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2 Introduction

This document describes the transmission timing and power levels of the Intelitag Tag transmitters for conformance to FCC Part 15 Subpart C for intentional transmitters.

3 System Description

The **Intelitag™** electronic tagging system, also distributed under the ParSec trade name, is a radio based short to long range tagging system for the protection and monitoring of assets. The system operates at a nominal frequency of 418MHz as a Low-Power, Non-Licensed Transmitter in accordance with FCC Part 15 Subpart C for intentional Radiators (TAGs) and Subpart B for unintentional radiators (Reader). The system is also type approved to MPT-1340 licence exempt frequency band by the UK Radiocommunications Agency. Approval number 13422 refers.

The basic system comprises a range of **tags** - compact radio frequency transmitters which communicate with a **universal reader**. The reader interprets the data packet received from a tag transmitting within its field of reception and, in turn, passes this data on to a controller or computer.

Using a combination of two power levels and differing data patterns, the universal reader is able to distinguish between 'long range' and 'short range' Intelitags. Long range tags are read at a nominal distance of up to 75m in free space, depending on the characteristics of the ambient RF environment. Short range tags are only detected by the reader when they enter its short range zone, which is adjustable from a few cm to 25m in free space. It is the combination of short and long range detection within a single reader which, in conjunction with the properties of the different tag types described below, which gives the Intelitag system its unique performance characteristics.

Every tag has a unique identity which it transmits in conjunction with additional data relating to its operational status which includes battery status. The data packet contains 60 bits and is transmitted at 2.731 Kbaud. Thus an asset or individual equipped with a tag can be uniquely identified by the system. The Intelitag system has been designed primarily for security applications although its use can also be extended to a wide range of asset tracking and management tasks.

A regular 'reporting' transmission from asset Intelitags provides both a security confidence check and an additional asset management (inventory) facility. Asset Intelitags incorporate anti-tamper switches which are detected at long range.

4 Reference Documentation

4.1 Reference Documentation

4.1.1 FCC Part 15 Subpart C for intentional transmitters

5 Transmission Requirements

5.1 FCC rules

5.1.1 Transmission Categories and Levels

5.1.1.1 The PAT, SAT and RAT tag transmissions fall into three categories.

These are, a) Automatic, b) Periodic and c) control signals.

5.1.1.2 The maximum Field Strength levels that apply for each category are as follows:

5.1.1.2.1 Automatic 10333uV/M (80.28dBuV/M)

5.1.1.2.2 Periodic 4410 uV/M (72.89dBuV/M)

5.1.1.2.3 Control 10333uV/M (80.28dBuV/M)

5.1.2 Timing Requirements

5.1.2.1 Automatic Transmissions

5.1.2.1.1 The covering FCC category is Part 15.231 (a), which states that a transmission activated automatically shall cease within 5 seconds. A triggering event occurring at any time after this 5 second period shall allow a further 5 second period of transmissions and so on.

5.1.2.2 Periodic Transmissions

5.1.2.2.1 The covering FCC category is Part 15.231 (e), which states that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least thirty times the duration of the transmission but in no case less than 10 seconds.

5.1.2.3 Control Signal Transmissions

5.1.2.3.1 The covering FCC category is Part 15.231 (a), which states that a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

6 TAG Transmission Timing and Operating Field Strength

6.1 PAT TAG

6.1.1 Operating Description

6.1.1.1 The **Portable Intelitag (PAT)** has been designed to allow the movement of mobile assets within a controlled area or building, whilst denying or monitoring the removal from, and re-entry of the assets into the area. The PAT is normally detected when it enters the short-range zone of a universal Reader; however it's other transmissions, including tamper, will be detected by a reader at long range.

6.1.1.2 The PAT Tag contains a shock sensor and miniature push button switch. The shock sensor is used to detect movement and the switch is used to detect removal (Tamper) of the TAG from an item it is adhered to. By monitoring the sensor and the switch the TAG can determine what sort of transmission should be transmitted.

6.1.2 Transmission Characteristics

6.1.2.1 Shock Triggered Transmission (automatic)

6.1.2.1.1 The transmission consists of 7 discrete frames of data at a repetition rate of approximately 0.576s at an output field strength level conforming to paragraph 5.1.1.2.1 above. The total transmission time is approximately 4 seconds. The transmissions will begin when the shock sensor is disturbed. After the transmission has stopped the shock sensor will then be interrogated for new shock events.

6.1.2.2 Tamper Triggered Transmission (automatic)

6.1.2.2.1 The transmission shall consist of 7 discrete frames of data at a repetition rate of approximately 0.576s at an output field strength level described in paragraph 5.1.1.2.1 above. The total transmission time is approximately four seconds. This transmission will begin when the tamper switch is released. When the tamper switch is re-closed the tamper transmission may be started again on its release.

6.1.2.3 Routine report (periodic)

6.1.2.3.1 The transmission shall consist of 7 discrete frames of data at a repetition rate of approximately 0.072s at an output field strength level described in paragraph 5.1.1.2.2 above. The total transmission time will be 0.9s. This transmission is repeated every 1 hour (± 10 minutes).

