



**REB Installation Guide  
Revision No.4**

Approval	Signature	Date

**PROPRIETARY NOTICE**

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**Revision History:**

Revision Level		Description	Date
1	S. Ed. Tan	Draft	Dec. 14, 2011
2	S. Ed. Tan		March 13, 2010
3	S. Ed. Tan	For 3G install	January, 19, 2015
4	S. Ed. Tan	Add SAR note	April 3, 2015

## Safety Precautions

- DANGER:** Before servicing the unit, disconnect the negative (-) battery cable to prevent the unit from starting which could cause injury. Always wear gloves and eye protection when removing and installing battery cables.
- DANGER:** Units equipped with and electric standby must be disconnected from the electrical supply source to avoid electrical shock and to prevent the unit from starting causing which could cause injury.
- WARNING:** Never drill holes in the unit unless absolutely necessary. Holes drilled into the unit could weaken structural components, holes drilled into electrical wiring can cause fire, explosion and or electrical shock.
- WARNING:** When using ladders or work platforms to install or service the refrigeration system, observe the manufacturer's safety nameplates and warnings.
- CAUTION:** When working with electronic circuits that contain microprocessors, always wear and EDS wrist strap. Connect the grounding clip to the chassis ground or the CH terminal. This will prevent electrostatic discharge from damaging circuits.



## **Regulatory Statements:**

### *FCC Rules:*

This device complies with (Part 15.19) of the FCC Rules.

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

### **Warning (Part 15.21)**

Changes or modifications made to this equipment not expressly approved by Thermo King Corporation may void the FCC authorization to operate this equipment.

### **Compliance Statement (Part 15.105(b))**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

### **Radiofrequency radiation exposure Information:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

***Industry Canada (IC) regulatory information:***

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

'Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.'

'Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.'

