MICROTRACKER MT-01

PRODUCT SPECIFICATIONS & SOFTWARE MANUAL FOR VERSION 1.1

REV 0.2

Revision history

Rev.	Date	Details	Originated by
0.1	21 October 2010	First release	Samuel Chereau
0.2	15 November 2010	Proof Reading	Pierre-Emmanuel Surga

This manual is written without any warranty.

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Besides, our company stresses the fact that the performance of the product as well as accessories depends not only on the proper conditions of use, but also on the environment around the places of use.

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Safety precautions

General precautions

- The modem generates radio frequency (RF) power. When using the modem care must be taken on safety issues related to RF interference as well as regulations of RF equipment.

- Do not use your phone in aircraft, hospitals, petrol stations or in places where using GSM products is prohibited.

- Be sure that the modem will not be interfering with nearby equipment. For example: pacemakers or medical equipment. The antenna of the modem should be away from computers, office equipment, home appliance, etc.

- An external antenna must be connected to the modem for proper operation. Only used approved antennas with the modem. Please contact authorized dealer on finding an approved antenna.

- Always keep the antenna with minimum safety distance of 26.6cm or more from human body. Do not put the antenna inside metallic box, containers, etc.

Using the modem in vehicle

- Check for any regulation or law authorizing the use of GSM in vehicle in your country before installing the modem

- Install the modem by qualified personnel. Consult your vehicle dealer for any possible interference of electronic parts by the modem.

- The modem should be connected to the vehicle's supply system by using a fuse-protected terminal in the vehicle's fuse box

- Be careful when the modem is powered by the vehicle's main battery. The battery may be drained after extended period.

Protecting your modem

To ensure error-free usage, please install and operate your modem with care. Do remember the following:

- Do not expose the modem to extreme conditions such as high humidity/rain, high temperatures, direct sunlight, caustic/harsh chemicals, dust, or water.

- Do not try to disassemble or modify the modem. There is no user serviceable part inside and the warranty would be void.

- Do not drop, hit or shake the modem. Do not use the modem under extreme vibrating condition.

- Do not pull the antenna or power supply cable. Please attach or detach by holding the connector.

- Connect the modem only according to the instruction manual. Failure to do it will void the warranty

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Chapter 1

Product Specifications

1.1 Physical and Mechanical

– Dimensions: 58.6 X 60.0 X 13.0 mm
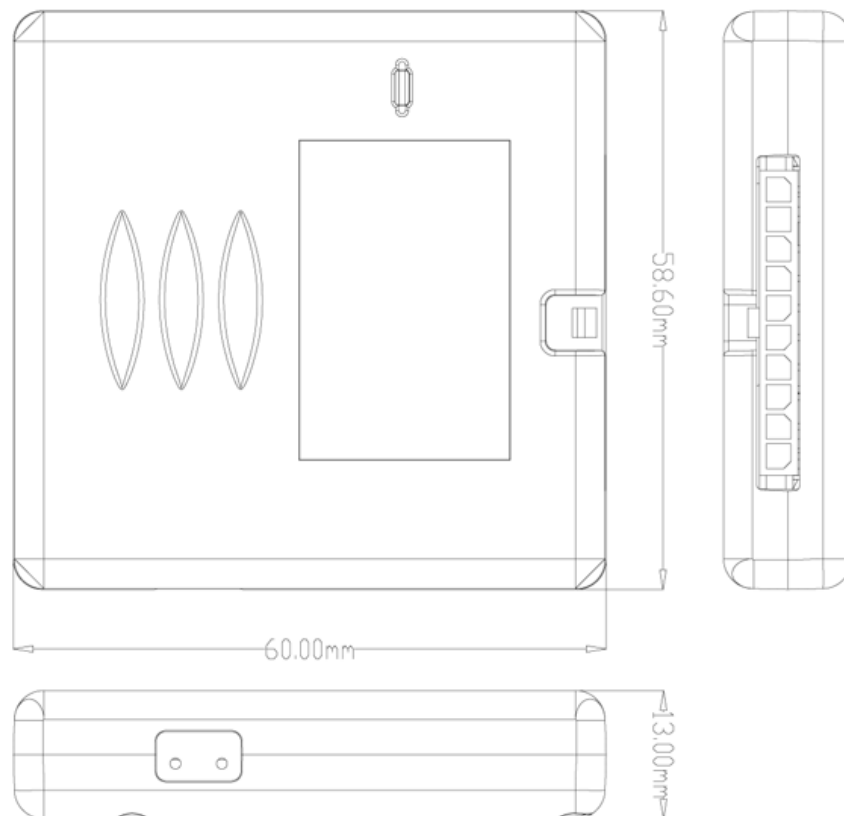
– Weight: 45g

– Case: PC/ABS material UL94V-0 flammability

– Packing method:

- bulk packaging: protected in poly bags in bulk packing with leaflet
- individual packaging: protected in poly bag in individual gift box with leaftlet

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– Exploded views
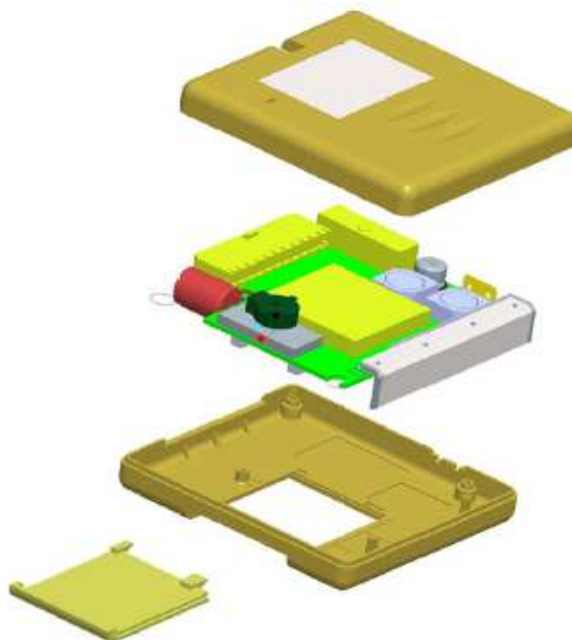
– Product label:

- IMEI: wireless module IMEI number
- Serial Number: SN#MT-01-<hardware version (2 digits)><lot number (2 digits)>-<production date (yymmdd)>-<unit number (4 digits)>
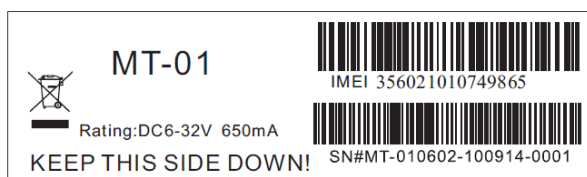
1.2 Environmental

– ETSI compliant: -20 to +55 °C

– Operating temperature: -30 to +80 °C

– Storage: -40 to +85 °C

– Shock & Vibration: SAE J1211 compliant

1.3 Power Supply

– Supply voltage range: 6 to 32V DC

- Current consumption during idle: 58mA - typical at 12V DC

- Current consumption during transmission: 104mA - typical at 12V DC

- Current consumption during power saving: 8mA - typical at 12V DC

- Rated current: 650mA (peak value)

1.4   GSM / GPRS

- GSM/GPRS engine: Sierra Wireless branded Wireless Microprocessor / part number - WMP100 (approved by AT&T; CE, PTCRB and FCC certified).

- 64Mb memory (6MB flash memory for embedded application; 2MB RAM)

- Frequency band: 850/1900MHz and 900/1800MHz

- Built-in GSM antenna: quad band

- SIM card interface: 1.8/3.0V

- SIM card holder: Flip type; SIM card is accessible from outside after removing a plastic lid

1.5   Communication with backend

- Configuration by SMS or GPRS[1]

- Configuration acknowledgment by SMS

- Communication with back-end (reports, alarms, replies) by SMS, TCP or UDP connection over GPRS

1.6   GPS

- GPS engine: eRide Inc. branded / part number - CompactRide emD1000k

- Built-in active antenna:

Characteristic	Specification
Center Frequency	1575.42±2 MHz
Bandwidth(10dB return loss)	10 MHz typical
Polarization	R.H.C.P

- Filter / LNA:

Characteristic	Specification
Center Frequency	1575.42±1.023 MHz
Gain	16±3dB (DC=3.0V)
Noise Figure	1.3dB typical (DC=3.0V)
Voltage	3.0±0.3V
Current(DC= 3.0±0.01V)	5.0±1mA

[1] as defined in Chapter 5

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- Positioning accuracy: 7m outdoors (CEP 95%) and <20m indoors

- Supports GPS L1-band, C/A code

- High sensitivity down to -155.5dBm for both acquisition and tracking

- TTFF typically 3s when hot and <40s from cold (outdoors)

- Supports A-GPS position aiding

1.7   Status Indicator

- One red color LED indicating GPS position fix

- One green color LED indicating GSM registration

1.8   Electrical Interface

- 10-pin connector[2]

- Connection for:

  - Power supply (from vehicle battery)
  - Primary digital output for driving external relay ("Starter Disabling")
  - Secondary digital output for driving additional relay or LED, etc. . .
  - Primary digital input for ignition detection, active between 6 to 32Vdc
  - Secondary digital input (reserved) , active between 6 to 32Vdc
  - Analog input for sensor reading, maximum absolute rating. 5V, 20mA

- All digital inputs and digital outputs are opto-isolated and all interfaces are ESD protected.

