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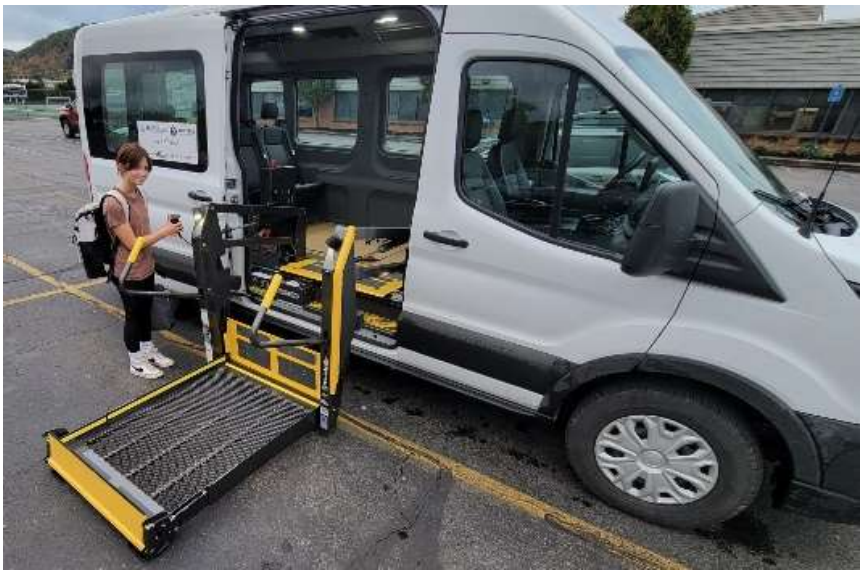
1. Test Purpose

To assist transit operators with route planning, this report establishes Performance and Operating Time baselines as a function of outside temperature.

2. Test Goals

- To recreate daily usage of a typical transit property.
- The system must maintain a 70degF internal temp during cold weather.
- To establish a target Ford Efficiency, which is measured in miles per kWh (see Test Summary for range discussion).
- Test implements Vehicle Pre-Conditioning, which is recommended by both Ford and Fenton to maximize runtime for both systems.
- The system must allow minimal "return to full charge time" using Level2 charging on the Ford side and either Level1 or Level2 charging on the SBS side.
- It is not recommended to use the Ford OEM heat because this will take away from the vehicle range. The SBS system will run the heating for the entire cabin area, while also providing power to the Lift, the Shift-n-Step and other accessories.



3. Test Setup

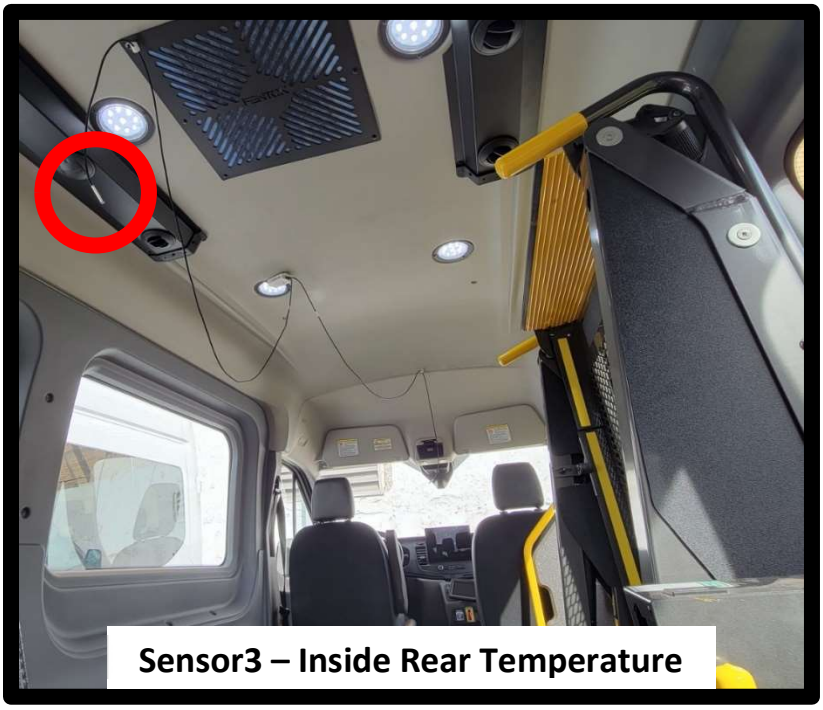
- Vehicle under test is a Ford eTransit 2023.
- Secondary Battery System under test is Fenton SBS Revision1.
- Charge both Ford and SBS systems to 100% SOC (State of Charge) before test.
- SBS System Setting1: SOC Threshold for Bank2-Heating = 2%. This means that the SBS Heating system will shut down when the SBS Battery SOC gets to 2%.
- SBS System Setting2: SOC Threshold for Bank3-Accessories = 8%. This means that the Accessories connected to SBS Bank3 will shut down when the SBS Battery SOC gets to 8%. No accessories are used in this test, so this setting has no impact on the test results.
- The Temperature Sensor details are as follows:
  - Sensor1 = Onset MX100 = Outside Temperature (degF)
  - Sensor2 = Onset MX2303 (Chan1) = Inside Temperature – FRONT (degF)
  - Sensor3 = Onset MX2303 (Chan2) = Inside Temperature – REAR (degF)
  - **[Specs for these sensors are shown in section *8. Test Specs*]**

