astra telematics

AT200 Vehicle Tracking Device

User Guide

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Abbreviations

ADC	Analogue to Digital Converter
ASCII	American Standard Code for Information Interchange (computer character set)
BLE	Bluetooth Low Energy
BT	Bluetooth
CAN	Controller Area Network
DC	Direct Current
FET	Field Effect Transistor
GIS	Geographic Information System
GPRS	General Packet Radio Service (part of GSM)
GPS	Global Positioning System
GSM	Global System for Mobile communication
IP	Internet Protocol (part of TCP/IP)
LED	Light Emitting Diode
MEMS	Micro Electro-Mechanical System
NMEA	National Marine Electronics Association (defined a GPS output format)
OTA	Over the Air (remote configuration of devices)
PC	Personal Computer
PCB	Printed Circuit Board
PDU	Protocol Description Unit (describes a binary SMS format)
RFID	Radio Frequency Identification
SIM	Subscriber Identity Module
SMS	Short Message Service
SMSC	Short Message Service Centre
SV	Satellite Vehicle
TCP	Transmission Control Protocol (part of TCP/IP)
UDP	User Datagram Protocol
WGS84	World Geodetic System 1984 (global co-ordinate system used by GPS)

Product Overview

The AT200 is low-cost vehicle tracking device, housed in a sturdy plastic enclosure. Both GPS and GSM antennas are internal. The AT200 incorporates the very latest technology, including the latest Cortex M3 ARM processor, SIMCom SIM800HQuad Band GSM/GPRS modem with Bluetooth and SiRFstar IV GPS with high sensitivity and anti-jamming features. The AT200 operates from an external power feed and has a 900mAh back-up battery, which allows operation for approx. 3 hours in continuous mode. Interconnections are made with a single 16way connector.

Features

The main features of the AT200 are highlighted below:

- Compact size
- Cortex M3 ARM Processor
- SiRFstar IV GPS, -160dBm sensitivity and anti-jamming feature
- SIM800H QUAD band GSM/GPRS/Bluetooth modem
- Internal GSM and Bluetooth antennas - PIFA PCB trace, high-sensitivity
- Internal GPS antenna, 10mm ceramic patch
- Low power consumption (near zero current drain when vehicle ignition is off)
- Bluetooth based driver ID / authentication / authorisation
- 3 axis accelerometer (2/8g)
- 2 digital inputs
- digital output
- RS232 Port
- Internal back-up battery, lithium-polymer, 900mAh
- Configuration by RS232, SMS or TCP/UDP
- Fast and reliable over the air firmware update
- Supports existing device protocols for easy compatibility with existing applications
- Reporting protocols support TCP or UDP
- Non-volatile storage of all report data until sent & acknowledged (2k report buffer)
- SDK available for rapid development of client customised applications
- Approved to: CE, 2004/104/EC

Technical Specifications[1]

E-GSM/GPRS Modem:	2 Watts (E-GSM900 and GSM850 Class 4) 1 Watt (GSM1800 and GSM1900 Class 1) GPRS multi-slot class 10
GSM up-link (TX): **Frequencies**	824 – 849 MHz, 880 – 915 MHz, 1710 - 1785 MHz, 1850 – 1910 MHz
GSM down-link (RX): **Frequencies**	869 – 894 MHz, 925 - 960 MHz, 1805 - 1880 MHz, 1930 - 1990 MHz
GPS Receiver:	
L1 receiver:	48 channels
Position accuracy:	< 2.5m CEP autonomous
Receiver sensitivity:	-160dBm (tracking)
TTFF: Cold start	< 35 sec
Warm start	< 32 sec
Hot start	< 1 sec
Input voltage:	7 – 36 volts DC
Input Protection:	Reverse polarity, overvoltage, internal self-resetting fuse
Internal Battery:	3.7V, 900mAh, lithium
Battery Life:	3 hours continuous operation 5 days operation in hourly update mode
Data transfer modes:	GPRS (TCP/UDP)
Inputs/outputs:	2 digital inputs 1 digital output (low side MOSFET switch) RS232 serial port iButton input
Driver ID:	iButton / Dallas Key 1-wire
Current consumption:	TBA mA @ 13.8 VDC (typical) <20mA (sleep mode - without battery) <100uA (sleep mode - battery fitted)
Dimensions:	60 x 58 x 18 mm
Weight:	180g (with battery)
Ingress Protection:	N/A
Temperature:	
Operating	-20 to +60°C
Storage	-40 to +85°C
Connector:	Cvilux PN CP3516P2V00
Mating Connector:	Cvilux PN CP3516S0010
Product Approvals:	CE, 2004/104/EC

[1]Specifications may change without notice.

Hardware Description

Overall Dimensions
60 x 58 x 18 mm

Back-up battery
Each AT200 is supplied with a 900mAh internal lithium-polymer back-up battery.

Basic electrical connections
A permanent connection to +12V/+24V vehicle power should be provided to the AT200 using the RED and BLACK wires, via a 1A fuse. If using a wired ignition-sense, connect this to digital input 1, again we recommend the use of a 1A fuse:

i.	RED	+12 / +24V	1A FUSED
ii.	BLACK	GROUND	1A FUSED
iii.	WHITE	IGNITION	1A FUSED

All unused wires should be insulated to avoid undesired behaviour.

For a full table of AT200 connections please see page 7.

Power requirements
The AT200 operates from a DC Voltage between 7 and 36 Volts. We recommend that a permanent 'live' power source is used to supply the AT200. If current drain is of concern, please refer to the power down options which can be specified with the IGNM command.

SIM installation
The SIM should be inserted in the slot at the rear of the device (with plastic enclosure fitted). The image on the device gives guidance for correct orientation. Note that the AT200 powers up when the SIM is fitted. For shipping with SIM fitted, we suggest extracting the SIM a few millimetres to power off the device.

Status LEDs

GPS Status (green):	Constant ON	Searching for initial fix
	Double Flash @ 1Hz	GPS 3D navigation
	Slow Flash @ 0.2Hz	Lost GPS navigation
GSM Status (blue):	Flash @ rate 1 per sec	GSM ON
	Flash @ rate 1 per 3 sec	GSM registered on network
	Flash @ rate 3 per sec	GSM Registered with GPRS service
	Constant OFF	GSM Modem OFF

Mounting
We recommend mounting the AT200 by either of the following methods:

- Double sided foam adhesive tape, using de-greaser / solvent on the vehicle surface
- Secure to vehicle using a cable tie, 5.0mm width to suit the cable tie guides on the device

Orientation
For optimum GPS performance, please mount the AT200 with the 'SKY SIDE' facing the sky.

