2: INSTALLATION MANUAL

NX10

AM TRANSMITTER

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Contact Information

Nautel Limited
10089 Peggy's Cove Road
Hackett's Cove, NS Canada B3Z 3J4

Toll Free: +1.877.6NAUTEL (662.8835)
(Canada & USA only) or
Phone: +1.902.823.3900 or
Fax: +1.902.823.3183

Nautel Inc.
201 Target Industrial Circle
Bangor, Maine USA 04401

Phone: +1.207.947.8200
Fax: +1.207.947.3693

Customer Service (24-hour support)
+1.877.628.8353 (Canada & USA only)
+1.902.823.5100 (International)

Email: support@nautel.com
Web: www.nautel.com

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Release Control Record

ISSUE	DATE	REASON
3.0	2019-06-01	Supports NX10 hardware NARA65B implementing NAP39C RF Power modules and a shielded arc detector assembly. Supports NX SW version 5.0 and higher.
3.1	2021-04-22	Implemented Castor Kit update.

SECTION 2.1: PREPARING FOR INSTALLATION

Before installing your NX10 transmitter, perform the following steps:

1. Ensure that you have performed the pre-installation tasks described in the *NX10 Pre-Installation Manual*.
2. Make sure that you received all the components. (Check your packing list.)
3. Inspect all crates and packages for damage. Inspect the tip and drop indicators attached to the crates to determine if a crate has been tipped over or has been subjected to excessive shock (see Figure 2.1.1).

Figure 2.1.1: Tip and drop indicators

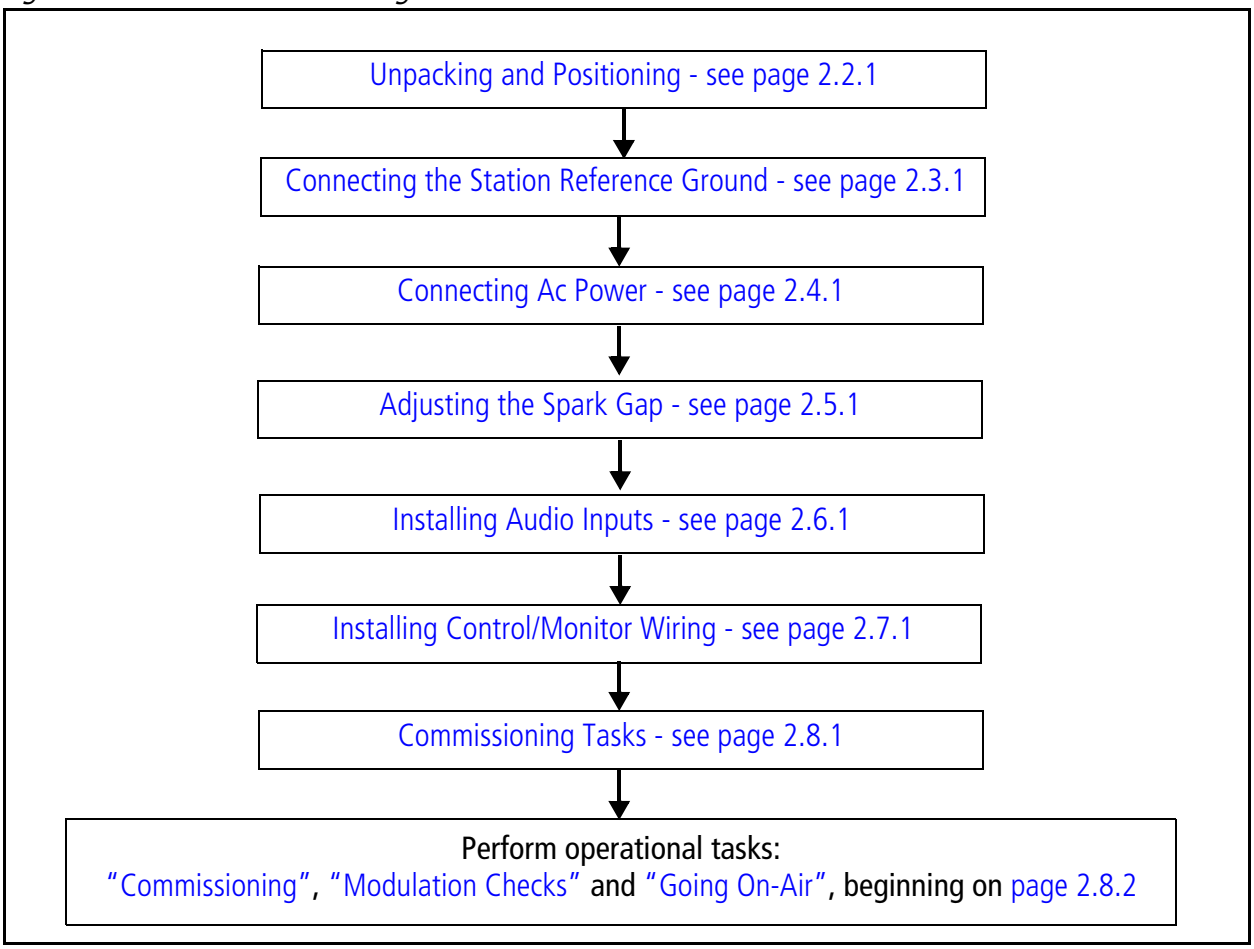
4. Report any damage immediately to your Nautel sales representative and the carrier.
5. Move the crates as close as possible to the transmitter's planned location.
6. Unpack the crates in accordance with the instructions provided on the outside of the crates.
   - For each crate, remove the panel labelled **open this side**. The panel is attached using Phillips head screws.
   - Remove any visible packing material, including braces, from the crate's interior.
   - Remove the remaining outer plywood shell by unscrewing the outer wood panels from the pallet under the transmitter.

7. Review any assembly notes or instructions contained inside the transmitter crates. (For sites requiring custom configurations, the instructions provided with the transmitter replace the instructions provided here.)
8. Assemble your parts and tools. For a list of required tools, see "Parts and tools" on page 2.9.1.
9. When you are ready to install the NX10 transmitter, follow the steps shown in Figure 2.1.2 on page 2.1.2.

TIP	When you have completed a task or step, put a check mark beside the step number.

CAUTION! FAILURE TO COMPLY WITH RECOMMENDATIONS MAY VOID YOUR MANUFACTURER'S WARRANTY. FOR MORE INFORMATION, REVIEW YOUR WARRANTY DOCUMENT.

Figure 2.1.2: Flowchart - Installing the transmitter



SECTION 2.2: UNPACKING AND POSITIONING

To install an NX10 transmitter, perform the following tasks:

NOTE: The NX10 is housed in a single cabinet, which includes the power transformer. The cabinet is designed for installation with or without a forklift. Both methods of installation are described in this section. Crated and uncrated cabinet weights are shown in Table 2.2.1.

Table 2.2.1: NX10 Weight

CRATED WEIGHT	UNCRATED WEIGHT
371 kg (817 lbs)	315 kg (695 lbs)

NOTE: Weights assume standard method of shipping, which includes power transformer in cabinet.

WARNING! DO NOT ATTEMPT TO MOVE THE TRANSMITTER CABINET UNLESS SUFFICIENT MANPOWER OR MECHANICAL ASSISTANCE IS AVAILABLE TO MOVE IT INTO POSITION WITHOUT DAMAGING THE CABINET OR CAUSING INJURY TO PERSONNEL.

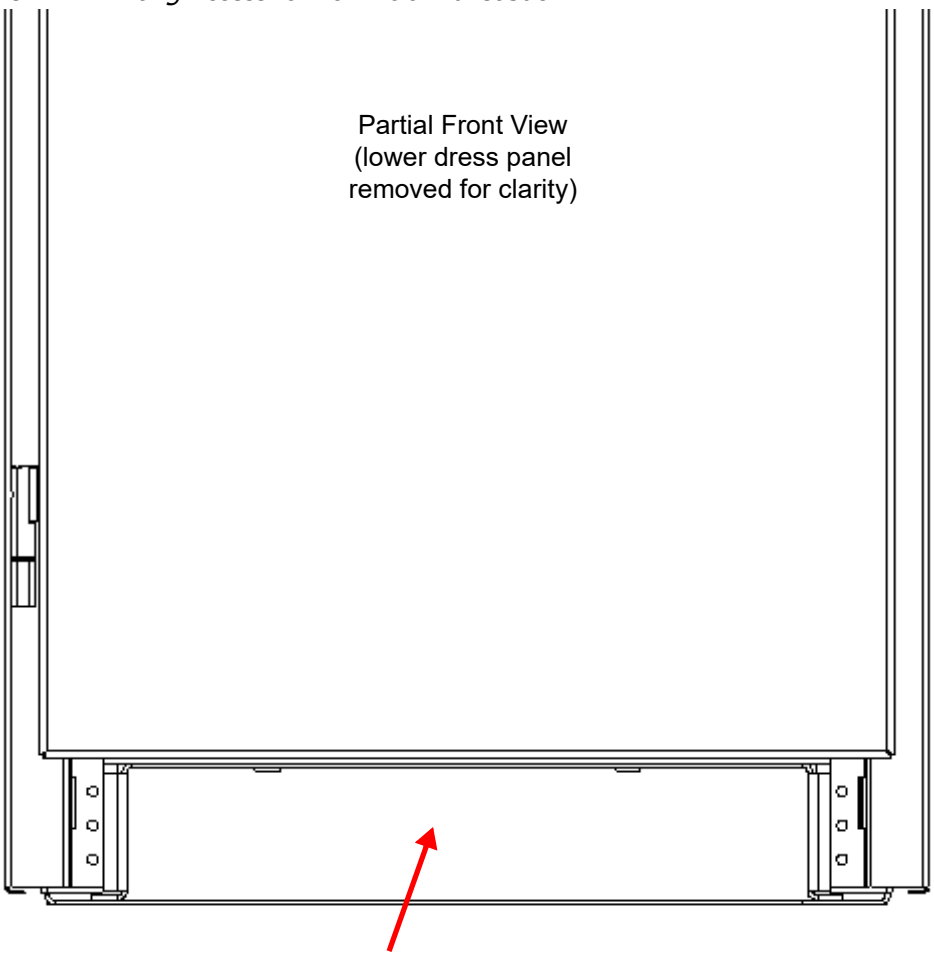
CAUTION! THE NX10 CONTAINS ADJUSTABLE FEET THAT ALLOW LEVELING OF THE CABINET IN ITS FINAL POSITION. ENSURE THE LEVELING FEET ARE FULLY RETRACTED (UP) BEFORE MOVING THE NX10. FAILURE TO DO SO MAY CAUSE DAMAGE TO THE LEVELING FEET AND ATTACHED METALWORK.

1. Ensure the NX10's outer plywood shell has been removed.
2. Lift the transmitter off the pallet, using a forklift or sufficient manpower. If you are using a forklift, lift the NX10 from the front or rear of the cabinet (see Figure 2.2.1 on page 2.2.2).

   NOTE: If you are using a forklift, ensure the two forks will fit together in the space provided.
3. Move the NX10 into its final position, using one of the following methods:
   - using a forklift, if available, and go to Step 5.
   - using a pallet jack, and go to Step 5.

     NOTE: If you are using a pallet jack, ensure that one fork of the pallet jack is centered under the transmitter cabinet and that an additional person is available to assist with stabilizing the transmitter while it is being lifted and moved.
   - installing the optional casters to roll the transmitter, as detailed in Step 4.

Figure 2.2.1: Lifting Access for Forklift or Pallet Jack



4. Nautel can provide an optional NX-LP Caster Kit (Nautel part # 212-8055) to aid in moving the transmitter into position. If you are using the casters to roll the NX10 into position, perform the following (see Figure 2.2.2 on page 2.2.4):

   - Open the front and rear doors of the NX10. Remove the four hole plugs from each bottom corner to expose the top of the threaded leveling feet.
   - Use the 3/16-inch hex bit socket (Nautel Part # HY120, provided in the ancillary kit) and a 3/8-inch drive ratchet (user provided) to extend each leveling foot to the transmitter room floor. Continue to extend the levelers so that the NX10 is approximately 1" (25 mm) above the floor.
   - Obtain the four casters (Nautel Part # HAW73), eight spacers (Nautel Part # 212-8166), sixteen (16) M8 x 30-mm hex bolts, and M8 nuts and washers from the Caster kit (Nautel part # 212-8055).
   - Use two spacers, four M8 bolts, nuts and washers to secure each caster to the bottom of the NX10 (see Figure 2.2.2 on page 2.2.4).

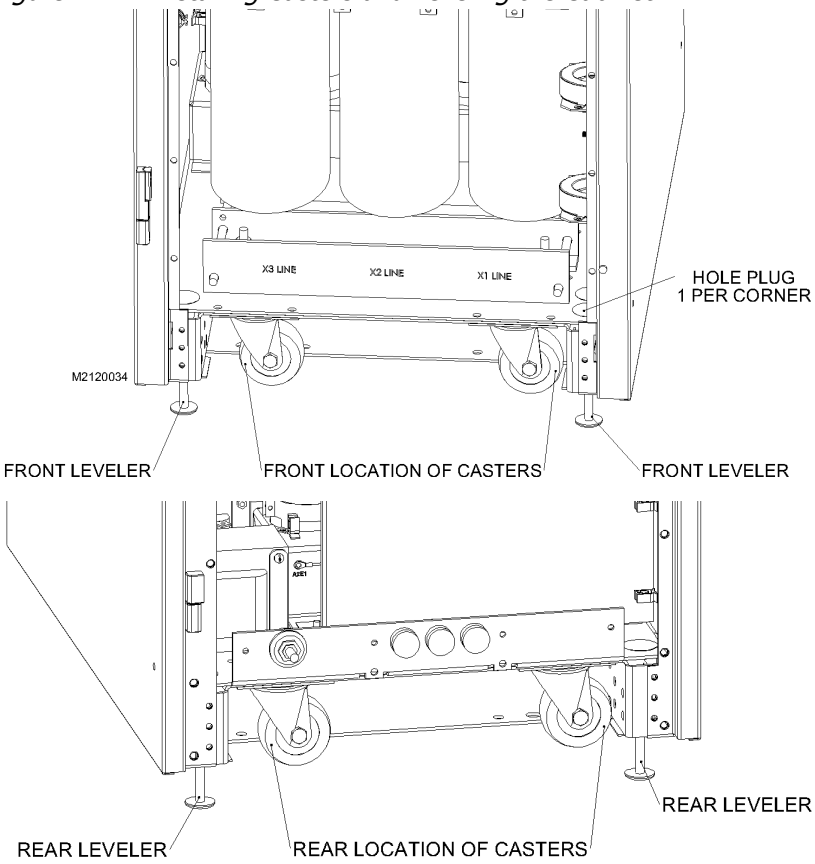
     NOTE: It may not be possible to install all four (4) bolts in the front casters. Install at least two (2) bolts, in opposite corners, taking care not to damage the power transformer.
   - Use the 3/16-inch hex bit socket to retract the levelers until the casters rest on the floor. Continue to retract the levelers a further 1" (25 mm).
   - Roll the NX10 into its final position. Extend the levelers to elevate the casters off the floor. Remove the casters and associated hardware. Store them for future use.
   - Adjust the levelers until the NX10 rests on the floor.

5. If you are not anchoring your transmitter, adjust the levelers until the NX10 is level. If you are anchoring your transmitter against seismic activity, obtain four 2-1/4 inch square washers (Nautel Part # HPS30) from the ancillary kit. Position the transmitter over the four pre-drilled mounting holes in the floor (see Figure 1.2.1 of the NX10 Pre-Installation Manual for pre-drilled hole locations) and install four anchoring bolts (user-provided), with square washers, in the holes provided in the bottom of the transmitter cabinet (see Figure 2.2.3 on page 2.2.5).

   NOTE: The maximum bolt length that can be used for seismic anchoring is dependent on the height of the cabinet opening above the anchor holes [3.5 inches (9 cm)] and the tool you are using to anchor the bolts. If the bolts are too long, try jacking up the transmitter cabinet (by adjusting the levelers), then installing the bolts while slowly dropping the height of the transmitter until it rests on the floor.

6. Obtain the front dress panel (Nautel Part # 212-8122-01) and rear dress panel (Nautel Part # 212-8122-02) from the ancillary kit. Install the panels as shown in Figure 2.2.4 on page 2.2.5.