Sensor1 – Outside Temperature

Note about Sensor1: This temperature sensor was mounted outside the vehicle on the windshield wiper. Future testing will shield the sensor better from direct solar radiation.

3. Test Setup (continued)

Sensor2 – Inside Front Temperature



Sensor3 – Inside Rear Temperature

Note: Temperature Sensor specs are shown in section ***8. Test Specs***

4. Test Procedure

- Pre-Condition the vehicle for 15minutes:
  - SBS System has already been charged to 100% SOC. (Note: The SBS screen will show charging "HALTED" as it should when the batteries are full and cannot accept anymore charge).
  - With SBS system still plugged-in, turn on SBS system and start heating.
- This test encompassed both Highway and City Driving.
- To create baseline daily usage of a typical transit property, 8 stops and 8 lift cycles were performed while logging important metrics into ***Table1 – Driving Log Data***.
- Temperature Datalogging was used in 3 different sensor locations at the rate of 1 reading per minute as shown in Graph1 and Graph2
- Lift Operation Process:
  - Park Appropriately
  - Shift-n-Step to full-right
  - Turn on Ramp and Lower to Ground
  - Wait 30 seconds [future tests will be 2mins]
  - Raise Ramp to Floor Level
  - Wait 30 seconds [future tests will be 2mins]
  - Fold Ramp to fully stowed position
  - Turn off Ramp
  - Shift-n-Step to full-left

5. Test Data

- Page7: ***Graph1 – Temperature vs Time During Start-Up***
- Page8: ***Table1 – Driving Data Log***
- Page9: ***Graph2 – Temperature vs Run-Time***