Interconnections

All connections to the AT200 are provided by a single 16-way connector.

AT200 Pin Applications and Colour Code

Pin	Function	Wire colour
1	JTMS	
2	JTDI	
3	RS232-TXD	GREEN
4	VIN 7 - 36 VDC	RED
5	DIGITAL INPUT 1	WHITE
6	DIGITAL OUTPUT	YELLOW
7	JTCK	
8	JTRST	
9	JTNRST	
10	JTDO	
11	RS232-RXD	BLUE
12	GND	BLACK
13	DIGITAL INPUT 2	BROWN
14	IBUTTON	GREY
15	VDD-DIG	ORANGE
16	GND	

Digital Inputs

Digital inputs 1 and 2 suitable for use in 'power-take-off' applications and can be connected directly to 12/24V vehicle circuits.

Digital Output

The AT200 is capable of switching an external load of up to 30V, 0.5A using a MOSFET Low Side Switch, which must be used to switch the GND side of the load. The use of a 1A in-line fuse with these switches is essential to prevent any damage through fault scenarios.

Integrated Accelerometer(s)

The AT200 has a built in 3 axis MEMS accelerometer that operates in the range ±2g and is used to measure driver behaviour (acceleration and braking) during normal driving conditions.

The accelerometer also allows the AT200 to wake from sleep on movement, with configurable thresholds. Please refer to the MEMS parameter and Power Management section for more details.

iButton (Dallas Key) Interface

This can be used to read iButton devices for the purpose of Driver Identification. See the Driver ID Application Note for more details of how to use this feature.

Electrical Parameters

Operating Conditions

Parameter	Min	Max	Units
Power Supply Input Voltage	+7	+36	V
Digital Input High Voltage Threshold	+5.0	-	V
Digital Input Low Voltage Threshold	-	+2.0	V
Digital Output Maximum Voltage	-	+30.0	V
Digital Output Maximum Current	-	0.5	A

Absolute Maximum Ratings

Parameter	Min	Max	Units
Power Supply Input Voltage	-32	+40	V
Voltage on Digital 1-2	-32	+32	V
Voltage on RS232 RX	-25	+25	V
Voltage on RS232 TX	-13	+13	V
Voltage on iButton/Dallas Interface	-5	+5	V
Current sunk by MOSFET low side switches		500	mA
Voltage rating of MOSFET switches	-	+30.0	V
Storage Temperature	-40	+85	°C
Operating Temperature (without battery)	-20	+60	°C
Operating Temperature (with battery)	0	45	°C

Typical Power Consumption

Operating Mode	Current @ 13.8V	Current @ 27.6V	Power Consumption
Fully Operational	25mA	14mA	< 400mW
Battery charging	500mA	275mA	< 7W
Sleep (no battery)	0.5mA	0.3mA	7mW
Sleep (with battery)	< 10uA	< 10uA	0.1mW

Environmental Specifications

Parameter	Specification
Storage temperature	-40 to +85 °C
Operating temperature (no battery)	-20 to +60 °C
Operating temperature (with battery)	0 to +45 °C (note: no charging below 0°C)
Ingress Protection	N/A
Vibration, broadband random	Complies with IEC60068-2-64
Shock	Complies with IEC60068-2-64
Humidity	N/A

Configuration

The AT200 has a versatile set of features to facilitate detailed customisation.

Programming with an ASCII Terminal
Custom configuration of the AT200 is best achieved via a serial interface to a PC. It is possible to use any ASCII terminal program (e.g. HyperTerminal, Teraterm, ProComm, Com7 etc.) to enter commands. Terminal settings are 115200 baud, 8 data bits, 1 stop bit, no parity and no flow control.

We recommend Teraterm, which can be downloaded free of charge.For details and download sources see http://logmett.com/

Command Format
The AT200 uses the same command format for all input methods; TCP, SMS and RS232.

Each command will take the following format:

```
$AAAA,<arg1>,<arg2>,<argX><CR><LF>
```

Where AAAA is the command code and the text enclosed in <> are optional arguments.

Response Format

Each command will result in one response, by the same mode as the command was received. For multiple commands see the section Multiple Command Response Format.

The format of an individual response message is as follows:

$AAAA,<status><CR><LF>

Where <status> is one of the following values

UN	Unknown Command
OK	Command Completed Successfully
ER	Command Failed (Error)
PR	Password Required

Single Command Examples

Status	Command	Response	
Unknown	`$FISH,400,56`	`$FISH,UN<CR><LF>`	`unrecognised command`
Success	`$DIST,50`	`$DIST,OK<CR><LF>`	`valid command, ok`
Error	`$DIST,9999909090`	`$DIST,ER<CR><LF>`	`parameter out of range`

Multiple Command Format

In SMS mode it is often convenient to send several commands together in one SMS or packet. It is possible to append multiple commands together as described below.

Example1

```
$DIST,50<CRLF>
$GPSQ,100<CRLF>
```

Example2 (recommended format for TCP/UDP mode)

```
$DIST,500$APAD,orangeinternet$IGNM,1
```

Multiple Command Response Format

Multiple commands received at the same time via any mode will result in one response for each command parsed. The responses will be in exactly the same format as those described in the section Single Command - Response.

For Example2 above the response would be:

```
$DIST,OK<CR>
$APPW,OK<CR>
$FRED,UN<CR><LF>
```

The first two commands are recognised and successfully executed, whereas the last command is unrecognised.

Over the Air Configuration by SMS/GPRS

The commands and formats described above can all be used over SMS, UDP or TCP sockets. The response will always be returned by the same mode as the command is received, so commands submitted by SMS will be responded to by SMS to the sender's phone number. Note that the sender's telephone number must be disclosed for the response to succeed.

When sending commands over TCP/UDP sockets, please do not include carriage return (CR) or line-feed (LF) characters between commands, these are not necessary and can cause parsing problems.

Prevention of Unauthorised Device Reconfiguration

There is a PIN code feature, which can be used to prevent unauthorised reconfiguration of devices by SMS. Please refer to the PASS command in the Configuration section of this document**.**

Application Parameters

GSM/GPRS Network Settings:

GPRS Access Point Address (APAD)
It is necessary to set the access point network (APN) details for the specific network or GPRS service provider being used. This information should be supplied by your GSM Network Operator or Service Provider. A list of GPRS access point addresses, usernames and passwords for most GSM operators can be found at http://www.taniwha.org.uk/gprs.html

GPRS Access Point Username (APUN)
See above.

GPRS Access Point Password (APPW)
See above.

