Field Modification FM24008

GV3.5 to GV40 and GV2-3.5 to GV2-40: Upgrading NAE107A, NAE107A/01 or newer to NAE107*/02 vExgine version

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FIELD MODIFICATION

1 INTRODUCTION

This document provides instructions for customers to upgrade applicable GV or GV2 analog (NAE107A or newer) or IBOC exciter (NAE107A/01 or newer) to the vExgine configuration (NAE107*/02) used in GV2 transmitters.

1.1 Reason for Modification

This modification upgrades the exciter to a vExgine configuration, which helps to prepare the transmitter for the HD Air Chain feature (see Software Impact in paragraph 1.2.2).

NOTE

Performing this Field Modification procedure alone does not fully prepare the transmitter to use the Air Chain feature. You must also perform one of the controller Field Modifications (FM24006 or FM24007*) and obtain software. Nautel recommends you perform this exciter Field Modification at the same time as the associated controller Field Modification. Contact Nautel Customer Service if you do not have the necessary Field Modification kit for the controller.*

After performing these Field Modifications, and until you obtain Air Chain software, you can only operate the modified exciter in FM mode. Operating in FM+HD and HD modes will only be possible when Air Chain software is installed.

Single-frequency networks (SFN) are not supported with the modified exciter, which does not include an Exgine board.

1.2 Equipment Affected

1.2.1 Hardware Impact

This procedure applies to GV3.5 to GV40 and GV2-3.5 to GV2-40 transmitters with analog exciter Nautel Part # NAE107A or newer, or IBOC exciter Nautel Part # NAE107A/01 or newer. Earlier versions of the exciter (NAE107 and NAE107/01) are not eligible for this upgrade.

NOTE

Operating with dual HD Air Chain compatible exciters is not currently supported. Transmitters intending to operate with HD Air Chain should use a single exciter approach, with automatic changeover disabled, until the software upgrade is available that allows dual HD Air Chain exciter operation.

1.2.2 Software Impact

Upgrading the exciter involves hardware changes only; no new software is being introduced during this procedure. However, similar modifications to the transmitter's controller module will result in new transmitter 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 the associated controller Field Modification (FM24006* or FM24007*) for more information.

The minimum software required to use the HD Air Chain feature is GV2 SW 1.2.0, with vExgine SW 1.0.0 or higher and vPorter SW 1.0.0 or higher. The exciter will only produce analog until GV2 SW 1.2.0 is installed and an appropriate license for HD operation is present.

1.3 Responsibility for Implementation of Procedure

This modification is written for qualified transmitter maintenance personnel who are familiar with GV or GV2 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

Upgrading the exciter requires approximately 60 minutes to complete.

1.6 Special Tools/Test Equipment

- #1 and #2 Phillips screwdriver
- Anti-static mat & wrist strap (recommended)

1.7 Material Required

The parts required for this modification are contained in the provided Field Modification kit. See Table 1 for the Field Mod Kit 219-5346, required to upgrade an analog or IBOC exciter.

Table 1: Field Mod Kit - Upgrading NAE107A, NAE107A/01 or newer to NAE107*/02 vExgine version (Nautel Part # 219-5346)

Item	Qty	Component	Part #/Description
2	1	219-5292	QR Code Sheet
3	1	219-3105	Cableset Assy, Exciter GV HD Air Chain
4	1	NAPI205	Exciter USB Interface PWB Assy
5	1	HAY390A	Label, Software-based Air Chain, 1.5 x .55
6	1	219-5019	Label, USB/LAN (U1J2)
7	1	JA143	Conn, Adapter, USB 3.0, Type A to Type A, F/F, Panel Mount
8	4	HMSP08F	Screw, Pan, Phil, M3 X 0.5 X 6LG, SS,C/W Split & Flat
9	1	HT77	Tyrap .098 W x 3.9 lg, Black, Heat Stabilized,115C

NOTE

One kit is required for each exciter being modified in the transmitter system, noting that dual HD Air Chain exciter operation is not supported in GV2 SW 1.2.0 (see paragraph 1.2.1).

1.8 Publications Affected

The Exciter (A5 and A6, if applicable) changes from Nautel Part # NAE107* or NAE107*/01 (see paragraph 1.2 for minimum applicable hardware version) to NAE107*/02. This change affects the following areas of the GV Troubleshooting Manual:

- Parts Information section 4.2
  - Family Tree Figure 4.2.1, noting the specific updates:
    - A5, Exciter A, changes to NAE107*/02
    - A6, Exciter B (if applicable), changes to NAE107*/02
    - A5A8 and A6A8 (if applicable), Exgine PWB, changes to NAPI205 Exciter USB Interface PWB
- Wiring/Connector Lists section 4.3
  - see included Table 2: Wiring List – NAE107*/02 Exciter
  - see included Table 3: Connector Mating Information – NAE107*/02 Exciter
- Electrical Schematics section 4.4
  - see included schematic for NAE107*/02 Exciter
  - see included schematic for NAPI205 Exciter USB Interface PWB
- Mechanical Drawings section 4.5
  - see included mechanical drawing for NAE107*/02 Exciter
  - see included mechanical drawing for NAPI205 Exciter USB Interface PWB

1.9 Identification of Modified Assemblies/Parts

Identifying modified assemblies informs future maintainers of the current configuration. Mark the rear panel of the exciter with "**FM24008**" next to the serial number label using indelible ink to indicate it has been modified.

2 UPGRADE PROCEDURE

Perform paragraphs 2.1 through 2.7 to upgrade the exciter.

2.1 Removing the Exciter

(a) For single exciter transmitters, press RF Off. Turn off and lock out the transmitter's main ac power. Disconnect the UPS power source, if installed.

For dual exciter transmitters, you can remain on air provided that the exciter changeover settings are properly managed. For example, set the exciter not being removed from the transmitter as the 'main' exciter, and disable automatic exciter changeover to prevent inadvertent changeover while the 'standby' exciter is removed for upgrade. This will ensure uninterrupted transmitter operation with the standby exciter removed. If you are upgrading both exciters (see NOTE in paragraph 1.2.1), you will need to reassign the 'main' exciter to the first exciter upgraded before removing the other exciter.

