



Device Configuration Guide Generic Command Reference



Abbreviations

ADC	Analogue to Digital Converter
ASCII	American Standard Code for Information Interchange (computer character set)
BLE	Bluetooth Low Energy
BT	Bluetooth (Classic)
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
GNSS	Global Navigation Satellite System
GSM	Global System for Mobile communication
HSPA	High Speed packet Access
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
PLMN	Public Land Mobile Network
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
UMTS	Universal Mobile Telecommunication Service
WGS84	World Geodetic System 1984 (global co-ordinate system used by GNSS)

Device Configuration

All Astra Telematics devices share a common set of configuration commands, which can be used in 4 different modes:

1. Using the device RS232 port
2. SMS to the device GSM voice/SMS telephone number
3. Over the TCP socket from the connected host server
4. Over BLE (subject to BLE option availability on the device)

The commands and behaviour are identical in each case, with very few exceptions. A handful of diagnostic commands are supported only in RS232 mode, due to the size of the response, they are not practical for use by SMS or TCP.

Configuration in RS232 mode using an ASCII Terminal

Custom configuration of the device is best achieved via an RS232 connection to a PC. It is possible to use any ASCII terminal program (e.g. HyperTerminal, Teraterm etc.) to enter commands.

Terminal settings are:

```
BAUD RATE:      115200
DATA BITS:      8
PARITY:         NONE
FLOW CONTROL:   NONE
```

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

Command Format

All devices use the same command format for all input methods: TCP, SMS and RS232.

Each command will take the following format:

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

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

<CR><LF> represents the carriage return and line feed characters

Note that the <> characters should not be included in your argument.

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

\$DIST,500
\$DIST,OK<CR><LF> valid command, ok

\$IPAD,123.456.89.10
\$IPAD,OK<CR><LF> valid command, ok

\$IPAD,host name.com
\$IPAD,ER<CR><LF> parameter out of range (invalid hostname)

\$FISH,400
\$FISH,UN<CR><LF> unrecognised command

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.

Example 1

\$DIST,50<CR>
\$GPSQ,100<CR>

Example 2 (recommended format for TCP/UDP mode)

\$DIST,500\$APPW,orangeinternet\$FRED,2

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 Example 2 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/TCP

The commands and formats described above can all be used over SMS 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 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.

Device Configuration Parameters & Commands

GSM/GPRS Network Settings:

GPRS Access Point Address (APAD)

ALL DEVICES

Access point network address (APN) for the specific network being used. This information should be supplied by your network operator or service provider. A list of APNs for most network operators can be found at <http://www.taniwha.org.uk/gprs.html>

\$APAD, <apn-address>

<apn-address> APN address as advised by your SIM provider

GPRS Access Point Username (APUN)

ALL DEVICES

APN username or specify "NONE" for a blank username.

\$APUN, <apn-username>

\$APUN, NONE blank username

<apn-username> APN username as advised by your SIM provider

GPRS Access Point Password (APPW)

ALL DEVICES

APN password or specify "NONE" for a blank password.

\$APPW, <apn-password>

\$APPW, NONE blank password

<apn-password> APN password as advised by your SIM provider

Application Server Settings:

TCP Host IP Address (IPAD)

ALL DEVICES

IP address or hostname for the host server. This is the destination to which the device will send reporting data. Maximum hostname length is 64 characters.

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

\$IPAD, <host-ip-addr>

<host-ip-addr> Host server IP address or hostname

TCP Host Port Number (PORT)

ALL DEVICES

The port number for the host server, to be used along with the IP address or hostname specified using IPAD.

\$PORT, <host-port-num>

<host-port-num> Host server port number

TCP Acknowledgment Timeout (TCPT)

ALL DEVICES

Specifies the maximum number of seconds that the device will wait for the host to send the ACK, in response to the device sending a report. The default value is 10 seconds. A value of zero will disable the acknowledgment feature (not recommended).

From firmware version 7.0.41, an additional option allows the definition of a ping-pong style TCP keepalive. The astra device sends a single byte 02 after <tcp-keepalive-sec> of idle time on the TCP connection, the platform may respond (optional) with a single byte 03. This maintains the TCP socket open and confirms if and when the socket may have been closed by the mobile network operator (in most cases, neither mobile device nor platform are notified of the closed socket and only discover this when trying to send data).

\$TCPT,<tcp-ack-to>[,<tcp-keepalive-sec>]

<tcp-ack-to> TCP acknowledgment timeout (seconds)

<tcp-keepalive-sec> TCP ping-pong keepalive (seconds)

Communication Mode (MODE)

ALL DEVICES

Specifies the device communication mode, as described in the table below:

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

The LOGIN option requires that the device sends a packet to identify itself immediately after a new TCP socket is opened, before continuing to send reports. This option can be used with all protocols, but note that some protocol, the packet headers will change based on the MODE LOGIN option (i.e. there will be no IMEI in the packet header), and other protocols will remain unchanged (i.e. the packet headers will include IMEIs regardless of MODE). Please refer to the relevant communication protocol description for more details regarding the LOGIN option.

\$MODE,<comms-mode>

<comms-mode> Communication mode

Reporting Level (REPL)

ALL DEVICES

This bitfield (4 bytes) can be used to enable/disable reporting of specific events based on their 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. Please refer to specific protocol documentation and the Report Filtering Application Note for details.

A value of 4294967295 will enable all reports.

\$REPL,<report-level>

<report-level> Report level bitmask

Reporting Protocol (PROT)

ALL DEVICES

Our devices support various communication protocols, including some legacy protocols, implemented for compatibility with existing systems. To take advantage of all device features and allow integration of new applications in the future, we recommend the use of our modular protocol 'X' for new implementations.

Documentation for each of these protocols is available on request from Astra Telematics, please email support@astratelematics.com for a copy.

<prot>	Reporting protocol	
6	Fixed packet protocol "K"	Legacy - not for new implementations
8	Fixed packet protocol "M"	Legacy - not for new implementations
10	Fixed packet protocol "P"	Carrier Transicold Refrigerator data
14	Fixed packet protocol "V"	Legacy - not for new implementations
16	Modular protocol 'X'	RECOMMENDED (supports all applications)
17	Fixed packet protocol "S"	Private client protocol
18	Modular protocol "Z"	Private client protocol

\$PROT,<protocol>,<protocol-mask>

<protocol> Communication protocol, selected from the table above
<protocol-mask> Protocol mask as specified in protocol 'X' description

please refer to the protocol X documentation for details of module options and appropriate mask settings

Preferred Mobile Network Operators (PMNO)

ALL DEVICES

[from firmware version 7.0.43] Allows modification of the PLMN Preferred Network Operators list, which can be stored on the SIM card to influence network selection priority. This can be useful to steer the device to avoid certain networks in certain scenarios, although in general it is not necessary.