Application Server Settings:

TCP Host IP Address (IPAD)
When using GPRS mode, the host server must provide a TCP socket with a static (public) IP address. This address should be entered (without the port number). Alternatively, a hostname can be accepted for the IPAD parameter, in which case the GPRS network service provider will provide the DNS look-up to resolve the hostname to an IP address. Maximum hostname length is 64 characters.

NOTE: IP address should be entered **WITHOUT LEADING ZEROS**

TCP Host Port Number (PORT)
The port number for the TCP host, as required for GPRS mode.

Communication Mode (MODE)
This command specifies the required GSM communication mode, as described in the table below:

<mode>	Communication method
1	RESERVED
2	RESERVED
3	RESERVED
4	GPRS (TCP)
5	GPRS (UDP)
6	RESERVED

TCP Acknowledgment Timeout (TCPT)
This parameter specifies the maximum number of seconds that the AT200 device will wait for the host to send the ACK code in response to sending a report. The default value is 30 seconds. A value of zero will disable the acknowledgment feature.

Reporting Level (REPL)
This parameter is a bitfield (3 bytes) which can be used to enable/disable certain types of report based on their event reason code. The bits are defined to match the reason bytes in the appropriate protocol, set the appropriate bit to enable reports based on the associated reason. Note there are differences between protocols, please refer to specific protocol documentation and the Report Filtering Application Note for details.

A value of 16777215will enable all reports.

Reporting Protocol (PROT)
The AT200 supports various reporting protocols (data packet formats). Protocols used by other Astra Telematics devices are implemented for compatibility with existing systems. To take advantage of the full AT200 feature set, the specific AT200 protocol "K" is recommended, hence this is the default setting.

Documentation for each of these protocols is available on request from Astra Telematics, please email support@gps-telematics.co.uk for a copy.

<prot>	Reporting protocol	
0	Fixed packet protocol "A"	Legacy - not for new implementations
1	Fixed packet protocol "C"	Legacy - not for new implementations
2	Fixed packet protocol "G" Basic version	Legacy - not for new implementations
3	Fixed packet protocol "G" Extra version	Legacy - not for new implementations
4	Fixed packet protocol "H"	Legacy - not for new implementations
5	Fixed packet protocol "F"	Legacy - not for new implementations
6	Fixed packet protocol "K"	RECOMMENDED

Reporting Interval / Event Settings:

Distance Reporting Interval (DIST)
Distance based reporting interval in metres. This feature can be disabled by setting Minimum Distance Moved to zero. Default is 5000.

Heading Reporting Threshold (HEAD)
The objective of this feature is to provide a vehicle trace which closely follows the actual route, but with the minimum of position update reports. In broad terms, the system provides fewer updates whilst driving in a straight line (e.g. motorways), but increases the number of updates whilst negotiating corners (e.g. city/town driving). Heading based reporting can be disabled, by setting HEAD to zero. Default is 45 degrees.

Stationary Timed Message Interval (STIM)
This command defines the maximum time interval in minutes between position update reports whilst stationary. The appropriate value for Stationary Timed Interval will depend on the user application. The default is 60. Setting the Stationary Timed Message Interval to zero will disable time based reports whilst stationary. The command also allows the GPS module to be left in low power mode on a timed wake from low power mode to save power consumption. If the GPS module is left in low power mode on a timed wake it is powered on if a journey start is detected.

The command format is:

$STIM,<time_interval>,<disable_gps_on_timed_wake>

The default setting for <disable_gps_on_timed_wake> is 0 which powers on the GPS module on a timed wake. To keep the GPS module in low power mode on a timed wake set <disable_gps_on_timed_wake> to 1.

Journey Timed Message Interval (JTIM)
This parameter defines the maximum time interval between position update reports whilst in a journey. The journey mode is dictated by the IGNM setting, as below:

<IGNM>	Journey Detection Method
0	GPS speed
1	Digital input 1
2	Digital input 1
3	External Voltage

The appropriate value for Journey Timed Interval will depend on the user application. Setting the Journey Timed Message Interval to zero will disable time based journey reports. Default is 2 minutes.

Journey Timed Message Interval (JSEC)
The journey timed reporting interval may be entered in seconds using the JSEC command. Default is 120 seconds.

Idle Mode Timed Message Interval (ITIM)
This parameter defines the maximum time interval between position update reports when a vehicle is idling. Idling mode is initiated after a period of stationary time (see IDLE parameter) whilst the ignition is on. Setting the Idle Mode Timed Message Interval to zero will disable time based idle mode journey reports. The setting is in minutes and the default is 5 minutes.

Idle Mode Threshold (IDLE)
A vehicle is defined as being in Idle Mode when a vehicle is stationary for a specific length of time whilst the ignition is on. Idle Mode ends once the vehicle starts moving again. This parameter defines the length of time (in seconds) that a vehicle must be stationary before Idle Mode is initiated. Note that Idle mode start reports, timed reports and end reports are sent to the host application, hence an excessively low value for IDLE can result in increased reporting. The default value for IDLE is 180 seconds.

Over-Speed Speed Threshold (OSST)
The AT200 can be configured to report over-speed events, which are defined as exceeding a given speed for a given amount of time. The OSST parameter defines the over-speed threshold in kmh. In order to trigger an over-speed event, the vehicle must travel in excess of OSST kmh for a period of OSHT seconds (see below). Further over-speed events cannot be triggered until OSIT seconds have elapsed and vehicle speed has fallen below the OSST threshold. A value of zero for OSST will disable over-speed events/reports. Default is 120 kmh.

Over-Speed Hold Time (OSHT)
Defines the period of time (in seconds) that a vehicle must exceed OSST kmh to trigger an over-speed event. Default is 30 seconds.

Over-Speed Inhibit Time (OSIT)
Defines the minimum time between over-speed events. Once an over-speed event has occurred, further over-speed events cannot be triggered until OSIT seconds have elapsed. Default is 120 seconds.

Journey Detection Settings:

Ignition Mode (IGNM)
This parameter defines the function of the IGNITION input and the method of journey START/STOP detection, as follows:

IGNM	Start/Stop Reports	Default Power Down?	Ignition Input
0	based on GPS (speed)	NO	Not required
1	based on Digital 1 input	NO	WHITE WIRE
2	based on Digital 1 input	YES	WHITE WIRE
3	based on External Voltage	NO	Not required

The command format is:

$IGNM,<ignition_source>[,<low_power_mode>]

where<ignition_source> is one from the above table (1 and 2 being the same). Default is 1. If <low_power_mode> is 0 then power down is disabled and if it is 1 then power down is enabled.

Power down mode is automatically enabled when <ignition_source> is set to 2. In other <ignition_source> modes, <low_power_mode> is disabled by default, but it can be enabled by specifying a value of 1 when setting the <ignition_source>.

