



# **Information Sheet IS21007**

## **NX Series: Upgrading Controller Firmware (NX SW 5.0)**

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# **NX Series: Upgrading Controller Firmware (NX SW 5.0)**

## **INFORMATION SHEET**

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### **1 INTRODUCTION**

This document details the procedure for programming an NX series controller (see equipment affected in paragraph 1.1). This procedure must be performed to allow a software upgrade to NX SW 5.1.0 or newer or to install NX UB118 SW 5.1.0 on NX15 to NX100 transmitters.

#### **1.1 Equipment Affected**

This information sheet applies to NX series AM broadcast transmitters (NX3 through NX100) that contain NAPC160\* or NAPC168\* Controller PWBs shipped between May 2019 and July 2021.

#### **1.2 Minimum Software Requirements**

This procedure applies only to NX3 to NX100 transmitters that have NX SW 5.0 installed.

#### **1.3 Responsibility for Implementation**

This procedure should be carried out by qualified personnel who are familiar with the NX series transmitter.

#### **1.4 Scheduling**

Implement this procedure at the earliest convenience for station maintenance personnel. It is necessary to go 'off air' while performing this procedure.

#### **1.5 Manpower Requirements**

Implementing these instructions will require approximately 30 minutes.

#### **1.6 Special Tools/Test Equipment**

- Atmel programming tool (either AVRISP mkII or Atmel ICE (Nautel part # UB103) contact Nautel Customer Service for availability)
- Laptop or PC, with Atmel Studio 6.2 (or higher) Program installed
- NX\_Controller\_V5.1.0.1.hex downloaded from:  
[http://www3.nautel.com/pub/NX\\_Series/NX\\_SW\\_5.1.0/NX\\_Controller/](http://www3.nautel.com/pub/NX_Series/NX_SW_5.1.0/NX_Controller/)

#### **NOTE**

*ATMEL Studio is licensed as freeware for PC or laptop with Windows 32 bit and 64 bit operating system. It is in science category and is available to all software users as a free download.*

#### **1.7 Materials**

No special materials are required to complete the procedure.

#### **1.8 Publications Affected**

This modification does not affect the transmitter's documentation.



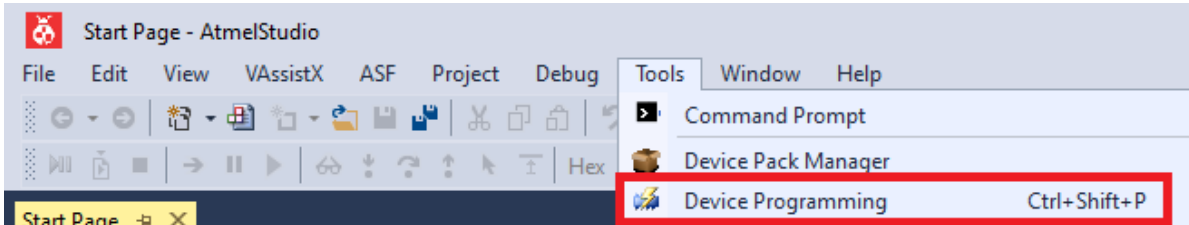
## 2 UPGRADING THE CONTROLLER FIRMWARE

- (a) Set the transmitter to its **RF Off** state. Open the front door of the control cabinet to gain access to the exciter panel, which is behind the front door.
- (b) Connect the Atmel programming tool to 6-pin connector J26 (for NAPC160\* Control/Interface PWBs, see Figure 5) or J23 (for NAPC168\* Control/Interface PWBs, see Figure 6).