SIM cards must support "service no.20" and the "EFPLMNwAct" file must be present (on the SIM) to allow access to the PLMN list. If these conditions are not met, the command will return an error status.

The number of preferred network operators supported is defined on each SIM card. Generally, the list starts at index 1, corresponding to the highest priority preferred network operator, going down to 20, being the least preferable. In some cases, the list may be longer or shorter than 20. The maximum index value supported by Astra Telematics devices is 255.

Network operators are defined by their numeric Home Network Identity (HNI) code, which is a combination the Mobile Country Code (MCC) and Mobile Network Code (MNC) for the operator. A complete list can be found here:

<https://www.mcc-mnc.com/>

For example, the MCC for the UK is 234 and the MNC for O2 UK is 10, hence the complete HNI for O2 UK will be defined as "23410". Note that many network operators have multiple MNCs.

\$PMNO,<index>,<mode>,[<mcc-mnc>,<rat>]

<index> entry number in the list
<mode> 0 : delete 1 : add
<mcc-mnc> home network identify number (HNI), MCC and MNC together, typically 5 or 6 digits
<rat> radio access technology
1 : GSM (default)
2 : GSM_compact
3 : UTRAN
4: E-UTRAN

Notes: specify an index number and mode 0 to delete an entry, in which case the <mcc-mnc> is not required

Only one \$PMNO command can be sent at once, to enter multiple networks, a guard-time of 10s is necessary between commands

To apply the modified PLMN list to the device, a network de-registration is required, hence the device will go offline approx. 60s after receipt of the last \$PMNO command

Networks may be allowed to be added to the list and written to the SIM, even if the <mcc-mnc> is not valid, or is not supported on the SIM's available operator list

<rat> is for future implementations, currently unsupported

examples:

\$PMNO,1,1,23410 add O2 UK as highest priority preferred network operator
\$PMNO,OK

\$PMNO,2,1,23415 add Vodafone UK as 2nd highest priority network operator
\$PMNO,OK

\$PMNO,3,1,23430 add EE UK to the list as 3rd priority
\$PMNO,OK

\$PMNO,3,0 delete PLMN entry no.3
\$PMNO,OK

\$PMNO,255,0 delete entire PLMN list
\$PMNO,OK

\$PMNO,0,0 ERROR: delete PLMN entry out of index
\$PMNO,ER

\$PMNO,1,1,23410 ERROR: SIM doesn't allow user-defined PLMN list
\$PMNO,ER

\$PMNO,24,1,23430 ERROR: Add PLMN entry out of index
\$PMNO,ER

Reporting Interval / Event Settings:

Distance Reporting Interval (DIST)

ALL DEVICES

Distance based reporting interval in metres. This feature can be disabled by setting DIST to zero. Default is 5000m.

\$DIST,<distance-m>

<distance-m> [Distance reporting interval in metres](#)

Heading Reporting Threshold (HEAD)

ALL DEVICES

Heading based reporting threshold in degrees. This feature can be disabled, by setting HEAD to zero. Default is 45 degrees.

\$HEAD,<hdg-deg>

<hdg-deg> [heading change threshold in degrees](#)

Journey Timed Message Interval (JSEC)

ALL DEVICES

The in-journey timed reporting interval may be entered in seconds using the JSEC command. Default is 120 seconds.

\$JSEC,<in-jny-sec>

<in-jny-sec> [In-journey timed reporting interval in seconds](#)

Stationary Timed Message Interval (STIM)

ALL DEVICES

Stationary timed reporting interval in minutes. Setting STIM to zero will disable time-based reports whilst stationary. An optional 2nd parameter allows the GNSS module to be left in low power mode on a timed wake from low power mode to reduce power consumption. The default STIM is 60 minutes, with GNSS enabled on wake from sleep.

\$STIM,<stim-mins>,<disable-gps>

<stim-mins> [Stationary timed reporting internal in minutes](#)

<disable-gps> [Set to disable GNSS on timed wake in low-power mode](#)

Idle Mode Timed Message Interval (ITIM)

ALL DEVICES

Timed reporting interval whilst the vehicle is idling, in minutes. Idling mode is initiated after a period of stationary time (see IDLE parameter) whilst the ignition is on. Setting the ITIM to zero will disable time based idle mode journey reports. The default value is 5 minutes.

\$ITIM,<itim-mins>

<itim-mins> [Idle timed reporting internal in minutes](#)

Idle Mode Threshold (IDLE)

ALL DEVICES

A vehicle is defined as being in idling mode when it has been stationary for a specific length of time whilst the ignition is on. Idling mode ends once the vehicle starts moving again. This parameter defines the length of time (in seconds) that a vehicle must be stationary before idling mode is initiated. The default value is 180 seconds.

\$IDLE,<idle-secs>

<idle-secs> [Idle mode threshold in seconds](#)

Over-speed Speed Threshold (OSST)

ALL DEVICES

The device 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 120kmh.

\$OSST,<speed-kmh>

<speed-kmh> [Over-speed threshold in kmh](#)

Over-speed Hold Time (OSHT)

ALL DEVICES

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

\$OSHT,<hold-time-secs>

<hold-time-secs> [Over-speed minimum hold time in seconds](#)

Over-speed Inhibit Time (OSIT)

ALL DEVICES

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.

\$OSIT,<inhibit-time-secs>

<inhibit-time-secs> [Over-speed inhibit time in seconds](#)

Journey Detection Settings:

Ignition Mode (IGNM)

AT110 AT200 AT210 AT240 AT400

Defines the method used to determine whether the vehicle is in-journey or stationary:

IGNM	Start/Stop Reports	Default Power Down?	Ignition Input
0	based on movement	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
4	from CANBus data	NO	OBD or FMS

\$IGNM,<ignition-source>[,<low-power-mode>]

<ignition-source> [Ignition detection mode, from the table above](#)

<low-power-mode> [Set to enable low-power mode \(sleep whilst stationary\)](#)

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 device will detect that the vehicle engine is running from the increase in external voltage (typically, the vehicle battery voltage increases by 2.0 Volts whilst the engine is running). This feature requires an absolute minimum voltage change of 0.8V whilst the engine is running, compared to when it is not running. Please refer to the

Installation Guide for the appropriate device, for installation and calibration guidance relating to the use of IGNM mode 3.

