

# Recent (2020) Transmitter Changes

- **Power/Wiring Changes**
- **Modulator Changes**

# Transmitter Cabinet UD3



# Power Distribution Panel UD3A13







AUXILIARY  
POWER

HIGH VOLTAGE  
POWER

POWER  
AMPLIFIER BLOWERS

CB2



ON  
  
OFF

CB1



ON  
  
OFF

CIRCUIT BREAKER  
LOCKED OFF  
WITH KEY IN  
THIS POSITION



CABINET  
OVER  
TEMPERATURE



FAULT



5 AMP



5 AMP



5 AMP



ON  
  
OFF

CABINET  
LIGHTS





AUXILIARY  
POWER



ON

OFF



HIGH VOLTAGE  
POWER



ON

OFF



CIRCUIT BREAKER  
LOCKED OFF  
WITH KEY IN  
THIS POSITION



CABINET  
OVER  
TEMPERATURE



5 AMP



5 AMP



FAULT



5 AMP

POWER  
AMPLIFIER  
BLOWERS



ON

OFF

CABINET  
LIGHTS



FILAMENT CURRENT

---



INCREASE





VACUUM PUMP CURRENT



OPERATE



HOURS



A3 CARD RACK ASSY

PS2

A3

A4

The image shows a vertical stack of power supply units (PSUs) within a rack assembly. The units are labeled PS2 through PS7. Each PSU unit includes a terminal block (TB101 and TB102) with multiple connection points. A prominent yellow label on each unit reads "CAUTION 120 VOLTS". The units also feature a fuse and a "SLOW BLOW" indicator. The terminal blocks are labeled with "28V ADJ", "28V FLT", "RTN", and "28V/18A". The units are densely packed with numerous white cables connected to the terminals. A thick black braided cable is visible on the left side of the rack. The rack itself is labeled "A3 CARD RACK ASSY" at the top. The units are also labeled with "F101 2 AMPS SLOW BLOW" and "F101 5 AMPS SLOW BLOW".

PS4

PS3

PS6

PS7

PS5

CAUTION  
120 VOLTS

CAUTION  
120 VOLTS

CAUTION  
120 VOLTS

F101 2 AMPS  
SLOW BLOW

F101 5 AMPS  
SLOW BLOW

F101 2 AMPS  
SLOW BLOW

28V ADJ  
28V FLT  
RTN  
28V/18A

CAUTION  
120 VOLTS

F101 2 AMPS  
SLOW BLOW

CAUTION  
120 VOLTS

TB101

TB102

J

1  
2  
3  
4

1  
2  
3  
4  
5  
6

FLT  
ADJ  
RTN  
OUT

10  
11  
10 AM

1  
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4

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2  
3  
4



AUXILIARY  
POWER



ON

OFF



HIGH VOLTAGE  
POWER



ON

OFF



CIRCUIT BREAKER  
LOCKED OFF  
WITH KEY IN  
THIS POSITION



CABINET  
OVER  
TEMPERATURE

FAULT

POWER  
AMPLIFIER BLOWERS

5 AMP

5 AMP

5 AMP

ON

OFF

CABINET  
LIGHTS

A13





↶  
INCREASE

FOCUS COIL CURRENT



↶  
INCREASE



# VOLTAGE/CURRENT



PARAMETERS 11,13,14,15 ARE AVG. VALUES

POSN	PARAMETER	FULL SCALE
1	+ 5 VDC PS	10V
2	+15 VDC PS	50V
3	-15 VDC PS	50V



AUXILIARY  
POWER



ON  
OFF



HIGH VOLTAGE  
POWER



ON  
OFF



CIRCUIT BREAKER  
LOCKED OFF  
WITH KEY IN  
THIS POSITION



CABINET  
OVER  
TEMPERATURE



FAULT

POWER  
AMPLIFIER BLOWERS



5 AMP



5 AMP



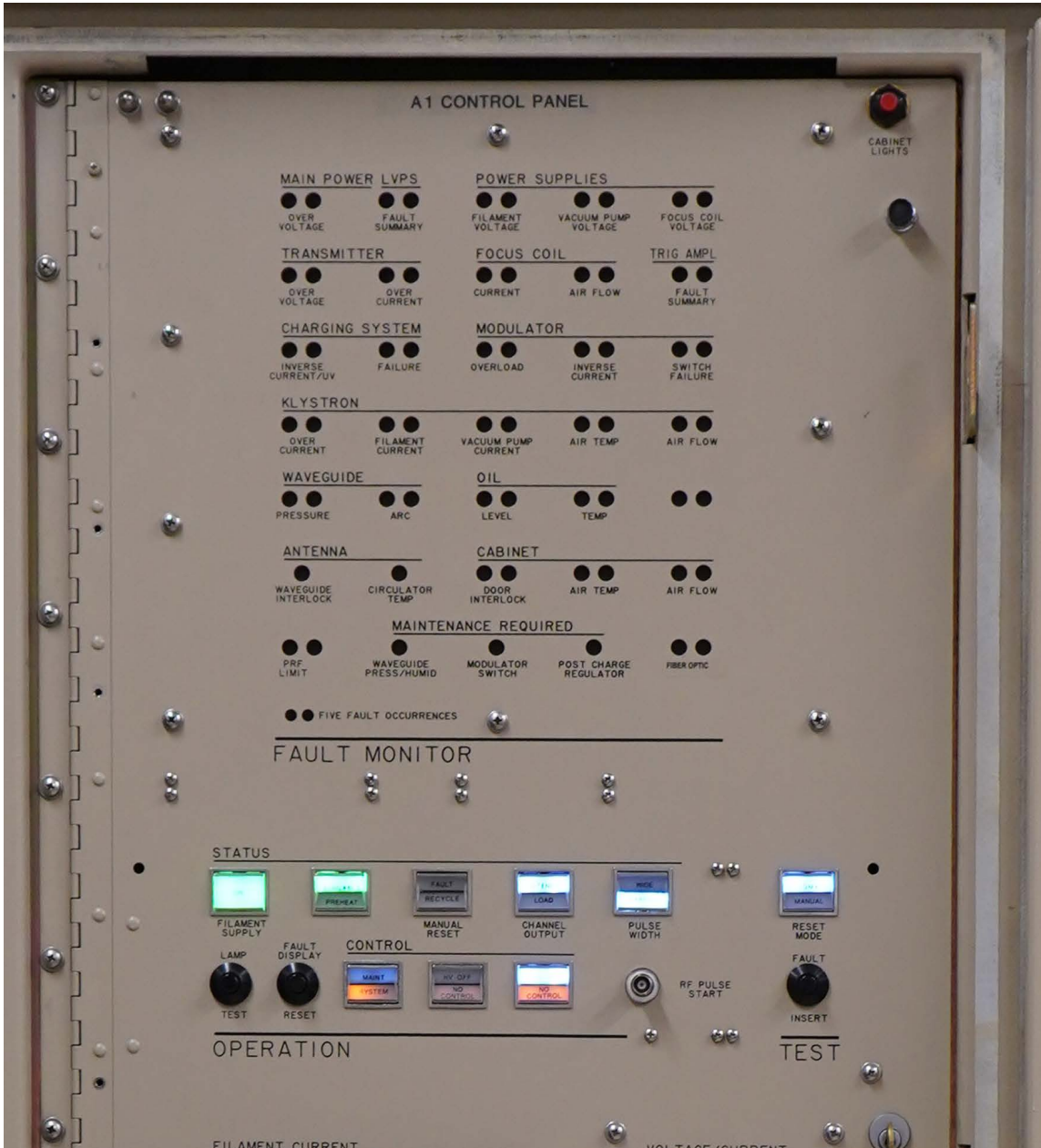
5 AMP



ON  
OFF

CABINET  
LIGHTS



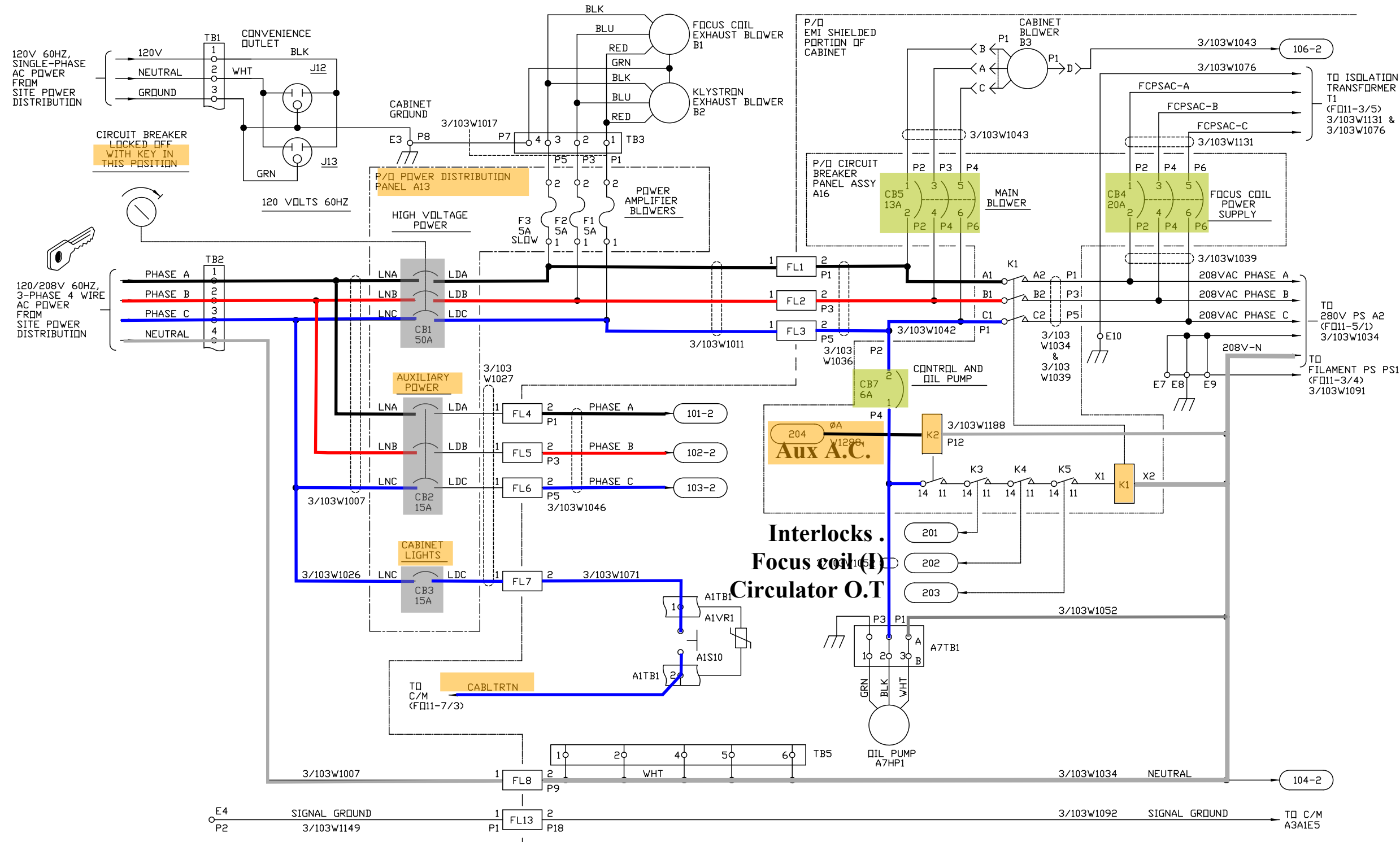


# Cabinet Lights CB3



# High Power turn-on Interlock control.



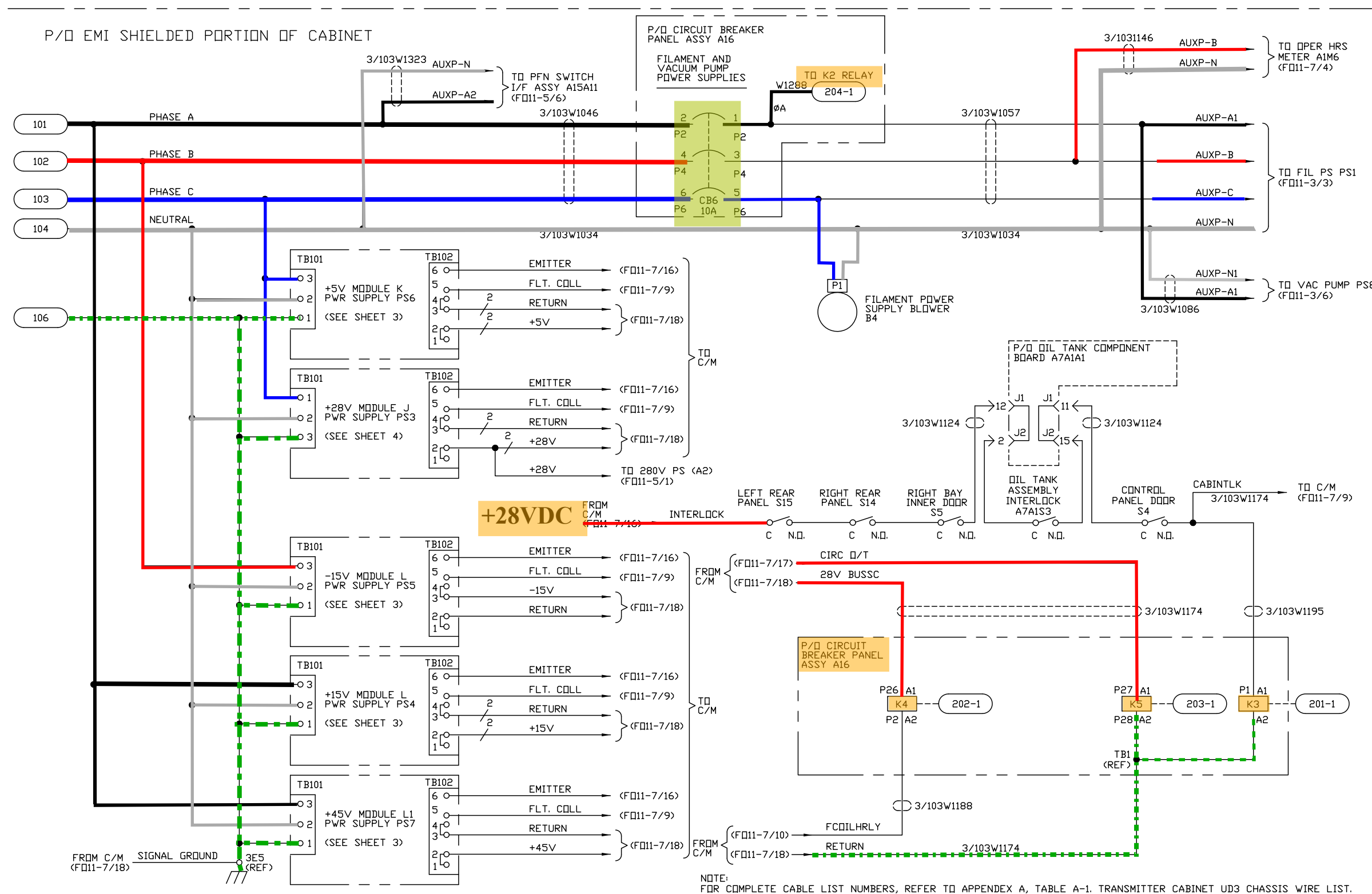


NOTE:  
FOR COMPLETE CABLE LIST NUMBERS, REFER TO APPENDIX A, TABLE A-1. TRANSMITTER CABINET UD3 CHASSIS WIRE LIST.

NX4099-B

Figure FO11-11. Power and Low Voltage Distribution Diagram (Sheet 1 of 4)

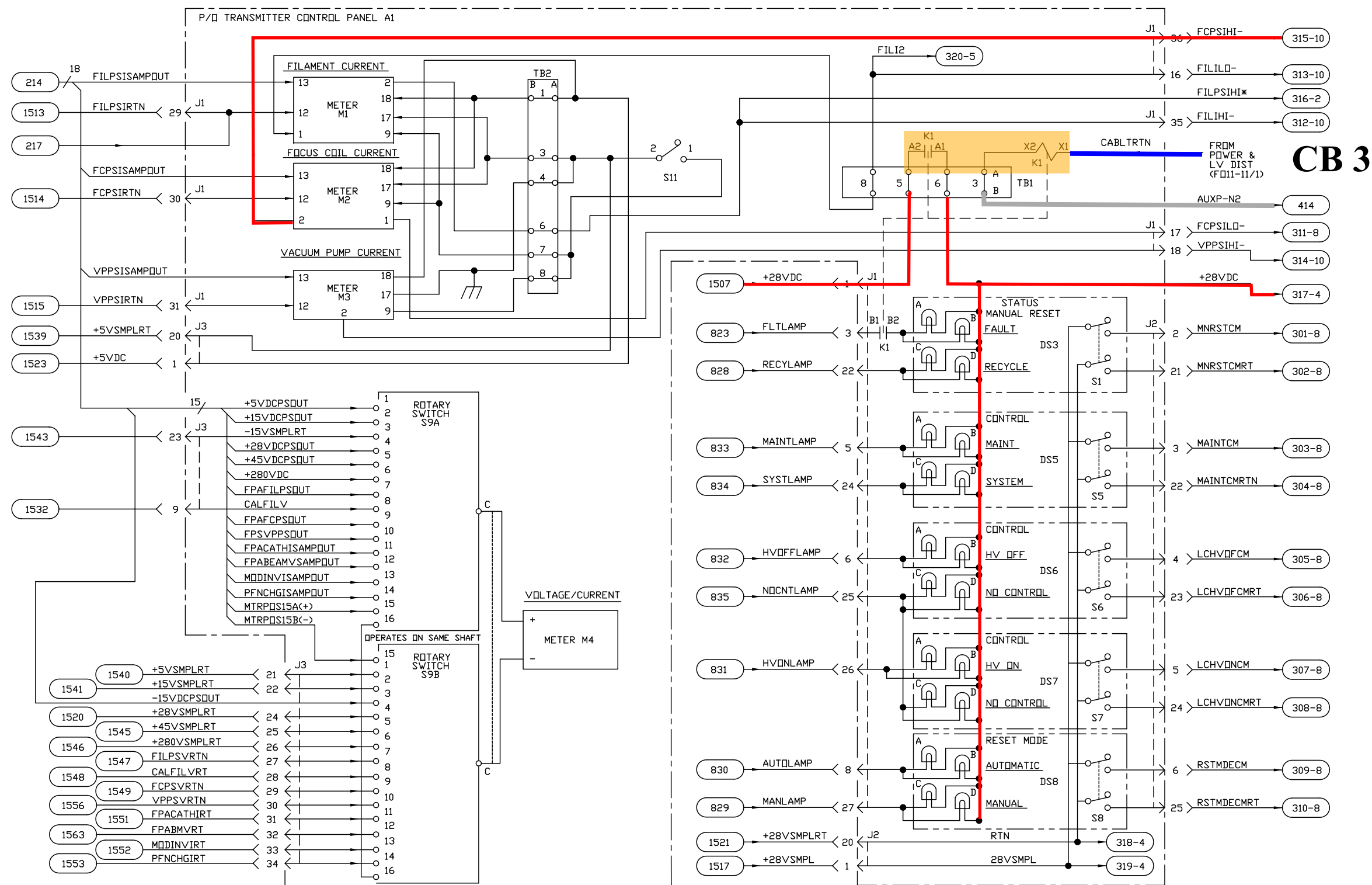




NX4100-B

Figure FO11-11. Power and Low Voltage Distribution Diagram (Sheet 2 of 4)