1.9   Service Port

- Accessible from outside only after removing a plastic lid

- Serial port at logic 2.8V TTL level (UART) + other electrical test points

- Using external RS232 transceiver for connection to a computer for diagnostic and factory settings

1.10   Functions & Features

- Immediate on-request reporting of vehicle status (position, speed, mileage, ignition status, GSM RSSI. . .)

- Periodic reporting of vehicle status (time and/or distance based)

- Call screening

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[2]See section 2.1.2

- Disable or enable starter motor on-request

- Alert messages for over-speed, geofence crossed, main battery connect/disconnect, ignition on/off, direction change, mileage exceed. . .

- Accept configuration (IP address, port number, APN,. . .) & threshold settings from server

- Over The Air embedded software update

1.11 Compliance

- FCC Part 15B, 22H & 24E certification

- PTCRB certification

- CE (R&TTE directive)

- ROHS

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Chapter 2

Optional Accessories

2.1 Wire harness
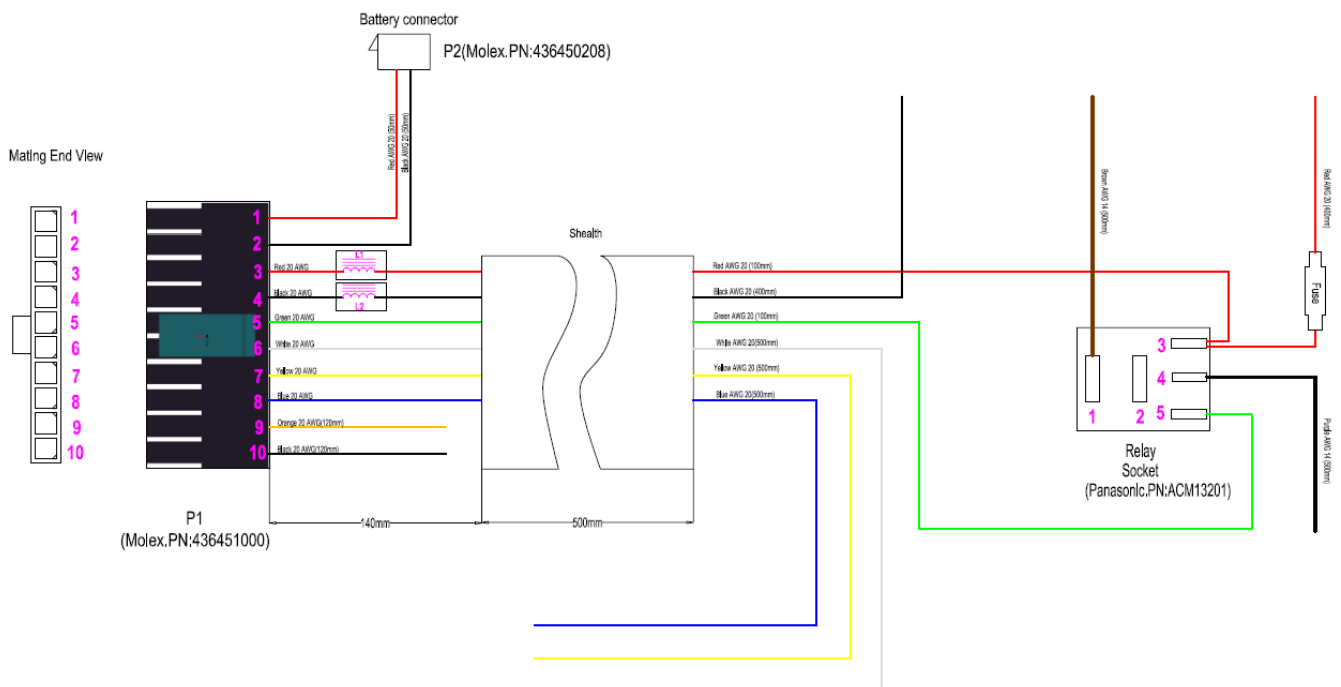
The wire harness has been designed for automotive grade.

2.1.1 Specifications

– 10 pin molex connector

– In-line Fuse holder with glass fuse on the cable

– Relay socket

– Relay

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2.1.2　10-pin connector assignment

Number	Name	I/O	Description	Color	Remark
1	BAT+	I	Battery backup power	red	
2	BAT-		Battery backup ground	black	
3	PWR	I	Main power input	red	DC 6-32V
4	GND		Main ground	black	
5	OUT1	O	Output to drive the relay - Disabling the starter	green	250mA max. sink current
6	DIN1	I	Digital input - Use for the ignition sense	white	Active > 6V, max. 32V
7	DIN2	I	Digital input - Reserved	yellow	Active > 6V, max. 32V
8	OUT2	O	Digital output - Reserved	blue	250mA max. sink current
9	ADC+	I	Analog input	orange	max. 5V, 20mA
10	ADC-		Analog input ground reference	black	

2.1.3　Standard wiring diagram
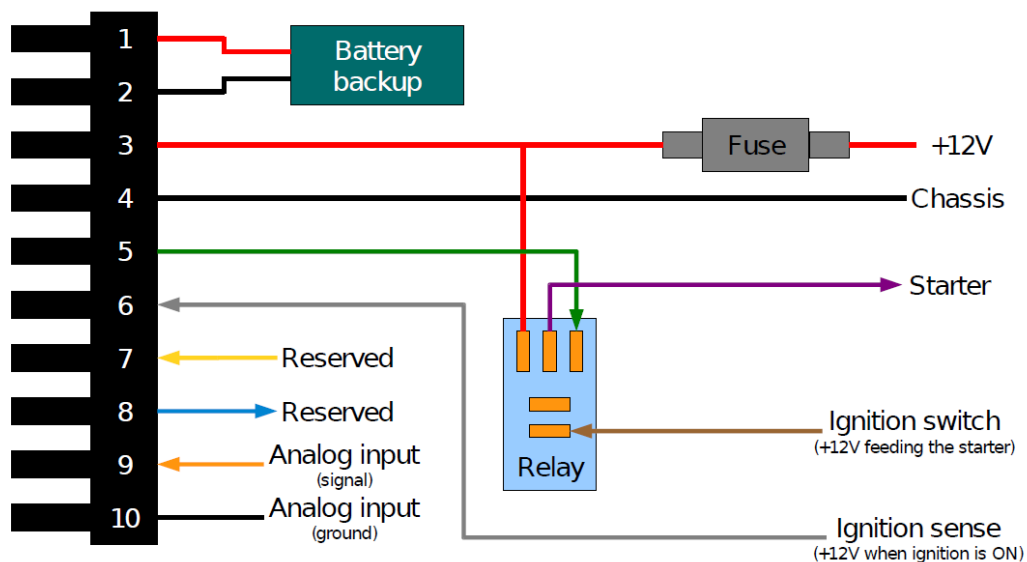
2.2　External back up battery
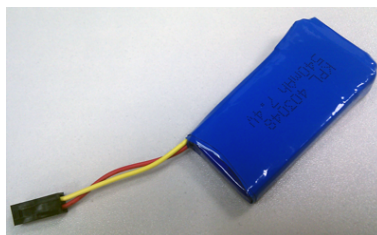
The back-up battery is designed as an optional add-on module and plugs directly on the wire harness. It embeds its own charging circuit, a two cells Lithium Polymer battery and protection circuits in a single housing.

In case the main power supply becomes unavailable, the MicroTracker will immediately switch to the back-up battery as its power source. An alert can be send to signal the disconnection of the main power source (which can happen in case of vehicle theft).

The battery can stand for around 5 hours of transmission, more than 2 days in power saving mode.

2.2.1   Specifications

– Voltage: 7.4V LiPo battery

– Capacity: 540mAh

– Connector: 2-pin molex

– Package: fiber glass

– Embedded charge circuit: will requires at least 8 hours of charge

2.2.2   /!\ Warning

The backup battery has been custom made, it includes a protection and charging circuit. Don't try to use any third-party battery on the wire harness connector.

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Chapter 3

Do and Do not

3.1 DO

– Plug the wire harness on the fuse box of the car, using the battery 12V or 24V to power the unit.

– Put the MicroTracker under the dash board facing up, to let the GPS see the sky.

– Go to a clear sky view area to first test the MicroTracker, as the GPS might have never got a fix before.

– Setup periodic report when ignition is on, and move the tracker driving the car it is installed in. You will be able to see good report position following your track.

– Always wait for the SMS acknowledgment of each configuration command before sending a new configuration command.

3.2 DO NOT

– Put the MicroTracker facing down. It will adversely affect the GPS signal reception if the antenna is not directed to the sky.

– Restart, reconfigure the unit all the time, if the MicroTracker cannot get a good GPS fix, please wait, first fix can take several minutes.

– Setup heartbeat reports every 30sec, and leave the MicroTracker not moving. If it is the case you will see a constellation of point around your position and that will not reflect the true quality of the GPS receiver. Heartbeat report is here to enable periodic health check report, to ensure the MicroTracker is well connected to the platform and still running well.