When IGNM=3 the AT200 will detect that the vehicle engine is running from the increase in external voltage (typically, the vehicle battery voltage increases by 2 Volts whilst the engine is running. This mode requires a two wire installation and frees up a digital input for other uses. Please refer to the AT200 Installation Guide for installation and calibration guidance relating to the use of IGNM mode 3.

For detailed information, guidance and trouble-shooting advice relating to IGNM and journey detection options, please refer to the Journey Detection application note.

Default value for IGNM is 1.

STOP Report Delay (STPD)
When IGNM is set to zero (see above), the AT200 will determine journey START and STOP events based on movement data from GPS, accelerometer and tremble sensor. A STOP event will occur after the vehicle has remained stationary for a pre-determined time. The length of stationary time necessary to trigger a STOP report is dictated by the STPD parameter.

When using IGNM 3 to detect journey status from external voltage, a STOP event will occur after the vehicle voltage has dropped for a pre-determined time, to prevent false journey STOP events during engine automatic start/stop. This delay time is dictated by the STPD parameter.

The default value for STPD is 60 seconds.

Driver ID Settings:

Driver ID Configuration (DRIC)

Command to configure driver ID source, authorisation, reporting and timeouts.

$DRIC,<driver_id_source>,<reminder>,<confirm>,<report_all>,<immobilise>,
<validity_timeout_secs>,<auth_timeout_secs>,<imob_output_state>,
<server_authorisation>,<allow_manual_imob_override>,>,
<reminder_timeout_sec>

where:

<driver_id_source>	0=none, 1=iButton, 2=Mifare card, 4=PicoPass Card (Note: Mode2 and Mode 4 from firmware 6.0.2.x)
<reminder>*(see note)	Set to 1 to enable a reminder buzzer when ignition is turned ON until iButton is presented
<confirm>*(see note)	Set to 1 to enable an indicator (short pulse) whenever an iButton is read
<report_all>	Set to 1 to enable to enable an event/report each time an iButton is presented
<immobilise>*(see note)	Set to 1 to enable the output switch is used to disable the vehicle until an iButton is presented
<validity_timeout_secs>	Driver ID validity timeout. Driver ID data will be attached to all journey START and STOP reports until validity expires. Default is 7200. If set to 0 the ibutton data will become invalid at the next STOP report.
<auth_timeout_secs>	Driver ID authentication timeout. Driver ID must be presented before the vehicle engine is started. If no Driver ID was seen for *auth_timeout_secs* the AT200 output switch will be activated if reminder or immobilise option is set. Default is 30. Minimum is 10.
<imob_output_state>	The state of the digital output when immobilisation is active. 0 = output OFF for immobilisation. 1 = output ON for immobilisation. Default is 0.
<server_authorisation>	This controls whether a driver ID must be authorised by the server using the commands described in the section Authorised Driver Implementation in Utility and Engineering Commands. 0 = server authorisation not required. 1 = server authorisation required.
<manual_imob_override>	Allows a one-time immobilisation override by a manual change of state of the immobilisation output selected by CDIG <immobiliser_output>. Default is 0 (not allowed).
<reminder_timeout_sec>	timeout on reminder buzzer in seconds. Default is zero, for an indefinite timeout. Note: from firmware 5.0.30.x

*NOTE: The AT200 has only one digital output, which can be assigned to *reminder, confirm* or *immobilise*. DRIC will return an error if you attempt to set more than 1.

Bluetooth Configuration (BLTC)
To configure Bluetooth features use command:

$BLTC,<min_rssi>,<scan_period>

Where

<min_rssi>	0-127 The lower the number the stronger a signal has to be to be accepted (default 75)
<scan-period>	range 10-60 seconds (default 30)

The <driver_id_source> must be set to 3 in the DRIC command to enable Bluetooth.

BLUETOOTH PAIRING:
Bluetooth devices can be 'seen' without pairing, but we recommend pairing to speed up device detection. When<driver_id_source> is set to 3, a Bluetooth a device may be paired at any time.

To pair your bluetooth device with the AT200, initiate a bluetooth device search from your mobile phone handset whilst in close proximity to the AT200, select the device 'AT200' and enter the PIN code 0000 when prompted.

If DRIC <server_authorisation> is set to 0 the paired device is immediately added to the whitelist. If DRIC <server_authorisation> is set to 1 the paired device is added to the whitelist only if it is accepted by the server.

SELECTION CRITERIA / PRIORITIES FOR BLUETOOTH DEVICES:

When the vehicle ignition is switched on,bluetooth devices will be scanned and considered in range if the received signal strength is a lower value than the BLTC <min_rssi> setting (note that <min_rssi> is in –dBm, hence lower values are stronger signals). Paired devices will automatically reconnect each time they are in range. The AT200 will select bluetooth devices for use with driver ID based on the following priority:

1. Paired devices
2. Device IDs in whitelist
3. Strongest ID in view

During a journey (ignition on) the bluetooth device scan will be repeated periodically until a device in range is found and the bluetooth device ID reported according to the DRIC options.

If the <immobilisation> option in the DRIC command is set then the authorised driver ID whitelist will be used to turn off immobilisation.

Driver ID Server Authorisation (DRID)
Host server authentication / authorisation for driver IDs can be enabled using the DRIC command (see above). When enabled, the AT200 will store a list of up to 10 approved Driver IDs and up to 10 declined Driver IDs. The source of the Driver ID is set using the DRIC command.

Each time a 'new' Driver ID is read (i.e. not currently in the approved list), the device will query the host server for approval to accept the new Driver ID. This process should take approximately 10 seconds. Driver IDs approved by the host will be added to the approved list and when presented again in the future they will be immediately authorised by the device.

Driver IDs that are declined will not be added to the approved list and will not allow the vehicle to be started. These are stored in a declined list. Declined Driver IDs send a query to the host so that if they are changed to approved in future they will be added to the approved list. Driver IDs previously approved can be removed from the approved list by the host.

If there are no communications with the host server, approved Driver IDs will allow the vehicle to be started and declined Driver IDs will not allow the vehicle to be started. Unknown Driver IDs will be temporarily allowed to start the vehicle and approval will be requested as soon as communications resume. If declined at that point, the vehicle will be immobilised.

If the approved list becomes full and a new Driver ID is presented and authorised, the oldest Driver ID will be removed from the list to make room for the new one. The oldest Driver ID is based on the last time that the Driver IDs were presented, so regularly used Driver IDs should never be removed from the approved list.

The device can re-request authorisation from the server of all Driver IDs in the approved list periodically.

