

# TTU-2820™

## Hardware and Installation Guide



### Installing the LMU

The installation of the LMU and its antennas can have a major impact on the LMU's performance. It is recommended that installers be familiar with the installation of GPS and cellular devices and are comfortable in a vehicle environment. It is best not to place the LMU unit in an unusually warm location such as directly near heater vents, near hot engine components or in direct sunlight. Typically, the LMU should be placed under the passenger seat or dashboard of the vehicle. LMUs with internal antennas should be placed to maximize their GPS performance. A typical location include under the dash close to the front wind-shield.

Attach the LMU to the solid body of the vehicle, not to plastic panels. The LMU can be placed out of sight by removing interior trim and molding to expose available space, then replacing the trim once the LMU is in place.

Status LED lights on the front of the LMU unit can provide valuable information about the operation of the LMU. When feasible, attempt to install the LMU in such a way that these lights can be seen with reasonable ease.

You may find it useful to be able to view the LEDs periodically to make sure that the LMU is operating properly. If at any time you should encounter a problem with the LMU, you may need to read the LEDs in order to troubleshoot the problem.

## LED

### LED #1 (Comm LED - Orange) Definitions

Condition	LED 1
Modem Off	Off
Comm On - Searching	Slow Blinking
Network Available	Fast Blinking
Registered but no Inbound Acknowledgement	Alternates from Solid to Fast Blink every 1s
Registered and Received Inbound Acknowledgement	Solid

### LED #2 (GPS LED - Green) Definitions

Condition	LED 2
GPS Off	Off
GPS On Slow	Blinking
GPS Time Sync	Fast Blinking
GPS Fix	Solid

## Primary Connector

The TTU-2820™ uses 8 22AWG leads for its power and I/O connections. These leads are mapped as follows:

Wire	Signal Name	Description	Color	Input or Output
1	GND	Ground	Black	Ground
2	Vcc	Primary Power	Red	Input
3	IN-0	Input 0 – Ignition	White	Input
4	IN-1	Input 1 – Digital Input	Blue	Input
5	IN-2	Input 2 – Digital Input	Orange	Input
6	OUT-0	Ouput 0 – Starter Disable Relay Driver	Green	Ouput
7	OUT-1	Ouput 1 – Digital Output	Brown	Ouput
8	OUT-2	Ouput 2 – Digital Output	Yellow	Ouput
9	SER_OUT	Serial Output	Green\Black	Output
10	SER_IN	Serial Input	Blue\Black	Input

## I/O Descriptions

The TTU-2820™ provides the following I/O:

### Digital Inputs

- Input 0: Ignition Sense (Always biased low)
- Input 1: Generic Digital Input (high or low bias per S-158)
- Input 2: Generic Digital Input (high or low bias per S-158)
- Input 3: Not Available
- Input 4: Not Available
- Input 5: Motion Sensor (low = no motion, high = motion)
- Input 6: Power Switch State (low = external power, high = internal battery)
- Input 7: Battery Voltage Critical Sensor ( low = VBatt ok, high = VBatt low. 3500mV threshold)

- Input 8: High Temperature Sensor (low = below Temp Threshold, high = above Temp threshold. Temp Threshold = 300)

### **Analog to Digital Inputs**

- A/D 0: External Power Supply Monitor
- A/D 1: Generic External Analog to Digital Input
- A/D 2: GPS Antenna Monitor
- A/D 3: uP Temperature
- A/D 4: uP Voltage
- A/D 5: Battery Voltage
- A/D 6: Temperature Sensor
- A/D 7: Vcc Sys

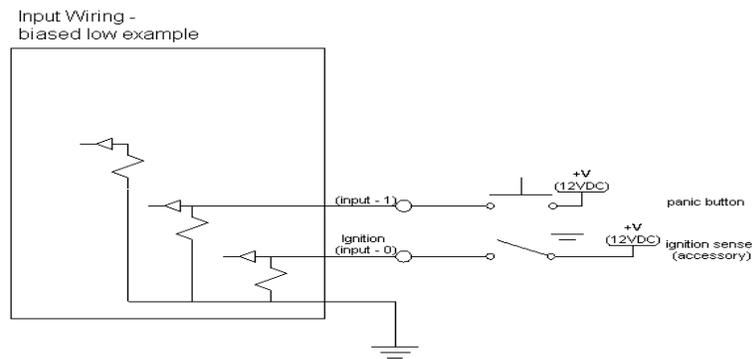
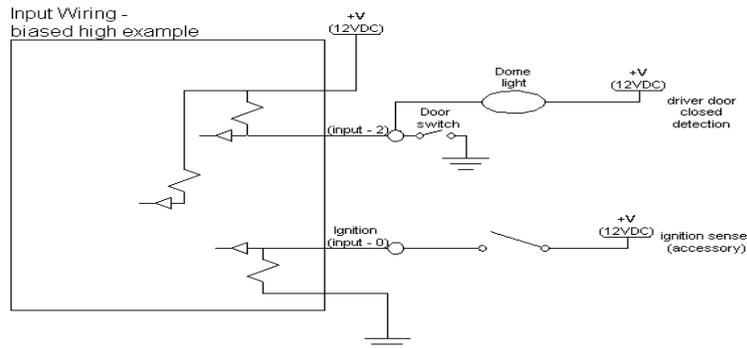
### **Outputs:**

- Output 0: Standard Open Collector Relay Output
- Output 1: Standard Open Collector Relay Output
- Output 2: Standard Open Collector Relay Output
- Output 3: Not Available
- Output 4: Power Supply Switch (cleared = switch to external power, set = switch to internal power)
- Output 5: Enable/Disable Battery charging (cleared = enable battery charging, set = disable battery charging)

### **Ignition and Inputs**

The TTU-2820™ provides up to 3 external inputs. The external inputs are protected from typical vehicle transients and can be directly connected to most vehicle level logical inputs from 4 volts up to the vehicle power input level (typically 12 VDC). Their input impedance is approximately 10kΩ. One of these inputs is dedicated to sensing the vehicle's ignition status to provide for flexible power management. The other two inputs may be used to sense vehicle inputs such as cooling unit operation, a hidden driver "Panic" switch, taxi on-duty/off-duty meter status or many others.

The ignition input is pulled to ground through the 10k resistance, where the other inputs can either be normally High (i.e. pulled to +12v through a 10kΩ resistor) or Low (i.e. pulled to ground through a 10kΩ resistor). Input 1 is always biased low, while inputs 2-4 are biased high. The diagrams below show how to connect the inputs in both a high and low-biased configuration:



### Connect power, ignition, and ground.

The power input (red wire) must be connected to a constant (un-switched) +12 VDC or +24 VDC supply; preferably, connected directly to the vehicle battery terminal or as close to it as possible. This connection point should be fuse protected to not more than 5 Amps.

The ignition input (white wire) must be connected to the vehicle ignition or another appropriate key operated line, such as ACCESSORY, ensuring that power to the ignition wire is available only when the vehicle ignition is on.

The ground line (black wire) must be connected to chassis ground.

**Failure to connect these lines in the manner described may result in discharge of the vehicle battery.**

For best results, it is strongly recommended that the LMU connection be on its own circuit. Connect the power input directly to the vehicle battery if possible and protect the circuit with an inline fuse. If you must connect through the fuse box, use standard commercial wiring practices to create a permanent installation rather than using press-in fuse clips or other temporary measures.