STOP Report Delay (STPD)

ALL DEVICES

When IGNM is set to zero (see above), the device will determine journey START and STOP events from motion (GNSS and accelerometer based). 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 IGNM is set to three a STOP event will occur after the vehicle external voltage has dropped for a pre-determined time. The length of time of the drop in voltage level necessary to trigger a STOP report is dictated by the STPD parameter. If the voltage rises before the time in STPD is reached the vehicle is considered to still be in the same journey. This is useful for vehicles with auto start-stop.

`$stpd,<stop-time-secs>`

`<stop-time-secs>` [Stationary time to trigger a STOP event in seconds](#)

Driver ID Settings:

Driver ID Configuration (DRIC)

AT110 AT200 AT210 AT240 AT400

Configure driver ID source options.

```
$DRIC,<driver-id-source>,<reminder>,<confirm>,<reportall>,<immobilise>,<validity-timeout-secs>,<auth-to-secs>,<imob-output-state>,<server-authorisation>,<allow-manual-imob-override>,<reminder-to-sec>,<progress-indicator>,<combined-reminder+progress>
```

<driver-id-source>	0 : none, 1 : iButton, 2 : RFID card, 3 : Bluetooth
<reminder> ^{1,2}	Set to 1 to enable a reminder buzzer when ignition is turned ON until a driver ID is presented
<confirm> ¹	Set to 1 to enable an indicator (short pulse) whenever an ID is read
<report-all>	Set to 1 to enable to enable an event/report each time an ID is presented
<immobilise> ¹	Set to 1 to enable the immobiliser output to disable the vehicle until an ID is presented. The immobiliser will be re-asserted 30 seconds after the end of the journey or the expiry of <validity-timeout-secs>
<validity-to-secs>	Driver ID will be attached to all journey START and STOP reports until validity expires. This can be useful for applications which involve many short journeys / stops, to avoid the need to present ID every time. If set to 0, the ID will become invalid at the next STOP report, and must be presented for every journey start (for reminder and immobiliser purposes). Default is 0.
<auth-to-secs>	When immobiliser option is enabled, the driver ID must be presented before the vehicle engine is started. If no Driver ID was seen for <i>auth-timeout-secs</i> the immobiliser will be activated. 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 DRID commands described in the following section. 0 = server authorisation not required 1 = server authorisation required
<manual-imob-override>	this option is no longer supported (new immobiliser priorities from firmware version 7.0.23)
<reminder-to-sec>	Timeout on reminder buzzer in seconds. Set to zero for an indefinite timeout. Default is 0.
<progress-indicator> ^{1,2}	Set to 1 to enable a progress indicator when the Driver ID is being authenticated by the server
<combined-rem+prog> ^{1,2}	Set to 1 to enable both the reminder and the DRID progress indicator to be combined on a single digital output

Note 1: these options require the use of a digital output. \$DRIC will return an error if the device does not have sufficient digital outputs to support all enabled options.

Note 2: <reminder>, <drid-progress-indicator>, and <combined-rem+prog> functions are mutually exclusive. Ensure that only one of these options is set at any one time.

Authorised Driver ID Implementation (DRID) AT110 AT200 AT210 AT240 AT400

This feature allows the driver ID to be linked to the immobiliser, such that only authorised drivers may start the vehicle. Each time a new ID is read (i.e. not currently in the whitelist), the device will query the host server for approval to accept the new ID. This process should take no more than 10 seconds. IDs approved by the host will be added to the device's whitelist and when presented again in the future, they will be immediately authorised by the device.

The device will store a list of up to 100 approved driver IDs (whitelist) and up to 50 declined IDs (blacklist).

IDs that are declined, will be added to the blacklist and will not allow the vehicle to be started. If a blacklisted ID is presented again in the future, the device will re-request approval on every occasion. IDs previously approved can be removed from the whitelist by the host.

If the device has no communication with the host server, whitelisted IDs will allow the vehicle to be started and blacklisted IDs will not allow the vehicle to be started. Unknown 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 whitelist becomes full and a new iButton is authorised, the oldest iButton will be removed from the list. The oldest iButton is based on the last time that the IDs were presented, so regularly used IDs should never be removed from the whitelist.

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

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

Argument	Format
<family-code>	iButton family code, fixed length, 2 hexadecimal digits, in ascii format (leading zeros), e.g. 0F. This field will only be populated if the source is an iButton, otherwise it will zero
<serial-number>	ID serial number, variable length, typically 12 – 16 hexadecimal digits (maximum 8 bytes)
<source>	Source of the ID, fixed length, 2 decimal digits 01=iButton, 02=Mifare card, 03=Bluetooth, 04=PicoPass Card

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>,<source>	Device requests driver ID authorisation from host
\$DRID,APPROVE,<family-code>,<serial-number>	approve ID
\$DRID,DECLINE,<family-code>,<serial-number>	decline ID
\$DRID,ADD,<family-code>,<serial-number>	add an ID to the whitelist
\$DRID,REMOVE,<family-code>,<serial-number>	remove ID from the whitelist
\$DRID,CLEAR	delete both whitelist and blacklist
\$DRID,CLEAR,WHITE	delete whitelist
\$DRID,CLEAR,BLACK	delete blacklist
\$DRID,BLOCK,<family-code>,<serial-number>	add ID to blacklist
\$DRID,VERIFY,<hours>	set the device whitelist verification period (0-65535). 0 disables the request

DRID Examples:

iButton (6 byte ID + family code) – Approved:

\$DRID,AT110,CHECK,351777042187300,01,00000000125408C9,01
\$DRID,APPROVE,01,00000000125408C9

query
response

MiFare card (8-byte ID) – Approved:

\$DRID,AT240V8,CHECK,351777042187300,00,000000009B200F2E,02
\$DRID,APPROVE,,000000009B200F2E

query
response

Bluetooth (6-byte ID)- Declined:

\$DRID,AT00V3,CHECK,351777042187300,00,0000FF254A2A548E,03
\$DRID,DECLINE,,0000FF254A2A548E

query
response

Driver Behaviour Related Settings:

Acceleration & Deceleration Event Thresholds (ACMX & DCMX) **ALL DEVICES**

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 value is 40.

```
$ACMX,<accel-mss>  
$DCMX,<accel-mss>
```

<accel-mss> Accel / decel threshold in metres per second per second * 10

Example:

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

Cornering Event Thresholds (ACMY & DCMY) **ALL DEVICES**

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 value is 50.

```
$ACMY,<cornering-mss>  
$DCMY,<cornering-mss>
```