In the command descriptions the <family-code> and <serial-number> are formatted as follows:

Argument	Format
<family-code>	Driver ID family code, fixed length, 2 hexadecimal digits (leading zeros), e.g. 01. For Bluetooth Driver IDs the <family-code> is always 00.
<serial-number>	Driver ID serial number, fixed length, 12 hexadecimal digits (leading zeros), e.g. 0000125408C9

The following table describes the commands. The first command is from device to host whilst the rest are from host to device.

Command	Description
$DRID,<model>,CHECK,<imei>,<family-code>, <serial-number>	Device requests Driver ID authorisation from host
$DRID,<model>,CHECK,<imei>,00,<serial-number>, <bluetooth-device-name>	Device requests Driver ID authorisation from host (Bluetooth only)
$DRID,APPROVE,<family-code>,<serial-number>	Host approval of Driver ID
$DRID,DECLINE,<family-code>,<serial-number>	Host declines Driver ID (unknown)
$DRID,ADD,<family-code>,<serial-number>	Host request to add Driver ID to approved list
$DRID,REMOVE,<family-code>,<serial-number>	Host request to remove Driver ID from approved list
$DRID,CLEAR	Host request to delete approved and declined list
$DRID,CLEAR,WHITE	Host request to delete approved list
$DRID,CLEAR,BLACK	Host request to delete declined list
$DRID,BLOCK,<family-code>,<serial-number>	Host request to add Driver ID to declined list
$DRID,VERIFY,<hours>	Host request to set the device whitelist verification period (0-65535). 0 disables the request

For example:

$DRID,AT200,CHECK,351777042187300,01,0000125408C9

For Bluetooth Driver IDs the CHECK command uses family code 00 and has an extra field <bluetooth-device-name>at the end.

Driver Behaviour Related Settings:

Acceleration and Deceleration Maximum Thresholds (ACMX & DCMX)
Report events can be triggered on specified thresholds of acceleration and deceleration (i.e. braking). ACMX specifies the acceleration threshold in m/s/s * 10, integer format. Default is 35. DCMX specifies the deceleration threshold in m/s/s * 10, integer format. Default is 40.

Example:

$ACMX,35 set accel threshold at 3.5 m/s/s
$DCMX,45 set decel threshold at 4.5 m/s/s

Cornering Maximum Thresholds (ACMY & DCMY)
Report events can be triggered on specified thresholds of cornering force. ACMY and DCMY specify the cornering threshold in m/s/s * 10, integer format. Default ACMY and DCMY is 50.

Example:

$ACMY,35 set cornering accel threshold at 3.5 m/s/s
$DCMY,45 set cornering decel threshold at 4.5 m/s/s

Collision Event Threshold (COLN)
This parameter defines the acceleration/deceleration threshold (on any axis) to be classified as a collision event. COLN specifies the threshold in m/s/s * 10, integer format. Default is 100.

Device Orientation (ORTN)
This parameter defines the AT200 installation orientation in order to allow corrections to be applied to the accelerometer X/Y data to ensure data is correctly orientated with the vehicle axis. When ORTN is specified correctly (as per the table below) X data will correspond to vehicle acceleration and deceleration and Y will correspond to cornering forces (+ve Y corresponding to a left turn and -ve Y for right hand turns). Default is 0.

ORTN	AT200 Installation Position	Data Corrections Applied
0	unspecified	No X/Y orientation corrections applied
1	connector facing to vehicle front	No X/Y orientation corrections applied
2	connector facing to vehicle RHS	X/Y swapped & X axis sign inversion
3	connector facing to vehicle rear	Both X and Y axes sign inversions
4	connector facing to vehicle LHS	X/Y swapped & Y axis sign inversion

Other Settings:

Alarm Phone Number (ALRM)
This is the delivery destination for alarm text messages sent via SMS. These are typically sent to a GSM handset (mobile telephone). The number should be entered in international format (e.g. +447979123456). Alarm text messages are sent for external power loss and low external power (supply input less than the level defined by CPWR).

Configure Power Monitoring (CPWR)
This command sets the conditions for sending external power status alarms.

$CPWR,<low_external_voltage_level>,<low_external_voltage_delay>,<external_power_event_delay>

The voltage level can specified with decimal places, e.g. 11.5. The delays are in seconds.

When external power falls below <low_external_voltage_level>for <low_external_voltage_delay> seconds a low external power SMS is sent.

When external power is lost an external power lost SMS is sent. External power is considered to be lost when it is less than 6V for <external_power_event_delay> seconds.

The default settings are

$CPWR,11.5,30,30

Roaming Enable (ROAM)
This parameter can be used to disable network roaming, as a means of controlling GSM network running costs. A value of zero will disable network roaming. The ROAM parameter can also be used to allow reporting at a reduced rate when roaming. A value of greater than 1 will cause the reporting intervals (DIST, HEAD, STIM and JTIM) to be extended by the specified value of ROAM. For example, when ROAM is set to 2, all of the reporting intervals are doubled, so that the reporting rate will be approximately half as much as when using the home GSM network operator. The default setting for ROAM is 1, which enables normal reporting on either home or roaming networks.

Accelerometer Wake-up Interrupt Configuration (MEMS)
This parameter allows the configuration of the criteria to determine if motion has been detected. If so, an accelerometer based wake-up interruption will be generated, waking the device from sleep. The accelerometer has two modes for detecting motion: Single click detection and Double click detection.

In single click detection mode, a trigger is generated when the input acceleration on the selected channel exceeds the programmed threshold and returns below it within a time window defined by the Time-Limit register. In this mode, Latency and Window are not relevant.

In double click detection mode, once the first click has been recognized, the second click detection procedure starts only if the input acceleration exceeds the threshold after the defined latency time, but before the window time has expired.

NOTE: All the parameters in the MEMS command need to be entered in hexadecimal

The MEMS command has the following format:

$MEMS,<config>,<thresholds>,<time-limit>,<latency>,<window>:

Where:

<config>: Set value 55 for single detection mode and 6A for double detection mode (bit 7 should always be set)

<thresholds>: The <thresholds> parameter specifies the X, Y and Z axis thresholds as follows ZYX, i.e. a hexadecimal value of 46A would set axis thresholds as Z=4, Y=6 and X=10. Note that the value on each axis is then multiplied by 0.5g.

<time-limit>: Time window in which the acceleration has to surpass the defined threshold and get under it again. The time limit argument can have hexadecimal values from 00 to FF (in decimal, 255). The value of time limit is then multiplied by 0.5ms. Being FF the maximum value permitted, the time limit ranges from 0 to 127.5 ms.

