GlobalTrak™
Field Setup and Diagnostic Guide

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GlobalTrak™ Field Setup and Diagnostic Guide

This purpose of the GlobalTrak™ Field Setup and Diagnostic Guide is to:

- Test each module as installed for fielding

To complete the Field Setup and Diagnostic procedure, the following are necessary:

1. Completed, Configured GlobalTrak installation

2. Laptop computer with RS232 port

3. CMU Field Test Cable

4. CMU Key switch

5. Quad-band GSM phone with Kore SIM card (Optional)

6. Orbcomm Antenna Analyzer (Optional) *

7. Orbcomm Spectrum Analyzer (Optional) *

8. Orbcomm View Software (Optional) *

Note: Items 6, 7, 8 only needed for installations requiring satellite communication

Table of Contents

1.0 Initial Setup

Connect the CMU to HyperTerminal

1.1. Disconnect the fielded CMU Cable circular connector (if any) and connect the field test cable as shown in figure 1.1.

INSERT FIGURE HERE

Figure 1.1

1.2. Open a HyperTerminal on the computer.

1.3. Name the connection by the following convention and press 'OK'.

XXXX_MM-DD-YY

XXXX = Last four digits of the CMU serial number
MM = two digit month
DD = two digit day
YY = two digit year

1.4. Select the COM port number that the CMU is connected to and press 'OK'.

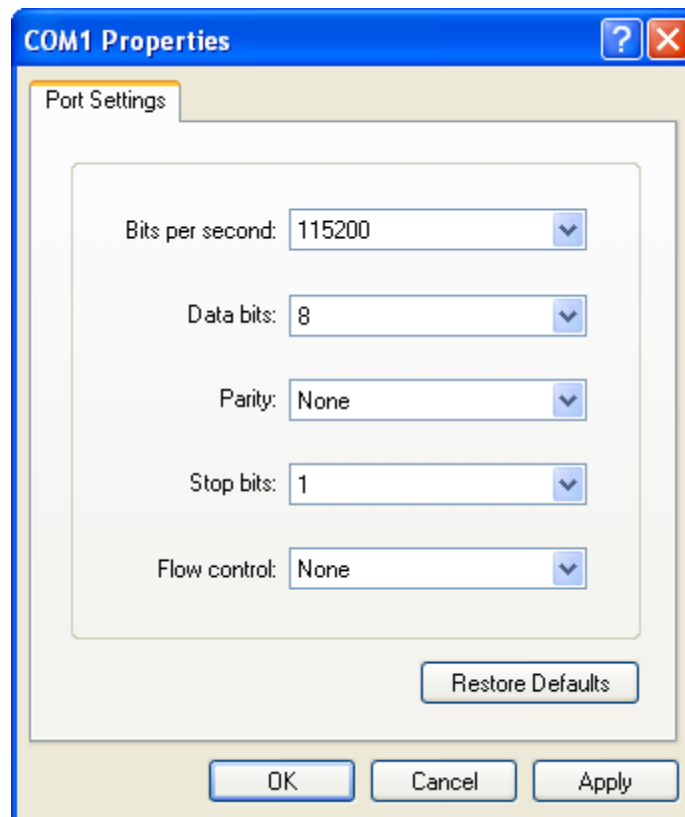1.5. Set the COM port properties using the settings shown in Figure 1.2 and press 'OK'.

Figure 1.2

Capture Diagnostic Information

1.6. Start log capture by clicking on 'Capture Text...' from the 'Transfer' menu.

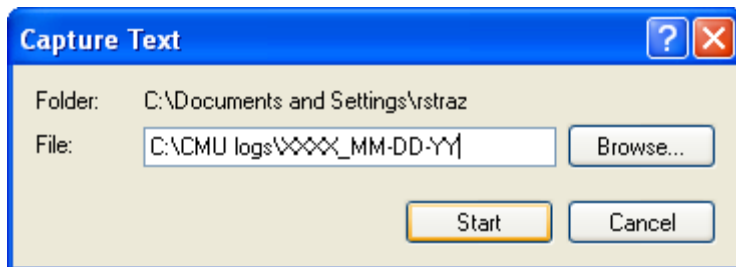1.7. In the Capture Text dialog box, name the file as shown in Figure 1.3. Use the same convention as in step 1.3.

