

# Blue Point Automated - Dual Element Heating

May 22, 2018

## **NIBE** ELEMENT RAILWAY SOLUTIONS



## ➤ Automated Control System

- Weather Station & Rail Sensors Determine How Much Heat to Apply Autonomously–“Man Out of The Loop”
- Energy Savings Maximized – Heat When Needed
- Additional Energy Savings beyond Flat Heater Energy Savings
  - Up to 25% Additional Savings with Weather Station
  - Up to 70% Additional Savings with Weather Station and Weather Forecast
- Avoids Track Fires by Keeping Power Levels Where Needed
- Allows for Remote and Local Override – Can Be Viewed Any Time
- Can be accessed from Computer, Tablet or Enclosure

➤ **Dual Heating Elements, 250 W/ft X2 = 500W/ft Max**

- Second Element Acts as a Redundant Heater – Should One Fail Heat Remains

➤ **Modulated Power – Extreme Heat (500 W/ft) for Extreme Conditions**

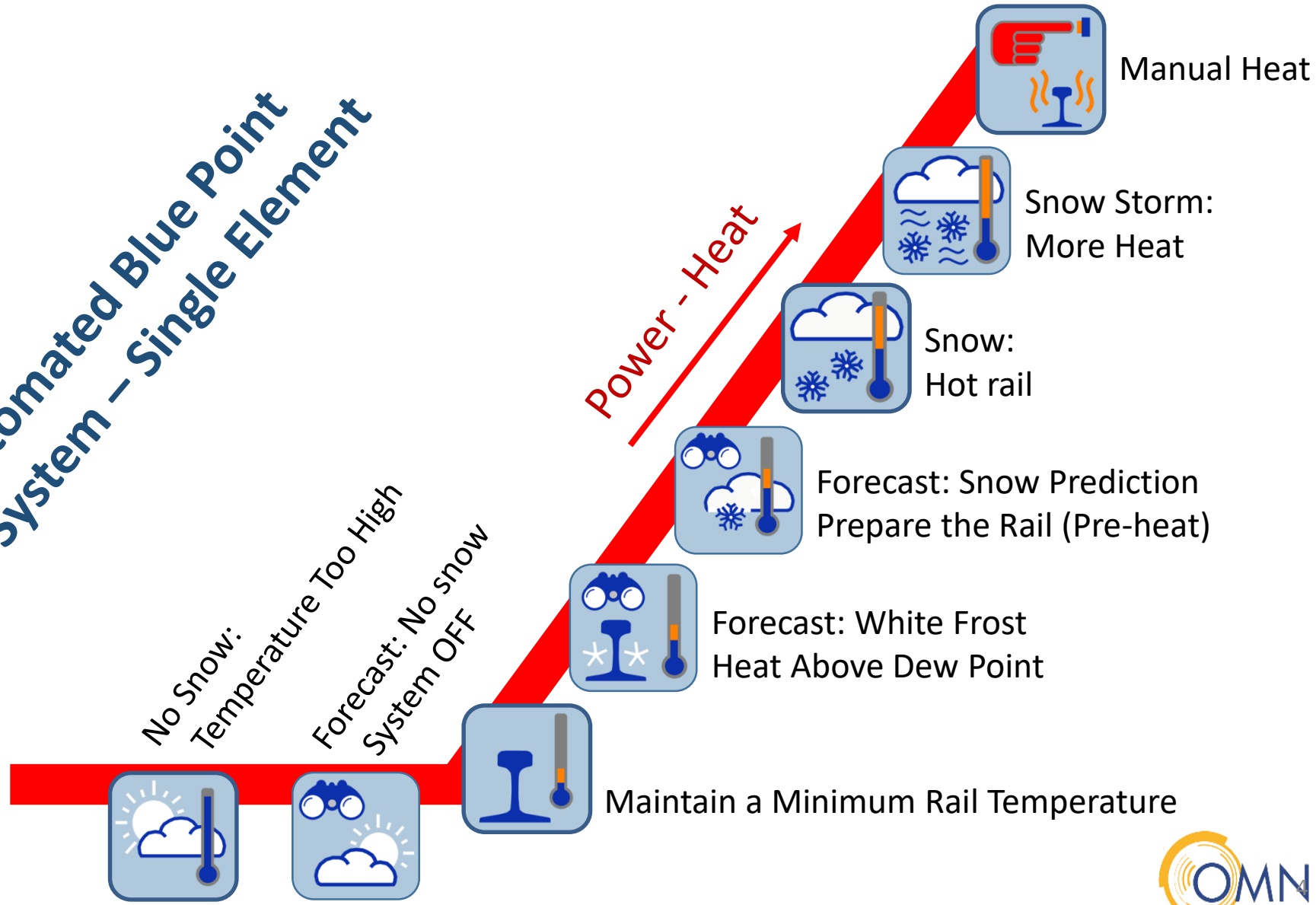
- Blizzard Mode..... Steady Wind in Excess of 25 mph
- Boost Mode ..... Heavy Snow and/or Extreme Cold & Snow
- Rush Hour Mode ..... Snow & Rush Hour – Tight Headway
- Following Snow Detection Mode ..... Snow Detected in Track from Departing Train

➤ **Automated Diagnostics Report on Failed Heating Element or Sensor – Alarms & Email Chain**

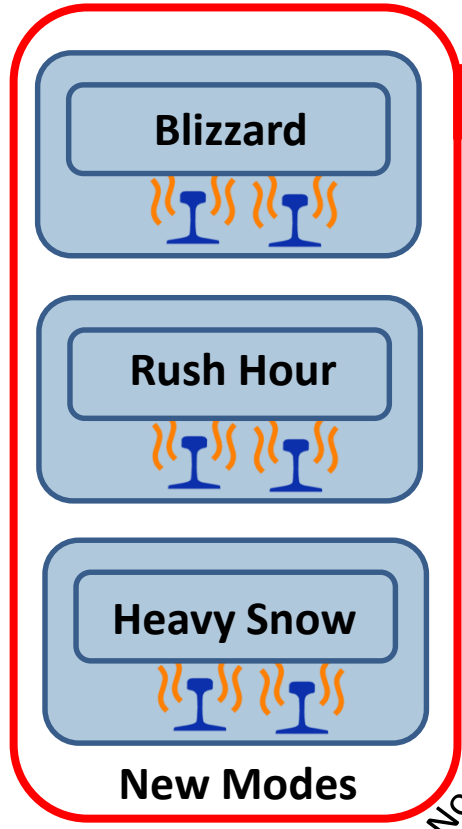
(Pre-Heat Allows System to Meet Temperature Requirements Within Reasonable Time Frame)

- Additional Benefit is that Less Switch Machine Adjustments Needed Since There is a Reduction of Temp Swings

# Fully Automated Blue Point SCADA System – Single Element



*Fully Automated-Modulated  
Blue Point SCADA System  
- Dual element Additional Modes*



Extreme Heat



Manual Heat



Snow Storm:  
More Heat



Snow:  
Hot rail



Forecast: Snow Prediction  
Prepare the Rail (Pre-heat)



Forecast: White Frost  
Heat Above Dew Point

No Snow:  
Temp Too High

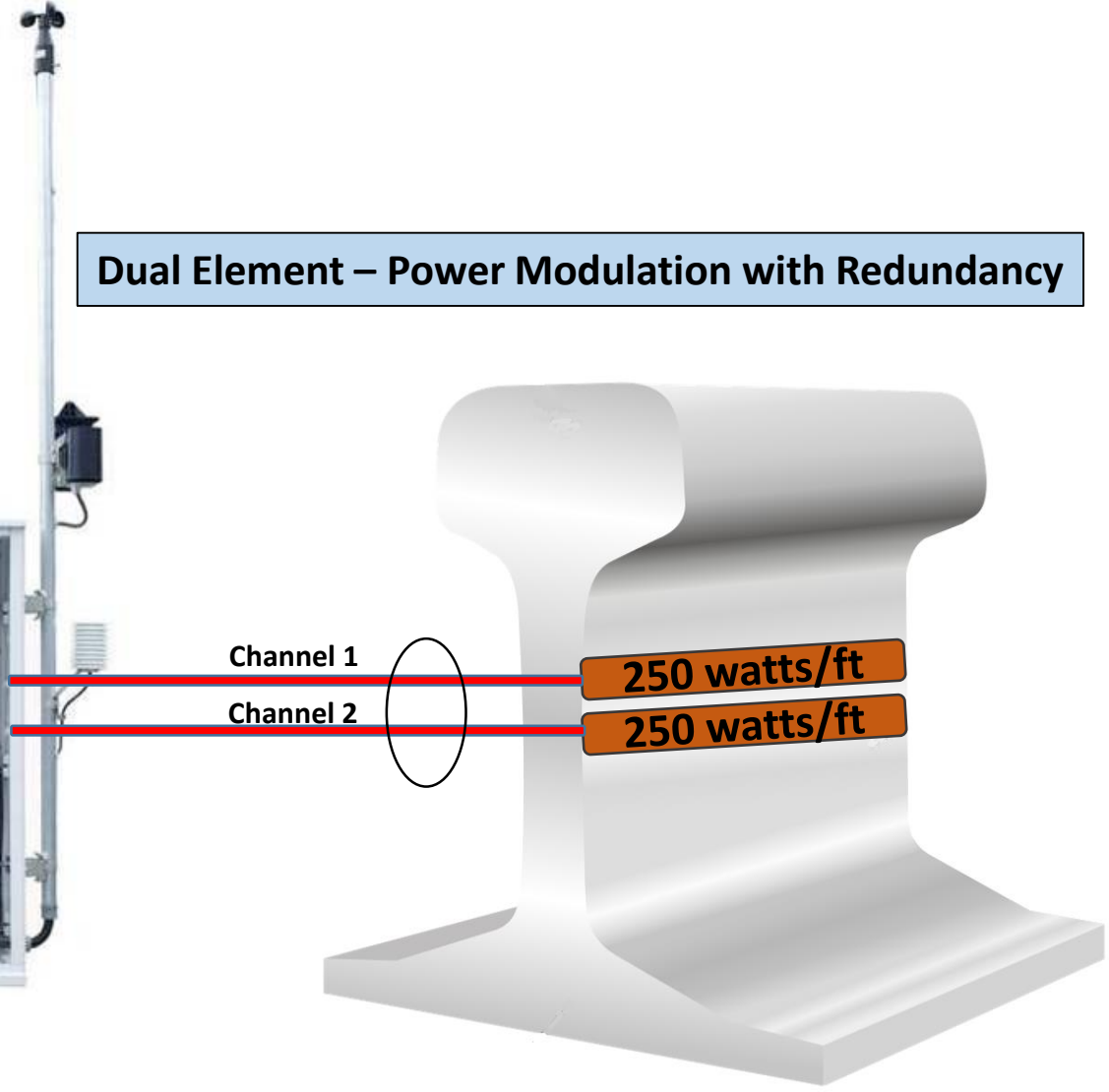


Maintain a Minimum Rail Temperature

Forecast: No snow  
System OFF

**Dual Element – Power Modulation with Redundancy**

**Blue Point Modulated  
Switch Heater Controller**



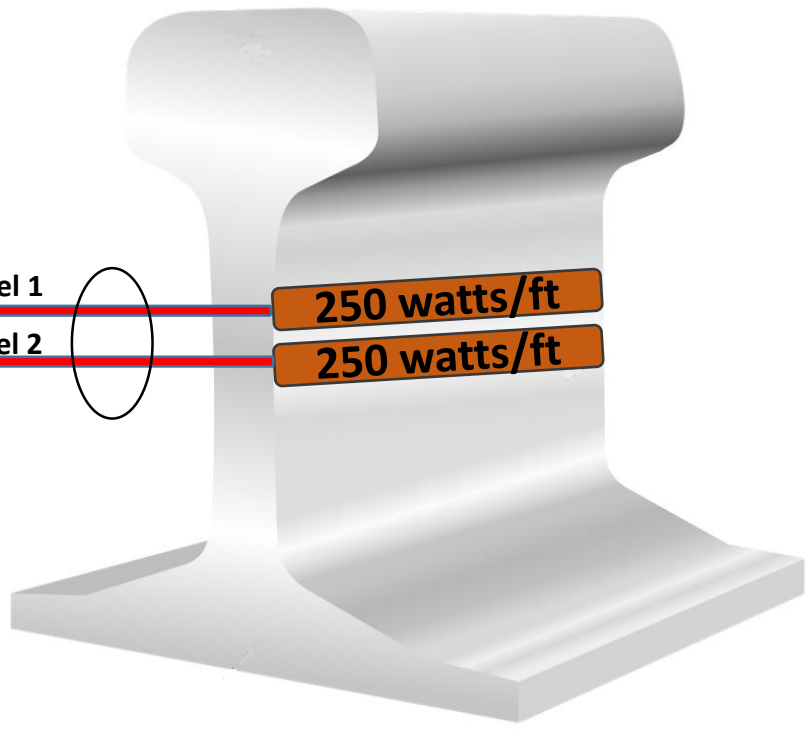
- Two flat elements operate alone or together
- Having two heating elements provides a redundant path in both element and channel
- Modulation is controlled by need according to weather conditions - warm to extreme – fully automated (Pulse Width Modulation PWM)
- No additional trenching needed – use existing heating cables and separate dual heaters at a provided Junction Box that is fused to protect each element from each other
- SAN-OMNI has “knock on” stainless steel clips that will support dual elements
- Extreme Heat, Energy Savings, Redundancy
  - ❖ New expanded Blue Point Functionality
  - ❖ Modulation and double heaters
- Weather Station, Rail Sensors & Weather Forecast Provide Optimal Automated System – “Man Out of the Loop” capability