Figure 2.2.2: Installing Casters and Leveling the Cabinet



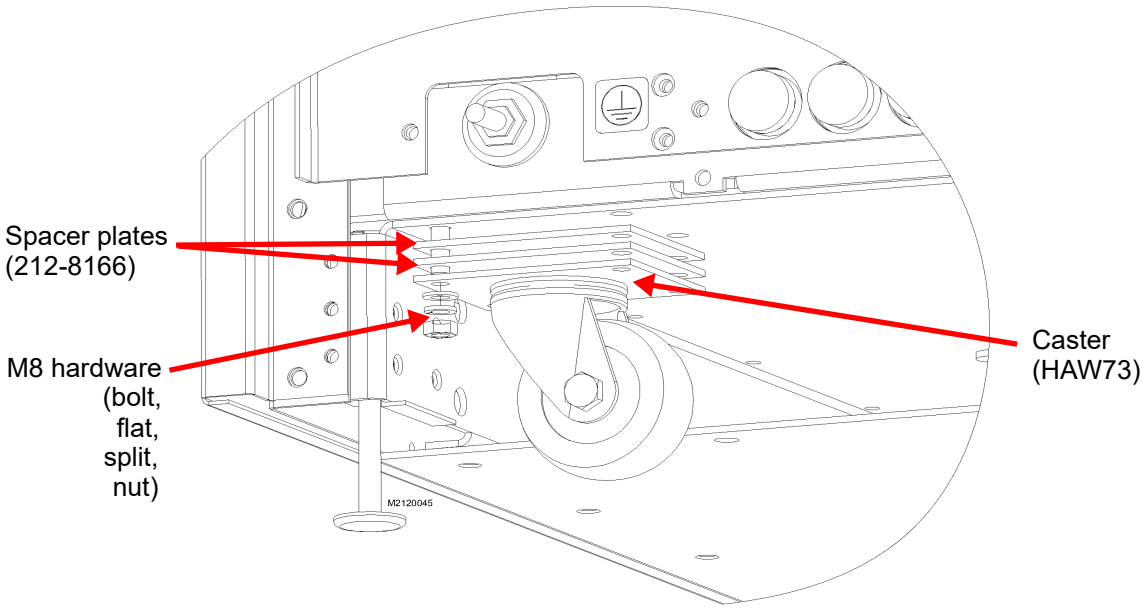


Figure 2.2.3: Seismic Anchoring Hole Locations

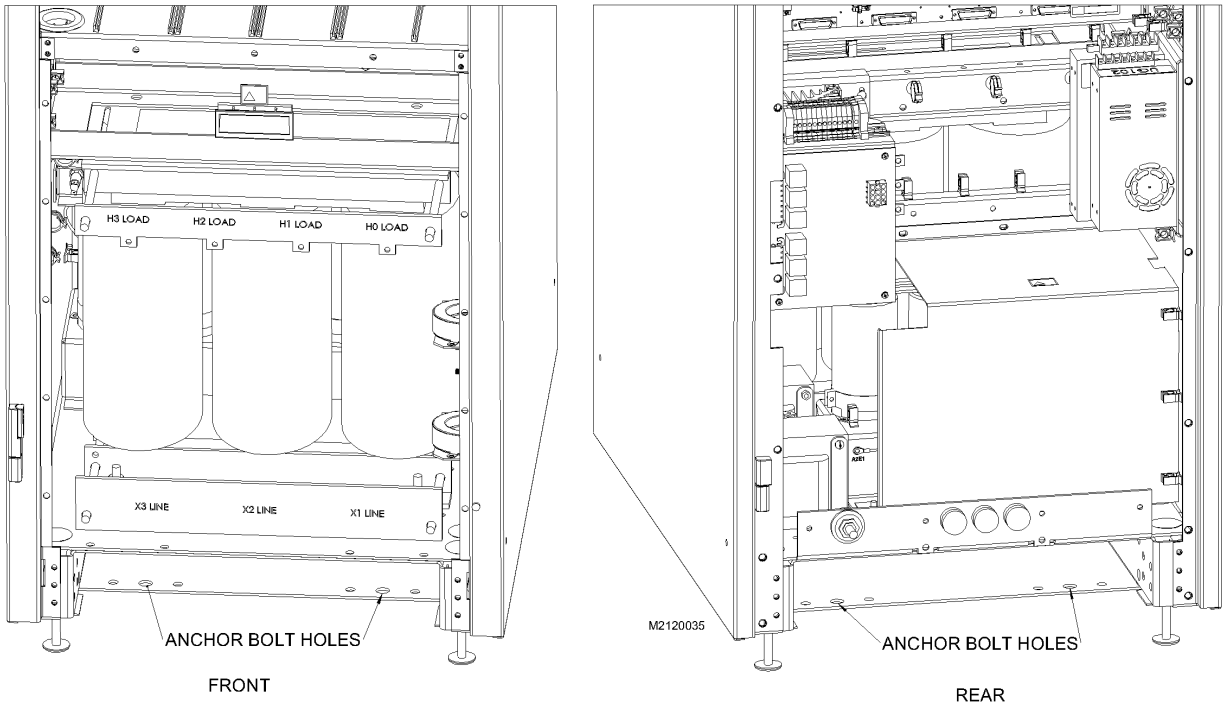
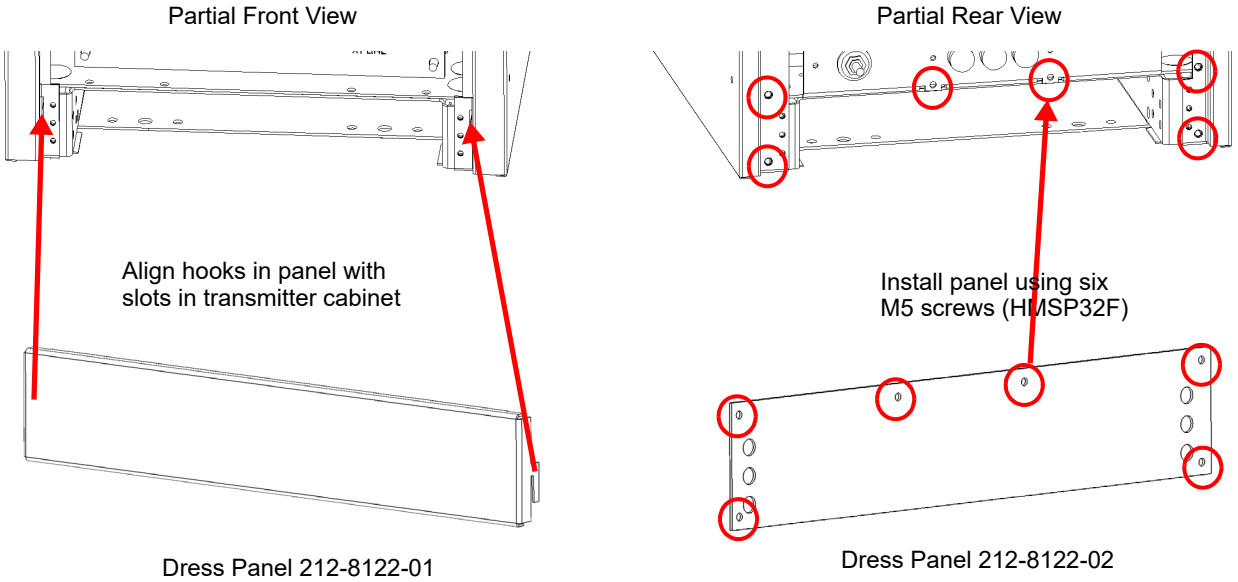


Figure 2.2.4: Installing Dress Panels



7. If you are using a closed air cooling configuration (see the NX10 Pre-Installation Manual for details):
   - Obtain the cover plate (Nautel Part # 212-5052) that was packed with the NX10 ancillaries.
   - Loosen the four (4) quarter-turn fasteners that secure the filter bracket to the rear door and remove the filter bracket (see Figure 2.2.5 on page 2.2.7).
   - Install the cover plate in its place and tighten its quarter-turn fasteners.
   - Remove the cover plate from the top of the NX10 (see Figure 2.2.5 on page 2.2.7) and attach the user-provided air intake duct.
8. Verify that the ac power cable from the ac power disconnect switch is long enough to reach through the entry point at the top or bottom of the NX10, to the transformer's primary terminals at the bottom of the NX10.
9. Install the RF output connector as follows (see Figure 2.2.6 on page 2.2.8 or Figure 2.2.7 on page 2.2.9):

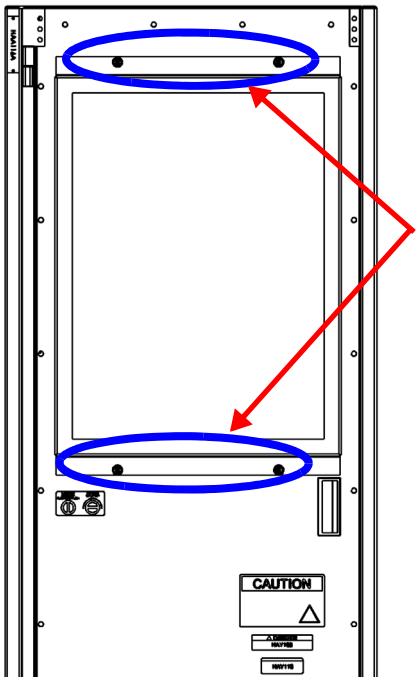
NOTE: The RF output connector for an NX10 can be configured for an 1-5/8 inch or 7/8 inch EIA connector. An output connector kit for the predetermined connector is provided with the ancillaries. The user must provide the appropriate inner male (bullet) connector and field flange connector to complete the RF output connector.

- Obtain the appropriate output connector kit (Nautel Part # 212-6200 for 1-5/8 inch or Nautel Part # 212-6200-01 for 7/8 inch), which was packed with the ancillary crate. Install the output cup, spacer plate and stud plate as shown in Figure 2.2.6 on page 2.2.8 (1-5/8 inch EIA) or Figure 2.2.7 on page 2.2.9 (7/8 inch EIA), using hardware provided in the kit.
- Install the user-provided inner male (bullet) connector in the RF output cup and install the user-provided field flange on top of the stud plate. Secure using provided hardware. RF feed cable installation is completed later in this manual.

10. Verify that the RF feed cable reaches the RF output connector on the top of the NX10.
11. Remove the rear door's securing screws and open the rear door. Locate the arc detector assembly (A24) (see Figure 2.2.8 on page 2.2.10) and remove the protective packing material that was added to prevent shipping damage. Close and secure the rear door.

Figure 2.2.5: Installing Rear Plate and Removing Top Cover Plate - Closed Air Cooling only

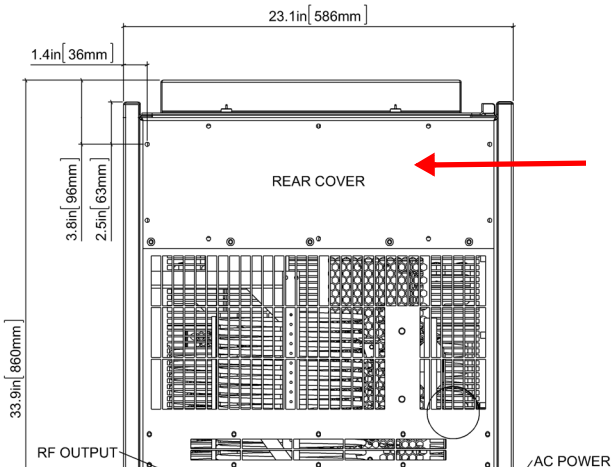
Partial Rear View



Loosen 4 quarter-turn fasteners to remove filter bracket.

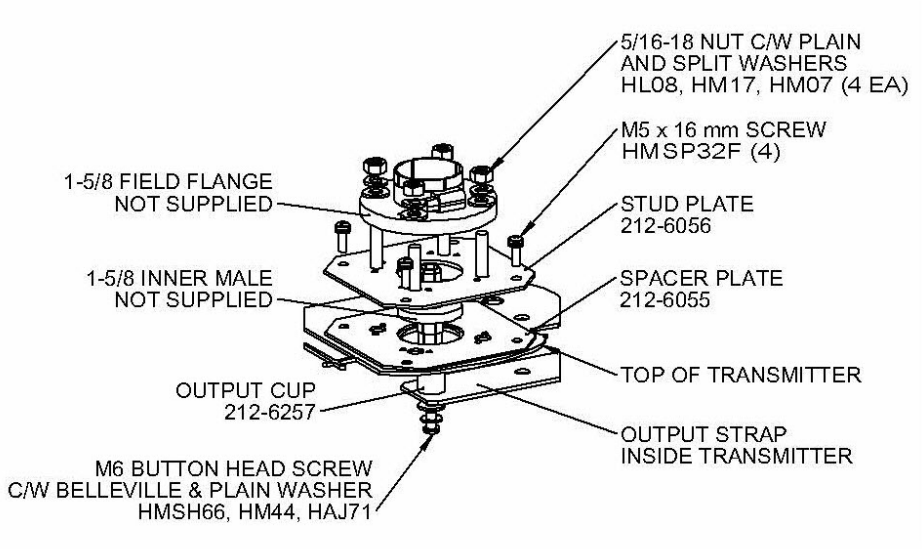
Use same holes to install cover plate. Tighten its 4 quarter-turn fasteners

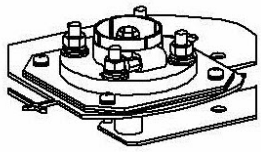
Partial Top View



Remove top cover plate.

Figure 2.2.6: RF Output Connector Detail: 1-5/8-inch EIA





1-5/8 FIELD FLANGE
AND INNER MALE INSTALLED

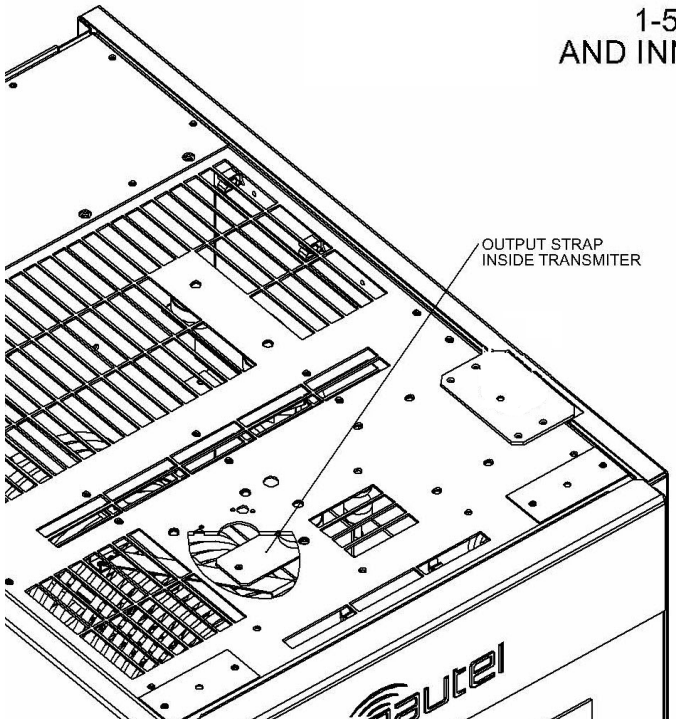
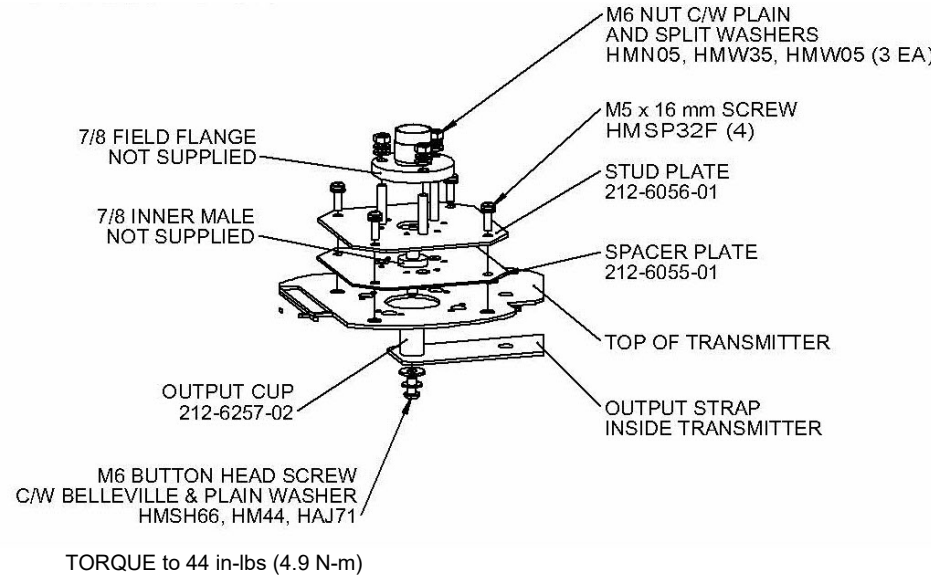
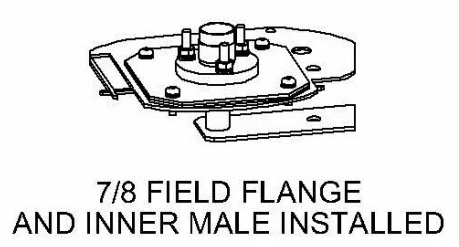