<cornering-mss> Cornering threshold in metres per second per second * 10

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) **ALL DEVICES**

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 value is 100 (10 m/s/s).

```
$COLN,<collision-mss>
```

<collision-mss> Collision threshold in metres per second per second * 10

Example:

```
$COLN,950                      set cornering accel threshold at 9.5 m/s/s
```

Device Orientation (ORTN)**ALL DEVICES**

This parameter defines the device 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,<orientation>

<orientation>	Device Installation Position
0	Unspecified
1	Device (label) facing sky, connector facing to LHS
2	Device (label) facing sky, connector facing FORWARD
3	Device (label) facing sky, connector facing to RHS
4	Device (label) facing sky, connector facing to REAR
5	Device (label) facing front or rear, connector facing to LHS
6	Device (label) facing LHS or RHS, connector facing FORWARD
7	Device (label) facing front or rear, connector facing to RHS
8	Device (label) facing LHS or RHS, connector facing to REAR
9	Device (label) facing LHS or RHS, connector facing UP or DOWN
10	Device (label) facing front or rear, connector facing UP or DOWN
11	Device (label) facing LHS or RHS, connector facing UP or DOWN
12	Device (label) facing front or rear, connector facing UP or DOWN

Pass Through Data Mode Related Settings:**PTDM Host IP Address (IPAD2)****AT110 AT200 AT210 AT240 AT400**

Host IP address or hostname to be used in Pass Through Data Mode. Maximum hostname length is 64 characters. Please refer to the appropriate application note for further details.

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

\$IPAD2,<ptdm-ip-addr>

<ptdm-ip-addr> [PTDM server IP address or hostname](#)

PTDM Host Port Number (PORT2)**AT110 AT200 AT210 AT240 AT400**

Port number to be used in Pass Through Data Mode. Please refer to the appropriate application note for further details.

\$PORT2,<ptdm-port>

<ptdm-port> [PTDM port number](#)

Pass Through Data Mode (PTDM)

AT110 AT200 AT210 AT240 AT400

Pass through data mode enable. Set this parameter to 1 to enable Pass Through Data Mode. Please refer to the appropriate application note for further details. Default is 0.

\$PTDM,<mode>,<baud-rate>,<packet-timeout-ms>,<packet-max-size>,<packet-terminator>,<device-login>,<rs232-port>,<tcp-socket>,<add-terminator>,<packet-headers>,<ack-enable>,<auto-off-time>

Field	Description	Range	
<mode>	PTDM mode	0 1 2 3 4	Disabled Enabled Garmin FMI incl. CONNECT message Transcan
<baud-rate>	RS232 baud rate	4800 9600 19200 38400 57600 115200 230400 460800 921600	
<packet-timeout-ms>	Packet assembler timeout	0 – 65535 ms	
<packet-max-size>	Packet assembler max. packet size	1 – 1024 (incl. header and terminator)	
<packet-terminator>	Packet assembler termination character options	0 1 2 3	no terminator Send on <CR> Send on <LF> Send on <CR><LF>
<device-login>	Enable a device login (IMEI) when a TCP socket is opened	0 1	no login login enabled
<rs232-port>	Select RS232 Port	0 1	RS232 Port 1 RS232 Port 2
<tcp-socket>	Select TCP socket to use for PTDM	0 1	Use IPAD / PORT Use IPAD2 / PORT2
<add-terminator>	specify additional termination characters to add to packets in both directions	0 1 2 3	no additional terminator Add <CR> Add <LF> Add <CR><LF>
<packet-headers>	Enable #PTDA: packet headers	0 1	no packet headers packet headers enabled
<ack-enable>	Option to ACK packets sent in both directions	0 1	ACK disabled ACK 05 byte is sent in response to packets received in both directions
<auto-off-time>	Optional pass through data mode disable timer	0 1-65535	PTDM mode runs continuously Defines a limited time (minutes) to run PTDM mode, after which PTDM will automatically disable (<mode> will be set to 0)

Please refer to the Pass Through Data Mode Applications Note for more details on these options

CANBus Related Settings

CANBus Configuration (CANC)

AT110 AT240 AT400

Allows configuration of the CANBus to suit the vehicle, installation and application.

\$CANC,<silent-mode>,<bit-rate>,<ext-CAN-ID>,<interface-type>,<fuel-type>

The silent mode option operates as described in the following table:

<silent-mode>	Description
0	silent mode OFF - uses dominant ACK bits. Device will acknowledge received messages. (default)
1	silent mode ON - uses recessive ACK bits. Device will not acknowledge received messages

The bit rate index is in the range 0-2 and represents an actual bit rate as given in the following table:

<bit-rate>	Bit rate
0	125 kbit/s
1	250 kbit/s (default)
2	500 kbit/s

The extended CAN ID option selects 11 bit or 29 bit CAN identifiers for CAN transmissions as follows:

<ext-CAN-ID>	Description
0	Standard 11 bit identifiers / J1979 OBD (default)
1	Extended 29 bit identifiers / J1939 FMS

The interface type is set as follows:

<interface-type>	Description
0	CANBus disabled (default)
1	FMS
2	OBD

The fuel type is set as follows:

<fuel-type>	Description
0	Fuel type AUTO DETECT (default)
1	Fuel type PETROL
2	Fuel type DIESEL

CANBus Event Mask (CANM)

AT110 AT240 AT400

FMS CANBus events can be configured to generate reports using the following command:

```
$CANM,<canbus-event-mask>
```

where the mask bits are set to 1 to enable event triggers and cleared to disable event triggers. The mask bits are described in the following table:

<canbus-event-mask>	Bit	Default
Brake switch – pedal released	0	0
Brake switch – pedal depressed	1	0
Cruise control – switched on	2	1
Cruise control – switched off	3	1
PTO – Off / Disabled	4	1
PTO – Set	5	1
PTO – Not Available	6	1
Vehicle Direction – Forward	7	1
Vehicle Direction – Reverse	8	1
Vehicle Speed – Overspeed	9	1
Vehicle Speed – No Overspeed	10	1
Reserved	11	0
Reserved	12	0
Reserved	13	0
Reserved	14	0
Reserved	15	0

The default CANM setting is 2044.