<latency>: Used in double click detection mode. In order to generate an interrupt, a second click has to be detected after this time has passed from the first click. The latency argument can have hexadecimal values from 00 to FF (in decimal, 255). This value represents a number of milliseconds. Being FF the maximum value permitted, the time limit ranges from 0 to 255.

<window>: Used in double click detection mode. In order to generate an interrupt, a second click has to be detected after latency time, but before this time limit has expired. The window argument can have hexadecimal values from 00 to FF (in decimal, 255). This value represents a number of milliseconds. Being FF the maximum value permitted, the time limit ranges from 0 to 255.

Example:

$MEMS,55,46A,32,64,14

Would set, single click detection on all axes, thresholds Z axis:2g, Y axis:3g and X axis 5g. Time limit: 25 ms, latency: 100 ms and window: 20ms (latency and window not relevant for single click detection).

SMS Monthly Usage Limit (SMSL)
This parameter can be used to control SMS costs by setting a monthly limit on the number of SMS which may be sent from the AT200. A value of zero will disable the Monthly SMS Limit feature. Default is 50.

GPS Minimum Acceptable Quality (GPSQ)
Defines the minimumacceptable quality threshold for an acceptable GPS fix, based on the estimated GPS position accuracy. The value for GPSQ is a percentage, allowed values are from 1 to 100. The default value is 50%, which corresponds to an estimated position error of 50m. A value of 100% specifies near perfect GPS results with an estimated error of 2m or less. A value of 1% for GPSQ specifies the lowest acceptable quality, based on an estimated error of 100m.

The AT200 GPS quality algorithms will not accept 2D fixes.

GSM Cell ID Mode (CLID)
Set the level of GSM Cell ID reporting. Default is 0.

$CLID,<mode>[,<request_period>]

where:

<mode> see table below
<request_period> for CLID=3 this is the minimum time between requests for location from the GSM network. Range 1-65535 minutes.

<mode>	Description
0	Never report Cell ID information
1	Report Cell ID information only when no GPS fix
2	Report GSM Cell ID information always
3	Report location provided by GSM network using M2M location service when no GPS fix

For CLID=3 when GPS is invalid any event that generates a report or a reply to $POLL or $POSN will cause the location to be requested from the GSM network, but only if the last request was more than <request_period> minutes ago. The status in the report will indicate that the location is network based in addition to invalid GPS.

Debug Level (DBUG)
Set the level of debug information displayed in the NMEA serial output as defined in the following table. Default is 2.

DBUG level	Information displayed
0	Only NMEA output on serial port 1
1	Display errors only
2	Display normal diagnostic information
3	Display extended diagnostic information
4	Display maximum diagnostic information

OTA Programming PIN Code (PASS)
OTA PIN code feature, which can be used to prevent unauthorised reconfiguration by SMS. The PIN code is specified using the PASS command. The PASS code can be set by RS232, SMS or TCP mode commands, but if PASS is non-zero, the correct current PASS code must be supplied before the new value. By default, PASS is set to zero, which disables OTA PIN code requirement. If PASS is set to any other value, the correct value must be specified with each OTA command. The PASS parameter can be up to 5 digits and must be the first command in the sequence.

e.g. to change distance reporting, when current PASS code is set to 12345:

$PASS,12345$DIST,1500

e.g. to change PASS code from 12345 to 5678:

$PASS,12345$PASS,5678

Only commands which change parameters require the PIN code. The PIN code is never required for the following commands: $ATSW, $BOOT, $DIAG, $IMEI, $NACK, $PARA, $POLL, $POSN, $SDIG, $SHDN, $SHOW, $SSMS and $STAT.

Geofences (GEOF)
Device based geofences can be configured with the GEOF command, which has 5 arguments as follows:

$GEOF,<index>,<type>,<radius>,<latitude>,<longitude>

Field	Description	Range
<index>	index	1 - 100
<type>	type	0 disabled 1 alarm on entry 2 alarm on exit 3 alarm on entry & exit
<radius>	radius in metres	20 - 65535
<latitude>	latitude, WGS84 decimal degrees	-90.0 to +90.0
<longitude>	longitude, WGS84 decimal degrees	-180.0 to +180.0

Entering the command with index argument only will echo back the existing geofence settings.

Tow Alert Parameters (TOWP)
A tow alert (i.e. report with REASON bit set indicating tow alert event) is generated whenever movement is detected whilst the vehicle ignition is off. This scenario is detected using a number of different sources, including GPS speed, GPS location, accelerometer and mechanical tremble/motion sensor. The sensitivity of tow alert detection can be changed using the TOWP command, as follows:

$TOWP,<distance_metres>,<speed_kmh>,<speed_seconds>,<motion_sensitivity>,
<trembler_sensitivity>

Field	Description	Range	
<distance_metres>	GPS distance moved from last STOP location	0 100–65535	disable default=500m
<speed_kmh>	GPS speed detected. Must exceed this threshold for the time in the <speed_seconds>	0 20 – 65535	disable default=50kmh
<speed_seconds>	time for which the speed must be above the threshold in the field <speed_kmh>	1– 65535	default=10 sec
<motion_sensitivity>	accelerometer based motion detection sensitivity	0 1 – 10	disable (1=most sensitive, 10=least sensitive, default=5)
<trembler_sensitivity>	Mechanical tremble sensor sensitivity	0 1 – 10	disable (1=most sensitive, 10=least sensitive default=5)

Utility and Engineering Commands

Delete All Geofences (GEOD)
Individual geofences can be deleted by setting <type> to zero. The GEOD command provides a convenient way of deleting all geofences.

Configure Digital Outputs (CDOP)
Where an output is controlled in response to an event, the digital output used can be configured using this command. CDOP is a simplified form of CDIG which can be used to set only one function instead of setting all outputs at once. Command introduced from release (6.0.6).

$CDOP,<output-number>,<application>

The digital outputs are numbered as follows:

<Application>	Description
0	Not assigned
1	Immobiliser
2	Reminder (driver ID)
3	Confirm (driver ID)
4	Driver Behaviour - yellow
5	Driver Behaviour - orange
6	Driver Behaviour - red

Examples:

$CDOP,1,2 use digital output 1 for Reminder.

Default settings for CDOP are:

$CDOP,1,1

Note: applications can be assigned to only one digital output. If an application has been assigned to a digital output and then later assigned to a different one, the previous assignment will be set to zero (not assigned).

Please refer to the driver behaviour application note and DB001 data sheet for details of driver behaviour features.

Configure Digital Outputs (CDIG) *FIRMWARE PRIOR TO 6.0.6.x
Where the output is controlled in response to an event the digital output can be configured using this command.

$CDIG,<immobiliser_output>,<reminder_output>,<confirm_output>,
<driver_behaviour_output>

There is only one digital output.