Graph1 – Temperature vs Time During Start-Up

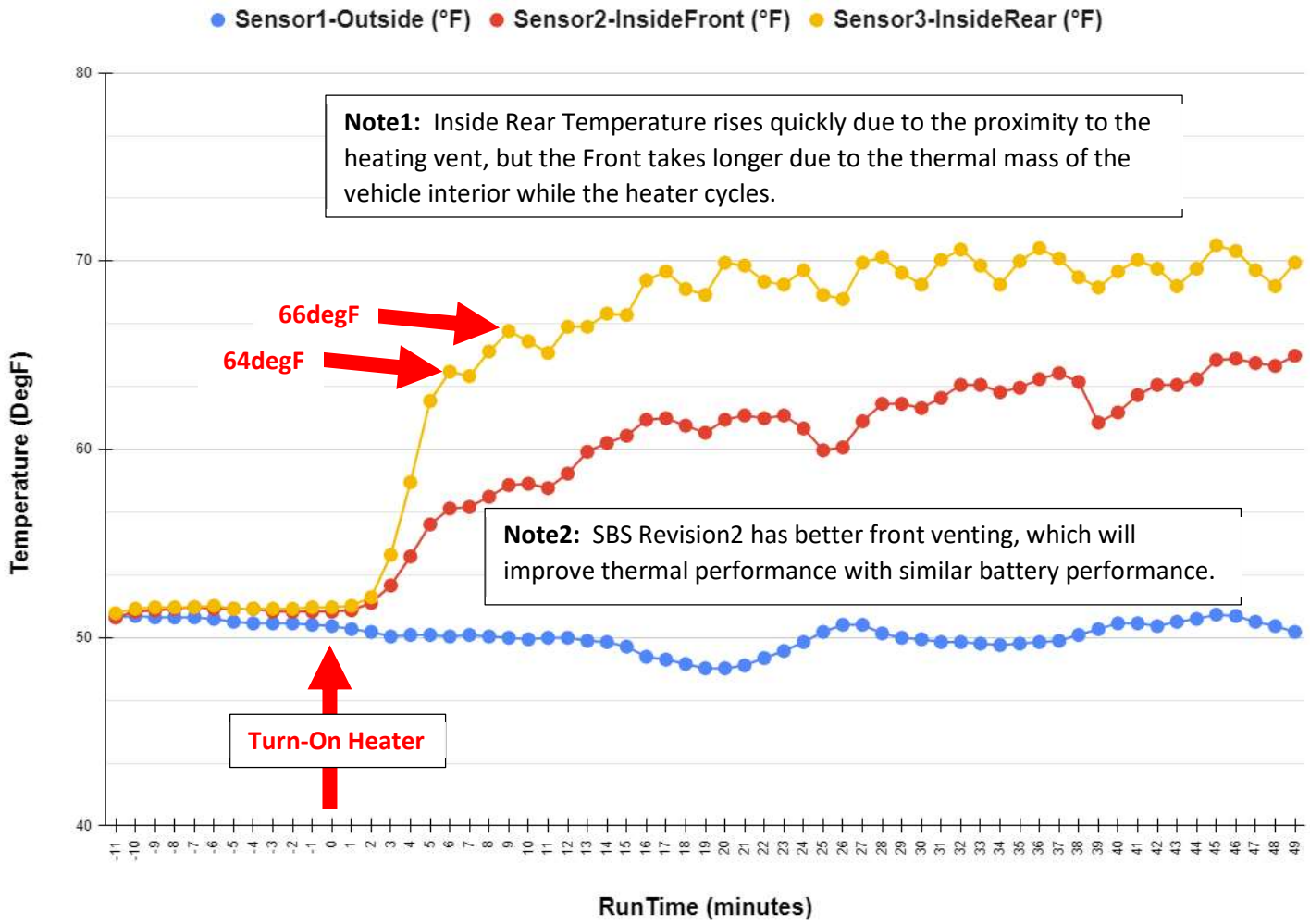


Table1 – Driving Data Log

SBS (Secondary Battery System) - Test Report 001

Vehicle:	Prototype1	Average Ambient Temperature:	49 degF
SBS Heat Setting:	74 degF	SBS Runtime:	23 Hours
Lift Cycles:	8 Cycles	Average Ford Efficiency:	2.1 mi/kWh