**Dual Element – Power Modulation with Redundancy**

**Blue Point Modulated  
Switch Heater Controller**



Channel 1  
Channel 2



**250 watts/ft**  
**250 watts/ft**

- Pulse Width Modulation (PWM) Regulates The Duty Cycle of the Heaters to Attain a Specific Wattage
- A Single Element may not Provide Enough Power for Extreme Conditions – Dual Elements Provide this Extreme Power – up to 500 w/ft
- The Blue Point SCADA System will Regulate the Duty Cycle According to Need Based on Sensors and the Attached Weather Station
- Blue Point and PWM Provides for:
  - Extreme Heat When Needed
  - Nominal Energy Savings
  - A Redundant Heating Path
- SAN has Applied for a Patent on PWM for Switch Heating

# Additonal Savings - Master/Slave

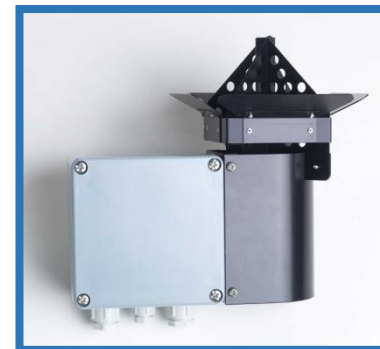
- Intelligent pre-programmed RTU
  - Energy optimized temperature settings
  - Multiple weather modes
- Control up to 8 switch points
- Connect up to 7 Slave Cubicles
  - Each slave controls and powers up to 8 switch points
  - Total up to 64 points
  - Perfect for Yards
- Input from:
  - Weather station
  - Cold and heated rail temperature sensor
  - Weather forecast





# Weather Station Control

- Heat only when necessary
- Save 60 – 70 % energy, compared to manual systems
- Maintenance free weather station
  - Wind speed
  - Air temperature
  - Snow detector (precipitation)
  - (Air humidity)
- Hot & Cold Rail Temperature Sensors



# SCADA - Secure Cloud or Internally Hosted

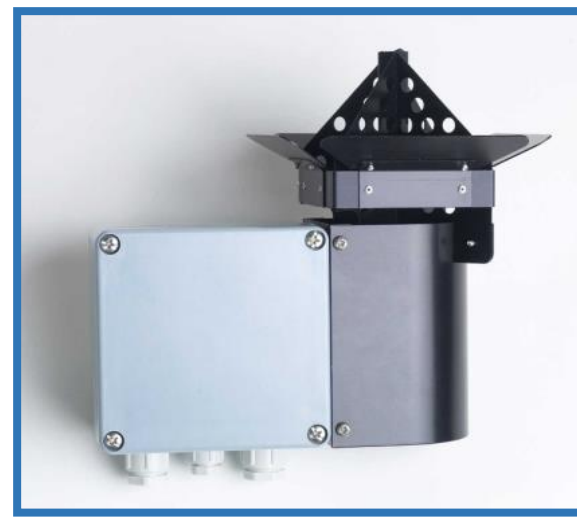
- **Secure Access & Control**
  - Cloud / Server
    - Secure Access over External Cloud
      - ✓ Private Cell Port
      - ✓ VPN
      - ✓ Authorized Users
      - ✓ Support Internal Server Hosting
  - Blue Point Access
    - Access & Control via web browser or local control panel
    - Personal Computer or Tablet on Any Connected Platform

**Weather Station**

**Blue Point Weather Station and Sensors**



**Snow Detector**



**Ambient Temperature**



**Hot & Cold Rail Temp**

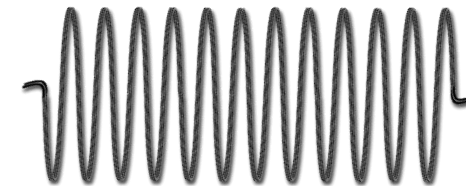
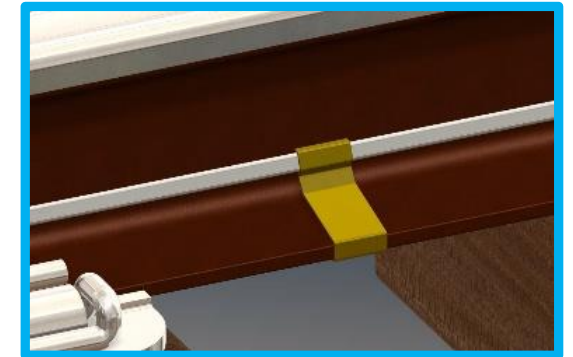
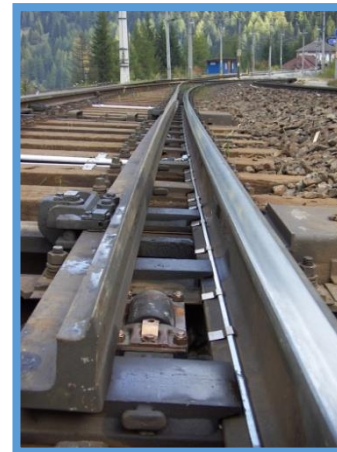


**Wind Detection**



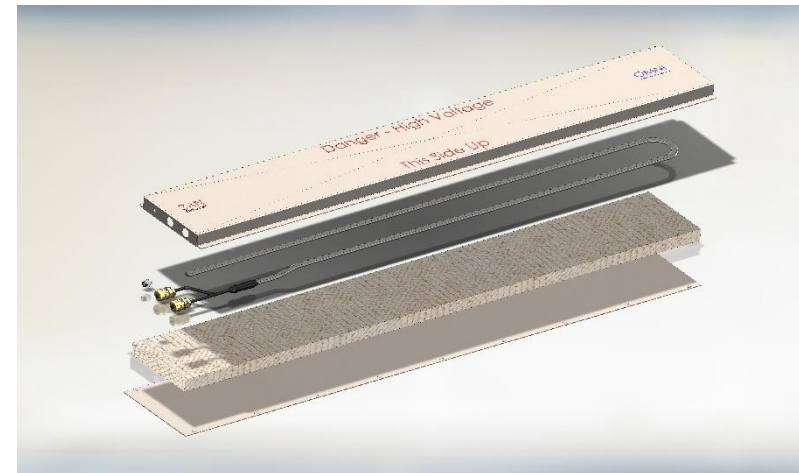
# Unique heating elements

- Flat Heater Thermal Conductivity
  - Flat Heater ~ 40% contact with rail vs tubular 15% contact with rail
- Proven reliability & long life time
  - Monel 400 sheath impervious to salt & most chemicals – 10 year warranty
  - Coiled Element Allows for Expansion & Contraction
  - Unique mechanical shock absorbent fibre glass wrap
  - Water Tight Connection (IPx7/IPx8)
  - 500,000+ successful installations
- Stainless Steel Knock On Clips

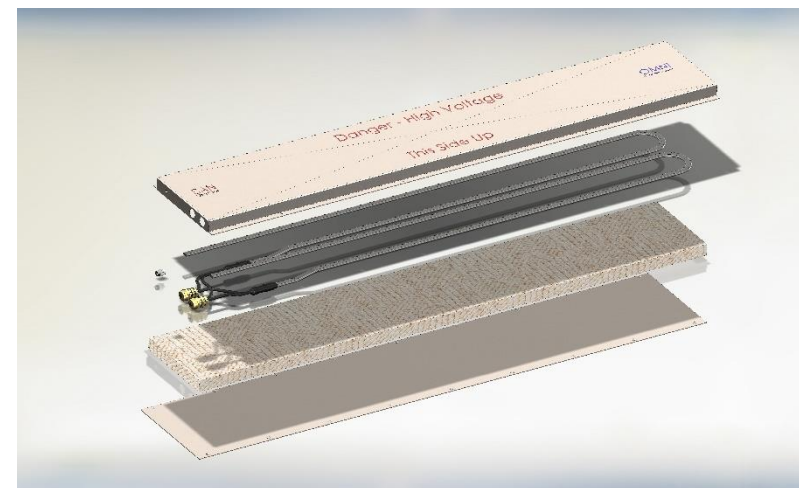


# PAN Heaters

- Utilize Monel 400 Sheathed Elements in Pan Enclosure
- Single & Dual Element Design
- Pan Slides Under Switch Rods Easily
- Stainless Steel Pan with Cross Breaks
- Varied Lengths 2ft to 12 ft with Articulated Option
- Varied Wattages 100 w/ft to 300 w/ft – Single and Double Element