– Send all the configurations commands in a row without waiting for the SMS acknowledgment.

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Chapter 4

Step by Step - Quick Start Guide

4.1 First installation

1. Install the wire harness in the car, follow 2.1.3 instructions. The minimal setup consists of only connecting the red and black power supply wires. DO NOT connect the Micro Tracker to the wire harness yet.

2. Insert the SIM card in the SIM card holder, ensure that the holder is well closed and slided in lock position before you put back the plastic lid.

3. Note down the IMEI and SIM card phone number for future reference, it will help for configuring the tracker.

4. Plug the tracker on the wire harness.

5. Wait a few seconds, and verify the LED status, C (Cellular) green LED should be solid lit, G (GPS) red LED should be blinking, or solid lit.

    Note: All configuration commands have to be sent to the MicroTracker by SMS.

6. Send configuration command, the first command to be set is the SG106, to setup the server address, APN, and the phone number to receive the MicroTracker SMS reply. Please see the next chapter for details about the SMS commands

7. Setup alert report, one which can be checked and set up easily (for testing and evaluation) is the automatic time-based reporting, for example every 60 seconds : SG208,60,0

8. Put the tracker under the sky (follow instructions on the MT-01 casing), verify that the G red LED goes solid. You can now connect to the m2mgateway.net website.

9. Please contact Maestro Wireless Solutions to get access credentials for the M2Mgateway.net website if necessary (provide the IMEI number of the tracker) to obtain login informations

10. Connect to the platform using your credentials, and check your reports online.

4.2 Run a test in your car

1. After having checked that you can get heartbeat report with your unit on the m2mgateway.net platform, you might want to test all the alert features of the MicroTracker. For that you will have to switch on some alert reporting.

2. To do so, use SG211 command[1], for example: **SG211,10,1,14400,1,0,40,40,10,0,600,1,28800,1,600,1,TEST#1,**

3. Setup the ignition as required[2], for example, if you plug the white wire on the car starter: **SG104,1**

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[1]Refer to 5.2.2 SG211 command
[2]Refer to 5.2.1 SG104 command

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4. Go for a ride outside, check when you first go out that the G red led is solid, and have a safe trip.

5. Back on the website, log on the m2mgateway.net platform, and check your trip on the map.

Chapter 5

Software Manual

5.1 Introduction

5.1.1 Overview

This chapter defines:

– The syntax of the commands to set the unit, the corresponding responses and the data format of reports.

– The list of commands alerts and reports.

– Explanations of the software algorithms.

– Step by step instructions for OTA software update

5.1.2 Which build ?

Software version: 1.1

5.1.3 Acronym use in this document

<ID> will always refer to the IMEI number of the unit. It is used in all reports.

5.2 Server originated commands

5.2.1 Configuration commands

SG101: Set server SMS number

Command: SG101,<SVN> Response (SMS): @<ID>,101,<SVN>!

– Where <SVN> is server's SMS number; maximum 24 digits in this number are allowed.

It is recommended that this is the first command to send when setting up the unit (although it can be replaced by the more versatile SG106)

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After the unit receives a valid number inside this command, this number will be stored in the non-volatile Flash memory. The unit will then accept SMS originated from any number and will report to <SVN>.

If the <SVN> field is not filled, the unit will not handle SMS.

Example: Need to configure SMS reply number 99887766

Command: SG101,99887766

Response: @352238020015913,101,99887766!

SG102: Set username, password, APN

Command: SG102,<UN>,<PW>,<APN>

Response (SMS): @<ID>,102,<UN>,<PW>,<APN>!

- – Where <UN> is APN user name (max. 29 characters)
- – Where <PW> is APN password (max. 29 characters)
- – Where <APN> is the access point name (APN) (max. 79 characters)

GPRS will be activated only if APN is correctly set. In some case, password and username are necessary. All of these are provided by the network operator. Upon receiving this command, the settings are stored in flash memory and the unit will reboot once.

Example: Username & password are not necessary. The APN is "m2m.t-mobile.net"

Command: SG102,,,m2m.t-mobile.net

Response: @352238020015913,102,,,m2m.t-mobile.net!

SG103: Set port, IP address and protocol

Command: SG103,<PORT>,<IPA>,<UT>

Response (SMS): @<ID>,103,<PORT>,<IPA>,<UT>!

- – Where <PORT> is a port number between 0 to 65535
- – Where <IPA> is the server's IP address or DNS (max. 79 characters)
- – Where <UT> is the communication protocol:
    - <UT> = 1 for TCP
    - <UT> = 2 for UDP
    - <UT> = 3 for UDP with acknowledge
    - <UT> = 4 for SMS

These are the settings of the back-end server. It is necessary to change them when you decide to use your own back-end server instead of the M2Mgateway.net evaluation page. These settings are automatically stored in flash memory

Example: Need to configure TCP server for report on port 6000

Command: SG103,6000,202.130.84.237,1

Response: @352238020015913,103,6000,202.130.84.237,1!

SG104: Select wired ignition or virtual ignition types

Command: SG104,<IG_TYPE>

Response (SMS): @<ID>,104,<IG_TYPE>!

- – Where <IG_TYPE> is the choice of ignition type:
    - 1 = Wired ignition
    - 2 = Virtual ignition (measure car battery voltage)
    - 3 = Virtual ignition (unit in motion detected by GPS speed)

Virtual ignition is a mechanism employed for detecting that the vehicle's motor is turned off if you can not sense the ignition signal directly. Battery voltag based virtual ignition is divided into three profiles called segments (<10V: backup battery; 10-18V: car; >18V: truck). During power up, the unit will check the voltage level and choose the good segment. Voltage threshold for car is set to 13.8V and for truck is set to 25.5V. If you want to change the threshold level, use the SG555 command.

Default setting: <IG_TYPE> = 3

Example: You are using wired ignition (no virtual ignition)

Command: SG104,1

Response: @352238020015913,104,1!

SG105: Set FTP directory & FTP server login for DOTA

Command: SG105,<DIR>,<FTPUN>,<FTPPW>,<FTPIPA>

Response (SMS): @<ID>,105,<DIR>,<FTPUN>,<FTPPW>,<FTPIPA>!

- – Where <DIR> is the directory where the FTP server keeps the file for DOTA
- – Where <FTPUN> is FTP server's login username (max. 29 characters)
- – Where <FTPPW> is FTP server's login password (max. 29 characters)
- – Where <FTPIPA> is FTP server's IP address or DNS (max. 79 characters)

Example: Need to configure FTP server for DOTA update, in the directory /ATD/

Command: SG105,/ATD/,user,pass,www.myatdupdateserver.com

Response: @352238020015913,105,/ATD/,user,pass,www.myatdupdateserver.com!

SG106: Set port, IP address, username, password, APN, SMS number, and protocol

Command: SG106,<PORT>,<IPA>,<UN>,<PW>,<APN>,<SVN>,<UT>

Response (SMS): @<ID>,106,<PORT>,<IPA>,<UN>,<PW>,<APN>,<SVN>,<UT>!

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- Where <PORT> is port number between 0 to 65535

- Where <IPA> is server's IP address (max. 79 characters)

- Where <UN> is user name (max. 29 characters)

- Where <PW> is password (max. 29 characters)

- Where <APN> is access point name (APN) (max. 79 characters)

- Where <SVN> is server's SMS number (max. 24 digits)

- Where <UT> is choice of protocol:

  - <UT> = 1 for TCP
  - <UT> = 2 for UDP
  - <UT> = 3 for UDP with acknowledge

This command is to setup all the basic setup in one; it uses same parameters as the aforementioned ones.

Example: Need to configure TCP server for report & SMS reply number & APN

Command: SG106,6000,202.23.65.203,,,m2m.t-mobile.net,99887766,1

Response: @352238020015913,106,6000,202.23.65.203,,,m2m.t-mobile.net,99887766,1!

SG131: Query device firmware revision

Command: SG131

Response (SMS): @<ID>,131,<AFW>,<PF>!

- Where <AFW> is the version number of the application firmware

- Where <PF> is the profile name

Example:

Command: SG131

Response: @352238020015913,131,090302AVer0.5!

SG132: Query connetion settings

Command: SG132

Response (SMS): @<ID>,132,<PORT>,<IPA>,<UN>,<PW>,<APN>,<SVN>,<UT>!

- Where <PORT> is port number

- Where <IPA> is server's IP address

- Where <UN> is user name

- Where <PW> is password

- Where <APN> is access point name (APN)

- Where <SVN> is server's SMS number

- Where <UT> is choice of protocol:

  - <UT> = 1 for TCP
  - <UT> = 2 for UDP
  - <UT> = 3 for UDP with acknowledge
  - <UT> = 4 for SMS

Upon receiving this command, the unit will reply the current value of the parameters.

Example:

Command: SG132

Response: @352238020015913,132,6000,202.23.65.203,,,m2m.t-mobile.net,99887766,1!

SG133: Query FTP settings

Command: SG133

Response (SMS): @<ID>,133,<DIR>,<UN2>,<PW2>,<IPA2>!