Figure 1.3

1.8. Note the location and filename on the field test checklist in appendix A:

1.9. Click 'Start' to begin capturing text.

2.0 Testing Sensor Module Operation

*Note: **Be sure to complete 1.0 initial setup.***
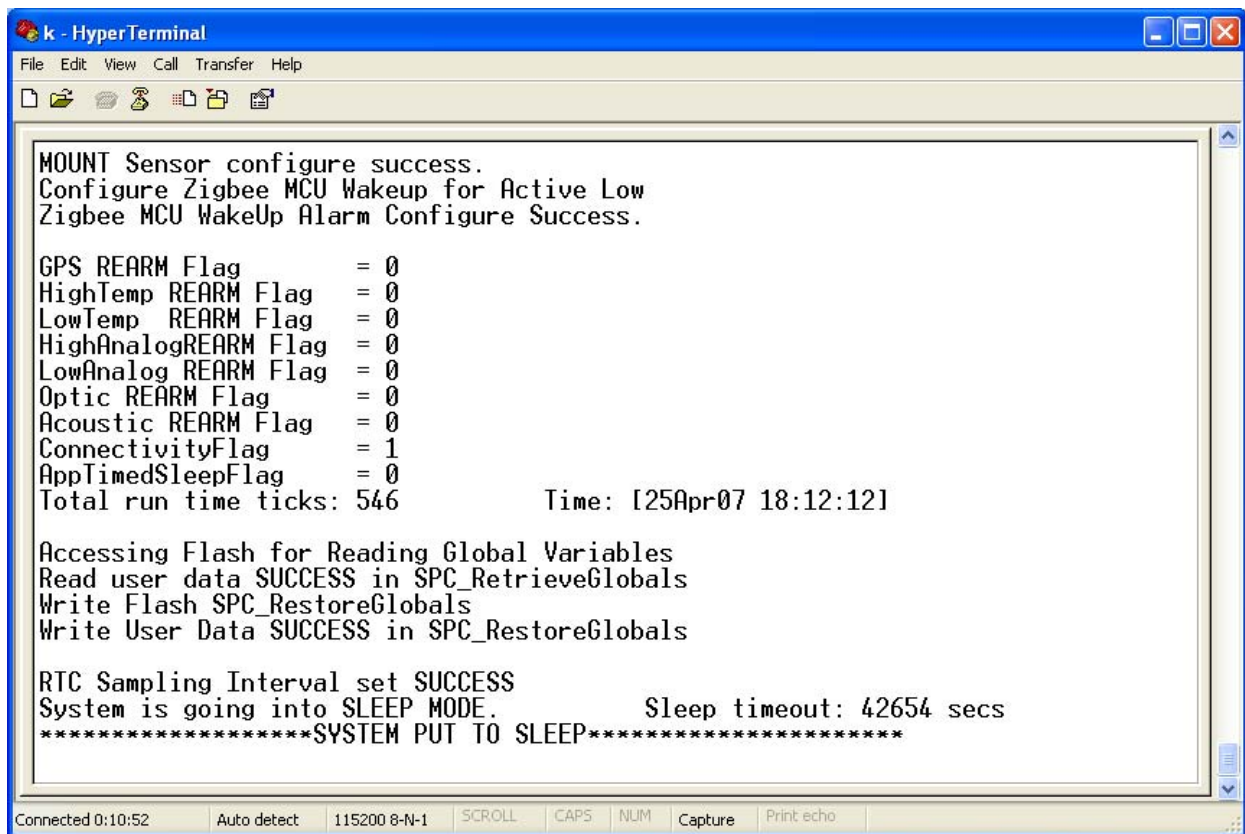

Test Sensor Suite functionality

2.1   Configure the installation as follows.

Door *(If Applicable)*:   Open
Mount *(If Applicable)*:   Unmounted
External Power *(If Applicable)*: Disconnected

2.2   Switch the CMU to the On (Horizontal) position.

2.3   Allow the CMU to run through one complete boot cycle and switch the AMU to the Off position. Completion is indicated by the screenshot shown in Figure 2.1.


```
MOUNT Sensor configure success.
Configure Zigbee MCU Wakeup for Active Low
Zigbee MCU WakeUp Alarm Configure Success.

GPS REARM Flag          = 0
HighTemp REARM Flag     = 0
LowTemp  REARM Flag     = 0
HighAnalogREARM Flag    = 0
LowAnalog REARM Flag    = 0
Optic REARM Flag        = 0
Acoustic REARM Flag     = 0
ConnectivityFlag        = 1
AppTimedSleepFlag       = 0
Total run time ticks: 546          Time: [25Apr07 18:12:12]

Accessing Flash for Reading Global Variables
Read user data SUCCESS in SPC_RetrieveGlobals
Write Flash SPC_RestoreGlobals
Write User Data SUCCESS in SPC_RestoreGlobals

RTC Sampling Interval set SUCCESS
System is going into SLEEP MODE.          Sleep timeout: 42654 secs
*******************SYSTEM PUT TO SLEEP***********************
```