FMS/OBD Event Thresholds

The CANBus event reporting thresholds can be configured by setting the relevant parameters using the commands described below:

Engine Load Event Configuration (ELEC)

AT110 AT240 AT400

```
$ELEC,<el-high-threshold>,<el-high-hold-timeout>,<el-high-inhibit-timeout>
```

Parameter	Description
engine-load-high-threshold	when reached or exceeded will generate a report. A value of 0 disables event reporting for this threshold.
engine-load-high-hold-timeout	the time (in seconds) for which the engine load must exceed the engine-load-high-threshold setting in order for an event to be reported
engine-load-high-inhibit-timeout	the time (in seconds) following an engine load high event, during which another event cannot be reported

The engine load is reported on a scale of 0-125 percent of the operational range of FMS and 0-100 for OBD.

RPM Event Configuration (RPEC)

AT110 AT240 AT400

\$RPEC,<rpm-high-threshold>,<rpm-high-hold-timeout>,<rpm-high-inhibit timeout>

Parameter	Description
rpm-high-threshold	when reached or exceeded, will generate a report. A setting of 0 disables event reporting for this threshold.
rpm-high-hold-timeout	the time (in seconds) for which the reported RPM must exceed the rpm-high-threshold setting in order for an event to be reported
rpm-high-inhibit-timeout	the time (in seconds) following RPM high event for which another event cannot be reported

The RPM is reported divided by 32 on a scale of 0-250 (to represent 0-8000 rpm) for FMS and 0-255 (0-8160) for OBD.

Throttle Position Event Configuration (TPEC)

AT110 AT240 AT400

\$TPEC,<rpm-high-threshold>,<rpm-high-hold-timeout>,<rpm-high-inhibit-timeout>

Parameter	Description
throttle-high-threshold	when reached or exceeded, will generate a report. A setting of 0 disables event reporting for this threshold.
throttle-high-hold-timeout	the time (in seconds) for which the reported throttle position must exceed the throttle-high-threshold setting in order for an event to be reported
throttle-high-inhibit-timeout	the time (in seconds) following a throttle high event for which another event cannot be reported

The throttle position is reported on a scale of 0-100%.

To summarise, the ranges for the event threshold parameters are given in the table below:

Parameter	Minimum	default value	Maximum
engine-load-high-threshold	1	90	125
engine-load -hold-timeout (secs)	1	30	65535
engine-load -inhibit-timeout (secs)	1	60	65535
rpm-high-threshold	1	4000	8000
rpm-hold-timeout (secs)	1	30	65535
rpm-inhibit-timeout (secs)	1	60	65535
throttle-high-threshold	1	75	100
throttle-hold-timeout (secs)	1	30	65535
throttle-inhibit-timeout (secs)	1	60	65535

Other Settings:

Alarm Phone Number (ALRM)

ALL DEVICES

This is destination number for alarm text messages sent via SMS. 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).

\$ALRM,<alarm-tel>

<alarm-tel>

Alarm SMS mobile telephone number

Configure Power Monitoring (CPWR)

AT110 AT200 AT210 AT240 AT400

This command sets the conditions for sending external power alarms.

\$CPWR,<volt-level>,<event-delay>,<report-delay>

<volt-level>

Voltage to trigger low external voltage

<low-volt-delay>

Delay before reporting low external voltage, in seconds

<no-volt-delay>

Delay before reporting no external voltage, in seconds

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

If the external voltage falls below <volt-level> for <low-volt-delay> seconds, an SMS alert is sent. If external power is lost (below 6.0V) for <no-volt-delay> seconds, an alert SMS is sent.

The default settings are

\$CPWR,11.5,30,30

Roaming Enable (ROAM)

ALL DEVICES

This parameter can be used to disable network roaming, as a means of controlling data network costs. A value of zero will disable network roaming. The ROAM default value is 1.

\$ROAM,<roam-enable>

<roam-enable>

Network roaming enable (1) / disable (0)

SMS Monthly Usage Limit (SMSL)

ALL DEVICES

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 device. A value of zero will disable outgoing SMS completely! Default SMSL is 50.

\$SMSL,<sms-limit>

<sms-limit>

Maximum allowed monthly SMS usage

GNSS Minimum Acceptable Quality (GPSQ)

ALL DEVICES

Defines the minimum acceptable quality threshold for a GNSS fix, based on the estimated GNSS position accuracy. The value for GPSQ is a percentage, allowed values are from 0 to 100. The default value is 50%, which corresponds to an estimated position error of 50m. A value of 100% specifies near perfect GNSS 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. A value of zero disables GNSS fix quality filtering, such that the device will use an 3D fix that the GNSS receiver determines as "autonomous" (i.e. valid).

2 optional arguments allow the minimum SV count and minimum SV elevation angle to be defined.

\$GPSQ,<location-accuracy>[,<min-sv-count>,<min-sv-elevation>]

Default:

\$GPSQ,50,3,5

<location-accuracy> Index to specify location quality filtering (0 – 100)
<min-sv-count> Minimum allowed SV count
<min-sv-elevation> Minimum allowed SV elevation angle above horizon

GSM Cell ID Mode (CLID)

ALL DEVICES

Enables GSM Cell ID reporting. Default is 0.

\$CLID,<mode>[,<request-period>]

<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 GNSS fix
2	Report GSM Cell ID information always
3	Report location provided by GSM network using M2M location service when no GNSS fix

For CLID=3 when GNSS 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 GNSS.

Debug Level (DBUG)

ALL DEVICES

Set the level of debug information displayed in the NMEA RS232 serial output as defined in the following table. Default is 2.

\$DBUG,<debug-level>

<debug-level> Debug level, selected from table below:

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)