**Single Element Pan**



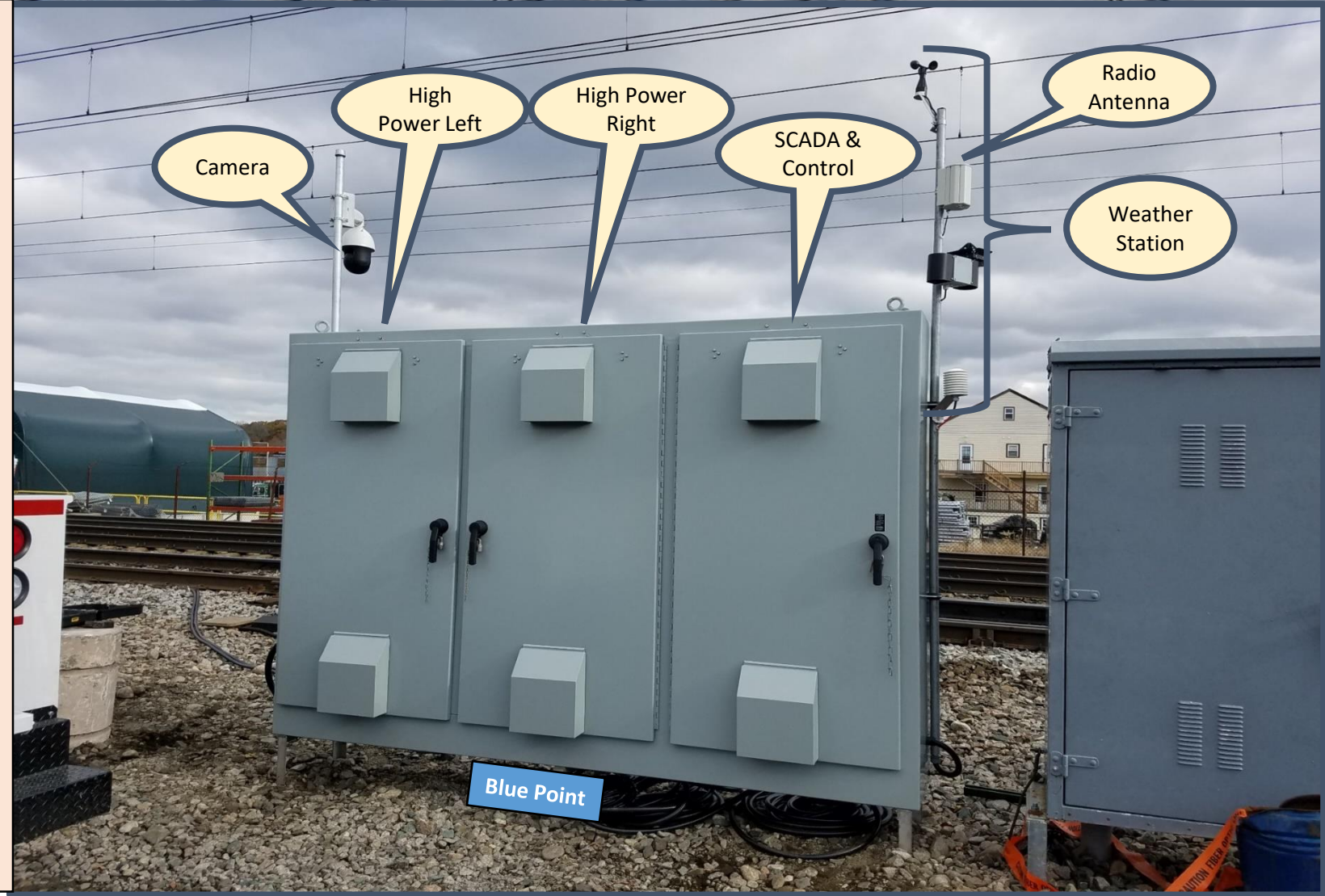
**Dual Element Pan**

# Blue Point – 40 year Evolution Over 500 Units Deployed Worldwide

## Top 9 - Most Deployed Blue Point Systems

Customer	Country	Application	Power Inside & Outside	First installation
Danish Railways	Denmark	Blue Point	200W/ft - 50V	1978
Swedish Railways	Sweden	Blue Point + Heating	200W/ft - 230V	1989
NSB	Norway	Blue Point + Heating	200W/ft - 50V	1989
Network Rail	U.K.	Blue Point + Heating	200W/m - 110V	1990
ÖBB	Austria	Blue Point + Heating	200W/ft - 230V	1999
Estonia Rail	Estonia	Blue Point	220W/ft - 230V	2002
National Rail	Lithuania	Blue Point + Heating	210W/ft - 220V	2003
HZ	Croatia	Blue Point	150w/ft – 230V	2014
PKP	Poland	Blue Point + Heating	150W/ft – 230V	2010

- Controls 4 flat elements Per Turnout and Two Pan Heaters
- Weather Station and Rail Sensors Allow for Automated Control – “Man Out of the Loop”
- Current Sensors Allow for Easy Diagnostics of Elements
- Power Meter and GFI Allow for Further Diagnostics Input
- Local & Remote Access
- System Will Alarm/Email Selected Users when Issue Arises – e.g. bad element or other error
- Camera Captures Site Condition
- Database Logs Status of System for Playback including Camera



Amtrak Read Interlocking

Blue Point High Power



Blue SCADA & Control





## Amtrak Read Pilot Results of Dual Heat With PWM Focused on Major Storms

- |  |                     |
|--|---------------------|
| 1. Blizzard 1 – March 13 <sup>th</sup> , 2018                          | 2 Blue Point Slides |
| 2. Nor Easter 1 March 7 <sup>th</sup> – 8 <sup>th</sup> , 2018         | 2 Blue Point Slides |
| 3. Nor Easter 2 February 17 <sup>th</sup> thru 18 <sup>th</sup> , 2018 | 2 Blue Point Slides |
| 4. Varied Smaller Storms .....   | 1 Slide             |

- Readville Blizzard – 14.5 “ Snow March 13<sup>th</sup> thru March 14<sup>th</sup>
- Blizzard Event Began at 2:30 AM 03-13-18 – Heaters Engaged
- Boost & Blizzard Mode Engaged at 5 AM – dual heat
- Snow Storm Ended at 1 AM 03-14-18
- Return to Preheat Mode
- Average Wind Speed = 27 mph
- Average Wind Gust = 41 mph
- Highest Wind Gust = 48 mph

10.8.0.5 No Connection Amtrak / READ

Start Date : 02.01.2018 End Date : 03.28.2018 System Log Data System Data Channel Data Hours Data Alarms

DateTime	GSMSignal	Alarm	Mode	Heat [h]	Battery	Air *	Cold *	Wind	L1_Volt	L2_Volt	L3_Volt	L1_Amp	L2_Amp	L3_Amp	Power kW	Power kWh
03.13.2018 03:02:10 PM	31 / 3G		Automatic Boost	684,4	13,6	30,2	32,5	1,8	478,7	478,7	477,1	160,4	189,2	156,4	139,3	59758,9
03.13.2018 02:47:12 PM	31 / 3G		Automatic Boost	684,1	13,6	30,2	32,4	2,7	478,5	478,2	477,2	160,4	189,0	156,3	139,1	59724,1
03.13.2018 02:32:11 PM	31 / 3G		Automatic Boost	683,9	13,6	30,2	32,4	8,1	478,2	478,1	476,7	160,4	189,0	156,3	138,9	59689,4
03.13.2018 02:17:12 PM	31 / 3G		Automatic Boost	683,6	13,6	30,4	32,4	9,8	477,7	478,1	476,3	160,6	188,9	156,3	138,9	59654,6
03.13.2018 02:02:12 PM	31 / 3G		Automatic Boost	683,4	13,6	30,2	32,4	3,6	477,9	478,0	476,3	159,6	188,8	156,2	138,6	59620,1
03.13.2018 01:47:13 PM	31 / 3G		Automatic Blizzard	683,1	13,6	30,0	32,4	16,1	477,6	478,1	476,4	160,4	189,0	156,5	139,0	59585,3
03.13.2018 01:32:11 PM	31 / 3G		Automatic Blizzard	682,9	13,6	30,0	32,4	6,3	477,7	477,7	476,1	159,8	189,1	156,4	139,0	59550,5
03.13.2018 01:17:10 PM	31 / 3G		Automatic Blizzard	682,6	13,6	29,7	32,4	15,2	476,5	477,1	475,1	158,9	188,8	156,3	138,2	59515,8
03.13.2018 01:02:12 PM	31 / 3G		Automatic Blizzard	682,4	13,6	29,3	32,4	8,9	476,1	476,3	474,6	160,9	188,5	155,9	138,3	59481,3
03.13.2018 12:47:12 AM	31 / 3G		Automatic Blizzard	682,1	13,6	29,3	32,4	6,3	476,2	476,6	474,4	161,0	188,8	155,8	138,4	59446,8
03.13.2018 12:32:12 AM	31 / 3G		Automatic Blizzard	681,9	13,6	29,1	32,4	9,8	476,4	477,5	475,0	159,8	189,1	156,3	138,4	59412,2
03.13.2018 12:17:11 AM	31 / 3G		Automatic Blizzard	681,6	13,6	28,9	32,4	8,1	477,4	477,3	475,3	159,4	189,5	156,3	138,7	59377,4
03.13.2018 12:02:12 AM	31 / 3G		Automatic Blizzard	681,4	13,6	28,9	32,4	5,4	477,6	477,4	475,8	161,4	190,4	157,2	139,7	59342,6
03.13.2018 11:47:11 AM	31 / 3G		Automatic Blizzard	681,1	13,6	28,9	32,4	11,6	485,0	481,5	482,2	18,4	52,3	63,5	34,0	59325,9
03.13.2018 11:32:11 AM	31 / 3G		Automatic Snow	680,9	13,6	29,1	32,4	0,0	476,8	476,1	473,6	161,2	190,3	156,6	138,9	59304,4
03.13.2018 11:17:12 AM	31 / 3G		Automatic Snow	680,6	13,6	29,5	32,4	0,0	484,3	480,9	482,2	18,4	52,2	63,4	33,9	59282,7
03.13.2018 11:02:11 AM	31 / 3G		Automatic Snow	680,4	13,6	29,5	32,4	0,0	476,4	475,5	473,3	160,8	189,5	156,0	138,2	59260,9
03.13.2018 10:47:11 AM	31 / 3G		Automatic Boost	680,1	13,6	29,8	32,4	0,0	474,6	474,0	472,3	159,1	187,7	154,7	136,6	59228,5
03.13.2018 10:32:09 AM	31 / 3G		Automatic Boost	679,9	13,6	30,0	32,4	0,0	470,2	469,8	468,1	157,6	186,0	153,5	134,1	59194,6
03.13.2018 10:17:12 AM	31 / 3G		Automatic Boost	679,6	13,6	30,0	32,4	0,0	470,7	470,4	468,8	157,7	186,2	153,6	134,4	59161,0
03.13.2018 10:02:12 AM	31 / 3G		Automatic Boost	679,4	13,6	30,0	32,4	0,0	471,6	471,0	469,3	158,0	186,5	153,9	134,9	59127,5
03.13.2018 09:47:11 AM	31 / 3G		Automatic Boost	679,1	13,6	30,2	32,4	0,0	475,0	473,7	472,9	159,3	187,3	154,8	136,8	59093,6
03.13.2018 09:32:11 AM	31 / 3G		Automatic Boost	678,9	13,6	30,6	32,4	13,4	471,7	470,9	469,6	158,2	186,5	153,6	134,8	59060,0
03.13.2018 09:17:11 AM	31 / 3G		Automatic Boost	678,6	13,6	30,9	32,4	8,9	471,8	471,3	469,5	157,9	186,4	153,9	135,0	59026,2
03.13.2018 09:02:11 AM	31 / 3G		Automatic Boost	678,4	13,5	31,5	32,4	8,1	472,4	472,2	470,8	158,2	186,4	154,3	135,4	58992,2
03.13.2018 08:47:35 AM	31 / 3G		Automatic Boost	678,1	13,6	32,2	32,4	8,1	471,8	471,1	469,9	158,0	186,3	154,0	135,0	58959,4
03.13.2018 08:10:35 AM	31 / 3G		Automatic Boost	677,5	13,6	32,7	32,4	14,3	472,3	472,1	470,9	158,3	186,5	154,2	135,3	58876,1
03.13.2018 08:00:11 AM	31 / 3G		Automatic Boost	677,3	13,6	32,5	32,4	10,7	472,9	473,5	471,7	158,4	186,9	154,8	136,0	58852,6
03.13.2018 07:45:11 AM	31 / 3G		Automatic Boost	677,1	13,6	32,7	32,4	8,1	473,9	473,7	472,5	158,9	187,2	154,8	136,4	58818,5
03.13.2018 07:30:13 AM	31 / 3G		Automatic Boost	676,8	13,6	32,7	32,4	8,1	474,2	473,9	472,9	159,6	187,2	154,9	136,7	58784,4
03.13.2018 07:15:41 AM	0 /		No Connection	0	0	32,0	32,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
03.13.2018 07:00:40 AM	0 /		No Connection	0	0	32,0	32,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
03.13.2018 06:45:40 AM	0 /		No Connection	0	0	32,0	32,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
03.13.2018 06:30:40 AM	0 /		No Connection	0	0	32,0	32,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
03.13.2018 06:22:43 AM	0 /		No Connection	0	0	32,0	32,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
03.13.2018 06:20:45 AM	0 /		No Connection	0	0	32,0	32,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
03.13.2018 06:15:12 AM	31 / 3G		Automatic Boost	675,6	13,6	33,1	32,4	8,9	472,4	472,3	471,4	158,4	186,7	154,0	135,6	58614,5
03.13.2018 06:00:11 AM	31 / 3G		Automatic Boost	675,3	13,6	33,3	32,4	7,2	473,5	473,4	472,5	158,9	187,1	154,5	136,2	58580,5
03.13.2018 05:45:12 AM	31 / 3G		Automatic Boost	675,1	13,6	33,4	32,4	8,1	472,7	473,0	471,9	158,7	186,9	154,4	135,8	58546,5
03.13.2018 05:30:12 AM	31 / 3G		Automatic Boost	674,8	13,6	33,4	32,4	12,5	474,8	474,7	473,5	159,2	187,7	155,0	137,0	58512,3
03.13.2018 05:23:43 AM	31 / 3G		Automatic Boost	674,7	13,6	33,4	32,4	10,7	474,5	474,7	473,0	159,2	187,6	154,9	136,8	58497,6
03.13.2018 05:15:12 AM	31 / 3G		Automatic Boost	674,6	13,6	33,4	32,4	13,4	474,6	474,9	473,6	159,3	187,8	155,0	136,9	58478,1
03.13.2018 05:00:12 AM	31 / 3G		Automatic Boost	674,3	13,6	33,4	32,4	17,9	475,3	475,6	474,6	161,0	189,4	156,4	138,5	58443,9
03.13.2018 04:45:11 AM	31 / 3G		Automatic Blizzard	674,1	13,6	33,6	32,4	10,7	475,5	475,8	474,7	160,4	189,0	156,0	138,2	58422,6
03.13.2018 04:30:13 AM	31 / 3G		Automatic Blizzard	673,8	13,6	33,6	32,4	12,5	475,6	476,1	474,9	161,6	189,6	156,6	138,8	58400,8
03.13.2018 04:15:11 AM	31 / 3G		Automatic Blizzard	673,6	13,6	33,6	32,5	9,8	475,8	476,3	475,0	161,2	189,2	63,2	73,4	58379,6
03.13.2018 04:00:11 AM	31 / 3G		Automatic Blizzard	673,3	13,6	34,0	32,4	9,8	475,8	476,4	475,1	161,3	190,1	156,8	138,9	58357,7
03.13.2018 03:45:12 AM	31 / 3G		Automatic Blizzard	673,1	13,6	34,0	32,5	18,8	482,7	480,2	481,6	18,3	52,1	63,1	33,7	58336,4
03.13.2018 03:30:11 AM	31 / 3G		Automatic Snow	672,8	13,6	34,2	32,7	13,4	475,7	476,4	474,8	161,2	189,7	156,6	138,7	58314,7