(b) Gain access to the front of the exciter (see Figure 1, right) by opening the front door. Gain access to the rear of the exciter (see Figure 1, left) by removing the upper, rear panel. For GV30N/GV30/GV40 and GV2-30N/GV2-30/GV2-40 models, remove the right-hand, upper, rear panel (as viewed from the rear).

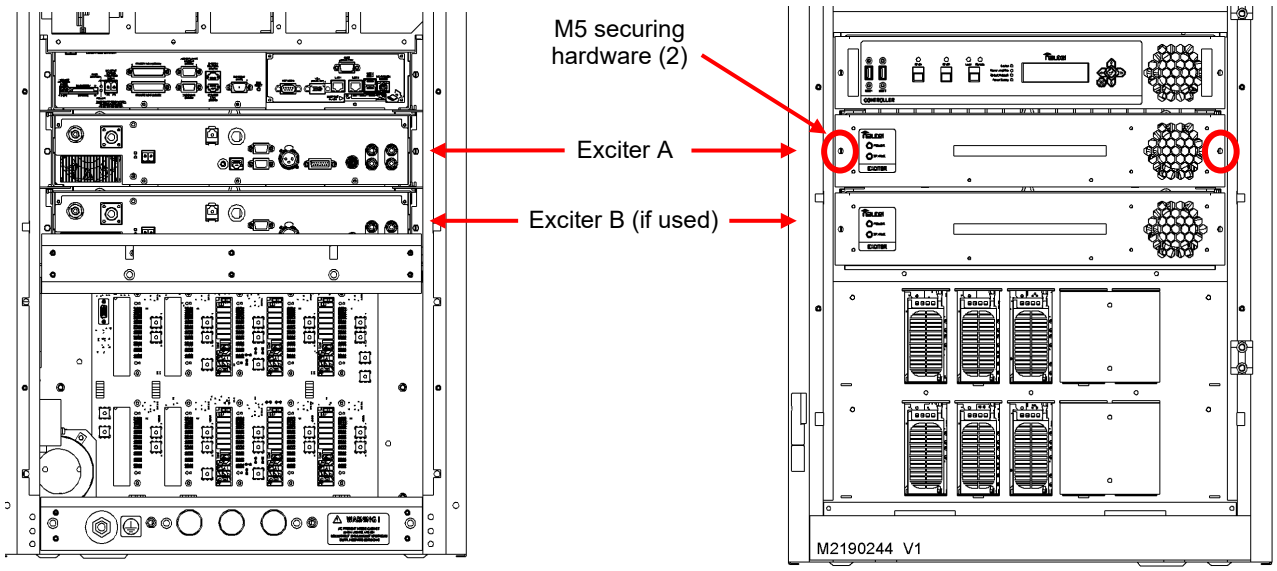


Figure 1: Exciter Locations (GV10/GV7.5 shown for reference)

(c) From the rear of the transmitter, disconnect the mating connectors from the exciter being upgraded (A5 or A6, as applicable). **NOTE**: Dual exciter transmitters can remain on-air provided the exciter changeover settings in step (a) are observed. In this case, disconnect cables only from the exciter being upgraded.

(d) From the front of the transmitter, use a # 2 Phillips screwdriver to remove the two M5 screws that secure the exciter to the transmitter (see Figure 1), and pull out the exciter. Retain the M5 screws.

(e) Place the exciter on a workbench suitable to allow modifications.

NOTE

The exciter contains static sensitive components. Nautel recommends using a properly grounded anti-static mat and wrist strap when handling static sensitive devices.

2.2 Installing the Exciter USB Interface PWB

(a) Remove and retain the 12 M3 Phillips screws that secure the exciter's top cover.

(b) For NAE107*/01 digital exciters only, you must first remove the Exgine PWB, as follows [for NAE107* analog exciters, proceed to step (c)]:

- Locate the Exgine PWB (A8) using Figure 2 as a guide.
- Disconnect all mating connectors from the Exgine PWB end only. Leave the other ends of the cables intact, as they may be reused.
- Remove and retain the four (4) sets of M3 hardware that secure the Exgine PWB to the chassis, noting that extra securing hardware is provided in the Field Modification kit.
- Remove the Exgine PWB from the exciter. Place it in an anti-static bag, if available, and save as a spare.

NOTE

Analog exciters (NAE107) do not contain the Exgine PWB.*

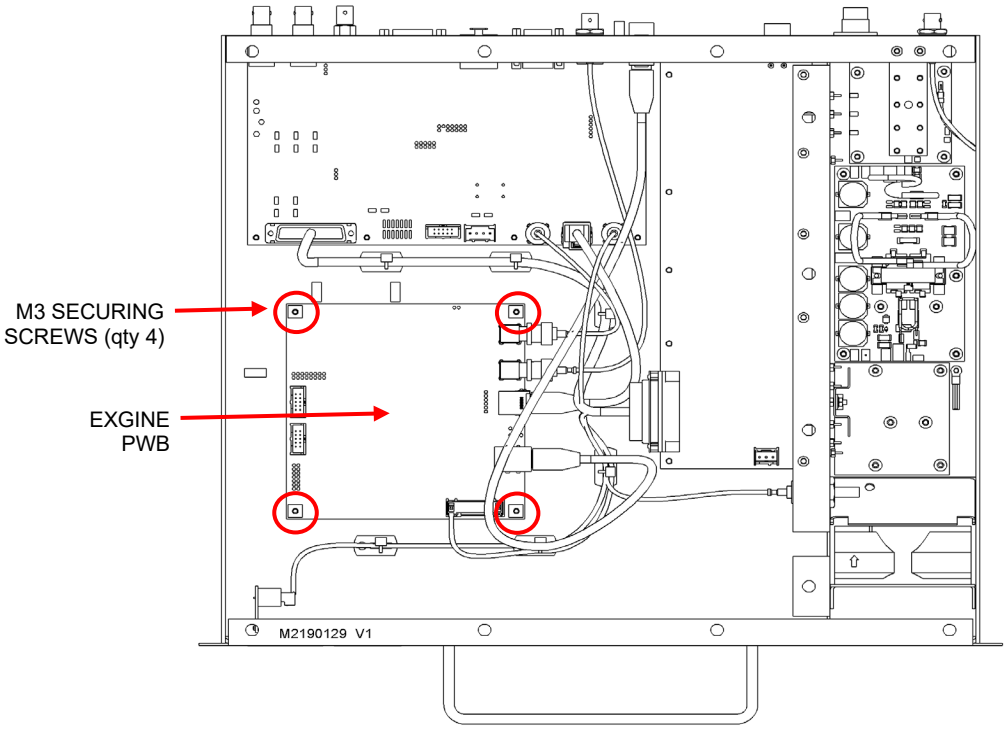


Figure 2: Exciter Top View, showing Exgine PWB (NAE107*/01 variations only)