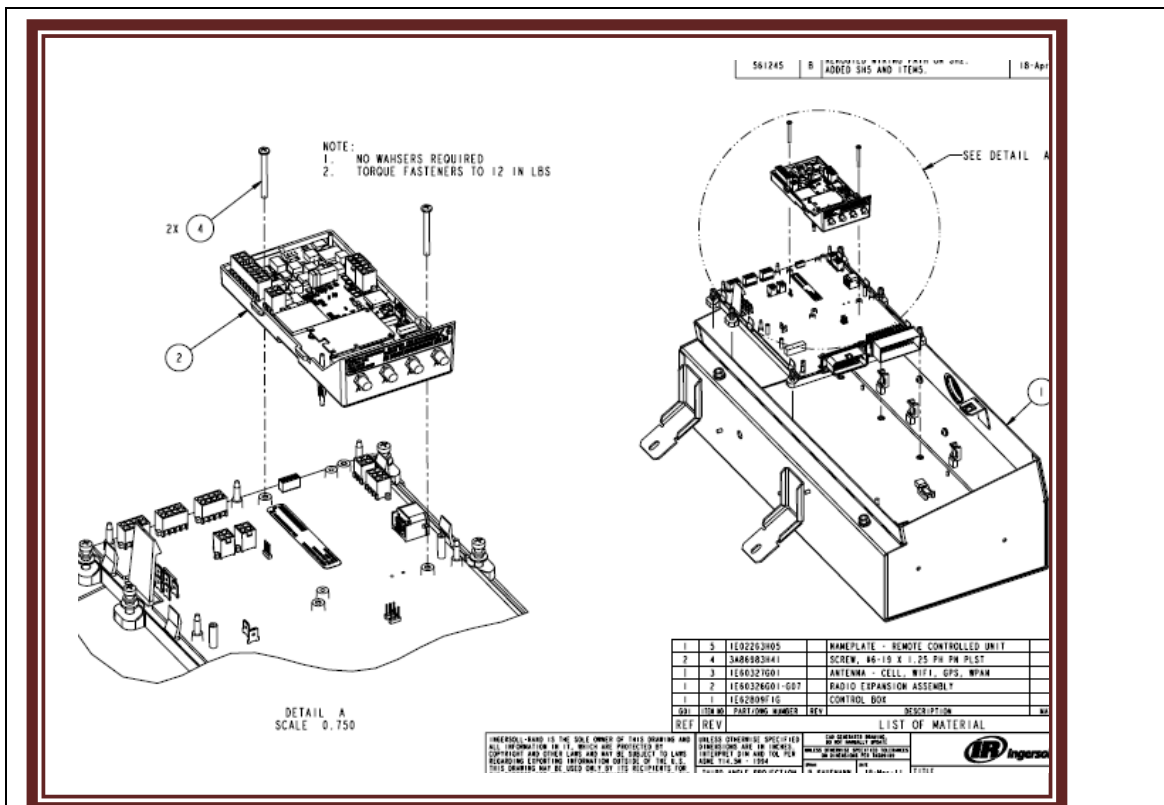
**Class B digital notice**

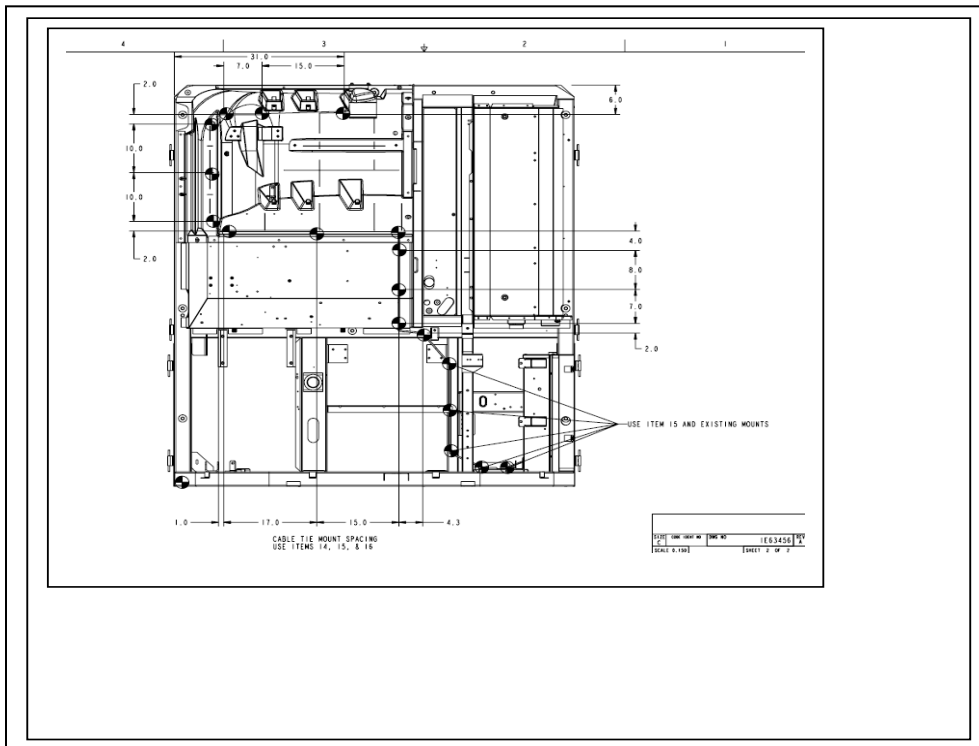
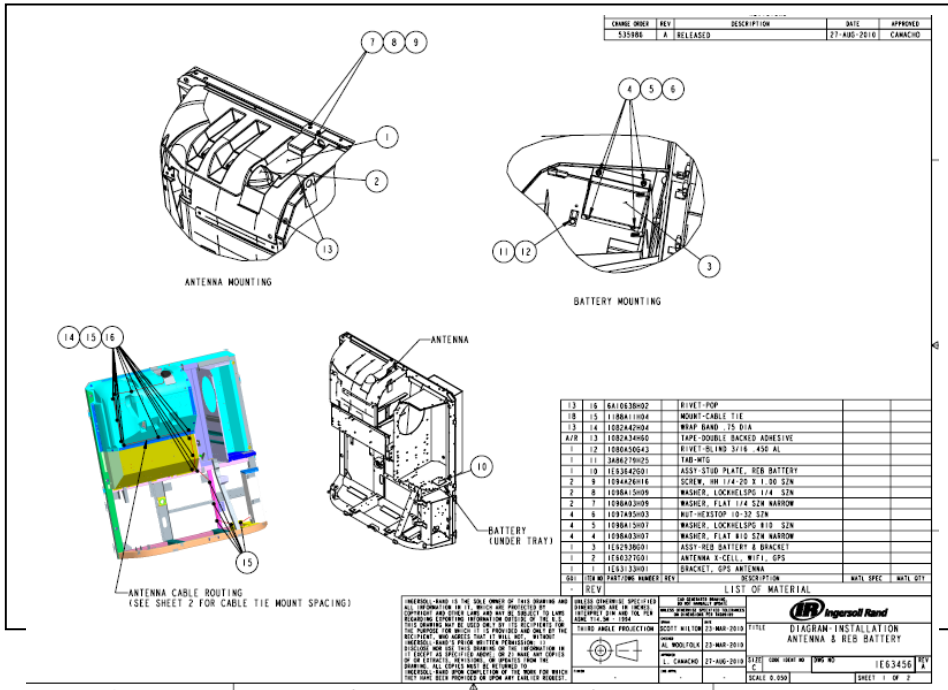
This Class B digital apparatus complies with Canadian ICES-003, RSS-Gen and RSS-210

