

# NX300 TRANSMITTER

## INSTALLATION MANUAL

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The comparisons and other information provided in this document have been prepared in good faith based on publicly available information. The reader is encouraged to consult the respective manufacturer's most recent published data for verification.

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## RELEASE CONTROL RECORD

| Issue | Date       | Reason                         |
|-------|------------|--------------------------------|
| 3.0   | 2012-11-01 | Release 3 of product (NARA54B) |





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## SECTION 1: PREPARING FOR INSTALLATION

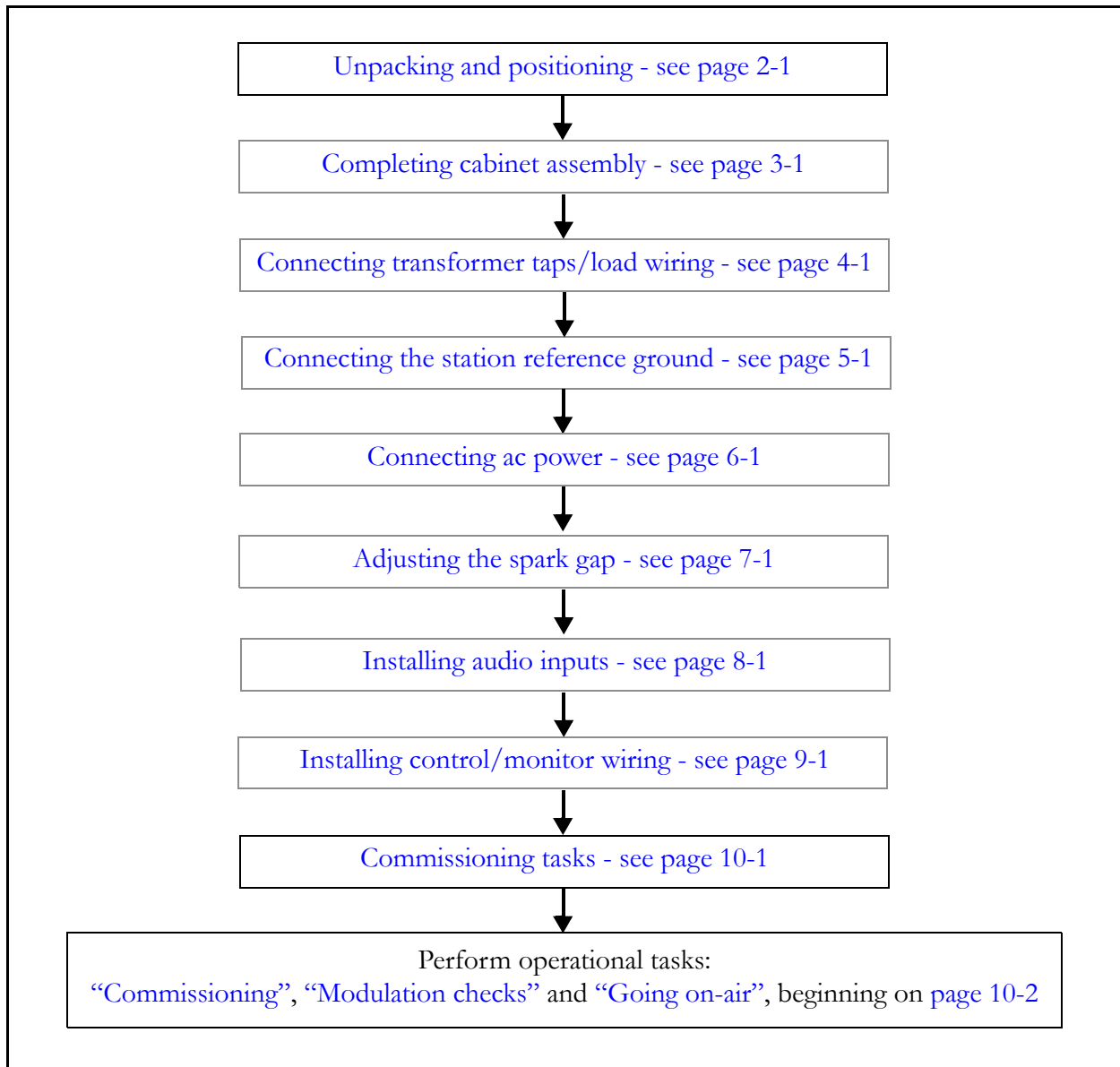
Before installing your NX300 transmitter, perform the following steps:

1. Ensure that you have performed the pre-installation tasks described in the *NX300 Pre-installation Manual*.
2. Make sure that you received all the components. (Check your packing list.)
3. Inspect all crates and packages for damage.
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 Philips head screws.
  - Remove any visible packing material, including braces, from the crate's interior.
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 11-1](#).
9. When you are ready to install the NX300 transmitter, follow the steps shown in [Figure 1.1 on page 1-2](#).

|            |  |
|------------|--|
| <b>TIP</b> | When you have completed a task or step, put a check mark beside the step number. |
|------------|--|



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|--|
| <b>CAUTION:</b><br>FAILURE TO COMPLY WITH RECOMMENDATIONS MAY VOID YOUR MANUFACTURER'S WARRANTY. FOR MORE INFORMATION, REVIEW YOUR WARRANTY DOCUMENTS. |
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**Figure 1.1: Flowchart - Installing the transmitter**

## SECTION 2: UNPACKING AND POSITIONING

To install an NX300 transmitter, perform the following tasks:

1. Lift and slide the transmitter cabinets off the base of their crates. The NX300 contains four main crates - a control cabinet, a middle cabinet, an output cabinet and a transformer cabinet. Crated and uncrated cabinet weights are shown in [Table 2.1](#). An additional crate, which contains the ac safety interlock switch, may be provided.

**Table 2.1: NX300 Cabinet Weights**

| Cabinet                    | Crated Weight<br>kg (lbs) | Uncrated Weight<br>kg (lbs) |
|----------------------------|---------------------------|-----------------------------|
| Control Cabinet            | 670 (1477)                | 567 (1250)                  |
| Middle and Output Cabinets | 670 (1477)                | 567 (1250)                  |
| Transformer Cabinet        | TBA (TBA)                 | 1579 (3481)                 |
| Ac Power Disconnect Switch | TBA (TBA)                 | 372 (820)                   |



**WARNING:**

**DO NOT MOVE THE TRANSFORMER CABINET UNLESS SUFFICIENT MANPOWER OR MECHANICAL ASSISTANCE IS AVAILABLE TO MOVE IT INTO POSITION WITHOUT DAMAGING THE CABINET OR CAUSING INJURY TO PERSONNEL.**

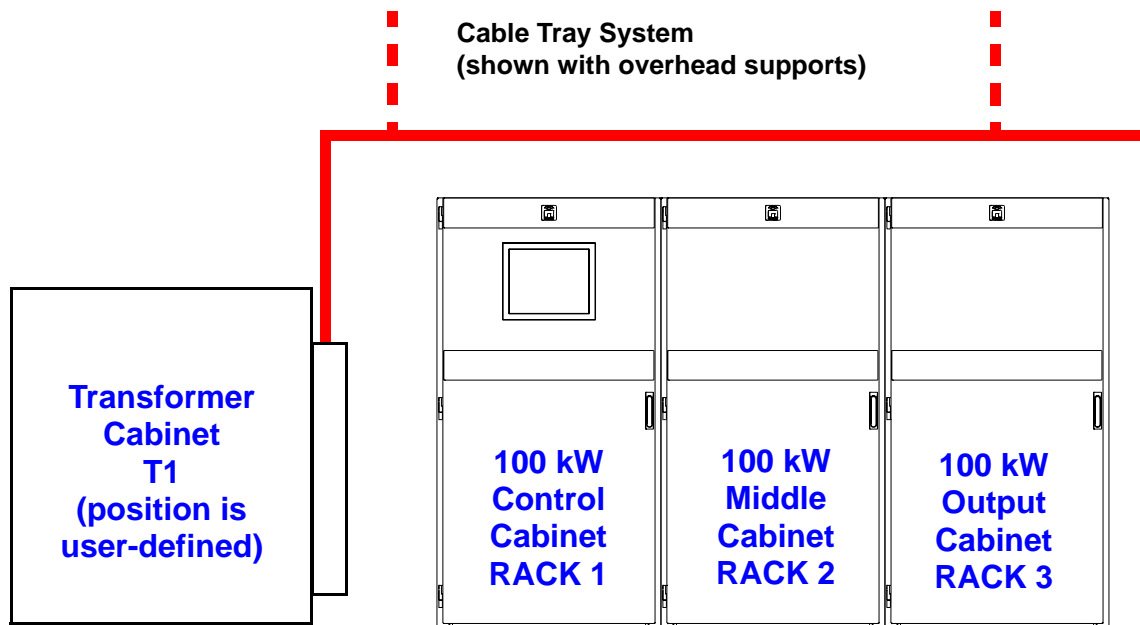
2. Using necessary mechanical assistance (forklift, etc), position the four cabinets in their final location, with their mating surfaces in close proximity. See [Figure 2.1 on page 2-2](#) for cabinet layout. Cabinets are labelled to assist in their positioning.



**Note:**

The position of the transformer cabinet can be determined by the user. The cabinet's location should accommodate input wiring from the ac power source (or ac power disconnect switch), output wiring to each of the transmitter cabinets, as well as a cable carrying system to support the output wiring.

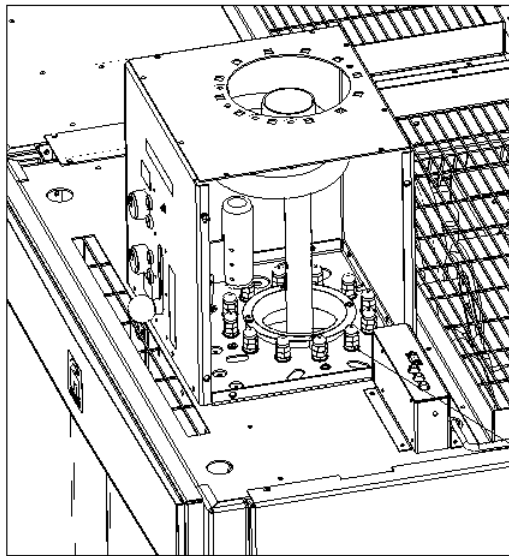
3. During assembly, remove any packing materials, loose wires or connectors that are sandwiched between cabinet mating surfaces.

**Figure 2.1: NX300 Cabinet Layout**

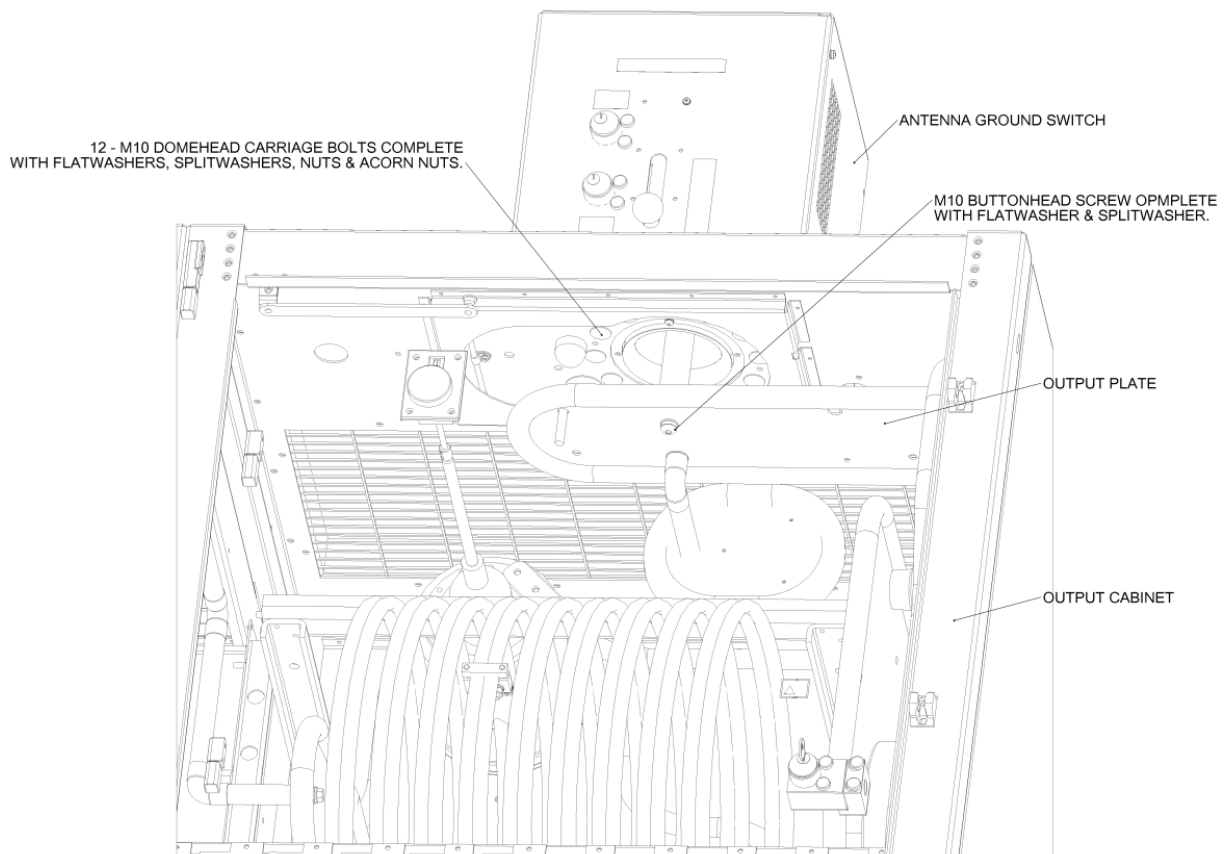
4. Verify that the ac power cable from the ac power disconnect switch reaches the entry point in the power transformer cabinet.
5. Verify that the RF feed cable reaches the RF output connector on the top of the output cabinet.
6. Install the antenna ground switch on top of the transmitter cabinet as follows:
  - Locate the antenna ground switch (Nautel Part # 213-8320-05) that was packed with the ancillary crate for shipping.
  - Open the front door of the output cabinet and unlock and open the filter door to gain access to the inside of the transmitter cabinet.
  - Remove any protective wrapping from the antenna ground switch and position it on top of the output cabinet cabinet, noting proper orientation and that the aluminum rod protruding from the bottom of the antenna ground switch must pass through a clearance hole in the transmitter cabinet (see [Figure 2.2 on page 2-4](#)).