(c) Obtain the exciter USB interface PWB (Nautel Part # NAPI205) and four (4) M3 screws (Nautel Part # HMSP08F) from the Field Modification kit. Note: the M3 screws provided are extra, if any of the retained screws from step (b) are misplaced.

NOTE

If you are using an external 10 MHz signal, jumper E1 on the exciter USB interface PWB must be set to the **EXT** *position. If Air Chain software is installed on the transmitter later, you will need to change this jumper to the* **INT** *position. See the NAPI205 mechanical drawing at the end of this document for jumper E1 location.*

(d) Install the exciter USB interface PWB on four (4) standoff pillars in the vacant position in the exciter. See Figure 3 to ensure proper orientation. Secure the exciter USB interface PWB using four (4) M3 screws from the Field Modification kit or retained from step (b), if applicable.

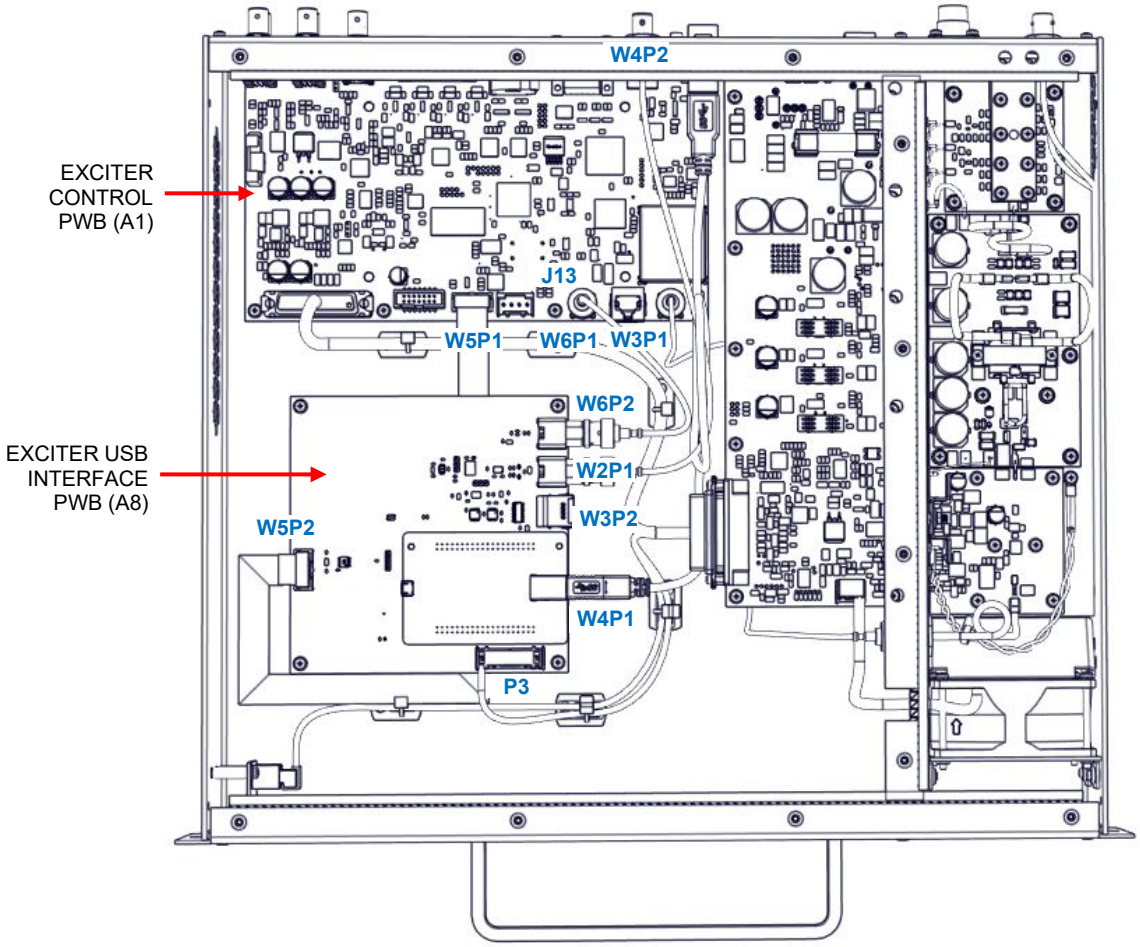


Figure 3: Exciter Top View, showing Exciter USB Interface PWB and cables installed

2.3 Replacing RJ45 Connector (U1J2) with USB Connector

(a) For NAE107*/01 (digital) exciters, remove the Cat5e cable (W4) connected between J1 of the Exgine PWB (A8) and J1 (inside) of the rear panel **LAN** connector U1. See Figure 4 to locate the **LAN** connector. Note: NAE107* (analog) exciters do not contain this cable.

(b) On the inside of the exciter's rear panel, press the tab on the top of the **LAN** connector to release the RJ45 connector adapter, allowing it to be released and removed through the rear panel.

(c) Obtain the USB connector adapter (Nautel Part # JA143) from the Field Modification kit. On the inside of the exciter's rear panel, install the USB connector adapter in the **LAN** connector's position (see Figure 4), pressing its tab to facilitate installation.