	Date	Time	Location	Ford Temp (degF)	Ford SOC (%)	Ford Range (Mi)	Odometer (miles)	Lift Cycles	Ford Dist (mi)	Ford AveSpd (MPH)	Ford Efficiency (mi/kWh)	SBS SOC (%)	Heater IN (degF)	Heater OUT (degF)	Notes
Start:	2023-10-17	12:15 PM	Randolph/Fenton	48	100%	111	2840.1	2	--	--	--	100%	--	--	12:15pm Turned on SBS, Charging Halted, SOC@100% 12:15pm Turned on SBS Heat, Set for 74degF 12:26pm Unplug SBS, causes heat shut down 12:28pm Turn heat back on & Drive 12:38pm Cycle Lift 1 @ Kennedy 12:52pm Cycle Lift 2 @ Frewsburg
End:	2023-10-17	1:14 PM	Warren/Frenchy's	48	79%	82	2869.1	1	29.0	38.0	1.8	90%	71	79	1:17pm Cycle Lift 3 @ Warren/Frenchy's
Start:	2023-10-17	5:38 PM	Warren/Frenchy's	47	80%	83	2869.1	--	--	--	--	70%	70	76	
End:	2023-10-17	5:56 PM	Warren/YMCA	49	75%	78	2876.8	1	7.6	26.0	2.5	70%	71	80	5:56pm Cycle Lift 4 @ Warren/YMCA
Start:	2023-10-17	6:04 PM	Warren/YMCA	48	75%	77	2876.8	--	--	--	--	70%	71	80	
End:	2023-10-17	6:16 PM	Warren/HogWildBBQ	48	73%	74	2879.4	1	2.6	19.0	2.0	70%	73	82	6:15pm Cycle Lift 5 @ HogWildBBQ
Start:	2023-10-17	6:16 PM	Warren/HogWildBBQ	49	73%	74	2879.4	--	--	--	--	70%	73	82	
End:	2023-10-17	6:29 PM	Warren/Snuffy's	49	70%	72	2882.7	1	3.2	19.0	2.5	70%	69	74	6:29pm Cycle Lift 6 @ Snuffy's Arrival
Start:	2023-10-17	7:54 PM	Warren/Snuffy's	48	70%	72	2882.7	1	--	--	--	70%	69	78	7:54pm Cycle Lift 7 @ Snuffy's Departure
End:	2023-10-17	8:08 PM	Warren/Frenchy's	46	64%	65	2889.9	1	7.1	33.0	1.7	60%	71	78	8:08pm Cycle Lift 8 @ Warren/Frenchy's
Start:	2023-10-18	7:14 AM	Warren/Frenchy's	46	64%	64	2889.9	--	--	--	--	20%	74	83	
End:	2023-10-18	7:52 AM	Randolph/Fenton	46	38%	37	2918.5	--	28.6	46.0	1.9	10%	70	84	
	2023-10-18	11:15 AM	Randolph/Fenton												11:15am Heat shut down @ SOC=2%

Explanation:

1) Each Start/End cycle in the above log represents a KeyOn/KeyOff cycle.
2) Test Parameters are shown in gray highlight.
3) Test Summary Results are shown in gold highlight.
4) Ford Efficiencies >= 2.0 are shown in green highlight, while <2.0 are shown in yellow highlight.