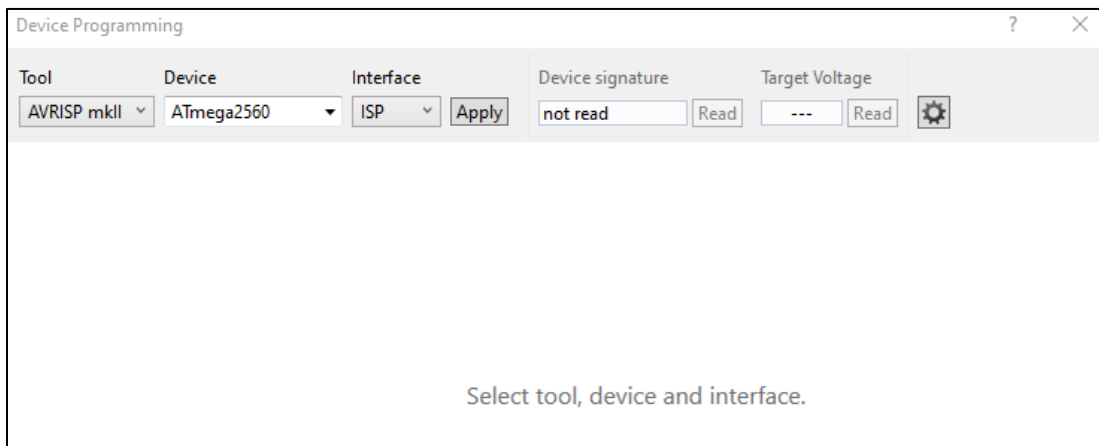
### **NOTE**

Ensure pin 1 on the Atmel programming tool (the red wire on the Atmel programming tool's ribbon cable indicates pin 1) is connected to pin 1 on connector J26.

- (c) Launch the Atmel Studio 6.2 (or higher) utility on the PC or laptop.
- (d) Click **Tools** from the AtmelStudio Start Page bar (see Figure 1) and select **Device Programming**.