10.8.0.5    Data    No Connection    Amtrak / READ


Event Table

Datetime	Event
03.13.2018 09:30:09 PM	LOG
03.13.2018 09:15:09 PM	LOG
03.13.2018 09:00:09 PM	LOG
03.13.2018 08:45:08 PM	LOG
03.13.2018 08:30:09 PM	LOG
03.13.2018 08:15:13 PM	LOG
03.13.2018 08:00:14 PM	LOG
03.13.2018 07:45:12 PM	LOG
03.13.2018 07:30:14 PM	LOG
03.13.2018 07:15:13 PM	LOG
03.13.2018 07:00:15 PM	LOG
03.13.2018 06:45:13 PM	LOG
03.13.2018 06:30:09 PM	LOG
03.13.2018 06:15:10 PM	LOG
03.13.2018 06:00:08 PM	LOG
03.13.2018 05:47:08 PM	LOG
03.13.2018 05:32:08 PM	LOG
03.13.2018 05:23:33 PM	BOOST
03.13.2018 04:17:40 PM	BOOST
03.13.2018 04:17:10 PM	LOG
03.13.2018 04:12:29 PM	BOOST
03.13.2018 04:02:46 PM	BOOST
03.13.2018 04:02:13 PM	LOG
03.13.2018 03:47:12 PM	LOG
03.13.2018 03:38:29 PM	BOOST
03.13.2018 03:32:12 PM	LOG
03.13.2018 03:17:12 PM	LOG
03.13.2018 03:02:12 PM	LOG
03.13.2018 02:47:13 PM	LOG
03.13.2018 02:32:09 PM	LOG
03.13.2018 02:17:08 PM	LOG
03.13.2018 02:02:08 PM	LOG
03.13.2018 02:00:06 PM	BOOST
03.13.2018 01:47:09 PM	LOG
03.13.2018 01:32:11 PM	LOG
03.13.2018 01:17:12 PM	LOG
03.13.2018 01:02:09 PM	LOG
03.13.2018 12:47:08 AM	LOG
03.13.2018 10:25:34 AM	LOG
03.13.2018 10:17:13 AM	LOG
03.13.2018 10:02:09 AM	LOG
03.13.2018 09:47:08 AM	LOG
03.13.2018 09:32:08 AM	LOG
03.13.2018 08:47:32 AM	LOG
03.13.2018 08:10:35 AM	LOG
03.13.2018 08:00:08 AM	LOG

Start Date : 02.01.2018    Record    Datetime : 03.13.2018 07:45:12 PM

End Date : 04.05.2018    Wait    Update    Log    Snow    Boost Mode    Rush Hour

Air temp. 30,4 °F    Rail temp.1 69,8 °F  
 Rail cold 32,4 °F    Rail temp.2 45,0 °C



04.05.2018 01:55:37 PM    BluePoint

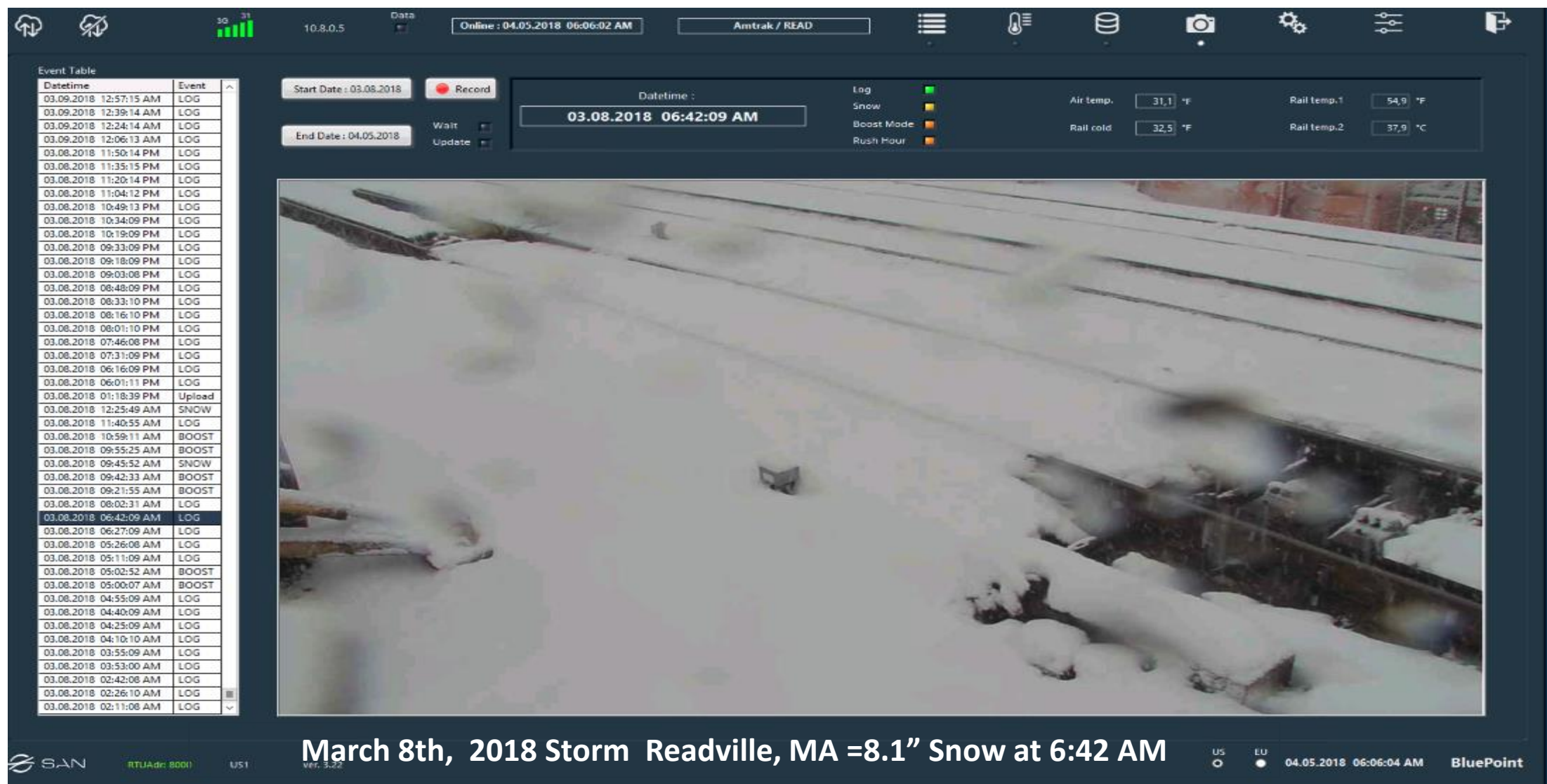
March 13th, 2018 Storm Readville, MA = 14.5" Snow at 7:45 PM

- Readville Snow Storm - 8.2 " Snow March 7<sup>th</sup> thru March 8<sup>th</sup>
- Snow Storm Event Began at 11:00 PM 03-07-18 – Heaters Engaged
- Boost Mode Engaged at 5 AM – dual heat
- Snow Storm Ended at 10 AM 03-08-18
- Return to Preheat Mode
- Average Wind Speed = 23 mph
- Average Wind Gust = 34 mph
- Highest Wind Gust = 45 mph

3G 31 10.8.0.5 Data Online : 04.05.2018 05:16:05 AM Amtrak / READ

Start Date : 02.01.2018 End Date : 03.28.2018 System Log Data System Data Channel Data Hours Data Alarms