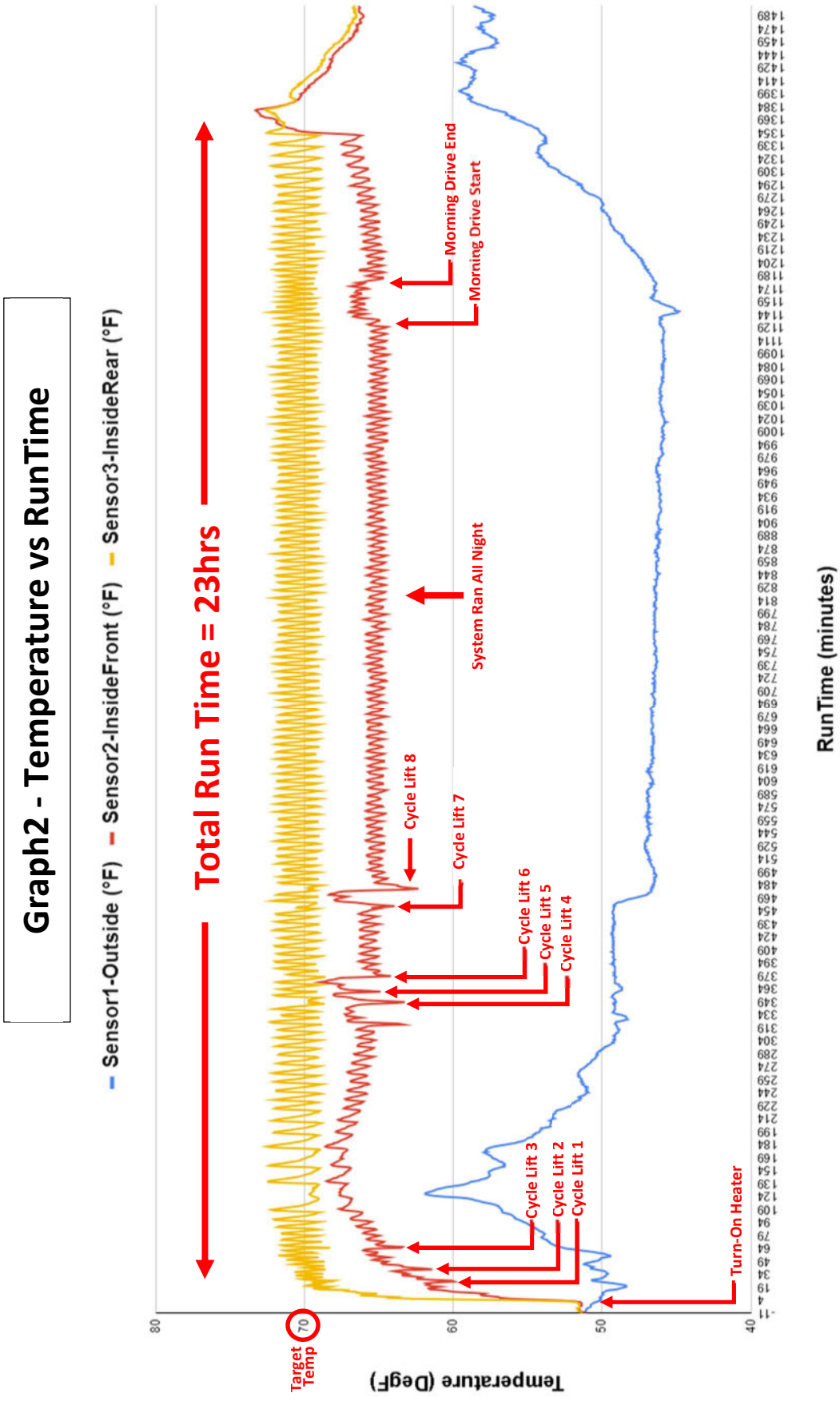
Note: SOC = State Of Charge

Note: The Ford Efficiency is calculated per KeyOn/KeyOff cycle. Each cycle is independent.