ALL DEVICES

OTA PIN code feature, which can be used to prevent unauthorised reconfiguration by SMS mode. The PIN code is specified using the PASS command. The PASS code can be set by RS232, SMS, BLE 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  
$STAT  
$TEST
```

Geofences (GEOF)

ALL DEVICES

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>	geofence index	1 - 100
<type>	geofence type	0 disabled 1 alarm on entry 2 alarm on exit 3 alarm on both
<radius>	geofence radius in metres	20 - 65535
<latitude>	geofence latitude, WGS84 decimal degrees	-90.0 to +90.0
<longitude>	geofence 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)

AT110 AT200 AT210 AT240 AT400

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 GNSS speed, GNSS location and accelerometer based motion sensor. The sensitivity of tow alert detection can be changed by editing the various decision thresholds using the TOWP command. The format of the command is as follows

\$TOWP,<distance-metres>,<speed-kmh>,<speed-seconds>,
<motion-sensitivity>,<trembler-sensitivity>,<distance-seconds>

Field	Description	Range
<distance-metres>	distance travelled from the last ignition off position	0 no distance check 100-65535 default=500
<speed-kmh>	speed which must be exceed <speed-seconds> to trigger an alert	0 no speed check 20 - 65535 default=50 minimum 20
<speed-seconds>	time for which the speed must be above <speed-kmh>	1- 65535 default=10
<motion-sensitivity>	accelerometer based motion detection sensitivity for triggering a tow alert	0 no accelerometer based motion detection 1 - 10 (1=most sensitive, 10=least sensitive, default=5)
<trembler-sensitivity>	Tremble sensor based motion detection sensitivity for triggering a tow alert	0 no trembler based detection 1 - 10 (1=most sensitive, 10=least sensitive default=5)
<distance-seconds>	the number of seconds that distance must breach <distance-metres> in successive GNSS fixes	0 - 255 default=10

Accelerometer Wake-up Threshold (MEMS)

ALL DEVICES

From firmware 7.0.35.xx MEMS has been extended with more precise inertial detection:

Defines the accelerometer-based motion detection criteria, used for waking the device from sleep and tow alert detection, amongst other things. The accelerometer has three modes for detecting motion:

- ***single click***
- ***double click***
- ***inertial***

single click detection mode:

motion will be detected when acceleration measured on the selected axes exceeds the specified <threshold> and returns below it within the value set for <time-limit>. In this mode, <latency>, <window>, <inertial-threshold>, and <inertial-duration> are irrelevant.

double click detection mode:

once the first click has been recognized, the second click detection procedure starts. Motion is deemed to have been detected only if the second click occurs after the defined <latency> time, but before the <window> time has expired.

inertial detection mode:

motion will be detected when acceleration on any axis exceeds <inertial-threshold> for <inertial-duration>. In this mode, <threshold>, <time-limit>, <latency>, and <window> are irrelevant.

NOTE: All MEMS arguments must be entered in hexadecimal

The MEMS command has the following format:

```
$MEMS,<config>,<threshold>,<time-limit>,<latency>,<window>,<inertial-  
threshold>,<inertial-duration>
```

Where:

<det-mode>: 0 inertial detection mode
 0x15 single click detection mode
 0x2A double click detection mode

For more detailed options, please refer to the LIS2DH12 data sheet and ST application note AN5005.

<threshold>: The <threshold> parameter specifies the X, Y and Z axis thresholds in 7 bits, from 0 to 0x7F, each bit corresponding to approx. 15mg of acceleration (i.e. 2G divided by 128). The most sensitive setting is therefore 1, and the least sensitive is 0x7F.

<time-limit>: Defines the maximum time interval that can elapse between the start of the click-detection procedure, from 0 to 0xFF. The value of <time-limit> is then multiplied by 0.5ms to give a range from 0 to 127.5ms.

<latency>: Defines the time interval that starts after the first click detection where the click-detection procedure is disabled, in cases where the device is configured for double-click detection. The <latency> is defined in milliseconds, from 0 to 0xFF, and should be lower than the <window> interval.

<window>: Defines the maximum interval of time that can elapse after the end of the latency interval in which the click-detection procedure can start, in cases where the device is configured for double-click detection. The <window> is defined in milliseconds, from 0 to 0xFF, and should be higher than the <latency> interval.

<inertial-threshold>: The <inertial-threshold> parameter defines the X, Y, Z axis thresholds in 7 bits, from 0 to 0x7F, each bit corresponding to about 16mg of acceleration. The most sensitive setting is therefore 1, and the least sensitive is 0x7F. Set non-zero to enable inertial interrupt mode.

<inertial-duration>: Defines the minimum duration of inertial interrupt before the inertia-detection can start. The <inertial-duration> is defined in ms x 20, from 0 to 0x7F. Set non-zero to enable inertial interrupt mode.

If you are using inertial interrupts, you will only need the last 2 parameters non-zero. The other parameters will be ignored:

```
$MEMS,0,0,0,0,0,0,<inertial-threshold>,<inertial-duration>
```

Example (using single click mode):

```
$MEMS,15,20,FF,1,1
```

Example (using inertia mode):

```
$MEMS,0,0,0,0,0,0,2,3
```

Configures single click detection on all axes, threshold of 0.5g, time limit: 127.5ms, latency: 1ms and window: 1ms (in this example, latency and window are irrelevant, since we are using single click detection).

The default settings are:

```
$MEMS,0,5,ff,1,1,10,5 (inertial mode: 160mg for 100ms)
```

Utility and Engineering Commands

Initiate "FastTrack" Mode (FTRK)

ALL DEVICES

Following receipt of this command, the device will send timed reports every 5 seconds, for a period of 1 minute.

\$FTRK enable "fast-track" mode

Delete All Geofences (GEOD)

ALL DEVICES

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

\$GEOD delete all device-based geofences

Set Digital Output (SDIG)

AT110 AT200 AT210 AT240 AT400

Allows manual setting and re-setting digital outputs.

\$SDIG,<output-num>,<state-to-set>

<output-num> digital output number (1-5)

<state-to-set> 1 for closed / ON and 0 for open / OFF

Examples:

\$SDIG,2,1 switch output 2 ON

\$SDIG,3,0 switch output 3 OFF

Note that the SDIG command forces an unconditional assignment of the specified digital output state, and hence should not be used with any digital output assigned to an immobiliser function which may stop the vehicle mid-journey.

From version 7.0.28, the \$SDIG command allows a pulsed operation, as follows:

\$SDIG,<output-num>,<state-to-set>,<set-time-ms>,<pulse-reps>,
 <unset-time-ms>

<output-num> digital output number to be switched (1 - 5)

<state-to-set> state to set output (0 - 1)

<set-time-ms> duration of the set time in milliseconds (10 - 65535)

<pulse-reps> pulse cycle repetitions (1 - 255)

<unset-time-ms> duration of the unset time in milliseconds (10 - 65535)

SDIG pulsed operation examples:

\$SDIG,2,1,500 switch output 2 ON for 500mS (and then OFF)

\$SDIG,3,1,150,5,75 switch output 3 ON for 150mS, OFF for 75ms, repeat 5 times

\$SDIG,5,1,300,2 switch output 5 ON for 300mS, OFF for 100ms*, repeat 2 times

* where a repetition is specified without an <unset-time-ms>, a default unset time of 100mS will be used.

Typical pulse timing tolerance is $\pm 10\text{mS}$

Configure Digital Outputs (CDOP)

AT110 AT200 AT210 AT240 AT400

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 application options 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
7	Progress Indicator (driver ID)
8	Combined reminder & progress indicator on a single output

Examples:

`$CDOP,3,1` Use digital output 3 for immobilisation
`$CDOP,2,3` Use digital output 2 for confirm
`$CDOP,1` Display the application assigned to digital output 1
`$CDOP` Display the available options for all applications

Default settings for CDOP are:

`<immobiliser>` output 1
`<reminder>` output 3
`<confirm>` output 4
`<driver-behaviour-x>` not assigned
`<drid-progress-indicator>` not assigned
`<rem-progress-indicator>` not assigned

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 Inputs (CDIP)

AT110 AT200 AT210 AT240 AT400

The digital inputs can be de-bounced over a period of time configured using the command

```
$CDIP,<digital1-db-secs>,<digital-plus-db-secs>
```

<digital1-db-secs> Debounce seconds for digital input 1

<digital-plus-db-secs> Debounce seconds for all other digital inputs

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

Serial Port Configuration (SRAL)

AT110 AT200 AT210 AT240 AT400

Assign an application to one of the RS232 serial ports, and specify an optional baud rate. If the baud rate is omitted, the device will assign the default baud rate according to the application, as specified in the table below.