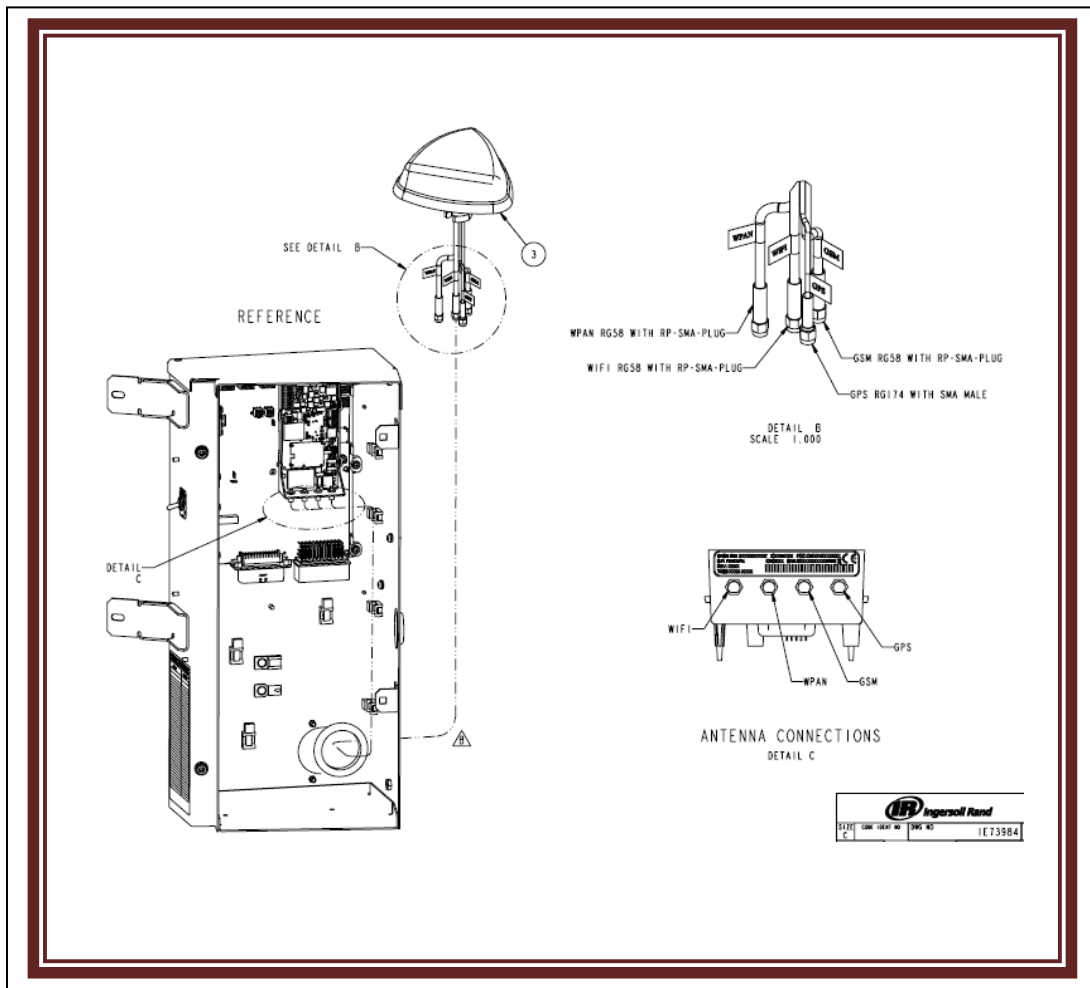
Cet appareil numérique de la classe B est conforme à la norme NMB-003, CNR-Gen et CNR-210 du Canada