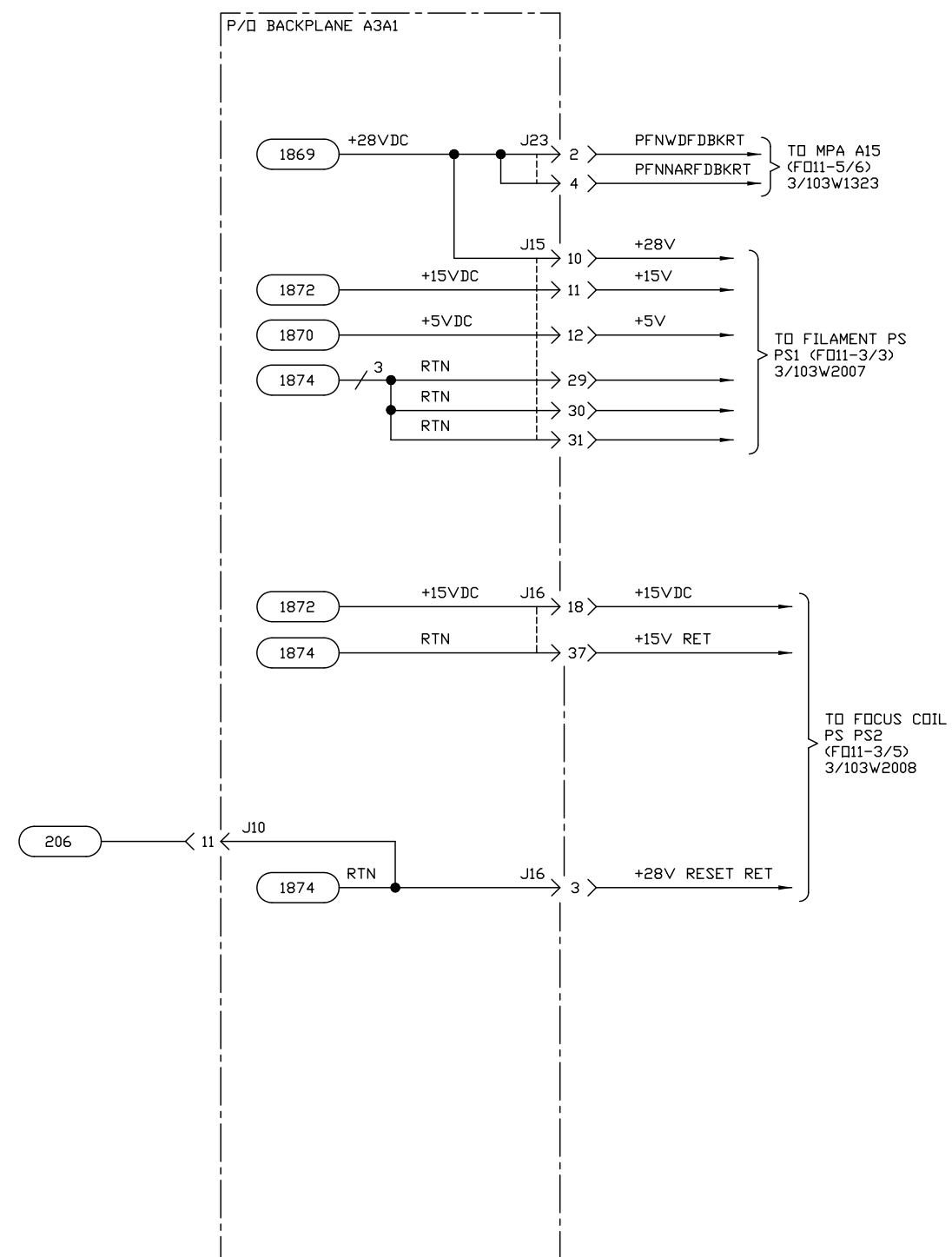
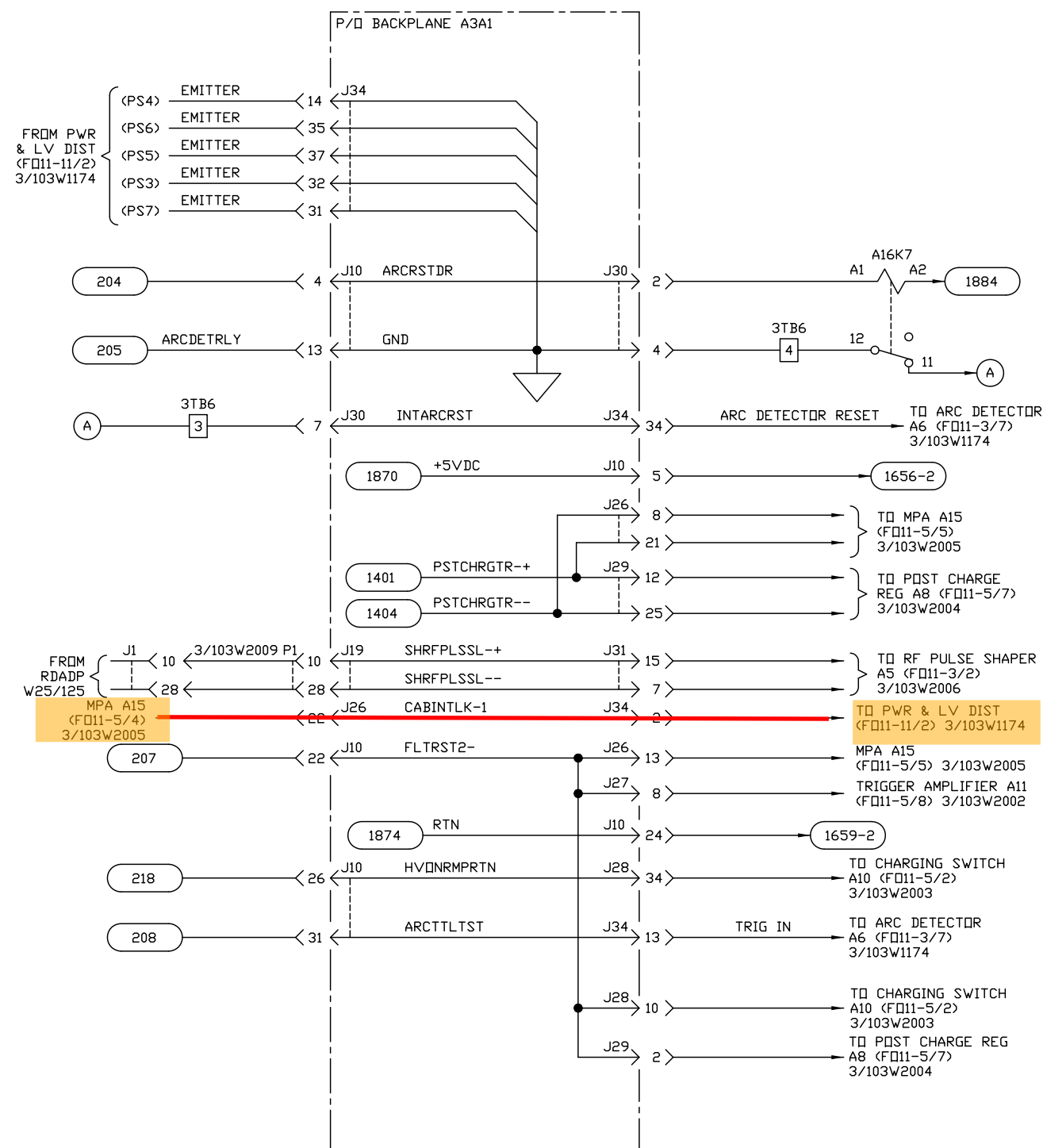


**CB 3**

NOTE:  
 1. CONTROL PANEL 3A1 JACK NUMBERS ARE ASSOCIATED WITH THE FOLLOWING CABLES: A1J1-3/103W2017, A1J2-3/103W2018, A1J3-3/103W2019, A1J4-3/103W2020. REFER TO APPENDIX A, TABLE A-1, TRANSMITTER CABINET UD3 CHASSIS WIRE LIST. REFERENCE FIGURE FO11-32, SHEETS 11 THRU 14 FOR CABLE ASSEMBLY DESIGNATIONS FOR CABLES ROUTED FROM A1J1 THRU A1J15 CONNECTING INTERNALLY ON THE CONTROL PANEL A1.  
 \* A LOGIC LOW (LOW VOLTAGE) SIGNAL DENOTES A HIGH CURRENT FAULT CONDITION.

NX4142-B

**Figure FO11-7. Control and Monitoring Signal Flow Diagram (Sheet 3 of 21)**

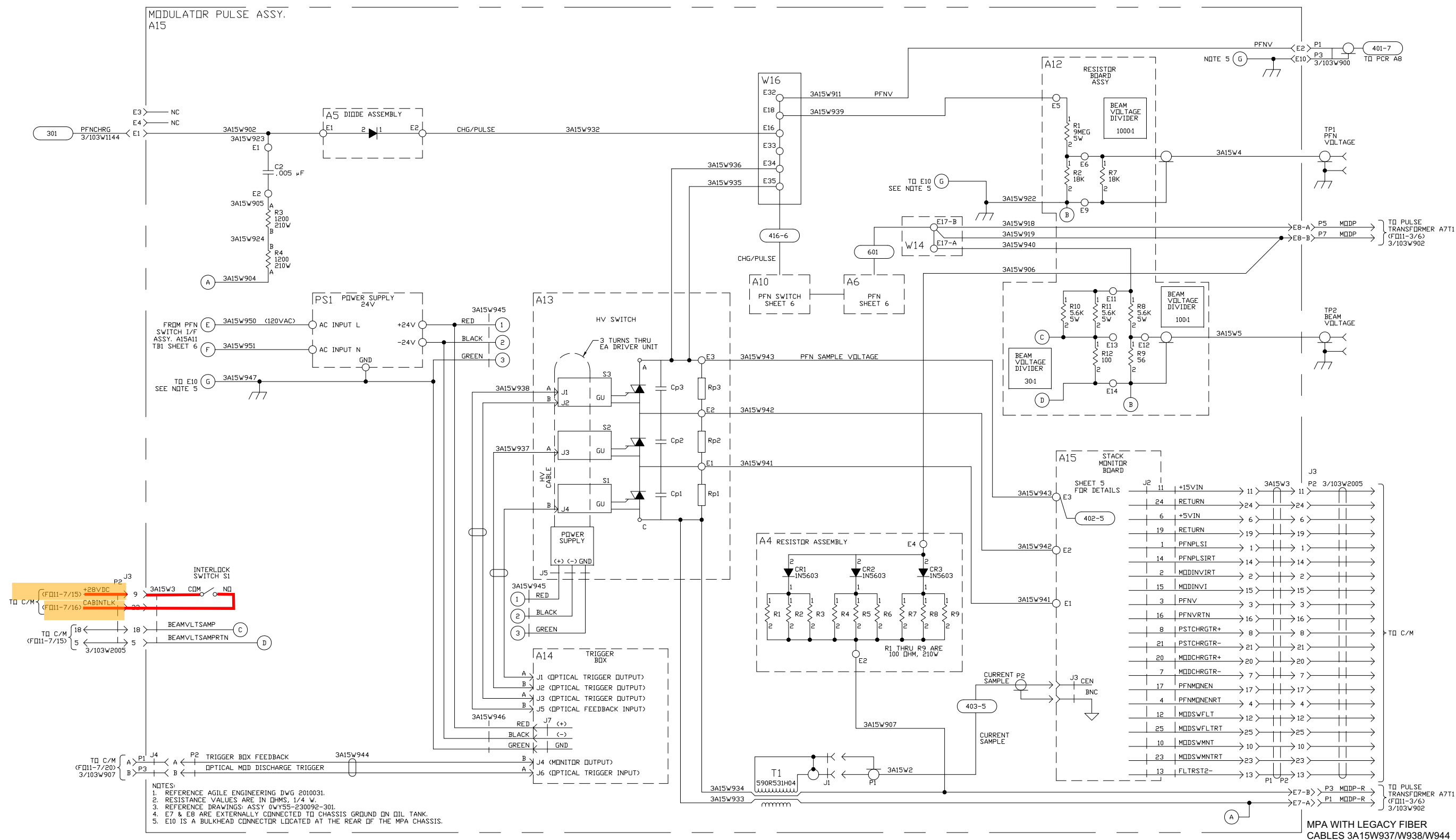


NOTE:  
 1. REFER TO APPENDIX A, TABLE A-1, TRANSMITTER CABINET UD3 CHASSIS WIRE LIST.  
 2. BACKPLANE A3A1 JACK NUMBERS THAT ARE NOT ILLUSTRATED ARE ASSOCIATED WITH THE FOLLOWING CABLES: A3A1J10-3/103W2020 AND A3A1J30-3/103W1086.

NX4155-A

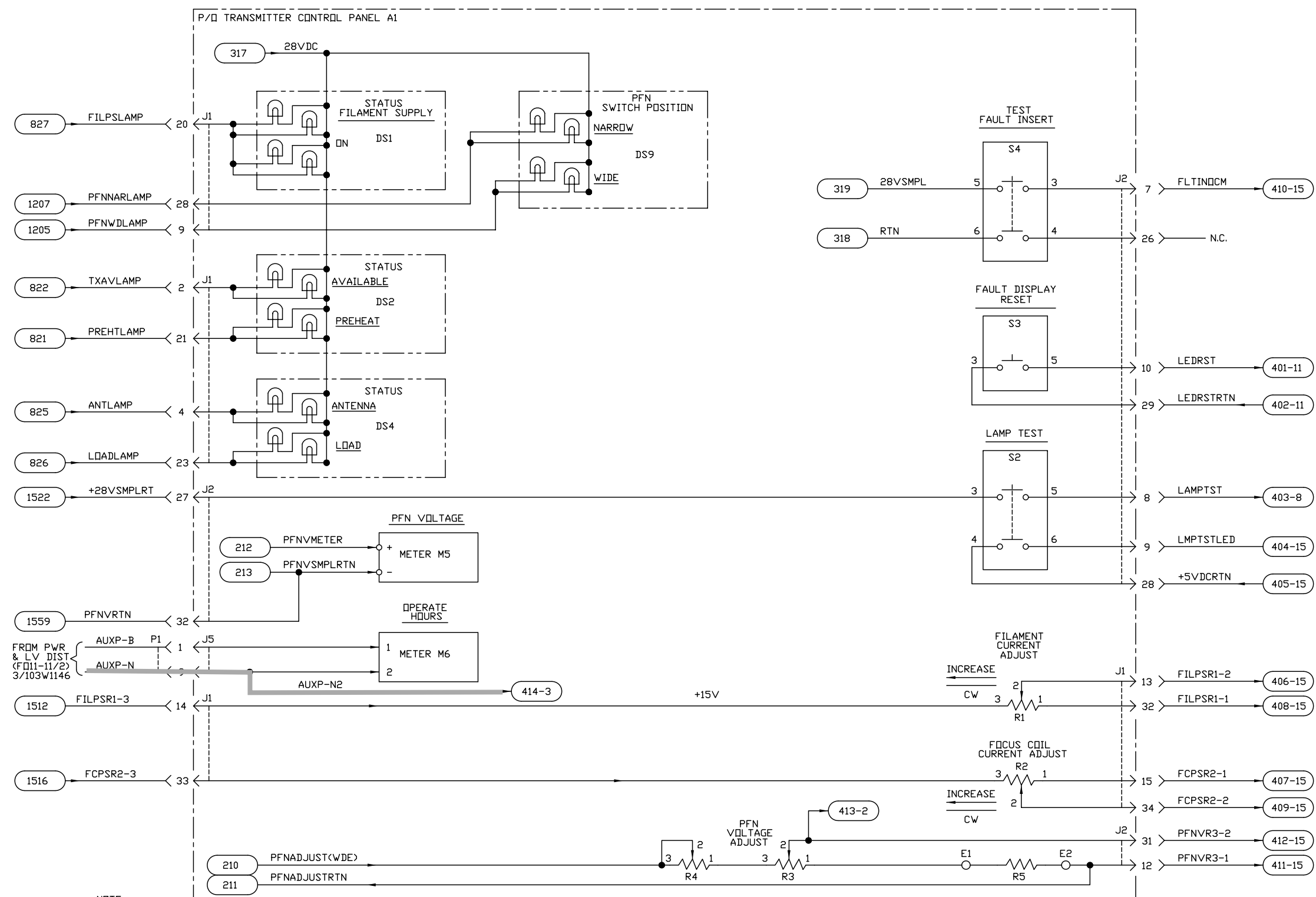
Figure FO11-7. Control and Monitoring Signal Flow Diagram (Sheet 16 of 21)





NX1402-K

Figure FO11-5. Modulator Signal Flow Diagram (Sheet 4A of 9)

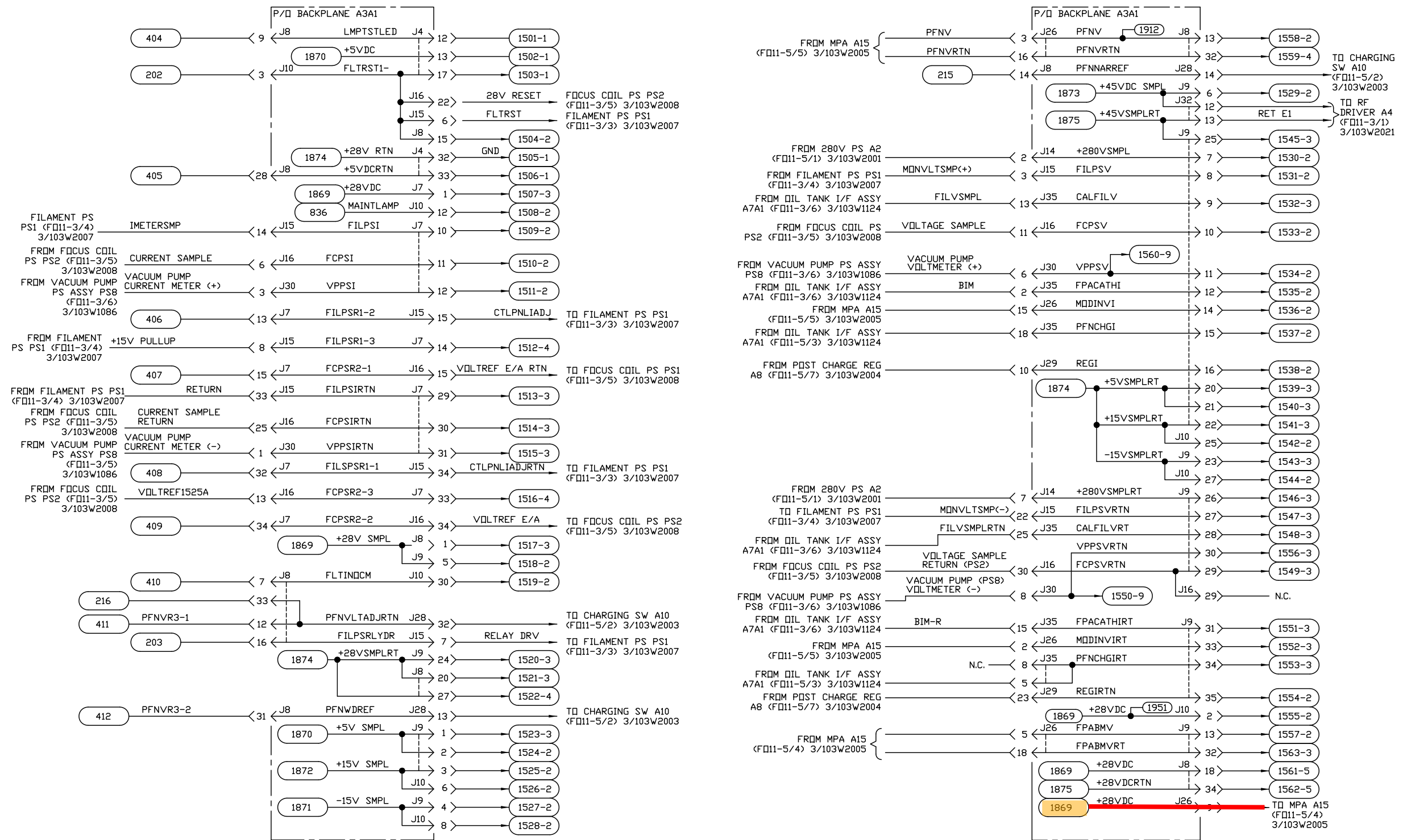


NOTE:  
 1. CONTROL PANEL 3A1 JACK NUMBERS ARE ASSOCIATED WITH THE FOLLOWING CABLES: A1J1-3/103W2017, A1J2-3/103W2018, A1J3-3/103W2019, A1J4-3/103W2020. REFER TO APPENDIX A, TABLE A-1, TRANSMITTER CABINET UD3 CHASSIS WIRE LIST. REFERENCE FIGURE FO11-32, SHEETS 11 THRU 14 FOR CABLE ASSEMBLY DESIGNATIONS FOR CABLES ROUTED FROM A1J1 THRU A1J15 CONNECTING INTERNALLY ON THE CONTROL PANEL A1.