6.1.2.3.2 The routine report facility may be disabled by placing switch 4 in the ON position before the Tag is switched on.

6.2 SAT TAG

6.2.1 Operating Description

6.2.1.1 The **Static Intelitag (SAT)** has been designed primarily to protect equipment such as computers and their internal components, and all other types of static office equipment. However, the SAT is highly versatile and can be used to protect any static article including hospital and laboratory equipment, works of art and any item of significant value. The SAT can be detected at a range of up to 75m in clear space

6.2.1.2 The SAT Tag contains a shock sensor and miniature push button switch. The shock sensor is used to detect movement and the switch is used to detect removal (Tamper) of the TAG from an item it is adhered to. By monitoring the sensor and the switch the TAG can determine what sort of transmission should be transmitted.

6.2.2 Transmission Characteristics

6.2.2.1 Shock Triggered Transmission (automatic)

6.2.2.1.1 The transmission consists of 7 discrete frames of data at a repetition rate of approximately 0.576s at an output field strength level conforming to paragraph 5.1.1.2.1 above. The total transmission time is approximately 4 seconds. The transmissions will begin when the shock sensor is disturbed. After the transmission has stopped the shock sensor will then be interrogated for new shock events.

6.2.2.2 Tamper Triggered Transmission (event driven)

6.2.2.2.1 The transmission shall consist of 7 discrete frames of data at a repetition rate of approximately 0.576s at an output field strength level described in paragraph 5.1.1.2.1 above. The total transmission time is approximately four seconds. The transmission will begin when the tamper switch is released. When the tamper switch is re-closed the tamper transmission may be started again on its release.

6.2.2.3 Routine report (periodic)

6.2.2.3.1 The transmission shall consist of 7 discrete frames of data at a repetition rate of approximately 0.072s at an output field strength level described in paragraph 5.1.1.2.2 above. The total transmission time is approximately 0.9s. The transmission repetition rate shall be approximately 1 hour (± 10 minutes).

6.2.2.3.2 The routine report facility may be disabled by placing switch 4 in the ON position before the Tag is switched on.

6.3 RAT TAG

6.3.1 Description

- 6.3.1.1 The **Range Adjustment TAG (RAT)** is used to remotely turn on and off the Reader's short-range reception field at a required distance. This varies the range at which the PAT tag's shock activated transmission's can be received.
- 6.3.1.2 The R.A.T. comprises two PCB assemblies connected by a screened 6 core cable (approximately 6cms long) enclosed in an ABS enclosure with external buttons. The main PCB is identical to the PCB in the SAT and PAT. The second PCB within the RAT is used to mount miniature switches beneath the external buttons. This PCB contains no other components.
- 6.3.1.3 The RAT is used generally once after installation of a system.
- 6.3.1.4 The reader will respond with a buzzer when it receives certain transmissions from the RAT (FIND and SEE). But the reader will always flash an LED every time it receives a complete packet of data.

6.3.2 Transmission Characteristics

- 6.3.2.1 While one of the four buttons is depressed the RAT transmits a **control signal** data packet of data at approximately 0.4s intervals at an output field strength level described in paragraph 5.1.1.2.1 above. The operation function of each button (FIND, SEE, + and -) is described below.
- 6.3.2.1.1 The FIND button is used to set the edge of Receiver's ON range. The user sets the reader into a preset mode and stands to where the edge of range is desired. The FIND button is then depressed. The received analogue signal is compared to a variable voltage from a digital comparator which is modified until the signal is 'lost'. The voltage on the comparator is then incremented once. After 5-10 seconds of the key press the reader will respond with a buzzer sound indicating that the range has been set. The button can then be released and the Reader mode returned to normal operation. Thus the receiver will be 'off' for any low power transmissions outside of this range and 'on' for any inside.
- 6.3.2.1.2 The SEE button is used to determine the range of a reader previously set. With the SEE button depressed the reader will respond with a buzzer when the RAT is within the range.

6.3.2.1.3 The Plus and Minus range buttons are used to increment the range of the Reader either out or in respectively to the users desired position.

6.3.2.2 The characteristics of the RAT remain unaltered throughout its operation.

7 FCC Identification

7.1 Tags

7.1.1 Portable Asset TAG (PAT) – N4GPAT2

7.1.2 Static Asset TAG (SAT) – N4GSAT2

7.1.3 Range Adjustment TAG (RAT) – N4GRAT2

7.2 Reader

7.2.1 N4GREADER

8 FCC Modification Disclaimer and other Statements

8.1 These devices comply with part 15 of the FCC rules. Operation is subject to the following two conditions:

8.2 (1) These devices may not cause harmful interference, and

8.3 (2) these devices must accept interference received, including interference that may cause undesired operation.

8.4 The user is cautioned that modifications or changes to an intentional or unintentional radiator not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

8.5 The tags are powered are by standard Lithium coin cells and as such the following warning shall be noted:

8.5.1 CAUTION Danger of explosion if batteries are incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.