**CAN ICES-3 (B) / NMB-3 (B)**

1. Introduction: This document will describe how REB and the antenna system are installed in the Thermo King unit in the factory and in the field.
2. Installation of REB to the mother board SR3 controller.
  - a. Plug-in REB with plastic housing to the SR3 controller board via connector RJ98.
  - b. Secure board to the SR3 controller board using two screws provided in the kit.
  - c. Mount the boards to the metal control box. See drawing for details.
  - d. Connect antenna connectors to corresponding REB connectors. Please review connection and make sure the label match antenna and REB.
  - e. Route Antenna cable as shown in the drawing below.
  - f. Plug-in back-up battery.







**Note:** The antenna system located on the top of a Thermo King Refrigeration Unit- installed on the side of a trailer body at least 10 feet from a human body (driver inside the tractor and technician in the ground). Therefore:

1. Safe from radio frequency exposure
2. Meets SAR guidelines.

### 3. REB Wi-Fi Configuration:

#### 3.1 Required Materials:

- REB - Radio Expansion Board
- TDAC- Tracking Diagnostic and Configuration Tool- PC based application to configure REB
- REB adapter cable PN;41-9171
- Wintrac cable : 204-918 + 44-9417

#### 3.2 Instructions:

- a) Connect Wintrac cable to the REB adapter cable as shown in figure 1.
- b) Unplug back-up battery