NX4143-A

Figure FO11-7. Control and Monitoring Signal Flow Diagram (Sheet 4 of 21)

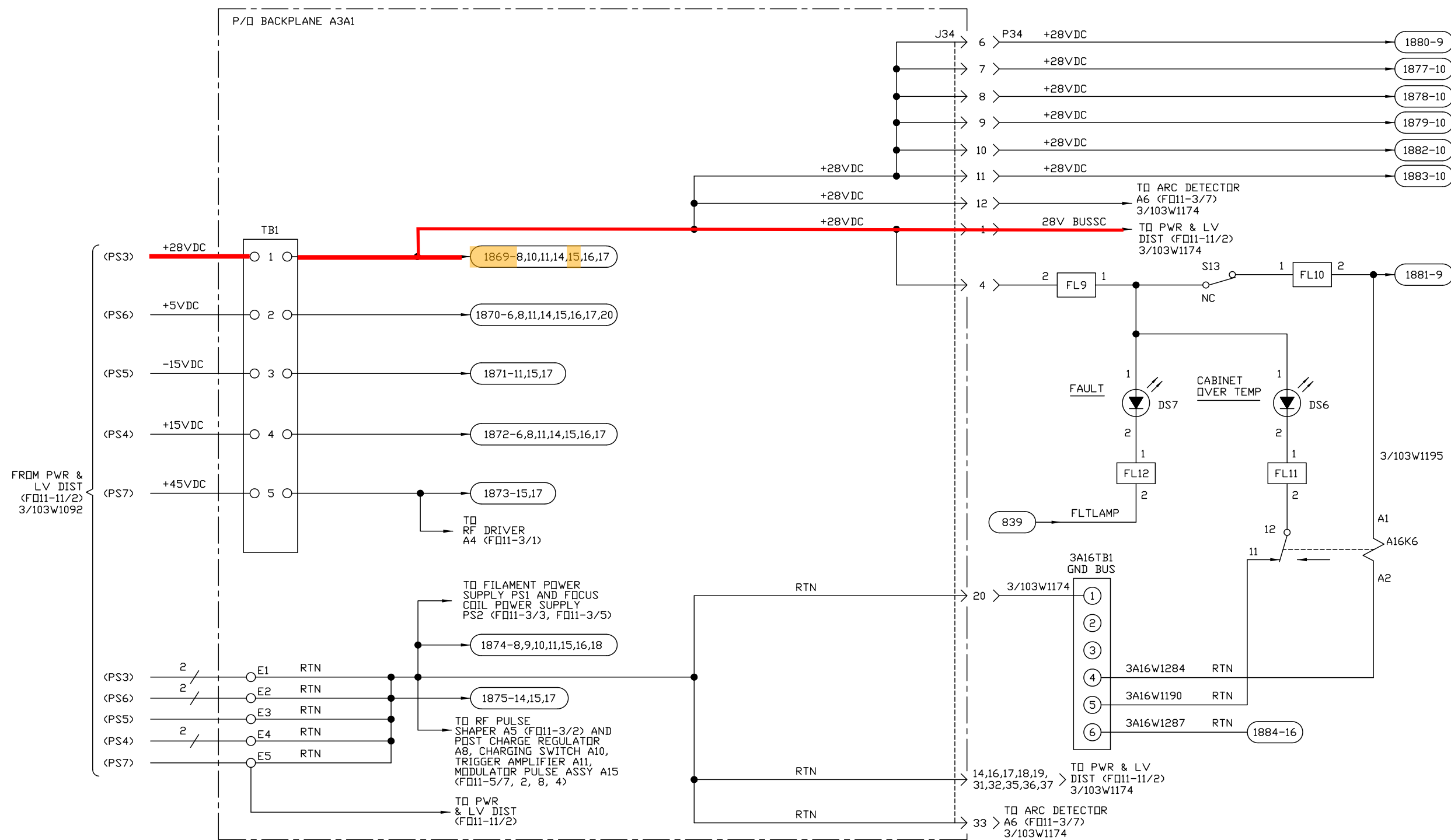




NOTE:  
 1. REFER TO APPENDIX A, TABLE A-1, TRANSMITTER CABINET UD3 CHASSIS WIRE LIST.

NX4154-A

Figure FO11-7. Control and Monitoring Signal Flow Diagram (Sheet 15 of 21)

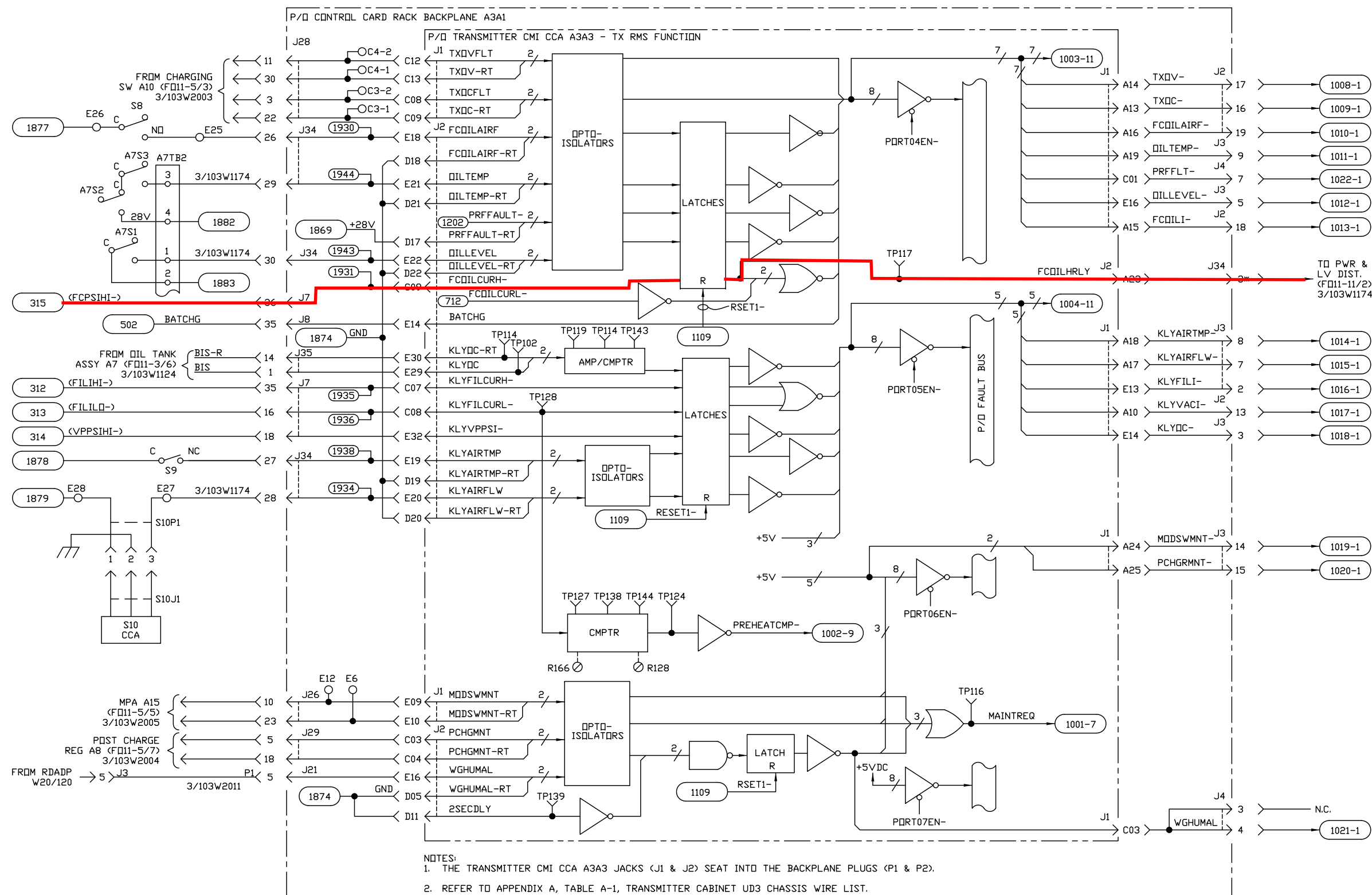


NOTE:  
 1. REFER TO APPENDIX A, TABLE A-1, TRANSMITTER CABINET UD3 CHASSIS WIRE LIST.  
 2. BACKPLANE A3A1 JACK NUMBERS THAT ARE NOT ILLUSTRATED ARE ASSOCIATED WITH THE FOLLOWING CABLE: A3A1J34-3/103W1174.

NX4157-C

Figure FO11-7. Control and Monitoring Signal Flow Diagram (Sheet 18 of 21)

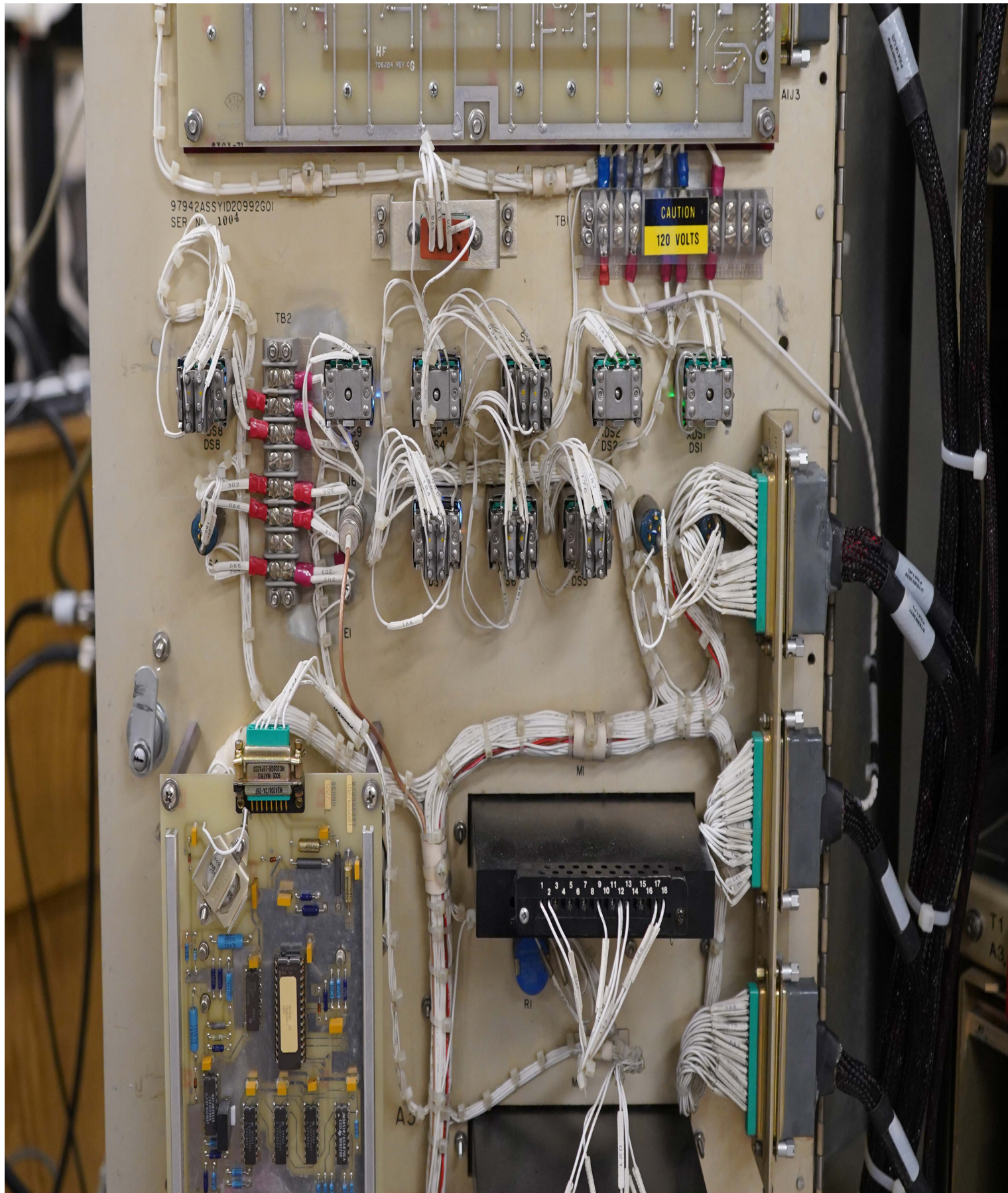




NX4149-D

Figure FO11-7. Control and Monitoring Signal Flow Diagram (Sheet 10 of 21)

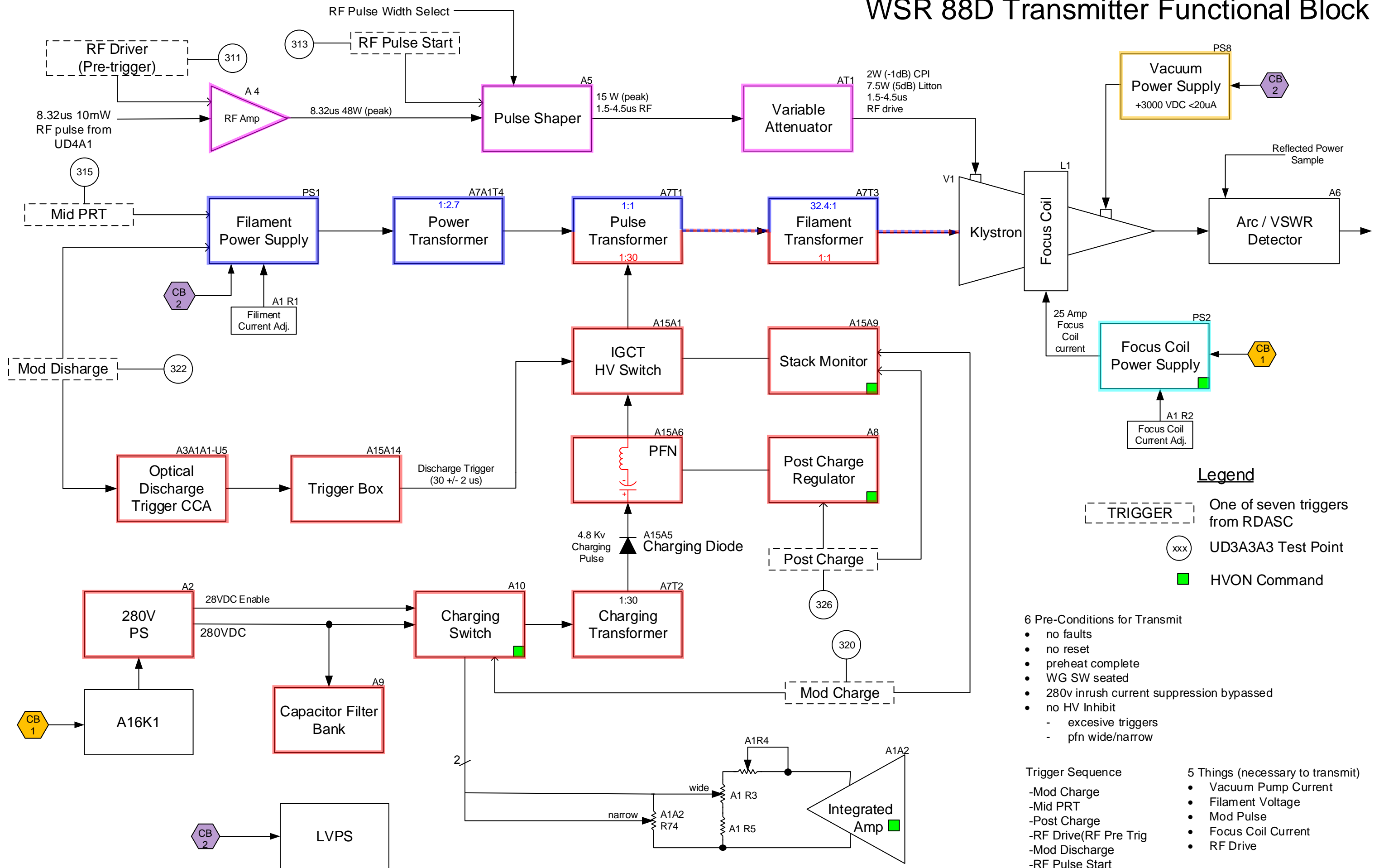
# K1





# **Modulator Changes**

# WSR 88D Transmitter Functional Block



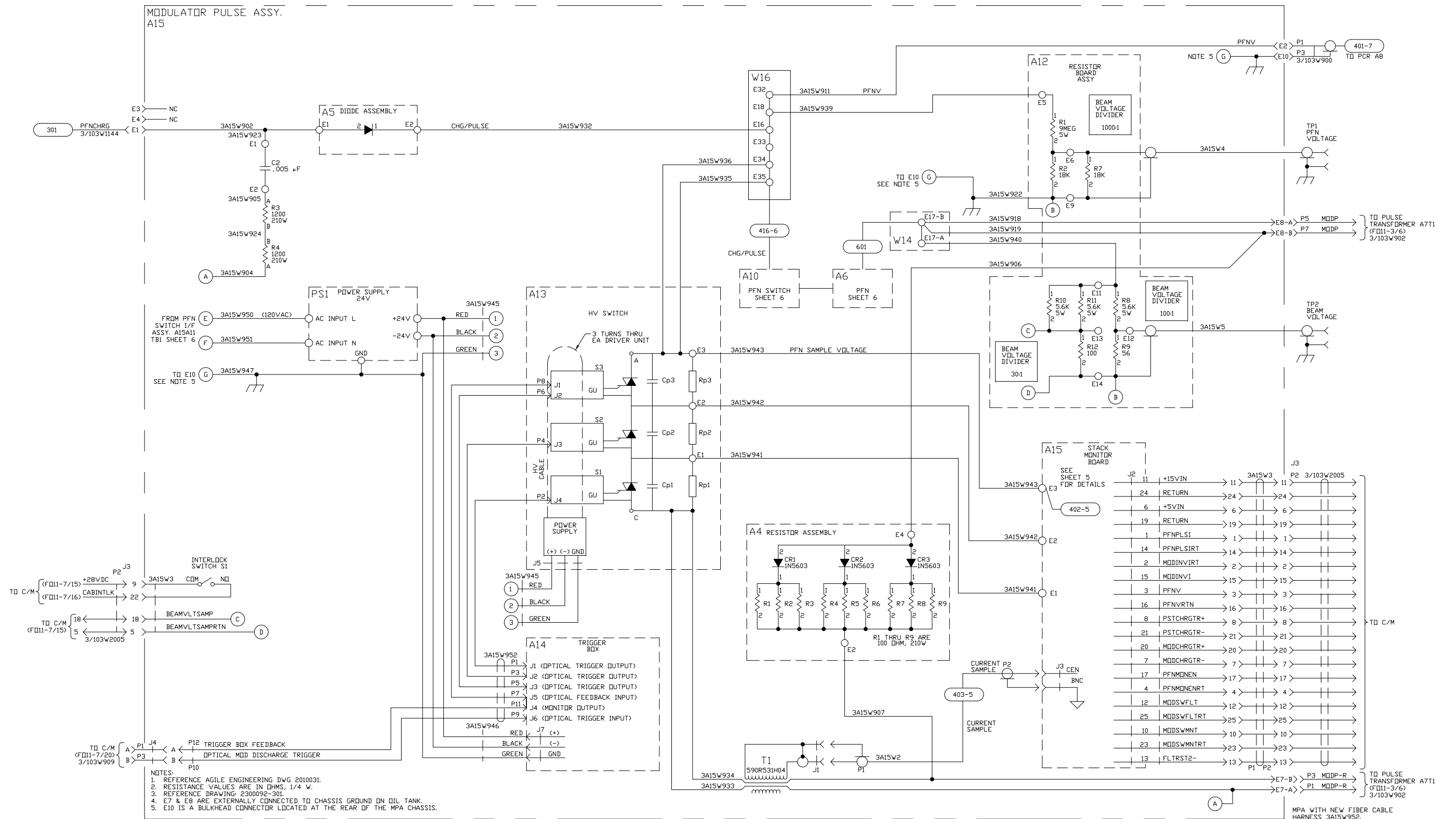
- Legend**
- TRIGGER (dashed box) One of seven triggers from RDASC
  - (xxx) UD3A3A3 Test Point
  - HVON Command