- 
- See [Figure 2.2 on page 2-4](#). Temporarily remove the right-hand side cover (as viewed from the front) from the antenna ground switch, to allow access to the securing hardware. Using the hardware provided with the transmitter, secure the antenna ground switch to the top of the cabinet using 12 sets of M10 hardware (dome head bolt, split washer, flat washer, nut and acorn nut). Secure the aluminum rod to the output plate using an M10 button-head cap-screw, split washer and flat washer. Ensure hardware is tight. Re-install the antenna ground switch's side cover.
  - Close and lock the filter panel. Close the front door of the transmitter. Continue with transmitter installation.
7. Locate the cable tray parts kit that was provided to support the cables that will connect ac power between the ac power disconnect switch and the primary for the power transformer, and also between the secondary of the power transformer and the transmitter cabinets. These parts may have been provided by Nautel (Cable Tray Parts List # 207-8385-\*\*) or purchased from an alternate vendor. Install the cable tray system according to your transmitter system dimensions. If the cable tray kit was purchased from Nautel, refer to Section 5 - Electrical Requirements of the *NX300 Pre-installation Manual* for standard drawings and parts lists or to the provided system manual for custom drawings and parts lists - to aid in the installation.

**Figure 2.2: Installing Antenna Ground Switch**



UPPER SIDE OF 12 DOME-HEAD CARRIAGE BOLTS. INSTALL FLAT WASHER, SPLIT WASHER & NUT AND TIGHTEN IN PLACE. INSTALL M10 ACORN OVER REMAINING END OF EACH BOLT AND TIGHTEN.



NOTE: FILTER DOOR REMOVED FOR CLARITY

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## SECTION 3: COMPLETING CABINET ASSEMBLY

To complete the assembly of the NX300 transmitter's cabinets, perform the following tasks:

**Note:**

The assembly instructions in this section help to achieve basic cabinet assembly, and are mostly limited to exterior mechanical connections. All assembly items and hardware that is not already in the transmitter is located in the transmitter's ancillary crate.

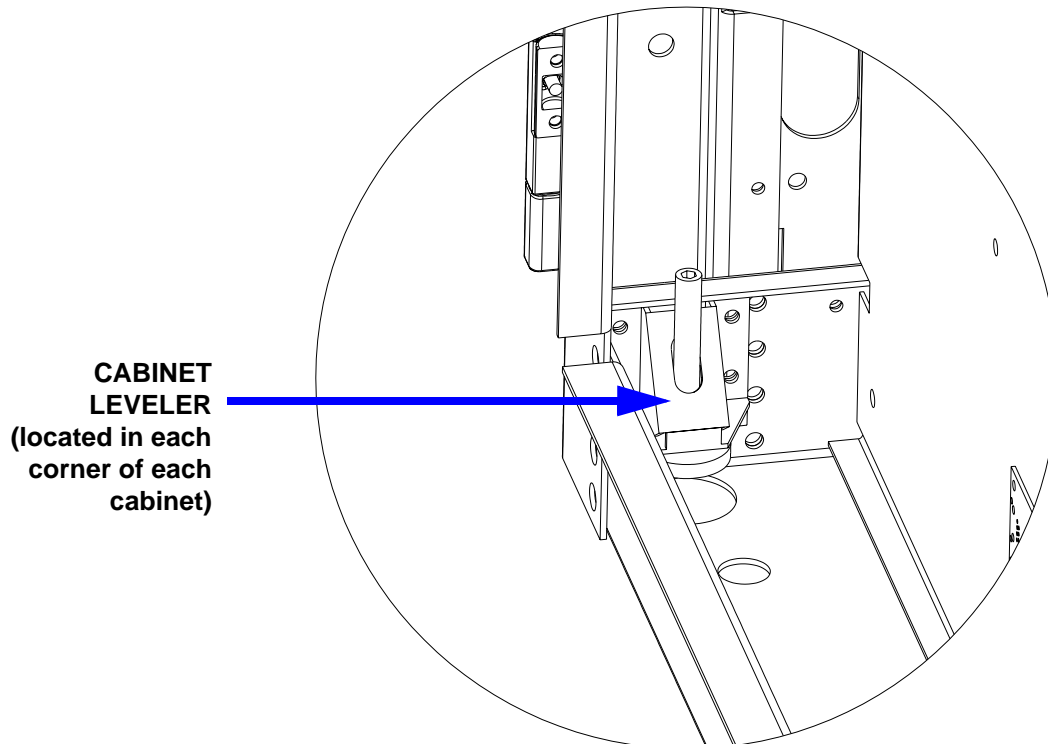
**Do not** allow any loose or dropped hardware to remain inside the transmitter.

1. Remove the side panel (see [Figure 3.4 on page 3-10](#)) from each of the control cabinet and output cabinet by removing the three M5 screws at the top of the panel and lifting the panel upward, then pullign upward. Retain hardware for reassembly later in this section.
2. Position the front and top edges of the control cabinet (Rack 1), middle cabinet (Rack 2) and output cabinet (Rack 3) so that they are flush with a straight line representing the front and top of the transmitter. Make sure the sides of adjacent cabinets are touching each other.
3. Open the front door of the control cabinet and lock it in the open position using the door stop near the top of the cabinet. Open the remaining front and rear doors. Door stops on the rear doors are located at the bottom of the cabinet.
4. Loosely bolt the cabinets together using eight sets of M8 hardware [long bolts, split washers and flat washers], two between each cabinet interface in the front and two between each cabinet interface in the back ([Figure 3.5 on page 3-11](#)). Do not tighten hardware at this time. If you cannot install all eight sets of cabinet interfacing hardware, try levelling the cabinets in [Step 5](#) and then install the remaining hardware.

**CAUTION:**

Before adjusting the levelers in [Step 5](#), make sure that the cabinets are in their final position. Moving the cabinets after the levelers have been adjusted may damage the levelers.

5. Using a 5 mm hex key (located in the ancillary kit), level the cabinets by adjusting the levelers in each cabinet's bottom corner (see [Figure 3.1 on page 3-2](#)). Ensure the front and rear faces of all three cabinets are flush and the tops (front and back) are level.

**Figure 3.1: Cabinet Leveler Detail**

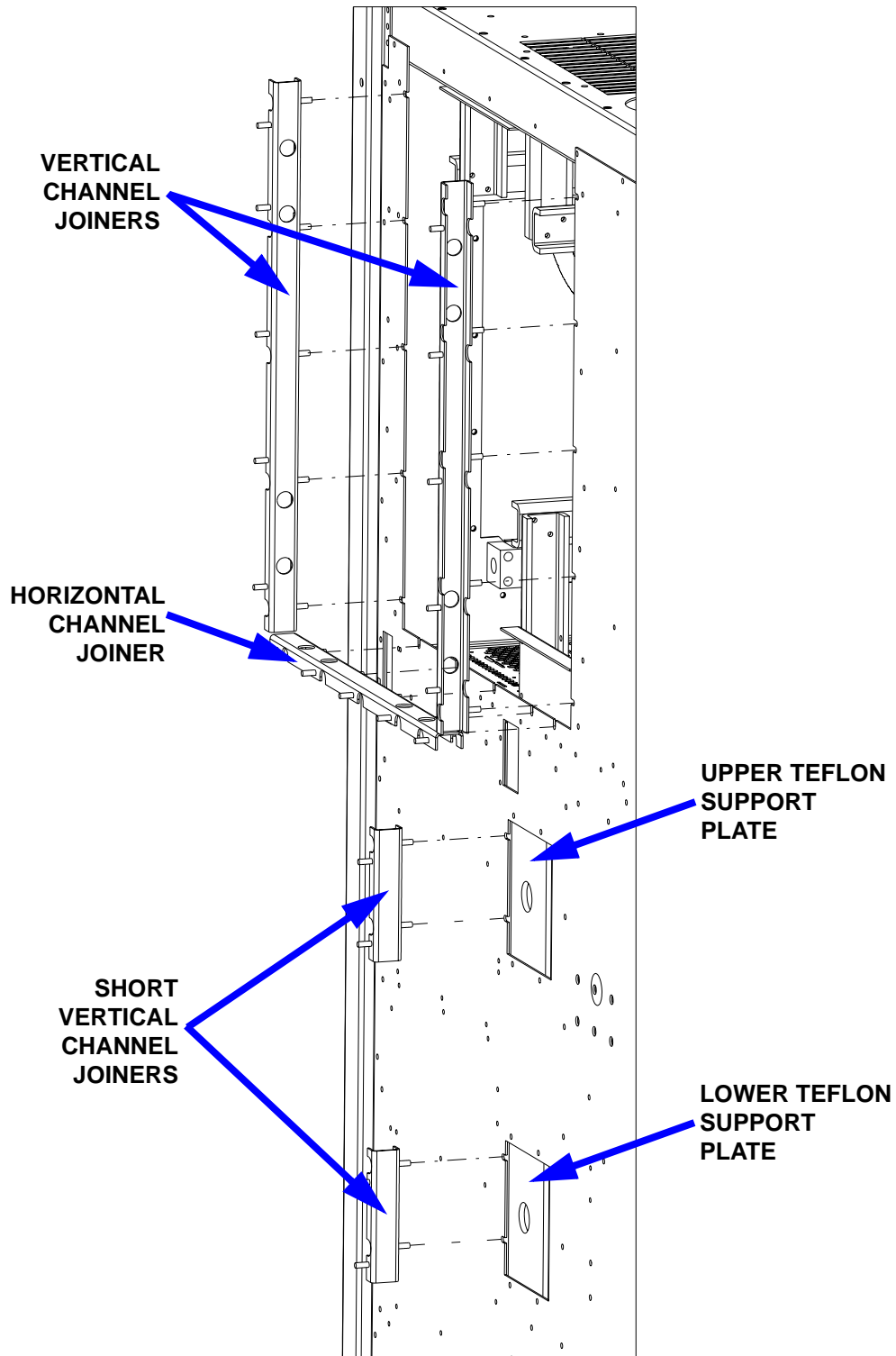
6. Open the filter door behind each cabinet's front door by unlocking the door and removing its M5 screws. Retain hardware.
7. See [Figure 3.2 on page 3-3](#) and [Figure 3.5 on page 3-11](#). Locate two "Long Vertical Cabinet Joiners" (Nautel Part # 207-8270), one "Horizontal Cabinet Joiner" (Nautel Part # 207-8270-01), two "Side Cabinet Joiners" (Nautel Part # 207-8270-02) and one "Connector Pipe" (Nautel Part # 194-6298-02), which are packed inside the filter compartment of each cabinet.
8. Install the joiners between the control cabinet and the middle cabinet, and between the middle cabinet and the output cabinet. Install the short joiners from the back of the cabinets, taking care not to damage the upper and lower teflon support plates. Install the vertical and horizontal joiners from the inside of the filter compartment. Secure each joiner using M6 hardware - starting at one end and moving toward the other end while making sure the joiner is properly seated.

**Note:**

It may be necessary to move the individual cabinets slightly to allow cabinet joiner installation. Any hardware dropped into the cabinets during installation must be located and removed.



Figure 3.2: Cabinet Joiner Channel Detail



9. Locate two “Top Joiner Plates” 207-8274-01. Attach each plate between the top of the two cabinet interfacing junctions (see [Figure 3.5 on page 3-11](#)) using 16 M5 screws.
10. Tighten the cabinet bonding hardware installed in [Step 4](#).
11. Install the connector pipe (194-6298-02) (see [Figure 3.5 on page 3-11](#) and [Figure 3.6 on page 3-12](#)) between cabinets 2 and 3. Torque securing nuts to 60 in-lb (6.8 N-m).
12. See [Figure 3.6 on page 3-12](#). In the control cabinet (Rack 1), unwrap the copper straps from inductors RK1-L7 and RK1-L8. Reattach the straps to the aluminum plate in the middle cabinet (Rack 2) using supplied hardware. Ensure proper hardware orientation as shown in [Figure 3.6 on page 3-12](#). Torque the strap hardware to 292 in-lb (32.7 N-m). Arrange or form the straps so that they do not touch inductors RK1-L7 or RK1-L8 or come within 0.5 inches (1.25 cm) of any ground potential point.
13. Locate and unpack all the “NX300 Internal Assembly” items (see [Figure 3.5 on page 3-11](#)) from the ancillary crate.
14. Remove the two cover plates (Nautel Part # 207-8162) from the side of the control and output cabinets (four plates total). Retain all securing hardware. It is not necessary to remove the center cover plate.
15. Refer to the “NX300 Internal Assembly” diagram in [Figure 3.5 on page 3-11](#), noting all parts are identified with a Nautel Part # (e.g., 207-xxxx). The combiner covers are already installed, and shown for reference only.
  - Locate and unpack a Nautel Part # 207-8251-02 “Copper Tube”. From the Output Cabinet side, carefully insert the “Copper Tube” (flat brass end first) into the upper, left opening behind the removed side cover plate and slide in approximately 2 ft (0.6 m), leaving at least six inches of the copper tube’s L-shaped brass end outside of the cabinet. Ensure that combiner transformer windings are not damaged.
  - Locate and unpack a Nautel Part # 207-8251-03 “Copper Tube”. Align its L-shaped brass end with the other copper tube and use the “Combiner Tube Jig” (Nautel Part # 207-9566) to hold the copper tubes in place while securing them together using two M8 captive screws. Remove the jig.
  - Carefully slide the joined copper tube section in and guide the end through the large hole in the “Teflon Plate” between the output cabinet and middle cabinet, leaving at least six inches of the second copper tube’s L-shaped brass end outside of the cabinet.