Figure 2.1

2.4 Open the file created in step 1.9 with Notepad.

2.5 Use the 'Find' function to search for sensor readings by opening the 'Find' dialog box in the 'Edit' menu. Search for "LR Creation" as shown below in Figure 2.2.
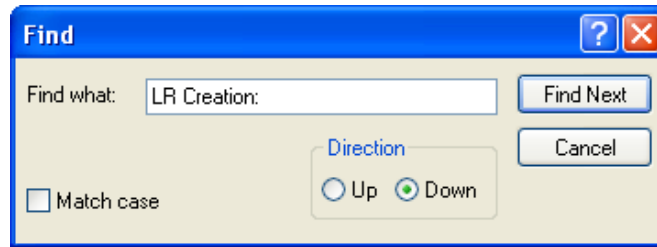

Figure 2.2

2.6 As shown in Figure 2.3, the sensor values are listed below the "LR Creation" line.
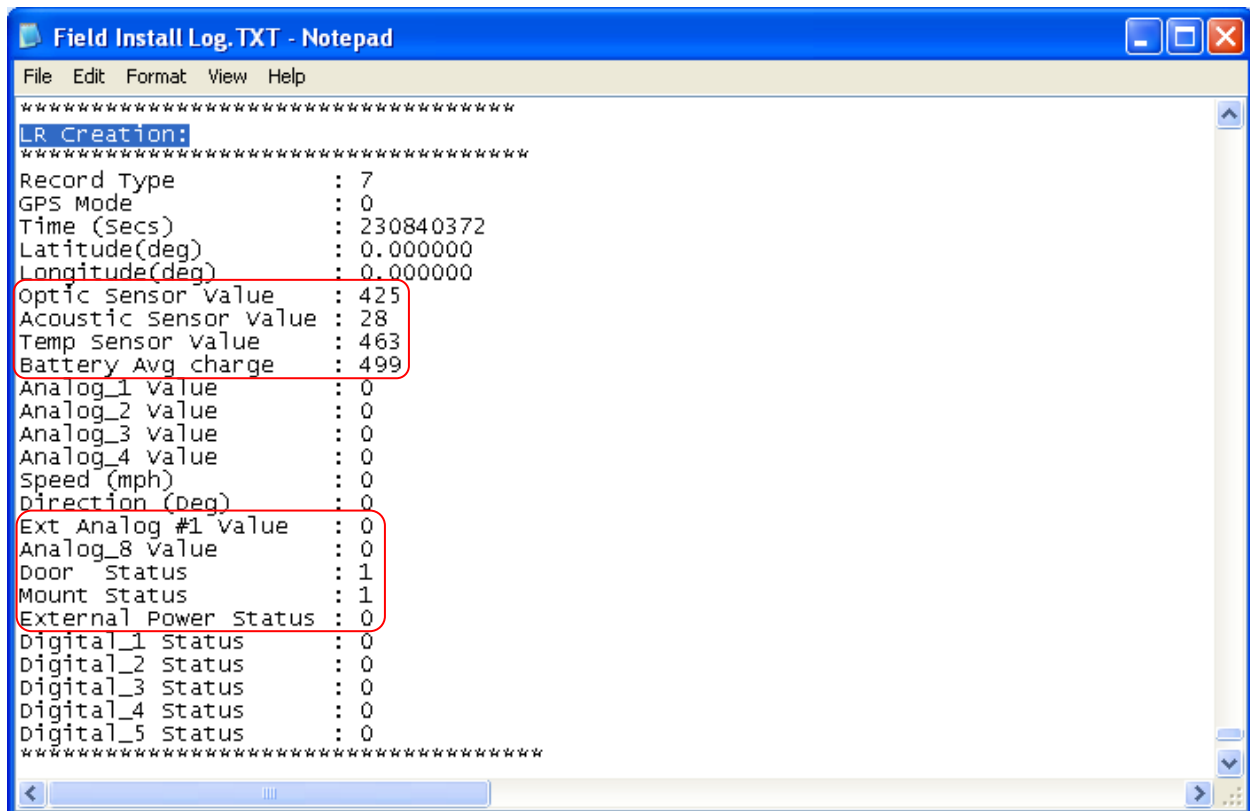

Figure 2.3

2.7 Record results in Appendix B: Field Test Checklist. The values should be with the ranges listed in Appendix A. If a sensor is out of range, consult Appendix C for troubleshooting.