Figure 2.2.7: RF Output Connector Detail: 7/8-inch EIA





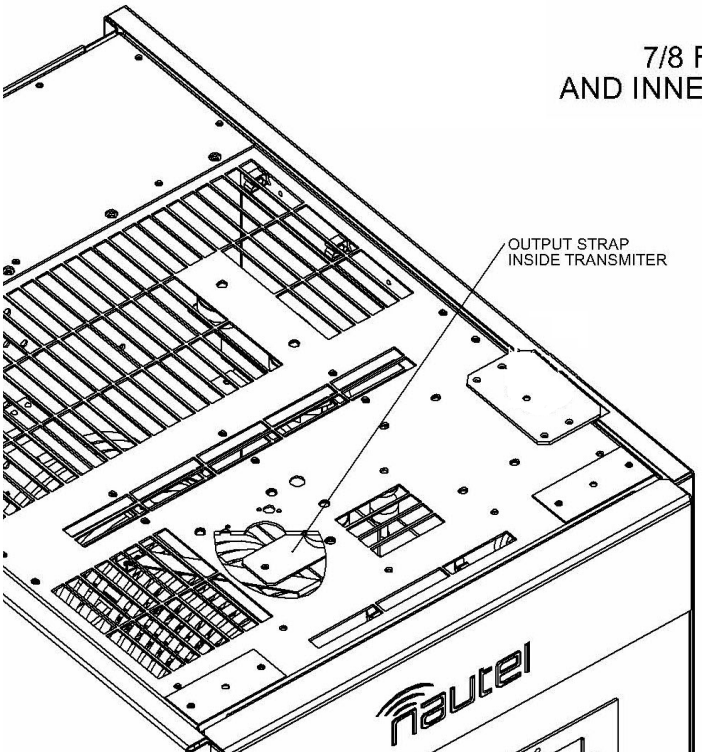
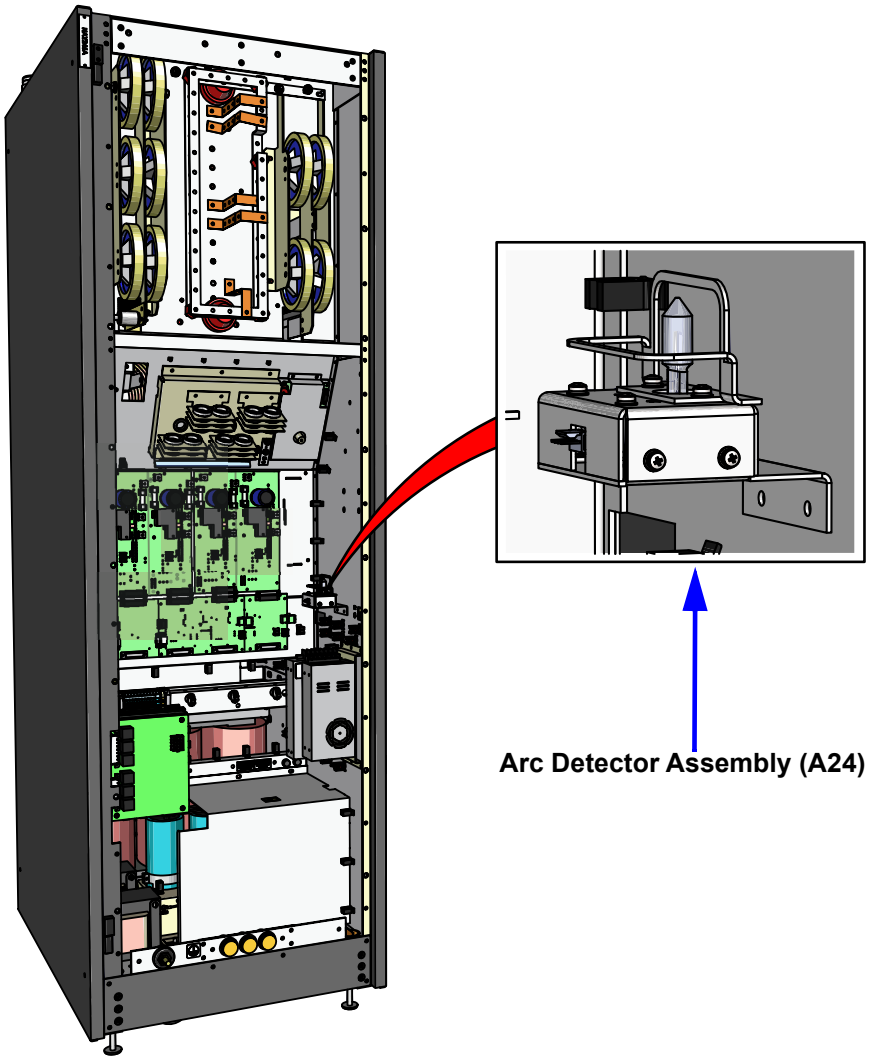


Figure 2.2.8: Location of Arc Detector Assembly



Partial Rear View; Rear Door Removed for Clarity

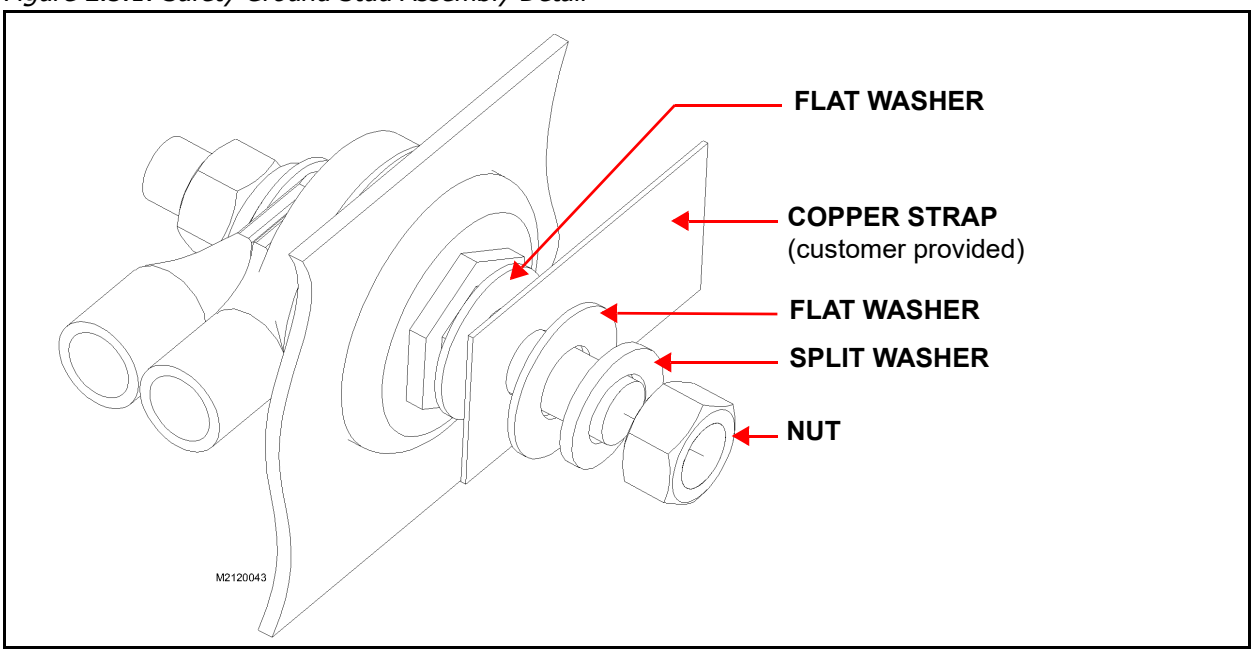
SECTION 2.3: CONNECTING THE STATION REFERENCE GROUND

To connect the station reference ground, perform the following steps:

1. Locate the station reference ground stud at the bottom left of the transmitter cabinet, as viewed from the rear.
2. Remove the outer (exterior) nut and re-assemble as shown in Figure 2.3.1 on page 2.3.2. Attach a continuous, low impedance conductor (minimum four-inch copper strap, or equivalent wire) between the site's station reference ground and the transmitter's station reference ground stud. Ensure the reference ground conductor is at least 3 mm (1/8 in) from the cabinet's exterior.
3. Verify it is still possible to open the rear door of the transmitter with the reference ground conductor connected. If you use a copper strap for the conductor, you may need to trim its width slightly near the door.
4. For information about grounding the lightning protection, see the *NX10 Pre-Installation Manual.*

   For detailed information about lightning protection, see the *Nautel Recommendations for Transmitter Site Preparation Manual*, available on the Nautel website or from your Nautel sales agent.
5. Firmly tighten all hardware.

Figure 2.3.1: Safety Ground Stud Assembly Detail



SECTION 2.4: CONNECTING AC POWER

To connect ac power to the transmitter, perform the following steps:

1. Switch off and lock out the main ac power at the service entrance.

2. Select the appropriate wire size for your main ac power cables. See the NX10 Pre-Installation Manual for assistance. Ensure the ground wire is insulated, so it does not contact the transmitter cabinet at any location other than the safety ground connection.

   WARNING! ENSURE THAT WIRING SIZES ARE APPROPRIATE. AC WIRING MUST BE INSTALLED BY A QUALIFIED, LOCALLY-CERTIFIED ELECTRICIAN.

   DANGER! ENSURE AC POWER IS DISCONNECTED AND LOCKED OUT AT THE SOURCE BEFORE PROCEEDING.

3. Route the main ac power cables in a suitable conduit, from the ac disconnect switch to the top or bottom of the transmitter, depending on your desired entry point. **NOTE**: Bottom entry requires a cable trench under the transmitter.

4. Prepare the desired ac input entry hole as follows:

   - For top entry, punch the appropriate size hole in the ac entry plate as follows (see Figure 2.4.1 on page 2.4.3):

     - Remove the ac entry plate from the top of the transmitter. It is secured using four M4 screws and has a pre-cut, centered 3/8-inch diameter hole.

     - Use a chassis punch tool (e.g., Greenlee, etc.) to punch the desired size hole in the ac entry plate. Make sure the ac input cables will pass safely through the hole. If necessary, you can remove the plate completely to gain access to a smaller, rectangular hole.

     - Install the conduit termination on the ac entry plate, if desired.

     - Re-install the ac entry plate on top of the transmitter using four M4 screws.

   - For bottom entry, remove the hole plug from the bottom ac input entry hole (2-inch diameter, see Figure 2.4.1 on page 2.4.3) or carefully drill the appropriate size hole in the hole plug.

     NOTE: If you are using an ac conduit, do not ground it to the transmitter cabinet's chassis.

5. For bottom entry only: lower the position of the ferrite assembly on the interior right-hand wall of the NX10 by loosening two nuts, moving the ferrite assembly down to the lower set of mounting studs and re-tightening the nuts (see Figure 2.4.1 on page 2.4.3).

   NOTE: The ferrite assembly is designed to accommodate two different positions: upper (for top entry) and lower (for bottom entry). This allows optimum wire routing to the power transformer's primary terminals. Nautel factory configures the ferrite assembly in the upper position for top ac entry.

6. Route all cables, as a group, along the interior wall of the NX10 to the ferrite assembly's toroids. For top entry, an internal cable duct is provided to guide the cables from the top of the transmitter to the ferrite assembly.

   NOTE: If the ac cable is a multi-conductor configuration, you may need to strip back the cable's outer jacket (Nautel recommends 90 inches for top entry, 40 inches for bottom entry) to allow wiring to pass through the transmitter's ac entrance (top or bottom). The cable channel between the top of the transmitter and the toroid assembly is approximately 52 inches long.

7. Pass all cables, as a group, down (or up, as applicable) through the ferrite toroids.

8. Verify that the station reference ground is connected to the safety ground stud assembly at the back of the cabinet.

9. Connect the ac line input to the Line 1, Line 2 and Line 3 terminals on the power transformer (see the appropriate Figure 2.4.2 on page 2.4.4 or Figure 2.4.3 on page 2.4.4 for your transformer). Secure using lugs and hardware provided in the ancillary kit (see Figure 2.4.4 on page 2.4.5) or provide your own lugs that are compatible with up to a 5/16-inch or M8 bolt. If using Nautel supplied parts, torque lugs to 77 in-lbs (8.6 N-m) and torque M6 bolts to 60 in-lbs (6.7 N-m).

10. Connect the ac ground to the transmitter's ac ground stud (see Figure 2.4.5 on page 2.4.6), again using a lug provided in the ancillary kit. If using Nautel supplied parts, torque lugs to 77 in-lbs (8.6 N-m) and torque the nut on the ground stud to 67 in-lbs (7.5 N-m).

11. Based on your nominal line-to-line voltage, select the appropriate tap position on the power transformer. All three phases must be set to the same tap (see the appropriate Figure 2.4.2 on page 2.4.4 or Figure 2.4.3 on page 2.4.4 for your transformer and Table 2.4.4 on page 2.4.5). If necessary, use the hardware already on each of the three copper straps to connect the straps to the new tap positions. Be sure to scrape any excess epoxy off the electrical joint area.

    NOTE: During the Commissioning procedure (see "Commissioning Tasks" on page 2.8.1), you will be required to check an ac sample voltage to confirm the tap settings are correct. It may be necessary to adjust the tap settings at this point, which may involve using the ±5 V or ±10 V minor taps.

Figure 2.4.1: NX10 Ac Power Cable Routing

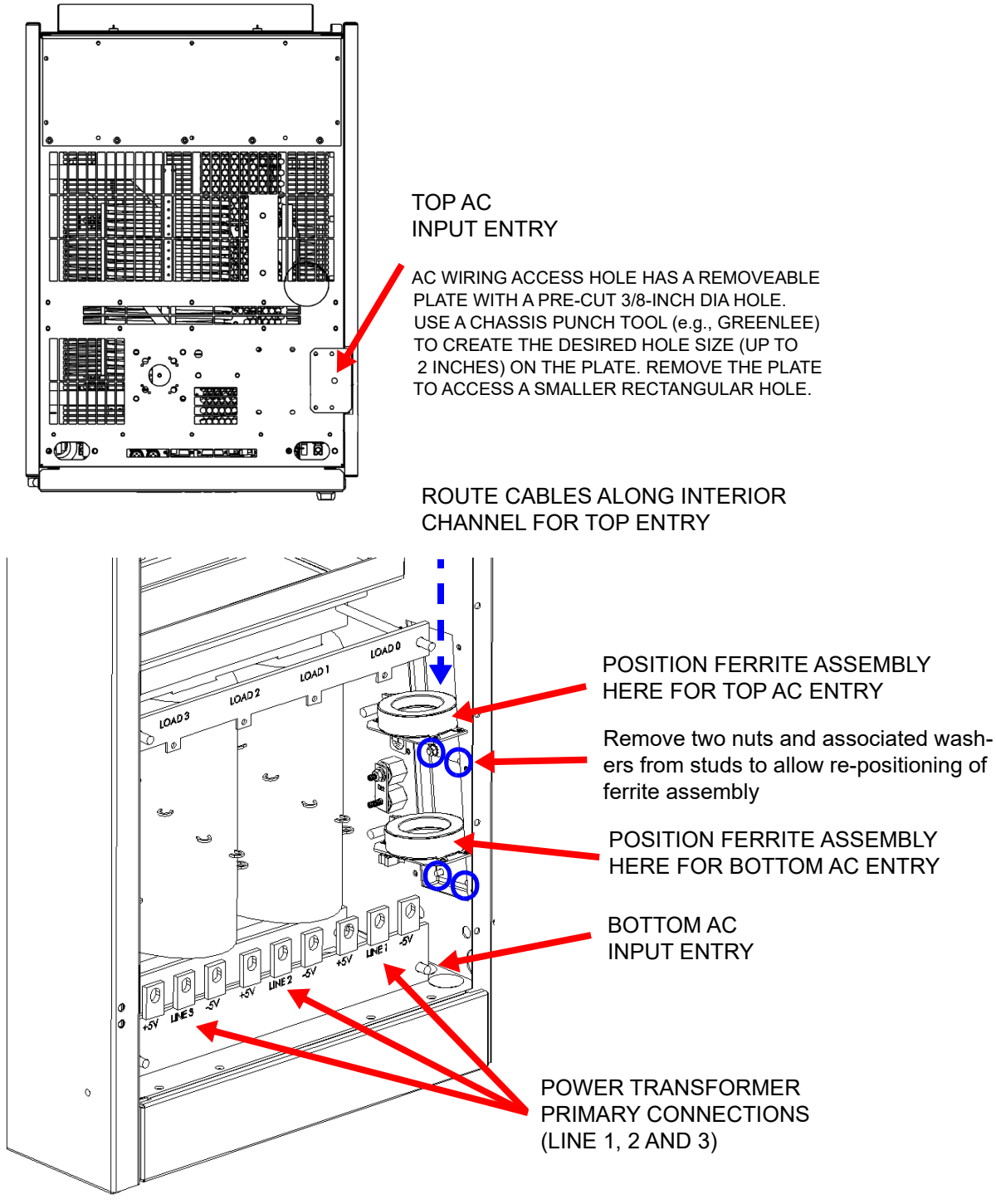


Figure 2.4.2: NX10 Power Transformer Line Voltage Tap Layout (360 - 505 V ac transformer)

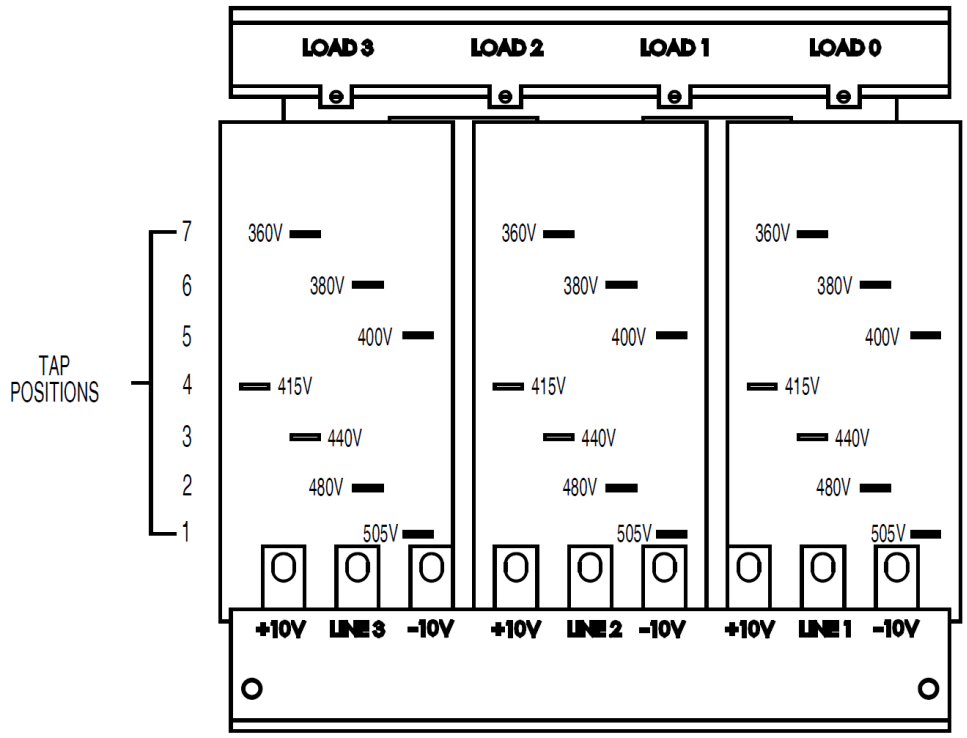


Figure 2.4.3: NX10 Power Transformer Line Voltage Tap Layout (200 - 250 V ac transformer)