- Locate and unpack a Nautel Part # 207-8251-01 “Copper Tube”. Align its L-shaped brass end with the other copper tube and again use the “Combiner Tube Jig” to hold the copper tubes in place while securing them together using two M8 captive screws. Remove the jig.
  - Carefully slide the full-length copper tube assembly in and guide the end through the large holes in the “Teflon Plates” between the cabinets until it reaches the opposite end of the control cabinet. Secure the end of the copper tube assembly to the copper angle using an M12 bolt, Belleville washer and flat washer, torqued to 275 in-lbs (31 N-m).
16. Repeat [Step 15](#) for the lower copper tube assembly, noting the Nautel Part # identification.
  17. Locate and unpack current probes A67 (Nautel Part # 207-6213-02) and A71 (Nautel Part # 207-6213-03) in the ancillary crate.
  18. Install current probe A71 at the output cabinet end of the “upper” copper tube installed in [Step 15](#) (see [Figure 3.5 on page 3-11](#)), using three sets of M8 hardware on the side and an M12 bolt, Belleville washer and flat washer on the end. Torque the M12 bolt to 275 in-lbs (31 N-m).
  19. Install current probe A67 at the output cabinet end of the “lower” copper tube installed in [Step 16](#) (see [Figure 3.5 on page 3-11](#)), using three sets of M8 hardware on the side and an M12 bolt, Belleville washer and flat washer on the end. Torque the M12 bolt to 275 in-lbs (31 N-m).
  20. Re-install the four side cover plates removed in [Step 14](#).
  21. Locate four combiner splice plates (Nautel Part # 207-8140-09), packed in the transmitter.
  22. Install the combiner splice plates, as shown in [Figure 3.5 on page 3-11](#), between the existing combiner covers in each cabinet. Install two plates between the upper and lower combiner covers in cabinets 1 and 2. Install two plates between the upper and lower combiner covers in cabinets 2 and 3. Secure each plate using M8 hardware already in the combiner covers.

23. Locate and install the directional coupler (3A68, Nautel Part # NAFP107A) on top of the output cabinet (Rack 3) using the hardware provided. Locate the directional coupler's mating connectors (9-pin D-sub P27 and Rogowski current probe BNC P1) that are tyrapped inside the output cabinet. Remove shipping tyrap and route these cables through the clearance hole adjacent the directional coupler. Mate D-sub connector P27 to A1J3. Mate BNC connector P1 to A1J4.
24. See [Figure 3.3 on page 3-9](#). Locate the RF drive cables terminated by RJ45 connectors RK2-W64P1 and RK3-W64P1, noting they are tyrapped in the front of each of the middle cabinet (Rack 2) and output cabinet (Rack 3), in each cabinet's bottom, left-hand corner. Cut securing tyrap and neatly route RK2-W64P1 and RK3-W64P1 into the control cabinet (Rack 1) to the control/exciter panel (RK1-A11). Route both connectors to the control/interface PWB (RK1-A11A1). Connect RK2-W64P1 to J14C and connect RK3-W64P1 to J14E.
25. See [Figure 3.3 on page 3-9](#). Locate the PDM drive cables terminated by RJ45 connectors RK2-W62P1 and RK3-W63P1, tyrapped in the front of each of the middle cabinet (Rack 2) and output cabinet (Rack 3), in each cabinet's bottom, left-hand corner. Cut securing tyrap and neatly route RK2-W62P1 and RK3-W63P1 into the control cabinet (Rack 1). Route both connectors to the control/interface PWB (RK1-A11A1). Connect RK2-W62P1 to J15B and connect RK3-W63P1 to J15C.
26. See [Figure 3.3 on page 3-9](#). Locate 25-pin D-sub connectors RK1-P32 and RK2-P33 that are tyrapped in the front of control cabinet Rack 1 (bottom, right-hand corner) and middle cabinet Rack 2 (bottom, left-hand corner). Cut securing tyrap, route RK1-P32 to RK2-P33 and mate them together.
27. See [Figure 3.3 on page 3-9](#). Locate 25-pin D-sub connectors RK2-P32 and RK3-P33 that are tyrapped in the front of middle cabinet Rack 2 (bottom, right-hand corner) and output cabinet Rack 3 (bottom, left-hand corner). Cut securing tyrap, route RK2-P32 to RK3-P33 and mate them together.
28. See [Figure 3.3 on page 3-9](#). Locate 9-pin D-sub connector RK1-P27 that is tyrapped in the front of control cabinet Rack 1, in the upper, right-hand corner. Cut securing tyrap. Route RK1-P27 through middle cabinet Rack 2, into output cabinet Rack 3 and up through a top clearance hole in rack 3. Connect RK1-P27 to A1J3 of the output cabinet's directional coupler (RK3-A68).
29. See [Figure 3.3 on page 3-9](#). Locate BNC connector P35 that is tyrapped in the back of middle cabinet Rack 2, near a side clearance hole adjacent control cabinet Rack 1. Cut securing tyrap and neatly route RK2-P35 into control cabinet Rack 1. Locate BNC connector P24 that is tyrapped in control cabinet Rack 1. Connect RK2-P35 to RK1-P24.

30. Cabinet assembly is complete. Leave the back doors open to allow installation of ac power wiring (see [Section 6, “Connecting ac power” on page 6-1](#)) and assembly of the output cabinet’s station reference ground (see [Section 5, “Connecting the station reference ground” on page 5-1](#)). Leave the front doors and filter doors open to allow spark gap adjustment (see [Section 7, “Adjusting the spark gap” on page 7-1](#)), audio wiring (see [Section 8, “Installing audio inputs” on page 8-1](#)) and control/monitor wiring (see [Section 9, “Installing control/monitor wiring” on page 9-1](#)).
31. After completing all installation requirements described in [Step 30](#):
- Close the filter door in each cabinet and secure using M5 screws retained in [Step 6](#). Make sure to use all screws.
  - Close all front and rear doors opened in [Step 3](#). Doors are unlatched open by pushing up on the door stop arm while starting to close the door.
  - Reinstall the side panels on the control cabinet and output cabinet by aligning the hooks and sliding downward. Secure each using the three M5 screws retained in [Step 1](#).



Figure 3.3: Routing Interconnect Cables

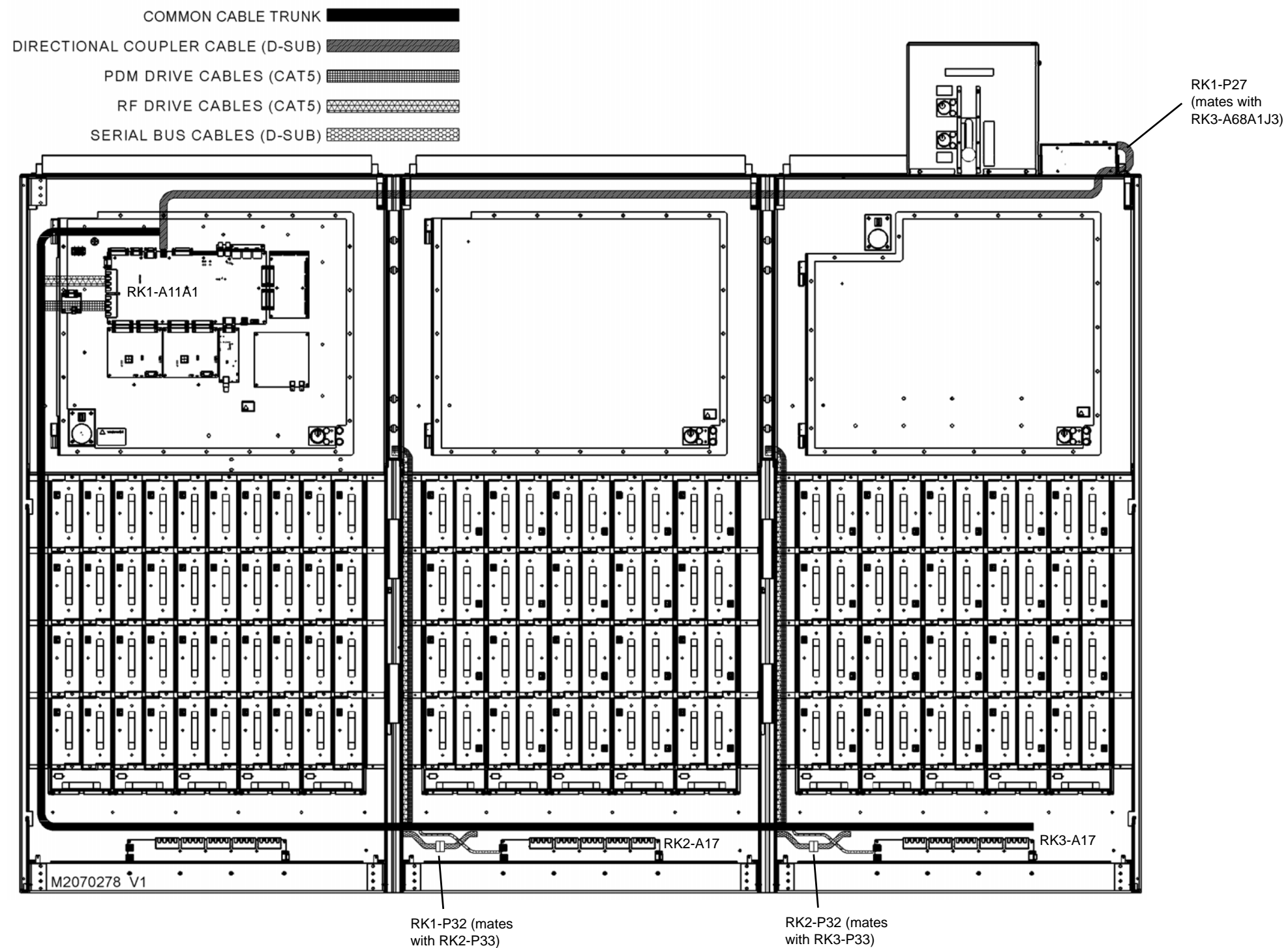


Figure 3.4: NX300 Transmitter Cabinet Assembly Aid (Sheet 1 of 3)

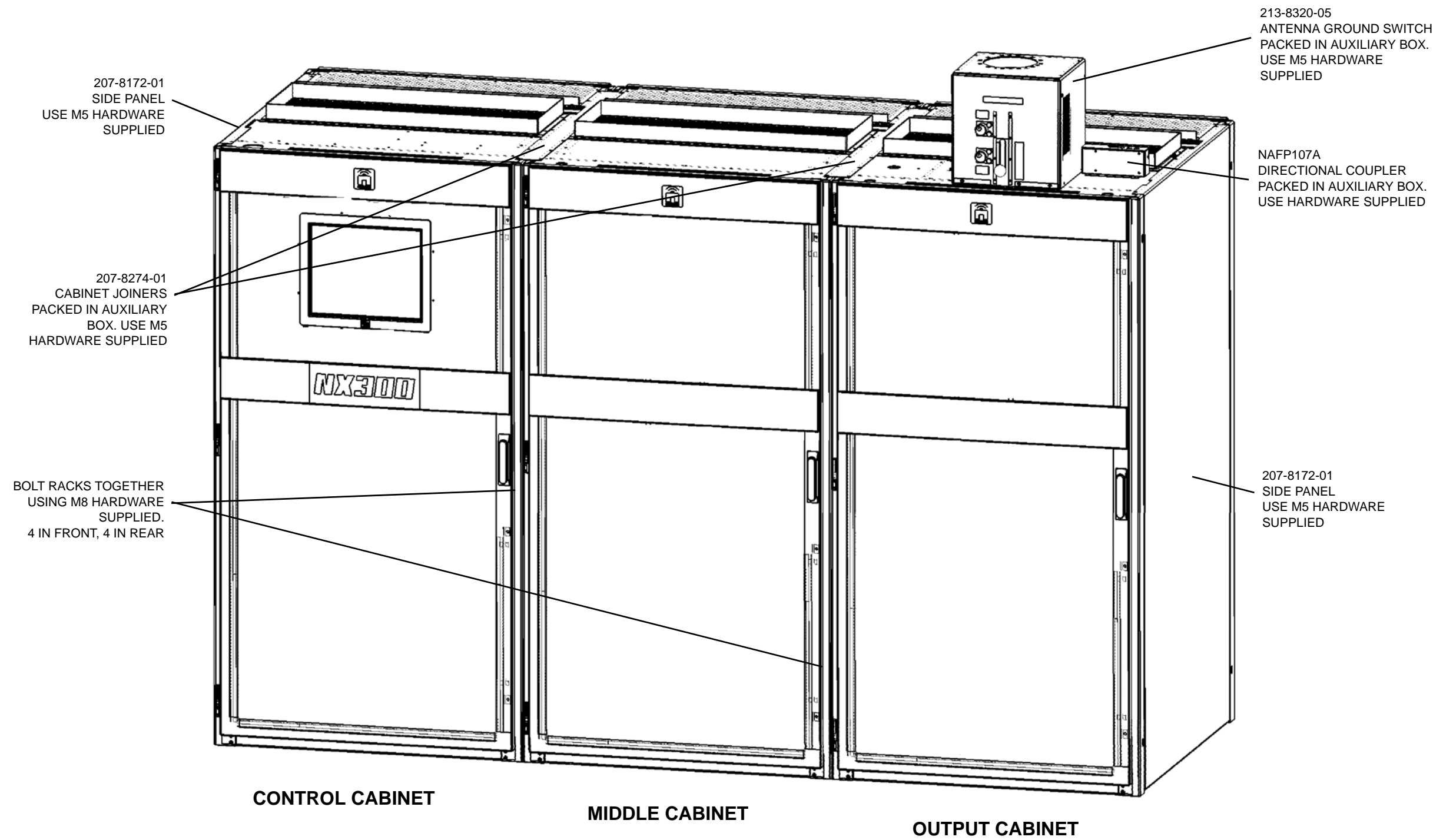




Figure 3.5: NX300 Transmitter Cabinet Assembly Aid (Sheet 2 of 3)