Examples:

$CDIG,1,0,0,0 use digital output 1 for immobilisation
$CDIG,0,0,1,0 use digital output 1 for confirmation

Default settings for CDIG are:

<immobiliser_output> 1
<reminder_output> 0
<confirm_output> 0

<driver_behaviour_output> 0

A value of 0 disables a feature, i.e. stops that feature from driving the output. When you select the digital output it must be selected for only one feature otherwise CDIG will return with the error $CDIG,ER.

If the output has been configured for <driver_behaviour_output> then the output will be turned on whilst the GPS speed exceeds the overspeed limit set by $OSST. If an accelerometer event (acceleration, braking or cornering) is generated then the output will pulse on/off for several seconds.

Set Digital Output (SDIG)
Allows manual setting and re-setting of the MOSFET digital output

Examples:

$SDIG,1,1 switch digital output1 ON
$SDIG,1,0 switch digital output 1 OFF

Configure Digital Inputs (CDIP)
The digital inputs can be de-bounced over a period of time configured using the command

$CDIP,<digital1_db_secs>,<digital2_plus_db_secs>

The ignition input de-bounce period is specified separately from other inputs using <digital1_db_secs>. The de-bounce period for all other outputs is specified using <digital2_plus_db_secs>. A value of 0 disables input state de-bouncing. The maximum allowed period is 5 seconds.

Default settings for CDIP are:

<digital1_db_secs> 1
<digital2_plus_db_secs> 0

Immobilise (IMOB)
Set digital output for purposes of vehicle immobilisation, giving the option of making the activation conditional on vehicle ignition status and speed to ensure safe immobilisation.

When this command is used, the output will remain in the ON (activated) state until $IMOB,0 is received to clear the immobilise condition. When $IMOB is used to activate the output switch, it cannot be reset or cleared by presentation of an iButton.

If $IMOB is used with no argument, the default mode 3 is used (conditional on ignition OFF and speed = zero). If iButton immobilise option has been set (e.g. using DRIC command), $IMOB with no argument uses mode 4 (immediate and unconditional).

$IMOB,<mode>

<mode>	IMOB Conditions
0	Clear immobilisation mode and deactivate output switch (OFF)
1	Activate output switch when vehicle ignition is OFF
2	Activate output switch when vehicle is stationary
3	Activate output switch when vehicle is stationary AND ignition is OFF (DEFAULT)
4	Activate output switch immediately and unconditionally

Automatic Immobilisation Schedule Settings (IMOS)
Automatic immobilisation can be scheduled individually for each day of the week using this command.

$IMOS,<day>,<on_time>,<off_time>

Field	Description	Range
<day>	Day of week since Sunday 0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday 7 = Apply same settings to every day	0-7
<on_time>	Vehicle enabled time: hour of day, GMT, 24 hour format	0-23
<off_time>	Vehicle disabled time: hour of day, GMT, 24 hour format	0-23

Note:

- <on_time> and <off_time> can be defined for each day of the week
- Specify <day>=7 to set the same <on_time> and <off_time> to all days of the week
- <on_time> and <off_time> are defined to the nearest hour using 24 hour clock
- <on_time> and <off_time> are specified in GMT (same as UK time in winter, but -1 hour when daylight saving time reverts to British Summer Time)
- Set <on_time> = <off_time> to disable auto immobilise schedule for any given day

The output will be turned OFF after the specified <on_time> for any given day of the week. The output will be turned ON after the specified <off_time> for any given day of the week and will remain ON until the specified <on_time> for the following day. The state of the output can be over-ridden by the use of the SDIG or IMOB command, which will force the state as specified until the next scheduled <on_time> or <off_time>.

IMOS scheduled immobiliser feature is disabled by default, on_time and off_time for all days is set to zero.

Restore Factory Default Settings (FACT)
Resets all parameters to factory defaults (or client defaults) as built into the device firmware.When using this command, please wait at least 5 seconds before reconfiguring the device by issuing further commands.

Position on Demand (POLL)
The AT200 will send an update report to the host server in response to a variety of user-configurable events. The POLL command can be used to request an update when there is no event to report.

Firmware Update (LOAD)
AT200 firmware can be updated over GPRS with this command. The firmware files must first be loaded onto a webserver in the correct format. Please contact Astra Telematics for support and assistance on remote firmware updates.

$LOAD,<host-ip-address>,<port-number>,<pathname>,<filename><CR><LF>

Reboot (BOOT)
Trigger a device reboot.

Firmware Version (ATSW)
Returns the device firmware version

IMEI Query (IMEI)
Returns the device IMEI

Status Check (STAT)
See Appendix

Parameter Check (PARA)
See Appendix

Position Check (POSN)
A device location can be queried from a mobile phone etc. using the POSN command. The reply will be formatted as a link to google maps, which can be viewed directly from a mobile telephone handset.

$POSN,<map_type>,<zoom>

<map_type> 'm' = map, 'k' = satellite, 'h' = hybrid
<zoom> 1-20, 20=maximum zoom in, 1=maximum zoom out

The parameters are optional. The $POSN command alone will give a position link with map view at zoom level 10.

Format of the POSN response:

```
POSN:<IMEI>
DD/MM/YYYY HR:MIN:SEC
http://maps.google.co.uk/?q=AT200@<latitude>,<longitude>&t=<map_type>&z=<zoom>
```

Diagnostics (DIAG)
Engineering diagnostics facilities:
$DIAG,1 GPS reset
$DIAG,2 Modem reset
$DIAG,3 RESERVED
$DIAG,4 Load defaults settings
$DIAG,5 Ignition (mode 3) recalibrate
$DIAG,6 check battery and ext voltage (and debug to RS232)
$DIAG,7 recalibrate accelerometer at rest values
$DIAG,8 RESERVED
$DIAG,9 RESERVED

Erase Stored Reports (ELOG)
Erase stored reports from non-volatile (flash memory). If no argument is specified, all reported will be deleted, otherwise the specified number will be deleted (oldest first).

Non-Volatile Set (NVST)
Initialise runtime and lifetime odometer. If the NVST command is submitted without parameters, both values are initialised to zero.

$NVST,<odometer_km>,<runtime_hrs>

Disable Acknowledgment (NACK)
Suppress the response to a given command (SMS/TCP mode)

NMEA enable (NMEA)
Enable NMEA GPS output on the serial port. A value of 1 enables $GPRMC NMEA sentences and zero disables them (see DBUG to enable/disable other serial output). Default is 1.

Serial Port Baud Rate (BAUD)
Configure the baud rate of the AT200 RS232 serial port. Default is 115200.