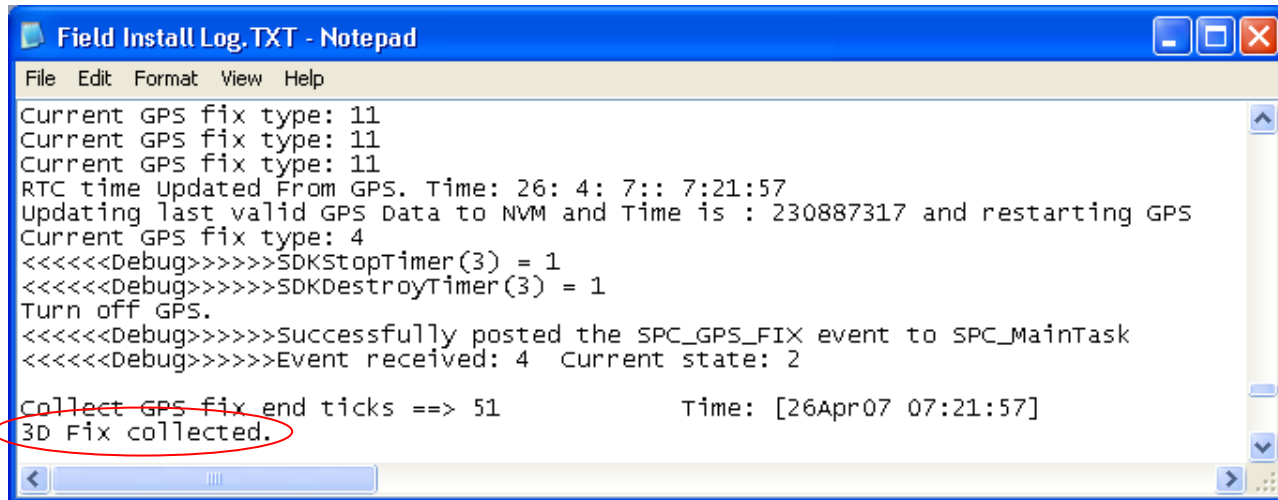2.8 Close Notepad

2.9   Configure the installation as follows.

Door *(If Applicable)*:   Closed
Mount *(If Applicable)*:   Mounted
External Power *(If Applicable)*: Connected

2.10 Repeat Steps 2.2 through 2.8

Test GPS functionality

2.11 Using the same Notepad window opened in step 2.9, use the 'Find' function to find the phrase, "Turn off GPS."

2.12 The statement a few lines below the line containing "Turn off GPS." states the GPS fix status. Record this line in the space provided. The text should look as indicated in Figure 2.4.