- 6 Pre-Conditions for Transmit**
- no faults
  - no reset
  - preheat complete
  - WG SW seated
  - 280v inrush current suppression bypassed
  - no HV Inhibit
    - excessive triggers
    - pfn wide/narrow

- Trigger Sequence**
- Mod Charge
  - Mid PRT
  - Post Charge
  - RF Drive(RF Pre Trig)
  - Mod Discharge
  - RF Pulse Start
- 5 Things (necessary to transmit)**
- Vacuum Pump Current
  - Filament Voltage
  - Mod Pulse
  - Focus Coil Current
  - RF Drive

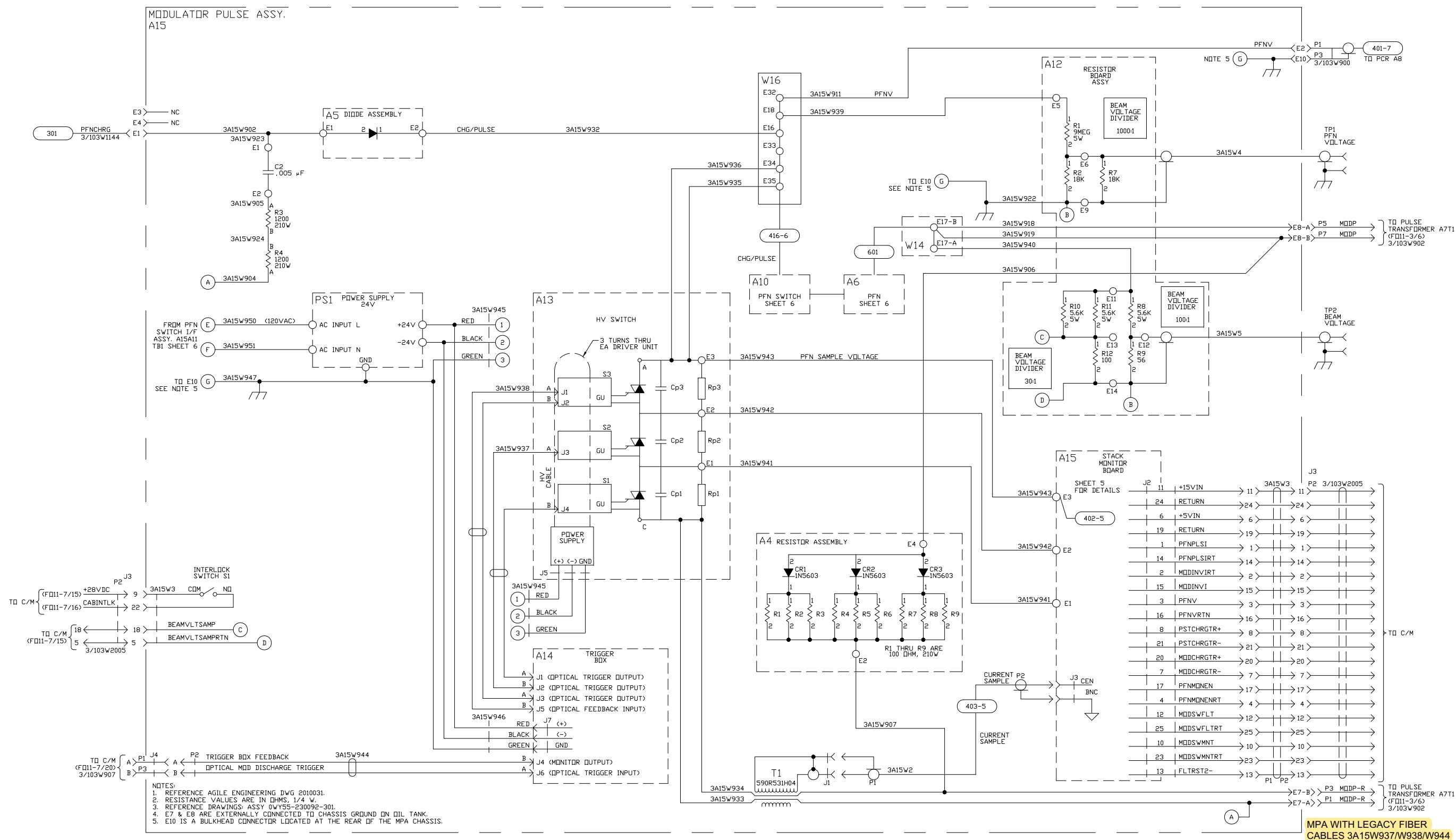
FOR TRAINING USE ONLY NWSTC





NX4273-A

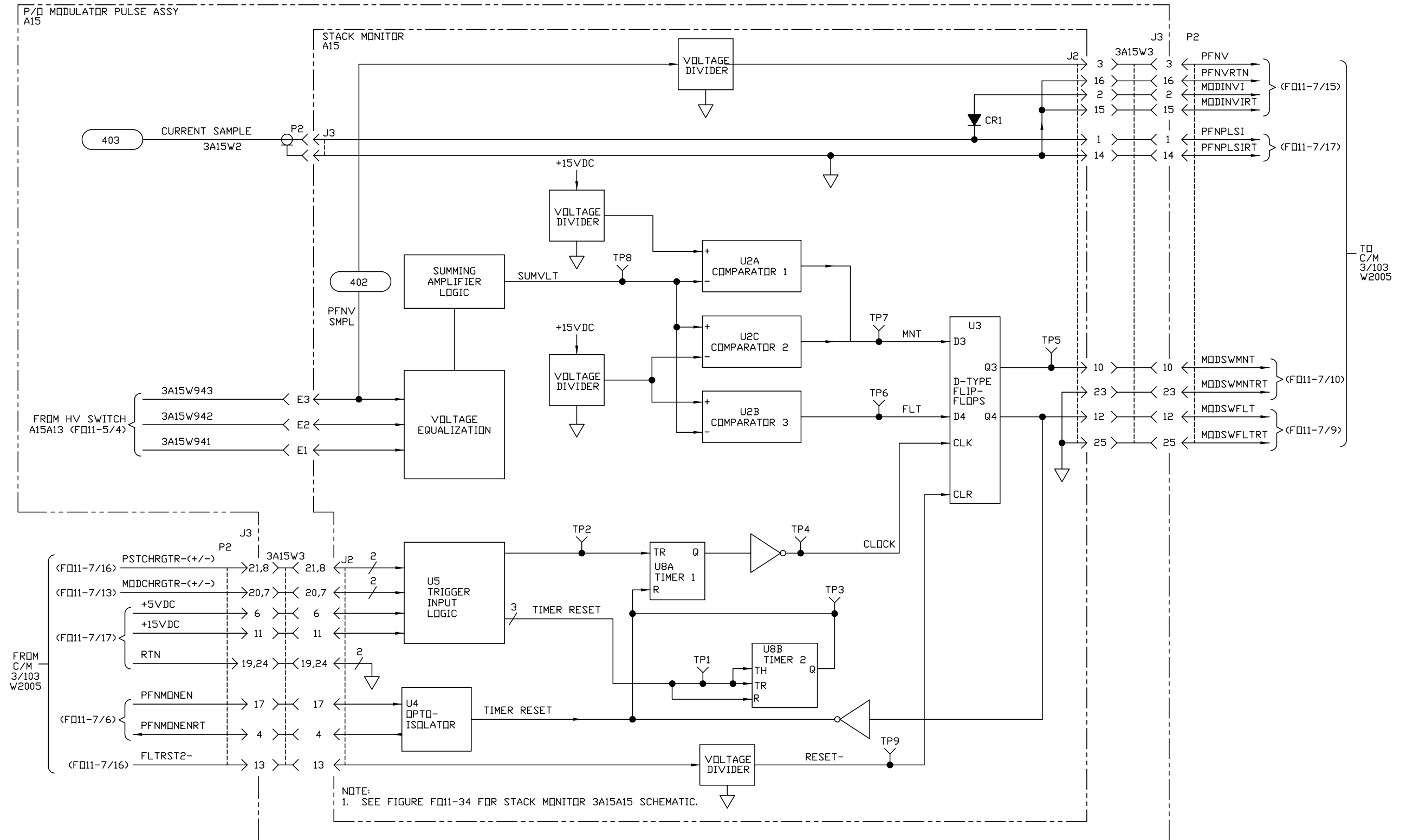
Figure FO11-5. Modulator Signal Flow Diagram (Sheet 4 of 9)



NX1402-K

Figure FO11-5. Modulator Signal Flow Diagram (Sheet 4A of 9)

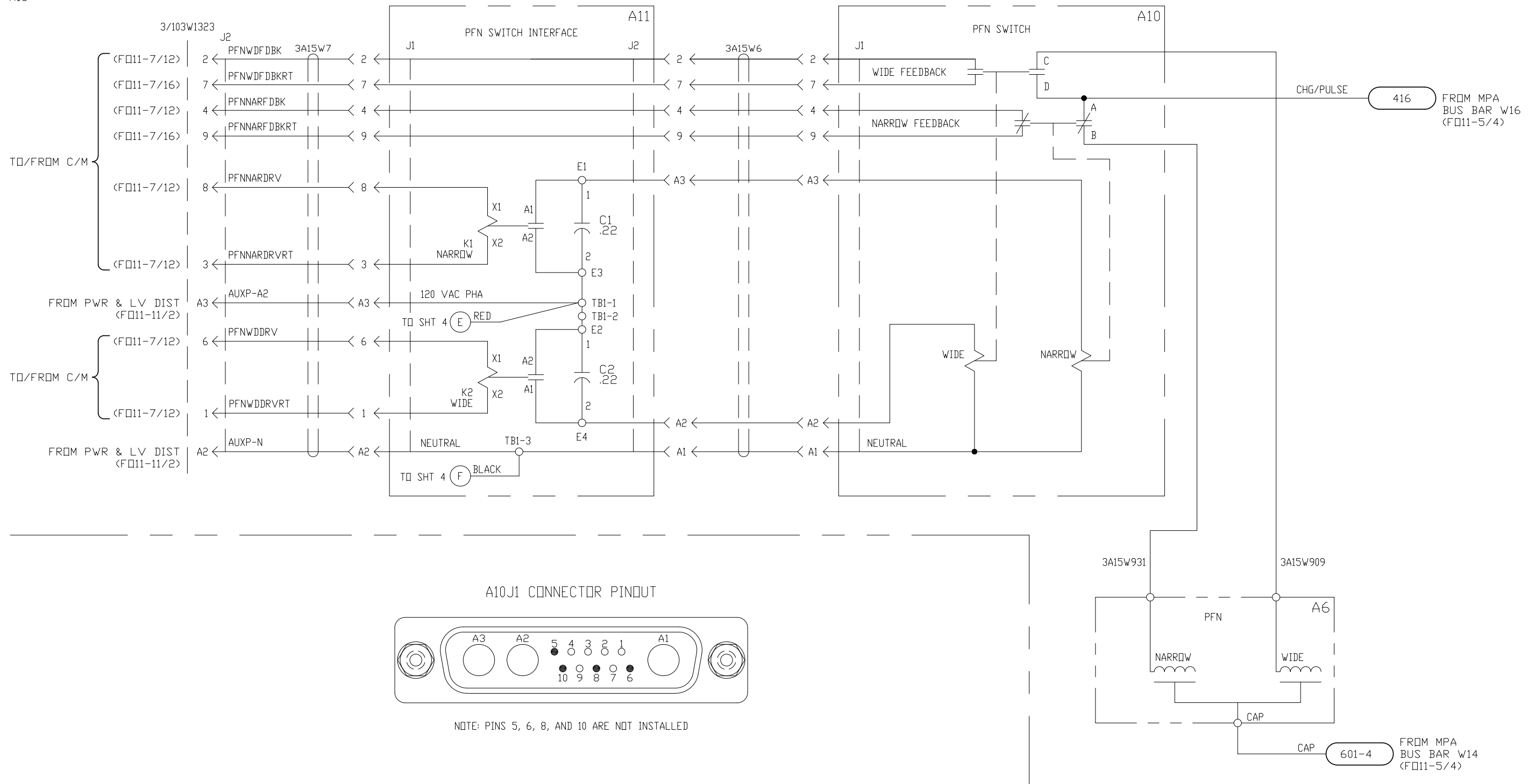




NX1403-E

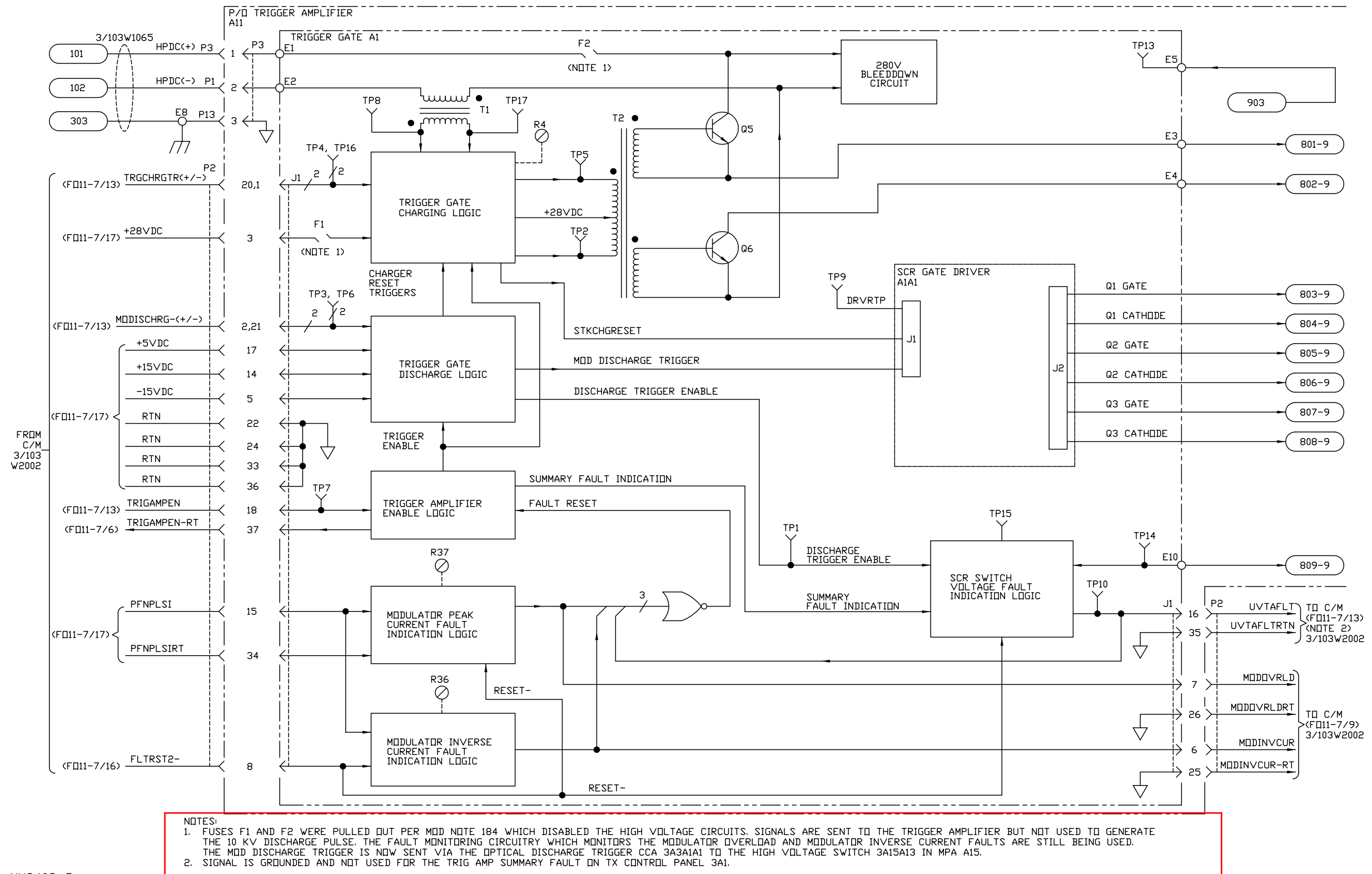
Figure FO11-5. Modulator Signal Flow Diagram (Sheet 5 of 9)

P/O MODULATOR PULSE ASSEMBLY  
A15



NX1404-G

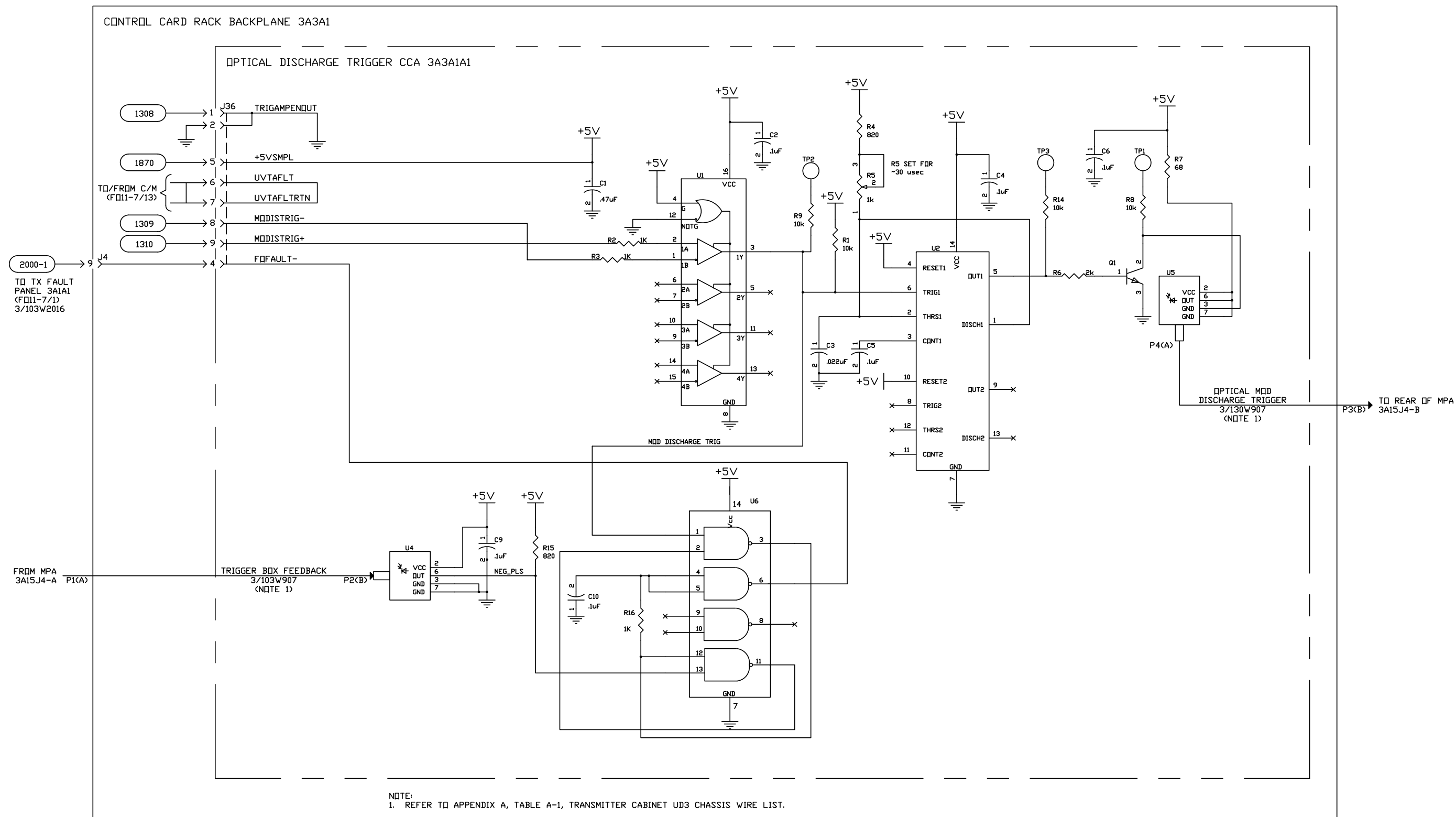
Figure FO11-5. Modulator Signal Flow Diagram (Sheet 6 of 9)