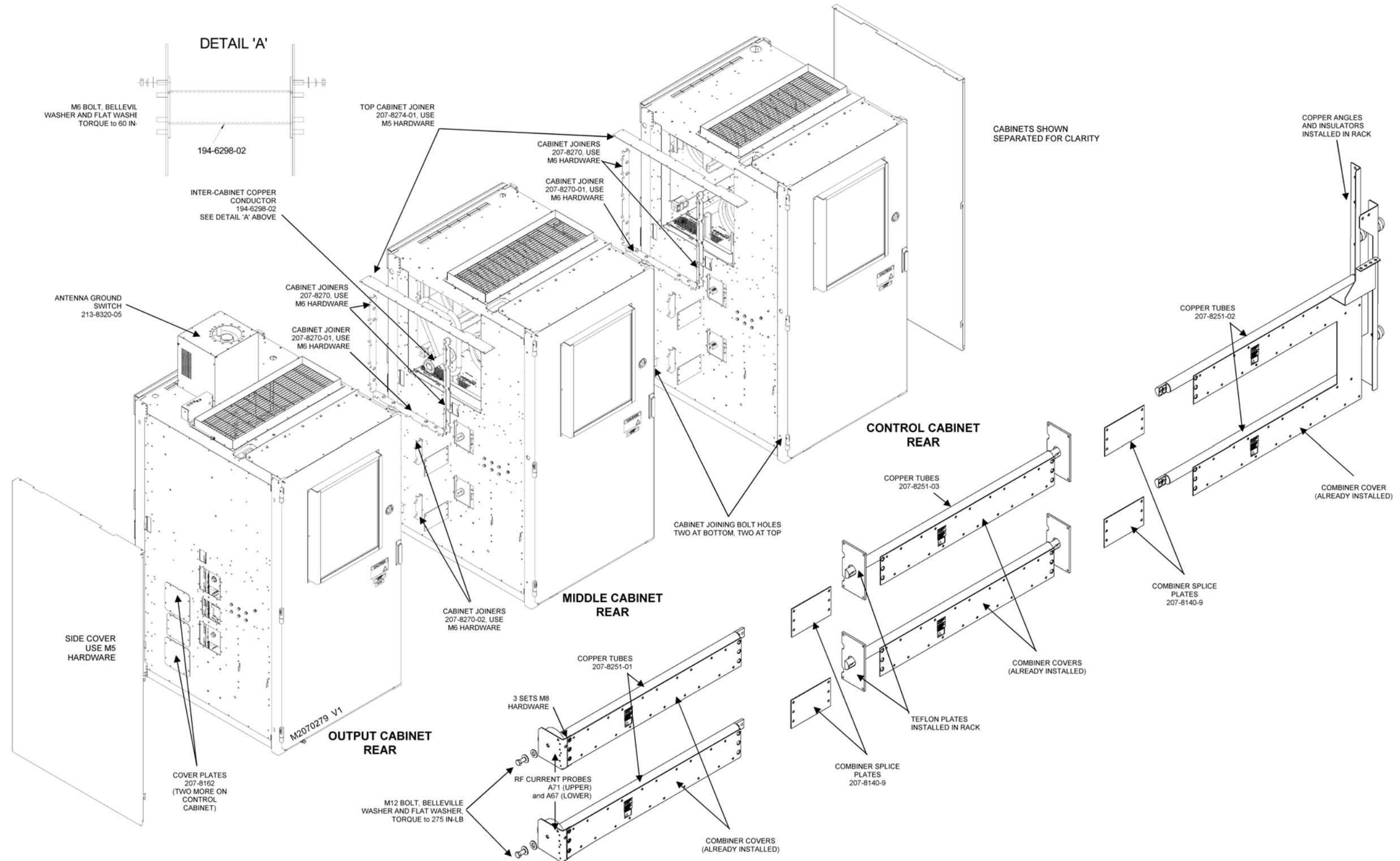
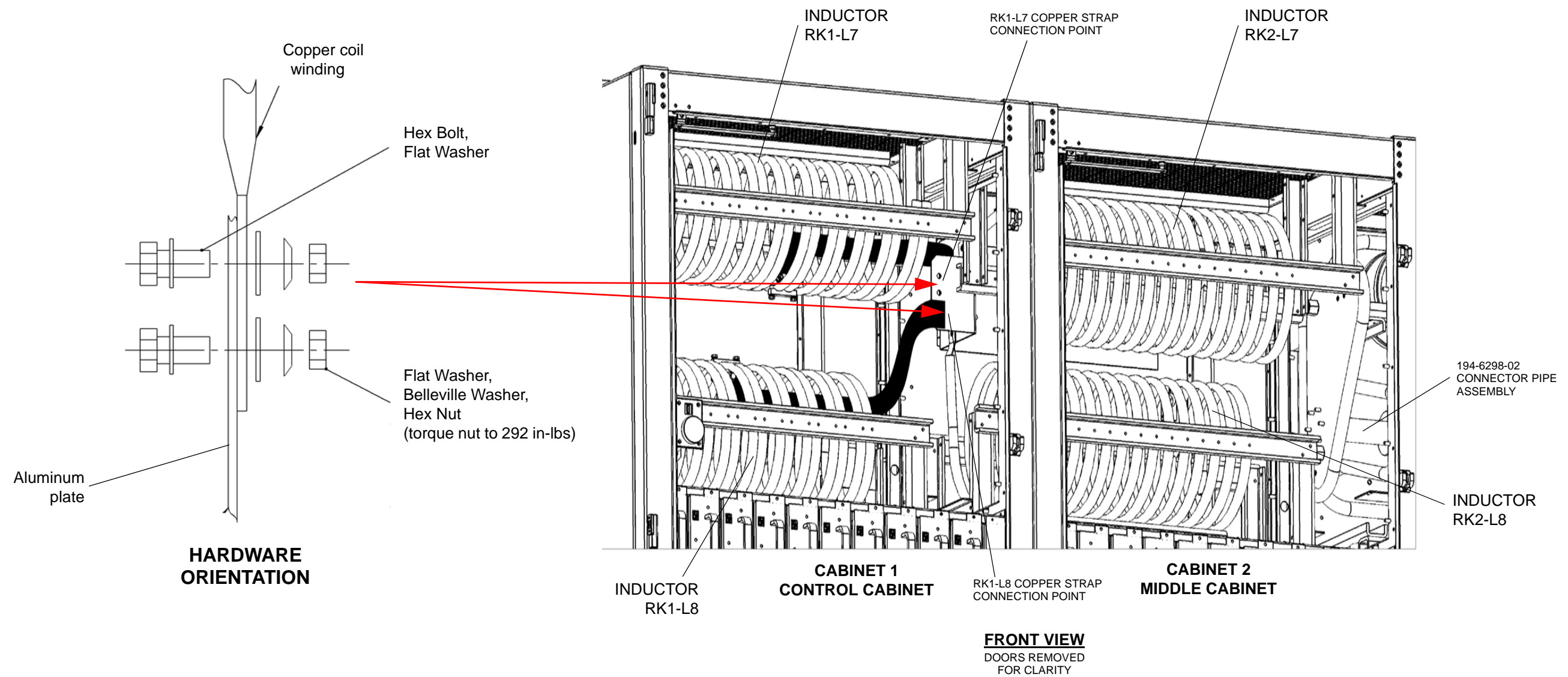


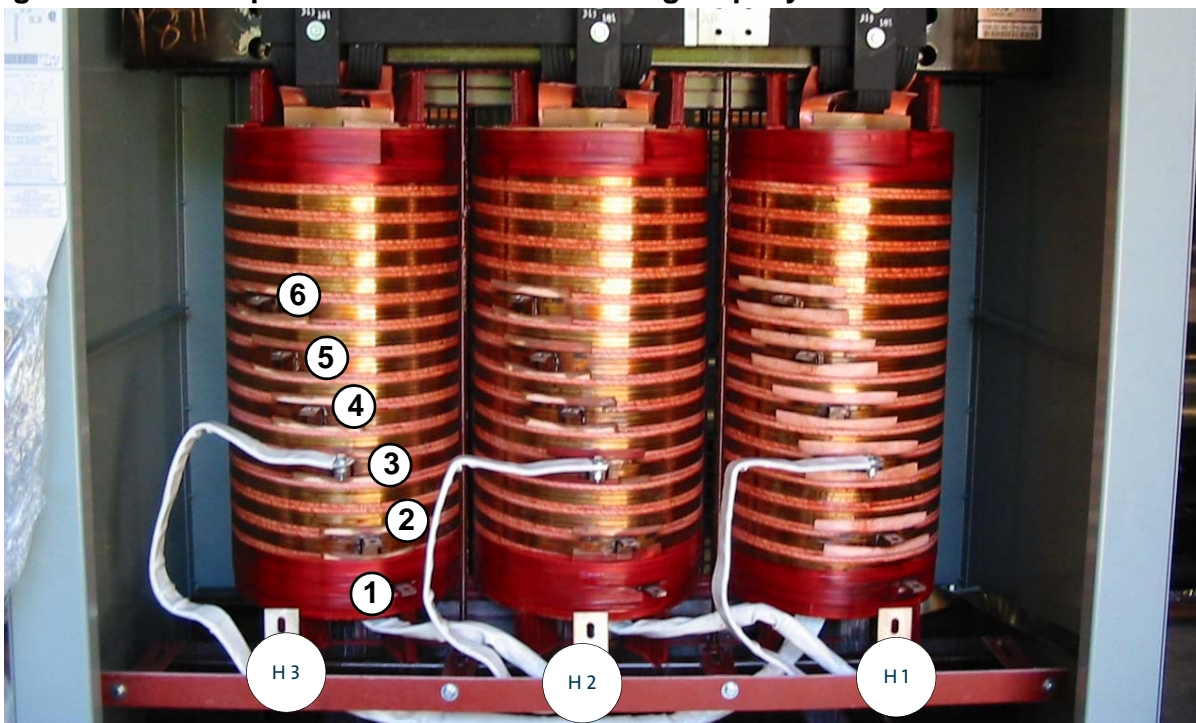
Figure 3.6: NX300 Transmitter Cabinet Assembly Aid (Sheet 3 of 3)



## SECTION 4: CONNECTING TRANSFORMER TAPS/ LOAD WIRING

1. Before connecting ac wiring to the transformer, set the line voltage tap selections. Based on your line to line voltage under full load, select the appropriate tap position identified on the labels mounted on the terminal board end of the transformer. One label identifies the tap number and the line-to-line voltage. Another label identifies the tap. All phases must be set to the same tap (see [Figure 4.1](#) and [Table 4.1](#) on page 4-2). 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.

**Figure 4.1: NX300 power transformer line voltage tap layout**



**Note:**

*It is important to choose the correct tap based on the loaded line-to-line voltage (i.e., the line voltage present when the NX300 is operating at full power and full modulation) for maximum peak modulation capability and maximum efficiency. If the loaded line-to-line voltage falls between two tap settings, choose the higher voltage tap (this will maximize the NX300's power factor).*

**Table 4.1: Three-phase primary winding tap nominal voltages (rms, phase-to-phase)**

| Voltage (V ac) | Tap |
|----------------|-----|
| 330 - 349      | 6   |
| 350 - 369      | 5   |
| 370 - 389      | 4   |
| 390 - 409      | 3   |
| 410 - 429      | 2   |
| 430 - 450      | 1   |

- Remove the cover on the side of the transformer cabinet (see [Figure 4.2 on page 4-4](#)). Remove only the screws that secure the cover. Do not remove the screws in the cover's clearance holes.
- Locate or obtain the wiring to make the four-wire electrical connections [phases A, B and C, which are 535 MCM wires (Nautel Part # WT04), and X0, which is a 1/0 AWG black wire (WT02)] between the transformer and Racks 1, 2 and 3 and the 1/0 AWG green wire (Nautel Part # WT01) to make the ground connection between the transformer and Rack 3. This wiring may be supplied by Nautel and packed in Racks 1, 2 and 3 or in the ancillary crate. If it is not purchased from Nautel, it must be obtained by the user. In this case, it is imperative that you purchase the wiring specified in Section 5 - Electrical Requirements of the *NX300 Pre-installation Manual*. Failure to observe this may void your warranty.



**WARNING: FAILURE TO COMPLY WITH RECOMMENDATIONS MAY VOID YOUR MANUFACTURER'S WARRANTY. FOR MORE INFORMATION, REVIEW YOUR WARRANTY DOCUMENTS.**

- Make sure a suitable cable carrying system is in place to support the wiring. A cable tray parts kit is available from Nautel. Cable tray brackets shown on the transformer cabinet and racks 1, 2 and 3 in the following illustrations may be packed in the ancillary kit for shipping. Refer to Section 5 - Electrical Requirements of the *NX300 Pre-installation Manual* for drawings and parts lists to aid in the installation.
- Route the 535 MCM wires (for each of the three phases) in [Step 3](#) between the fuses on the secondary side of the transformer (see [Figure 4.2 on page 4-4](#)) and the top of each rack, down through its ac cable duct, to the ac terminals (see [Figure 4.3 on page 4-5](#)). Ensure wires are properly routed along the cable carrying system and pass through appropriate holes in any cable tray interfacing junctions.