- Where <DIR> is the directory where the FTP server keeps the file for DOTA

- Where <UN2> is FTP server's login username

- Where <PW2> is FTP server's login password

- Where <IPA2> is FTP server's IP address

Example:

Command: SG133

Response: @352238020015913,133,/ATD/,user,pass,www.myatdupdateserver.com !

5.2.2   Commands for setting interval/threshold of report/alert

SG201: Set ignition ON periodic location reporting & alert

Command: SG201,<INT_ON>,<ALT_ON>

Response (SMS): @<ID>,201,<INT_ON>,<ALT_ON>!

- Where <INT_ON> is the interval in **seconds** between each successive location reporting when ignition is ON. If it is set to any value **between 10 and 65000 with increment of 10**, then periodic location reporting will be enabled with reporting interval as the value set. If value set to 0, then periodic location reporting will be disabled.

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For the format of this periodic location reporting, please refer to event number 702 (wired ignition) and 703 (virtual ignition) described in chapter 6.

- – Where <ALT_ON> is to enable / disable alert message, which is triggered by an ignition ON:
    - 0 = disable
    - 1 = enable.

For the format of this alert message, please refer to event number 611 (wired ignition) and 612 (virtual ignition) described in chapter 6.

Default setting: <INT_ON> = 0, <ALT_ON> = 0

Example: Set alert of Ignition ON and report every minute

Command: SG201,60,1

Response: @352238020015913,201,60,1!

SG202: Set ignition OFF periodic location reporting & alert

Command: SG202,<INT_OFF>,<ALT_OFF>

Response (SMS): @<ID>,202,<INT_OFF>,<ALT_OFF>!

- – Where <INT_OFF> is the interval in **seconds** between each successive location reporting when ignition is OFF. If it is set to any value between **10 and 65000 with increment of 10**, then periodic location reporting will be enabled with reporting interval as the value set. If value set to 0, then periodic location reporting will be disabled.

For the format of this periodic location reporting, please refer to event number 705 (wired ignition) and 706 (virtual ignition) described in chapter 6.

- – Where <ALT_OFF> is to enable / disable alert message which is triggered by an ignition OFF:
    - 0 = disable
    - 1 = enable

For the format of this alert message, please refer to event number 614 (wired ignition) and 615 (virtual ignition) described in chapter 6.

Default setting: <INT_OFF> = 0, <ALT_OFF> = 0

Example: Set alert of Ignition OFF and report every hour

Command: SG202,3600,1

Response: @352238020015913,202,3600,1!

SG203: Set direction change threshold

Command: SG203,<TH_DC>

Response (SMS): @<ID>,203,<TH_DC>!

– Where <TH_DC> is the threshold of direction change in **degree** if exceeded will trigger an alert message. The value is to be set **between 10 and 180 with increment of 5**. If value set to 0, then this alert message will be disabled.

For the format of this alert message, please refer to event number 605 described in chapter 6.

This feature will function only if the GPS signal is available and the unit is in motion

Default setting: <TH_DC> = 0

Example: Set alert report of 90 degrees threshold.

Command: SG203,90

Response: @352238020015913,203,90!

SG204: Set speed threshold

Command: SG204,<TH_SP>

Response (SMS): @<ID>,204, <TH_SP>!

– Where <TH_SP> is the threshold of speed in **mph** if exceeded more than 15 seconds will trigger an alert message. The event will be reset when speed is 15mph below the threshold. The value is to be set **between 20 and 150 with increment of 5**. If value set to 0, then this alert message will be disabled.

For the format of this alert message, please refer to event number 606 described in chapter 6.

This feature will function only if the GPS signal is available

Default setting: <TH_SP> = 0

Example: Set alert report of 75 mph threshold.

Command: SG204,75

Response: @352238020015913,204,75!

SG205: Set Mileage Threshold

Command: SG205,<TH_MI>

Response (SMS): @<ID>,205,<TH_MI>!

– Where <TH_MI> is the threshold of distance travel in **miles** if exceeded will trigger an alert message. The value is to be set **between 10 and 65000 with increment of 5**. If value set to 0, then this alert message will be disabled. An alert is when multiple of the set threshold is reached. When the mileage accumulates up to 65000, it goes back to zero, at this point, an alert is sent also. This alert can be used for distance-based reporting.

For the format of this alert message, please refer to event number 607 described in chapter 6.

Default setting: <TH_MI> = 0

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Example: Set alert report of 600 miles threshold.

Command: SG205,600

Response: @352238020015913,205,600!

SG206: Set low battery detection

Command: SG206,<TH_BAT>,<PS>

Response (SMS): @<ID>,206,<TH_BAT>,<PS>!

- Where <TH_BAT> is main battery voltage threshold, in volt.
- Where <PS> is the GPS power saving mode. In power saving mode the GPS will get a fix and sleep for 10min, before wake up and fix again. The MT-01 will go under power saving mode when battery back-up is too low, or when ignition is off.

For the format of this alert message, please refer to event number 608 described in chapter 6.

Default setting: <TH_BAT> = 0, <PS> = 0

Example: Set low battery detection to 10V and GPS power saving on battery backup.

Command: SG206,10,1

Response: @352238020015913,206,10,1!

SG207: Set battery disconnect detection

Command: SG207,<INT_MB>,<ALT_MB>

Response (SMS): @<ID>,207,<INT_MB>,<ALT_MB>!

- Where <INT_MB> is the periodic report interval in **seconds**. If it is set to any value between **10 and 65000 with increment of 10**, then periodic location reporting will be enabled with reporting interval as the value set. If value set to 0, then periodic location reporting will be disabled.
- Where <ALT_MB> is to enable/disable alert message which is triggered by battery disjunction.

For the format of this alert message, please refer to event number 609 (battery disconnected) and 610 (battery reconnected) described in chapter 6. For the format of the periodic report, please refer to event number 707 described in chapter 6.

Default setting: <INT_MB> = 0, <ALT_MB> = 0

Example: Set battery disconnection alert and report every 15min.

Command: SG207,900,1

Response: @352238020015913,207,900,1!

SG208: Set Heartbeat reporting / Power up alert

Command: SG208,<INT_HB>,<ALT_PU>

Response (SMS): @<ID>,208,<INT_HB>,<ALT_PU>!

– Where <INT_HB> is the interval in **seconds** between each successive heartbeat location reporting. If it is set to any value **between 10 and 65000 with increment of 10**, then heartbeat location reporting will be enabled with reporting interval as the value set. If value set to 0, then periodic location reporting will be disabled. For the format of this periodic location reporting, please refer to event number 701 described in chapter 6.

– Where <ALT_PU> is to enable / disable alert message which is triggered by a power-up:

  • 0 = disable
  • 1 = enable

For the format of this alert message, please refer to event number 601 described in chapter 6.

Default setting: <INT_HB> = 0, <ALT_PU> = 0

Example: Set power up alert and heartbeat every hour.

Command: SG208,3600,1

Response: @352238020015913,208,3600,1!

SG209: Set idle alert period

Command: SG209,<IDT>

Response (SMS): @<ID>,209,<IDT>!

Idle means your car engine is running and your car is not moving.

– Where <IDT> is the threshold idle time in **seconds**, if exceeded will trigger an alert message. The value is to be set **between 10 and 65000 with increment of 10**. If value set to 0, then this alert message will be disabled.

For the format of this alert message, please refer to event number 616 described in chapter 6.

This feature will function only when ignition type is set at 1 (no virtual ignition) This feature will function only if the GPS signal is available

Default setting: <IDT> = 0

Example: Set idle time report to 30min

Command: SG209,1800

Response: @352238020015913,209,1800!

SG210: Set tow alert

Command: SG210,<TOW>

Response (SMS): @<ID>,210,<TOW>!

Tow means your car engine is not running, but your car is moving.

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- Where <TOW> is for controlling the detection of tow:

    - 0 = disable tow alert
    - 1 = enable tow alert

For the format of this alert message, please refer to event number 617 (tow detected) and 618 (tow stopped) described in chapter 6.

This feature will function only when ignition type is set at 1 This feature will function only if the GPS signal is available

Default setting: <TW> 0

Example: Set tow alert.

Command: SG210,1

Response: @352238020015913,210,1!

SG211: Sets commands from SG201 to SG210 in one, with profile name

Command:
SG211,<INT_ON>,<ALT_ON>,<INT_OFF>,<ALT_OFF>,<TH_DC>,<TH_SP>,<TH_MI>,<TH_BAT>, <PS>,<INT_MB>,<ALT_MB>,<INT_HB>,<ALT_PU>,<IDT>,<TOW>,<PF>,

Response (SMS):
@<ID>,211,<INT_ON>,<ALT_ON>,<INT_OFF>,<ALT_OFF>,<TH_DC>,<TH_SP>,<TH_MI>, <TH_BAT>,<PS>,<INT_MB>,<ALT_MB>,<INT_HB>,<ALT_PU>,<IDT>,<TOW>,<PF>,!