NX3403-G

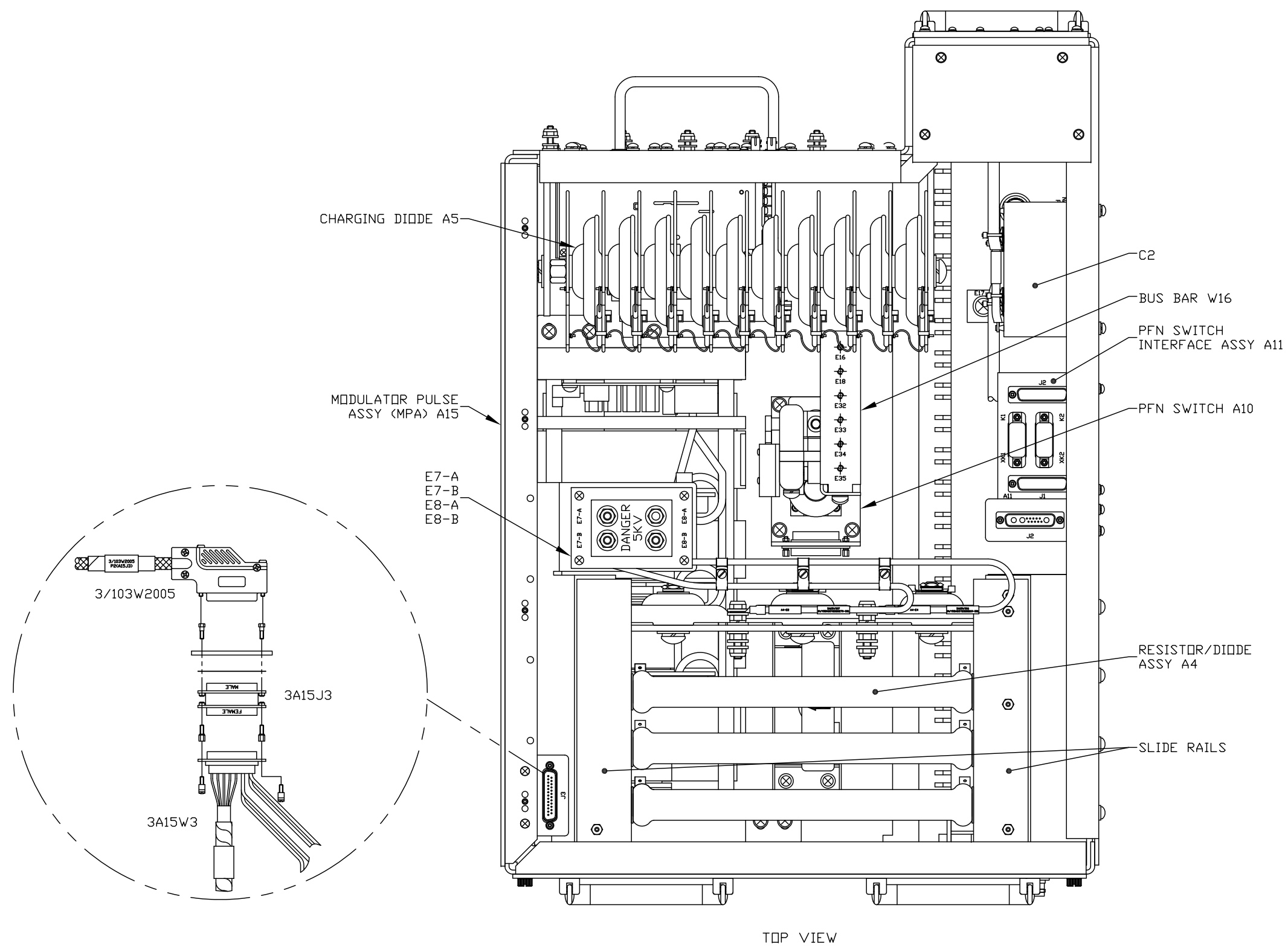
Figure FO11-5. Modulator Signal Flow Diagram (Sheet 8 of 9)





NX4162-B

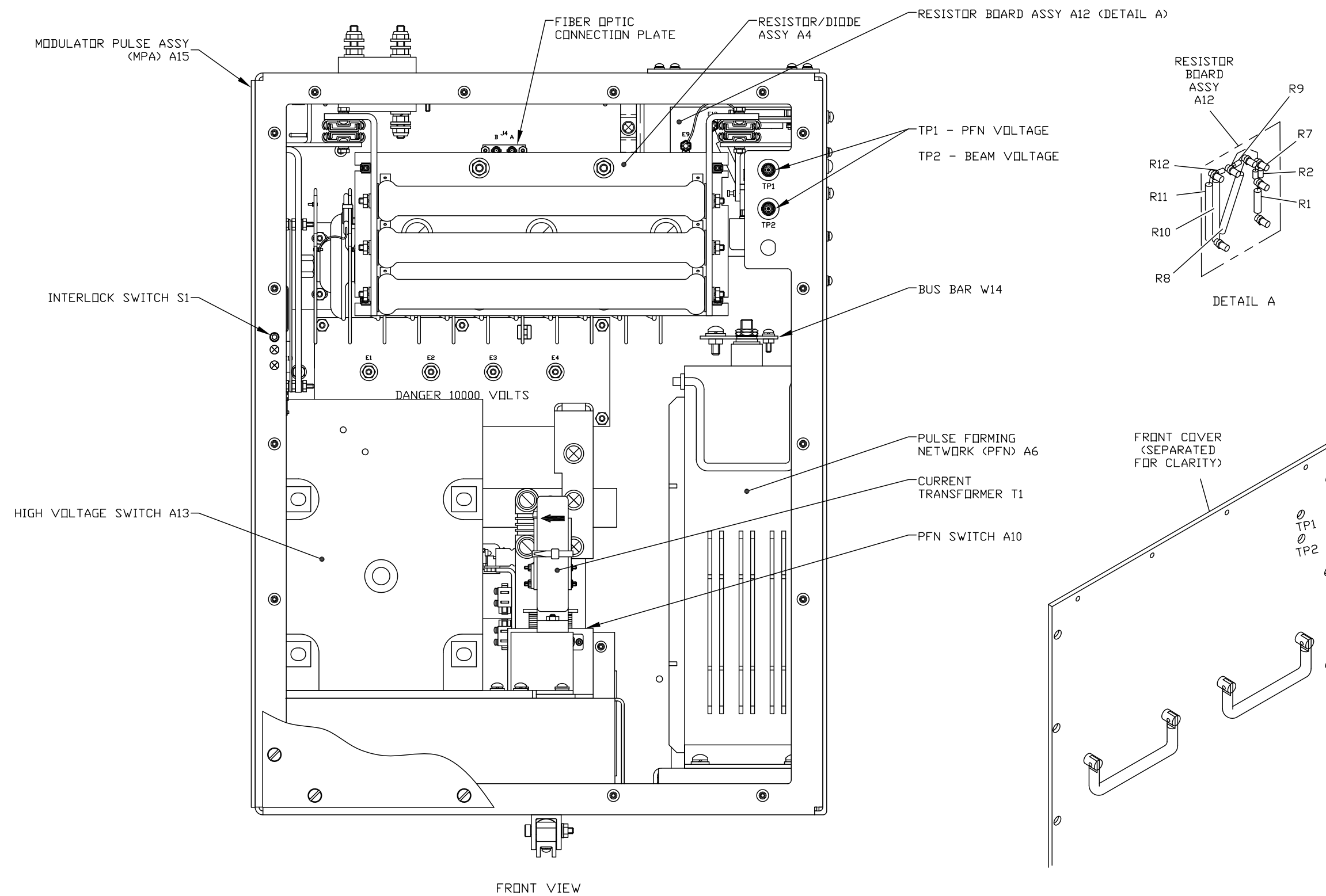
Figure FO11-7. Control and Monitoring Signal Flow Diagram (Sheet 20 of 21)



NX4184-A

Figure FO11-28. Modulator Pulse Assembly UD3A15 Major Components (Sheet 1 of 5)

FP-11-159/(FP-11-160 blank)

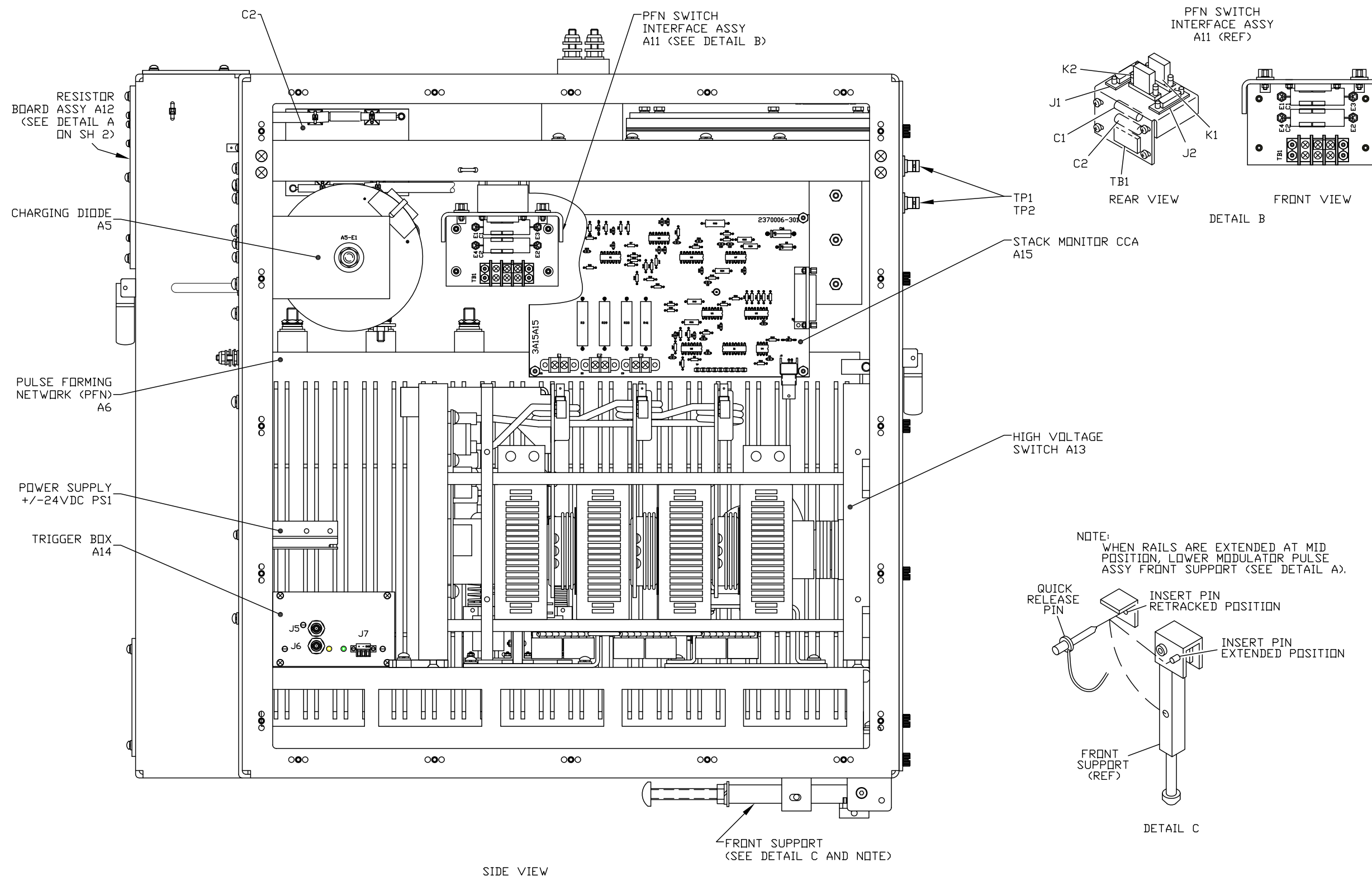


NX4185-A

Figure FO11-28. Modulator Pulse Assembly UD3A15 Major Components (Sheet 2 of 5)

FP-11-161/(FP-11-162 blank)





NX4186-A

Figure FO11-28. Modulator Pulse Assembly UD3A15 Major Components (Sheet 3 of 5)

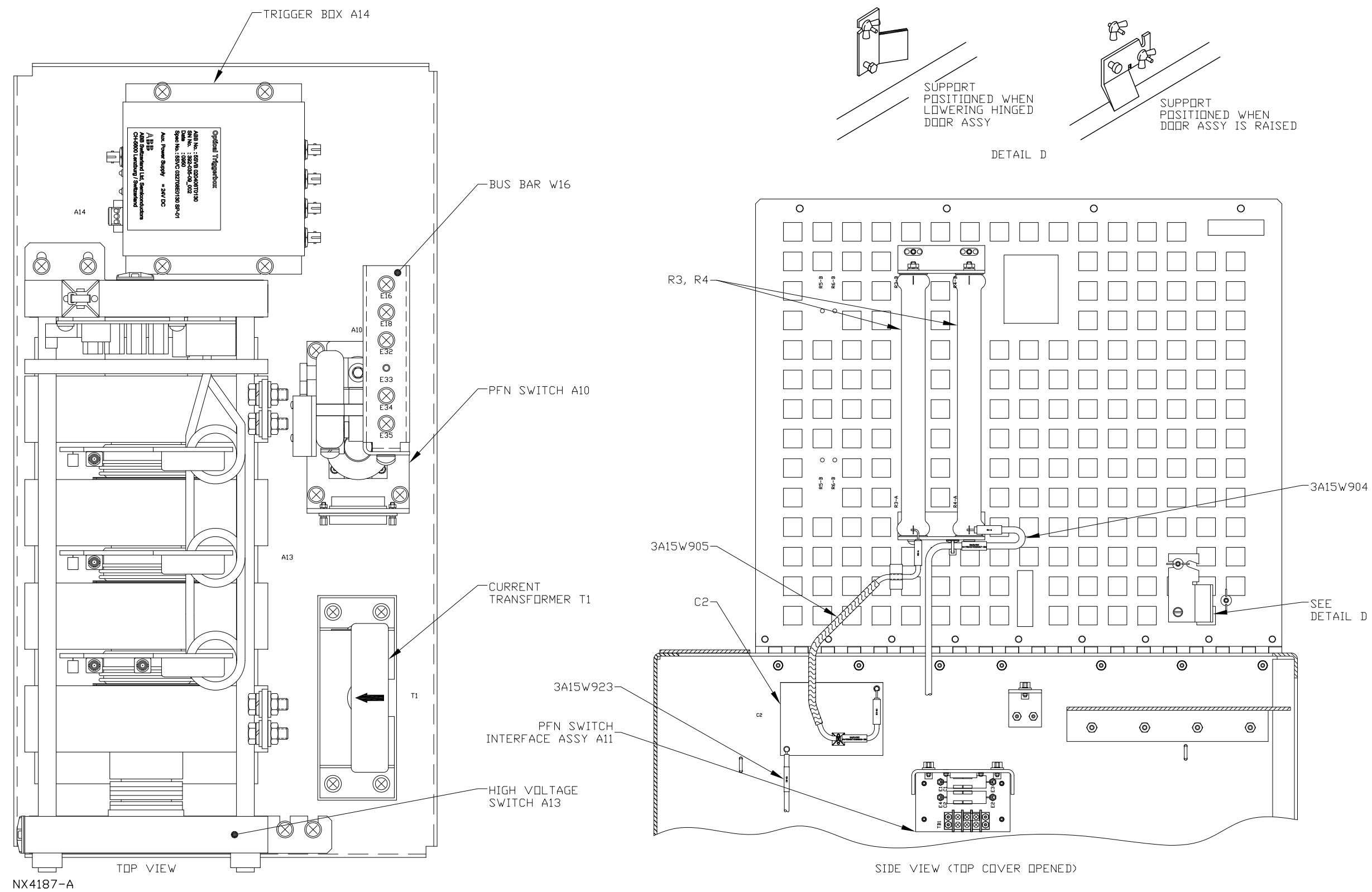


Figure FO11-28. Modulator Pulse Assembly UD3A15 Major Components (Sheet 4 of 5)