Figure 2.4

2.13 Record the results of the GPS fix test on the Field Test Checklist provided in Appendix B. If no fix is available, consult Appendix C for troubleshooting.
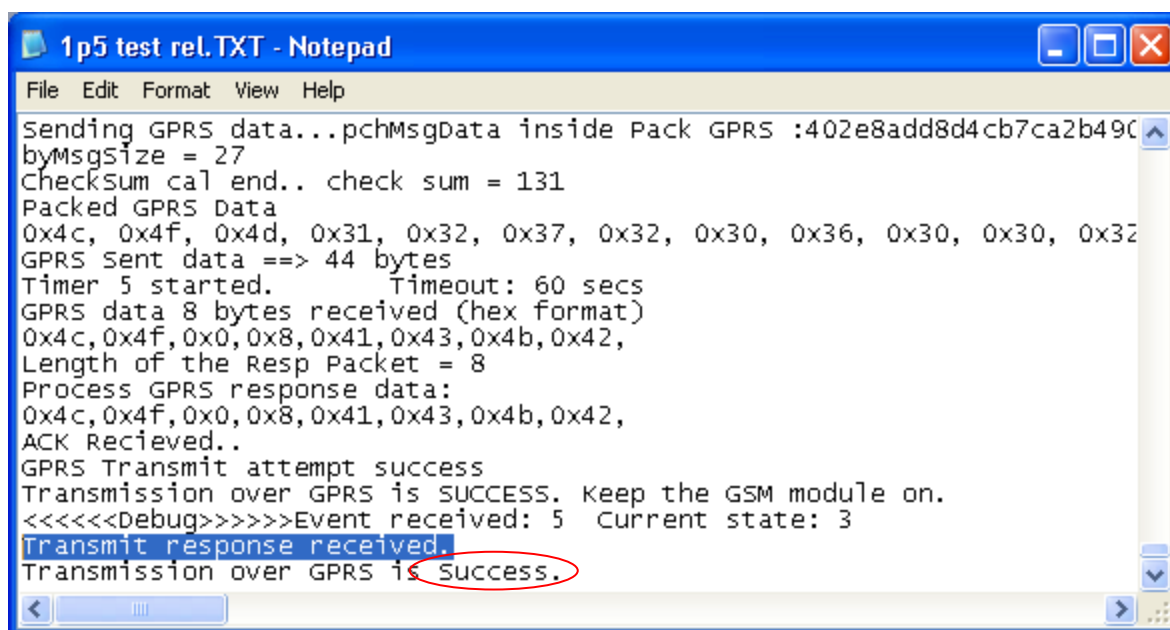
2.14 Turn off the CMU.

2.15 Close Notepad.

3.0 Testing Cellular Communication

Note: Be sure to complete 1.0 initial setup.

Note: If cellular communication is not used, skip to 4.0.

    3.1   Switch the CMU to the On (Horizontal) position.

    3.2   Allow the CMU to run through one complete boot cycle. Completion is indicated by the screenshot shown in Figure 1.4.

    3.3   Open the file created in step 1.9 with Notepad.

    3.4   Use the 'Find' function to search for the phrase "Transmit response received." (See step 2.4 for details).

    3.5   On the line below "Transmit response received." Look for a successful transmission response as indicated in Figure 3.1.

Figure 3.1

    3.6   Record the results of the GSM transmit test on the Field Test Checklist provided in Appendix B.

    3.7   Close Notepad.

    3.8   Turn off the CMU.

    3.9   Repeat steps 3.1 through 3.8 for two more trials.

    3.10 If all three tests failed, consult Appendix C for troubleshooting.

4.0 Testing Satellite Communication

Note: Be sure to complete 1.0 initial setup.

Note: If satellite communication is not used, skip to 4.0.

4.1 Disconnect the GSM antenna

4.2 Switch the CMU to the On (Horizontal) position.

4.3 Allow the CMU to run through one complete boot cycle. Completion is indicated by the screenshot shown in Figure 1.4.

4.4 Open the file created in step 1.9 with Notepad.

4.5 Use the 'Find' function to search for the phrase "Transmit response received." (See step 2.4 for details).

4.6 On the line below "Transmit response received." Look for a successful transmission response as indicated in Figure 4.1.
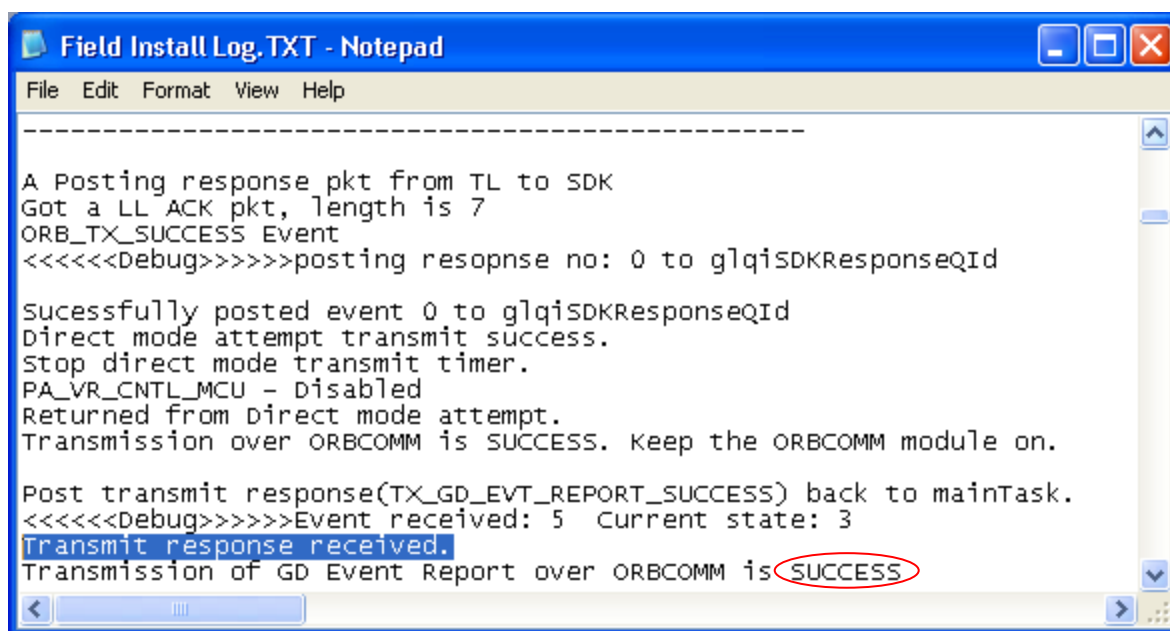