DateTime	GSMSignal	Alarm	Mode	Heat [h]	Battery	Air *	Cold *	Wind	L1_Volt	L2_Volt	L3_Volt	L1_Amp	L2_Amp	L3_Amp	Power kW	Power kWh
03.08.2018 06:16:11 PM	31 / 3G		Automatic Preheat	654,2	13,6	36,5	35,4	1,8	484,0	483,2	480,2	0,0	0,0	0,0	0,0	56702,9
03.08.2018 06:01:12 PM	31 / 3G		Automatic Preheat	654,2	13,6	36,7	35,6	0,0	484,2	482,7	479,9	0,0	0,0	0,0	0,0	56702,9
03.08.2018 06:42:13 AM	29 / 3G		Automatic Boost	650,6	13,6	31,1	32,4	0,0	477,1	476,7	474,8	160,2	188,6	155,7	138,2	56204,2
03.08.2018 06:27:13 AM	29 / 3G		Automatic Boost	650,3	13,6	31,1	32,4	0,0	476,9	476,3	474,9	160,2	188,4	155,6	138,1	56169,6
03.08.2018 06:12:13 AM	29 / 3G		Automatic Boost	650,1	13,6	31,3	32,5	0,0	477,1	476,4	474,9	160,3	188,5	155,6	138,2	56135,1
03.08.2018 05:57:13 AM	29 / 3G		Automatic Boost	649,8	13,6	31,3	32,5	0,0	478,2	478,1	476,7	160,8	189,0	156,2	139,1	56100,4
03.08.2018 05:42:13 AM	29 / 3G		Automatic Boost	649,6	13,6	31,5	32,4	0,0	478,1	478,2	476,2	160,7	189,1	156,0	139,0	56065,7
03.08.2018 05:26:11 AM	29 / 3G		Automatic Boost	649,3	13,5	31,5	32,4	0,0	479,0	478,8	477,0	161,0	189,3	156,3	139,4	56028,6
03.08.2018 05:11:09 AM	29 / 3G		Automatic Boost	649,1	13,6	31,6	32,4	0,0	477,6	478,0	476,2	160,5	188,9	156,3	138,8	55993,7
03.08.2018 04:55:11 AM	29 / 3G		Automatic Snow	648,8	13,6	31,8	32,4	0,0	478,5	479,0	477,0	161,6	190,2	157,2	140,0	55962,2
03.08.2018 04:40:12 AM	29 / 3G		Automatic Snow	648,6	13,6	32,0	32,4	0,0	487,2	484,4	485,3	18,6	52,4	63,8	34,4	55940,2
03.08.2018 04:25:11 AM	29 / 3G		Automatic Snow	648,3	13,6	32,0	32,4	0,0	479,9	480,0	478,3	162,0	190,7	157,5	140,6	55918,4
03.08.2018 04:10:12 AM	29 / 3G		Automatic Snow	648,1	13,6	32,0	32,4	0,0	488,2	485,1	486,4	18,6	52,5	63,9	34,5	55896,3
03.08.2018 03:55:11 AM	29 / 3G		Automatic Snow	647,8	13,6	32,2	32,4	0,0	481,0	481,2	479,1	162,4	191,2	157,8	141,3	55874,5
03.08.2018 03:53:03 AM	29 / 3G		Automatic Snow	647,8	13,6	32,2	32,5	0,0	481,1	481,1	479,0	162,9	191,6	158,0	141,5	55871,2
03.08.2018 02:42:11 AM	30 / 3G		Automatic Snow	646,6	13,6	32,7	32,4	2,7	486,7	483,6	484,4	18,5	52,4	63,6	34,2	55767,2
03.08.2018 02:26:10 AM	30 / 3G		Automatic Snow	646,3	13,6	33,1	32,5	0,9	488,5	485,2	485,9	18,6	52,5	63,9	34,5	55743,8
03.08.2018 02:11:10 AM	30 / 3G		Automatic Snow	646,1	13,6	33,3	32,5	3,6	481,7	481,8	479,6	162,7	191,4	158,0	141,7	55721,9
03.08.2018 01:56:11 AM	30 / 3G		Automatic Snow	645,8	13,6	33,4	32,4	3,6	488,5	485,0	485,6	18,6	52,5	63,8	34,5	55699,7
03.07.2018 01:41:11 AM	30 / 3G		Automatic Snow	635,1	13,6	34,3	34,2	1,8	475,3	475,6	475,9	161,3	189,5	156,8	138,7	54716,2
03.07.2018 01:25:12 AM	30 / 3G		Automatic Preheat	634,9	13,6	34,7	34,7	0,9	485,3	484,5	483,3	0,0	0,0	0,0	0,0	54700,6
03.07.2018 01:10:11 AM	30 / 3G		Automatic Preheat	634,9	13,6	34,9	34,9	2,7	485,7	484,6	483,1	0,0	0,0	0,0	0,0	54700,6
03.07.2018 12:53:09 AM	30 / 3G		Automatic Preheat	634,9	13,6	34,9	34,9	5,4	486,2	485,4	483,4	0,0	0,0	0,0	0,0	54700,6
03.07.2018 12:37:12 AM	31 / 3G		Automatic Preheat	634,9	13,6	35,6	35,2	3,6	485,6	484,7	482,8	0,0	0,0	0,0	0,0	54700,6
03.07.2018 12:22:12 AM	31 / 3G		Automatic Preheat	634,9	13,6	35,6	35,4	0,0	484,7	484,0	482,0	0,0	0,0	0,0	0,0	54700,6
03.07.2018 12:06:11 AM	31 / 3G		Automatic Preheat	634,9	13,6	35,6	35,6	0,0	485,8	484,9	482,9	0,0	0,0	0,0	0,0	54700,6
03.06.2018 11:50:11 PM	31 / 3G		Automatic Preheat	634,9	13,6	35,6	35,6	0,0	484,4	483,7	481,7	0,0	0,0	0,0	0,0	54700,6
03.06.2018 11:35:12 PM	31 / 3G		Automatic Preheat	634,9	13,6	35,6	35,8	0,0	483,4	483,0	481,0	0,0	0,0	0,0	0,0	54700,6
03.06.2018 11:20:11 PM	31 / 3G		Automatic Preheat	634,8	13,6	35,6	35,6	0,0	481,1	478,5	480,5	18,4	51,8	63,0	33,6	54687,1
03.06.2018 11:05:12 PM	31 / 3G		Automatic Preheat	634,5	13,6	35,6	35,2	0,0	474,7	475,1	474,0	160,8	188,9	156,4	138,1	54665,8
03.06.2018 10:49:13 PM	31 / 3G		Automatic Preheat	634,4	13,6	35,6	35,2	0,0	483,0	482,6	480,4	0,0	0,0	0,0	0,0	54657,5
03.06.2018 10:30:11 PM	31 / 3G		Automatic Preheat	634,4	13,6	35,6	35,6	0,0	483,0	482,2	479,9	0,0	0,0	0,0	0,0	54657,5
03.06.2018 10:15:11 PM	31 / 3G		Automatic Preheat	634,4	13,6	35,8	35,6	0,0	483,6	482,8	480,0	0,0	0,0	0,0	0,0	54657,5
03.06.2018 09:58:12 PM	31 / 3G		Automatic Preheat	634,4	13,6	36,1	35,8	0,0	484,4	483,0	481,0	0,0	0,0	0,0	0,0	54657,5
03.06.2018 09:43:12 PM	31 / 3G		Automatic Preheat	634,4	13,6	36,0	35,6	1,8	483,0	482,3	480,0	0,0	0,0	0,0	0,0	54657,5
03.06.2018 09:27:11 PM	31 / 3G		Automatic Preheat	634,4	13,6	35,8	35,8	0,0	483,1	482,3	480,3	0,0	0,0	0,0	0,0	54657,5
03.06.2018 09:12:12 PM	31 / 3G		Automatic Preheat	634,4	13,6	35,8	35,6	1,8	484,1	483,5	481,4	0,0	0,0	0,0	0,0	54657,5
03.06.2018 08:57:12 PM	31 / 3G		Automatic Preheat	634,4	13,6	35,6	35,8	1,8	484,1	483,0	481,0	0,0	0,0	0,0	0,0	54657,5
03.06.2018 08:41:12 PM	31 / 3G		Automatic Preheat	634,4	13,6	35,6	35,8	1,8	483,1	482,2	480,3	0,0	0,0	0,0	0,0	54657,5
03.06.2018 08:25:10 PM	31 / 3G		Automatic Preheat	634,4	13,6	35,4	35,8	3,6	481,3	480,4	478,7	0,0	0,0	0,0	0,0	54657,5
03.06.2018 08:10:12 PM	31 / 3G		Automatic Preheat	634,4	13,6	35,4	36,0	0,0	480,9	480,0	478,4	0,0	0,0	0,0	0,0	54657,5
03.06.2018 07:54:12 PM	31 / 3G		Automatic Preheat	634,4	13,6	35,4	36,0	0,0	480,9	480,4	478,2	0,0	0,0	0,0	0,0	54657,5
03.06.2018 07:36:11 PM	31 / 3G		Automatic Preheat	634,4	13,6	35,6	36,0	1,8	481,5	481,0	478,4	0,0	0,0	0,0	0,0	54657,5
03.06.2018 07:21:12 PM	31 / 3G		Automatic Preheat	634,4	13,6	35,6	36,3	2,7	481,7	480,5	478,5	0,0	0,0	0,0	0,0	54657,5
03.06.2018 07:05:10 PM	31 / 3G		Automatic Preheat	634,3	13,6	35,4	36,5	2,7	472,1	472,2	471,1	159,9	187,6	155,2	136,4	54647,6
03.06.2018 06:48:11 PM	31 / 3G		Automatic Preheat	634	13,6	35,4	36,7	1,8	479,4	476,1	477,3	18,3	51,6	62,7	33,2	54623,6
03.06.2018 06:32:11 PM	31 / 3G		Automatic Preheat	633,8	13,6	35,4	37,0	3,6	480,4	479,1	476,8	0,0	0,0	0,0	0,0	54605,0
03.06.2018 06:16:12 PM	31 / 3G		Automatic Preheat	633,8	13,6	35,6	37,2	3,6	480,7	479,3	477,6	0,0	0,0	0,0	0,0	54605,0
03.06.2018 06:00:11 PM	31 / 3G		Automatic Preheat	633,8	13,6	35,4	37,4	3,6	481,8	480,7	478,2	0,0	0,0	0,0	0,0	54605,0



10.8.0.5 Online : 04.05.2018 06:06:02 AM Amtrak / READ

**Event Table**

Datetime	Event
03.09.2018 12:57:15 AM	LOG
03.09.2018 12:39:14 AM	LOG
03.09.2018 12:24:14 AM	LOG
03.09.2018 12:06:13 AM	LOG
03.08.2018 11:50:14 PM	LOG
03.08.2018 11:35:15 PM	LOG
03.08.2018 11:20:14 PM	LOG
03.08.2018 11:04:12 PM	LOG
03.08.2018 10:49:13 PM	LOG
03.08.2018 10:34:09 PM	LOG
03.08.2018 10:19:09 PM	LOG
03.08.2018 09:33:09 PM	LOG
03.08.2018 09:18:09 PM	LOG
03.08.2018 09:03:08 PM	LOG
03.08.2018 08:48:09 PM	LOG
03.08.2018 08:33:10 PM	LOG
03.08.2018 08:16:10 PM	LOG
03.08.2018 08:01:10 PM	LOG
03.08.2018 07:46:08 PM	LOG
03.08.2018 07:31:09 PM	LOG
03.08.2018 06:16:09 PM	LOG
03.08.2018 06:01:11 PM	LOG
03.08.2018 01:18:39 PM	Upload
03.08.2018 12:25:49 AM	SNOW
03.08.2018 11:40:55 AM	LOG
03.08.2018 10:59:11 AM	BOOST
03.08.2018 09:55:25 AM	BOOST
03.08.2018 09:45:52 AM	SNOW
03.08.2018 09:42:33 AM	BOOST
03.08.2018 09:21:55 AM	BOOST
03.08.2018 08:02:31 AM	LOG
03.08.2018 06:42:09 AM	LOG
03.08.2018 06:27:09 AM	LOG
03.08.2018 05:26:08 AM	LOG
03.08.2018 05:11:09 AM	LOG
03.08.2018 05:02:52 AM	BOOST
03.08.2018 05:00:07 AM	BOOST
03.08.2018 04:55:09 AM	LOG
03.08.2018 04:40:09 AM	LOG
03.08.2018 04:25:09 AM	LOG
03.08.2018 04:10:10 AM	LOG
03.08.2018 03:55:09 AM	LOG
03.08.2018 03:53:00 AM	LOG
03.08.2018 02:42:08 AM	LOG
03.08.2018 02:26:10 AM	LOG
03.08.2018 02:11:08 AM	LOG

**03.08.2018 06:42:09 AM**

Air temp: 31.1 °F    Rail temp.1: 54.9 °F  
 Rail cold: 32.5 °F    Rail temp.2: 37.9 °C

**March 8th, 2018 Storm Readville, MA =8.1" Snow at 6:42 AM**

- Readville Snow Storm - 6" Snow February 17<sup>th</sup> thru February 18<sup>th</sup>
- Snow Storm Event Began at 8:30 PM 2-17-18 – Heaters Engaged
- Snow Storm Ended at 10 AM 02-18-18
- Return to Preheat Mode
- Average Wind Speed = 10.4 mph
- Average Wind Gust = NA
- Highest Wind Gust = 25 mph
- See Next Slide for Picture