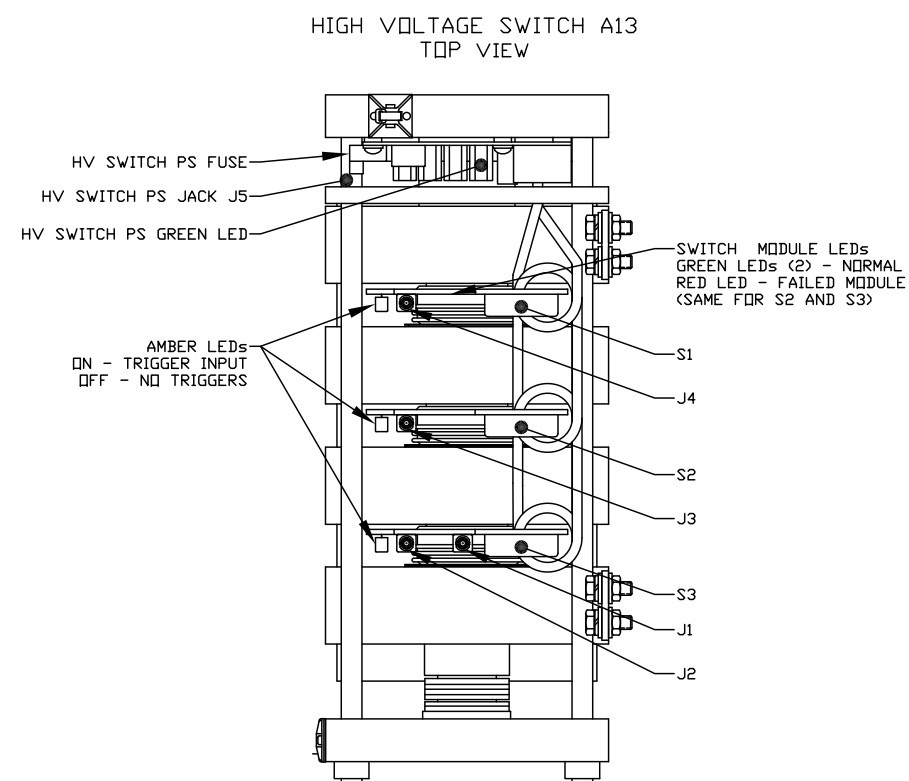
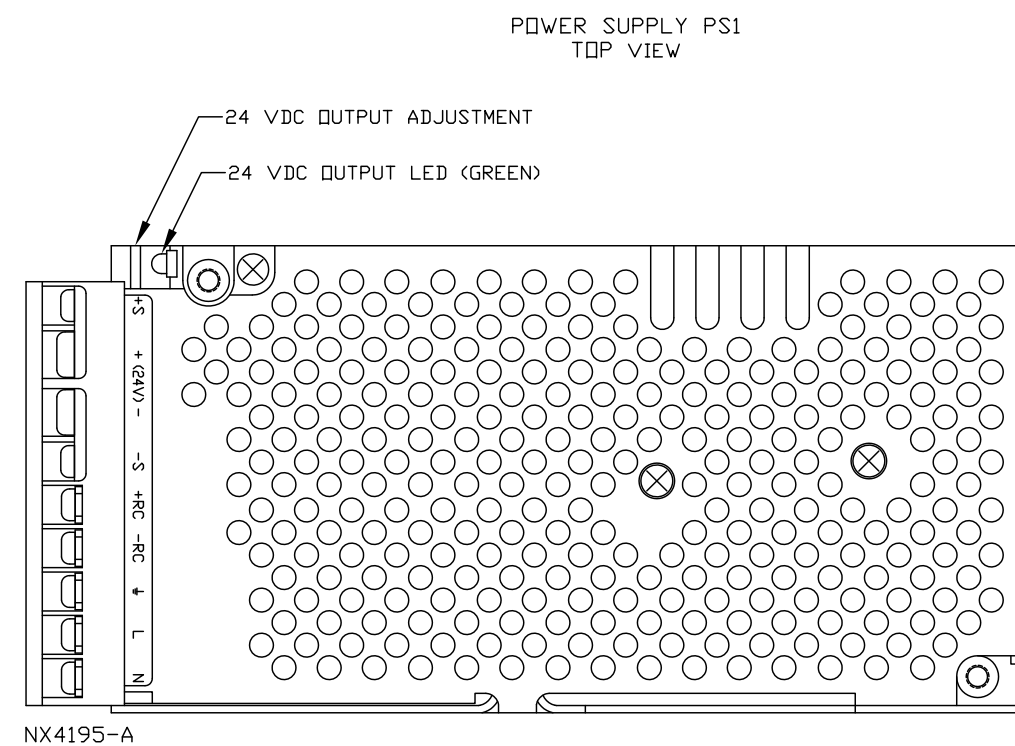
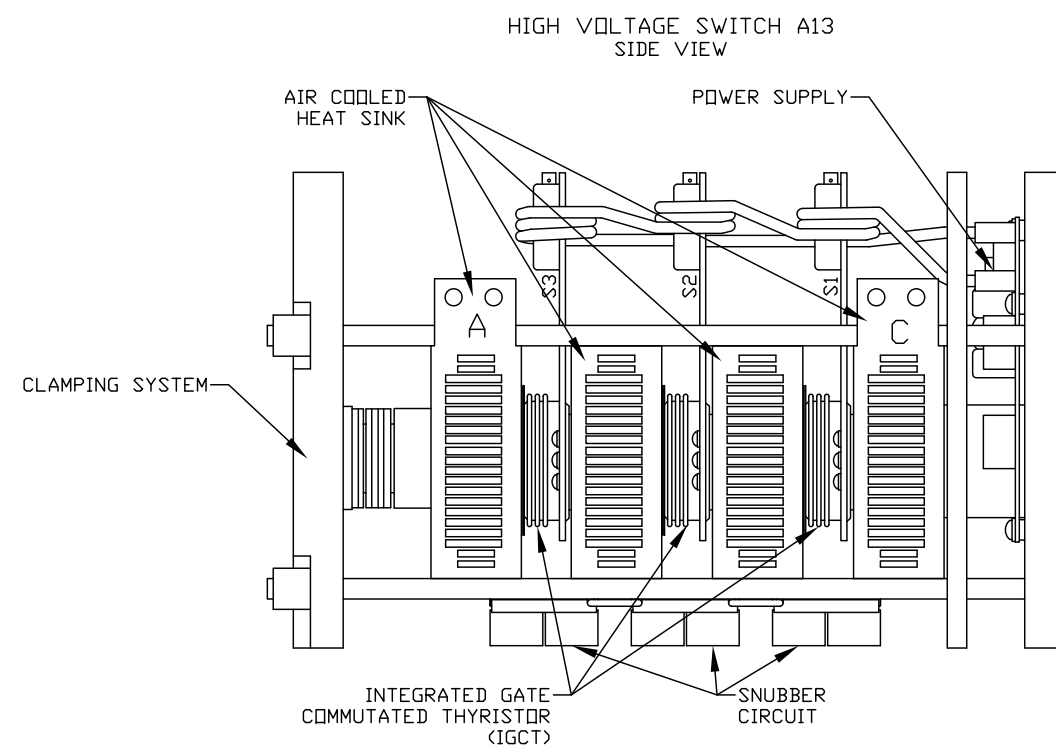
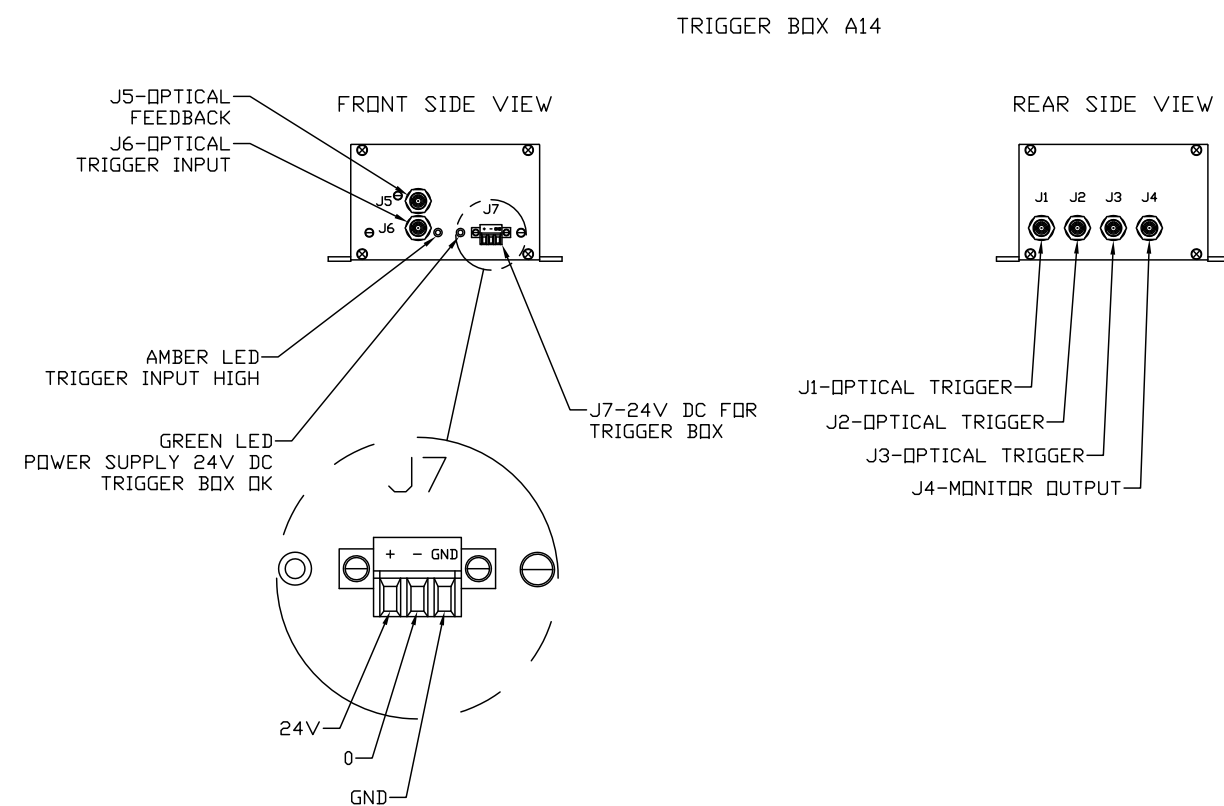


Figure FO11-28. Modulator Pulse Assembly UD3A15 Major Components (Sheet 5 of 5)



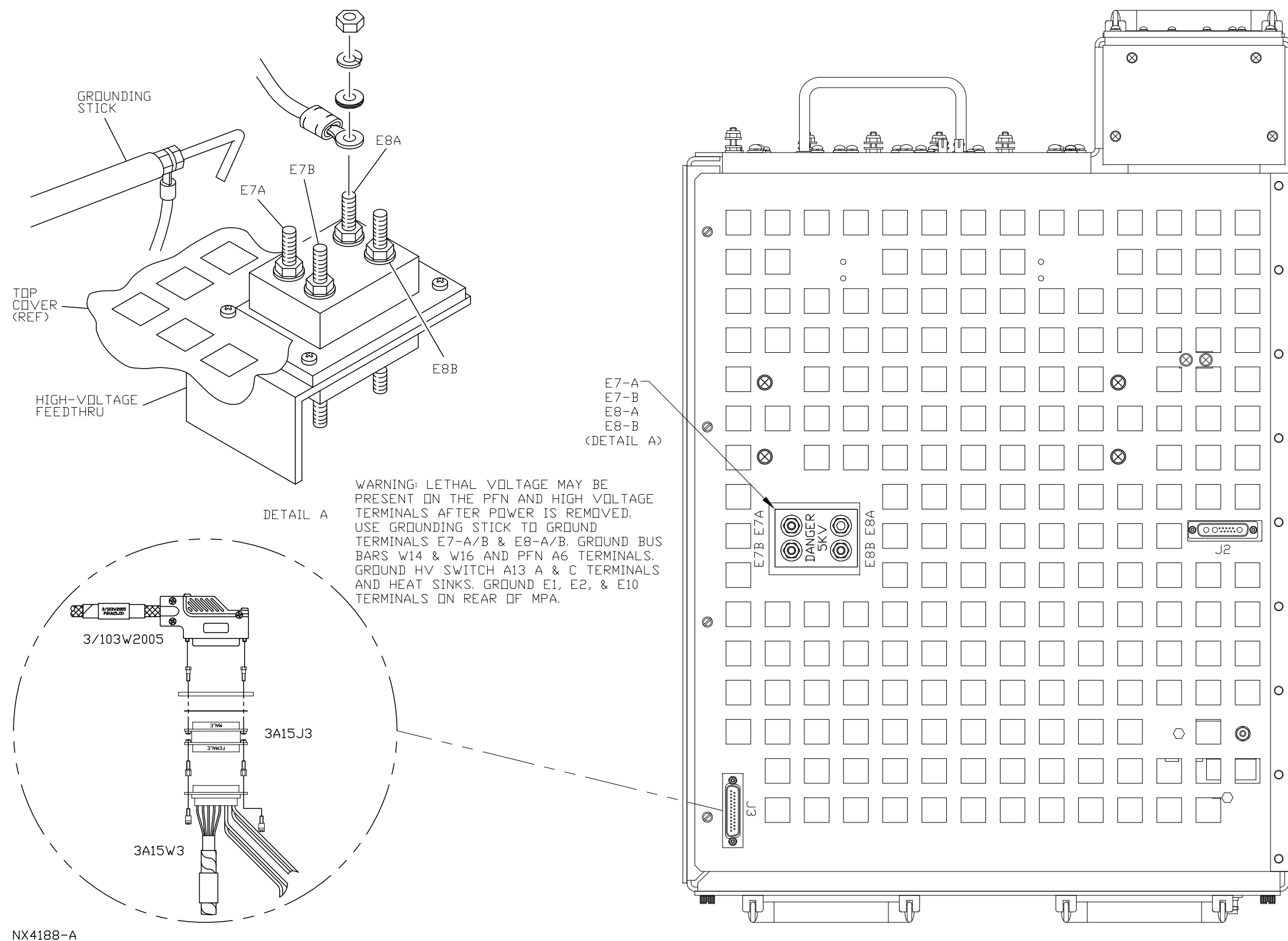
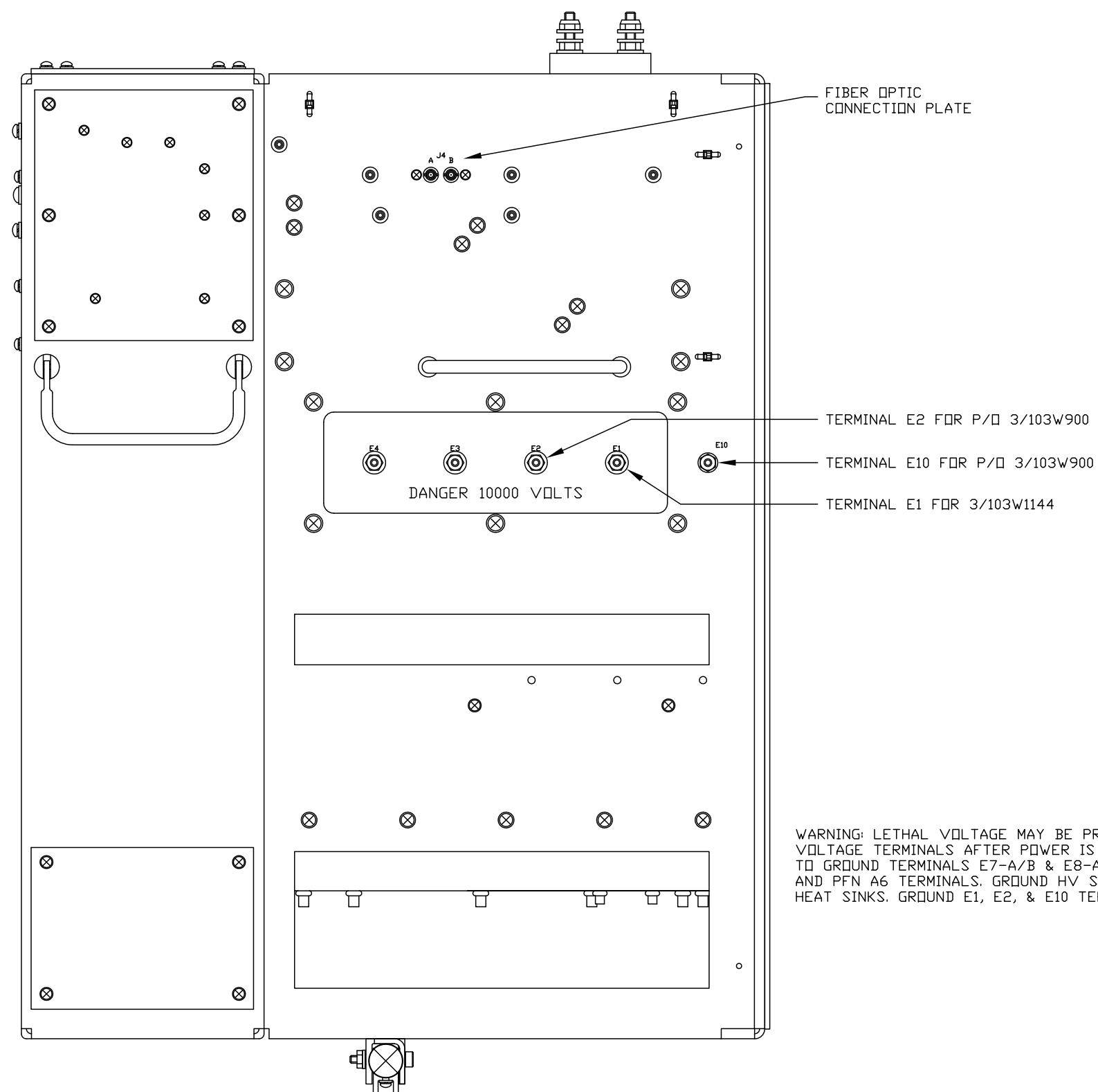


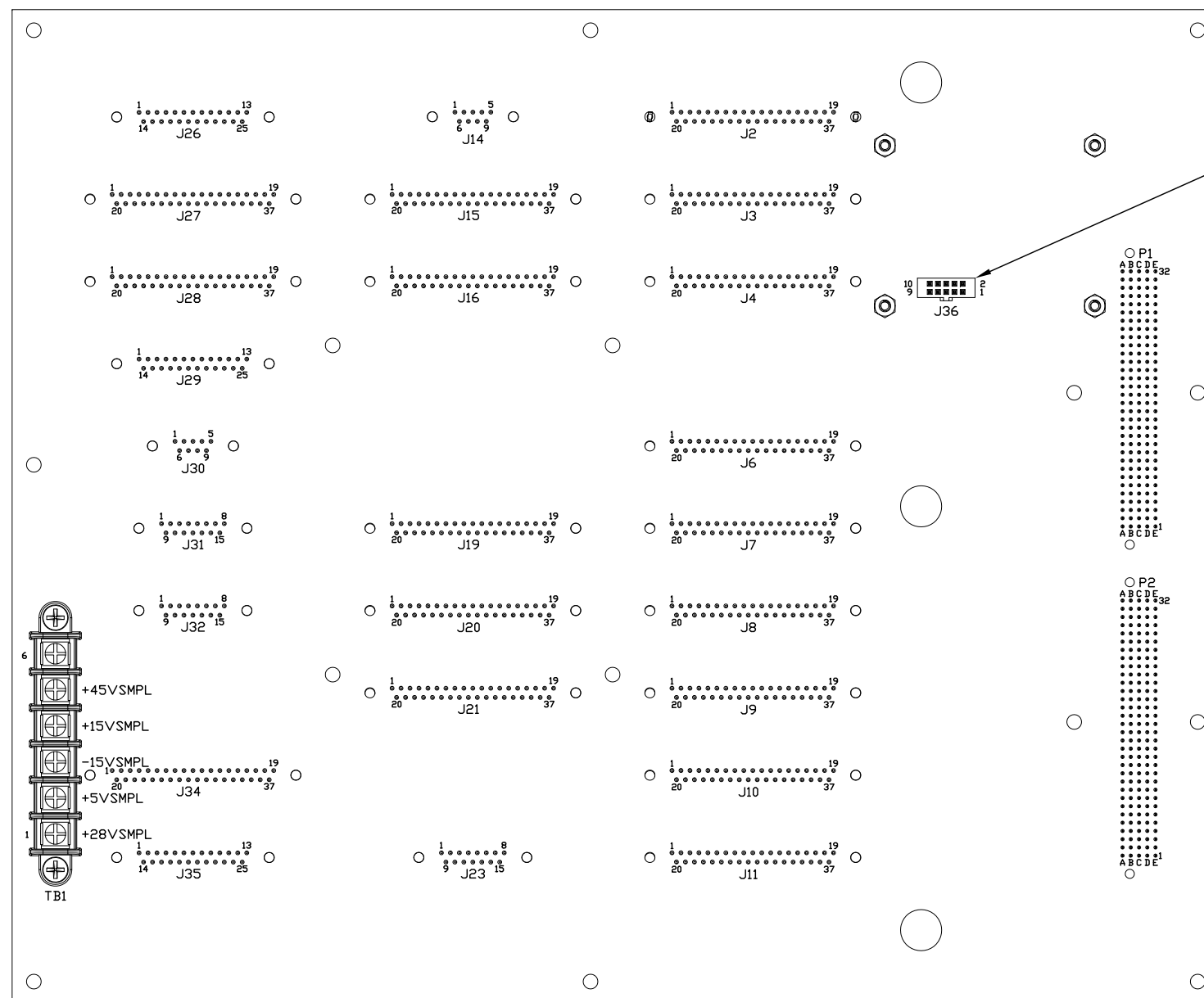
Figure FO11-29. Modulator Pulse Assembly UD3A15 Components Removal/Installation (Sheet 1 of 6)



WARNING: LETHAL VOLTAGE MAY BE PRESENT ON THE PFN AND HIGH VOLTAGE TERMINALS AFTER POWER IS REMOVED. USE GROUNDING STICK TO GROUND TERMINALS E7-A/B & E8-A/B. GROUND BUS BARS W14 & W16 AND PFN A6 TERMINALS. GROUND HV SWITCH A13 A & C TERMINALS AND HEAT SINKS. GROUND E1, E2, & E10 TERMINALS ON REAR OF MPA.