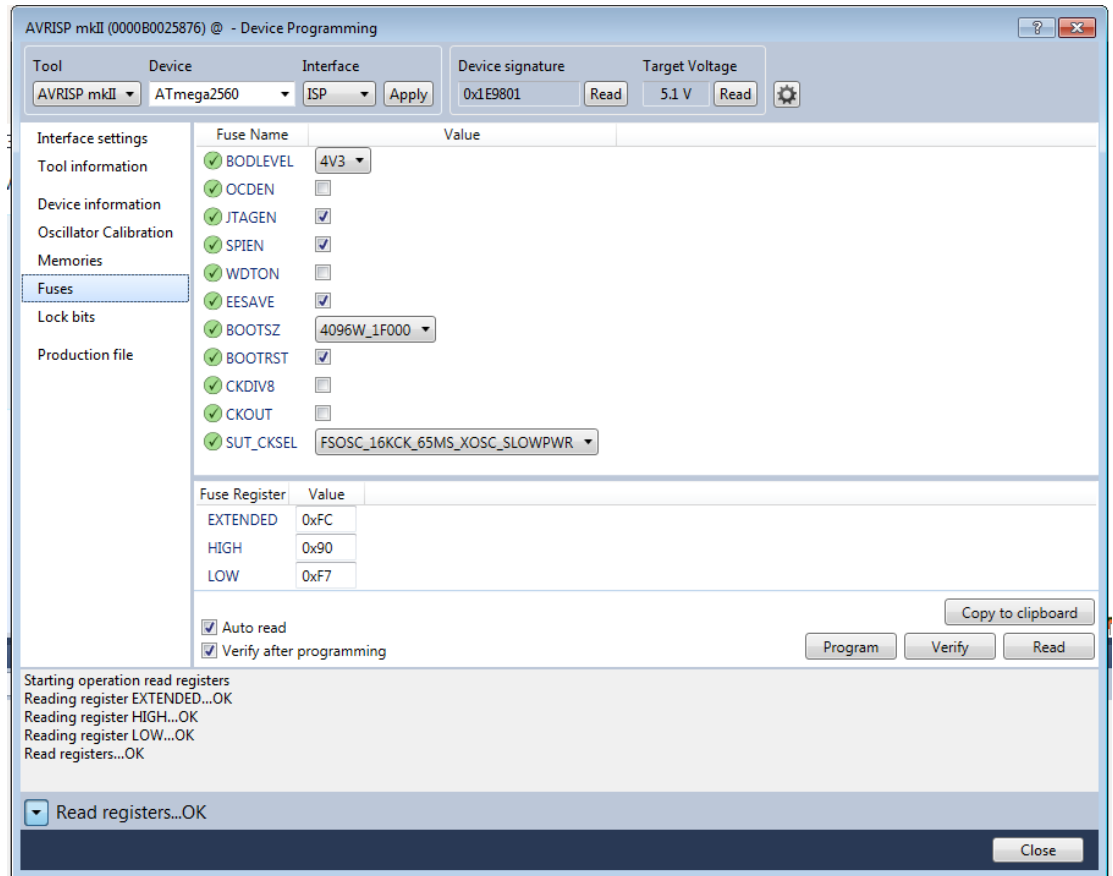
**Figure 1: Device Programming Menu**



**Figure 2: Device Programming – Initial Settings**

- (e) Using Figure 2 as a guide, select the tool, device and interface as follows:
  - Under **Tool**, select the Atmel programming device (AVRISP mkII or AtmelICE) being used.
  - Under **Device**, select ATMEGA2560 from the drop-down menu.
  - Under **Interface**, select ISP and click **Apply**.

- (f) Go to **Interface settings** (see Figure 3, top of the list on the left) and ensure the ISP Clock is set to 250.0 kHz (for NAPC160\* Control/Interface PWBs) or 125.0 kHz (for NAPC168\* Control/Interface PWBs).



**Figure 3: Device Programming Menu – Fuses section selected**

- (g) Press the **Read** button next to Device Signature, which should indicate 0x1E9801. Connection has been made to the ATMEGA2560.
- (h) Go to the **Fuses** section (see Figure 3) and set the fuses for the appropriate Control/Interface PWB as shown in Table 1.

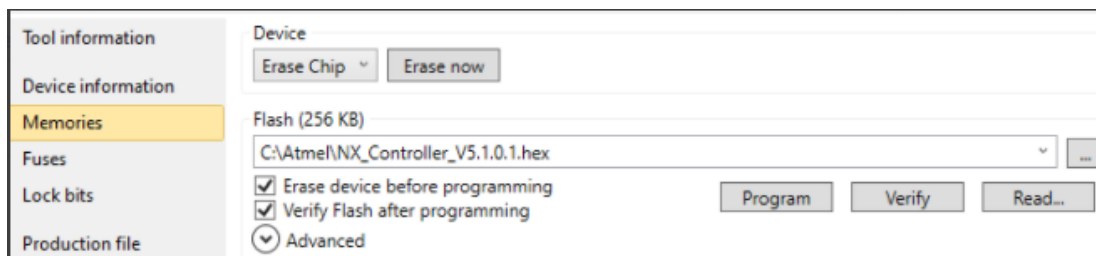
**NOTE**

*Entering the hex values auto-populates the checkboxes.*

**Table 1:** Fuse Settings

Fuse Name	Value or Checked/Unchecked	
	NX15 to NX100 (NAPC160*)	NX3 to NX10 (NAPC168*)
BODLEVEL	4V3 (4.3 V)	4V3 (4.3 V)
OCDEN	Unchecked	Unchecked
JTAGEN	Unchecked	Checked
SPIEN	Checked	Checked
WDTON	Unchecked	Unchecked
EESAVE	Checked	Checked
BOOTSZ	Boot Flash size = 4096; Words start address = \$1F000	Boot Flash size = 4096; Words start address = \$1F000
BOOTRST	Checked	Checked
CKDIV8	Unchecked	Unchecked
CKOUT	Unchecked	Unchecked
SUT_CKSEL	Ext. Crystal Osc. 8.0- MHz; Start-up time: 16K CK +65ms	FSOSC_16KCK_65MS_XOSC_SLOWPWR
Fuse Register	Value or Checked/Unchecked	
	NX15 to NX100 (NAPC160*)	NX3 to NX10 (NAPC168*)
EXTENDED	0xFC	0xFC
HIGH	0xD0	0x90
LOW	0xFF	0xF7

- (i) Ensure the **Auto read** and **Verify after programming** checkboxes are checked.
- (j) Click the **Program** button and confirm that “Read registers...OK” (see bottom section of Figure 3).
- (k) Go to the **Memories** section (see Figure 4).



**Figure 4:** Device Programming Menu – Memories section selected (Flash settings shown)

- (l) In the Flash section of the Memories display:
- Ensure the **Erase** and **Verify after programming** checkboxes are checked.
  - Select the file to be programmed in the flash box using the [ ... ] button.
  - Click the **Program** button and confirm that the “Programming flash OK” and “Verifying flash OK” messages are displayed.
- (m) Close the Atmel Studio 6.2 (or higher) utility on the PC or laptop.
- (n) Disconnect the Atmel programming tool from the Control/Interface PWB.
- (o) Close the front door of the control cabinet and AC cycle to restore the transmitter to desired operation.