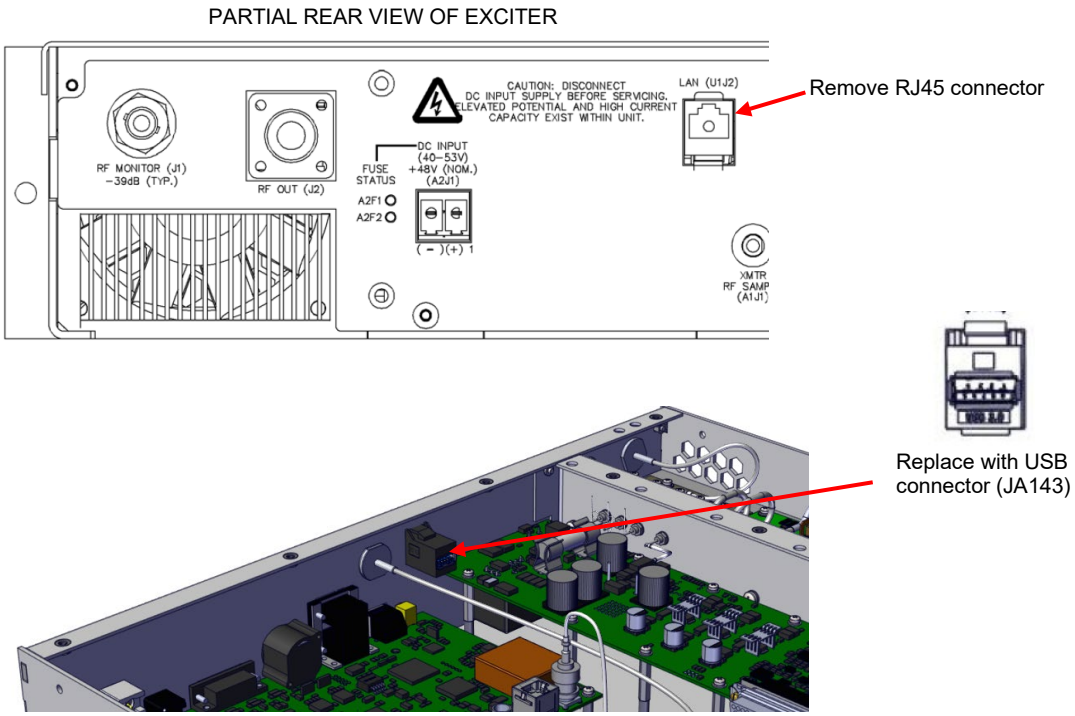


Figure 4: Replacing the RJ45 connector with a USB connector

2.4 Installing the Exciter Cable Set Assembly

(a) Obtain the Exciter Cable Set Assembly (Nautel Part # 219-3105) from the Field Modification kit, which contains cables W3 through W6.

NOTE

The Exciter Cable Set Assembly contains four cables (W3 through W6). These cables permit 'HD Air Chain' compatibility. For NAE107/01 exciters, three of these cables (W3, W5 and W6) are already present in the exciter and may be re-used. Nautel recommends saving the additional cables as spares.*

(b) For NAE107* (analog) exciters, install cables from the Field Modification kit as follows (see Figure 3 to locate connection points):

- Connect Cat5e cable W3 between J14 of exciter control PWB A1 (W3P1) and J2 of exciter USB interface PWB A8 (W3P2).
- Connect USB cable W4 between U13J1 of exciter USB interface PWB A8 (W4P1) and the inside portion of USB connector U1J1 (W4P2) installed in paragraph 2.3. Make a loop with excess W4 cable and use a tyrap (Nautel Part # HT77, provided in the Field Modification Kit) to secure the loop.
- Connect ribbon cable W5 between J11 of exciter control PWB A1 (W5P1) and J8 of exciter USB interface PWB A8 (W5P2).
- Connect BNC-to-BNC cable W6 between J13 of exciter control PWB A1 (W6P1) and J4 of exciter USB interface PWB A8 (W6P2).

(c) For NAE107*/01 (digital) exciters, install cables from the Field Modification kit or reconnect existing cables as follows (see Figure 3 to locate connection points):

- Connect the W3P2 end of existing Cat5e cable W3 to J2 of exciter USB interface PWB A8.
- Connect USB cable W4 from the Field Modification kit between U13J1 of exciter USB interface PWB A8 (W4P1) and the inside portion of USB connector U1J1 (W4P2) installed in paragraph 2.3. Make a loop with excess W4 cable and use a tyrap (Nautel Part # HT77, provided in the Field Modification Kit) to secure the loop
- Connect the W5P2 end of existing ribbon cable W5 to J8 of exciter USB interface PWB A8.
- Connect the W6P2 end of BNC-to-BNC cable W6 to J4 of exciter USB interface PWB A8.

NOTE

Table 3 near the end of this document provides updated connector mating information for the modified exciter. Use this table for future exciter maintenance and to confirm proper connector mating in paragraphs 2.4 and 2.5.

2.5 Installing Miscellaneous Cables

(a) Locate connectors P3 and W2P1, noting:

- For NAE107* (analog) exciters, P3 has been tied back to the chassis and W2P1 is connected to J13 of the exciter control PWB (A1) (see Figure 3). Cut P3's tyraps as required and disconnect W2P1 from A1J13.
- For NAE107*/01 (digital) exciters, P3 and W2P1 were disconnected from the Exgine PWB in step 2.2 (b).

(b) Connect P3 to J5 of the exciter USB interface PWB. See Figure 3 for connector location.

(c) Connect W2P1 to J3 of the exciter USB interface PWB. See Figure 3 for connector location.

(d) Modifications inside the exciter are complete. Use retained M3 Phillips screws to re-install the exciter's top cover.

2.6 Installing the Software-Based Air Chain Label

(a) Obtain the 'Software-based Air Chain' label (Nautel Part # HAY390A) from the Field Modification kit. Peel off the label's backing and apply the label to the front of the exciter as shown in Figure 5. Note that NAE107*/01 (digital) exciters already have an 'HD Radio' label in this location. Place this label over it.