Display Settings (SHOW)
Display settings in readable ASCII format (not recommended for TCP/SMS, see PARA)

Send SMS (SSMS)
Send an SMS text message.

$SSMS,<gsm_number>,<message>

This command is intended to engineering purposes, typically to check/confirm GSM telephone number for unknown SIMs. The implementation does not provide any message buffering or communication retries etc. and hence it is not recommended for operation applications.

Device Shutdown (SHDN)
This sets the device to sleep mode and turns off the immobiliser output for a specified number of minutes or indefinitely.

$SHDN,<minutes>

Where <minutes> is in the range 1 to 65535. The <minutes> parameter is optional and if it is omitted the shutdown is indefinite.

Over The Air Test Command (TEST)

The$TEST command can be send by SMS, RS232 or TCP. We recommend that this command is used after every installation, BEFORE the installer leaves the vehicle / site. The $TEST command is also useful to diagnose suspected device or installation problems.

The format of the $TEST response starts with TEST: and is followed by:

Line	Description	Comments
1	Device model	e.g. AT200
2	Firmware version number	e.g. 4.0.41.0
3	IMEI	15 digits, e.g.357322042745742
4	Network operator name	e.g. Orange UK
5	External input voltage	In Volts followed by percentage of power present over last 7 days, e.g. PWR:12.5V (99%)
6	Battery level	As a percentage, e.g. BAT:100%
7	GPS status (% availability)	OK, ERR or JAM followed by percentage, e.g. GPS:OK (95%)
8	GPRS status (% availability)	OK, ERR or N/A if errors in any above status, e.g. GPRS:OK (98%)
9	APN connection status	OK, ERR or N/A if errors in any above status, e.g. APN:OK
10	TCP socket status	OK, ERR or N/A if errors in any above status, e.g. SKT:OK
11	TCP ack status	OK, ERR or N/A if errors in any above status, e.g. ACK:OK
12	Ignition inactivity	OK or ERR, e.g. IGN:OK + current state of IGN
13	Immobilisation output state	ON, OFF or N/A if no digital output assigned to immobiliser

Some example responses are shown below:

Example 1: device with no errors/problems:

```
TEST:AT200
4.0.41.0
357322042745742
O2 UK
PWR:12.5V (100%)
BAT:100%
GPS:OK (95%)
GPRS:OK (98%)
APN:OK
SKT:OK
ACK:OK
IGN:OK (OFF)
IMOB:OFF
```

Example 2: device with an external power issue (not permanent):

```
TEST:AT200
4.0.41.0
357322042745742
O2 UK
PWR:12.5V (24%)
BAT:100%
GPS:OK (95%)
GPRS:OK (98%)
APN:OK
SKT:OK
ACK:OK
IGN:OK (ON)
IMOB:OFF
```

Notes for guidance on handling of $TEST errors:

GPS Error or poor GPS availability (low % GPS availability)
A GPS ERROR indicates that no fix has been returned for a fixed timeout period. Could be an indication of a device/antenna fault or simply that the vehicle is parked in covered area (e.g. underground car park). Persistent GPS errors and low availability are most often caused by installation issues, poor device location, incorrect orientation or vehicle issues such as interference or athermic glass windscreens.

A 'JAM' status indicates that the GPS receiver has detected continuous wave (CW) interference which could be cause by the use of a GPS jamming device in close proximity, typically within 5-10m (i.e. in the vehicle itself).

GPRS Error
This means that the device has no GPRS service. Can be simply due to GSM network coverage/service, but persistent GPRS ERROR is an indication that the GSM SIM card is not enabled for GPRS. We suggest that you discuss with your SIM provider and consider trying a SIM refresh or replacing the SIM.

APN Error
This is usually caused by incorrect GPRS access point settings (APAD, APUN and APPW). Please check the correct settings with your network/SIM provider and configure the device accordingly using the commands:

$APAD,<apn-address>
$APUN,<apn-username>
$APPW,<apn-password>

TCP Socket Error
The modem has failed to open a socket on the specified IP address and port number. Can be caused by incorrect TCP address settings (IPAD, PORT), a fault at the host server or even wider internet problems. If necessary, re-configure the IPAD & PORT using the commands:

$IPAD,<ip-or-hostname>
$PORT,<port-number>

Modem TCP acknowledgment Error
This indicates that the *device* can proceed all the way to open a socket and deliver the report packet, but does not get the normal acknowledgment response from the host TCP application. This is normally caused by a fault at the host end. Ensure that the device is correctly provisioned on your application/software, correct type, protocol and that the 15 digit IMEI matches the one on your system.

Ignition Input Inactivity Error
This error is set when no ignition events have been detected for more than 24 hours. This is usually caused by poor/incorrect installation. Consider using an alternative ignition mode with the following commands:

$IGNM,0 // use GPS speed / accelerometer data for journey mode detection
$IGNM,3 // use external voltage for journey mode detection

Immobilisation Issues
If status shows as 'N/A', the immobiliser application is not assigned to any digital output. Please refer to the CDOP command in the user guide for the appropriate device, for details of how to assign applications to digital outputs.

The ON/OFF status refers to the physical status of the device output, which may relate to immobiliser status ON or OFF, based on the immobiliser logic defined in the DRIC command.

Parameter Check (PARA) – Response Format

PARA:	Fixed packet header
Software version number	Floating point number
SERV SMS host number	International format telephone
IPAD primary TCP IP address	TCP IP address
PORT primary TCP port number	TCP port number - integer
IPAD TCP IP address for PTDM mode	TCP IP address
PORT TCP port number for PTDM mode	TCP port number - integer
APAD access point address	Text string
APUN access point username	Text string
APPW access point password	Text string
DIST distance report value (metres)	Integer
HEAD heading change report value	Integer
JTIM in-journey timed reporting interval	Integer
STIM stationary timed report interval	Integer
ITIM idling timed report interval (minutes)	Integer
IDLE idle mode start threshold (seconds)	Integer
STPD stop report delay (seconds)	Integer
OSST overspeed threshold (kmh)	Integer
OSHT overspeed hold time (sec)	Integer
OSIT overspeed inhibit time (sec)	Integer
MODE GSM reporting mode	Integer
PROT reporting protocol	Integer
REPL reporting level	Integer
SMSL maximum monthly SMS usage	Integer
IGNM ignition mode	Integer
GPSQ minimum GPS quality	Integer
ROAM network roaming enable	integer
TCPT TCP mode timeout (seconds)	Integer
IBTN iButton Mode	Integer
CLID cell-ID mode	Integer
PTDM pass through data mode enable	Integer
GSM network operator name	Text string (max 12 chars)
GSM own telephone number	Text string (max 15 chars)