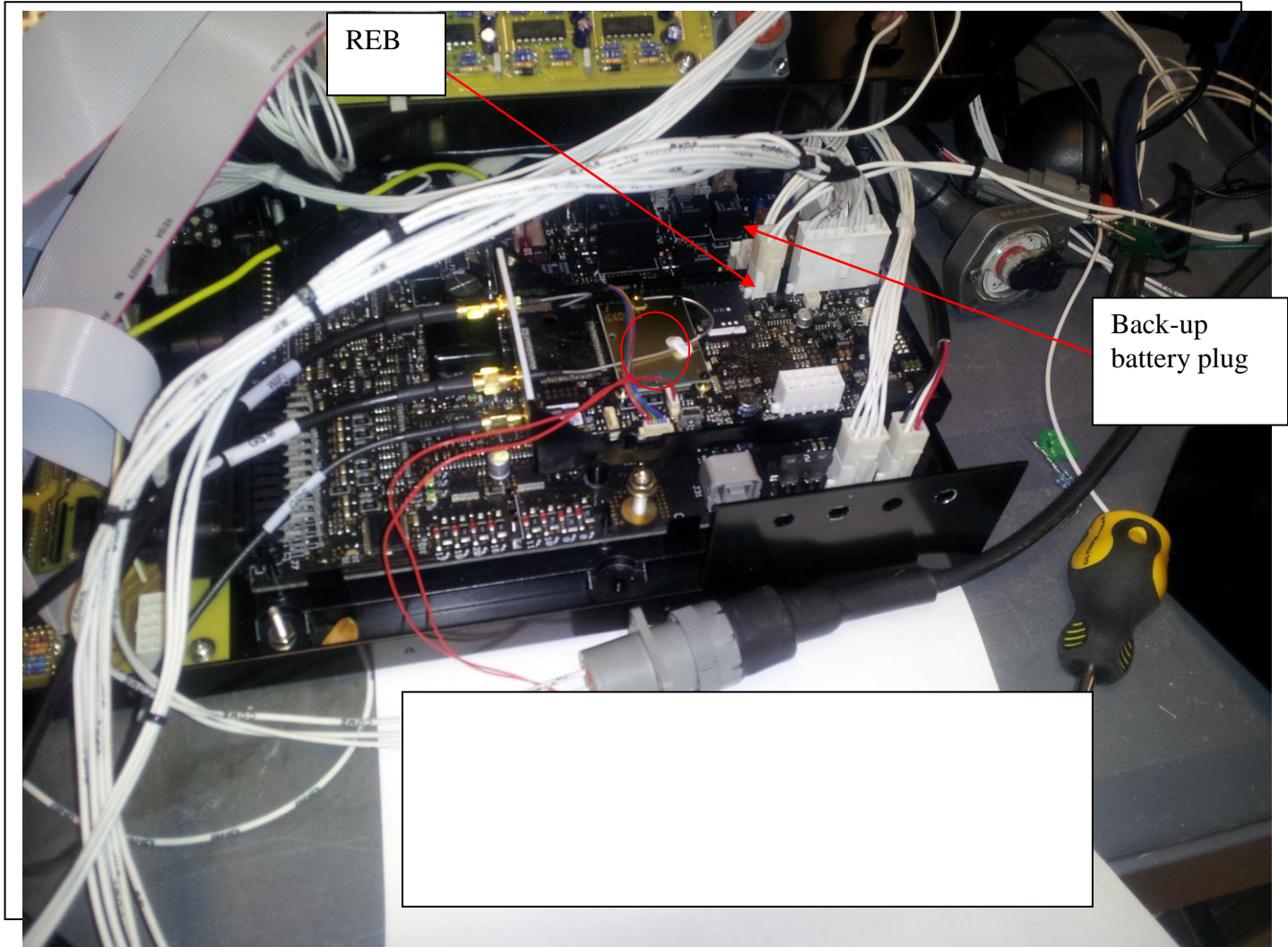


Figure1.

d. Launch TDAC application in your PC. See Figure 2.

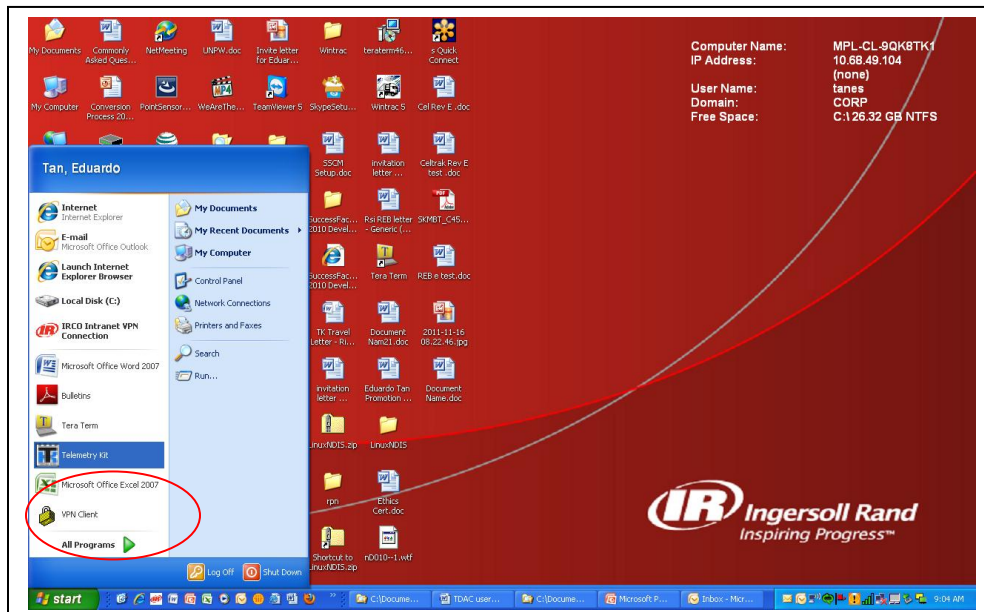




Figure 2

e. Turn TK unit ON (Controller and HMI running).

fote: The TDAC will not work if back-up battery is still connected make sure to unplug it.) See figure 3 for details.