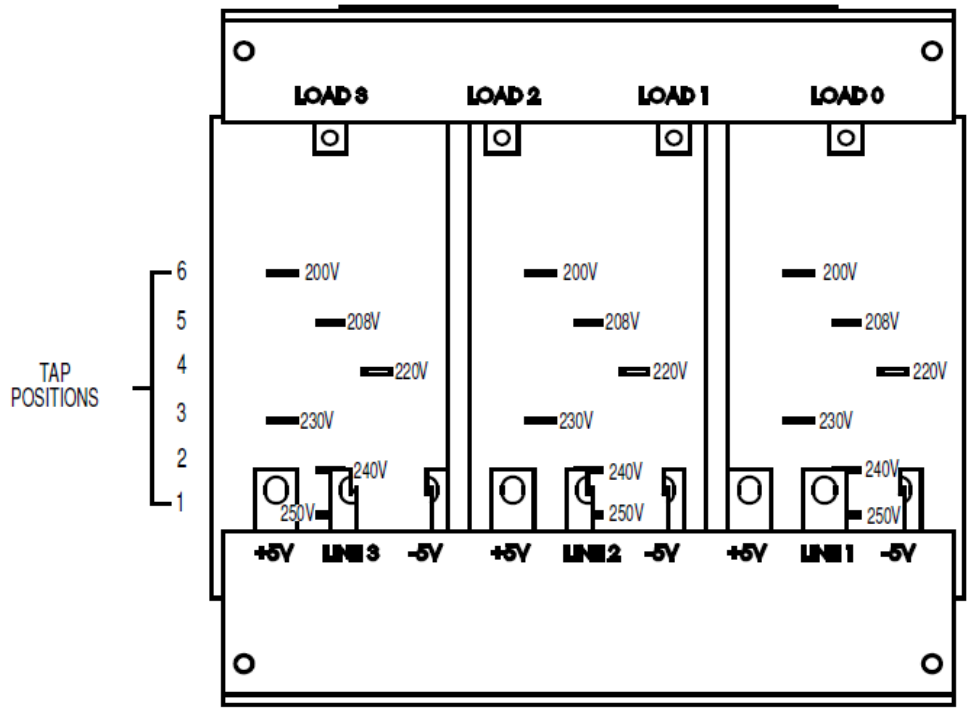


Table 2.4.1: Three-phase primary winding tap nominal voltages (rms, phase-to-phase)

Ac Power Source Voltage		Tap
200 - 250 V ac	360 - 505 V ac	
N/A	360	7
200	380	6
208	400	5
220	415	4
230	440	3
240	480	2
250	505	1

Figure 2.4.4: Transformer Line 1, 2, 3 Terminal Hardware Orientation

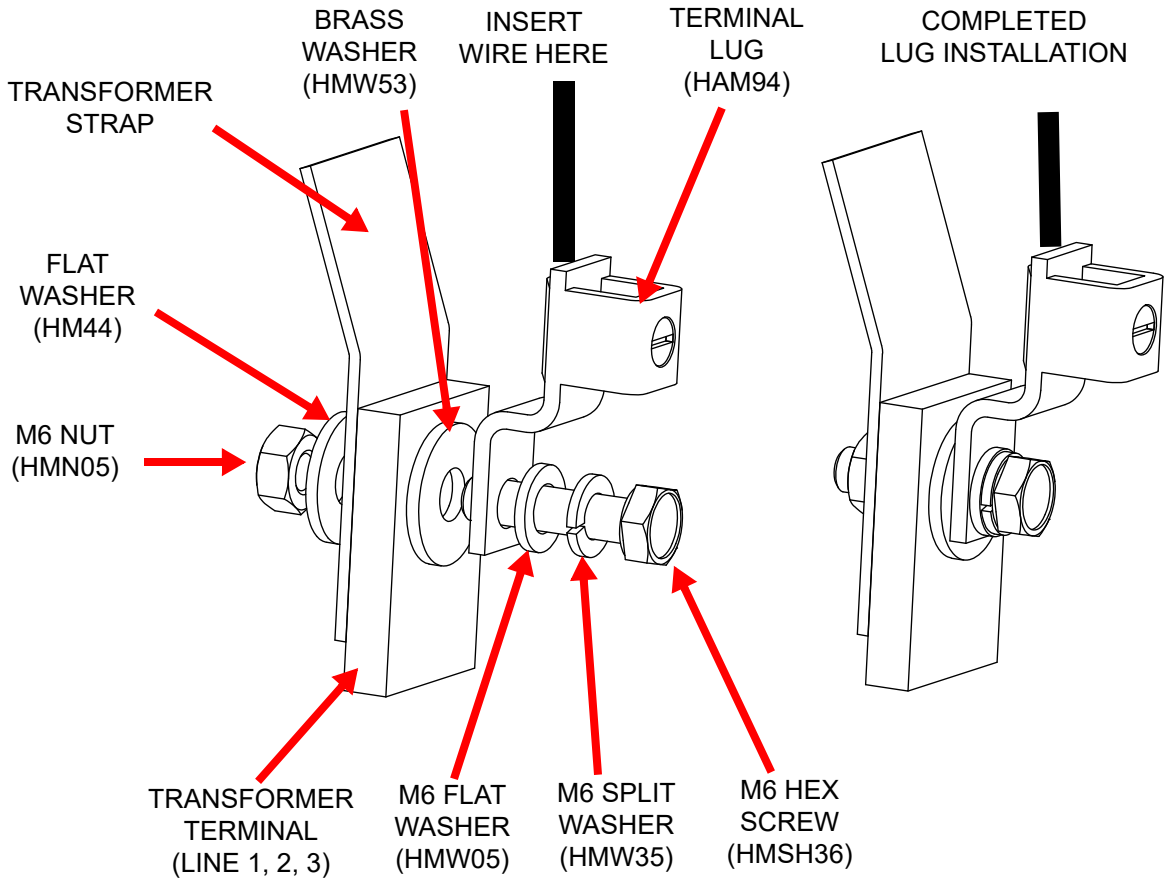
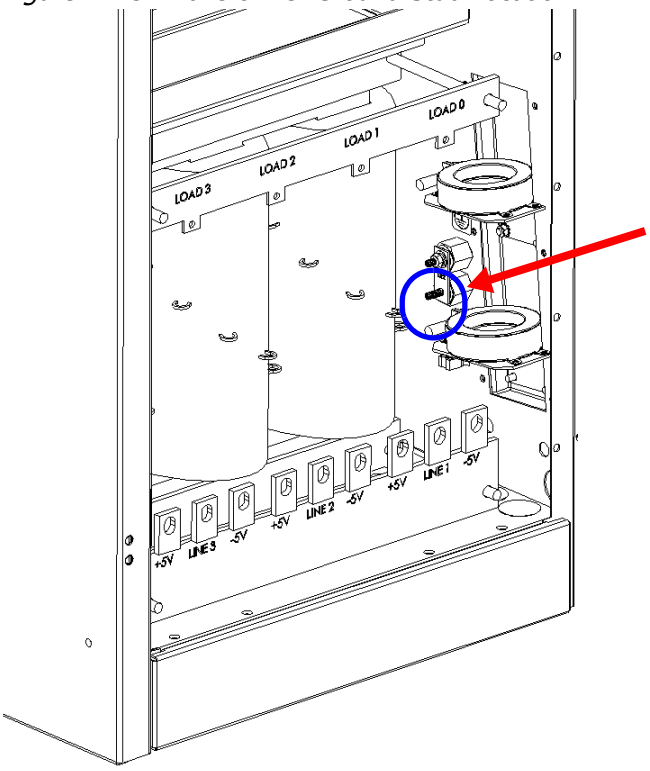


Figure 2.4.5: Transformer Ground Stud Location



GROUND STUD

NOTE: A HAM94 lug is provided to terminate the ground wire of the ac source cable

SECTION 2.5: ADJUSTING THE SPARK GAP

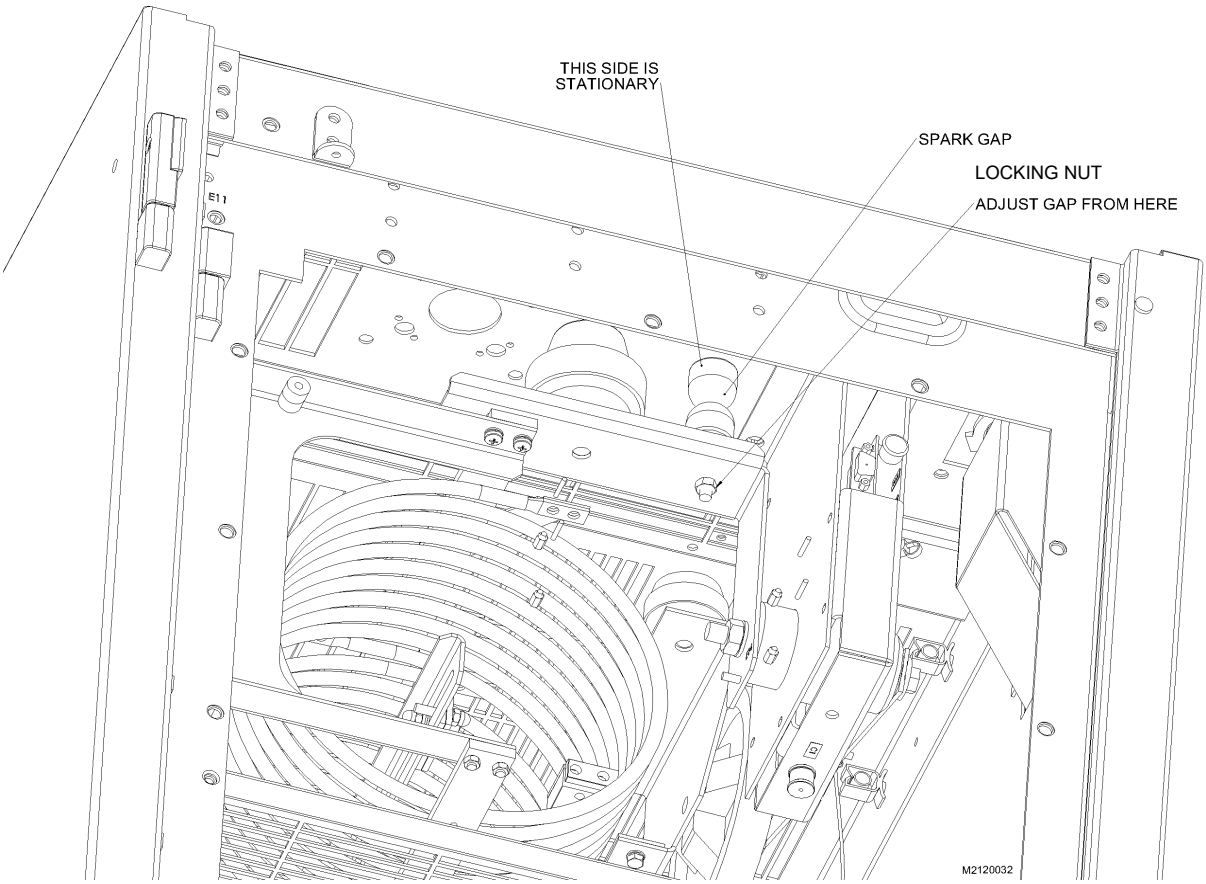
The NX10's RF output filter contains a spark gap that must be adjusted - based on site altitude - to provide protection against excessive voltage (i.e., lightning) on the RF output.

NOTE: Nautel presets the spark gap for 0.035 inches, which corresponds to a site altitude of 0 m (i.e., sea level). If your transmitter site is at sea level, no spark gap adjustment is required.

WARNING! THE AC VOLTAGES PRESENT IN THE TRANSMITTER CAN BE FATAL. EXERCISE EXTREME CAUTION.

1. Determine the altitude of the transmitter site (in feet).
2. Make sure that the ac power is switched off and locked out.
3. Gain access to the RF output spark gap by opening the front door and then opening the hinged exciter panel, noting it is secured using 16 M5 screws. Retain hardware.
4. Locate the spark gap (see Figure 2.5.1 on page 2.5.2). Using a feeler gauge, measure the air gap between the spark gap balls.
5. The air gap should be 0.035 inches multiplied by the scale factor listed in Table 2.5.1, "Altitude Scale Factor" on page 2.5.3 for the altitude determined in Step 1. If not, loosen the locking nut on the bottom carbon hemisphere, adjust the position of the spark gap ball for the required gap and then tighten the locking nut.
6. Close and secure the exciter panel using the M5 screws retained in Step 3.

Figure 2.5.1: RF Output Spark Gap Location



ACCESS SPARK GAP FROM FRONT OF TRANSMITTER
WITH FRONT DOOR AND EXCITER PANEL OPEN

Table 2.5.1: Altitude Scale Factor

ALTITUDE (FT)	SPARK GAP SCALE FACTOR (MULTIPLY GAP BY...)
0	1.00
1,000	1.06
2,000	1.09
3,000	1.12
4,000	1.18
5,000	1.23
6,000	1.26
7,000	1.32
8,000	1.38
9,000	1.43
10,000	1.49
11,000	1.55
12,000	1.63
13,000	1.69

SECTION 2.6: INSTALLING AUDIO INPUTS

This section describes how to route audio input wiring to the NX10's exciters.

Planning Complete?

1. Make sure you have read and fully understood the audio input options described in the *NX10 Pre-installation Manual* before proceeding.
2. Make sure the audio input wires are long enough to allow routing through the top of the transmitter cabinet and down to the exciter panel.

Routing Cables and Connecting Audio Inputs

1. Route all audio cables from their audio sources to the top of the NX10. Two possible entry holes are provided to accept audio input wiring (see Figure 2.6.1 on page 2.6.3).
2. Punch the appropriate size hole in the desired audio entry plate as follows (see Figure 2.6.1 on page 2.6.3):
   - Remove the left-hand or right-hand entry plate from the top of the transmitter. Each is secured using two M4 screws and has a pre-cut, centered 1/4-inch diameter hole.
   - Use a chassis punch tool (e.g., Greenlee, etc.) to punch the desired size hole in the entry plate. Make sure the audio input cables will pass safely through the hole. If necessary, you can remove the plate completely to gain access to a smaller, rectangular hole.
   - Install a conduit termination on the entry plate, if desired.
   - Re-install the entry plate on top of the transmitter using two M4 screws.
3. Obtain two ferrite toroids (one each of Nautel Part # LXP38 and LXP44) from the ancillary kit.
4. Pass all audio input cables through the ferrite toroids obtained in Step 2. If practical, wires should pass through a minimum of two times (two turns) (see Figure 2.6.2 on page 2.6.3). Position the ferrite toroids just outside, or just inside, the audio input entry hole.
5. Route the audio input cables through the selected entry hole and toward the exciter panel, located behind the front door (see Figure 2.6.3 on page 2.6.4). If possible, install exciter mating connectors after passing cables through the entry hole. Route all wiring from the top of the cabinet to the hinged side of the exciter panel to allow the panel to open.

6. With the audio input cables near their destination, cut each wire to the required length and install connectors, as necessary.

7. Remove plastic cap-plugs from the connectors on the exciter panel, if applicable.

8. Connect the audio input cable(s) to the appropriate connector(s) on the control/monitor PWB (A4) as shown in Figure 2.6.3 on page 2.6.4. Secure cables using the appropriate arrowhead tyraps (Nautel Part # HT76) in the ancillary kit (see Figure 2.6.3 on page 2.6.4 to locate tyrap anchor hole locations).

9. If you are using an external USB device as your playlist, connect the USB device to a USB port (J3B or J3C) on the control/interface PWB (A4). Refer to the Operations and Maintenance Manual for details on using the Audio Player's Playlist feature, available through the remote AUI.