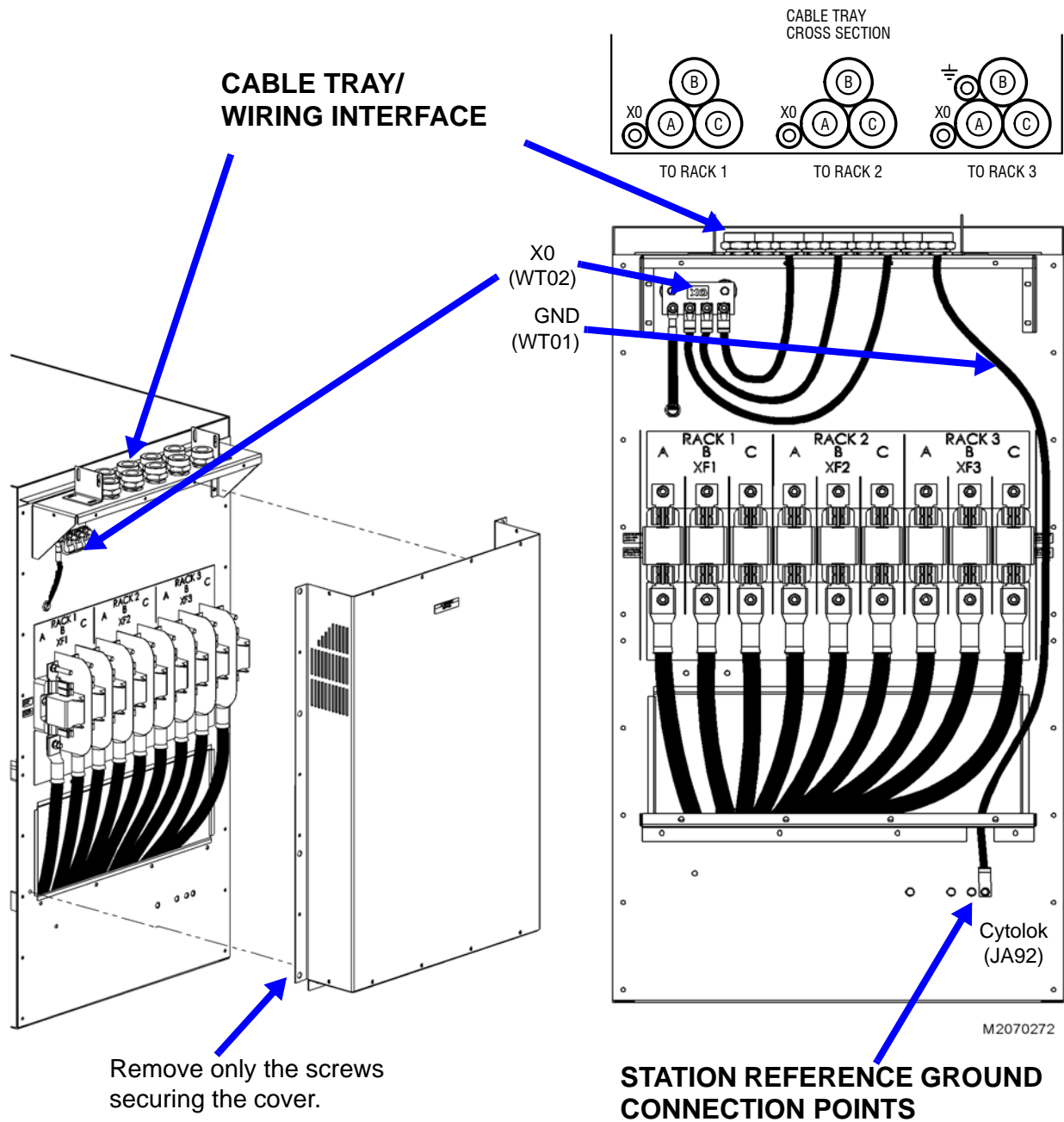
6. For each cabinet, remove the lexan cover over the ac terminals in each cabinet and connect the three-phase wires to the **AC1**, **AC2** and **AC3** terminals (see [Figure 4.3 on page 4-5](#)). Terminate all wiring using the appropriate size Cytolok cable connectors (Nautel Part # JA93 for 535 MCM wire), which are provided in the ancillary kit (see [Figure 4.4 on page 4-6](#) for proper installation techniques).



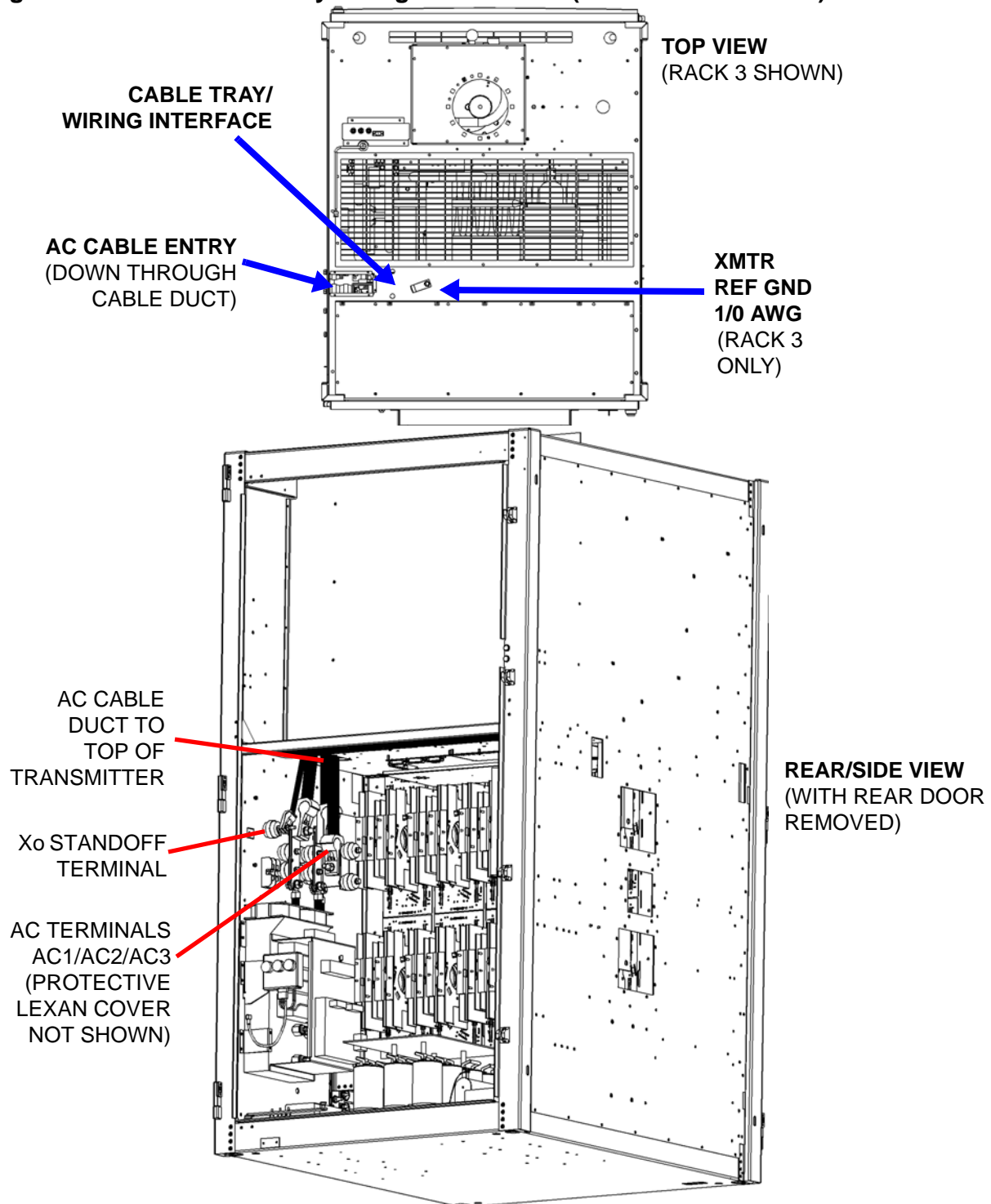
**WARNING: DO NOT CONNECT THE X0 TERMINAL OF THE POWER TRANSFORMER TO GROUND. CONNECT AS DETAILED IN [STEP 7](#).**

7. Route the black, 1/0 AWG wire (for **X0**) in [Step 3](#) between one of the three **X0** connection points on the side of the transformer (see [Figure 4.2 on page 4-4](#)) and the top of each rack, down through its ac cable duct, to the **X0** termination point (see [Figure 4.3 on page 4-5](#)). Ensure the wire is properly routed along the cable carrying system and passes through appropriate holes in any cable tray interfacing junctions. For each cabinet connect this wire between an **X0** terminal of the power transformer and the **X0** terminal in each cabinet. Terminate all wiring using the appropriate size Cytolok cable connectors (Nautel Part # JA92 for 1/0 AWG wire), which are provided in the ancillary kit (see [Figure 4.4 on page 4-6](#) for proper installation techniques).
8. Route the black, 1/0 AWG wire (for ground) in [Step 3](#) between the station reference ground point on the side of the transformer (see [Figure 4.2 on page 4-4](#)) and the **Xmtr Ref Gnd** point on the top of Rack 3 (see [Figure 4.3 on page 4-5](#)). Ensure the wire is properly routed along the cable carrying system and passes through appropriate holes in any cable tray interfacing junctions. Terminate the wire using the appropriate size Cytolok cable connectors (Nautel Part # JA92 for 1/0 AWG wire), which are provided in the ancillary kit (see [Figure 4.4 on page 4-6](#) for proper installation techniques).
9. Re-install the lexan cover removed in [Step 6](#).
10. Leave the other cabinets' back doors open to allow for station reference ground connection in [Section 5, "Connecting the station reference ground" on page 5-1](#).
11. Reinstall the cover on the secondary side of the transformer cabinet. NOTE: You will need to access the primary side of the transformer cabinet to allow for ac power connection in [Section 6, "Connecting ac power" on page 6-1](#).

Figure 4.2: NX300 secondary wiring connections (power transformer cabinet)

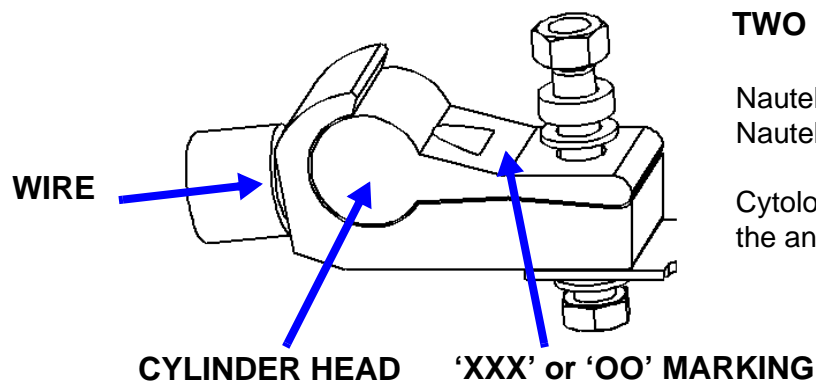


**Figure 4.3: NX300 secondary wiring connections (transmitter cabinets)**



**REPEAT AC CONNECTIONS FOR EACH TRANSMITTER RACK**

**Figure 4.4: Installing Cytelok Cable Connectors**



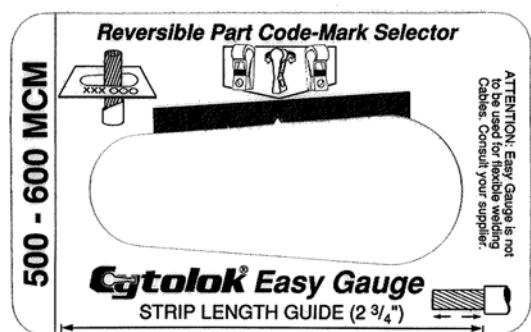
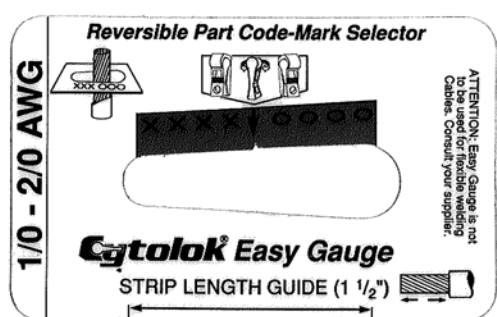
**TWO SIZES USED:**

Nautel Part # JA92 for 1/0 AWG wire  
 Nautel Part # JA93 for 535 MCM wire

Cyteloks connectors can be found in the ancillary kit.

**INSTALLATION INSTRUCTIONS:**

1. Select the proper connector for the wire/cable being used (see size options above).
2. Use the Easy Gauge supplied with each Cytelok connector to establish the insulation strip length (see both types below).
3. Insert the stripped cable end into the gauge's largest end. Move the cable until it contacts the gauge on both sides. The gauge will indicate either "XXXX" or "OOOO"
4. Insert the cylindrical head into the hooked shaped part with the "XXX" or "OO" visible, as determined in step 3.
5. With the bore in the two connector pieces lined up, insert the cable until into the opening until it reaches the end of the cylindrical component.
6. Attach Cytelok connector to its securing stud. Use a standard wrench (torque wrench not required), tighten the connector until both of its metal pieces are in contact. Tighten an additional 1/4 to 1/2 turn to assure complete closure.
7. Due to the spring action of the connector, Belleville and spring washers are not required.