- Where <INT_ON> & <ALT_ON> are ignition ON reporting & alert settings

- Where <INT_OFF> & <ALT_OFF> are ignition OFF reporting & alert settings

- Where <TH_DC> is threshold of direction change

- Where <TH_SP> is threshold of speed

- Where <TH_MI> is threshold of mileage

- Where <TH_BAT> is threshold of battery disconnected

- Where <PS> is the power saving mode of GPS

- Where <INT_MB> is the interval of battery disjunction

- Where <ALT_MB> is the alert of battery disjunction

- Where <INT_HB> is the interval of heartbeat location reporting

- Where <ALT_PU> is to enable/disable Power Up alert

- Where <IDT> is the threshold idle time

- Where <TOW> is for controlling the detection of tow

- Where <PF> is the profile name (max. 10 char.)

Upon receiving this command, the settings are stored in Flash memory and the unit will reboot once.

Example: Set all alerts ON, periodic report OFF and name this profile FIRSTSET.

Command: SG211,0,1,0,1,0,0,0,0,0,0,1,0,1,0,1,0,0,FIRSTSET,

Response: @352238020015913,211,0,1,0,1,0,0,0,0,0,0,1,0,1,0,1,0,0,FIRSTSET,!

SG231: Query current interval, alert and threshold settings

Command: SG231

Response (SMS):
@<ID>,231,<INT_ON>,<ALT_ON>,<INT_OFF>,<ALT_OFF>,<TH_DC>,<TH_SP>,<TH_MI>,
<TH_BAT>,<PS>,<INT_MB>,<ALT_MB>,<INT_HB>,<ALT_PU>,<BZ>,<IG_TYPE>,<IDT>,<TOW>,<PF>!

- Where <INT_ON> & <ALT_ON> are ignition ON reporting & alert settings

- Where <INT_OFF> & <ALT_OFF> are ignition OFF reporting & alert settings

- Where <TH_DC> is threshold of direction change

- Where <TH_SP> is threshold of speed

- Where <TH_MI> is threshold of mileage

- Where <TH_BAT> is threshold of battery disconnected

- Where <PS> is the power saving mode of GPS

- Where <INT_MB> is the interval of battery disjunction

- Where <ALT_MB> is the alert of battery disjunction

- Where <INT_HB> is the interval of heartbeat location reporting

- Where <ALT_PU> is to enable/disable Power Up alert

- Where <BZ> is to enable/disable buzzer

- Where <IG_TYPE> is the choice of ignition type

- Where <IDT> is the threshold idle time

- Where <TOW> is for controlling the detection of tow

- Where <PF> is the profile name

Example:

Command: SG231

Response: @352238020015913,231,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,3,0,0,FGT!

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5.2.3 Commands for setting up geofence

SG301: Add rectangular geofence to device memory

Command: SG301,<IDX>,<MODE>,<TL_LAT>,<TL_LON>,<BR_LAT>,<BR_LON>

Response (SMS): @<ID>,301,<IDX>,<MODE>,<TL_LAT>,<TL_LON>,<BR_LAT>,<BR_LON>!

- Where <IDX> is the index number 0 to 9 assigned to each geofence
- Where <MODE> is mode:

  - 0 = disable geofence
  - 1 = trigger alert message when the unit moves out of geofence
  - 2 = trigger alert message when the unit moves into geofence
  - 3 = trigger alert message when the unit either moves in or out of geofence

- Where <TL_LAT> is the latitude of the top left corner (max 8 char, 0.00000)
- Where <TL_LON> is the longitude of the top left corner (max 8 char, 0.00000)
- Where <BR_LAT> is the latitude of the bottom right corner (max 8 char, 0.00000)
- Where <BR_LON> is the longitude of the bottom right corner (max 8 char, 0.00000)

For the format of this alert message, please refer to event number 602 described in chapter 6.

The unit executes the cross-fence checking only if GPS signal is available.

Example: Rectangular geofence index 0 which trigger alert in or out with top left corner 45.5,85.1 and bottom right corner 27.1,105.6

Command: SG301,0,3,45.5,85.1,27.1,105.6

Response: @352238020015913,301,0,3,45.5,85.1,27.1,105.6!

SG302: Set Circular region

Command: SG302,<IDX>,<MODE>,<C_LAT>,<C_LON>,<RA>

Response (SMS): @<ID>,302,<IDX>,<MODE>,<C_LAT>,<C_LON>,<RA>!

- Where <IDX> is the index number 0 to 9 assigned to each geofence
- Where <MODE> is mode:

  - 0 = disable geofence
  - 1 = trigger alert message when the unit moves out of geofence
  - 2 = trigger alert message when the unit moves into geofence
  - 3 = trigger alert message when the unit either moves in or out of geofence

- Where <C_LAT> is the latitude of center (max 8 char, 0.00000)
- Where <C_LON> is the longitude of center (max 8 char, 0.00000)

– Where <RA> is the radius (unit meter, minimum 40m, maximum 100km)

For the format of this alert message, please refer to event number 603 described in chapter 6.

The unit executes the cross-fence checking only if GPS signal is available.

Example: Circular geofence index 4 which trigger alert in with center 45.5,85.1 and 500m radius

Command: SG302,4,2,45.5,85.1,500

Response: @352238020015913,302,4,2,45.5,85.1,500!

SG303: Set Polygon region

Command: SG303,<IDX>,<MODE>,<D_LAT1>,<D_LON1>,<D_LAT2>,<D_LON2>,..., <D_LAT8>,<D_LON8>

Response (SMS): @<ID>,303,<IDX>,<MODE>!

- Where <IDX> is the index number 0 to 9 assigned to each geofence
- Where <MODE> is mode:

  - 0 = disable geofence
  - 1 = trigger alert message when the unit moves out of geofence
  - 2 = trigger alert message when the unit moves into geofence
  - 3 = trigger alert message when the unit either moves in or out of geofence

- Where <D_LAT1> is the latitude of location dot 1 (max 8 char, 0.00000)
- Where <D_LON1> is the longitude of location dot 1 (max 8 char, 0.00000)

Note: maximum of 8 location points, please follow the order of drawing polygons, set the D_LATn and D_LONn.

For the format of this alert message, please refer to event number 604 described in chapter 6.

The unit executes the cross-fence checking only if GPS signal is available.

Example: Polygonal geofence index 6 which trigger alert out with points: 33,106; 23,118; 28,96.

Command: SG303,6,1,33,106,23,118,28,96

Response: @352238020015913,303,6,1,33,106,23,118,28,96!

SG331: Query geofence settings

Command: SG331,<IDX>

Response (SMS): @<ID>,331,<IDX>,<MODE>,<TL_LAT>,<TL_LON>,<BR_LAT>,<BR_LON>!

- Where <IDX> is the index number 0 to 9 assigned to each geofence
- Where <MODE> is mode:

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- 0 = disable geofence
- 1 = trigger alert message when the unit moves out of geofence
- 2 = trigger alert message when the unit moves into geofence 3= trigger alert message when the unit either moves in or out of geofence

  - Where <TL_LAT> is the Latitude of the Top Left corner

  - Where <TL_LON> is the Longitude of the Top Left corner

  - Where <BR_LAT> is the Latitude of the Bottom Right corner

  - Where <BR_LON> is the Longitude of the Bottom Right corner

Example: Query geofence index 4

Command: SG331,4

Response: @352238020015913,331,4,2,45.50000,85.10000,500!

SG351: Delete all geofences

Command: SG351

Response (SMS): @<ID>,351!

This will disable all geofences.

Example: Delete all the geofences in memory

Command: SG351

Response: @352238020015913,351!

5.2.4   SMS number screening

You can enable SMS number screening to allow up to three numbers to send command to the unit. The main server SMS number will always be allowed to send command.

SG401,1: Set SMS number and enable screening

Command: SG401,1,<SSN1>,<SSN2>,<SSN3>

Response (SMS): @<ID>,401,1,<SSN1>,<SSN2>,<SSN3>!

  - Where SSN is the phone number allow to send SMS to the unit.

    Note: SSN1, SSN2, SSN3 are optional, that means you can type "SG401,1„xxx," to change only the second number.
    Note: If no change the <SSN>, you can use the "SG401,1„," to just enable it.

Example: Set SMS number screening 99887766

Command: SG401,1,99887766„

Response: @352238020015913,401,1,99887766,*,*!

SG401,2: Query SMS number screening list

Command: SG401,2

Response (SMS): @<ID>,401,2,<SSN1>,<SSN2>,<SSN3>!

Example: Query SMS number screening

Command: SG401,2

Response: @352238020015913,401,2,99887766,*,*!

SG401,3: Remove the SMS number screening list

Command: SG401,3

Response (SMS): @<ID>,401,3!

Example: Remove SMS number screening list

Command: SG401,3

Response: @352238020015913,401,3!

SG401,0: Disable screening

Command: SG401,0

Response (SMS): @<ID>,401,0!

Example: Disable SMS number screening

Command: SG401,0

Response: @352238020015913,401,0!

5.2.5   General actions commands

SG501: Reset the modem

Command: SG501

Response (SMS): @<ID>,501!

This will reset the entire modem and revert back to all non-volatile parameters

Example: One shot reboot

Command: SG501

Response: @352238020015913,501!

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SG502: Erase entire non-volatile memory

Command: SG502

Response (SMS): @<ID>,502!