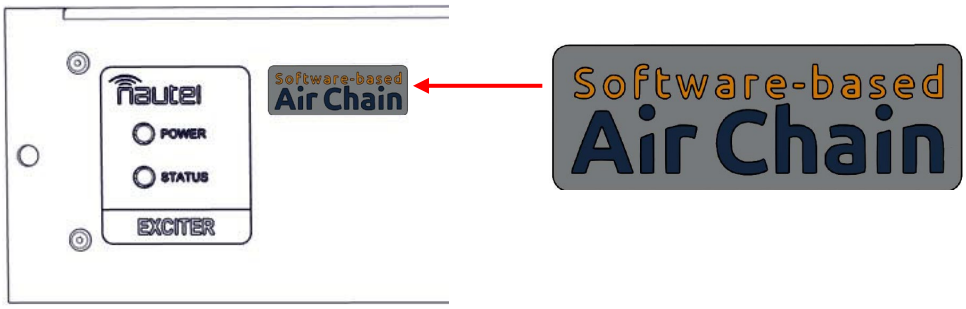


Figure 5: Software-based Air Chain Label Location on Exciter Front Panel

2.7 Installing the LAN/USB Label

(a) Obtain the 'LAN/USB (U1J2)' label (Nautel Part # 219-5019) from the Field Modification kit. Peel off the label's backing and apply the label to the rear of the exciter as shown in Figure 6.

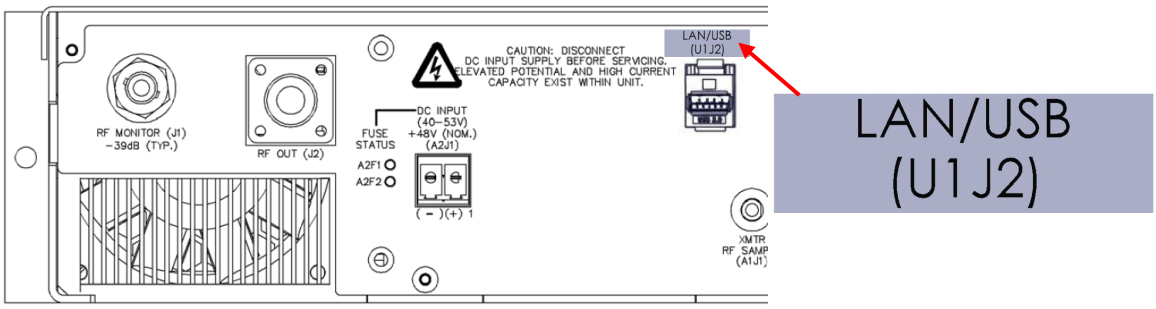


Figure 6: LAN/USB Label Location on Exciter Rear Panel

(b) Modifications are complete.

3 RESTORING THE EXCITER TO OPERATION

(a) Re-install the modified exciter in the host transmitter, using retained M5 screws.

(b) Re-install mating connectors to the rear of the exciter, except for any Exgine-related Ethernet cables, which will no longer apply.

(c) Close the transmitter's front door and re-install the upper, rear panel(s), as required.

(d) Restore the transmitter to service.

Refer to the tables and figures at the end of this document for Publications Affected items referenced in paragraph 1.8.

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

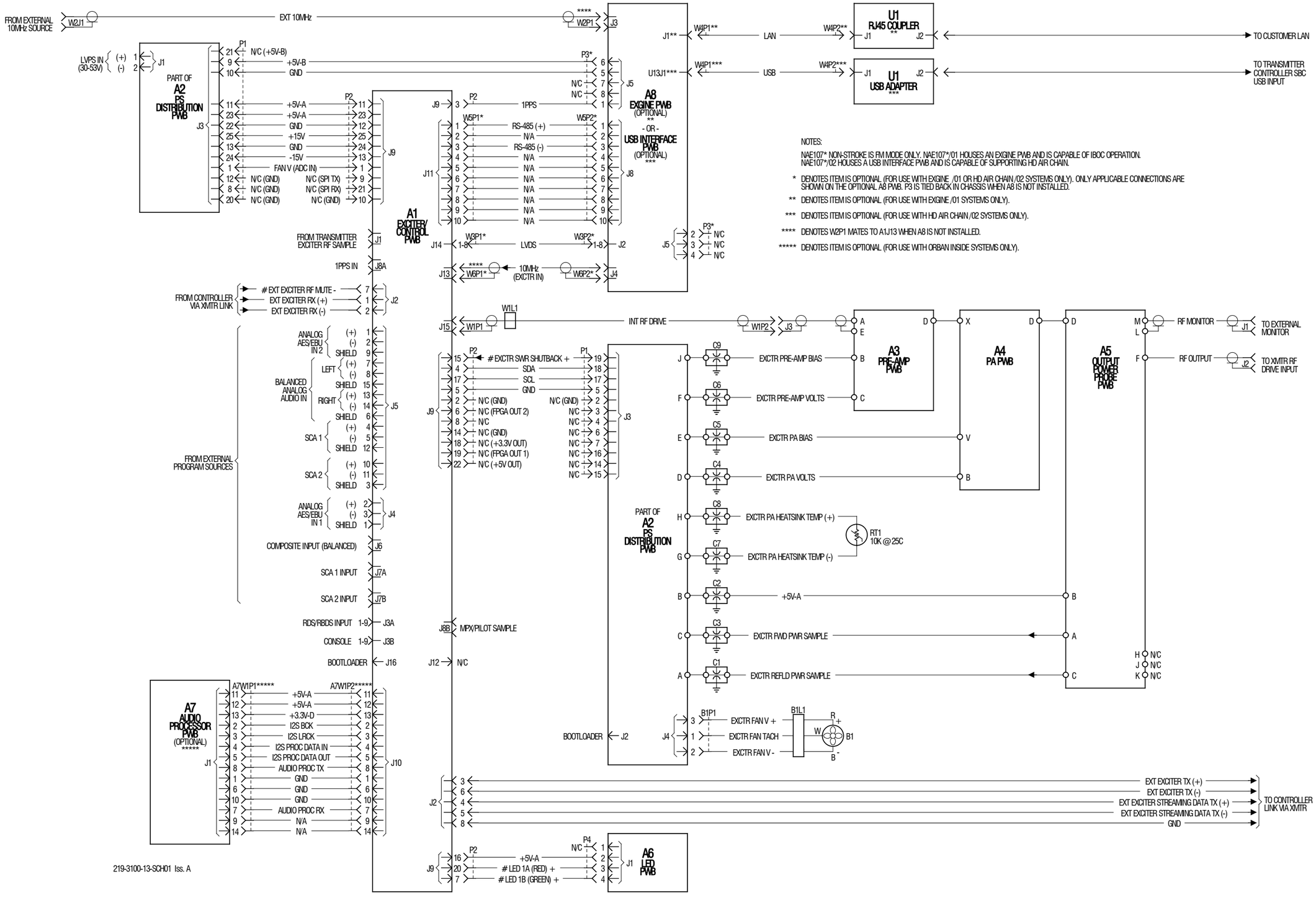
Telephone:1-877-662-8835
Email: support@nautel.com