Figure 3

g. The status will change to "Connection established" once the TDAC has successful connection to REB. The TDAC screen display will change, adding more icons for you to configure REB with Wi-Fi settings. See Figure 4

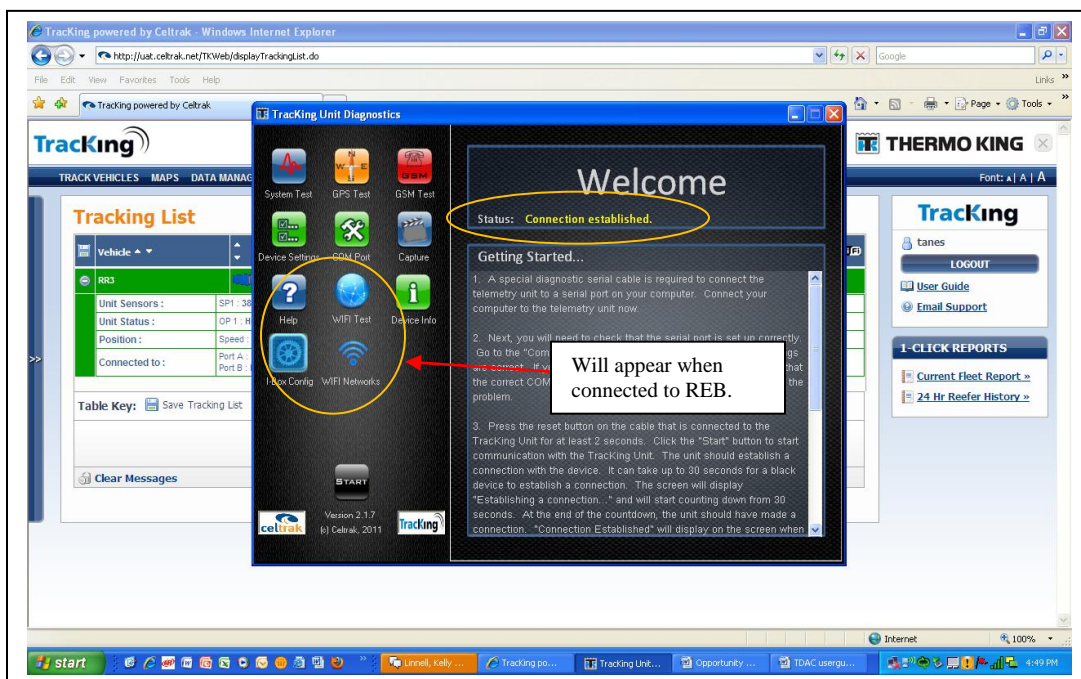


Figure 4

h. Click on Wi-Fi Network icon to configure REB to connect to the Website via Wi-Fi. See Figure 5.



network. This data will be provided by your local IT or TK Customer Service. Note: At present, Key management configuration is limited to the following:

- WEP 64
- WEP 128
- WPA
- WPA2

j. Review your configuration and click update. At this point, Wi-Fi connection profile has been created.

k. To add more Wi-Fi connection profiles click WIFI 2. At present, you are limited to a maximum of 5 Wi-Fi connection profiles.

Note: For technical help, call your local IT or TK customer service.

l. Click on Routing Selection and select " Wi-Fi if present" and click update button. See Figure 6.

Note: This will allow REB to connect to cellular network if your trailer is driving away from the Wi-Fi coverage.





Figure 6

m. Test the Wi-Fi connection to an available Wi-Fi connection/profile, by clicking on Wi-Fi test icon. Wait for 2-5 minute to display result. See Figure 7.

Expected Result:

- Signal Quality should be green. If not green move to a location that displays green signal quality to guarantee connection.
- Channel display ( normally 1, 6, Or 11)
- Network Name is same as SSID configure in the profile.
- Wi-Fi Status should display connected.



## Figure 7

n. Check if unit is reporting in the website. Wi-Fi icon in the website indicates unit is connected via Wi-Fi.