Figure 4.1

4.7 Record the results of the ORBCOMM transmit test on the Field Test Checklist provided in Appendix A.

4.8 Close Notepad.

4.9 Turn off the CMU.

4.10 Repeat steps 3.1 through 3.8 for four more trials.

4.11 If three or more tests failed, consult Appendix C for troubleshooting.

5.0 Final Configuration

Note: Be sure to complete 1.0 initial setup.

5.1 Reconnect the GSM antenna.

5.2 Switch the CMU to the On (Horizontal) position.

5.3 Clear any queued messages by typing the command below in HyperTerminal. Figure 5.1 shows an example of what should be seen on the HyperTerminal window.

     65 [enter]

     6 [enter]


```
Flush the GSM response queue.
Initialize GSM modem.
65
Choose below option:
 1. View V3C Configuration
 2. Set V3C Configuation
 3. View Queued LRs
 4. View Queued LM
 5. Set V3C defaults
 6. Reset V3C Queue
 7. View backup LRs
 8. Delete backup LRs
 9. Set V3C debug level
 10. Hour meter
 11. Service Provider Selection
 12. Debug Command for SPC Core Timer
 65. Application User Command
6
Accessing Flash for Reading Global Variables
Read user data SUCCESS in SPC_RetrieveGlobals
Writing Flash SPC_ResetStorage

Success in restting SPC storage
$$_
```

Figure 5.1

5.4 Clear any backup records by typing the command below. Figure 5.2 shows an example of what should be seen on the HyperTerminal window.

     65 [enter]

     8 [enter]

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Figrure 5.2

5.6 Switch the CMU to the Off (Verticle) position.

5.7 Remove the CMU Field Test cable from the CMU.

5.8 Close the Diagnostic port dust cap.

5.9 Return the CMU to the fielded installation.

5.10 Switch the CMU to the On (Horizontal) position.

5.11 Watch for the green LED to illuminate, indicating that the device is running properly.

Appendix A: Reasonable Sensor Ranges

Note: Event Sensor data is data taken at the time of event. Standard optic and acoustic values are peak values since last report, temperature is average since last report..

Optic Sensor

Value	Meaning	Possible Conditions
0 – 50	No light	Sealed container with no light, completely covered light sensor
50 – 300	Very Dim Light	Night with very little ambient light hitting sensor
300 – 600	Low Ambient Light	Shadowed light sensor with some ambient light
600 – 900	Bright Ambient Light	Bright light that is not directly at the sensor aperture. Ex. Ambient Day Light, ambient office lighting
900 – 1023	Bright Direct Light	Bright directly at the sensor aperture. Ex. Direct sunlight, flashlight into aperture

Acoustic Sensor

Value	Meaning	Possible Conditions
0 – 50	No Noise	No noise above background
50 – 300	Low Noise Level	Medium volume noise near AMU. Ex. Whistle, music
300 – 800	High Noise Level	Loud ambient noise, light to medium banging on AMU. Ex. Truck or rail travel, knocking on AMU enclosure
800 – 1023	Very High Noise	Very loud ambient noise, hard strike to AMU Ex. Dropping container, very loud jarring during truck or rail travel, forceful strike to AMU enclosure

Temperature Sensor

The temperature sensor uses a known transfer function to calculate the actual temperature.