Table 2: Wiring List – NAE107*/02 Exciter

SOURCE	DESTINATION	WIRE #	COLOUR	SIZE	REMARKS
P1-1	P2-1	1	White	22	
P1-5	P2-5	2	Black	22	
P1-11	P2-11	3	White	22	
P1-13	P2-24	4	Black	22	
P1-18	P2-4	5	White	22	
P1-17	P2-17	6	White	22	
P1-19	P2-15	7	White	22	
P1-22	P2-12	8	Black	22	
P1-23	P2-23	9	White	22	
P1-24	P2-13	10	White	22	
P1-25	P2-25	11	White	22	
P2-7	P4-4	12	White	22	
P2-16	P4-2	13	White	22	
P2-20	P4-3	14	White	22	
P1-9	P3-6	15	White	22	
P1-10	P3-5	16	Black	22	
P2-3	P3-1	17	White	22	
J1-Conductor	A5-M	18	Core		50 Ohm Coaxial
J1-Shield	A5-L	18	Shield		50 Ohm Coaxial
J3-Conductor	A3-A	19	Core		50 Ohm Coaxial
J3-Shield	A3-G	19	Shield		50 Ohm Coaxial
C1E1	A2-A	LINK		20	
A5-C	C1E2	LINK		20	
C2E1	A2-B	LINK		20	
A5-B	C2E2	LINK		20	
C3E1	A2-C	LINK		20	
A5-A	C3E2	LINK		20	
C4E1	A2-D	LINK	White	16	
A4-B	C4E2	LINK	White	16	
C5E1	A2-E	LINK		24	
A4-V	C5E2	LINK		24	
C6E1	A2-F	LINK		24	
A3-C	C6E2	LINK		24	
C7E1	A2-G	LINK		24	
C8E1	A2-H	LINK		24	
C9E1	A2-J	LINK		24	
A3-B	C9E2	LINK		24	
A3-D	A4-X	LINK		20	
A4-D	A5-D			20	
A5-F	J2-Conductor	LINK		20	
C8E2	RT1-B		Black	22	Thermistor Lead
C7E2	RT1-A		Black	22	Thermistor Lead

Table 3: Connector Mating Information – NAE107*/02 Exciter

CONNECTOR	MATE	REMARKS
B1P1	A2J4	
P1	A2J3	
P2	A1J9	
P3	A8J5	
P4	A6J1	
W1P1	A1J15	
W1P2	J3	
W2P1	A1J13	
W2P1	A8J3	
W3P1	A1J14	
W3P2	A8J2	
W4P1	A8U13J1	
W4P2	U1J1	
W5P1	A1J11	
W5P2	A8J8	
W6P1	A1J13	
W6P2	A8J4	



NOTES:

NAE107* NON-STROKE IS FM MODE ONLY. NAE107*/01 HOUSES AN EXGINE PWB AND IS CAPABLE OF IBOC OPERATION.
NAE107*/02 HOUSES A USB INTERFACE PWB AND IS CAPABLE OF SUPPORTING HD AIR CHAIN.

* DENOTES ITEM IS OPTIONAL (FOR USE WITH EXGINE /01 OR HD AIR CHAIN /02 SYSTEMS ONLY). ONLY APPLICABLE CONNECTIONS ARE SHOWN ON THE OPTIONAL A8 PWB. P3 IS TIED BACK IN CHASSIS WHEN A8 IS NOT INSTALLED.