Figure 2.6.1: Audio Cable Entry

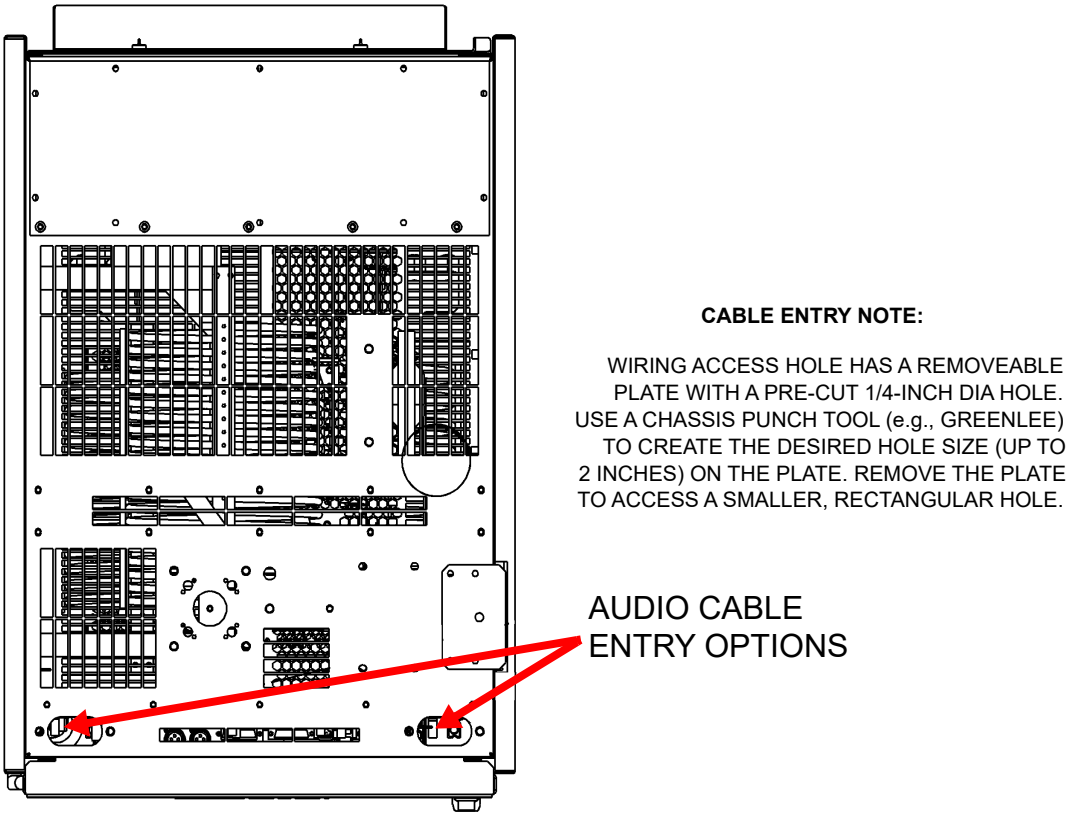


Figure 2.6.2: Passing Audio Input Wiring Through Ferrite Toroids

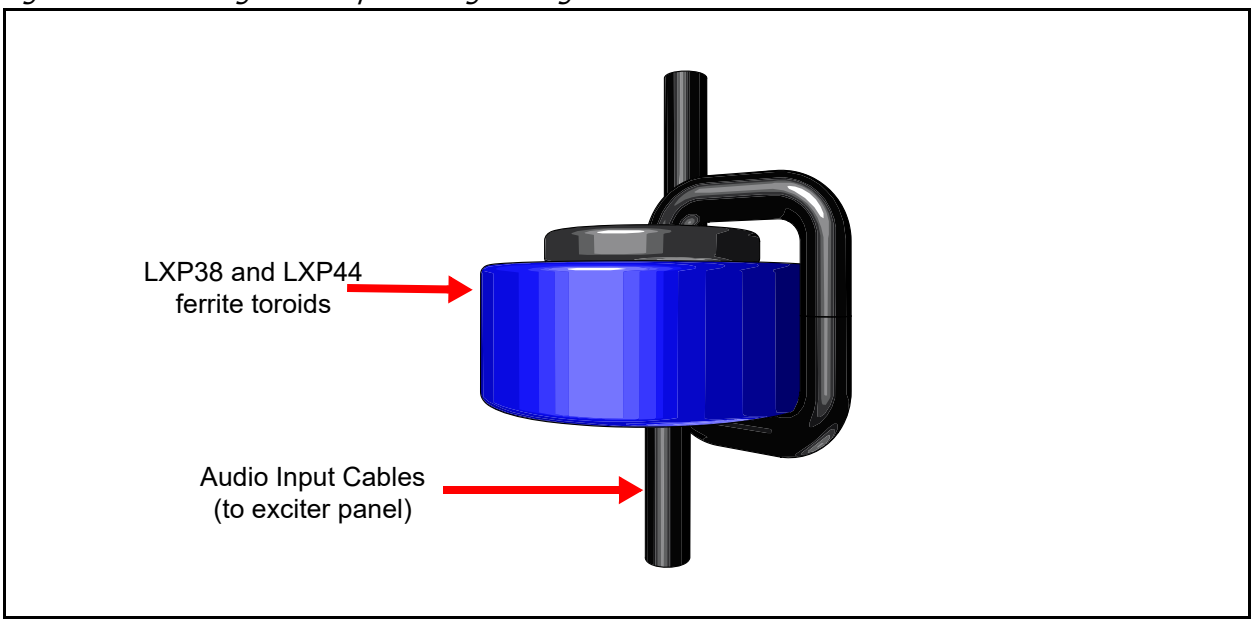
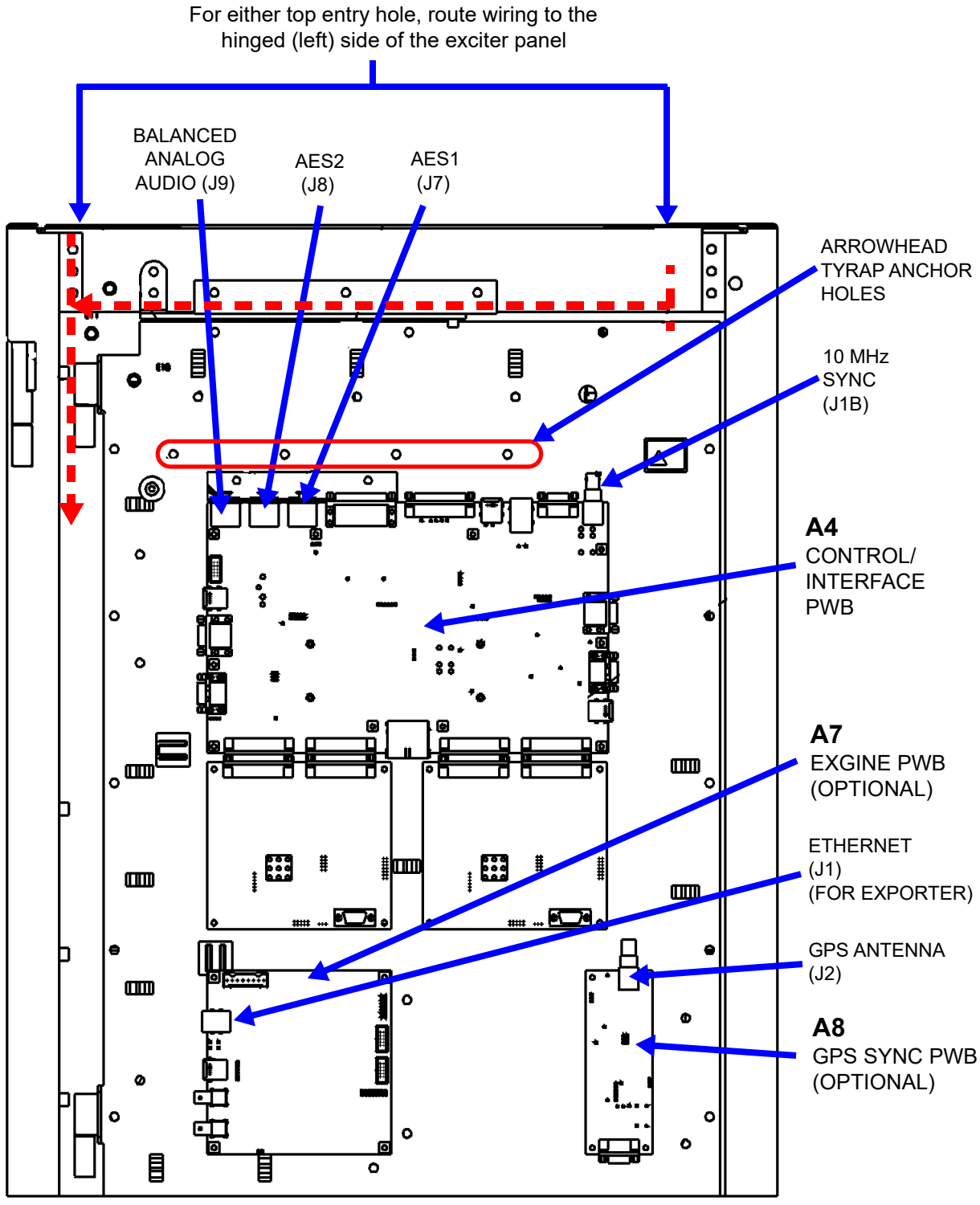


Figure 2.6.3: Audio Connections (Exciter Panel shown)



SECTION 2.7: INSTALLING CONTROL/MONITOR WIRING

This section describes how to route wiring associated with the remote control and monitoring of the NX10 transmitter.

Planning Complete?

1. Make sure you have read and fully understood the control and monitoring options described in the *NX10 Pre-installation Manual* before proceeding.
2. Make sure the control/monitor wires are long enough to allow routing through the top of the transmitter cabinet and down to the exciter panel.

Routing Cables

1. Route all remote control/monitor cables to the top of the transmitter. Two possible entry holes are provided to accept control/monitor wiring (see Figure 2.7.2 on page 2.7.3).
2. Punch the appropriate size hole in the desired control/monitor entry plate as follows (see Figure 2.7.2 on page 2.7.3):
   - Remove the left-hand or right-hand entry plate from the top of the transmitter. Each is secured using two M4 screws and has a pre-cut, centered 1/4-inch diameter hole.
   - Use a chassis punch tool (e.g., Greenlee, etc.) to punch the desired size hole in the entry plate. Make sure the control/monitor cables will pass safely through the hole. If necessary, you can remove the plate completely to gain access to a smaller, rectangular hole.
   - Install a conduit termination on the entry plate, if desired.
   - Re-install the entry plate on top of the transmitter using two M4 screws.
3. Obtain two ferrite toroids (one each of Nautel Part # LXP38 and LXP44) from the ancillary kit.
4. Pass all control/monitor cables through the ferrite toroids obtained in Step 2. If practical, wires should pass through a minimum of two times (two turns) (see Figure 2.7.3 on page 2.7.3). Position the ferrite toroids just outside, or just inside, the selected entry hole.
5. Route the control/monitor cables through the selected entry hole and toward the control/ interface PWB (A4) on the exciter panel (see Figure 2.7.4 on page 2.7.4). Route all wiring from the top of the cabinet to the hinged side of the exciter panel to allow the panel to open.

6. With the control/monitor cables near their destination, cut each wire to the required length and install connectors, as necessary.

7. Connect the control/monitor cable(s) to the appropriate connector(s) shown in Figure 2.7.4 on page 2.7.4. Secure wires to the existing cabling and to the panel using arrowhead tyraps (Nautel Part # HT76) in the ancillary kit (see Figure 2.7.4 on page 2.7.4 to locate tyrap anchor hole locations). See "Configuring Remote Inputs" on page 2.7.5 to configure the external control input switching circuits for single-ended (using the transmitter's 15 V dc supply) or differential (using an external dc supply).

8. If you are using web based control for the transmitter, route an Ethernet cable to the control/ monitor PWB (A4).

9. If the optional GPS Sync PWB is installed and you wish to synchronize the transmitter's carrier signal, install the GPS antenna and cabling in the selected location, then connect the cable to J2 on the GPS Sync PWB. Secure wires to the existing cabling and to the panel using arrowhead tyraps (Nautel Part # HT76) in the ancillary kit (see Figure 2.7.4 on page 2.7.4 to locate tyrap anchor hole locations). Ensure the GPS Sync PWB is configured for the correct antenna voltage (5 V or 3.3 V, the Nautel supplied antenna is 3.3 V) see Figure 2.7.1.

Figure 2.7.1: GPS Sync PWB Configuration for GPS Antenna

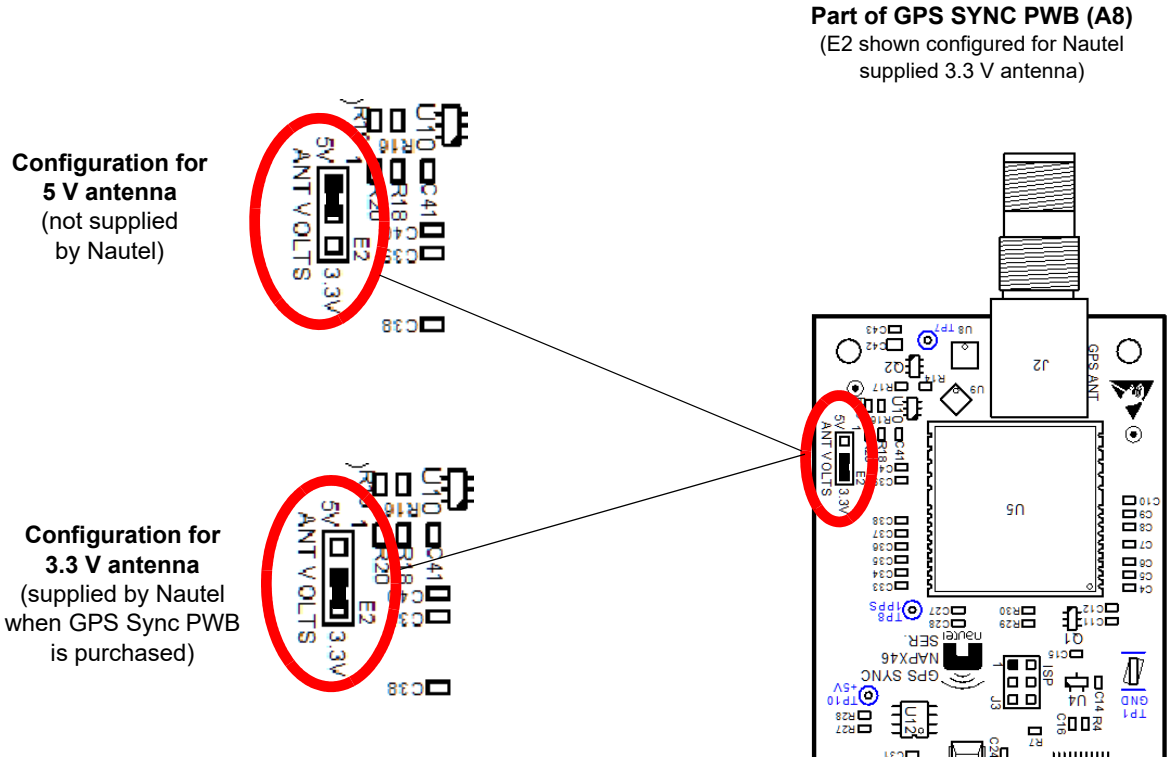
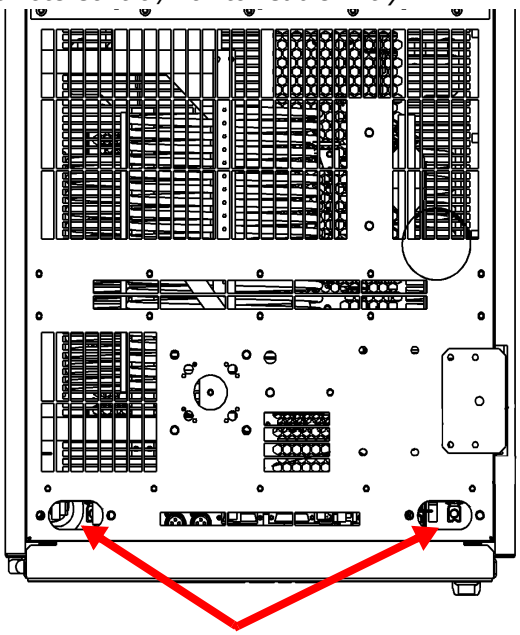


Figure 2.7.2: Remote Control/Monitor Cable Entry

PARTIAL TOP VIEW



CONTROL/MONITOR CABLE ENTRY OPTIONS

CABLE ENTRY NOTE:

WIRING ACCESS HOLE HAS A REMOVEABLE PLATE WITH A PRE-CUT 1/4-INCH DIA HOLE. USE A CHASSIS PUNCH TOOL (e.g., GREENLEE) TO CREATE THE DESIRED HOLE SIZE (UP TO 2 INCHES) ON THE PLATE. REMOVE THE PLATE TO ACCESS A SMALLER, RECTANGULAR HOLE.

