CLAIMS:

1. A system comprising:

a refrigerant leak sensor;

an evaporator fan;

a controller, wherein the controller is configured to:

validate an operation of the refrigerant leak sensor;

operate the evaporator fan based ~~at least in part~~ on validating the operation of the refrigerant leak sensor;

~~responsive to operating the fan,~~ determine if a leak is present using the refrigerant leak sensor;

perform a refrigeration test including operating compressor and other components of a refrigeration system to circulate refrigerant through the refrigeration system;

determine if a leak is present using the refrigerant leak sensor; and

provide an alarm based at least in part on determining the leak is present.

2. The system of claim 1, further comprising a refrigeration system, wherein the refrigeration system includes a compressor and a condenser.

3. The system of claim 2, wherein the controller comprises a low charge diagnostics calculation module for calculating a state of the refrigeration system, wherein the controller receives measurements from other sensors in the refrigeration system.

4. The system of claim 2, wherein the refrigeration system is a transport refrigeration unit.

~~5. The system of claim 1, wherein the sensor is a refrigerant leak sensor.~~

56. A method for performing pre-trip sequence and diagnostics for a leak sensor, the method comprising:

validating an operation of a sensor;

operating an evaporator fan based ~~at least in part~~ on validating the operation of the sensor;

~~responsive to operating the evaporator fan,~~ determining if a leak is present using the sensor;

performing a refrigeration test including operating compressor and other components of a refrigeration system to circulate refrigerant through the ~~of a~~ refrigeration system;

determining if a leak is present using the sensor; and

providing an alarm based at least in part on determining the leak is present.

67. The method of claim 56, wherein validating the sensor comprises sending, by the controller, a signal to the sensor; and

receiving a reading from the sensor.

78. The method of claim 67, wherein if validating the sensor fails, providing a sensor service alarm to indicate the sensor requires servicing.

89. The method of claim 56, wherein the sensor is refrigerant leak sensor.

910. The method of claim 56, wherein the evaporator fan is operated prior to performing the refrigeration test.

1011. The method of claim 56, wherein the evaporator fan is operated with the refrigeration test.

1112. The method of claim 56, wherein the refrigeration test comprises operating one or more components of the refrigeration system ~~to test~~ for ~~component failures; and~~

testing for a presence of a leak.

1213. The method of claim 56, further comprising initiating diagnostics for the sensor including calculating low charge diagnostics for the refrigeration system.

1314. The method of claim 1213, further comprising comparing the low charge diagnostics calculations with the measured values from other sensors in the refrigeration system; and

comparing results of the low charge diagnostics calculations with a state of the sensor.

1415. The method of claim 1314, further comprising determining a potential false alarm exists based on comparing the low charge diagnostics calculations and measurements obtained from the sensor.

1516. The method of claim 1415, wherein the potential false alarm exists when the sensor indicates a sensor alarm and the low charge diagnostics calculations indicate the refrigeration system is operating within its operational limits.

1617. The method of claim 1314, further comprising determining a faulty sensor exists when the sensor has not indicated a sensor alarm and the low charge diagnostics calculations indicate that a leak has occurred in the refrigeration system and is operating outside of its operating limits.

1718. The method of claim 1314, further comprising evacuating the refrigeration system if the sensor detects a leak above an evacuation threshold value and the low charge diagnostics calculations indicate that the refrigeration system is operating within its limits.

1819. The method of claim 1718, further comprising performing a recheck after servicing or replacing the sensor;

if the sensor is providing a sensor alarm, provide an additional sensor alarm to indicate the sensor requires service or repair.

1920. The method of claim 56, wherein the refrigeration system is a transport refrigeration unit.