UTAH STATE UNIVERSITY

Passive Tracking Device
– Senior Project –
Specifications Document

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1 Scope

This document outlines the specification of a passive tracking solution that could be used by enterprise level clients to track a large fleet of vehicles both ATVs or automobiles. This type of passive solution provides another alternative to companies wanting to track their fleet of vehicles that is both cheaper and less power intensive than other active tracking solutions.

1.1 General

This specification establishes the design, construction, performance, development, and test requirements for the passive tracking device, herein referred to as the PTD. Another focus of this project is to create a proof of concept that is compact enough to be contained within an ATV and use the ATVs battery to power the PTD. Many times it is difficult for companies to manage the location of their ATVs when they are used by a collective group of employees. This can make it difficult to know if the ATVs are really unaccounted for or merely being used by another employee.

2 Applicable Documents

The following documents of the exact issue shown shall form part of this specificaion to the extent specified herein. In the event of conflict between the requirements of this specification and any referenced document the order of precedence shall be 1. The contract, 2. This specification, 3. Referenced documents.

2.1 Government Documents

The regulations in the following documents shall be met to allow the PTD to be legally used in most of North America (US and Canada).

- The United States (US) FCC Part 15-2008.
- Canada's Industry Canada ICES-003:2004 Issue 4.

3 Requirements

This section outlines the requirements and specifications of the PTD.

3.1 Item Definitions

The PTD will likely consist of 4 main subsystems, namely:

- Cell Network Interface
- Global Positioning System
- Controller Circuit
- Power Converter/Regulator

The PTD system will be a passive system, meaning that the PTD will power down to a very low power state while not in use. At an appointed trigger it will power up and transmit it's location to the PTDs owner via a cell network. There is no plan for the owner of the PTD to be able to activate the device externally. The PTD shall opperate in this power-up, transmit location, power-down sequence.

3.1.1 Interface Description/Functional Block Diagram

3.2 Characteristics

The following section provides a technical summary of the PTD's characteristics.

3.2.1 Performance Characteristics

3.2.1.1 Physical Characteristics
The PTD shall meet the following physical requeirements:

3.2.1.1.1 The PTD shall conform to the following form factor: 16cm by 8cm by 5cm

3.2.1.2 Electrical Characteristics
The PTD shall meet the following electrical requirements:

3.2.1.2.1 The PTD shall operate using the power provided by a standard ATV battery, specifically, 12V 11Ah battery.

3.2.1.2.2 For the purposes of proof of concept the PTD may make use of a breadboard to connect the components.

3.2.2 Environmental Characteristics

3.2.2.1 Natural Characteristics The PTD shall meet the following natural evironmental characteristics. The PTD shall meet the requirements of this specification during and after exposure to any combination of any of the following natural environments. The PTD may be packaged to precluded exposure to any environments that would control the design.

3.2.2.1.1 The PTD shall function between 0° C and 40° C

3.2.2.2 Induced Environment Characteristics The PTD shall meet the following induced evironmental characteristics. The PTD shall meet the requirements of this specification during and after exposure to any combination of any of the following induced environments. The PTD may be packaged to precluded exposure to any environments that would control the design.

3.2.2.2.1 The PTD shall withstand mechanical shocks of 3 ft drop test 5 times onto concrete.

3.2.2.2.2   The PTD shall withstand vibrations of 1 ocilations per second with an amplitude of 1.5cm for 1 hour.

3.2.2.2.3   The PTD shall function in a dusty environment, specifically, the shock and vibration tests shall be repeated after 15 grams of fine sand is applied to the device.

3.3   Electromagnetic Interference

The PTD shall conform to the standards found in the *Applicable Documents* section of this document.

4   Verification

4.1   Item Definitions

4.1.1   Interface Description/Functional Block Diagram

4.2   Characteristics

4.2.1   Performance Characteristics

4.2.1.1   Physical Characteristics

4.2.1.1.1   The PTD shall be placed in an small box of dimention stated in requirements.

4.2.1.2   Electrical Characteristics

4.2.1.2.1   The PTD shall function with only the power provied by an ATV battery. The PTD shall also be tested while the ATV's engine is actively running and under normal operation.

4.2.1.2.2   The PTD shall have connections that function in any manner.

4.2.2   Environmental Characteristics

4.2.2.1   Natural Characteristics

4.2.2.1.1   The PTD shall be tested for full functionality at both ends of the temperature spectrum.

4.2.2.2   Induced Characteristics

4.2.2.2.1   The PTD shall function after the drop tests.

4.2.2.2.2   The PTD shall function after the viberation test is performed

4.2.2.2.3   The PTD shall function after the dust test is performed.

4.3 Electromagnetic Interference

The EMI shall be measured and shall meet the requirements found in the *Applicable Documents* section of this document.