Figure 2.7.3: Passing Remote Control/Monitor Wiring Through Ferrite Toroids

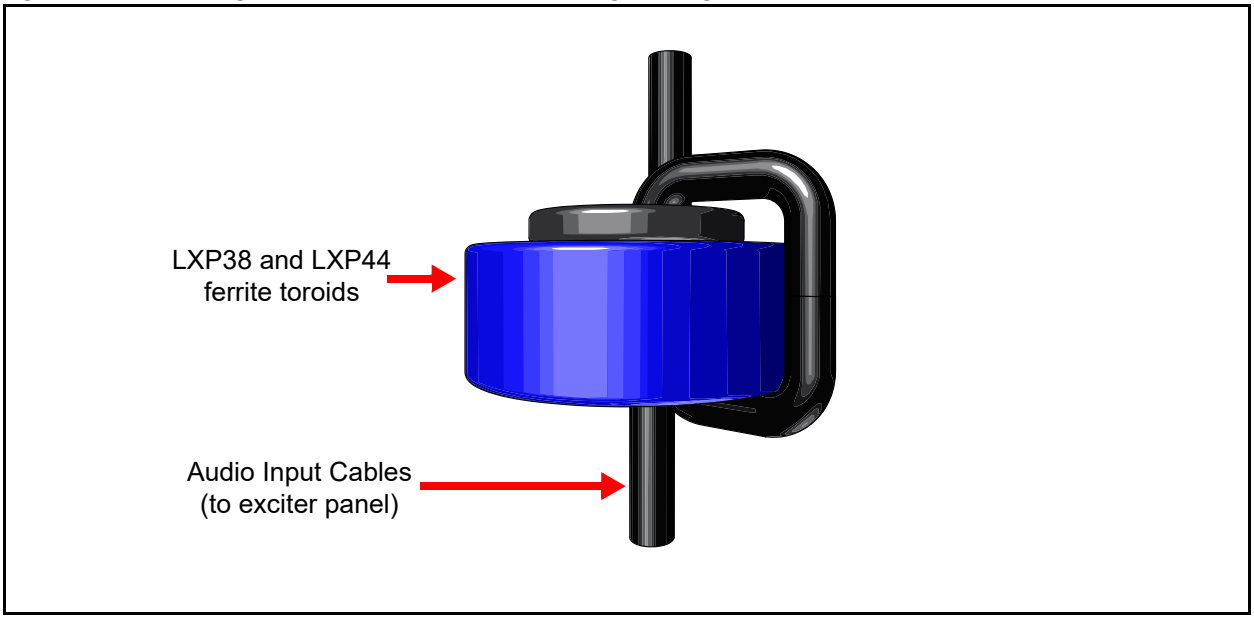
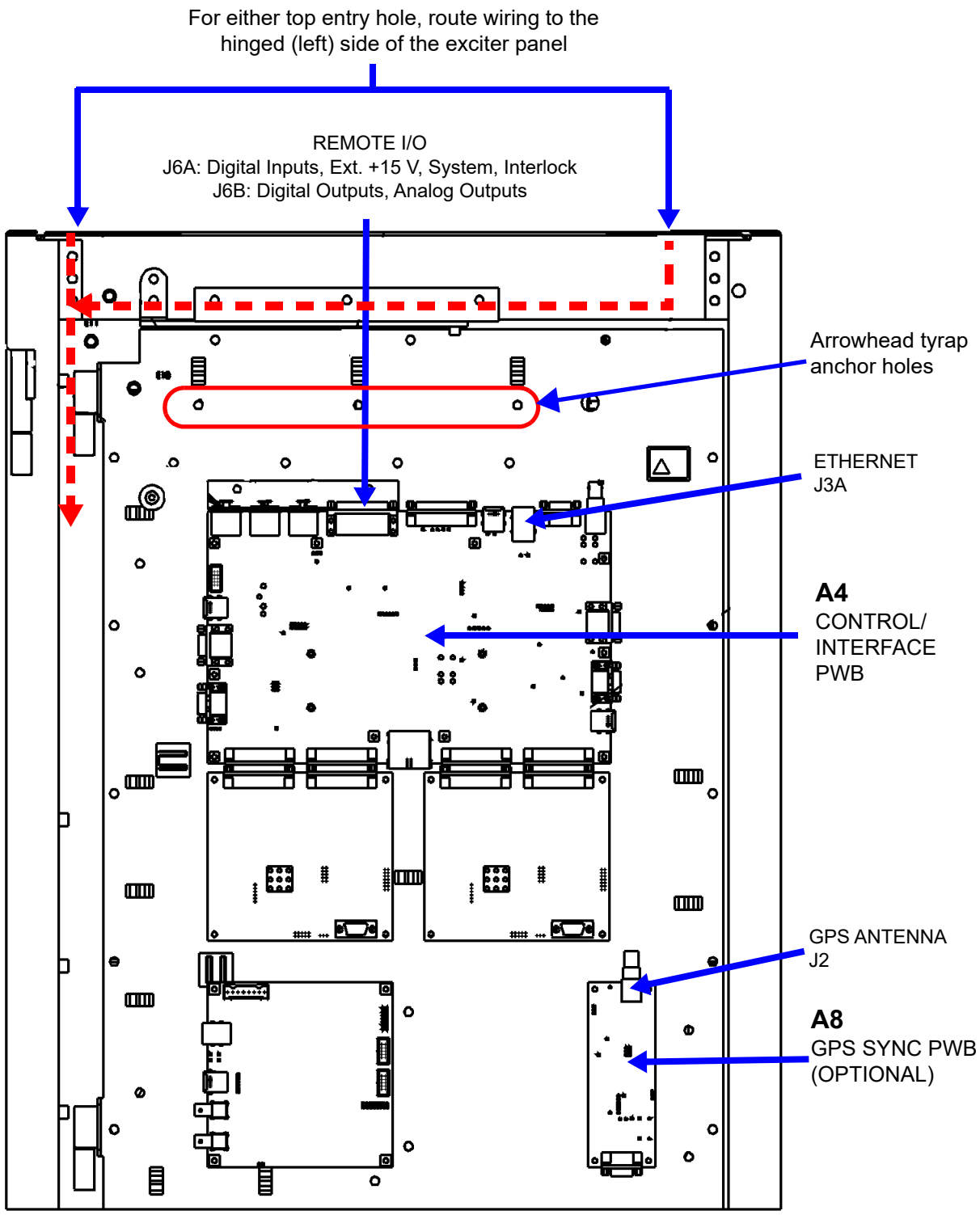


Figure 2.7.4: Remote Interface and Ethernet Connections

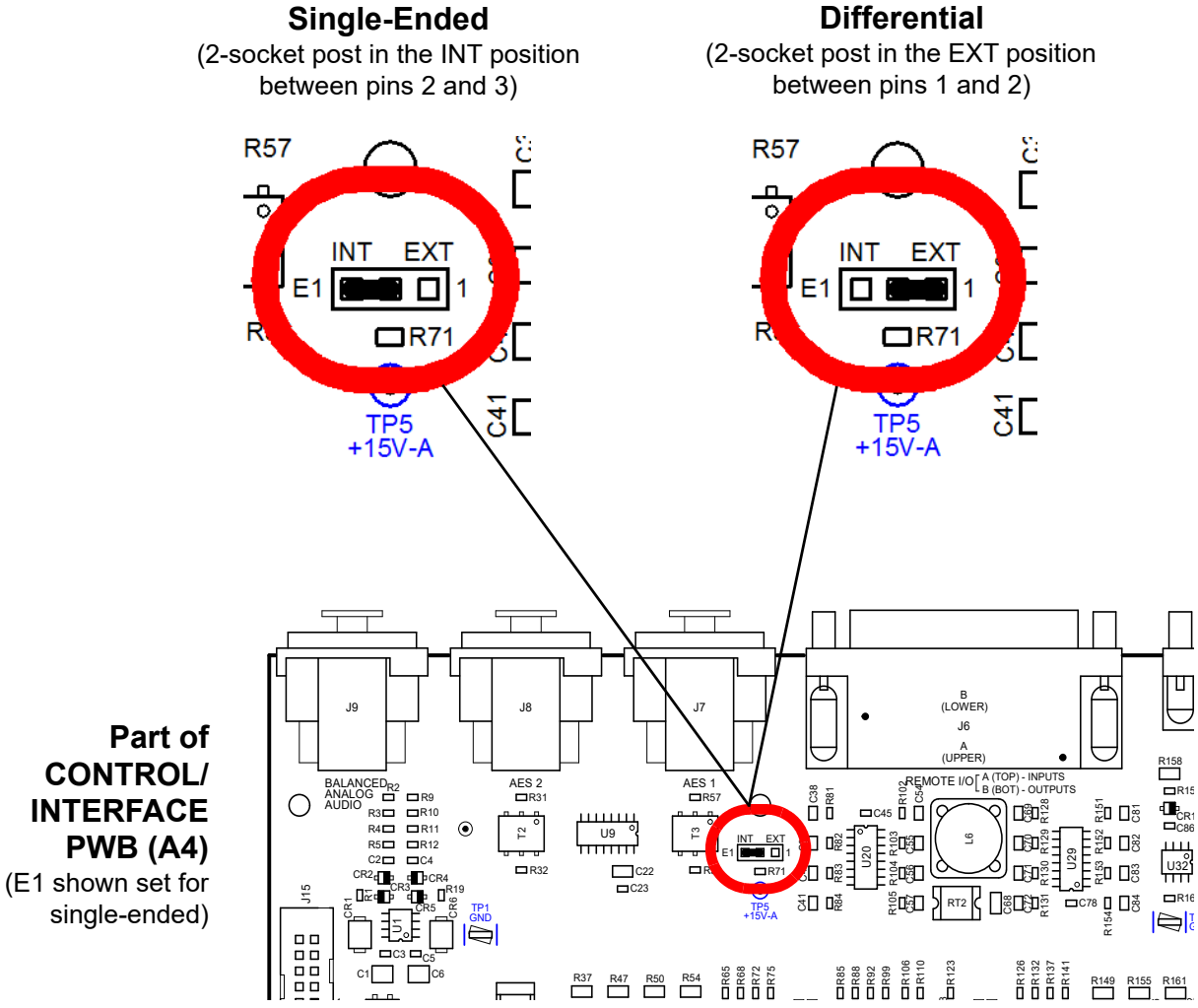


Configuring Remote Inputs

NOTE: The NX10 Pre-Installation Manual contains detailed information on remote inputs and the requirements of their external switching circuits.

If you are connecting remote control input wiring to the REMOTE I/O-A (J6A) 25-pin male D-sub connector on the control/interface PWB (A4), you must configure a 2-socket shunt post on the INT/EXT 3-pin header (E1) on the control/interface PWB. This allows the remote inputs to operate as single-ended inputs (using the transmitter's internal 15 V dc supply) or as differential inputs (using an external dc supply). See Figure 2.7.5 for configuration options.

Figure 2.7.5: Setting Jumper E1 for Remote Input Configuration (Single-Ended or Differential)



SECTION 2.8: COMMISSIONING TASKS

WARNING! BEFORE APPLYING AC POWER AND TURNING ON THE TRANSMITTER, YOU MUST CUSTOMIZE SOME CIRCUITS TO THE STATION'S POWER SOURCE AND OPERATING REQUIREMENTS. DO NOT PERFORM THIS PRE-COMMISSIONING UNLESS YOU ARE A STATION ENGINEER OR A COMPETENT ELECTRONICS TECHNICIAN.

The transmitter contains solid-state devices that may be damaged if subjected to excessive heat or high-voltage transients. Ensure that circuits are not overdriven or disconnected from their loads while turned on.

The transmitter was precisely calibrated and tested during manufacturing. Do not change any adjustments other than those specified

Pre-Commissioning Tasks

1. Terminate the transmitter's RF output into a precision, 50 Ω, resistive test load that is able to dissipate the RF power being applied to it: 15 kW total required.
2. Verify that all panels are installed, and ensure that their attaching hardware is firmly tightened.
3. Connect the test load's interlock or, if necessary, simulate the closing of all external interlocks. This requires a short circuit between pins J6A-19 and J6A-20 of the control/interface PWB's REMOTE I/O connector (J6A).

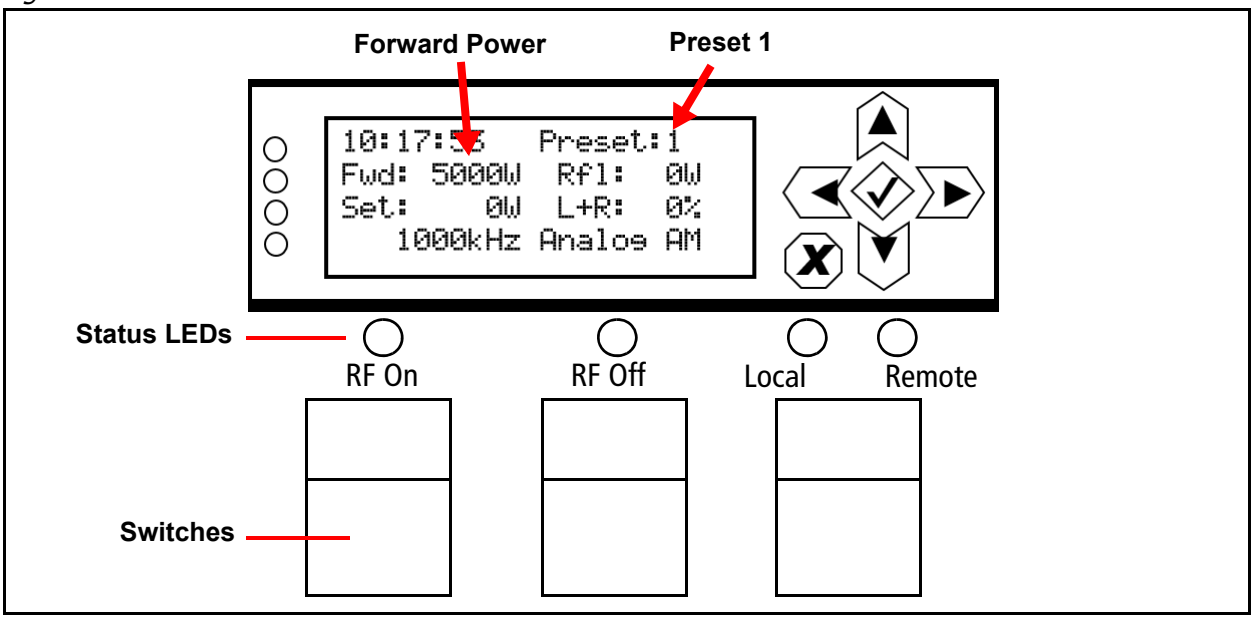
   WARNING! If a jumper is placed between interlock pins J6A-19 and J6A-20 on the control/interface PWB, safety features controlled by the external interlocks will be disabled. A fail-safe method of alerting personnel to this fact should be implemented. Voltages which are dangerous to life will be present on the RF output stages if the transmitter is turned on.

   NOTE: An interlock jumper (Nautel Part # 212-5051) is provided in the NX10's ancillary kit. It is intended to plug directly into the REMOTE I/O-A (J6A) connector (pins 19 and 20), on the control/interface PWB (A4). This jumper cannot be used if you are using a D-sub connector to make other remote I/O connections. Instead, you must solder a jumper between pins 19 and 20 of the mating connector (Nautel Part # JS28, also provided in the ancillary kit).
4. In lieu of normal station programming, connect an analog audio signal generator, preset to 1000 Hz at a zero output level (turned off), to XLR connector J9 on the control/interface PWB, or an AES signal generator to XLR connector J7 on the control/interface PWB.

Commissioning

NOTE: The following procedures require the use of the transmitter's front panel UI and pushbuttons (see Figure 2.8.1). If you require assistance to navigate the front panel, refer to the NX10 Operations & Maintenance Manual for detailed information.

Figure 2.8.1: Front Panel User Interface



Turning on the Transmitter

1. Switch on the ac power at the service entrance to turn on the transmitter.

   NOTE: You may notice a flashing amber light on the control/interface PWB behind the front door. This is the CPU OK LED and it is indicating that the microcontroller is operating normally.

2. Check the alarm and status indications on the front panel UI's Main Menu -> View Status -> View Alarms menu. See the NX10 Operations & Maintenance Manual or the NX10 Troubleshooting Manual for detailed information.

3. Check the output of the +15 V power supply on the front panel UI's Main Menu -> View Status -> View Meters -> Rack menu.

4. Check the ac sample voltage using the local front panel UI (Main Menu-> View Status -> View Meters -> Rack). This sample represents the transformer's secondary voltage. It should be between 302 V and 326 V. If so, proceed to Step 5. If not, change the transformer tap setting as follows:

   - If the ac sample voltage is too high, you will need to increase the tap voltage. If the ac sample voltage is too low, you will need to decrease the tap voltage.
   - If the ac sample voltage is more than 4 V outside of the acceptable range (i.e., less than 298 V or greater than 330 V), a "major tap change" is required. If the ac sample voltage is within 4 V of the acceptable range (i.e., between 298 and 302 V or between 326 and 330 V), a "minor tap change" is required. See Figure 2.8.2 on page 2.8.4 for explanations of major and minor tap changes.
   - Estimate the expected ac sample level for a major or minor tap change using the following formula:

$$\text{Ac Sample (new)} = \text{Ac Sample (Step 4)} \times \frac{\text{Current Major Tap}}{\text{New Major Tap*} + \text{New Minor Tap*}}$$

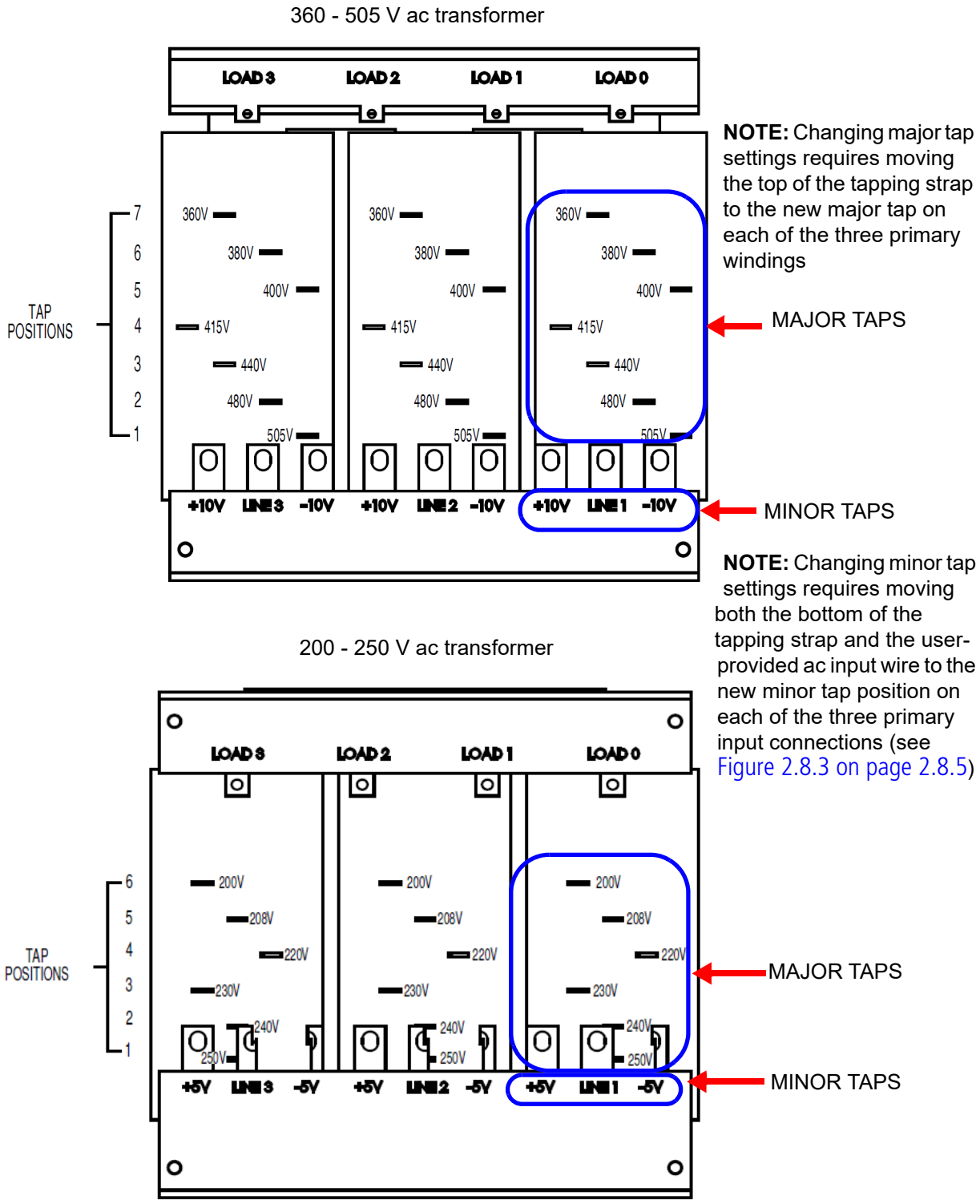
     NOTE: * denotes change only the major tap value or the minor tap value, as applicable.

