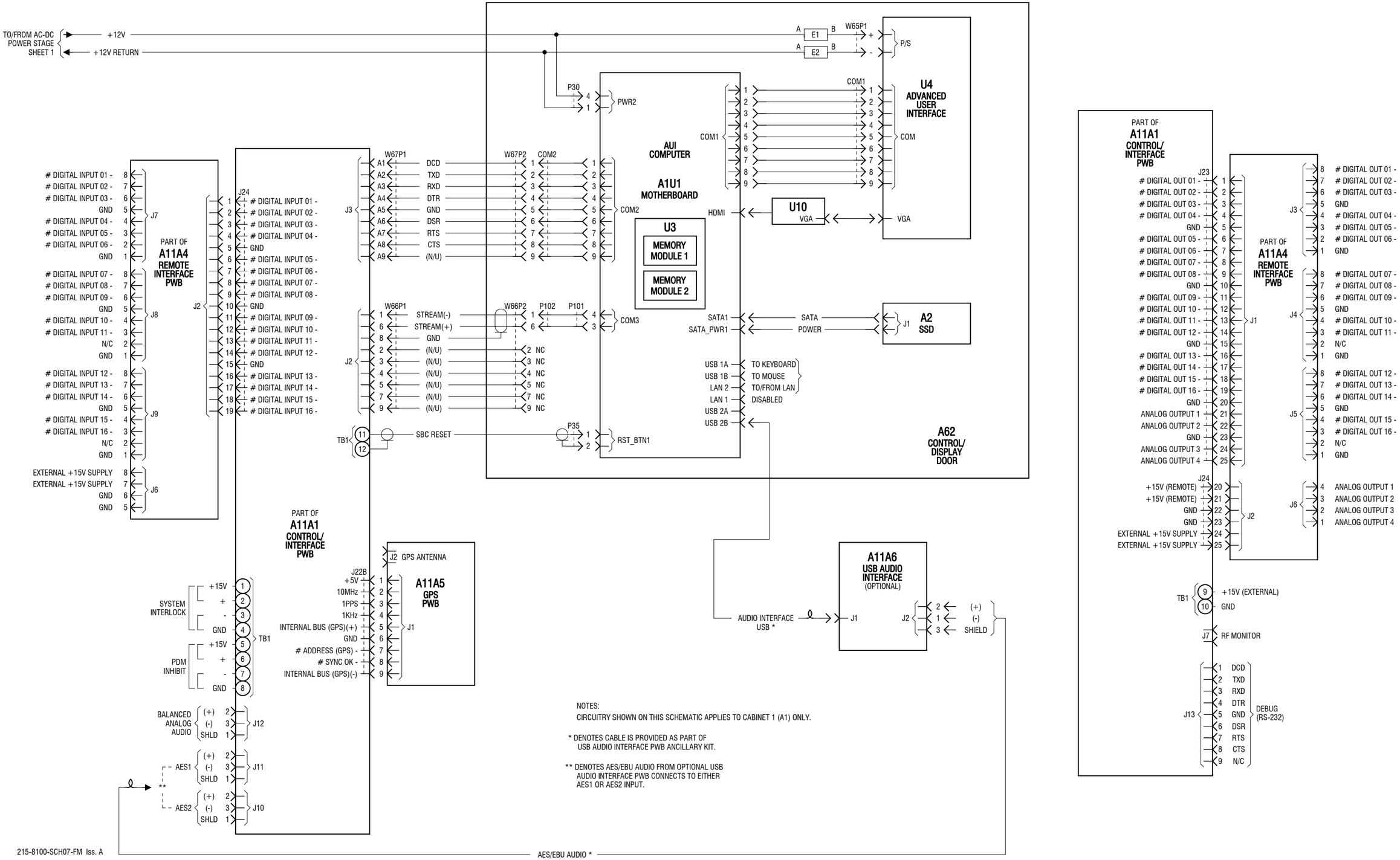

Figure SD-7: NX400 Transmitter – Control/Monitor Stage