NX4192-A

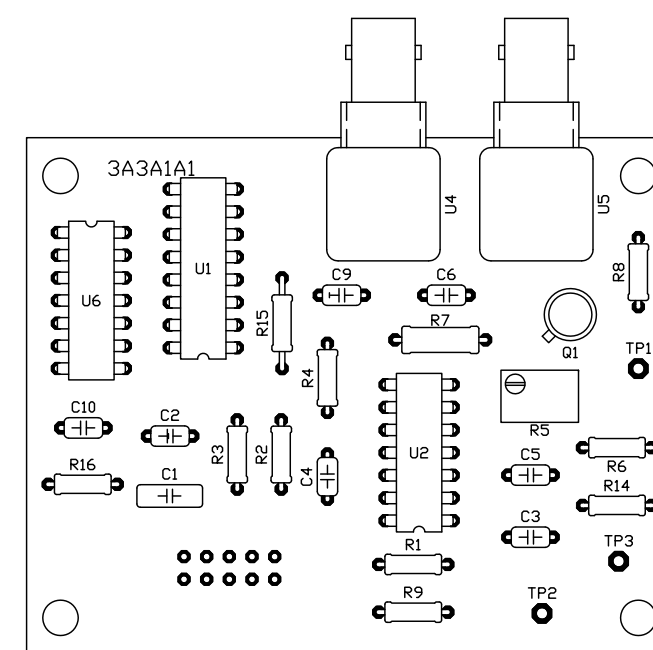
**Figure FO11-29. Modulator Pulse Assembly UD3A15 Components Removal/Installation (Sheet 5 of 6)**



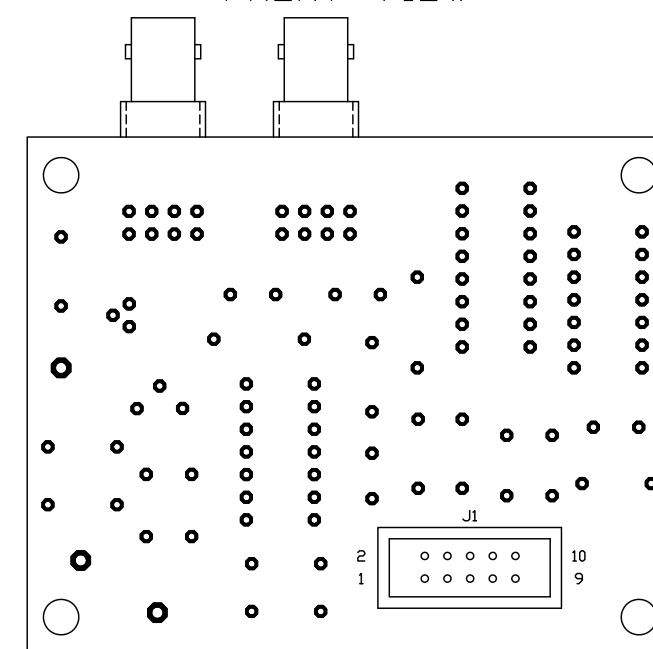
CONTROL CARD RACK  
BACKPLANE A3A1  
REAR VIEW

NX4118-A

OPTICAL DISCHARGE  
TRIGGER CCA A3A1A1  
CONNECTION



OPTICAL DISCHARGE  
TRIGGER CCA A3A1A1  
FRONT VIEW



OPTICAL DISCHARGE  
TRIGGER CCA A3A1A1  
REAR VIEW

Figure FO11-13. Transmitter Major  
Components (Sheet 3 of 6)

FP-11-109/(FP-11-110 blank)



Step	Operator Action
12	Replace the waveguide switch dust cover, if removed. Ensure the waveguide pressure/humidity alarm clears.
13	Return to <a href="#">Figure FO10-1</a> , Transmitter Flowchart T21A, Sheet 21.

⑬ SEND TRIGGERS WITH HIGH VOLTAGE OFF

Step	Operator Action
1	At the Main RDA HCI, place the system in Standby. Standby displays in the State: field.

**NOTE**

The settings below are recommended to best view HV Switch A13 LEDs.

2	On the Main RDA HCI, click on <b>System Test Software</b> and <b>Yes</b> to confirm. Click <b>Control ► Transmitter Control</b> ; and select the following:  Waveform: <b>Doppler</b> PRF (Hz): <b>Any PRF &gt; 1000</b> RF Drive/Triggers: <b>On</b>
3	Perform the fault note or flowchart action that requires active triggers at the transmitter. Return here to remove the triggers.
4	To remove triggers to the transmitter, in the Transmitter Control window, select the following:  RF Drive/Triggers: <b>Off</b>
5	Close all System Test Software windows by clicking <b>Close, File, and Exit</b> . Click <b>Yes</b> and <b>OK</b> at pop-up windows.

⑭ OPTICAL DISCHARGE TRIGGER (ODT) CCA 3A3A1A1 CHECK

Step	Operator Action
1	At the Main RDA HCI, login and gain control to place the system in Standby. Standby displays in the State: field.

Step	Operator Action
2	On Transmitter PDP 3A13, set the following circuit breakers to <b>OFF</b> : CABINET LIGHTS CB3, HIGH VOLTAGE POWER CB1, and AUXILIARY POWER CB2. Remove the interlock key.

**WARNING**

Filter Capacitor Bank A9 can hold a lethal charge long after transmitter power has been removed. Discharge Filter Capacitor Bank A9 after transmitter power is off and prior to transmitter maintenance by opening the right bay inner door while monitoring the charge on VOLTAGE/CURRENT Meter A1M4, at position 6, +280 VDC power supply. Opening the right bay inner door releases the filter capacitor bank discharge plunger. Failure to complete could cause serious injury or **DEATH**.

3	Use the interlock key to unlock and open the right bay inner door. Verify the 280 VDC is at zero on Meter A1M4, position 6.
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**WARNING**

Hazardous voltages may still be present above Control Card Rack Backplane A3A1. Use caution when performing measurements on Optical Discharge Trigger CCA A3A1A1 to prevent serious injury or **DEATH**.

4	Remove the left bay rear panel and set aside.
5	Bypass (cheat) left rear panel Interlock Switch S15. See <a href="#">Figure FO11-13</a> , Sheet 6 for switch location.
6	On Transmitter PDP 3A13, set the following circuit breakers to <b>ON</b> : CABINET LIGHTS CB3 and AUXILIARY POWER CB2.

**NOTE**

The settings below are recommended to best view HV Switch A13 LEDs.

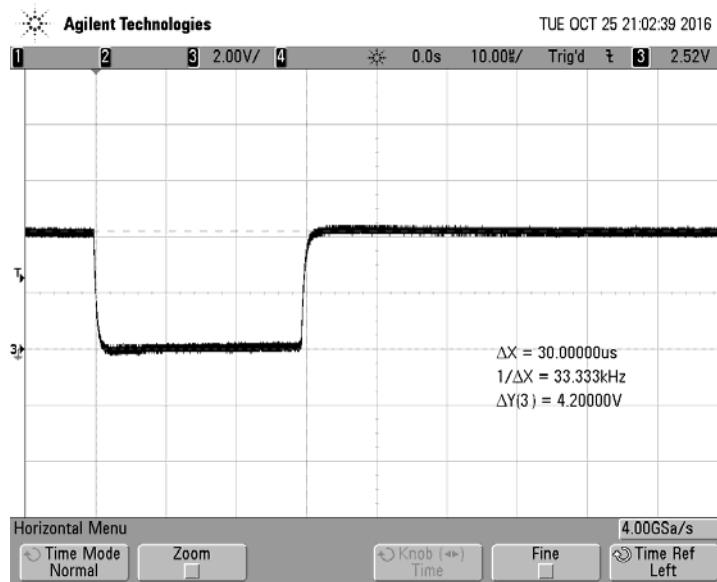
7	<p>On the Main RDA HCI, click on <b>System Test Software</b> and <b>Yes</b> to confirm. Click <b>Control ► Transmitter Control</b>, and select the following:</p> <p>Waveform: <b>Doppler</b>  PRF (Hz): <b>Any PRF &gt;1000</b>  RF Driver/Triggers: <b>On</b></p>
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Step	Operator Action
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**WARNING**

Hazardous voltages are present above Control Card Rack Backplane A3A1. Use caution when performing measurements on Optical Discharge Trigger CCA A3A1A1 to prevent serious injury or **DEATH**.

8 At ODT CCA A3A1A1, use an oscilloscope to measure the output pulse sent to the MPA at TP1. See [Figure 1](#).



**Figure 1**

Set the oscilloscope to 10 μs/div, 2 V/div, and trigger on the trailing edge. If the pulse width is not 30 ± 2.0 μs wide, adjust R5 until the pulse measurement at TP1 is within tolerance.

(TP1 is inverted of the signal sent to the MPA, which is an active-high burst of light.)

**NOTE**

If unable to view the mod discharge trigger at TP1 or at the next step at TP2 (input trigger to the ODT CCA), refer to NWS EHB 6-513, Fault Note 13 to verify triggers are being sent to the transmitter from the IFDR 4/104A38 via SPIP 90/190A1.



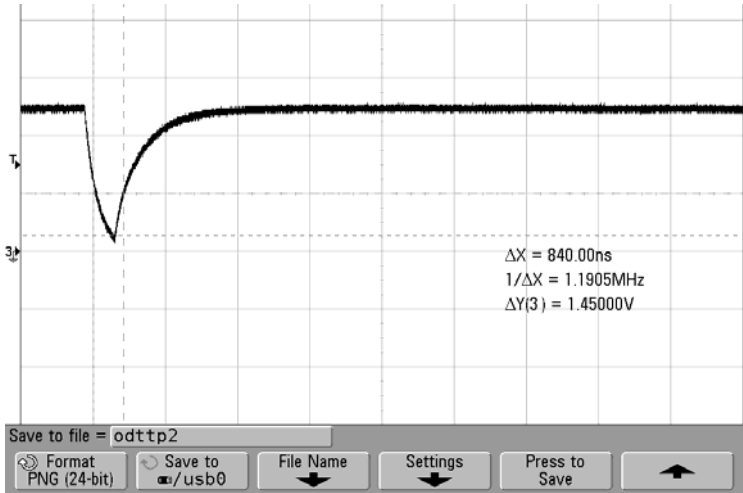
Step	Operator Action
9	<p data-bbox="315 317 1425 386">At the ODT CCA, measure the modulator discharge trigger at TP2. See <a href="#">Figure 2</a>. This is the trigger input from the RDADP.</p> <p data-bbox="846 428 935 457" style="text-align: center;"><b>NOTE</b></p> <p data-bbox="456 506 1317 831">The modulator discharge trigger is not a normal square wave at TP2. This measurement occurs after a 10K Ohm resistor. Albeit small, the resistance and test probe capacitance (approximately 100 pF shunt capacitor) creates a low pass filter with a time constant of <math>R \cdot C = 1</math> microsecond. The RC time constant is the time it take for the capacitor to charge (68%) or discharge (32%) of the expected voltage (+5V in our example). Therefore, in our example, the capacitive effort of the measurement probe means our measurements will be imperfect.</p> <p data-bbox="315 877 1235 907">Set the oscilloscope to 1 <math>\mu</math>s/div, 2 V/div, and trigger on the trailing edge.</p> <p data-bbox="315 951 1458 1052">The pulse should be approximately 0.85 <math>\mu</math>s wide at the midway point. Increasing the horizontal time scale of the oscilloscope will reveal pulses occurring at the PRF setting at the RDADP.</p> <div data-bbox="518 1152 1256 1642" style="text-align: center;">  </div>

Figure 2

Step	Operator Action
10	<p data-bbox="266 323 1308 359">At the ODT CCA, measure the modulator discharge trigger at TP3. See <a href="#">Figure 3</a>.</p> <p data-bbox="797 401 889 432" style="text-align: center;"><b>NOTE</b></p> <p data-bbox="407 474 1222 543">This is a measurement of the 555-timer output used to drive the optical transmitter U5 at TP3.</p> <div data-bbox="518 577 1166 1079" style="text-align: center;"> <p>The image shows an Agilent oscilloscope screen. At the top, it says 'Agilent technologies' and 'TUE OCT 20 21:20:16 2016'. The top bar shows channel 2 selected, a scale of 2.00V/div, and a trigger level of 2.15V. The main display shows a square wave pulse that is inverted, with a high level followed by a low level. The pulse width is measured as 28.80000us, and the frequency is 34.722kHz. The bottom bar shows various settings like Mode, Source, X, Y, X1, X2, and X1 X2.</p> </div> <p data-bbox="784 1115 902 1150" style="text-align: center;"><b>Figure 3</b></p> <p data-bbox="266 1171 1382 1283">Set the oscilloscope to 10 <math>\mu</math>s/div, 2 V/div, and trigger on the leading edge. The pulse is inverted at TP3 and should be approximately 30.0 <math>\mu</math>s wide. If adjustments are necessary, repeat step 8 using TP1 and R5. Do not adjust R5 while measuring TP3.</p>

Step	Operator Action
11	<p>At the ODT CCA, carefully remove fiber optic cable 3/103W909 (or Legacy cable 3/103W907), P2 end, from U4 (see <a href="#">Figure 4</a>). Push down and twist to unlock the fiber ST connector. This is the optical feedback from the modulator HV Switch A15A13 via Trigger Box A15A14.</p> <div data-bbox="568 499 1209 997" data-label="Image"> </div> <p style="text-align: center;"><b>Figure 4</b></p>
12	<p>At Transmitter Control Panel 3A1, verify the FIBER OPTIC fault LED is lit. See <a href="#">Figure 5</a>.</p> <div data-bbox="467 1203 1307 1638" data-label="Image"> </div> <p style="text-align: center;"><b>Figure 5</b></p>
13	<p>At the ODT CCA, carefully connect fiber optic cable 3/103W909 (or Legacy cable 3/103W907), P2, to U4. Push down and twist to lock the fiber ST connector.</p>
14	<p>At Transmitter Control Panel 3A1, press the <b>FAULT DISPLAY RESET</b> button to reset the FIBER OPTIC fault LED on the transmitter control panel. Verify the FIBER OPTIC fault LED extinguishes.</p>



Step	Operator Action
15	On Transmitter PDP 3A13, set the following circuit breakers to <b>OFF</b> : CABINET LIGHTS CB3 and AUXILIARY POWER CB2.
16	<p>Measure resistance on the following pins on the ODT CCA at J1 referenced to ground. See <a href="#">Figure 6</a>.</p> <ul style="list-style-type: none"> <li>• Pin 1: &lt; 5 Ω</li> <li>• Pin 2: &lt; 5 Ω</li> <li>• Pin 6: &lt; 5 Ω</li> <li>• Pin 7: &lt; 5 Ω</li> </ul> <div data-bbox="500 814 1190 1203" data-label="Image"> </div>
17	Restore Interlock Switch S15, and install and secure the left bay rear panel.
18	Close and lock the right bay inner door and remove the interlock key.
19	On Transmitter PDP 3A13, return interlock key to CB1 and set the following circuit breakers to <b>ON</b> : CABINET LIGHTS CB3, AUXILIARY POWER CB2, and HIGH VOLTAGE POWER CB1.
20	Close all System Test Software windows by clicking <b>Close</b> , <b>File</b> , and <b>Exit</b> . Click <b>Yes</b> and <b>OK</b> at pop-up windows.

Figure 6

**NOTE**

The transmitter will be UNAVAILABLE. Wait for the PREHEAT indicator to go out and the AVAILABLE indicator to illuminate (green), approximately 12-15 minutes after restoring power to the transmitter.

21	Clear any faults on Transmitter Control Panel 3A1.
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⑮ HIGH VOLTAGE SWITCH 3A15A13 AND TRIGGER BOX 3A15A14 CHECK

Step	Operator Action
1	At the Main RDA HCI, login and gain control to place the system in Standby. Standby displays in the State: field.
2	At Transmitter Control Panel A1, press the <b>MAINT/SYSTEM</b> switch. Observe the MAINT and HV OFF indicators are illuminated (white).
3	On Transmitter PDP A13, set the following circuit breakers to <b>OFF</b> : CABINET LIGHTS CB3, HIGH VOLTAGE POWER CB1, and AUXILIARY POWER CB2. Remove the interlock key.

**WARNING**

Filter Capacitor Bank A9 can hold a lethal charge long after transmitter power has been removed. Discharge Filter Capacitor Bank A9 after transmitter power is off and prior to transmitter maintenance by opening the right bay inner door while monitoring the charge on VOLTAGE/CURRENT Meter A1M4, at position 6, +280 VDC power supply. Opening the right bay inner door releases the filter capacitor bank discharge plunger. Failure to complete could cause serious injury or **DEATH**.

4	Use the interlock key to unlock and open the right bay inner door. Verify 280 VDC is at zero on Meter A1M4, position 6.
5	Disconnect cable 3/103W2003 from J1 on the front of Charging Switch A10 and remove the charging switch.
6	Unscrew the two captive screws on the front bottom of MPA A15.
7	Press both release knobs at bottom of the MPA and slide it slowly out of the cabinet until the braided ground wire on the top left of the assembly is exposed.
8	Disconnect the braided ground wire.

**CAUTION**

Jumpering pins 9 and 22 is jumpering 28 VDC. Verify the jumper is not touching anything in the system before applying power.

9	Disconnect cable 3/103W2005 from J3 on top of the MPA, then bypass the interlock on the MPA by placing a jumper between pins 9 and 22 on cable 3/103W2005. See <a href="#">Figure FO11-5</a> , Sheet 4 or 4A.
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Step	Operator Action
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**CAUTION**

Use extreme caution not to bend, stretch, or otherwise stress fiber cable 3/103W909 (or Legacy cable 3/103W907) while sliding the MPA out of the transmitter cabinet. Use a second technician to continuously observe this cable at the rear of the MPA while the MPA is approaching its extended position.

10	Slide the MPA out far enough to remove the left side panel and lower the front support at the bottom of the MPA and lock it into position using the quick release. See <a href="#">Figure FO11-28</a> , Sheet 3, detail C.
11	With the ground stick from the center cabinet, ground terminal leads E7A, E7B, E8A, and E8B on the top of the MPA. See <a href="#">Figure FO11-29</a> , Sheet 1, detail A.
12	Remove the MPA front cover and left side panel.

**WARNING**

Hazardous voltages may be present on HV Switch A13. Use grounding stick to ground the four metal heatsinks on the HV switch. High voltage could be present even after primary power is shut off. Failure to comply could result in serious injury or **DEATH**.

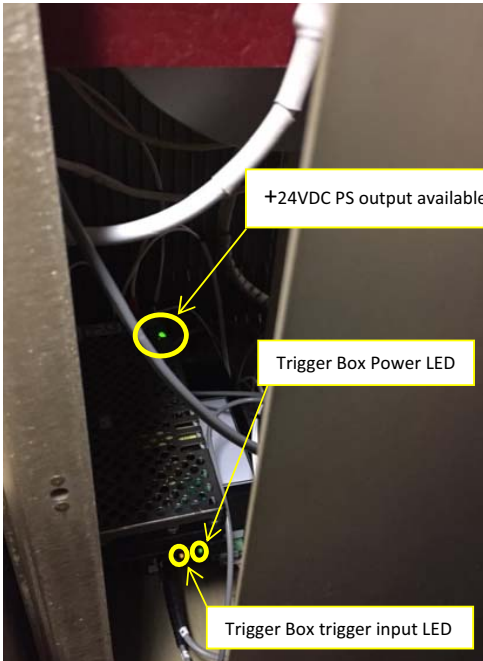
13	Use the grounding stick located in the center bay cabinet to ground the high voltage modulator components; i.e., HV Switch A13 heatsinks, PFN A6 terminals, Bus Bar W16, etc., before performing maintenance inside the MPA. See <a href="#">Figure FO11-28</a> and <a href="#">Figure FO11-29</a> for component locations.
14	At the back of the transmitter, remove the right bay rear access panel.
15	Bypass (cheat) right bay rear panel Interlock Switch S14. See <a href="#">Figure FO11-13</a> , Sheet 6 for the switch location.
16	Use grounding stick located in center bay cabinet to ground all of the exposed high voltage connections at the rear of the right bay.