     Example # 1: If the ac sample voltage in Step 4 is 335 V, you require a "major" tap increase. If the transformer is currently tapped at 380 V (360 - 505 V ac transformer), the next higher major tap is 400 V (see Figure 2.8.2 on page 2.8.4). Using the equation above (noting "New Minor Tap" = 0), the "Ac Sample (new)" value is 318.2 V, which is within the acceptable range.

     Example # 2: If the ac sample voltage in Step 4 is 300 V, you require a "minor" tap decrease (-10 V for the 360 - 505 V ac transformer; -5 V for the 200 - 250 V ac transformer). If the transformer is currently tapped at 380 V (360 - 505 V ac transformer), use the equation above (noting "New Major Tap"= "Current Major Tap"; in this example 380 V), the "Ac Sample (new)" value is 308.1 V, which is within the acceptable range.

   - If the proposed tap change yields an expected Ac Sample between 302 V and 326 V, perform the "major" or "minor" tap change, using Figure 2.8.2 on page 2.8.4, Figure 2.8.3 on page 2.8.5 and Section 2.4, "Connecting Ac Power" as guides.
   - Ensure the ac sample voltage on the front panel UI is between 302 V and 326 V. If not, repeat Step 4.

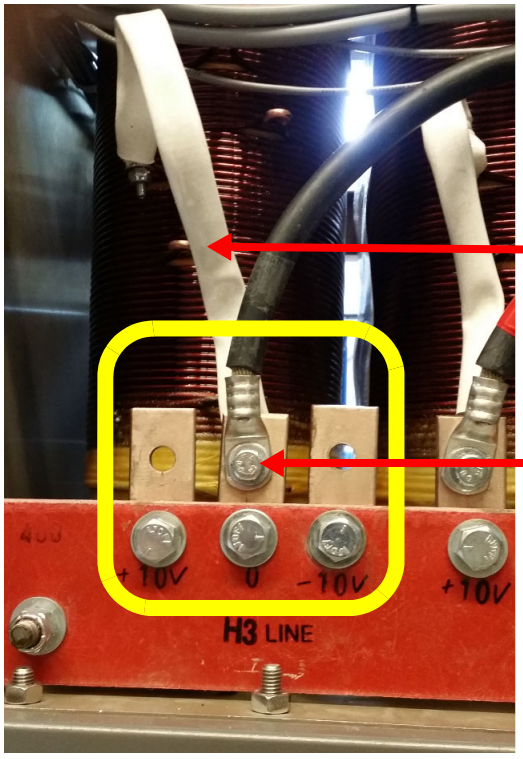
Figure 2.8.2: NX10 Power Transformer Tap Changes



NOTE: Changing major tap settings requires moving the top of the tapping strap to the new major tap on each of the three primary windings

NOTE: Changing minor tap settings requires moving both the bottom of the tapping strap and the user-provided ac input wire to the new minor tap position on each of the three primary input connections (see Figure 2.8.3 on page 2.8.5)

Figure 2.8.3: Close-up Views of Minor Tap Changes (Example: +10 V adjustment shown)

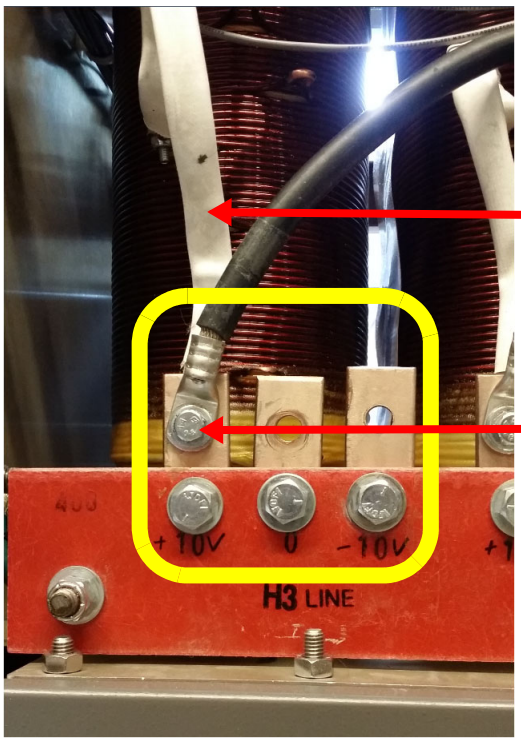


360 - 505 V ac transformer,
H3 phase winding shown

TAPPING STRAP - PART OF TRANSFORMER (one per phase)

USER-PROVIDED WIRE (one per phase)

INITIAL TAP SETTINGS
(using the middle 0 V tap)



TAPPING STRAP - PART OF TRANSFORMER (one per phase)

USER-PROVIDED WIRE (one per phase)

MINOR TAP CHANGE
(using the +10 V tap)

5. Set the active preset's power output to 1000 W as follows:
   - Go to the front panel UI's Main Menu -> Edit Presets menu. Scroll to the "Analog AM 0W" preset and press accept (checkmark).
   - Select the Output Power sub-menu and increase the output power to 1000 W. Save the change by pressing the accept (checkmark) button. The preset is now called "Analog AM 1000W*".
   - Go back to the front panel UI's Main Menu -> Select Preset menu. Scroll to the "Analog AM 1000W*" preset and press accept (checkmark) to activate the preset.
6. Verify the AM Source is set to Unused using the front panel UI's Main Menu -> Edit Presets -> Audio Options -> AM Source menu.
7. Press the front panel's RF On button. Its integral status LED will turn amber.
8. Check the output of the +48 V power supply using the front panel UI's Main Menu -> View Status -> View Meters -> Rack menu.
9. If you wish to remotely control the transmitter via a network or directly through a laptop, use the front panel UI to configure your network parameters. See "Network Setup" on page 2.8.10 for detailed information.

   NOTE: If you are not using a network, see "Network Setup" on page 2.8.10, set DHCP to DISABLE and manually set the IP address to 0.0.0.0. This disables the "Host Network Down" alarm.
10. Check for alarms using the front panel UI's Main Menu -> View Status -> View Alarms screen.
11. Increase the power to the desired setpoint (use the method in Step 5) while monitoring the PA voltage. Ensure the PA voltage remains within ±10% of the following calculated value:

$$PA\ Volts = \sqrt{\frac{\mathbf{Pout}}{\mathbf{10,000\ W}}} \times \mathbf{163\ V} \times \frac{\mathbf{400\ V}}{\boldsymbol{B + Voltage}}$$

12. Check the reflected power level. It should be near 0 W.
13. Check for alarms using the View Alarms screen.
14. Set up your desired presets using the Main Menu -> Edit Presets menu, noting you can create up to 62 presets. See the "Operating the Transmitter" section of the NX10 Operations & Maintenance Manual for detailed information.
15. Set the time and date using the Main Menu -> User Settings-> Set Clock screen.

16. Using a web browser go to ftp://www3.nautel.com/NX_Series/ to make sure your software version is the latest available. Check the existing software version using the remote AUI's System Settings-> Upgrade Software page. If necessary, update your software. See the "Standard Maintenance" section of the NX10 Operations & Maintenance Manual for detailed information.

17. To improve overall system security, change the login password for the AUI display. Nautel factory sets the AUI with a default login password (see "Changing the Password" on page 3.2.125 of the NX10 Operations and Maintenance Manual).

18. If you wish to participate in the Nautel Phone Home feature, which allows Nautel support personnel to monitor, analyze and proactively troubleshoot your transmitter, use the remote AUI to enable the use of Phone Home. See the "Operating the Transmitter" section of the NX10 Operations & Maintenance Manual for detailed information.

19. If you purchased the Exgine option (i.e., an Exgine PWB is installed on the exciter panel), use the front panel UI or the AUI to configure your Exgine parameters. See the "Configuring Exgine Settings" on page 3.2.97 of the NX10 Operations & Maintenance Manual for detailed information.

20. If you purchased the GPS Sync PWB option (i.e., a GPS Sync PWB is installed on the exciter panel), use the AUI to set the synchronization source to "GPS Sync Card". See the "Exciter Clock Calibration" on page 3.2.130 of the NX10 Operations & Maintenance Manual for detailed information.

21. Use the front panel UI or remote AUI to configure your desired remote inputs and outputs. See the "Operating the Transmitter" section of the NX10 Operations & Maintenance Manual for detailed information.

Modulation Checks

Verify that the RF output is appropriately modulated when audio is applied:

1. Connect an appropriate modulation monitor to the control/interface PWB's RF MONITOR BNC connector (J1). The RF monitor level is factory set for 5 V rms. Ensure there is sufficient attenuation installed between the RF MONITOR connector and the modulation monitor.

2. From the front panel UI's Main Menu -> Select Presets menu, select the desired preset and verify the AM Source is set for your audio signal generator.

3. Verify that an audio signal generator is connected to J7 (AES1) or J9 (balanced analog) on the control/interface PWB, and that its output is preset to 1000 Hz at a zero output level (turned off).

4. Turn on the audio signal generator and increase the output level of the audio signal generator until a modulation depth of 100% is attained, as indicated on the modulation monitor. The audio signal generator's output level should be at the user-defined input level (e.g., 10 dBm) set in the preset.

5. Use the modulation monitor to verify that the RF output's modulation envelope is acceptable.
6. Check the ac sample voltage using either the local front panel UI (Main Menu-> View Status -> View Meters -> Rack) or the remote AUI (click Meters, then select Rack 1 and then select AC Sample). It should be between 297 V and 321 V.
7. Set the output level of the audio signal generator to zero (off).
8. Turn off the RF power stage: press RF Off. The RF Off button's LED will turn amber.
9. Disconnect the audio signal generator from J7 or J9 on the control/interface PWB.

Going On-Air

WARNING! IF A JUMPER IS PLACED BETWEEN INTERLOCK PINS J6A-19 AND J6A-20 ON THE CONTROL/INTERFACE PWB, SAFETY FEATURES CONTROLLED BY THE EXTERNAL INTERLOCKS WILL BE DISABLED. A FAIL-SAFE METHOD OF ALERTING PERSONNEL TO THIS FACT SHOULD BE IMPLEMENTED. VOLTAGES WHICH ARE DANGEROUS TO LIFE WILL BE PRESENT ON THE RF OUTPUT STAGES IF THE TRANSMITTER IS TURNED ON.

IMPORTANT: Before going on the air, if you want the safety interlocks to operate properly, the shorting jumpers installed in "Pre-Commissioning Tasks" on page 2.8.1, Step 3 should be removed and the antenna system's interlock should be installed.

When the commissioning tests are successfully completed, connect the studio audio to the transmitter's appropriate audio input connector, follow the steps below to go on-air, and then complete any emission tests that are required.

1. Turn off the power using the ac disconnect switch, if one is being used, or else at the ac source.
2. Connect the transmitter's RF output to an antenna system (or verify that the current connection is intact). Ensure that a ferrite toroid (Nautel Part # LP23) is installed on the RF coaxial hardline at the transmitter's output.
3. Turn on the transmitter's ac power.
4. Connect the desired modulation source to the transmitter (see Section 1.7, "Planning audio inputs" of the Pre-Installation manual for connection options).

   NOTE: If analog modulation is being applied, it is recommended that negative modulation peaks do not exceed -96% and positive peaks do not exceed 140% to minimize audio distortion caused by signal clipping.

5. Use the front panel UI controls to begin transmitter operation. For detailed instructions on using the front panel UI or the remotely accessible advanced user interface (AUI), refer to the *NX10 Operation & Maintenance Manual.*
6. Check the four LEDs on the left-hand side of the front panel UI. They should all be green, indicating normal operation. If not, check for alarms by navigating to the front panel's Main Menu -> View Status -> View Alarms screen and consult the NX10 Troubleshooting Manual for detailed information on each alarm.

Network Setup

If you wish to remotely control the transmitter via a network or directly through a laptop, configure your network parameters as follows:

1. Verify that the networking (DHCP enable or disable) decisions outlined in Section 1.2, "Pre-installation tasks" of the Pre-Installation Manual have been made. To use DHCP, you must have a visible DHCP server on your network. If you are not planning to use DHCP (i.e., your network does not have a DHCP server), you must obtain an IP address and netmask from your network administrator as well as gateway and nameserver(s) as applicable.

2. From the front panel UI, go the Main Menu -> User Settings -> Network Settings screen (see Figure 2.8.4 on page 2.8.11).

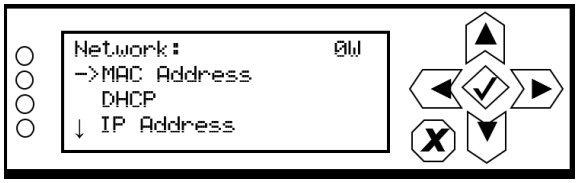
3. Ensure your network or laptop is connected to the ETHERNET (J3A) connector on the control/interface PWB (see Section 2.7, "Installing Control/Monitor Wiring"). Use one of the following two methods, depending on whether you are automatically (DHCP) or manually (static) assigning an IP address:

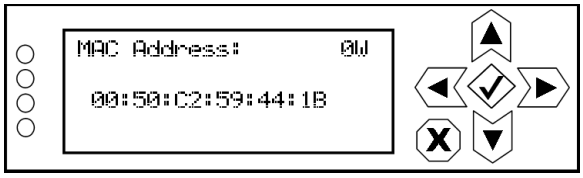
   - If your network has a DHCP server and DHCP is set to ENABLE (factory default), IP addresses will be automatically assigned. Verify this has occurred by viewing the IP Address and Netmask address sub-menus (Gateway and Nameserver addresses are optional; view as applicable). The MAC Address field cannot be modified.
   - If your network does not have a DHCP server or you wish to assign static IP addresses (i.e., direct connection with a laptop), set DHCP to DISABLE. Enter the appropriate addresses in the IP Address, Netmask, Gateway and Nameserver sub-menus, as applicable.

4. Once you have established an IP address, you can login to the NX10's advanced user interface (AUI), which allows you to remotely control and monitor the NX10. See the "Operating the Transmitter" section of the Operations and Maintenance Manual for detailed AUI information.

Figure 2.8.4: Network Settings screens

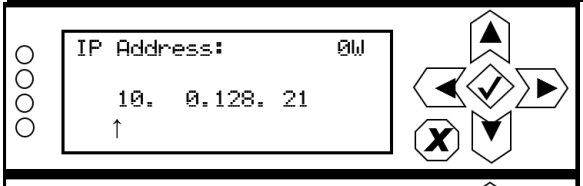
All addresses shown are for reference purposes only



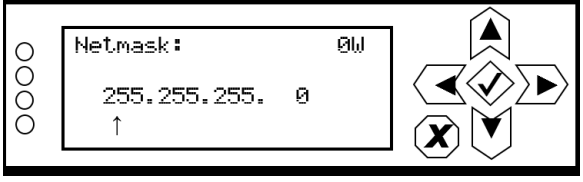


Displays a number that serves as unique network adapter identifier. This is set by the manufacturer and is displayed for informational purposes only (cannot be user set). It may be necessary to use this number to allow the AUI to access your network.

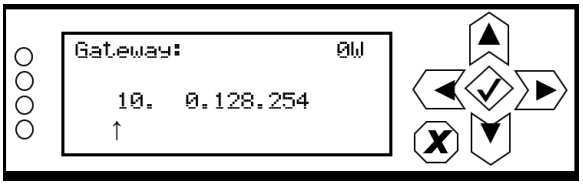
Set to ENABLE to automatically assign the IP Address, Netmask, Gateway, Nameserver 1 and Nameserver 2 by the access point (i.e., a router) or set to OFF to manually assign. In either case, the access point must be configured with the correct settings, which match the settings on the AUI in order for the AUI to access the network.



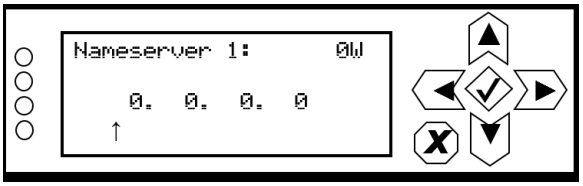
Displays a unique numerical network identifier for the transmitter. If DHCP was set to DISABLE, specify the IP address. Consult with your network administrator.If DHCP was set to ENABLE, this screen is for display purposes only.