System Log

DateTime	GSMSignal	Alarm	Mode	Heat [h]	Battery	Air *	Cold *	Wind	L1_Volt	L2_Volt	L3_Volt	L1_Amp	L2_Amp	L3_Amp	Power kW	Power kWh
02.18.2018 07:15:11 AM	31 / 3G		Automatic Snow	600,2	13,6	31,5	32,4	0,9	482,4	480,6	482,3	18,5	52,0	63,2	33,8	51473,3
02.18.2018 07:00:11 AM	31 / 3G		Automatic Snow	599,9	13,6	31,6	32,4	0,0	474,9	476,0	475,1	160,9	188,8	156,3	138,3	51452,0
02.18.2018 06:45:12 AM	31 / 3G		Automatic Snow	599,7	13,6	31,8	32,4	0,0	481,7	479,9	482,2	18,5	52,0	63,1	33,8	51430,2
02.18.2018 06:30:12 AM	31 / 3G		Automatic Snow	599,4	13,6	32,0	32,4	0,0	474,0	475,1	474,4	160,6	188,3	155,9	137,7	51408,9
02.18.2018 06:15:12 AM	31 / 3G		Automatic Snow	599,2	13,6	32,0	32,4	1,8	482,6	480,6	482,7	18,5	52,0	63,2	33,8	51387,2
02.18.2018 06:00:12 AM	31 / 3G		Automatic Snow	598,9	13,6	32,2	32,4	1,8	475,3	476,4	476,3	161,2	188,8	156,4	138,7	51365,9
02.18.2018 05:45:10 AM	31 / 3G		Automatic Snow	598,7	13,6	32,2	32,4	0,0	482,9	480,9	483,8	18,6	52,0	63,2	33,9	51344,0
02.18.2018 05:30:11 AM	31 / 3G		Automatic Snow	598,4	13,6	32,4	32,4	0,0	475,9	477,5	476,9	161,6	189,3	156,8	139,2	51322,6
02.18.2018 05:15:13 AM	31 / 3G		Automatic Snow	598,2	13,6	32,5	32,4	0,0	483,6	481,7	484,4	18,6	52,3	63,5	34,1	51300,7
02.18.2018 05:00:11 AM	31 / 3G		Automatic Snow	598	13,6	32,7	32,4	0,0	485,9	486,2	485,0	0,0	0,0	0,0	0,0	51290,1
02.18.2018 04:45:42 AM	0 /		No Connection	0	0	32,0	32,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
02.18.2018 04:30:40 AM	0 /		No Connection	0	0	32,0	32,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
02.18.2018 04:15:40 AM	0 /		No Connection	0	0	32,0	32,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
02.18.2018 04:00:11 AM	31 / 3G		Automatic Snow	597,3	13,6	32,7	32,4	0,0	477,0	478,8	478,3	161,6	189,6	157,2	139,8	51221,4
02.18.2018 03:45:11 AM	31 / 3G		Automatic Snow	597	13,6	33,1	32,4	0,0	484,6	482,7	485,3	18,6	52,3	63,5	34,2	51199,4
02.18.2018 03:30:09 AM	31 / 3G		Automatic Snow	596,8	13,6	33,1	32,4	0,0	486,2	486,6	485,4	0,0	0,0	0,0	0,0	51180,0
02.18.2018 03:15:11 AM	31 / 3G		Automatic Snow	596,8	13,6	33,3	32,4	0,0	486,6	487,1	485,7	0,0	0,0	0,0	0,0	51180,0
02.18.2018 03:00:11 AM	31 / 3G		Automatic Snow	596,8	13,6	33,3	32,4	0,0	486,2	486,8	485,5	0,0	0,0	0,0	0,0	51180,0
02.18.2018 02:45:10 AM	31 / 3G		Automatic Snow	596,6	13,6	33,3	32,4	0,0	484,0	482,3	484,8	18,5	52,2	63,4	34,1	51161,7
02.18.2018 02:30:11 AM	31 / 3G		Automatic Snow	596,3	13,6	33,1	32,4	0,0	475,9	477,2	476,7	161,2	189,2	156,6	138,8	51140,2
02.18.2018 02:15:11 AM	31 / 3G		Automatic Snow	596,1	13,6	33,1	32,4	0,0	482,8	480,9	483,5	18,4	52,1	63,2	33,9	51118,4
02.18.2018 02:00:12 AM	31 / 3G		Automatic Snow	595,8	13,6	32,9	32,4	0,0	475,3	476,9	476,2	161,1	189,1	156,6	138,7	51097,0
02.18.2018 01:45:11 AM	31 / 3G		Automatic Snow	595,6	13,6	32,7	32,4	0,0	484,2	482,4	485,0	18,6	52,2	63,4	34,1	51075,2
02.18.2018 01:30:11 AM	31 / 3G		Automatic Snow	595,3	13,6	32,5	32,4	0,0	476,5	477,6	477,4	161,6	189,4	156,9	139,3	51053,5
02.18.2018 01:15:10 AM	31 / 3G		Automatic Snow	595,1	13,6	32,5	32,4	0,0	483,5	481,5	484,3	18,5	52,1	63,3	34,0	51031,7
02.18.2018 01:00:11 AM	31 / 3G		Automatic Snow	594,8	13,6	32,4	32,4	0,0	476,3	477,6	477,0	161,6	189,5	156,9	139,2	51010,0
02.18.2018 12:45:11 AM	31 / 3G		Automatic Snow	594,6	13,6	32,4	32,4	0,0	484,3	482,3	484,7	18,6	52,2	63,4	34,1	50988,4
02.18.2018 12:30:11 AM	31 / 3G		Automatic Snow	594,3	13,6	32,2	32,4	0,0	476,1	477,0	476,7	161,6	189,3	156,7	139,1	50966,7
02.18.2018 12:15:11 AM	31 / 3G		Automatic Snow	594,1	13,6	32,2	32,4	0,0	483,2	480,7	483,5	18,6	52,1	63,2	33,9	50945,1
02.18.2018 12:00:11 AM	31 / 3G		Automatic Snow	593,8	13,6	32,2	32,4	0,0	475,5	476,2	475,8	161,2	189,2	156,5	138,7	50923,5
02.17.2018 11:45:12 PM	31 / 3G		Automatic Snow	593,6	13,4	32,2	32,4	0,0	475,6	476,4	475,8	160,9	189,1	156,4	138,6	50902,2
02.17.2018 11:30:12 PM	31 / 3G		Automatic Snow	593,3	13,6	32,0	32,4	0,0	483,1	480,6	482,9	18,4	52,1	63,2	33,9	50880,4
02.17.2018 11:15:54 PM	0 /		No Connection	0	0	32,0	32,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
02.17.2018 11:00:12 PM	31 / 3G		Automatic Snow	592,8	13,6	31,6	32,4	0,0	482,6	480,3	481,9	19,1	52,5	64,0	34,3	50837,3
02.17.2018 10:45:12 PM	31 / 3G		Automatic Snow	592,8	13,6	31,6	32,4	0,0	484,8	484,4	482,1	0,0	0,0	0,0	0,0	50835,4
02.17.2018 10:30:11 PM	31 / 3G		Automatic Snow	592,8	13,6	31,6	32,4	0,0	475,3	476,2	474,8	161,1	189,2	156,2	138,4	50833,4
02.17.2018 10:15:12 PM	31 / 3G		Automatic Snow	592,5	13,6	31,6	32,4	3,6	481,3	478,6	481,1	18,4	51,8	62,9	33,6	50811,9
02.17.2018 10:00:12 PM	31 / 3G		Automatic Snow	592,3	13,6	31,5	32,4	0,0	474,7	475,7	474,9	160,8	188,8	156,2	138,2	50790,6
02.17.2018 09:45:12 PM	31 / 3G		Automatic Snow	592	13,6	31,5	32,5	0,0	481,9	479,1	481,3	18,4	51,9	62,9	33,6	50768,9
02.17.2018 09:30:11 PM	31 / 3G		Automatic Snow	591,8	13,6	31,3	32,7	3,6	475,4	476,3	474,9	161,1	189,2	156,2	138,6	50747,4
02.17.2018 09:15:12 PM	31 / 3G		Automatic Snow	591,5	13,6	31,3	33,1	3,6	482,2	480,1	481,8	18,4	52,0	63,1	33,7	50725,8
02.17.2018 09:00:11 PM	31 / 3G		Automatic Snow	591,3	13,6	31,5	33,6	3,6	474,9	475,1	474,4	161,0	188,9	156,0	138,0	50704,3
02.17.2018 08:45:12 PM	31 / 3G		Automatic Snow	591	13,6	31,8	34,2	4,5	481,1	478,4	480,4	18,4	51,8	62,9	33,5	50682,9
02.17.2018 08:30:11 PM	31 / 3G		Automatic Snow	590,8	13,6	32,9	35,1	6,3	473,0	473,6	472,6	160,8	188,7	155,8	137,4	50661,5
02.17.2018 08:15:08 PM	31 / 3G		Automatic Preheat	590,7	13,6	34,0	35,4	5,4	482,2	481,1	479,3	0,0	0,0	0,0	0,0	50650,7
02.17.2018 08:00:11 PM	31 / 3G		Automatic Preheat	590,7	13,6	34,2	36,9	4,5	482,0	481,0	479,1	0,0	0,0	0,0	0,0	50650,7
02.17.2018 06:30:13 PM	31 / 3G		Automatic Preheat	590,6	13,6	34,3	37,2	5,4	474,0	473,7	472,5	161,0	188,9	155,6	137,4	50647,3
02.17.2018 06:15:11 PM	31 / 3G		Automatic Preheat	590,4	13,6	34,5	37,4	4,5	480,8	477,6	479,5	18,4	51,8	62,8	33,5	50626,0
02.17.2018 06:00:11 PM	31 / 3G		Automatic Preheat	590,2	13,6	34,9	37,8	3,6	483,7	482,8	480,5	0,0	0,0	0,0	0,0	50615,6

3G 10.8.0.5 Data Online : 04.05.2018 09:04:37 AM Amtrak / READ

Datetime	Event
02.18.2018 01:45:09 PM	LOG
02.18.2018 01:30:09 PM	LOG
02.18.2018 01:15:09 PM	LOG
02.18.2018 01:00:10 PM	LOG
02.18.2018 12:45:10 AM	LOG
02.18.2018 12:30:09 AM	LOG
02.18.2018 12:15:09 AM	LOG
02.18.2018 12:00:09 AM	LOG
02.18.2018 11:45:09 AM	LOG
02.18.2018 11:30:08 AM	LOG
02.18.2018 11:15:08 AM	LOG
02.18.2018 11:00:10 AM	LOG
02.18.2018 10:45:09 AM	LOG
02.18.2018 10:30:09 AM	LOG
02.18.2018 10:15:09 AM	LOG
02.18.2018 10:00:08 AM	LOG
02.18.2018 09:45:10 AM	LOG
02.18.2018 09:30:09 AM	LOG
02.18.2018 09:15:10 AM	LOG
02.18.2018 09:00:09 AM	LOG
02.18.2018 08:45:09 AM	LOG
02.18.2018 08:30:09 AM	LOG
02.18.2018 08:22:33 AM	SNOW
02.18.2018 08:15:09 AM	LOG
02.18.2018 08:00:09 AM	LOG
02.18.2018 07:45:09 AM	LOG
02.18.2018 07:30:09 AM	LOG
02.18.2018 07:15:09 AM	LOG
02.18.2018 07:00:09 AM	LOG
02.18.2018 06:45:10 AM	LOG
02.18.2018 06:30:09 AM	LOG
02.18.2018 06:15:09 AM	LOG
02.18.2018 06:00:09 AM	LOG
02.18.2018 05:45:10 AM	LOG
02.18.2018 05:30:09 AM	LOG
02.18.2018 05:15:14 AM	LOG
02.18.2018 05:00:09 AM	LOG
02.18.2018 04:50:09 AM	SNOW
02.18.2018 04:00:10 AM	LOG
02.18.2018 03:45:13 AM	LOG
02.18.2018 03:30:08 AM	LOG
02.18.2018 03:15:08 AM	LOG
02.18.2018 03:00:08 AM	LOG
02.18.2018 02:45:09 AM	LOG
02.18.2018 02:30:09 AM	LOG
02.18.2018 02:15:09 AM	LOG

Start Date : 02.01.2018    Record    Datetime : **02.18.2018 08:22:33 AM**    Log    Air temp. : 36.5 °F    Rail temp.1 : 51.6 °F  
 End Date : 04.05.2018    Wait    Boost Mode    Rail cold : 32.4 °F    Rail temp.2 : 71.2 °C  
 Update

February 17 - 18 , 2018 Storm 53B & 31A  
 Readville, MA = 6" Snow at 8:22 AM

SAN    RTUAdr: 8000    US1    ver. 3.22    US    EU    04.05.2018 09:04:40 AM    BluePoint

## Smaller Storms at Read Interlocking

- January 17<sup>th</sup>, 2018 Storm <4"
- January 30<sup>th</sup>, 2018 – Storm <2"
- February 7<sup>th</sup> Storm < 3"