Temp ($^\circ$C) = (T_{dig} * 0.1613) − 50   where T_{dig} is digital value read from sensor

Appendix B: Field Test Checklist

	Pass	Fail	Value
Optic Sensor	☐	☐	_____
Acoustic Sensor	☐	☐	_____
Temperature Sensor	☐	☐	_____
External Analog	☐	☐	_____
Door Open	☐	☐	_____
Door Closed	☐	☐	_____
Mounted	☐	☐	_____
Unmounted	☐	☐	_____
External Power	☐	☐	_____
No External Power	☐	☐	_____
GPS Fix	☐	☐	_____
GSM Transmit 1	☐	☐	_____
GSM Transmit 2	☐	☐	_____
GSM Transmit 3	☐	☐	_____
ORBCOMM Transmit 1	☐	☐	_____
ORBCOMM Transmit 2	☐	☐	_____
ORBCOMM Transmit 3	☐	☐	_____

Appendix C: Troubleshooting

Problems with Sensor Modules

Symptom	Possible Cause	Solution
Optic Sensor out of range	Optic sensor is in direct sunlight or other bright light which saturates sensor	Move the unit from the light source or cover the optic sensor window
	The optic sensor is damaged or otherwise faulty	• Replace the optic sensor or • Switch CMU to a different unit or • If the optic sensor reading is unnecessary for deployment, note the problem and continue with installation
Acoustic sensor out of range	CMU is in a loud area that is pushing the sensor out of range	Move the unit to a quieter area
	The acoustic sensor is damaged or otherwise faulty	• Replace the acoustic sensor or • Switch CMU to a different unit or • If the acoustic sensor reading is unnecessary for deployment, note the problem and continue with installation
Temperature(internal) sensor out of range	The CMU is in an extremely hot or cold environment	Use the temperature conversion formula* to match the CMU temperature reading to the actual temperature
	The temperature sensor is damaged or otherwise faulty	• Replace the temperature sensor or • Switch CMU to a different unit
Temperature(external) sensor out of range	The CMU external temperature sensor is in an extremely hot or cold environment	Use the temperature conversion formula* to match the CMU temperature reading to the actual temperature
	The temperature sensor cable is not connected properly	Disconnect temperature sensor assembly and reconnect
	The temperature sensor assembly is damaged or otherwise faulty	Replace the temperature sensor assembly
Door sensor fail (open or close)	The door sensor and magnet are too far apart when the door is closed	Move the magnet closer to the sensor
	The door switch cable is not connected properly	Disconnect and reconnect the door switch cable
	The door switch cable is damaged or otherwise faulty	Replace the door switch cable

* Temperature($°C$) = $((((Temp_{reading}*3.3)/1023)-0.1)/0.01)-40$

Symptom	Possible Cause	Solution
GPS fix not attempted	GPS antenna not connected	Connect GPS antenna
	Configuration disables GPS	Check the Configuration file for errors and reload a correct file
	Damaged or otherwise faulty GPS antenna	Replace the GPS antenna
GPS fix failure after GPS timeout	The installation is shielded from a direct view to the sky	Move the installation to a location with a better view to the sky
	Cold start fix was unavailable	Retry a GPS fix at least 3 times by creating CMU events (eliminates cold start)

Problems with GSM Communication

Symptom	Possible Cause	Solution
No GSM communication attempted	SIM card not installed or installed improperly	Check SIM card installation
	Configuration disables GSM communication	Check the Configuration file for errors and reload a correct file
GSM communication failed after GSM timeout	No GSM signal available	Test network strength with quad-band phone. If no network available, move installation where a stronger signal is available
	The GSM antenna is disconnected	Reconnect the GSM antenna
	The GSM antenna is damaged or otherwise faulty	Replace the GSM antenna

Problems with Satellite Communication

Symptom	Possible Cause	Solution
No Satellite communication attempted	Configuration disables satellite communication	Check the Configuration file for errors and reload a correct file
Satellite communication failed after ORBCOMM timeout	The installation is shielded from a direct view to the sky	Move the installation to a location with a better view to the sky
	High volume of VHF interference present at the installation's location	Test interference levels with the ORBCOMM spectrum analyzer. If unacceptable interference levels are present, move installation to a location with less interference
	The satellite antenna is damaged or otherwise faulty	Test the antenna with the antenna analyzer. If the antenna is faulty, replace it
	There was no satellite available when transmission was attempted	Using ORBCOMM View, ensure there is a satellite overhead and retest