a. Troubleshooting and Diagnostics for REB configurations K, L, M and N

Sub-System	Failure Mode	Effects of Failure	Causes of Failure
<b>Servers</b>			
Mapping Server	Mapping Server offline	Maps not available	Hardware or Application Failure
Web Server	Web Server offline	Cannot log in	Hardware or Application Failure
GPRS Server	GPRS Server offline	No real time data	Hardware or Application Failure
SMPP Server	SMPP Server offline	Slower polling rate as messages routed via comms server	Hardware or Application Failure
Application Server	Application Server offline	System non-functional	Hardware or Application Failure
Database Server	Database Server offline	System non-functional	Hardware or Application Failure
Communications Server	Communication Server offline	None, unless there is a gprs failure	Hardware or Application Failure
Sub-System	Failure Mode	Effects of Failure	Causes of Failure
<b>Network Connections</b>			
CELtrak internal LAN	All servers offline	System non-functional	Hardware failure
CELtrak Leased Line	All servers offline	System non-functional	Hardware failure
Internet failure	All servers offline	System non-functional	Hardware failure
<b>GSM Network</b>			
SMSC	No SMS traffic	Cannot poll a vehicle	GSM Network issue
SMPP	No SMPP link	Slow polling of vehicles	GSM Network issue
GPRS	No GPRS link	Loss of real time data	GSM Network issue or no GPRS coverage for a vehicle
Sub-System	Failure Mode	Effects of Failure	Causes of Failure
<b>Vehicle Installation</b>			
GPS Antenna	No GPS signal	Cannot get a position, will get temperature data	Antenna failure, installation issue, connection issue
GSM Antenna	No GSM signal	System non-functional	Antenna failure, installation issue, connection issue
Tracking Unit	No communications	System non-functional	Unit failure
Power	No power feed to unit	System will run on internal back up battery until it discharges	Connection failure, TK battery is run down
Ign Sense	No ignition sense	Incorrect ignition status reported	Loss of connection
SR2 Controller Link	No controller link	No controller data	Loss of connection
SR2 Datalogger Link	No datalogger link	Loss of independent sensors data	Loss of connection

3G LED Definition :

LED blinks green twice a second when on the network.  
LED blinks green once a second when off the network.

Armed (No Change), Countdown and full SCOM modes (New modes):  
LED blinks green every three seconds when on the network.  
LED blinks amber every three seconds when off the network.

Conservative and Full Null (replaces sleep):  
LED blinks red every five seconds until the ARM is switched, after this LEDs cannot be switched.

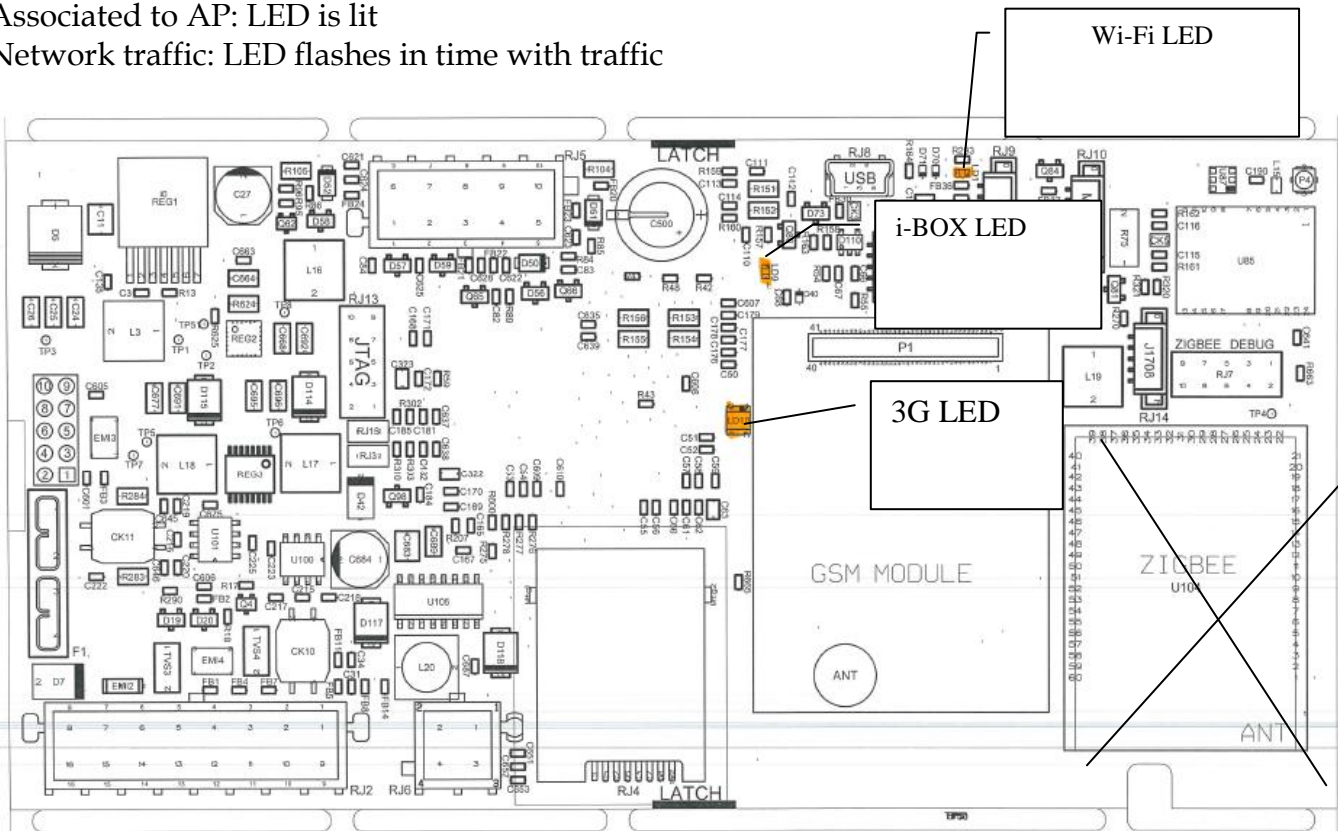
Limited SCOM (New mode, effectively a short wakeup from Conservative mode):  
LED blinks green every five seconds when on the network.