3G 31
10.8.0.5
Data
Online : 04.01.2018 08:28:23 AM
Amtrak / READ

System Data (Ref. 53B)	53B (Single)	31A (Dual)	31B (Dual covers)	12A (Dual)	12B (Dual)	53A (Single)	95 (Single)
Automatic <input checked="" type="checkbox"/>	Mode - Heaters <b>Auto. High Airtemp.</b>	Mode - Heaters <b>Auto. High Airtemp.</b>	Mode - Heaters <b>Auto. High Airtemp.</b>	Mode - Heaters <b>Auto. High Airtemp.</b>	Mode - Heaters <b>Auto. High Airtemp.</b>	Mode - Heaters <b>Auto. High Airtemp.</b>	Mode - Heaters <b>Auto. High Airtemp.</b>
Manual <input type="checkbox"/>	Output <b>BluePoint System</b>	PWM - Output Duty Cycle 50%	PWM - Output Duty Cycle 50%	PWM - Output Duty Cycle 50%	PWM - Output Duty Cycle 50%	Output <b>BluePoint System</b>	Output <b>BluePoint System</b>
CTECH "On" (Auto) <input checked="" type="checkbox"/>	Rail temp.1 <input type="text" value="47,3"/> °F	Rail temp.3 <input type="text" value="48,0"/> °F	Rail temp.7 <input type="text" value="47,5"/> °F	Rail temp.11 <input type="text" value="47,3"/> °F	Rail temp.15 <input type="text" value="47,3"/> °F	Rail temp.19 <input type="text" value="48,2"/> °F	Rail temp.23 <input type="text" value="47,8"/> °F
Controlpanel - Snow sensor <input type="checkbox"/>	Rail temp.2 <input type="text" value="46,8"/> °F	Rail temp.4 <input type="text" value="47,7"/> °F	Rail temp.8 <input type="text" value="47,3"/> °F	Rail temp.12 <input type="text" value="47,3"/> °F	Rail temp.16 <input type="text" value="47,3"/> °F	Rail temp.20 <input type="text" value="47,7"/> °F	Rail temp.24 <input type="text" value="47,3"/> °F
Precipitation <input type="checkbox"/> Snow <input type="checkbox"/>	Threshold On <input type="text" value="-58,0"/> °F	Threshold On <input type="text" value="-58,0"/> °F	Threshold On <input type="text" value="58,0"/> °F	Threshold On <input type="text" value="-58,0"/> °F	Threshold On <input type="text" value="-58,0"/> °F	Threshold On <input type="text" value="-58,0"/> °F	Threshold On <input type="text" value="-58,0"/> °F
In Ground - Snow sensors <input type="checkbox"/>	Threshold Off <input type="text" value="-58,0"/> °F	Threshold Off <input type="text" value="-58,0"/> °F	Threshold Off <input type="text" value="58,0"/> °F	Threshold Off <input type="text" value="-58,0"/> °F	Threshold Off <input type="text" value="-58,0"/> °F	Threshold Off <input type="text" value="-58,0"/> °F	Threshold Off <input type="text" value="-58,0"/> °F
Precipitation <input type="checkbox"/> Snow <input type="checkbox"/>	Aut. Heat signal <input type="checkbox"/>	Aut. Heat signal <input type="checkbox"/>	Aut. Heat signal <input type="checkbox"/>	Aut. Heat signal <input type="checkbox"/>	Aut. Heat signal <input type="checkbox"/>	Aut. Heat signal <input type="checkbox"/>	Aut. Heat signal <input type="checkbox"/>
Rush hour (Workdays) <input type="checkbox"/>	Duty Cycle <input type="text" value="100"/> %	Duty Cycle <input type="text" value="50"/> %	Duty Cycle <input type="text" value="50"/> %	Duty Cycle <input type="text" value="50"/> %	Duty Cycle <input type="text" value="50"/> %	Duty Cycle <input type="text" value="100"/> %	Duty Cycle <input type="text" value="100"/> %
05:00 - 10:00 AM	Cycles / On <input type="text" value="682"/>	Cycles / On <input type="text" value="32072"/>	Cycles / On <input type="text" value="2006"/>	Cycles / On <input type="text" value="-29163"/>	Cycles / On <input type="text" value="-29327"/>	Cycles / On <input type="text" value="679"/>	Cycles / On <input type="text" value="678"/>
02:00 - 07:00 PM	Heating <input type="checkbox"/> <input type="text" value="827,5"/> h	Heating <input type="checkbox"/> <input type="text" value="653,3"/> h	Heating <input type="checkbox"/> <input type="text" value="53,5"/> h	Heating <input type="checkbox"/> <input type="text" value="629,2"/> h	Heating <input type="checkbox"/> <input type="text" value="629,7"/> h	Heating <input type="checkbox"/> <input type="text" value="827,0"/> h	Heating <input type="checkbox"/> <input type="text" value="827,0"/> h
<b>Total input Main Power</b>	Voltage <input type="text" value="484,7"/> V	Voltage <input type="text" value="482,1"/> V	Voltage <input type="text" value="484,3"/> V	Voltage <input type="text" value="484,7"/> V	Voltage <input type="text" value="482,0"/> V	Voltage <input type="text" value="484,0"/> V	Voltage <input type="text" value="482,0"/> V
L1 - L2 <input type="text" value="484,5"/>	Current <input type="text" value="0,0"/> A	Current <input type="text" value="0,0"/> A	Current <input type="text" value="0,0"/> A	Current <input type="text" value="0,0"/> A	Current <input type="text" value="0,0"/> A	Current <input type="text" value="0,0"/> A	Current <input type="text" value="0,0"/> A
L2 - L3 <input type="text" value="483,9"/>	Impedance <input type="text" value="999,9"/> Ω	Impedance <input type="text" value="999,9"/> Ω	Impedance <input type="text" value="99,9"/> Ω	Impedance <input type="text" value="999,9"/> Ω	Impedance <input type="text" value="999,9"/> Ω	Impedance <input type="text" value="999,9"/> Ω	Impedance <input type="text" value="999,9"/> Ω
L1 - L3 <input type="text" value="482,3"/>	Limit Impdance <input type="text" value="17,9"/> Ω	Limit Impdance <input type="text" value="9,2"/> Ω	Limit Impdance <input type="text" value="9,5"/> Ω	Limit Impdance <input type="text" value="9,6"/> Ω	Limit Impdance <input type="text" value="9,6"/> Ω	Limit Impdance <input type="text" value="23,9"/> Ω	Limit Impdance <input type="text" value="28,5"/> Ω
L1 <input type="text" value="0,0"/>	Power <input type="text" value="0,0"/> kW	Power <input type="text" value="0,0"/> kW	Power <input type="text" value="0,0"/> kW	Power <input type="text" value="0,0"/> kW	Power <input type="text" value="0,0"/> kW	Power <input type="text" value="0,0"/> kW	Power <input type="text" value="0,0"/> kW
L2 <input type="text" value="0,0"/>	Ground Fault Alarm <input type="checkbox"/>	Ground Fault Alarm <input type="checkbox"/>	Ground Fault Alarm <input type="checkbox"/>	Ground Fault Alarm <input type="checkbox"/>	Ground Fault Alarm <input type="checkbox"/>	Ground Fault Alarm <input type="checkbox"/>	Ground Fault Alarm <input type="checkbox"/>
L3 <input type="text" value="0,0"/>	Heating Alarm <input type="checkbox"/>	Heating Alarm <input type="checkbox"/>	Heating Alarm <input type="checkbox"/>	Heating Alarm <input type="checkbox"/>	Heating Alarm <input type="checkbox"/>	Heating Alarm <input type="checkbox"/>	Heating Alarm <input type="checkbox"/>
Power [kW] <input type="text" value="0,0"/>	Railsensor 1 Alarm <input type="checkbox"/>	Railsensor 3 Alarm <input type="checkbox"/>	Railsensor 7 Alarm <input type="checkbox"/>	Railsensor 11 Alarm <input type="checkbox"/>	Railsensor 15 Alarm <input type="checkbox"/>	Railsensor 19 Alarm <input type="checkbox"/>	Railsensor 23 Alarm <input type="checkbox"/>
Power Tot [kWh] <input type="text" value="72718,7"/>	Railsensor 2 Alarm <input type="checkbox"/>	Railsensor 4 Alarm <input type="checkbox"/>	Railsensor 8 Alarm <input type="checkbox"/>	Railsensor 12 Alarm <input type="checkbox"/>	Railsensor 16 Alarm <input type="checkbox"/>	Railsensor 20 Alarm <input type="checkbox"/>	Railsensor 24 Alarm <input type="checkbox"/>
OverTemp - Warning: <input type="checkbox"/> <input type="text" value="0,0"/>	Manual <input type="checkbox"/>	Ground Fault Alarm <input type="checkbox"/>	Ground Fault Alarm <input type="checkbox"/>	Ground Fault Alarm <input type="checkbox"/>	Ground Fault Alarm <input type="checkbox"/>	Ground Fault Alarm <input type="checkbox"/>	Ground Fault Alarm <input type="checkbox"/>
High Airtemp.: <input checked="" type="checkbox"/> <input type="text" value="491,9"/>	CTECH Alarm <input type="checkbox"/>	Heating Alarm <input type="checkbox"/>	Heating Alarm <input type="checkbox"/>	Heating Alarm <input type="checkbox"/>	Heating Alarm <input type="checkbox"/>	Heating Alarm <input type="checkbox"/>	Heating Alarm <input type="checkbox"/>
Preheat: <input type="checkbox"/> <input type="text" value="1578,5"/>	Air sensor <input type="checkbox"/>	Railsensor 1 Alarm <input type="checkbox"/>	Railsensor 3 Alarm <input type="checkbox"/>	Railsensor 7 Alarm <input type="checkbox"/>	Railsensor 11 Alarm <input type="checkbox"/>	Railsensor 15 Alarm <input type="checkbox"/>	Railsensor 19 Alarm <input type="checkbox"/>
Snowing: <input type="checkbox"/> <input type="text" value="134,5"/>	Cold sensor <input type="checkbox"/>	Railsensor 2 Alarm <input type="checkbox"/>	Railsensor 4 Alarm <input type="checkbox"/>	Railsensor 8 Alarm <input type="checkbox"/>	Railsensor 12 Alarm <input type="checkbox"/>	Railsensor 16 Alarm <input type="checkbox"/>	Railsensor 20 Alarm <input type="checkbox"/>
Boost (Rush hour): <input type="checkbox"/> <input type="text" value="46,0"/>							
Blizzard: <input type="checkbox"/> <input type="text" value="14,0"/>							
Manual / Constant <input type="checkbox"/> <input type="text" value="169,1"/>							
CTECH "Off" <input type="checkbox"/> <input type="text" value="0,0"/>							
HeartBeat On: <input type="checkbox"/> <input type="text" value="0,0"/>							
Door open <input type="checkbox"/>							
Power 480VAC <input type="checkbox"/>							
Power 24VDC <input type="checkbox"/>							
Replace Battery <input type="checkbox"/>							

### System Data (Ref. 53B)

Automatic

Manual

CTECH "On" (Auto)

Controlpanel - Snow sensor  
Precipitation  Snow

In Ground - Snow sensors  
Precipitation  Snow

Rush hour (Workdays)   
05:00 - 10:00 AM  
02:00 - 07:00 PM

---

**Total input Main Power**

	L1- L2	L2 - L3	L1 - L3
Voltage [V]	0,0	0,0	0,0
Current [A]	L1: 0,0	L2: 0,0	L3: 0,0
Power [kW]	0,0	Power Tot [kWh] 0,0	