TestReport001 – eTransit with SBS

Fenton Secondary Battery System – Range Test

Report Date: 2023-Oct-28 **Vehicle:** Prototype1



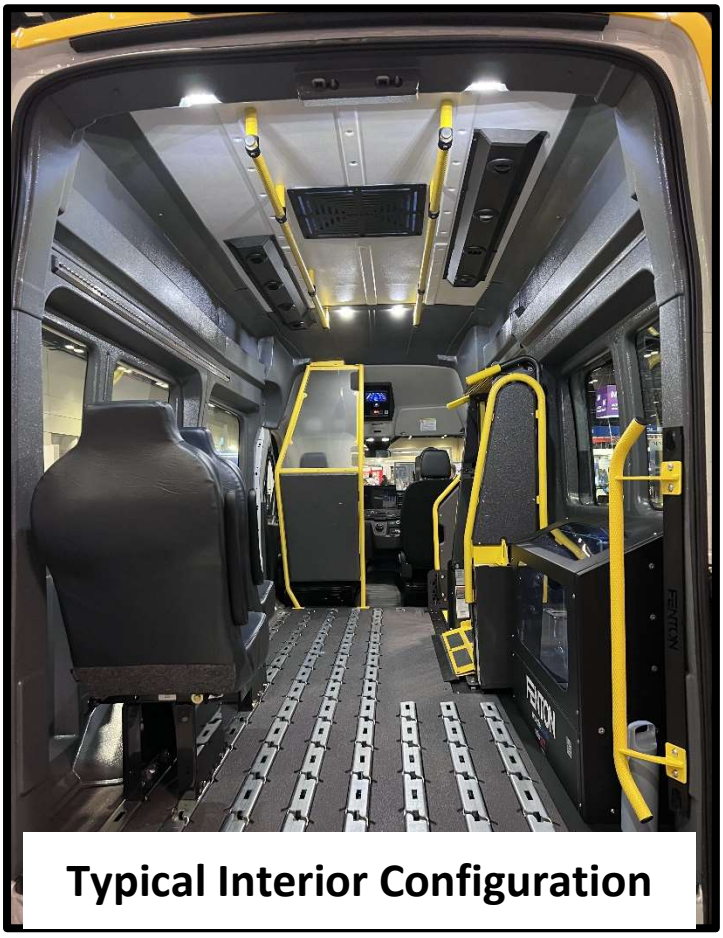
6. Test Summary

- This test resulted in the following performance metrics:
  - Average Ford Efficiency: 2.1 mi/kWh
  - Total Miles Driven: 78.4 miles
  - Total Ford SOC% Consumed: 62%
  - Extrapolated Range: 126.5 miles (100% * 78.4mi / 62%)
  - SBS Runtime: 23 Hours
  - Average (Outside) Ambient Temperature: 49 degF
  - Average Inside Front Temperature = 66 degF
  - Average Inside Rear Temperature = 70 degF
- SBS Runtime Discussion:
  - We can see above that the SBS system was able to run for 23hours while maintaining an average inside rear temperature of 70degF. This runtime is heavily dependent on the outside ambient temperature. In this case, the average outside temperature was 49degF. When it is colder outside, however, the system will need to work harder to maintain the desired internal temperature, resulting in a reduction in runtime.
  - It is also worth noting that, in general, cold weather consumes ~2x the energy consumption as compared to hot weather. This is due to the maximum power ratings of ~7-8kW for the Heating System and ~3-4kW for the Cooling System.
- Range Discussion:
  - This test established an expected target Ford efficiency of 2.1mi/kWh.
  - This means it is possible to achieve greater than 136miles when starting with a full Ford OEM battery. [Battery Capacity is 68kWh, so 2.0mi/kwh * 68kWh = 136miles].
    NOTE: This range is heavily dependent on these external factors:
    - Uphill/Downhill grade
    - Acceleration/deceleration habits
    - Door open cycles
    - Outside Ambient Temperature
    - Desired Inside Temperature
    - Sunshine
  - Pathway to get to 200mi/day: If more range is desired, Fenton has successfully implemented a DC Fast-Charge in the middle of a shift which added 45kWh during a 40minute lunch break. This extends the range by ~2.0mi/kwh * 45kWh = ~90miles.

6. Test Summary (Continued)

- Therefore it will be possible to acheive a minimum of 175miles with one DCDC fast charge in the middle of the day.

Typical HMI Installation



Typical Interior Configuration

7. Other Fenton Documents

- For real-world testing data of charging both the Ford eTransit 2023 and the Fenton Secondary Battery Systems, please see these documents:
  - Charging @ Level1: See ***TestReport002-eTransit-w-SBS-ChargingLevel1***
  - Charging @ Level2: See ***TestReport003-eTransit-w-SBS-ChargingLevel2***
  - DC Fast Charging: See ***TestReport004-eTransit-w-SBS-DC-Fast-Charging***
  - For best practices and recommendations for optimizing performance and getting the most out of your system, please see the ***Best Practices*** document on the website @ fentonmobility.com.

8. Test Specs

- Temperature Sensor Specs:
  - Sensor1 = Onset HOBO MX100 = Outside Temperature

Temperature Sensor	
Range	-30° to 70°C (-22° to 158°F)
Accuracy	±1.0°C from -30° to -5°C (±1.8°F from -22° to 23°F) ±0.5°C from -5° to 50°C (±0.9°F from 23° to 122°F) ±1.0°C from 50° to 70°C (±1.8°F from 122° to 158°F)
Resolution	0.04°C (0.072°F)
Drift	<0.01°C (0.018°F) per year
Response Time	6 minutes typical to 90% in open air moving 1 m/s, unmounted

  - Sensor2 = Onset HOBO MX2303 (Chan1) = Inside Temperature – FRONT
  - Sensor3 = Onset HOBO MX2303 (Chan2) = Inside Temperature – REAR

Temperature Sensor	
Range	MX2301A and MX2305 internal sensors: -40 to 70°C (-40 to 158°F) MX2302A external temperature sensor: -40 to 70°C (-40 to 158°F) MX2303 and MX2304 external sensors: -40 to 100°C (-40 to 212°F), with tip and cable immersion in fresh water up to 50°C (122°F) for one year
Accuracy	±0.25°C from -40 to 0°C (±0.45 from -40 to 32°F) ±0.2°C from 0 to 70°C (±0.36 from 32 to 158°F) ±0.25°C from 70 to 100°C (±0.45 from 158 to 212°F), MX2303 and MX2304 only
Resolution	MX2301A and MX2302A: 0.02°C (0.036°F) MX2303, MX2304, and MX2305: 0.04°C (0.072°F)
Drift	<0.01°C (0.018°F) per year