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

**Telephone: 1-902-823-5100 or 1-877-628-8353 (Canada & USA)**

**Email: [support@nautel.com](mailto:support@nautel.com)**







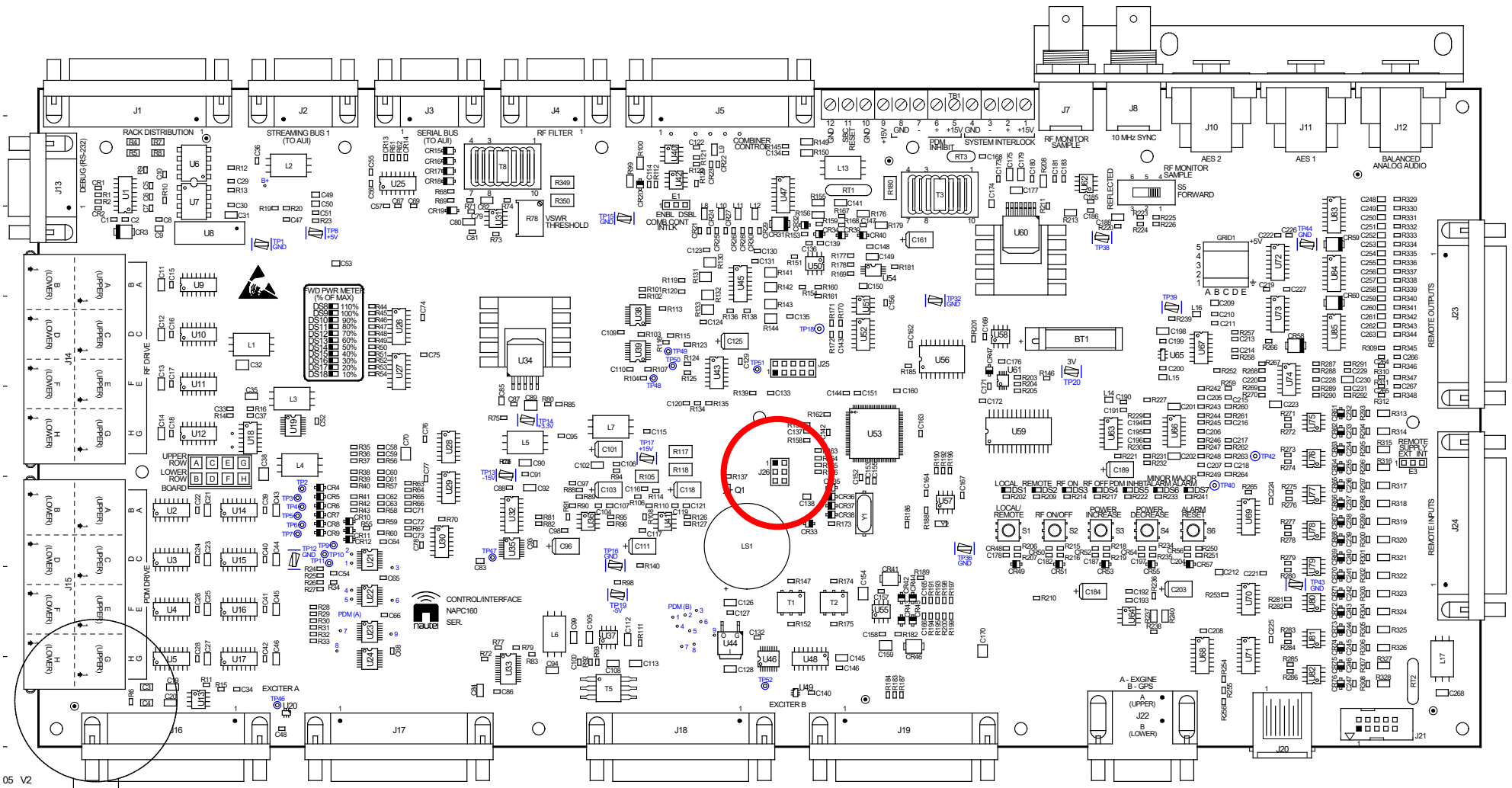


Figure 5 Assembly Detail - NAPC160\* Control/Interface PWB

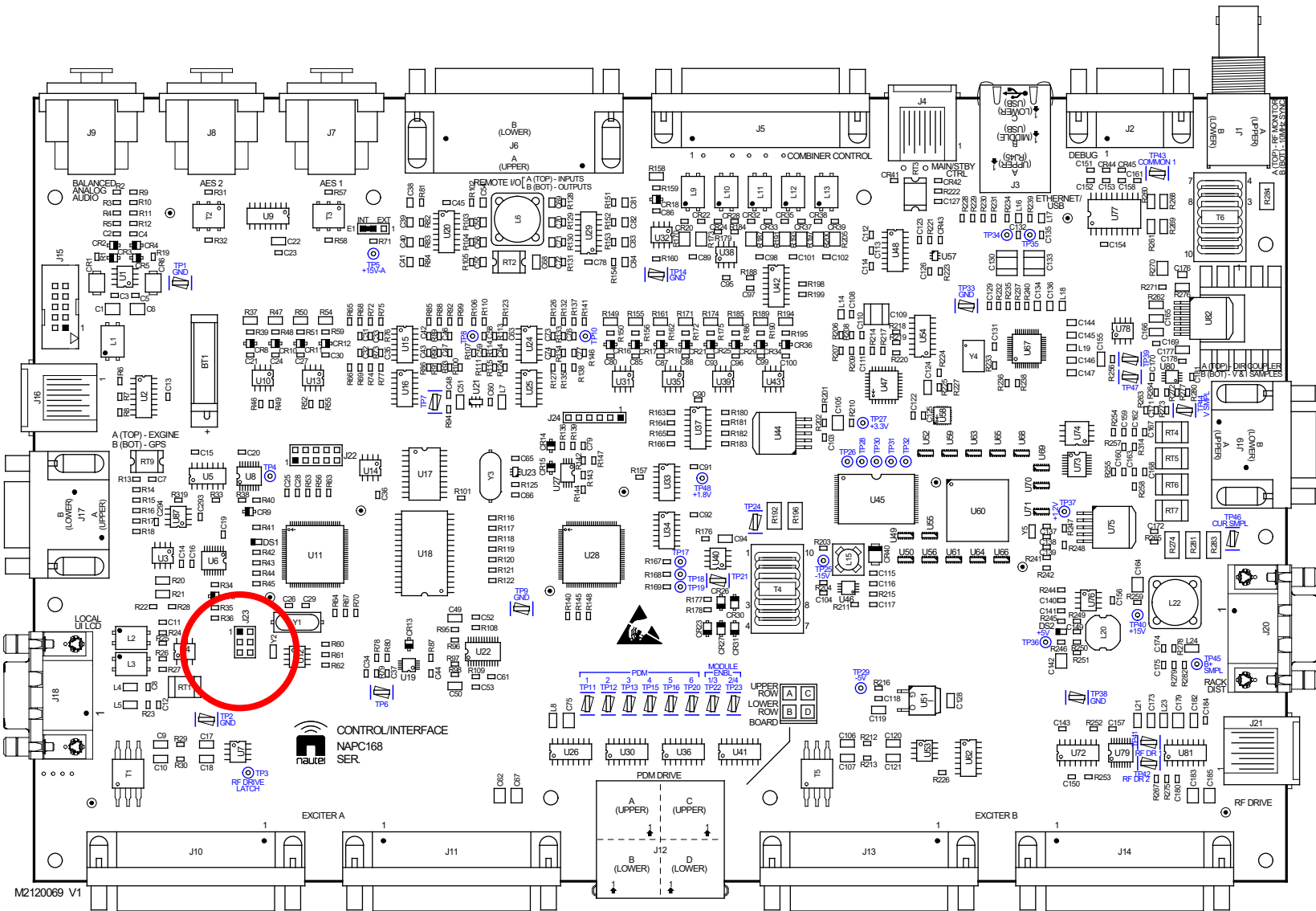


Figure 6: Assembly Detail - NAPC168\* Control/Interface PWB