### 53B (Single)

**Mode - Heaters**  
Standby Heat Off

---

**Output**  
Duty Cycle 25%

---

Rail temp.1 0,0 °F

Rail temp.2 0,0 °F

Threshold On 0,0 °F

Threshold Off 0,0 °F

Aut. Heat signal

Duty Cycle 0 %

### 31A (Dual)

**Mode - Heaters**  
Standby Heat Off

---

**PWM - Output**  
Duty Cycle 25%

---

Rail temp.3 0,0 °F

Rail temp.4 0,0 °F

Threshold On 0,0 °F

Threshold Off 0,0 °F

Aut. Heat signal

Duty Cycle 0 %

### 31B (Dual/Covers)

**Mode - Heaters**  
Standby Heat Off

---

**PWM - Output**  
Duty Cycle 25%

---

Rail temp.7 0,0 °F

Rail temp.8 0,0 °F

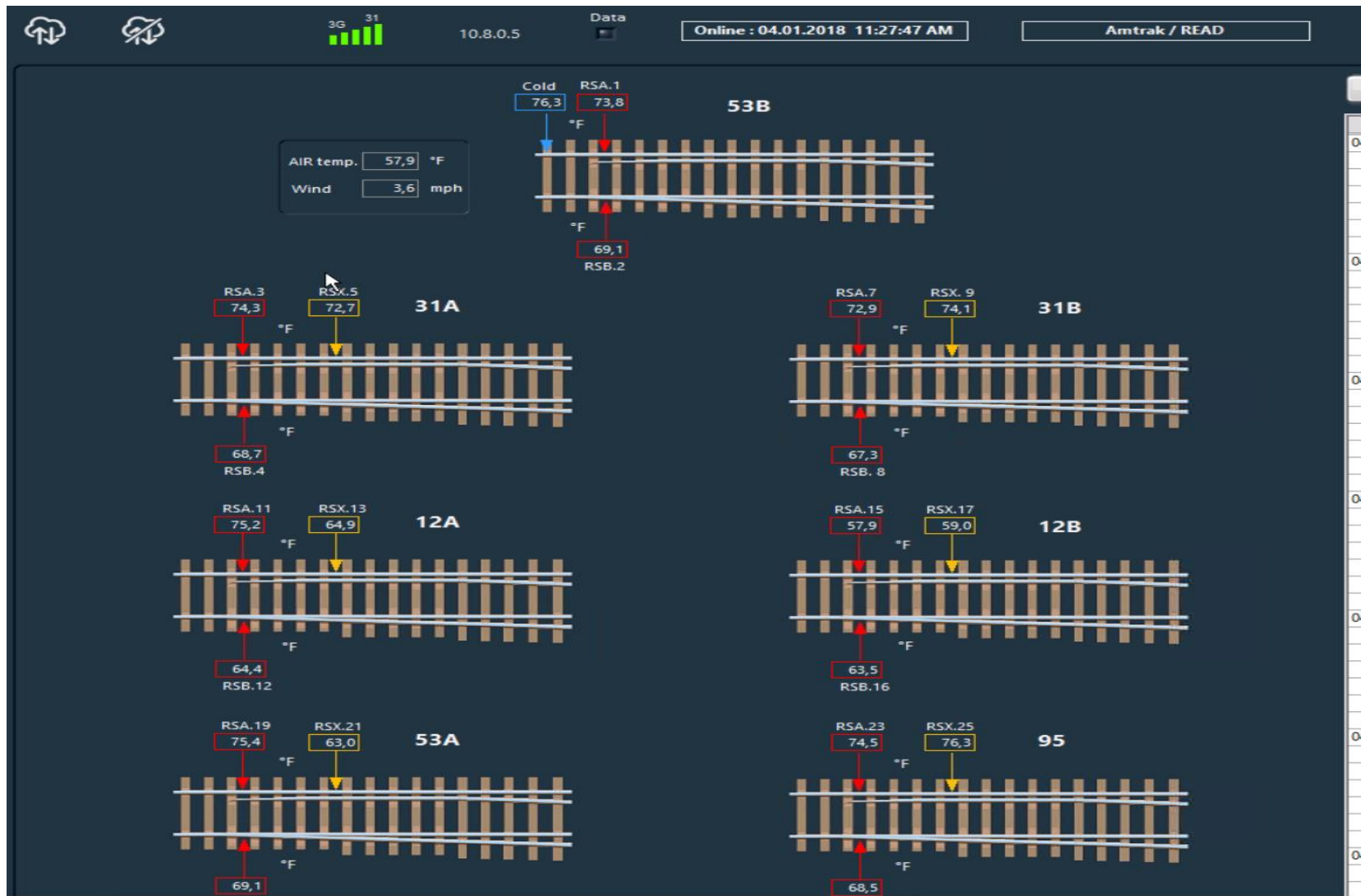
Threshold On 0,0 °F

Threshold Off 0,0 °F

Aut. Heat signal

Duty Cycle 0 %

			53B (Single)		31A (Dual)		31B (Dual/Covers)		
			Mode - Heaters		Mode - Heaters		Mode - Heaters		
			Standby Heat Off		Standby Heat Off		Standby Heat Off		
OverTemp - Warning:	<input type="checkbox"/>	Mode [h] <input type="text" value="0,0"/>	Heat signal [h]	Cycles / On <input type="text" value="0"/>	Cycles / On <input type="text" value="0"/>	Cycles / On <input type="text" value="0"/>	Cycles / On <input type="text" value="0"/>	Cycles / On <input type="text" value="0"/>	
High Airtemp.:	<input type="checkbox"/>	<input type="text" value="0,0"/>		Heating <input type="checkbox"/> <input type="text" value="0,0"/> h	Heating <input type="checkbox"/> <input type="text" value="0,0"/> h	Heating <input type="checkbox"/> <input type="text" value="0,0"/> h	Heating <input type="checkbox"/> <input type="text" value="0,0"/> h	Heating <input type="checkbox"/> <input type="text" value="0,0"/> h	
Preheat :	<input type="checkbox"/>	<input type="text" value="0,0"/>	<input type="text" value="0,0"/>	Voltage <input type="text" value="0,0"/> V	Voltage <input type="text" value="0,0"/> V	Voltage <input type="text" value="0,0"/> V	Voltage <input type="text" value="0,0"/> V	Voltage <input type="text" value="0,0"/> V	
Snowing :	<input type="checkbox"/>	<input type="text" value="0,0"/>	<input type="text" value="0,0"/>	Current <input type="text" value="0,0"/> A	Current <input type="text" value="0,0"/> A	Current <input type="text" value="0,0"/> A	Current <input type="text" value="0,0"/> A	Current <input type="text" value="0,0"/> A	
Boost (Rush hour) :	<input type="checkbox"/>	<input type="text" value="0,0"/>	<input type="text" value="0,0"/>	Impedance <input type="text" value="0,0"/> Ω	Impedance <input type="text" value="0,0"/> Ω	Impedance <input type="text" value="0,0"/> Ω	Impedance <input type="text" value="0,0"/> Ω	Impedance <input type="text" value="0,0"/> Ω	
Blizzard :	<input type="checkbox"/>		<input type="text" value="0,0"/>	Limit Impdance <input type="text" value="0,0"/> Ω	Limit Impdance <input type="text" value="0,0"/> Ω	Limit Impdance <input type="text" value="0,0"/> Ω	Limit Impdance <input type="text" value="0,0"/> Ω	Limit Impdance <input type="text" value="0,0"/> Ω	
Manual / Constant	<input type="checkbox"/>		<input type="text" value="0,0"/>	Power <input type="text" value="0,0"/> kW	Power <input type="text" value="0,0"/> kW	Power <input type="text" value="0,0"/> kW	Power <input type="text" value="0,0"/> kW	Power <input type="text" value="0,0"/> kW	
CTECH "Off"	<input type="checkbox"/>		<input type="text" value="0,0"/>						
HeartBeat On:	<input type="checkbox"/>		<input type="text" value="0,0"/>						
Door open	<input type="checkbox"/>	Manual	<input type="checkbox"/>	Ground Fault Alarm	<input type="checkbox"/>	Ground Fault Alarm	<input type="checkbox"/>	Ground Fault Alarm	<input type="checkbox"/>
Power 480VAC	<input type="checkbox"/>	CTECH Alarm	<input type="checkbox"/>	Heating Alarm	<input type="checkbox"/>	Heating Alarm	<input type="checkbox"/>	Heating Alarm	<input type="checkbox"/>
Power 24VDC	<input type="checkbox"/>	Air sensor	<input type="checkbox"/>	Railsensor 1 Alarm	<input type="checkbox"/>	Railsensor 3 Alarm	<input type="checkbox"/>	Railsensor 7 Alarm	<input type="checkbox"/>
Replace Battery	<input type="checkbox"/>	Cold sensor	<input type="checkbox"/>	Railsensor 2 Alarm	<input type="checkbox"/>	Railsensor 4 Alarm	<input type="checkbox"/>	Railsensor 8 Alarm	<input type="checkbox"/>



## Amtrak Blue Point SCADA Manual Override View – 7 Crossovers

53B	31A	31B	12A	12B	53A	95
Ch.1 Single	PWM - Ch.2 Dual	PWM - Ch.3 Dual	PWM - Ch.4 Dual	PWM - Ch.5 Dual	Ch.6 Single	Ch.7 Single
100% BluePoint	Duty Cycle 50%	Duty Cycle 50%	Duty Cycle 50%	Duty Cycle 50%	100% BluePoint	100% BluePoint
Standby - Heat Off	Standby - Heat Off	Standby - Heat Off	Standby - Heat Off	Standby - Heat Off	Standby - Heat Off	Standby - Heat Off
Automatic Heat	Automatic Heat	Automatic Heat	Automatic Heat	Automatic Heat	Automatic Heat	Automatic Heat
Boost Heat (100%)	Boost Heat (100%)	Boost Heat (100%)	Boost Heat (100%)	Boost Heat (100%)	Boost Heat (100%)	Boost Heat (100%)
Constant Heat	Constant Heat	Constant Heat	Constant Heat	Constant Heat	Constant Heat	Constant Heat

Apply      CTECH ON █      CTECH OFF      Cancel

## Threshold Adjustments

HeartBeat
Default
Reset
Location Amtrak / READ

Air Limit BluePoint

40,1 °F

Moisture Delay

600 sec.

**Pre Heating**

On 36,5 °F  Off 41,0 °F

Min. Rail

17,6 °F

**Snow Heating**

On 42,8 °F  Off 46,4 °F

Wind set

6,0 mph

Wind On

10 sec.

Wind Off

1000 sec.

**Boost Heating**

On 53,6 °F  Off 59,0 °F

53B - Imp.
Heating <input checked="" type="checkbox"/>
Load <span style="border: 1px solid #333; padding: 2px;">999,9</span> Ω
Limit <span style="border: 1px solid #333; padding: 2px;">17,9</span> Ω
Adjust Imp.

31A - Imp.
Heating <input checked="" type="checkbox"/>
Load <span style="border: 1px solid #333; padding: 2px;">999,9</span> Ω
Limit <span style="border: 1px solid #333; padding: 2px;">9,2</span> Ω
Adjust Imp.

31B - Imp.
Heating <input checked="" type="checkbox"/>
Load <span style="border: 1px solid #333; padding: 2px;">999,9</span> Ω
Limit <span style="border: 1px solid #333; padding: 2px;">9,5</span> Ω
Adjust Imp.

12A - Imp.
Heating <input checked="" type="checkbox"/>
Load <span style="border: 1px solid #333; padding: 2px;">999,9</span> Ω
Limit <span style="border: 1px solid #333; padding: 2px;">9,6</span> Ω
Adjust Imp.

12B - Imp.
Heating <input checked="" type="checkbox"/>
Load <span style="border: 1px solid #333; padding: 2px;">999,9</span> Ω
Limit <span style="border: 1px solid #333; padding: 2px;">9,6</span> Ω
Adjust Imp.

53A - Imp.
Heating <input checked="" type="checkbox"/>
Load <span style="border: 1px solid #333; padding: 2px;">999,9</span> Ω
Limit <span style="border: 1px solid #333; padding: 2px;">23,9</span> Ω
Adjust Imp.

95 - Imp.
Heating <input checked="" type="checkbox"/>
Load <span style="border: 1px solid #333; padding: 2px;">999,9</span> Ω
Limit <span style="border: 1px solid #333; padding: 2px;">28,5</span> Ω
Adjust Imp.

Apply
Cancel