This will erase all the non-volatile parameters saved in flash memory, including diagnostics values.

/!\ **Caution: This command force all the settings to factory default. The unit will then reboot once.**

Example: One shot reset and restore to factory configuration

Command: SG502

Response: @352238020015913,502!

SG503: Update Firmware

Command: SG503,<FILE>

Response to indicate update start (SMS): @<ID>,503,1,<FILE>!

Response to confirm completion (SMS): @<ID>,503,2,<VER>,<PF>!

- – Where <FILE> is the filename
- – Where <VER> is the firmware version
- – Where <PF> is profile name

Example: Launch DOTA update

Command: SG503,update1.1.wpb.dwl

Response: @352238020015913,503,1,update1.1.wpb.dwl!

Response after reboot on new version: @352238020015913,503,2,101109BV1.1,FIRSTSET!

SG531: Read and report vehicle position immediately

Command: SG531,<RSP>

Response (TCP/UDP or SMS): @<ID>,531,<PF>,<GPS>,<BV>,<RSSI>,<STARTER>,<IGNIT>,<D>,<T>, <LT>,<LN>,<AL>,<SP>,<DIR>,<SAT>,<HDOP>,<MI>!

- – Where <RSP> is the means by which the response will be sent
  - • 1 = TCP/UDP/UDPwACK as configured
  - • 2 = SMS
  - • If omitted, it will send report via the medium use to send the command. ie if you send SG551 command by SMS it will reply by SMS.
- – Where <D> is the date (10 characters YYYY/MM/DD)
- – Where <T> is the time (8 characters HH:MM:SS)

- Where <LT> is the latitude

- Where <LN> is the longitude

- Where <AL> is the altitude

- Where <SP> is the speed (mph)

- Where <DIR> is the heading direction in degree

- Where <SAT> is the number of satellites used for position fix

- Where <HDOP> is the HDOP GPS accuracy value

- Where <BV> is battery voltage

- Where <GPS> is GPS status

- Where <STARTER> is starter status

    - 0 = Starter disabled
    - 1 = Starter enabled

- Where <RSSI> is the GSM signal strength

- Where <MI> is the Mileage reading

- Where <IG> is the Ignition status

Example: One shot request position by SMS

Command: SG531,2

Response: @352238020015913,531,FGT,1,13.4,23,0,1,2009/08/22,02:24:49,22.58552,145.4589,100,20.5, 25.5,5,1.5,104.25!

SG532: Query diagnostics values

Command: SG532,<CLEAR>

Response (SMS):
@<ID>,532,<GSM>,<GPRS>,<PDP>,<HO>,<PU>,<R>,<%GPS>,<%GPSQ>,<%GPRS>,
<DBO>,<ABI>,<DBI>,<SO>,<SI>,<SS>,<MAX_ACC>,MIN_ACC>,<MAX_SP>,<CARRIER_ID>,<TOWER_ID>!

- Where <CLEAR> is 1 to reset the values, 0 to do nothing.

- Where <GSM> is registration state:

    - 0 = no registration
    - 1 = home
    - 2 = search
    - 3 = denied
    - 4 = unknown
    - 5 = roaming

  Note: for SMS response GSM registration is required, so only states 1 and 5 will appeared.

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- Where <GPRS> is GPRS registration state

- Where <PDP> is GPRS PDP state

- Where <HO> is the number of hours the unit was on, since last clear

- Where <PU> is the number of power up, since last clear

- Where <R> is the number of reset, since last clear

- Where <%GPS> is percentage of GPS lost, since last clear

- Where <%GPSQ> is the percentage of GPS with no good fix, since last clear

- Where <%GSM> is the percentage of GSM lost, since last clear

- Where <%GPRS> is the percentage of GPRS lost, since last clear

- Where <DBO> is the number of data sent (in bytes), since last clear

- Where <ABI> is the number of bytes sent as ACK, since last clear

- Where <DBI> is the number of bytes receive for DOTA, since last clear

- Where <SO> is the number of SMS sent, since last clear

- Where <SI> is the number of SMS received, since last clear

- Where <SS> is the number of SMS received and ignored, since last clear

- Where <MAX_ACC> is the maximum acceleration the unit had, since last clear

- Where <MIN_ACC> is the maximum deceleration the unit had since last clear

- Where <MAX_SP> is the maximum speed the unit had since last clear

- Where <CARRIER_ID> is the ID of the GSM carrier

- Where <TOWER_ID> is the ID of the GSM tower cell the unit is connected to

Example: One shot query diagnostics values

Command: SG532,0

Response: @352238020015913,532,1,0,1,a,1,1,1,0,0,139,0,0,c,12,0,0,0,0,45406,cc30!

SG533: Check GPS and Communication status

Command: SG533

Response (SMS): @<ID>,533,GPS:<x>,BE:<x>,SC:<x>,FC:<x>!

- Where GPS is the GPS state

- Where BE is GPRS state

- Where SC is the TCP connect state

- Where FC is the FTP connect state during DOTA operation

- Where <x> is the state of respective functions

- 0 = Inactive
- 1 = Active

Example: One shot check of GSM and communication status

Command: SG533

Response: @352238020015913,533,GPS:1,BE:1,SC:0,FC:0!

SG551: Sets output for external starter relay

Command: SG551,<STARTER>,<RSP>

Response (TCP/UDP or SMS): @<ID>,551,<D>,<T>,<LT>,<LN>,<AL>,<SP>,<DIR>,<SAT>,<HDOP>,<BV>, <GPS>,<STARTER>,<RSSI>,<MI>,<IG>!

- Where is <STARTER> status:

  - 0 = starter disabled (relay opened)
  - 1 = starter enabled (relay closed)

- Where <RSP> is the means by which the response will be sent

  - 1 = TCP/UDP/UDPwACK
  - 2 = SMS
  - If omitted, it will send report via the medium use to send the command. ie if you send SG551 command by SMS it will reply by SMS.

- Where <BV> is battery voltage

- Where <GPS> is GPS status

- Where <RSSI> is the GSM signal strength

- Where <MI> is the mileage reading

- Where <IG> is the ignition status

Upon receiving SG551,0 commands, if the unit is registered to GSM network, then the starter will be disabled. But if the unit loses GSM registration at this moment, the starter will not be disabled until GSM registration is recovered.

Default setting: <STARTER> = 1 meaning that the starter is enabled.

Example: One shot set output for starter relay

Command: SG551,0,2

Response: @352238020015913,551,FGT,1,13.4,23,0,1,2009/08/22,02:24:49,22.58552,145.4589,100,20.5, 25.5,5,1.5,104.25!

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SG552: Set Buzzer pattern

Command: SG552,<BZ>

Response (SMS): @<ID>,552,<BZ>!

- Where <BZ> is for controlling the buzzer on/off and the sound pattern:
  - 0 = disable
  - 1 = pattern#1 (100Hz for 3 seconds & 1000Hz for 2 seconds alternating)
  - 2 = pattern#2 (550Hz for 3 seconds & 1000Hz for 2 seconds alternating)

Default setting: <BZ> = 0

Example: One shot set buzzer pattern 2 ON

Command: SG552,2

Response: @352238020015913,552,2!

SG553: Initialize / set Odometer

Command: SG553,<ODO>

Response (SMS): @<ID>,553,<ODO>!

- Where <ODO> is the between 0 and 65,000 in miles in increment of 1.

This command is to set the odometer to a value from 0 to 65,000 miles.

Default setting: <ODO> = 0

Example: On installation set the odometer to 600 miles

Command: SG553,600

Response: @352238020015913,553,600!

SG554: Activate A-GPS Position Aiding

Command: SG554,<AGPS>

Response (SMS): @<ID>,554!

- Where <AGPS> is the AGPS status
  - 0 = AGPS disabled
  - 1 = AGPS enabled

Assisted-GPS enhance the GPS performance to achieve speedy position fix and accuracy.

/!\ **Warning:** Turning on AGPS will increase the GPRS data traffic, one AGPS fix requires data traffic of approximately 2KB.

Default setting: <AGPS> = 0

Example: Activated A-GPS

Command: SG554,1

Response: @352238020015913,554,1!

SG555: Change the voltage detection level for the virtual ignition

Command: SG555,<MODE>,<BVC>,<BVT>

Response (SMS): @<ID>,555,<MODE>,<BVC>,<BVT>!

- **–** Where <MODE> is

    - 0 = Read the values
    - 1 = Set new values

- **–** Where <BVC> times 16 is the voltage level for Car battery in mV
- **–** Where <BVT> times 16 is the voltage level for Truck battery in mV

Default setting: <BVC> = 862*16 = 13792 $\approx$ 13.8V, <BVT> = 1593*16 = 25488 $\approx$ 25.5V

Example: Change the voltage detection level for the virtual ignition to 13.8V and 25.5V

Command: SG555,1,862,1593

Response: @352238020015913,555,1,862,1593!

SG556: Control digital output 2

Command: SG556,<state>

Response (SMS): @UID,556,<DO2>!

- **–** Where <DO2> is the output 2 state

    - 1 is output High
    - 0 is output Low

Default setting: <DO2> = 0

Example: Switch the digital output 2 to High.

Send: SG556,1

Response: @0123456789012,556,1!