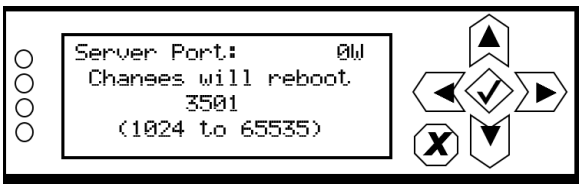
Masks an IP address, and divides the IP address into network address and host address. If DHCP was set to DISABLE, specify netmask. Typical netmask address shown. Consult with your network administrator. If DHCP was set to ENABLE, this screen is for display purposes only.



Displays the address of the network access point. If DHCP was set to DISABLE, specify the gateway address. Consult with your network administrator. If DHCP was set to ENABLE, this screen is for display purposes only.



Address that identifies the DNS host. The DNS (Domain Name System) translates internet domain and host names to IP addresses. DNS automatically converts the name typed into a web browser address bar to the IP addresses of web servers hosting those sites. If DHCP is set to DISABLE, specify the address. If DHCP was set to ENABLE, this screen is for display purposes only.



Used to identify the senders and receivers of messages. Also supports port forwarding (remapping) which allows the AUI of multiple transmitters to be accessed on the same network. See your network router documentation for additional remapping information and instructions. NOTE: Changes to this port are reset to 3501 after a software upgrade; reconfigured the port, as required, after an upgrade.
IMPORTANT: Do not use ports 3601 or 7005 for this setting.

SECTION 2.9: PARTS AND TOOLS

This section describes parts associated with the NX10 transmitter, and tools needed during installation and routine operation. Topics include:

Contacting Nautel

You can reach Nautel to order parts or for technical assistance at:

Nautel Limited
10089 Peggy's Cove Road
Hackett's Cove, NS Canada B3Z 3J4
Phone: +1.877.628.8353 (Canada/US)
+1.902.823.5100 (International)

Fax: +1.902.823.3183

Email: support@nautel.com

Web: www.nautel.com

Parts Supplied by Nautel

Ancillary Parts Kit

An ancillary parts kit is shipped with the NX10. This kit contains hardware needed during the installation process. The kit includes toroids, spare fuses, screws and other miscellaneous hardware.

Documentation

"NX5/NX3 Transmitter Manuals" on page 1.xi. of the Pre-Installation Manual.

Parts Not Supplied by Nautel

Some parts and materials required to complete installation are not supplied by Nautel. The parts you need vary with the installation requirements. The list of parts you normally provide yourself during installation include:

- A suitable 50 Ω RF output coaxial cable, terminated by the proper connector, complete with center male connector at the transmitter end.
- All external control and monitor wiring, including the associated terminating devices, conduit and conduit clamps.
- All electrical power cables, including conduit, terminating devices, and conduit clamps.
- Seismic anchoring bolts (1/2 inch or 12 mm), optional

Parts Ordering

You can order replacement parts from your Nautel sales agent, or directly from Nautel through the Nautel website.

Module Replacement Program

Nautel offers a module replacement program for customers who require expedited servicing and replacement of faulty modules. The module replacement program provides immediate replacement of failed modules with refurbished modules.

- The replacement module is shipped to the customer as soon as the customer reports the failure. The customer then returns the failed module to Nautel using the same shipping package.

Tools for Installation

The tools you need during transmitter installation include the following:

- Digital voltmeter
- Phillips screwdrivers, sizes #1 and #2
- Pliers
- Wire cutters
- Slot screwdriver, 5 mm (3/16 inch)
- Metric and Imperial socket set up to 24 mm (15/16 inch)
- Metric and Imperial wrench set up to 25 mm (1 inch)
- Feeler gauge (to measure spark gap)
- Torque wrench (capable of up to 60 in-lbs or 6.7 N-m)
- Ratchet wrench, 3/8 inch, drive
- Appropriately sized hole punch or drill (for audio input wiring, control/monitor wiring entry and AC power wiring entry)
- Analog audio or AES signal generator

SECTION 2.10: PRE-INSTALLATION / INSTALLATION ASSISTANCE

Nautel provides a number of support options to help you during pre-installation planning and preparation:

Pre-Installation Consulting

Nautel field support specialists are available to answer questions and work with you to ensure that your site will be ready for the installation of your NX10 transmitter. For support, contact Nautel Customer Service and request assistance ("On-Site Support" on page 2.10.3).

Installation and Commissioning Service

Nautel offers an installation and commissioning service to customers who want assistance with configuring and commissioning a new Nautel transmitter. After the customer completes the transmitter assembly and installation, Nautel technical personnel will spend up to three days on-site to help make the ac power, RF and remote connections, and to assist with the configuration and testing of Nautel equipment.

The customer is responsible for ensuring that the following stages of installation have been completed, prior to the arrival of Nautel personnel:

- Ac power wiring for the transmitter has been installed and connected at the breaker panel or the building's service entrance. If local electrical codes allow Nautel personnel to connect the transmitter to the ac supply, using the customer's cable, that task is included in this service. Otherwise, the customer must ensure that an approved electrician is present for this task.

- The customer has prepared the RF coaxial cable – used to connect the transmitter to the antenna – and installed the required connector. The customer has also installed the RF coaxial cable in place and connected it to the antenna, while leaving the transmitter end of the cable unconnected.
- Where required, all remote control and monitoring cables have been installed and connected to the station equipment (e.g., modulation monitor, frequency monitor, and power meter).
- The site has been made ready for the equipment, and adequate protection against lightning and lightning-induced transients has been provided.
- The transmitter has been unpacked, closely checked for any damage caused by shipping, and then assembled.
- The following test equipment has been made available at the site:
  - Two-channel oscilloscope (with probes)
  - Audio signal generator
  - Distortion analyzer
  - Modulation monitor
  - Frequency counter
  - 50 Ω test load (rated for 150% of carrier power, VSWR less than 1.1:1)

Nautel's service representative takes full responsibility for commissioning the transmitter, validating all external interfaces (i.e., the ac supply, RF output, remote control and monitoring equipment) and checking out the equipment prior to activation. The service representative turns on the transmitter, performs all adjustments and set-up procedures, and carries out *proof of performance* tests at the site. These tests ensure that the transmitter is operating normally in compliance with its specifications. The service representative also provides a demonstration and a short explanation of the operation of the transmitter. Finally, the customer signs an *Acceptance of Installation Certificate* that provides feedback to Nautel regarding the commissioning service.

Online Documentation

Nautel provides documentation online to customers, letting you familiarize yourself with specifications, operation, maintenance and troubleshooting prior to the delivery of your equipment. Go to http://support.nautel.com/login/ to access documents. See Nautel Website / Online Resources of the Pre-Installation Manual for details.

On-Site Support

If you require on-site assistance, Nautel's field support specialists can help you prepare your site and ensure that your NX10 transmitter installation can proceed as quickly as possible. For more information about on-site support, including scheduling and pricing, contact Nautel Customer Service:

- Telephone: +1.902.823.5100
- Fax: +1.902.823.3183
- Email: support@nautel.com

After business hours (Atlantic time or Eastern time in North America), requests sent by fax or email will be acknowledged within one working day.

Training

Nautel's SBE-certified broadcast training programs satisfy your day-to-day knowledge requirements. Students participating in Nautel's broadcast transmitter or RF basics training programs earn one SBE credit for each completed day of training.

Nautel's comprehensive selection of training programs will help customer staff develop valuable skill sets, reduce downtime, and make the most of the customer's technology investment.

Nautel training programs are made up of individual modules that can be 'mixed and matched' to meet the customer's specific training needs. All Nautel training courses are available at the Nautel Training Center. Training can also be provided at the customer's facility, and training the customer's technical staff on the customer's transmitter.

All training courses at the Nautel Training Centre combine classroom and hands-on laboratory work to ensure a balanced learning experience.

Nautel training courses feature:

- Limited class sizes to ensure maximum student participation and access to equipment
- Emphasis on need-to-know, day-to-day knowledge
- Labs that focus on the tasks most often performed at the transmitter site.

Many of our classes also include diagnostic lab exercises.

Standard Warranty

Nautel guarantees all mechanical and electrical parts of Nautel Transmitters for a period of forty-eight months, and all other Nautel manufactured equipment (including Importers and Exporters) for a period of twelve months from date of shipment, provided the equipment has been installed, operated and maintained in accordance with Nautel's recommendations, and the equipment has not been misused, neglected or modified. Nautel's liability is limited, at the absolute discretion of Nautel, to repairing or replacing returned equipment that to the satisfaction of Nautel has been found defective.

Warranty for third-party items is provided by the Original Equipment Manufacturer. Exercise of such warranty shall be between the Buyer and the Third-Party.

1. Properly qualified technical personnel must install, maintain, and repair the equipment in accordance with Nautel recommendations and good engineering practice.

2. A "Part Failure" shall be deemed to have occurred when the part has become defective, or does not have the characteristics required for the specified equipment performance:

   a. when the equipment is operated within the design parameters, and

   b. when the equipment is installed and adjusted according to Nautel's prescribed procedures as stated in the instruction manual.

3. Nautel shall provide replacements for all "Parts" to the Buyer when they become defective during the warranty period, and upon the return of the defective part. Replacement parts warranty to be 90 days or end of original warranty; whichever comes first.

4. If the Buyer receives a replacement module, as part of Nautel's module exchange program, the old module must be returned to Nautel within 30 days of receipt of the new module, at the buyers expense. If the old module is not received after 30 days, the customer will be invoiced. The buyer is responsible for installing the replacement/repaired module in the transmitter.

5. In the event that a "Part" fails during the warranty period and causes damage to a subassembly which cannot be readily repaired in the field, the entire subassembly so damaged may be returned to Nautel for repair. The repairs will be made without charge to the Buyer.

6. Written authorization must be obtained before returning any equipment or goods for any reason. Equipment or goods returned under this warranty shall be delivered to Nautel's premises at the Buyer's expense. Where no-charge warranty replacements or repairs are provided under items 2, 3, 4, or 5, Nautel will pay that part of the shipping costs incurred in returning the part/assembly to the Buyer. Note: the Buyer is responsible for any and all import fees, duties or taxes.

7. Nautel does not warrant or guarantee, and will not be liable for:

    a. defects or failures caused in whole or in part by abuse, misuse, unauthorized repair attempts, unauthorized alteration or modification of the equipment;

    b. equipment built to customer specifications that is later found not to meet customer needs or expectation;

    c. performance of equipment when it is used in combination with other equipment not purchased, specified, or approved by Nautel;

    d. damages and performance limitations due to outside forces such as lightning, excessive heat or cold, excessive ac surges or high corrosive environments;

    e. changes made by personnel other than Nautel authorized personnel, including charges incurred; and

    f. for any costs for labor performed by the customer without Nautel's prior written approval.

8. Nautel does not warrant that software:

    a. is free or errors, bugs or defects;

    b. will be compatible with third party software;

    c. results, output or data provided through or generated by the software are accurate, complete, or reliable; and

    d. errors found will be corrected.

9. Nautel shall have the right and shall be provided full access to investigate whether failures have been caused by factors beyond its control.

10. In no event shall Nautel be liable for any consequential damages arising from the use of this equipment.

11. This warranty is in lieu of all other express warranties of Nautel, whether express or implied, and Nautel does not assume, nor is any other person authorized to assume on Nautel's behalf, any other obligation or liability.

12. Third party items ordered, the guarantee/warranty of these items will be from the manufacturer of these items. Exercise of such warranty shall be between the Buyer and the third party provider.

13. Nautel provides telephone and email support for its products for the life of the product at no charge. After the warranty period, parts and on-site support for the equipment are offered at a rate to be determined upon request.

Technical Assistance

Nautel's field service department provides telephone technical assistance on a 24 hour, seven days a week basis. Requests by other media (fax or e-mail) will be responded to the next working day if received after Nautel's normal working hours. Contact the appropriate field service centre:

Nautel Limited
10089 Peggy's Cove Road
Hackett's Cove, NS Canada B3Z 3J4
Phone: +1.902.823.3900 or
Toll Free: +1.877.6NAUTEL (6628835) (Canada & USA only)
Fax: +1.902.823.3183

Nautel Inc.
201 Target Industrial Circle
Bangor, Maine USA 04401
Phone: +1.207.947.8200
Fax: +1.207.947.3693

Customer Service (24 hour support)
+1.877.628.8353 (Canada & USA only)

+1.902.823.5100 (International)

Email: support@nautel.com
Web: www.nautel.com

Module Exchange Service

In order to provide Nautel customers with a fast and efficient service in the event of a problem, Nautel provides - for North American customers only - a factory rebuilt, module exchange service which takes full advantage of the high degree of module redundancy in Nautel equipment.

For complete details on this service, see http://support.nautel.com/policies/repairs-exchange/

Extended Warranties

Nautel's standard four-year warranty provides excellent coverage and satisfies most customers' needs. However, if you want extended coverage, Nautel offers one and two-year Extended Warranty Plans to cover electrical and mechanical repairs or replacements for all Nautel equipment.

Coverage

The Extended Warranty Plan includes:

- A module exchange program for many common modules and circuit boards (North America only)
- Toll-free hotline (North America only)
- Necessary labor performed by Nautel authorized personnel to repair the product back to factory specifications
- Necessary components
- Modifications to correct performance problems
- Return shipping

Details

Extended Warranty Plans must be purchased prior to the expiration of original four-year warranty.

One-year Extended Warranty Plans add an additional year (12 months) of coverage after the end of the customer's standard four-year warranty. The two-year plan adds an additional two years (24 months).

Only repairs done at Nautel's facilities or by Nautel authorized personnel will be covered by the Extended Warranty Plans.

You must ship faulty products back to Nautel, prepaid, and in the original package or in a package that provides equivalent protection.

Nautel can choose to repair or replace equipment.

Purchasing a One or Two-Year Extended Warranty Plan

If the transmitter is still covered by its original four-year warranty period, you can contact Nautel by telephone, fax, mail, or email with the model number, serial number and date of purchase.

Once you purchase a Nautel Extended Warranty Plan, you receive an extended warranty plan certificate, plan number, and a toll-free number (North America only) to call for any service-related issues.

Using the Extended Warranty Plan

Contact Nautel's Canadian or U.S. service facility by phone, fax, or email as soon as a problem occurs. The following will be required when contacting Nautel:

- Extended warranty plan number
- Product model number
- Serial number
- Brief description of the problem

If Nautel’s service technicians are unable to solve the problem over the telephone, Nautel will give you an RMA number. You then return the module or circuit board to a Nautel service facility so that Nautel can provide a replacement. Do not ship a component back to Nautel until you have an RMA number.

SECTION 2.11: LIST OF TERMS

This section defines some of the terms that are used in Nautel documentation.

ADC. Analog to Digital Converter.

AES-EBU. Audio Engineering Society/European Broadcasting Union (AES/EBU) is the name of a digital audio transfer standard. The AES/EBU digital interface is usually implemented using 3-pin XLR connectors (the same type connector used in professional microphones). One cable carries both left and right-channel audio data to the receiving device.

B+. The high voltage dc generated by the transmitter's ac power supply for use within the transmitter. The B+ voltage is used to supply the transmitter's modulators and other transmitter circuitry.

CUTBACK. A reduction in RF output power, caused by a total power limit fault or the occurrence of three shutbacks within a five second period.

DAC. Digital to Analog Converter.

DAM. Dynamic Amplitude Modulation.

DCC. Dynamic Carrier Control.

DRM. Digital Radio Mondiale. A set of digital audio broadcasting technologies designed to work existing AM radio channels.

DSP. Digital Signal Processing.

FPGA. Field Programmable Gate Array.

HD RADIO. HD Radio is another term for In Band On Channel (IBOC) technology. HD Radio is a trademark of iBiquity Digital Corporation.

IBOC. Nautel In-Band-On-Channel technology provides high quality digital audio over existing AM radio channels.

IPM. Incidental Phase Modulation

LATCHING ALARM. An alarm that, while active, keeps the transmitter in an 'RF inhibited' state. This type of alarm (e.g., High SWR Shutdown) require a reset - locally or remotely - to attempt to restore transmitter operation.

NE IBOC. Nautel's In-Band-On-Channel signal generator. See IBOC. Required for NX series IBOC installations.

PDM. Pulse Duration Modulation.

PRESET. A setting that controls power level, active exciter, and power scheduler status on a time-of-day and date basis. Exciters can be configured on a preset for a specific operating mode (for example, Exciter A - conventional AM, and Exciter B - IBOC). The NX10 allows you to pre-program multiple presets.

SHUTBACK. A complete loss of RF output power, caused by any one of a variety of faults, including high VSWR, low B+ voltage, high RF current, RF drive failure, external interlock or spark gap.

SNMP. Simple network management protocol. A method of communication via web browser between the transmitter and remote computer using specific agent software (in the transmitter) and client software.

SURGE PROTECTION BOARD. An electrical panel that protects equipment from electrical surges in the ac power supply, antenna or site ground caused by lightning strikes.

VSWR. Voltage standing wave ratio. This is an expression of the ratio of forward voltage to reverse voltage on the feedline and antenna system. An ideal VSWR of 1:1 provides maximum transmitter-antenna efficiency.

NX10 INSTALLATION MANUAL

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Nautel Limited
10089 Peggy's Cove Road
Hackett's Cove, NS Canada B3Z 3J4

Toll Free: +1.877.6NAUTEL (662.8835)
(Canada & USA only) or
Phone: +1.902.823.3900 or
Fax: +1.902.823.3183

Nautel Inc.
201 Target Industrial Circle
Bangor, Maine USA 04401

Phone: +1.207.947.8200
Fax: +1.207.947.3693

Customer Service (24-hour support)
+1.877.628.8353 (Canada & USA only)
+1.902.823.5100 (International)

Email: support@nautel.com
Web: www.nautel.com