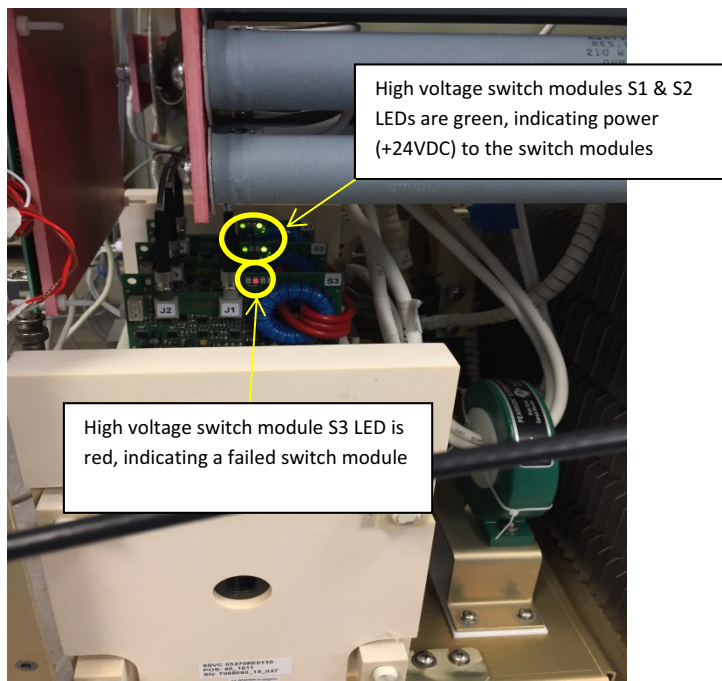
**CAUTION**

Do not turn on the High Voltage circuit breaker CB1. Damage to equipment may occur due to the right bay inner door being open and the Capacitor Bank A9 plunger in the out position.

Step	Operator Action
17	On Transmitter PDP A13, set the following circuit breakers to <b>ON</b> : CABINET LIGHTS CB3 and AUXILIARY POWER CB2.
<p><b>NOTE</b></p> <p>High Voltage Switch A13 requires a PRF of at least 1000 Hz to illuminate the amber LEDs on S1, S2, and S3 which indicate the optical trigger is being received. PRFs lower than 1000 Hz will barely illuminate the amber LEDs making it difficult to visually verify if the LEDs are illuminated.</p>	
18	<p>On the Main RDA HCI, click on <b>System Test Software</b> and <b>Yes</b> to confirm. Click <b>Control ► Transmitter Control</b>; and select the following:</p> <p>Waveform: <b>Doppler</b>  PRF (Hz): Any PRF &gt;1000  RF Drive/Triggers: <b>On</b></p>
<p><b>NOTE</b></p> <p>To aid in viewing the LEDs, turn the RDA shelter lights <b>OFF</b>.</p>	
19	<p>At the MPA, verify the trigger box and the high voltage switch are receiving 24 VDC from the 24V power supply. If not, replace the 24V Power Supply A15PS1 per paragraph 5.4.3.16.</p> <ol style="list-style-type: none"> <li>a. The power supply will have a green LED illuminated. See <a href="#">Figure 1</a>.</li> <li>b. The trigger box will have a green LED illuminated. See <a href="#">Figure 1</a>.</li> <li>c. High voltage switch modules S1, S2, and S3 LEDs are green, indicating power (+24 VDC) to the switch modules. See <a href="#">Figure 2</a>.</li> </ol>



Step	Operator Action
19 Cont.	 <p data-bbox="787 535 1084 592">+24VDC PS output available LED</p> <p data-bbox="803 709 1015 745">Trigger Box Power LED</p> <p data-bbox="755 976 998 1012">Trigger Box trigger input LED</p> <p data-bbox="787 1066 901 1102"><b>Figure 1</b></p>



**Figure 2**

Step	Operator Action
20	If any red LEDs are illuminated on the HV switch (see <a href="#">Figure 2</a> ), skip to step 23.
21	<p>Inside the MPA, verify Trigger Box A15A14 and High Voltage Switch Assembly A15A13 amber LEDs are illuminated. The amber LEDs represent both assemblies are receiving the optical discharge trigger.</p> <ol style="list-style-type: none"><li>At the high voltage switch, the amber LEDs are at the far left side of each switch module (S1, S2, and S3), when viewing the MPA from the front. See <a href="#">Figure 3</a> and <a href="#">Figure 4</a>. Ensure a PRF greater than 1000 PRF is selected in STS to view these LEDs.</li><li>At the trigger box, the amber LED is at the right of J6, left of the green power LED, see <a href="#">Figure 1</a>.</li></ol>

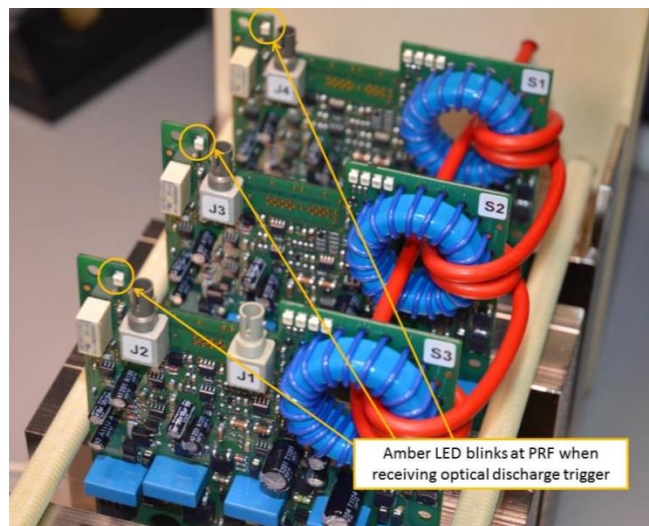
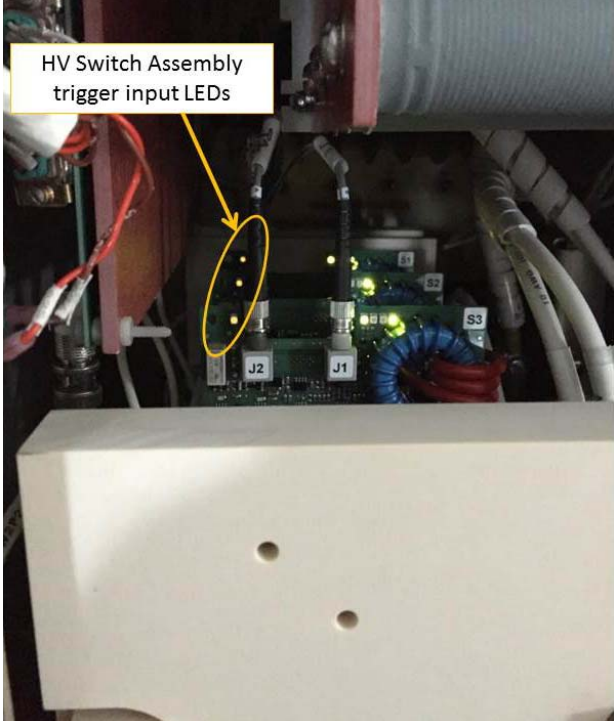



Figure 3

Step	Operator Action
21 Cont.	 <p style="text-align: center;"><b>Figure 4</b></p>
22	<p>If the amber LEDs are illuminated on HV Switch Modules S1, S2, and S3 (Figure 4) and on the trigger box, continue to the next step.</p> <p>If the amber LEDs are not illuminated on HV Switch Modules S1, S2, and S3 (Figure 4) and on the trigger box, proceed to Fault Note 14, Optical Discharge Trigger CCA A3A1A1 Check and Fault Note 16, Fiber Optic Cable Loopback Test to test fiber cables 3/103W909 or (Legacy cable 3/103W907).</p> <p>If Fault Note 14 is successful; fiber cable 3/103W909 (or Legacy cable 3/103W907) pass Fault Note 16; and the amber LED is still not illuminated on HV Switch Modules S1, S2, and S3, then replace the Modulator Pulse Assembly 3A15.</p> <p style="text-align: center;"><b>NOTE</b></p> <p>When the high voltage switch, trigger box, or connecting fiber cables are suspected bad, replacement of the Next Higher Assembly (MPA 3A15) is necessary due to exceptionally long lead-time repair for High Voltage Switch 3A15A13. Simple cabling and troubleshooting errors of any of these components may result in damage to the high voltage switch.</p>

Step	Operator Action
23	If any of the HV switch modules (S1, S2, and S3) have a red LED illuminated, then the HV switch module has failed (see <a href="#">Figure 2</a> ).
24	On Transmitter PDP A13, set the following circuit breakers to <b>OFF</b> : CABINET LIGHTS CB3 and AUXILIARY POWER CB2.
25	Wait approximately one minute, then on Transmitter PDP A13, set the following circuit breakers to <b>ON</b> : CABINET LIGHTS CB3 and AUXILIARY POWER CB2.
26	On the high voltage switch, verify there are two green LEDs illuminated on each switch module (S1, S2, and S3, see <a href="#">Figure 2</a> ). If not, verify the green LED on the +24 VDC power supply is illuminated (see <a href="#">Figure 1</a> ).
27	<p>If no green LED is illuminated on the +24 VDC power supply, replace the +24 VDC power supply per paragraph <a href="#">5.4.3.16</a>.</p> <p>If the green LED is illuminated on the +24 VDC power supply, check the +24 VDC PS1 DC output voltage for +24.0 +/- 2.4 VDC. See <a href="#">Figure 3-10</a> for DC output measurement and adjustment locations. If any switch module (S1, S2, or S3) has a red LED illuminated, replace Modulator Pulse Assembly 3A15.</p> <p style="text-align: center;"><b>NOTE</b></p> <p style="text-align: center;">When the high voltage switch, trigger box, or connecting fiber cables are suspected bad, replacement of the Next Higher Assembly (MPA 3A15) is necessary due to exceptionally long lead-time repair for High Voltage Switch 3A15A13. Simple cabling and troubleshooting errors of any of these components may result in damage to the high voltage switch.</p>
28	On Transmitter PDP A13, set the following circuit breakers to <b>OFF</b> : CABINET LIGHTS CB3 and AUXILIARY POWER CB2.



Step	Operator Action
29	<p>Measure the resistance of each high voltage switch IGCT by connecting the multimeter leads as directed below. See <a href="#">Figure 5</a>. A functioning HV switch will typically measure a higher resistance reading (K ohm range) in reverse bias compared to forward bias. A failed HV switch module will typically measure less than 10 Ω both directions. The IGCT measurements can be completed in circuit or out of circuit. Expect higher values when measuring the HV switch out of circuit.</p> <ul style="list-style-type: none"> <li>• Positive lead to <b>A</b>, negative lead to <b>B</b>: Reverse bias</li> <li>• Positive lead to <b>B</b>, negative lead to <b>C</b>: Reverse bias</li> <li>• Positive lead to <b>C</b>, negative lead to <b>D</b>: Reverse bias</li> <li>• Positive lead to <b>B</b>, negative lead to <b>A</b>: Forward bias</li> <li>• Positive lead to <b>C</b>, negative lead to <b>B</b>: Forward bias</li> <li>• Positive lead to <b>D</b>, negative lead to <b>C</b>: Forward bias</li> </ul> <div style="text-align: center;">  </div> <p style="text-align: center;"><b>Figure 5</b></p> <p>If one (1) switch module is failed, replace Modulator Pulse Assembly 3A15.</p>

Step	Operator Action
29 Cont.	<p style="text-align: center;"><b>NOTES</b></p> <p>When the high voltage switch, trigger box, or connecting fiber cables are suspected bad, replacement of the Next Higher Assembly (MPA 3A15) is necessary due to exceptionally long lead-time repair for High Voltage Switch 3A15A13. Simple cabling and troubleshooting errors of any of these components may result in damage to the high voltage switch.</p> <p>An MPA with one (1) HV switch module failure, resulting in a MAINTENANCE REQUIRED: MODULATOR SWITCH alarm (RDASC alarm number 93), may continue to operate for several weeks to months. However, replace the failed items as soon as possible.</p>
<p><b>NOTE</b></p> <p>The remaining steps return the transmitter to RDASC control, ready for operation.</p>	
30	Install both left and front panels on the MPA.
31	Raise and secure the front support at the bottom of the MPA.
32	Press both release knobs at the bottom of the MPA and while holding the disconnected cables clear, slowly slide the MPA into the cabinet until cable 3/103W2005 can be connected to J3 on top of the MPA.
33	Remove jumper on cable 3/103W2005 and connect cable to J3 on top of the MPA.
34	Slide the MPA into the cabinet until the braided ground wire can be reconnected, and reconnect the braided ground wire.
<p><b>CAUTION</b></p> <p>When moving the MPA, ensure the rear plenum duct in the cabinet does not pinch cable 3/103W1144 connected to the rear interface plate. Also, ensure HV cable 3/103W900 and fiber optic cable 3/103W909 (or Legacy cable 3/103W907) do not get pinched when sliding the MPA into the cabinet.</p>	
35	While a second technician observes from the rear of the cabinet, slide the MPA into cabinet and tighten two captive screws on the bottom of the MPA. Ensure cables behind the MPA are not pinched against the plenum duct.

Step	Operator Action
36	Install the right bay rear panel.
37	Install Charging Switch A10 and reconnect cable 3/103W2003 to J1. Close the right bay inner door and remove the key.
38	Close all System Test Software windows by clicking <b>Close, File, and Exit</b> . Click <b>Yes</b> and <b>OK</b> at pop-up windows.
39	Return interlock key to HIGH VOLTAGE POWER CB1 and rotate the key CCW.
40	On Transmitter PDP A13, set the following circuit breakers to <b>ON</b> : CABINET LIGHTS CB3, AUXILIARY POWER CB2, and HIGH VOLTAGE POWER CB1.

**NOTE**

The transmitter will be UNAVIALABLE. Wait for the PREHEAT indicator to go out and the AVAILABLE indicator to illuminate (green), approximately 12-15 minutes after restoring power to the transmitter.

41	At Transmitter Control Panel A1, press the <b>Fault Display Reset</b> button to clear any fault LEDs.
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**16**

FIBER OPTIC CABLE LOOPBACK TEST

Step	Operator Action
<p>This procedure checks the fiber optic cable ability to propagate light by utilizing an ST coupler (ASN R400-SE63) to loopback the signal back to the source. The procedure is written to test fiber cable 3/103W909 (or Legacy cable 3/103W907) between Optical Discharge Trigger CCA 3A3A1A1 and MPA 3A15 bulkhead J4.</p>	
1	At the Main RDA HCI, login and gain control to place the system in Standby. Standby displays in the State: field.
2	At Transmitter Control Panel A1, press the <b>MAINT/SYSTEM</b> switch. Observe the MAINT and HV OFF indicators are illuminated (white).
3	On Transmitter PDP A13, set the following circuit breakers to <b>OFF</b> : CABINET LIGHTS CB3, HIGH VOLTAGE POWER CB1, and AUXILIARY POWER CB2. Remove the interlock key.

Step	Operator Action
<b>WARNING</b>	
<p>Filter Capacitor Bank A9 can hold a lethal charge long after transmitter power has been removed. Discharge Filter Capacitor Bank A9 after transmitter power is off and prior to transmitter maintenance by opening the right bay inner door while monitoring the charge on VOLTAGE/CURRENT Meter A1M4, at position 6, +280 VDC power supply. Opening the right bay inner door releases the filter capacitor bank discharge plunger. Failure to complete could cause serious injury or <b>DEATH</b>.</p>	
4	Use the interlock key to unlock and open the right bay inner door. Verify the voltage dropped to zero on VOLTAGE CURRENT Meter A1M4, at position 6.
5	Remove the right bay rear panel.
6	On Transmitter PDP A13, set the following circuit breakers to <b>ON</b> : CABINET LIGHTS CB3 and AUXILIARY POWER CB2.
7	<p>On the Main RDA HCI, click on <b>System Test Software</b> and <b>Yes</b> to confirm. Click <b>Control ► Transmitter Control</b>; and select the following:</p> <p>Waveform: <b>Doppler</b>  PRF (Hz): Any PRF &gt;1000  RF Drive/Triggers: <b>On</b></p>

**NOTES**

The FIBER OPTIC fault lamp behaves like a one-shot occurrence alarm. On ODT CCA A3A1A1, the fault circuit sets when the optical feedback is absent and then resets only after the optical feedback circuit is restored. Coupled with the control panel fault history display, a FIBER OPTIC fault will illuminate only once and when the FAULT DISPLAY RESET is pressed, the fault will not illuminate again until after the ODT CCA feedback circuit is restored and subsequently broken again.

A loopback on a good fiber cable will momentarily restore the optical feedback circuit to the ODT CCA and allow the fault to reoccur when the circuit is opened under controlled conditions. If the FIBER OPTIC fault does not illuminate after opening a loopback circuit, then the fiber cable under test is defective.



Step	Operator Action
8	At the rear of the MPA, disconnect fiber cable 3/103W909 (or Legacy cable 3/103W907), P1 and P3, from the MPA at J4A and J4B and use the ST coupler (ASN R400-SE63) to connect the two fiber cable ends P1 and P3 ends to each other. Line up the key, and push down and twist to lock the fiber ST connectors. This action should reset the ODT CCA optical feedback circuit.
9	At Transmitter Control Panel A1, press the <b>Fault Display Reset</b> button to clear the fiber optic fault.
10	To create a controlled FIBER OPTIC fault, disconnect one end of fiber cable 3/103W909 (or Legacy cable 3/103W907) P1 or P3 from the ST coupler.
11	<p>On Transmitter Control Panel A1 fault display, observe the FIBER OPTIC indicator. If the FIBER OPTIC fault is illuminated, then the fiber cable under test is good. Proceed to the next step.</p> <p>If the fault does not illuminate, then the fiber cable failed. Thoroughly clean all ends of cable 3/103W909 (or Legacy cable 3/103W907), including the ends connected to ODT CCA 3A3A1 in the left rear bay. Once cleaned and reconnected, repeat the loopback test, steps 9 through 11.</p> <p style="text-align: center;"><b>NOTE</b></p> <p style="text-align: center;">A general practice of cleaning optical fiber cables is a good and recommended habit to ensure overall system reliability and peak performance. To clean a fiber cable end, use a dry technique (microfiber cloth). If the fiber end is still dirty, clean again using the dry technique. If the fiber end is still dirty, use a wet cleaning technique (isopropyl alcohol) followed immediately with a dry clean to ensure no residue is left on the fiber endface.</p>
12	At the rear of the MPA, remove the ST coupler and reconnect fiber cable 3/103W909 (or Legacy cable 3/103W907), P1 and P3 to the MPA at J4A and J4B respectively. Line up the key, and push down and twist to lock the fiber ST connector.
13	If cable 3/103W909 (or Legacy cable 3/103W907) is faulty, replace the fiber cable and repeat this test on the new cable.
14	Close all System Test Software windows by clicking <b>Close</b> , <b>File</b> , and <b>Exit</b> . Click <b>Yes</b> and <b>OK</b> at the pop-up windows.
15	On Transmitter PDP A13, set the following circuit breakers to <b>OFF</b> : CABINET LIGHTS CB3 and AUXILIARY POWER CB2.
16	Install the right bay rear panel.

Step	Operator Action
17	On Transmitter PDP A13, set the following circuit breakers to <b>ON</b> : CABINET LIGHTS CB3, AUXILIARY POWER CB2, and HIGH VOLTAGE POWER CB1.

**NOTE**

The transmitter will be UNAVAILABLE. Wait for the PREHEAT indicator to go out and the AVAILALBE indicator to illuminate (green), approximately 12-15 minutes after restoring power to the transmitter.

18	At Transmitter Control Panel A1, press the <b>Fault Display Reset</b> button to clear any fault LEDs.
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