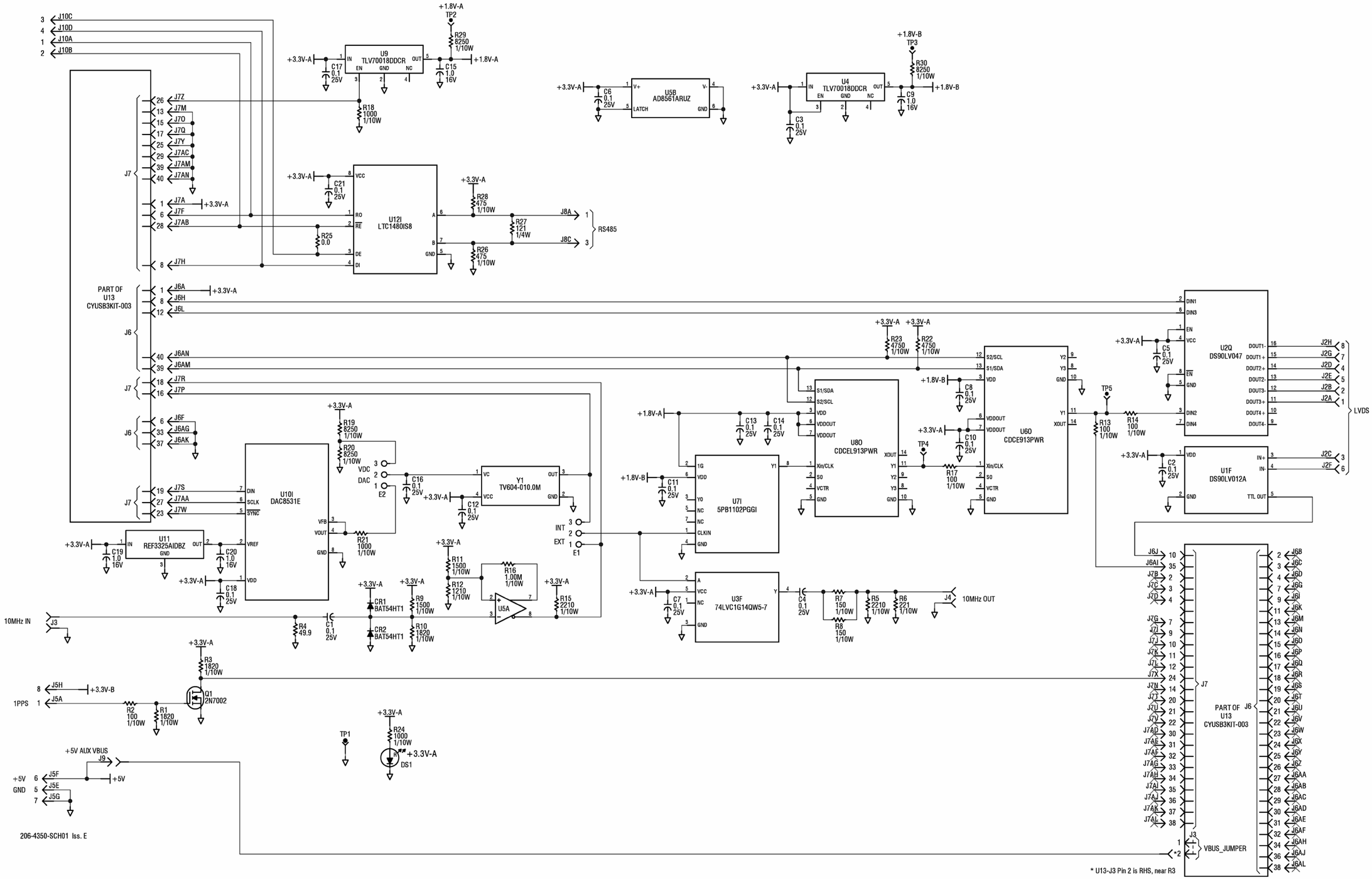
** DENOTES ITEM IS OPTIONAL (FOR USE WITH EXGINE /01 SYSTEMS ONLY).

*** DENOTES ITEM IS OPTIONAL (FOR USE WITH HD AIR CHAIN /02 SYSTEMS ONLY).

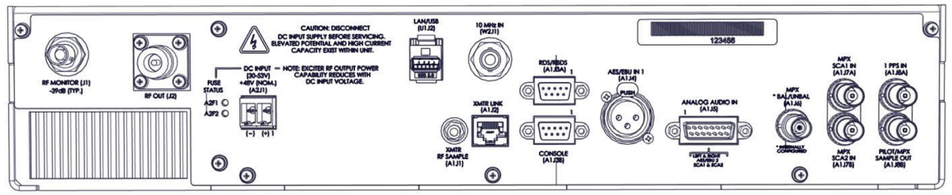
**** DENOTES W2P1 MATES TO A1J13 WHEN A8 IS NOT INSTALLED.

***** DENOTES ITEM IS OPTIONAL (FOR USE WITH ORBAN INSIDE SYSTEMS ONLY).

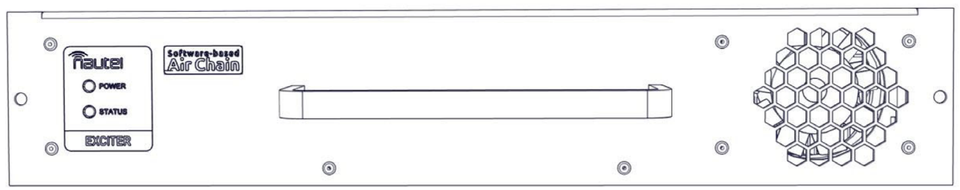
Electrical Schematic - NAE107/02 Exciter*