SG557: Read the Analog input

Command: SG557

Response (SMS): @UID,557,<AI value>!

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Note: Analog input voltage max is 5V.

– Where <AI value> is from 0-2000 equals 0-5V.

Example: Read the analog input

Send: SG557

Response: @0123456789012,557,1500!

SG558: Set analog input alert report under/over value

Command: SG558,<AI_L>,<AI_H>

Response (SMS): @UID,558,<AI_L>,<AI_H>!

Note: Analog input value is 0-2000 equals 0-5V.

– Where <AI_L> is the analog input value that will trigger alert 619 if voltage goes under.
– Where <AI_H> is the analog input value that will trigger alert 620 if voltage goes over.

When the analog input value will come back in the normal range, alert 621 will be triggered.

Default setting: <AI_L> = 0 & <AI_H> = 0

Example: Setup an alert report when analog input goes over 3.75V.

Send: SG558,0,1500

Response: @0123456789012,558,0,1500!

Chapter 6

Event-triggered Periodic Reporting & Alert Message

Both periodic reporting & alert messages are sent through TCP or through UDP by the unit to the server when a defined event is triggered.

This chapter describes the syntax of the alert and periodic reporting (Report type syntax #1) and the geofence alert message (syntax #2) As well as the special UDP with ACK format and behavior (syntax #3).

6.1   Meaning of Syntax Fields

- <ID> IMEI number of the unit

- <PF> the profile name

- <GPS> GPS status

- <BV> battery voltage

- <RSSI> GSM signal strength

- <STARTER> starter status

- <IGNIT> ignition mode

- <D> date

- <T> time

- <LT> latitude

- <LN> longitude

- <AL> altitude in meters

- <SP> speed in mph

- <DIR> direction in degree

- <SAT> number of satellites used position fix

- <HDOP> GPS position accuracy indication

- <MI> mileage reading

- <GF_ID>

  - First digit = the index number 0 to 9 of the geofence
  - Second digit = 1 or 2 (1 means out of fence violation; 2 means inside the fence violation)

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6.2 Syntax #1: TCP/UDP/SMS

General Reports: @ <ID>, <MSG#>, <PF>, <GPS>, <BV>, <RSSI>, <STARTER>, <IGNIT>, <D>, <T>, <LT>, <LN>, <AL>, <SP>, <DIR>, <SAT>, <HDOP>, <MI> !

Event number (MSG#)	Description	Details
531	Location report on demand (command SG531)	Alert send directly after reception, send position if good fix, if no GPS send last know position
551	External starter relay status change (command SG551)	same as 531
701	Periodic reporting heartbeat while powered	On each timer, send position if good fix, if no GPS send last know position
702	Periodic reporting with wired ignition ON	When DI1 is High, same as 701
703	Periodic reporting while virtual ignition ON	When supply voltage is > BVC, same as 701
704	Periodic reporting while GPS ignition ON	When GPS position is moving, same as 701
705	Periodic reporting with wired ignition OFF	When DI1 is Low, same as 701
706	Periodic reporting while virtual ignition OFF	When supply voltage is < BVC - 0.8V, same as 701
707	Periodic reporting while battery is disconnected	When main input voltage < 9V, same as 701
708	Periodic reporting when speed threshold exceeded	When speed is > TH_SP, same as 701
601	Alert message when power up/reset	When unit power cycle happen and GPS has good fix, send report
605	Alert message when direction change threshold exceeded	When direction between two position change > TH_DC, same as 531
606	Alert message when speed threshold exceeded	When speed > TH_SP, same as 531
607	Alert message when mileage threshold exceeded / reach 65000 miles	When mileage > TH_MI or 65000 miles, same as 531
608	Alert message when battery Voltage below threshold	When main input voltage < TH_BAT, same as 531
609	Alert message when battery disconnected	When main input voltage < 9V, same as 531
610	Alert message when battery re-connected	When main input back on 12V or more, same as 531
611	Alert message when wired ignition ON detected	When DI1 is High, same as 531
612	Alert message when virtual ignition ON detected	When supply voltage is > BVC, same as 531
613	Alert message when GPS ignition ON detected	When GPS position is moving, same as 531
614	Alert message when wired ignition OFF detected	When DI1 is Low, same as 531
615	Alert message when virtual ignition OFF detected	When supply voltage is < BVC - 0.8V, same as 531
616	Alert message when idle period threshold exceeded	When ignition is on, and position not moving for time > IDT, same as 531
617	Alert message when towing detected	When GPS speed > 5mph, same as 531
618	Alert message when towing stopped	After 617, when speed < 5mph, same as 531
619	Alert message when analog input over limit is breached	When AI1 > AI_H, same as 531
620	Alert message when analog input go back to normal range	After 619 or 621 and AI_L < AI1 < AI_H, same as 531
621	Alert message when analog input under limit is breached	When AI1 < AI_L, same as 531

6.2.1 Syntax #2: TCP/UDP/SMS – Geofence reports

@ <ID>, <MSG#>, <PF>, <GPS>, <BV>, <RSSI>, <STARTER>, <IGNIT>, <D>, <T>, <LT>, <LN>, <AL>, <SP>, <DIR>, <SAT>, <HDOP>, <MI>, <GF_ID> !

Event number (MSG#)	Description
602	Alert message when rectangular geofence crossing is detected
603	Alert message when circular geofence crossing is detected
604	Alert message when polygonal geofence crossing is detected

6.3 Syntax #3: UDPwACK

General report: @ <ID>, <MSG#>, <PF>, <GPS>, <BV>, <RSSI>, <STARTER>, <IGNIT>, <D>, <T>, <LT>, <LN>, <AL>, <SP>, <DIR>, <SAT>, <HDOP>, <MI>, <SEQ> !

Geofence report: @ <ID>, <MSG#>, <PF>, <GPS>, <BV>, <RSSI>, <STARTER>, <IGNIT>, <D>, <T>, <LT>, <LN>, <AL>, <SP>, <DIR>, <SAT>, <HDOP>, <MI>, <GF_ID>, <SEQ> !

- Where <SEQ> is the sequence number (0 to 255, incremented on each successful UDP acknowledgment from the server) assigned by the unit if UDP with acknowledge mode is enabled.

The format of the UDP acknowledgment from the server: SG*UDP_ACK,<ID>,<SEQ>,<CR>,<LF>

- Where <CR> is the Carriage Return character

- Where <LF> is the Line Feed character

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Chapter 7

Annex

7.1 Firmware update

7.1.1 By serial port

Condition

– The serial port is accessible after removing the lid covering the SIM card holder.

– Maestro Wireless has given you a serial port adaptor that will be hooked up to the MicroTracker.

Procedure

1. Load the .dwl file of the desired version into designated directory

2. Launch the HyperTerminal program on a PC running Windows XP, or with HyperTerminal software

3. Configure the right COM port number, Baud rate = 115200, Character Framing = 8N1, hardware flow control

4. Send command AT to check if OK response

5. Send AT+WOPEN=0 to stop the software execution. It should reply OK

6. Send command AT+WDWL to activate download mode. It should reply +WDWL:0

7. Pull-down menu: Transfer -> Send

8. Browse the directory and select the .dwl file

9. Select Xmodem protocol

10. Push SEND button. Download begins

11. After download finishes, send AT+CFUN=1 command to reset the unit

12. Send AT+WOPEN=1 to start the software execution. It should reply OK

7.1.2 DOTA process

Condition

– A valid SIM Card is placed into the device and device can register to GSM network

– Device can use GPRS provided by the network

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- Make sure GSM network is stable

- Make sure FTP server is stable and accessible

- Make sure power supply is stable

Procedure

1. Plug your tracker with the SIM card inserted. Verify the SIM card phone number and APN.

2. Use your mobile phone to send the configuration command by SMS.

3. Follow this process:

   (a) If the APN has not been configured before, send the following command:
       SG106,60000,202.130.84.237,<APNUSER>,<APNPASS>,<APN>,<REPLYPHONENUMBER>,1

   (b) Always wait for the SG106 SMS reply as it is the most important command.

   (c) Send FTP configuration command: **SG105,/mt-01/,maestro,dota,202.130.84.237**

   (d) Wait for the SG105 SMS reply.

   (e) Send Reset command to ensure the configuration is saved in flash properly: **SG501**

   (f) Wait for the SG501 SMS reply.

   (g) Send the Launch DOTA command: **SG503,update1.1.wpb.dwl**

   (h) You will receive a Launch DOTA acknowledgement as SG503,1 SMS reply.

   (i) When DOTA is completed (around 5min later) you will received a SG503,2 SMS reply with the new version name : @<IMEI>,503,2,101109BV1.1,FGT! The device will auto reset after finishing downloading and upgrading the firmware.