### I-BOX LED Definition

- Good Connection (i-Box LED Not Blinking, Steady On)
- Bad Controller Connection (i-Box LED 2 Blinks, 3 Seconds Off)
- Bad Modem Connection (i-Box LED 3 Blinks, 3 Seconds Off)
- Bad Connection On Both Controller and Modem (i-Box LED 4 Blinks, 3 Seconds Off)

### Wi-Fi LED Definition

- Not associated to AP: LED is dark
- Associated to AP: LED is lit
- Network traffic: LED flashes in time with traffic



3 LEDs = [yellow dot]

TOP PARTS  
2.5x



#### 4. Understanding REB Power Management

##### 5.1 Power Status:

###### 5.1.1 Full-On:

Conditions: Reefer is running, 8xp is high

Behavior: The REB reporting to website every hour for U.S. and 15 minutes for ESA, the power status in the website is “ON”

###### 5.1.2 Countdown and Conservative

Pre-Conditions: HMI is turned-off, Controller OFF, 8xP is low

Behavior:

- a. Very similar to full-on. It will periodically reports to the website dependent on the logging interval set when unit is OFF. The website will display unit as OFF. The REB will save power as much it can since it takes power directly from the unit battery including the door and fuel sensors if connected to the REB. Thus, it is essential for REB to monitor the voltage level of the unit battery to ensure engine start up when needed by the customer. When this voltage level ( default is 12 V but configurable by TDAC)is achieved, the REB will wait for 5 minutes, send alarm 253 and then switch to back-up battery as power source. This state of the REB is known as “Conservative”.
- b. Conservative can also be attained if countdown log counter is achieved. The default countdown log interval is 24. This value is configurable by TDAC. When countdown log timer expires the REB will switch back-up battery as power source and send alarm 253 –telling customer that the REB is in back-up battery mode and alarm notifications (doors and fuel) will be suspended. This states is also known as “ Conservative”
- c. If unit power is interrupted (i.e. unit battery being cut-off) it will switched to back-up mode, REB in Conservative mode.
- d. The website will display OFF in Conservative mode.
- e. When REB is in Conservative state it will report to the website every hour with location only.
- f. The REB can be woken up before its logging/reporting interval if it has cellular radio but not possible if REB has Wi-Fi only.
- g. If the REB has WIFI radio only and in Conservative state, it will wait for the next logging interval before it checks and execute requests made from the website.

###### 5.1.3 Full-Null

Pre-Conditions: Back-up battery below is below 5.21V

Behavior:

- a. When back-up battery is less than 5.21V the REB will quit working but will send alarm 233 prior to switching to full-null.
- b. The REB will transition to another state when unit is turned On.
- c. The Full-null can also be attained if the conservative log counter expires. The log counter is 96 as a default but configurable via TDAC.