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## SECTION 5: CONNECTING THE STATION REFERENCE GROUND

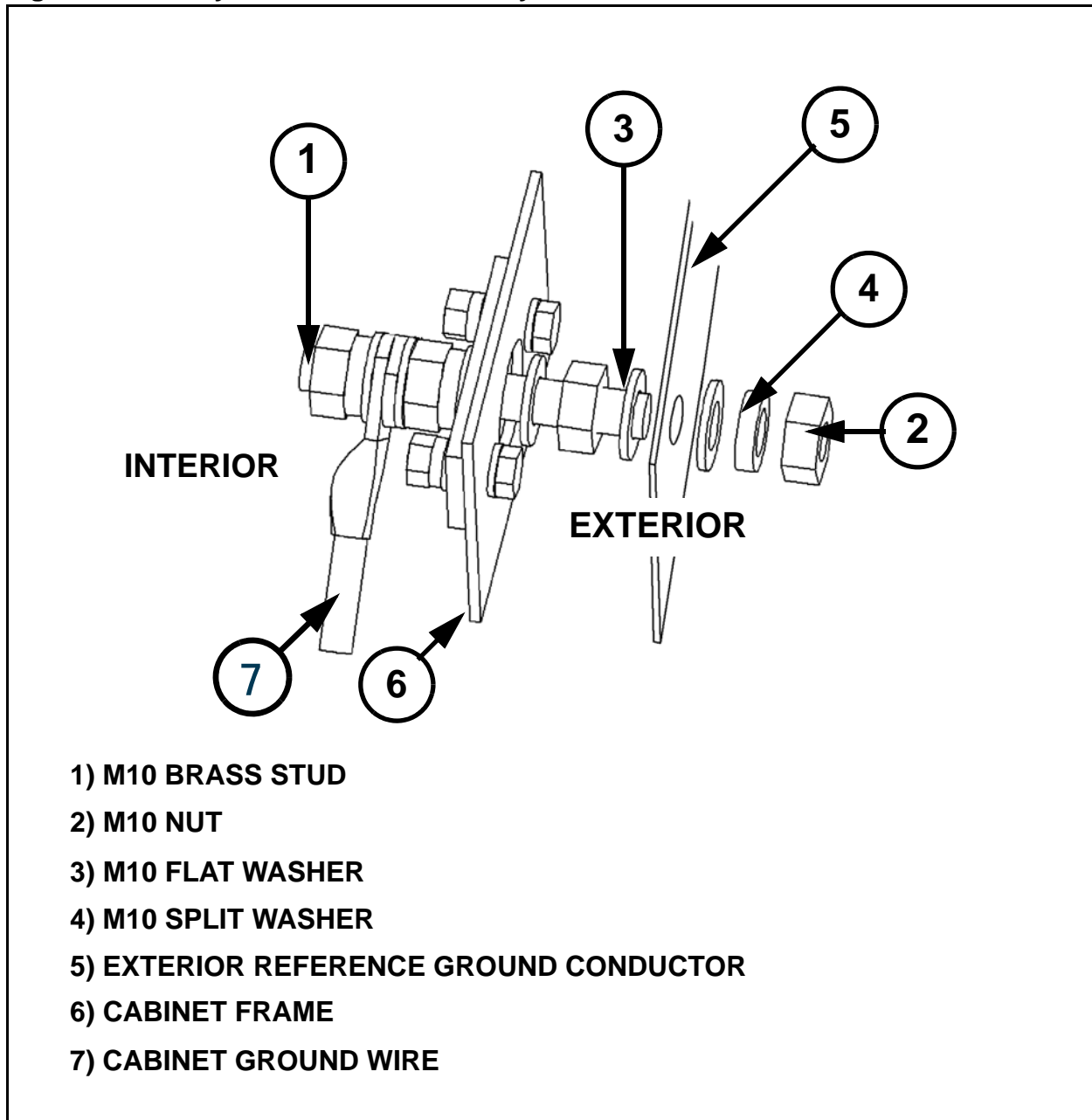
To connect the station reference ground, perform the following steps:



**Note:**

Proper grounding configuration is critical for protecting transmitter circuitry from lightning strikes. See the Electrical Requirements section of the *NX300 Pre-Installation Manual* or the *Recommendations for Transmitter Site Preparation Manual* for information on proper grounding and lightning protection recommendation. Failure to follow these guidelines may void your warranty.

1. Locate the safety ground stud assembly for the output cabinet. It has been set back in its final location at the bottom left rear of the cabinet.
2. Remove the two nuts holding it to the phenolic bar.
3. Re-assemble as shown in [Figure 5.1](#). Attach a continuous, low impedance conductor (minimum four-inch copper strap, or equivalent wire) between the station reference ground and the stud assembly (E1) in the output cabinet. Ensure the reference ground conductor is at least 3 mm (1/8 in) from the cabinet's exterior.
4. Attach a continuous, low impedance conductor (minimum four-inch copper strap, or equivalent wire) between the stud assembly (E1) in the output cabinet and the transformer cabinet's ground stud. Ensure the reference ground conductor is at least 3 mm (or 1/8 in) from any cabinet's exterior.
5. Firmly tighten all hardware.

**Figure 5.1: Safety Ground Stud Assembly Detail**

## SECTION 6: CONNECTING AC POWER

Connect ac power to the ac power disconnect switch and then to the transmitter, as follows:



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



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

1. Run the ac power cable from the ac power source to the ac power disconnect switch. The preferred entry point is through the top of the ac power disconnect switch. Cabinet punches or hole saws will be required to cut the entry holes for the conduits.
2. Open the ac power disconnect switch's front door. Connect the ac line input from the power source to the top **L1** (Line 1), **L2** (Line 2) and **L3** (Line 3) input terminals. Connect the ac ground to the top ground terminal.
3. Connect the ac power disconnect switch's load wiring to the bottom **T1** (Line 1), **T2** (Line 2) and **T3** (Line 3) terminals. Connect the ac ground to the bottom ground terminal.
4. If applicable, connect **EMERGENCY STOP** switch wiring between the + and - terminals of TB2, near the bottom of the ac power disconnect switch. This circuit must present a closed contact between these terminals to allow ac power to be applied to the transmitter. In some cases, Nautel may provide an **EMERGENCY STOP** switch. Close the ac power disconnect switch's front door.
5. Route the load wiring from the ac power disconnect switch to the transformer cabinet, passing all the conductors, as a group, through a ferrite toroid (Nautel Part # LX63, provided in the ancillary kit)..

**Note:**

*The preferred entry point for ac input wiring is through a hole in the primary side of the transformer cabinet. There is a cable tray wiring interface cover on the primary side to connect to your cable tray system, as applicable. Temporarily remove the cover to pass the primary wiring into the transformer cabinet.*

6. Connect the ac power ground to the station reference ground.
7. Verify that the station reference ground and the transformer ground stud are connected to the safety ground stud assembly at the back of the output cabinet.

8. Connect the ac line input to the **H1** (Line 1), **H2** (Line 2) and **H3** (Line 3) input terminals on the transformer (see [Figure 4.1 on page 4-1](#)). Connect the ac ground to the transformer's ground stud.
9. Optionally (if purchased), install the ac transient surge protection system.

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## SECTION 7: ADJUSTING THE SPARK GAP

The NX300'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.

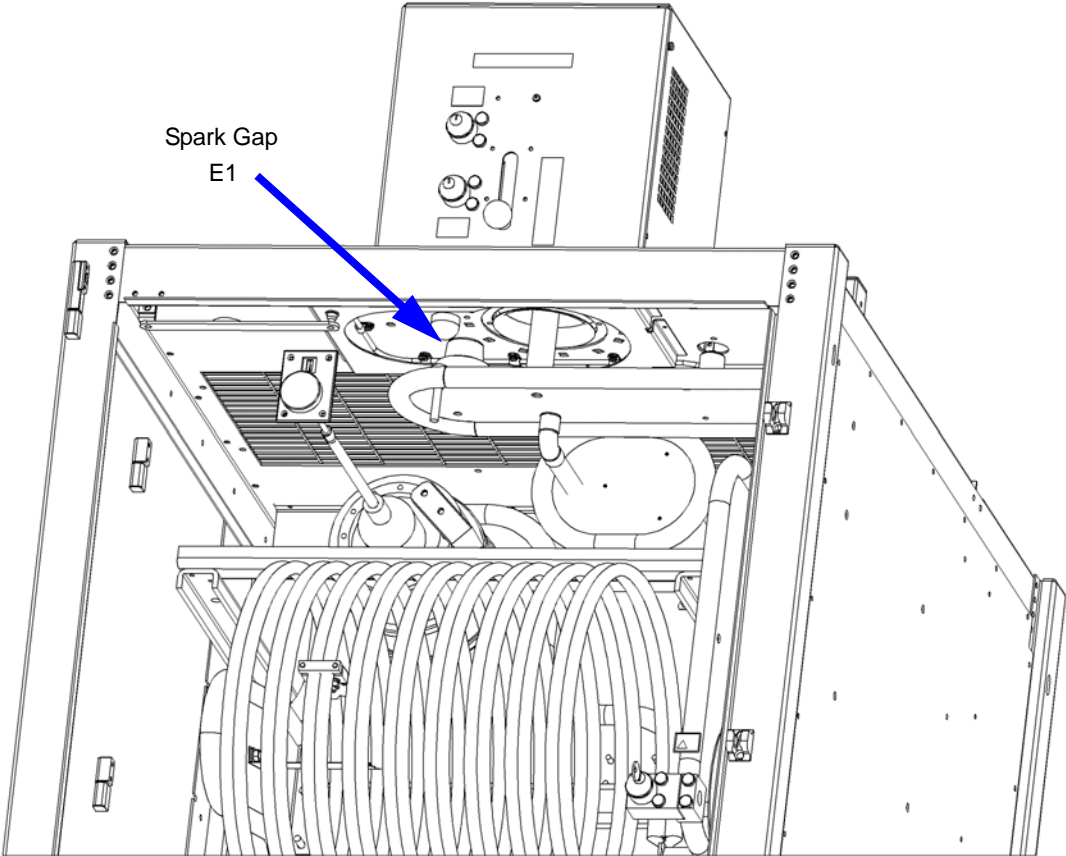
If the altitude of the transmitter site is known prior to transmitter delivery, then the spark gap is adjusted at Nautel. If this is the case, it may only be necessary to verify the spark gap setting.



**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. Refer to the Operating section of the *NX300 Operations and Maintenance Manual* for instructions on using the ac disconnect or safety interlock switch, which is provided by Nautel.
3. Gain access to the RF output spark gap, noting it is in the top section of the output cabinet (Rack 3).
4. Locate the spark gap (see [Figure 7.1 on page 7-2](#)). Using a feeler gauge, measure the air gap between the spark gap balls.
5. The air gap should be 0.407 inches multiplied by the scale factor listed in [Table 7.1, "Altitude Scale Factor" on page 7-3](#) 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 the filter door using the M5 screws retained in [Section 3, "Completing cabinet assembly" on page 3-1](#).

Figure 7.1: RF Output Spark Gap Location



**Table 7.1: Altitude Scale Factor**

---

| <b>Altitude (ft)</b> | <b>Spark Gap Scale Factor<br/>(multiply gap by...)</b> |
|----------------------|--|
| 0                    | 1.00   |
| 1,000                | 1.05   |
| 2,000                | 1.10   |
| 3,000                | 1.16   |
| 4,000                | 1.23   |
| 5,000                | 1.30   |
| 6,000                | 1.38   |
| 7,000                | 1.47   |
| 8,000                | 1.57   |
| 9,000                | 1.68   |
| 10,000               | 1.81   |

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## SECTION 8: INSTALLING AUDIO INPUTS

This section describes how to route audio input wiring to the NX300's exciters.

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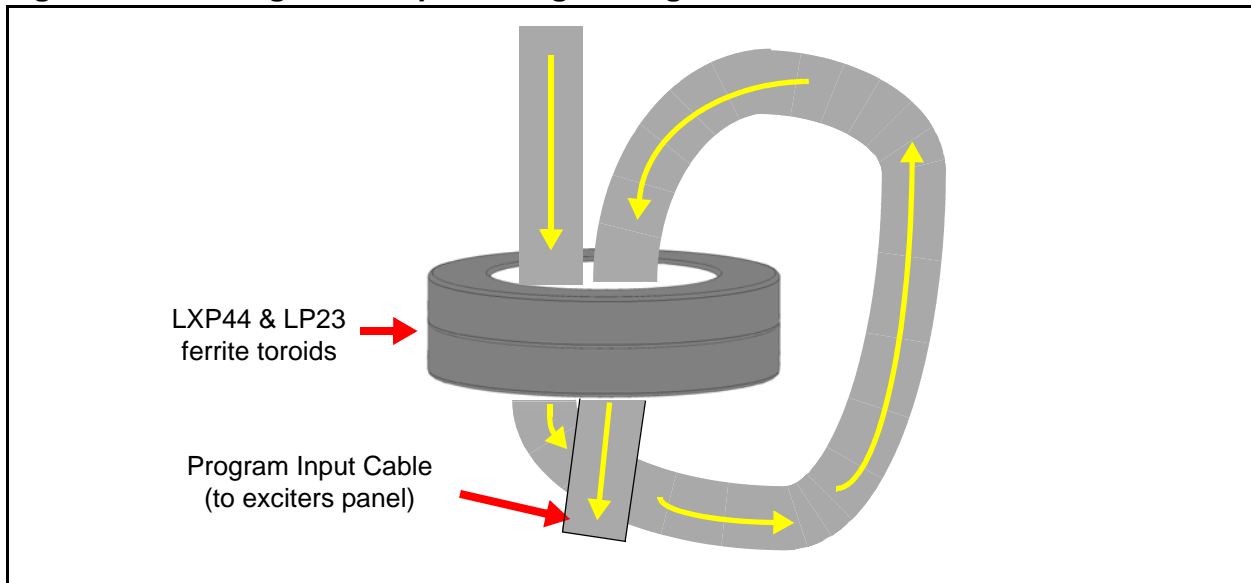
### PLANNING COMPLETE?

1. Make sure you have read and fully understood the audio input options described in the *NX300 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.
- 

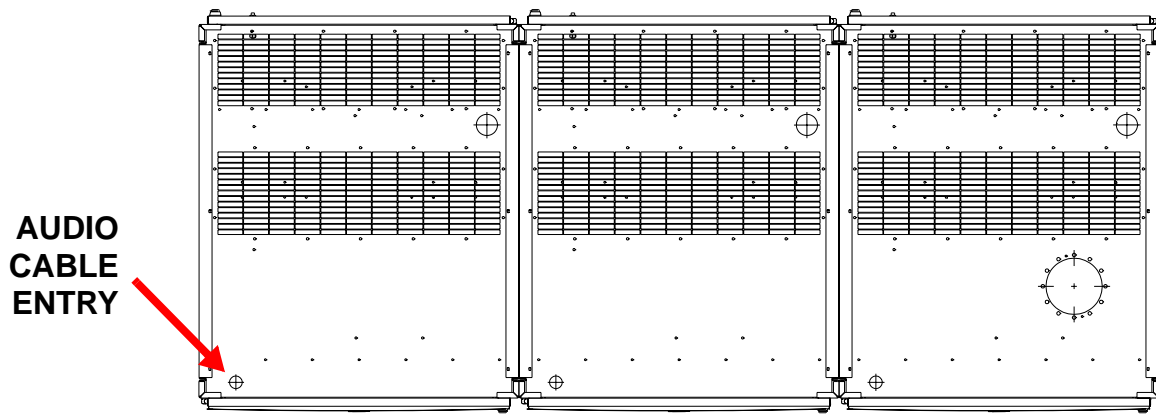
### ROUTING CABLES

1. Route all audio cables from their audio sources to the top of the transmitter (left-hand).
  2. Get two ferrite toroids (one each of Nautel Part # LXP44 and LP23) from the ancillary kit.
  3. 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 8.1 on page 8-2](#)). An entrance is provided at the top of the transmitter to accept audio input wiring (see [Figure 8.2 on page 8-3](#)). Position the ferrite toroids just outside, or just inside, the audio input entry hole.
  4. Route the audio input cables through the entry hole and toward the exciter panel (A11), located behind the front door (see [Figure 8.3 on page 8-3](#)). If possible, install exciter mating connectors after passing cables through the audio input entry hole.
  5. With the audio input cables near their destination, cut each wire to the required length and install connectors, as necessary.
  6. Remove plastic cap-plugs from the connectors on the exciter panel, if applicable.
  7. Connect the appropriate audio input cable(s) to the connector(s) described in Section 7 of the *NX300 Pre-installation Manual*.
-