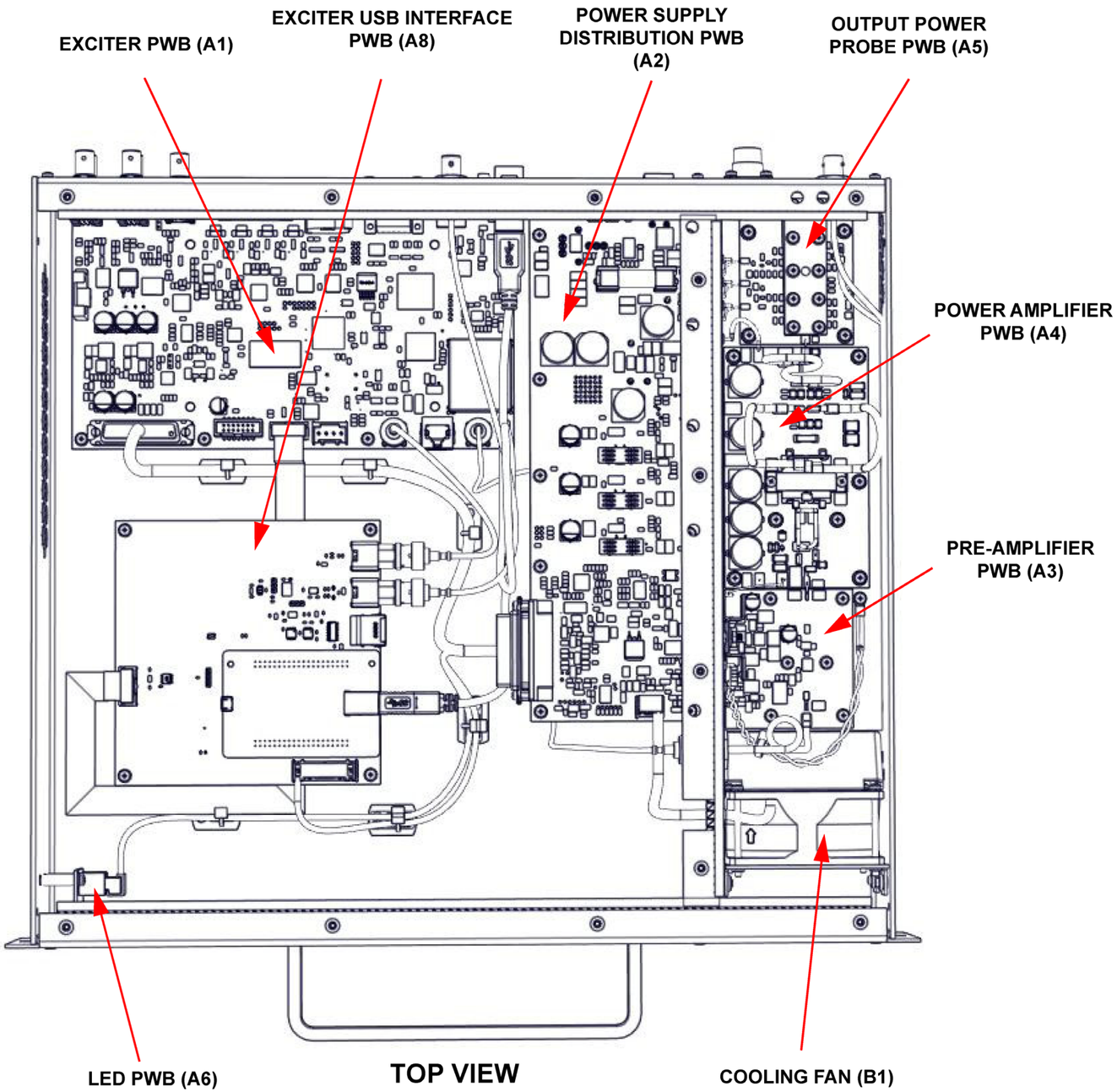
Electrical Schematic – NAPI205 Exciter USB Interface PWB



REAR VIEW

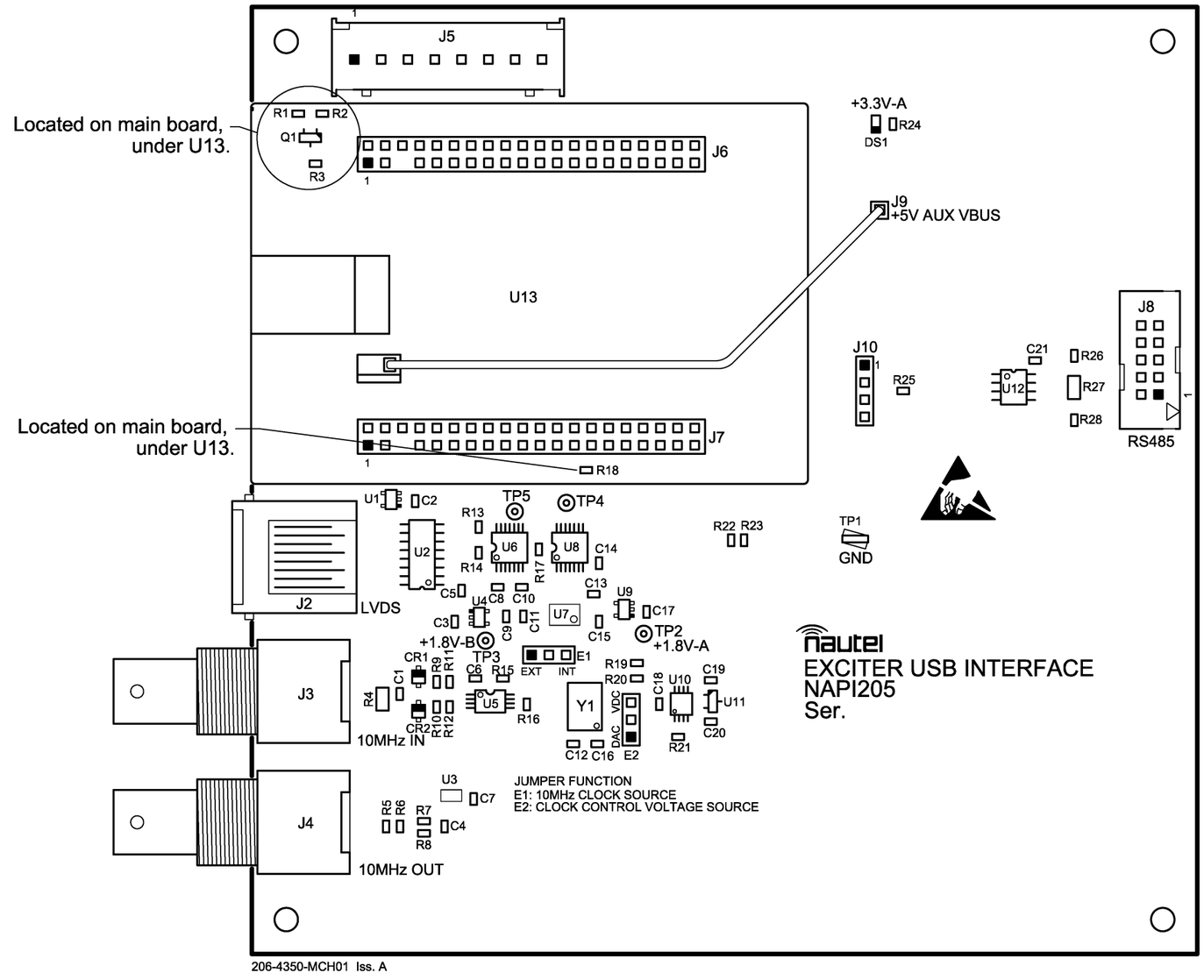


FRONT VIEW



TOP VIEW

Mechanical Drawing: NAE107/02 Exciter (HD Air Chain Compatible)*



Mechanical Drawing: NAPI205 Exciter USB Interface PWB