   (j) Now you are all set to enjoy the features of the V1.1.
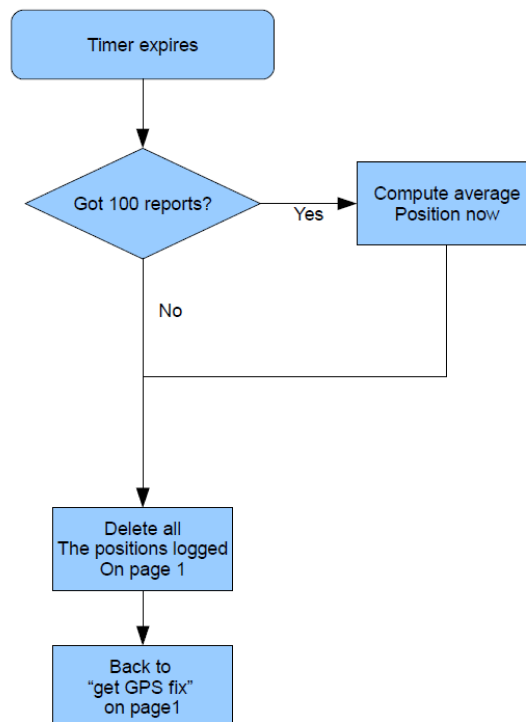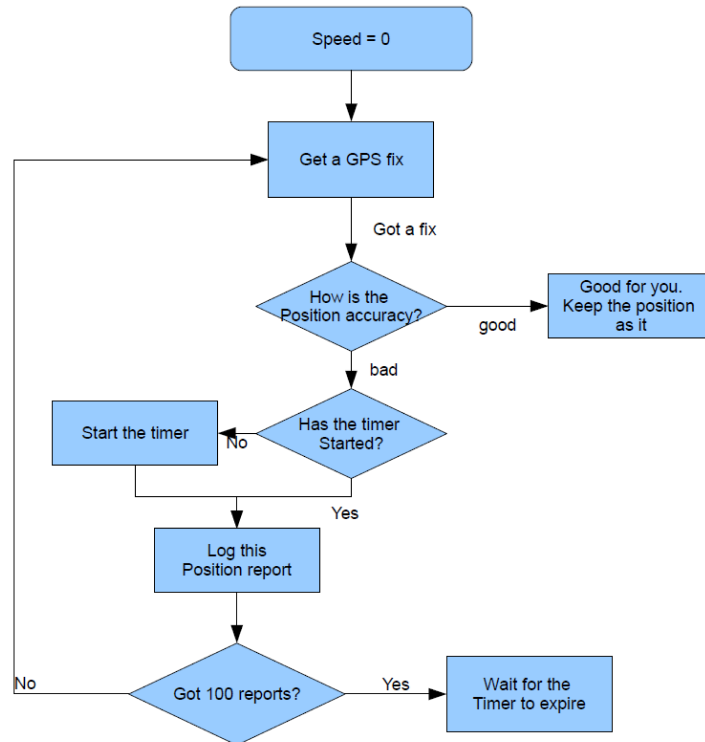
Costing of DOTA operation

- Time consumption: Time for DOTA depends on network condition and file size. Usually it is completed in 60-120 sec.

- GPRS consumption: GPRS data depends on DOTA files size. Usually the size is between 350k-500k Bytes.

Possible reason of unsuccessful DOTA

- DOTA Server is closed

- DOTA Server is blocked by firewall

- Connection to DOTA Server is too slow or unstable

- Network provider does not offer GPRS service

- GSM network signal is unstable

Note: If DOTA is unsuccessful, the operation will be aborted and device continues to operate with the old firmware version.

7.2   GPS good fix algorithm

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7.3 Power saving mode behavior

7.3.1 Functional Description

The MicroTracker has an auto power saving mode. If you want to enable this function, you need to send **SG206,0,1** command. When activated the application will monitor the car ignition switch and the power supply. When MT-01 power supply is in normal range, power saving is activated when ignition is off. If MT-01 power supply is low, the power saving will be always on.

7.3.2 How it works ?

Ignition state is:

- ON:

  - If power supply is low, the GPS will try to get a fix for 5min, then go to sleep 10min; until alert timer is raised, or command received.

- OFF:

  - The GPS goes to sleep mode; until alert timer is raised, command received, or ignition goes to on.

7.4 Reports example for parser development

Location report on demand (command SG531) - 531: @ 123451234512345, 531, FGT, 1, 12.5, 30, 0, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160.0, 8, 1, 20 !

External starter relay status change (command SG551) - 551: @ 123451234512345, 551, FGT, 1, 12.5, 30, 1, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160.0, 8, 1, 20 !

Periodic reporting heartbeat while powered - 701: @ 123451234512345, 701, FGT, 1, 12.5, 30, 0, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160.0, 8, 1, 20 !

Periodic reporting with wired ignition ON - 702: @ 123451234512345 , 702, FGT, 1, 14.7, 30, 0, 1, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 25.12, 160.0, 8, 1, 25 !

Periodic reporting while virtual ignition ON - 703: @ 123451234512345, 703, FGT, 1, 14.7, 30, 0, 1, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 25.12, 160.0, 8, 1, 25 !

Periodic reporting while GPS ignition ON - 704: @ 123451234512345, 704, FGT, 1, 14.7, 30, 0, 1, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 25.12, 160.0, 8, 1, 25 !

Periodic reporting with wired ignition OFF - 705: @ 123451234512345, 705, FGT, 1, 12.5, 30, 0, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160.0, 8, 1, 25 !

Periodic reporting while virtual ignition OFF - 706: @ 123451234512345, 706, FGT, 1, 12.5, 30, 0, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160.0, 8, 1, 25 !

Periodic reporting while battery is disconnected - 707: @ 123451234512345, 707, FGT, 1, 7.4, 30, 0, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160.0, 8, 1, 25 !

Periodic reporting when speed threshold exceeded - 708: @ 123451234512345, 607, FGT, 1, 14.7, 30, 0, 1, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 81.0, 160.0, 8, 1, 25 !

Alert message when power up/reset - 601: @ 123451234512345, 601, FGT, 1, 12.5, 30, 0, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160.0, 8, 1, 25 !

Alert message when rectangular geofence crossing is detected - 602: @ 123451234512345, 602, FGT, 1, 14.7, 30, 0, 1, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 25.12, 160.0, 8, 1, 25, 02 !

Alert message when circular geofence crossing is detected - 603: @ 123451234512345, 603, FGT, 1, 14.7, 30, 0, 1, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 25.12, 160.0, 8, 1, 25, 12 !

Alert message when polygonal geofence crossing is detected - 604: @ 123451234512345, 604, FGT, 1, 14.7, 30, 0, 1, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 25.12, 160.0, 8, 1, 25, 23 !

Alert message when direction change threshold exceeded - 605: @ 123451234512345, 605, FGT, 1, 14.7, 30, 0, 1, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 25.0, 20, 8, 1, 25 !

Alert message when speed threshold exceeded - 606: @ 123451234512345, 606, FGT, 1, 14.7, 30, 0, 1, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 87.0, 160, 8, 1, 25 !

Alert message when mileage threshold exceeded / reach 65000 miles - 607: @ 123451234512345, 607, FGT, 1, 14.7, 30, 0, 1, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 50.0, 160, 8, 1, 500 !

Alert message when battery Voltage below threshold - 608: @ 123451234512345, 608, FGT, 1, 10.5, 30, 0, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160, 8, 1, 25 !

Alert message when battery disconnected - 609: @ 123451234512345, 609, FGT, 1, 7.4, 30, 0, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160, 8, 1, 25 !

Alert message when battery re-connected - 610: @ 123451234512345, 610, FGT, 1, 12.5, 30, 0, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160, 8, 1, 25 !

Alert message when wired ignition ON detected - 611: @ 123451234512345, 611, FGT, 1, 14.7, 30, 0, 1, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160, 8, 1, 25 !

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Alert message when virtual ignition ON detected - 612: @ 123451234512345, 612, FGT, 1, 14.7, 30, 0, 1, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160, 8, 1, 25 !

Alert message when GPS ignition ON detected - 613: @ 123451234512345, 613, FGT, 1, 14.7, 30, 0, 1, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 5.0, 160, 8, 1, 25 !

Alert message when wired ignition OFF detected - 614: @ 123451234512345, 614, FGT, 1, 12.5, 30, 0, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160, 8, 1, 25 !

Alert message when virtual ignition OFF detected - 615: @ 123451234512345, 615, FGT, 1, 12.5, 30, 0, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160, 8, 1, 25 !

Alert message when idle period threshold exceeded - 616: @ 123451234512345, 616, FGT, 1, 14.7, 30, 0, 1, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160, 8, 1, 25 !

Alert message when towing detected - 617: @ 123451234512345, 617, FGT, 1, 12.5, 30, 0, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 20.0, 160, 8, 1, 25 !

Alert message when towing stopped - 618: @ 123451234512345, 618, FGT, 1, 12.5, 30, 0, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160, 8, 1, 25 !

Alert message when analog input over limit is breached - 619: @ 123451234512345, 619, FGT, 1, 12.5, 30, 0, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160, 8, 1, 25 !

Alert message when analog input go back to normal range - 620: @ 123451234512345, 620, FGT, 1, 12.5, 30, 0, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160, 8, 1, 25 !

Alert message when analog input under limit is breached - 621: @ 123451234512345, 621, FGT, 1, 12.5, 30, 0, 0, 2010/10/10, 09:09:09, 22.222222, 114.141414, 45.6, 0.0, 160, 8, 1, 25 !