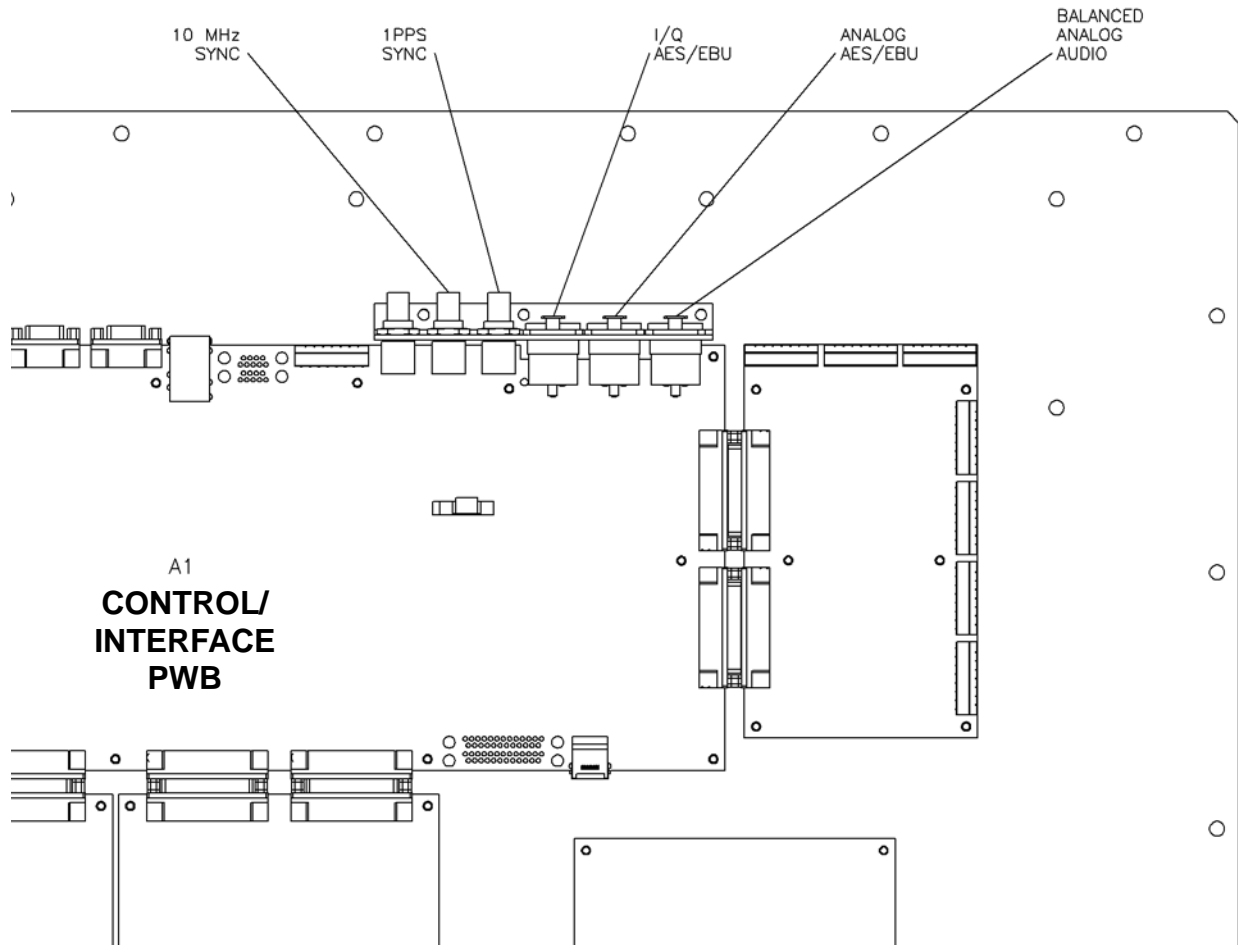
**Figure 8.1: Passing Audio Input Wiring Through Ferrite Toroids**



**Figure 8.2: Audio Cable Entry**



**Figure 8.3: Audio Connections**



## SETTING ENGINE AUDIO PARAMETERS

Use the transmitter's AUI to set and adjust Engine audio parameters as follows (refer also to the Operating section of the *NX300 Operations and Maintenance Manual*):

From the AUI click **Menu -> User Settings -> Engine Settings**. The menu in [Figure 8.4](#) will appear (note there are three tab pages - IP, Mode and Tuning).

**Figure 8.4: Engine Settings menu**



**IP Tab**



**Mode Tab**



**Tuning Tab**

- In the IP tab, enter Exgine IP settings (see the associated Exporter manual for assistance with IP settings).
- In the Mode tab, set Digital Carriers to On or Off.
- In the Mode tab, set Analog Transmission to On or Off.
- In the Mode tab, set the Default Service Mode (MA1 for hybrid; MA3 for all-digital).
- In the Tuning tab, adjust carrier levels by changing the values of the Upper Primary Level Adjust and Lower Primary Level Adjust fields.
- In the Tuning tab, adjust the analog gain by changing the value of the Analog Gain field.



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## SECTION 9: INSTALLING CONTROL/MONITOR WIRING

This section describes how to route wiring associated with the remote control and monitoring of the NX300 transmitter.

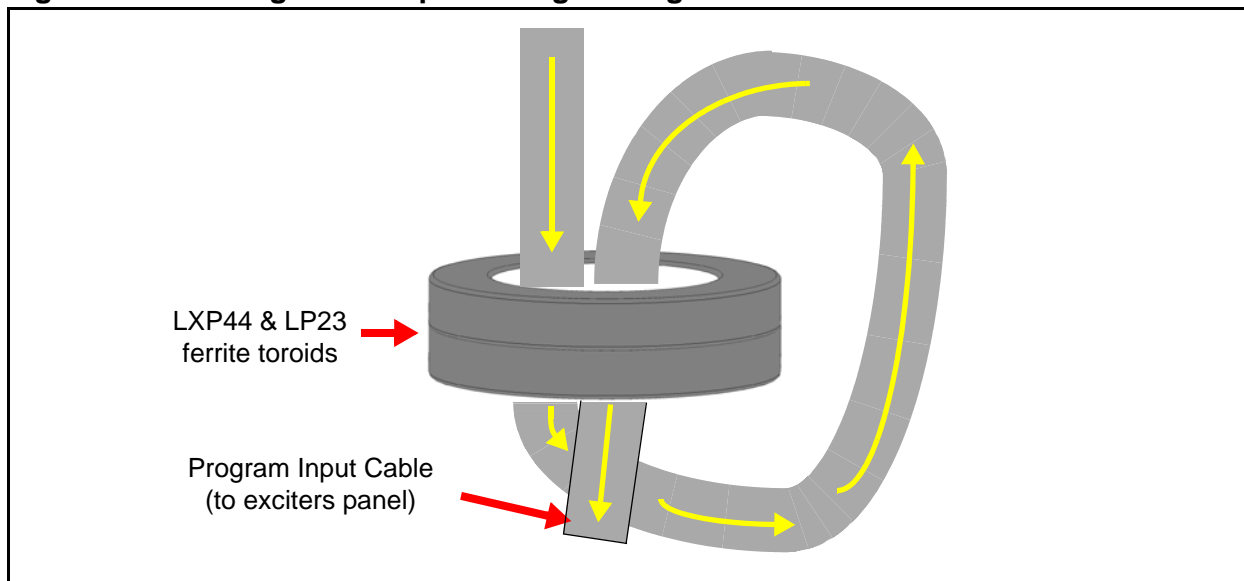
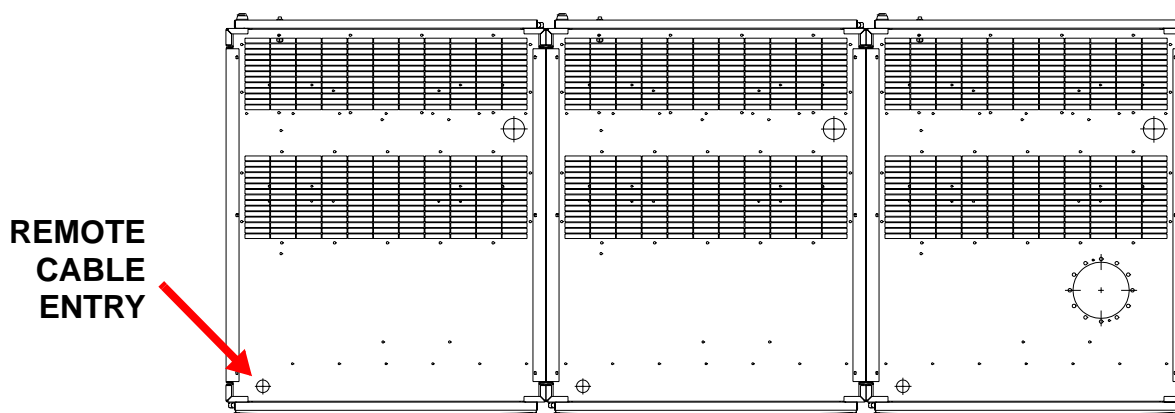
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### PLANNING COMPLETE?

1. Make sure you have read and fully understood the control and monitoring options described in the *NX300 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

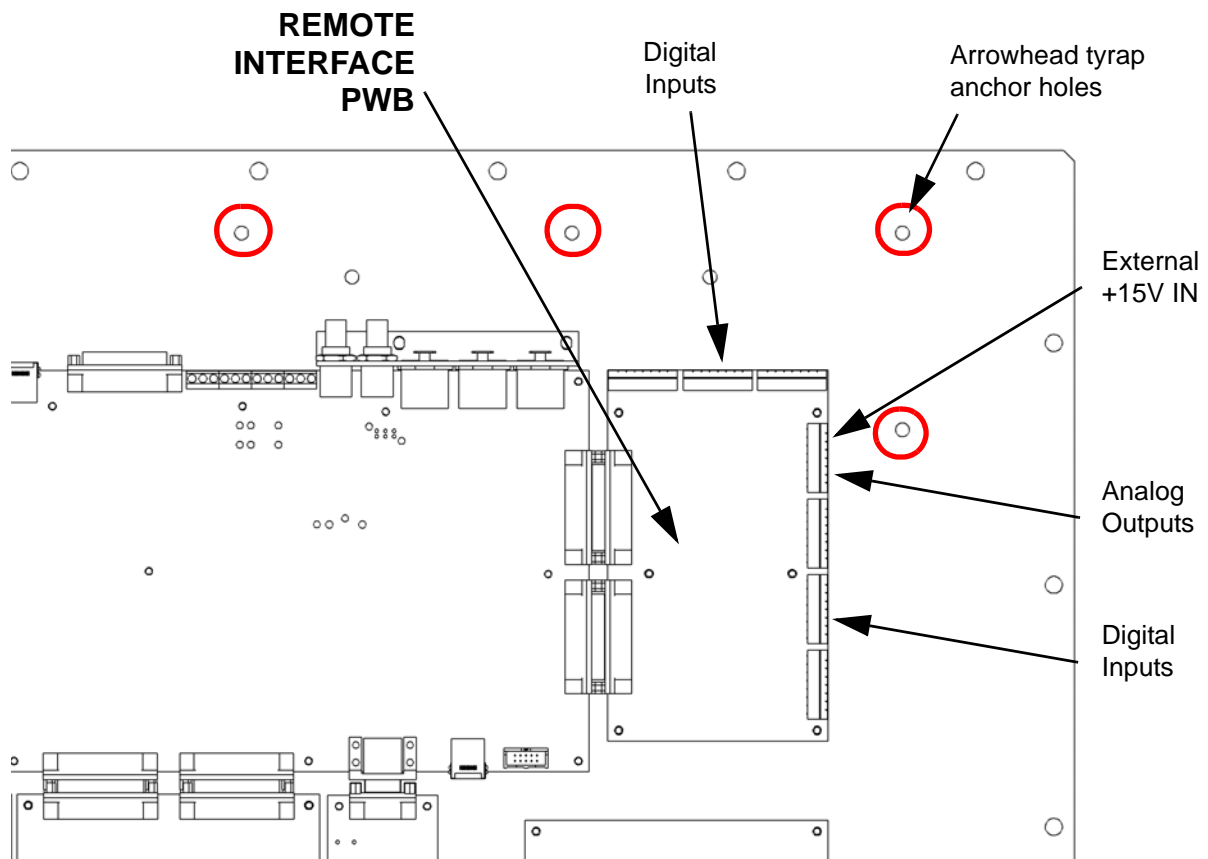
1. Route all remote control/monitor cables to the top of the transmitter (left-hand).
  2. Get two ferrite toroids (one each of Nautel Part # LXP44 and LP23) from the ancillary kit.
  3. Pass all remote control/monitor cables through the ferrite toroids obtained in [Step 2](#). If practical, wires should pass through a minimum of two times (two turns) (see [Figure 9.1 on page 9-2](#)). An entrance is provided at the top of the transmitter to accept remote control/monitor wiring (see [Figure 9.2 on page 9-2](#)). Position the ferrite toroids just outside, or just inside, the remote control/monitor entry hole.
  4. Route the remote control/monitor cables through the cable entry hole and toward the remote interface PWB (A11A4) on the exciter panel (see [Figure 9.3 on page 9-3](#)).
  5. With the audio input cables near their destination, cut each wire to the required length and install connectors, as necessary.
  6. If you are using web based control for the transmitter, route an Ethernet cable to the motherboard (A65U1) on the back of the front door. Connect the Ethernet cable to connector J1 on the motherboard (see [Figure 9.4 on page 9-4](#)). Secure the cable to the existing cable harness using tyrap provided in the ancillary kit.
-

**Figure 9.1: Passing Audio Input Wiring Through Ferrite Toroids****Figure 9.2: Remote Cable Entry**

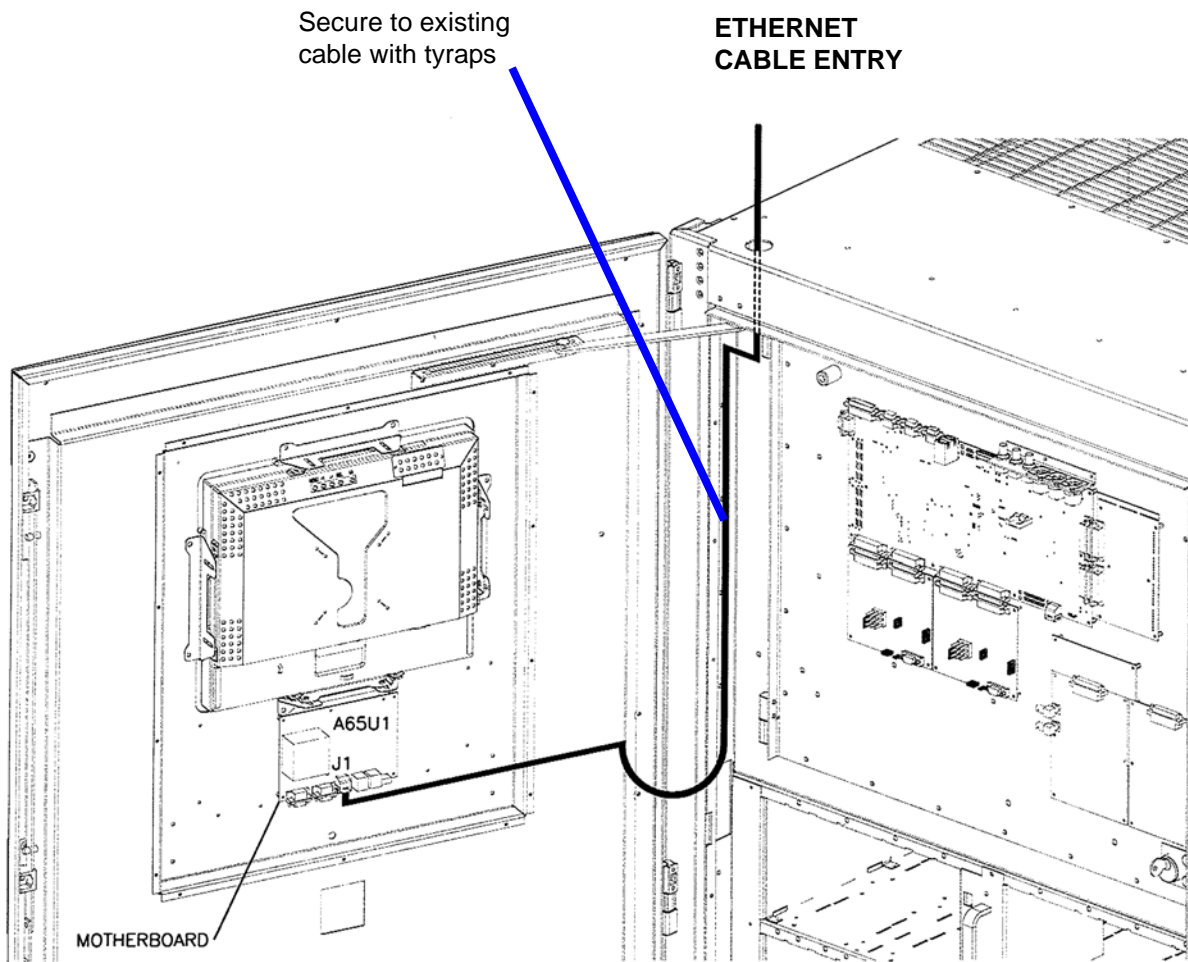
7. Connect the appropriate control/monitor cable(s) to the connector(s) described in Section 8 of the *NX300 Pre-installation Manual*. Secure wires to the existing cabling and to the panel using arrowhead tyrap provided in the ancillary kit (see [Figure 9.3 on page 9-3](#) to locate tyrap anchor hole locations).



**Figure 9.3: Remote Interface Connections**



**Figure 9.4: Web Interface Connection**



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## SECTION 10: 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. Confirm the ac power source's nominal, loaded, phase-to-phase, rms voltage.
2. Ensure that ac power source is switched off at the safety interlock switch.



**WARNING: IF YOU DO NOT OBSERVE THIS PRECAUTION, YOU COULD BE SERIOUSLY INJURED OR KILLED BY THE VOLTAGES ON THE CIRCUIT BREAKER AND THE TRANSFORMER TERMINALS.**

3. Identify which primary winding taps should be used and connected to the transformer's ac power input (Line) terminals. See [Table 4.1 on page 4-2](#).
4. Confirm that the taps are configured correctly.
5. Remove the rear filters from the transmitter and spray them with filter coat adhesive spray (Nautel Part # HQ59), located in the ancillary kit. Re-install the rear filters on the transmitter.
6. Terminate the transmitter's RF output into a precision, 50  $\Omega$  resistive dummy load that is able to dissipate the RF power being applied to it: 450 kW total required.

7. Verify that all panels are installed, and ensure that their attaching hardware is firmly tightened.

**WARNING:**

IF A JUMPER IS PLACED BETWEEN INTERLOCK INPUTS J6-1/2 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 AND THE ANTENNA SYSTEM IF THE TRANSMITTER IS TURNED ON.

8. Connect the dummy load's interlock or, if necessary, simulate the closing of all external interlocks. This requires a short circuit between J6-1 and J6-2 of the control/interface PWB. Ensure all networks connected to the transmitter's RF output are properly covered.
9. In lieu of normal station programming, connect an analog audio signal generator, preset to 1000 Hz at a zero output level (turned off), to connector J12 on the control/interface PWB, or an AES signal generator to connector J11 on the control/interface PWB.

---

## COMMISSIONING

### TURNING ON THE TRANSMITTER

1. Switch on the ac power at the service entrance to turn on the transmitter.
2. Check the alarm and status indications on the control cabinet's AUI using the **Transmitter Status** page of the AUI.
3. Check the output of the +5, +15 and -15 V power supplies on the AUI (click **Meters**, then select **Rack 1** and the appropriate power supply).
4. Check the ac sample voltage on the AUI (click **Meters**, then select **Rack 1** and then select AC Sample). It should be between 310 V and 335 V. If not, change the transformer tap setting (see [Section 3, "Installing the power transformer" on page 3-1](#)).
5. Select **Local** control.
6. Set the active preset's power output to zero.
7. Press **RF On**. The **RF On** button will turn green.

8. Check the output of the +48 V power supply on the AUI (**Meters, Rack 1**).
9. Check for alarms using the **Transmitter Status** page of the AUI.
10. Increase the power to normal operating levels while monitoring the PA voltage. Ensure the PA voltage remains within specification [that is,  $\text{Sqrt}(\text{Pout}/300,000 \text{ W}) * 167 \text{ V} * 400 \text{ V/B+ Voltage} = \text{PA Volts}$  within 10%].
11. Check the reflected power level. It should be near 0 W.
12. Set up preset modes. See the *NX300 Operating and Maintenance Manual*.
13. Set the correct time and date on the AUI display. See the *NX300 Operating and Maintenance Manual*.
14. To improve overall system security, change the login password for the AUI display. Nautel factory sets the AUI with a default login password. See the *“Changing the password”* section of the *NX300 Operating and Maintenance Manual*.

## 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** connector (J7). The RF monitor level is factory set. Ensure there is sufficient attenuation installed between the **RF MONITOR** connector and the modulation monitor.
2. From the AUI's 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 J11 (AES) or J12 (analog) on the control/interface PWB, and that its output is preset to 1,000 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. Verify that the RF output's modulation envelope is acceptable.
6. Set the output level of the audio signal generator to zero (turned off).

7. Turn off the RF power stage: press **RF Off**. The **RF Off** button will turn red and the **Rf On** button will turn grey.
8. Disconnect the audio signal generator from J11 or J12 on the control/interface PWB.

---

## GOING ON-AIR

**WARNING:**

IF A JUMPER IS PLACED BETWEEN INTERLOCK INPUTS J6-1/J6-2 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 AND THE ANTENNA SYSTEM 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 [“Turning on the transmitter” on page 10-2, Step 8](#) should be removed.

When the commissioning tests are successfully completed, connect the studio audio to the transmitter's audio input connector, connect the RF output to its antenna system, and 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 # LX63) is installed on the RF coaxial hardline at the transmitter's output.
3. Turn the transmitter's ac power back on.
4. Use the AUI controls to begin transmitter operations. For detailed instructions, refer to the *NX300 Operating and Maintenance Guide*.

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## SECTION 11: PARTS AND TOOLS

This section describes parts associated with the NX300 transmitter, and tools needed during installation and routine operation. Topics include:

- [Parts supplied by Nautel](#)
- [Parts not supplied by Nautel - see page 11-2](#)
- [Parts ordering - see page 11-2](#)
- [Module replacement program - see page 11-2](#)
- [Tools for installation - see page 11-3](#)

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### 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](mailto:support@nautel.com)

Web: [www.nautel.com](http://www.nautel.com)

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### PARTS SUPPLIED BY NAUTEL

#### ANCILLARY PARTS KIT

An ancillary parts kit is shipped with the NX300. This kit contains hardware needed during the installation process. The kit includes toroids, spare fuses, screws and other miscellaneous hardware.

## DOCUMENTATION

See “NX300 transmitter manuals” on page xii.

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## 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  $\Omega$  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.
- 

## PARTS ORDERING

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

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## 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
- Philips 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 275 in-lbs or 31 N-m)



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## SECTION 11: PRE-INSTALLATION / INSTALLATION ASSISTANCE

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

- [Pre-installation consulting](#)
- [Installation and commissioning service](#)
- [Online documentation - see page 11-3](#)
- [On-site support - see page 11-3](#)
- [Training - see page 11-3](#)
- [Standard warranty - see page 11-4](#)
- [Extended warranties - see page 11-7](#)

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### 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 NX300 transmitter. For support, contact Nautel Customer Service and request assistance ([“On-site support” on page 11-3](#)).

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### 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
  - Spectrum analyzer
  - Modulation monitor
  - Frequency counter

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.

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## 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. (Documentation is also provided on CDROM and in paper binders that are delivered with the transmitter.)

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## ON-SITE SUPPORT

If you require on-site assistance, Nautel's field support specialists can help you prepare your site and ensure that your NX300 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](mailto: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.

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## 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.

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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.

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## STANDARD WARRANTY

Nautel Limited/Nautel Incorporated, hereinafter referred to as Nautel, guarantees all mechanical and electrical parts of the equipment for a period of **18 months from date of shipment and 12 months from the date of commissioning.**

1. 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.
  2. Nautel shall provide replacements for all "Parts" at no cost to the Customer when they become defective during the warranty period, and upon the return of the defective part.
  3. In the event that a "Part" fails during the warranty period and causes damage to a sub-assembly that cannot be repaired in the field, the entire sub-assembly so damaged may be returned to Nautel for repair. The repairs will be made without charge to the Customer.
  4. Where warranty replacements or repair are provided under items 2 or 3, Nautel will pay that part of the shipping costs incurred in returning the part/assembly to the Customer.
  5. Warranty replacement parts and repair, which are provided under items 2 or 3, shall be guaranteed for a period of ninety days from date of shipment or until the end of the original warranty period, whichever occurs later.
  6. Nautel will not assume responsibility for any charges incurred by other than Nautel employees.
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7. Nautel shall have the privilege of investigating whether failures have been caused by factors beyond its control.
8. Nautel shall in no event be liable for any consequential damages arising from the use of this equipment.
9. When requesting a warranty repair/replacement, please provide complete and accurate information. Observe the instructions regarding “[Equipment being returned to Nautel](#)” on [page 11-6](#) and provide the information requested.
10. When ordering spare/replacement parts, please provide complete and accurate information. Refer to the parts list of the Repair manual for ordering information. Provide as much of the information requested for 'Equipment Being Returned to Nautel' on page two of this warranty as is practical. The information identified by an asterisk is the minimum required.

## 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](mailto:support@nautel.com)

Web: [www.nautel.com](http://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 operates a factory rebuilt, module exchange service which takes full advantage of the high degree of module redundancy in Nautel equipment. This module exchange service is operated from Nautel's factory in Bangor, Maine and Hackett's Cove, Nova Scotia. These two locations allow us to provide a quick turn around service to keep our customers on the air. During the transmitter's warranty period, up to thirteen months from shipment, repair and exchange of modules is at no charge to the customer. When the warranty has expired, a charge of 80% of the list price for all exchanged modules is made. If the faulty module is returned to Nautel within 30 days, a credit is issued reducing this charge by one half to 40% of the list price. USA customers are required to contact our Bangor, Maine facility. Canadian and overseas customers should contact our Nova Scotia, Canada facility.

## EQUIPMENT BEING RETURNED TO NAUTEL

For all equipment being returned to Nautel and all requests for repairs or replacements:

- Obtain an RMA number from Nautel (you must have an RMA number to return equipment)
- Mark the item as 'field return'
- Mark the item with the RMA number assigned by Nautel
- Address the item to the appropriate Nautel facility

Complete and accurate information regarding the equipment being returned will ensure prompt attention and will expedite the dispatch of replacements. Refer to the nameplate on the transmitter and/or the appropriate module/assembly to obtain name, type, part and serial number information. Refer to the parts list of this manual or the appropriate service instruction manual for additional ordering information.

The following information should accompany each request (\* denotes minimum required information):

- \*Model and serial number of equipment
- \*Name of part/assembly
- Serial number of part/assembly
- \*Complete reference designation of part/assembly



- \*Nautel's part number of part/assembly
  - \*OEM's part number of part/assembly
  - Number of hours in use
  - Nature of defect
  - \*Return shipping address
- 

## EXTENDED WARRANTIES

Nautel's [standard 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 [the standard warranty](#).

One-year Extended Warranty Plans add an additional year (12 months) of coverage after the end of the customer's [standard 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 standard 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.)

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## SECTION 13: 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 NX300 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.

**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.



## **NX300 INSTALLATION MANUAL**

Document: NHB-NX300-INS-3.0

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