```
$SRAL,<port-number>,<application>,<baud-rate>
```

<port-number> can be 1 or 2, depending on the number of RS232 ports available on the appropriate device

<application> see table below for available applications

<baud-rate> baud rate (is not specified, the default will apply, as defined below)

<application>	Description	Default Baud Rate
0	NONE	N/A
1	DEBUG (default)	115200
2	PTDM	9600
3	CR001 CARD READER	9600
4	MP2 CARD READER	19200
5	BSEN15430 GRITTER	9600
6	REDFORGE GRITTER	9600
7	CARRIER REFRIGERATOR	9600
8	ECON 3-BYTE GRITTER	9600
9	ECON 1-GRAM GRITTER	9600
10	HEGEMON TRAILER TAG	9600
11	SCHMIDT GRITTER	19200
12	TRANSCAN TEMP RECORDER	19200

Example:

```
$SRAL,2,3                    RS232 port 2 for use with CR001 card reader (at the default baud rate)
```

NOTE: please refer to our communication protocol documentation for details of supported applications. All applications are supported by our modular protocol X, by enabling the appropriate module, using the \$PROT command.

Immobilise (IMOB)

AT110 AT200 AT210 AT240

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 ON (vehicle disabled) until \$IMOB,0 is received to clear the immobilise condition.

If \$IMOB is used with no argument, the default mode 3 is used (conditional on ignition OFF and speed = zero). If the driver ID based immobilise option is enabled (see DRIC command), \$IMOB with no argument uses mode 4 (immediate and unconditional).

\$IMOB,<mode>,<delay-sec>

<mode>	IMOB Conditions
0	Clear immobilisation mode and set immobiliser output to enable
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

<delay-sec> specifies an optional delay, after all conditions are met, before the immobiliser is activated. This field should be left blank if no delay is required.

IMOB may be used whilst DRIC or IMOS immobiliser functions are active, in which case the immobiliser state will be changed until the next DRIC/IMOS event. For example, the specified IMOS on-time / off-time, an ignition ON event, or an ignition OFF event.

Automatic Immobilisation Schedule (IMOS)

AT110 AT200 AT210 AT240 AT400

Automatic immobilisation can be scheduled individually for each day of the week using this command.

\$IMOS,<day>,<on-time-hr>,<off-time-hr>,<on-time-min>,<off-time-min>

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-hr>	Vehicle enabled time: hour of day, GMT	0-23
<off-time-hr>	Vehicle disabled time: hour of day, GMT	0-23
<on-time-min>	Vehicle enabled time: minutes after the hour	0-59
<off-time-min>	Vehicle disabled time: minutes after the hour	0-59

Note:

- The output used must be assigned to <immobiliser> using the CDOP command
- IMOS will never allow a vehicle to be immobilised mid-journey, whilst the ignition is on
- <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
- 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-hr>,<on-time-min> for any given day of the week. The output will be turned ON after the specified <off-time-hr>,<off-time-min> for any given day of the week, and will remain ON until the specified <on-time-hr>,<on-time-min> for the following day. The state of the output can be over-ridden by the use of the SDIG or IMOB commands, which will force the state as specified until the next scheduled <on-time-hr>,<on-time-min> or <off-time-hr>,<off-time-min>.

ADC Configuration (ADCC)

AT110 AT200 AT210 AT240 AT400

ADC1 and ADC2 will be sampled at regular intervals. Each sample is a 12 bit value. The average over a specified number of samples will be inserted in the next report. If a sample changes by more than a specified percentage of the input voltage range from the previous reading then this will cause a report to be sent.

The format of the ADCC command is as follows:

\$ADCC,<event-threshold-%-change>,<avg-samples>,<avg-sample-interval>

Field	Description	Range
<event-threshold-%-change>	Percentage change of the analogue reading from one sample to the next that will cause a report to be sent. Percentage is the change compared to the full scale input range	0-100 Default 0 0 to disable this feature
<avg-samples>	Number of most recent samples that is used to calculate the average reading	1-100 Default 10
<avg-sample-interval>	Number of seconds between each sample	1-255 Default 5

Restore Factory Default Settings (FACT)

ALL DEVICES

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.

\$FACT [Load factory default device configuration](#)

Position on Demand (POLL)

ALL DEVICES

The device 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.

\$POLL [Create an immediate event, reason "POLLED" and send a report](#)

Firmware Update (LOAD)**ALL DEVICES**

Device firmware can be updated over GPRS/UMTS 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>

Reboot (BOOT)**ALL DEVICES**

Trigger a device reboot.

\$BOOT [Reboot device](#)

Firmware Version (ATSW)**ALL DEVICES**

Returns the device firmware version

\$ATSW [Returns device firmware version](#)

Example response:

\$ATSW, 7.0.33.0

IMEI Query (IMEI)**ALL DEVICES**

Returns the device IMEI

\$IMEI [Returns device IMEI](#)

Example response:

\$IMEI, 123456789012345

Status Check (STAT)**ALL DEVICES**

This legacy command is still supported, but we recommend use of the more user-friendly \$TEST command, which has an easily readable response format.

Status Check (\$TEST)**ALL DEVICES**

This command is useful to diagnose device connection / installation issues. We recommend that it is used after each installation, to verify power, ignition, CANBus and signal availability. We also recommend use of \$TEST to diagnose devices that go offline unexpectedly. Details of the \$TEST feature can be found later in the document or in the Remote Device Test application note.

Parameter Check (PARA)**ALL DEVICES**

See Appendix

Position Check (POSN)

ALL DEVICES

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=device@<latitude>,<longitude>&t=<map-type>&z=<zoom>>

Erase Stored Reports (ELOG)

ALL DEVICES

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).

\$ELOG[, <num-reports>]

<num-reports>

optional, number of reports to delete

Examples:

\$ELOG

Delete all reported stored in non-volatile memory

\$ELOG,99

Delete the oldest 99 reports from non-volatile memory

Non-volatile Set (NVST)

ALL DEVICES

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)

ALL DEVICES

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

Examples:

\$DIST, 500

Device will reply \$DIST, OK

\$DIST, 500\$NACK

Delete will act on command but will not reply

NMEA enable (NMEA)

ALL DEVICES

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

\$NMEA, 1

Enable NMEA \$GPRMC output on debug RS232 port

\$NMEA, 0

Disable NMEA output on debug RS232 port

Serial Port Baud Rate (BAUD)**ALL DEVICES**

Configure the baud rate of the device RS232 debug serial port. Also see SRAL command. Default is 115200.

`$BAUD,9600`

Set RS232 debug port BAUD rate to 9600

Display Settings (SHOW)**ALL DEVICES**

Display settings in readable ASCII format, RS232 mode. For TCP/SMS modes, please use \$PARA.

Send SMS (SSMS)**ALL DEVICES**

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)**ALL DEVICES**

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. In the case of indefinite shutdown, the device will wake up on a change of state of external power or ignition.

Send LOGIN packet (LOGN)**ALL DEVICES**

When MODE is set to 6, the device will send a LOGIN packet each time a new TCP socket is opened. Thereafter, the LOGIN packet will not be resent unless specifically requested using \$LOGN command or if/when the socket gets closed and has to be re-opened.

Diagnostics (DIAG)**ALL DEVICES**

Engineering diagnostics facilities:

`$DIAG,1` GNSS reset`$DIAG,2` Modem reset`$DIAG,3` Recalibrate accelerometer - immediate and unconditional`$DIAG,4` Load default settings`$DIAG,5` Ignition (mode 3) recalibrate`$DIAG,6` show external voltage and battery status`$DIAG,7` recalibrate accelerometer – waits for ignition off`$DIAG,8` display GSM network information`<network-operator>;<H|R><BSIC><MNC><LAC><Cell_ID>``$DIAG,9` Display device information`<Device>;<HW-model>;<HW-version>;<firmware-version>;<MCU Revision ID>;<MCU Device ID>``$DIAG,28` Settings for Accelerometer to recalibrate automatically

When Ignition is off, and device is stationary, if accelerometer readings show a large value greater than set threshold, accelerometer is recalibrated automatically.

\$DIAG,28,<accel_thresh>,<accel_timeout>,<accel_sleep_timeout>,<accel_constant_thresh>

Field	Description	Range
<accel_thresh>	Threshold in milli-g used to check if accelerometer axis reading is too high	Default 5 milli-g
<accel_timeout>	Timeout in seconds after which the accelerometer will be recalibrated when an axis reading is continuously greater than the threshold	Default 60
<accel_sleep_timeout>	Timeout in seconds, if no accel recalibrate threshold cross events happen within this time device is allowed to go to sleep	Default 5
<accel_constant_thresh>	Accel readings have to be within this range to confirm device is stationary for recalibration to happen	Default 25 milli-g

\$DIAG,110 Set fuel tank capacity for OBD fuel used calculation purposes

\$DIAG,111 Enter despatch mode (device powers down until connected to power)

Over The Air Device Test (TEST)

ALL DEVICES

The \$TEST command can be sent by SMS, RS232 or TCP. We recommend that this command is used after every installation, before the installer leaves the vehicle / site.

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

Line	Description	Comments
1	Device model	e.g. AT240V8
2	Firmware version number	e.g. 7.0.15.0
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	GNSS status (% availability)	OK, ERR or JAM followed by percentage, e.g. GNSS: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	CANBus Inactivity*	OK or ERR, e.g. CAN:OK (CANBus based protocols only)
14	Immobilisation output state	ON, OFF or N/A if no digital output assigned to immobiliser
15	Number of queued reports	0 – 9999

*CANBus activity error only supported on AT110 and AT240

Example 1: device with no errors/problems:

```
TEST:AT200
7.0.18.0
357322042745742
02 UK
PWR:12.5V (100%)
BAT:100%
GPS:OK (95%)
GPRS:OK (98%)
APN:OK
SKT:OK
ACK:OK
IGN:OK (OFF)
IMOB:OFF
REPO:0
```

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

```
TEST:AT240
7.0.18.0
357322045896451
02 UK
PWR:12.5V (24%)
BAT:100%
GPS:OK (95%)
GPRS:OK (98%)
APN:OK
SKT:OK
ACK:OK
IGN:OK (ON)
CAN:N/A
IMOB:OFF
REPO:0
```

Notes on status results:

- GPS** N/A after power-up, until the first fix has been acquired
OK thereafter, if GPS is available, or has been available in the last 5 minutes
ERR if GPS has been unavailable for more than 5 minutes
- GPRS** ERR at first power up, or whenever the device has no GPRS network service
OK when the device has GPRS network service
- APN** N/A at first power-up
N/A until the device tries to communicate
N/A if the device has no GPRS network service, which is a prerequisite
OK when the device has activated a pdp context (connected to the APN/internet)
ERR when the device has tried to activate a pdp context, but failed
- TCP** N/A at first power-up
N/A until the device tries to communicate
N/A if the device has no GPRS network service or has an APN error (no internet)
OK when the device has opened a TCP socket to specified IPAD/PORT
ERR when the device has attempted to open a TCP socket, but failed
- ACK** N/A at first power-up
N/A until the device has successful status for all previous communication steps
OK when the device has sent a report and received an ACK from the host server
ERR when the device has sent a report, but not received an ACK within TCPT seconds
- IGN** ERR if no change of state of ignition has been detected since power-up
ERR if no change of state of ignition has been detected in the last 24 hours
OK if a change of state of ignition has been detected in the last 24 hours
(ignition method will depend on IGNM setting)
- CAN** N/A at power up, until the device has seen ignition ON
OK when CANBus data has been received in the last 20 seconds, whilst the ignition is ON
ERR when CANBus data has not been received within the last 20 seconds, whilst the ignition is ON, or if no CANBus data was received during the last ignition On period
- IMOB** N/A if no digital output has been assigned to the immobiliser application
ON when the immobiliser has been assigned, and is currently active
OFF when the immobiliser has been assigned, and is currently inactive
(note that the immobiliser logic is define using the DRIC command, to determine whether active corresponds to the output switch being ON or OFF)
- REPQ** Number of reports stored in non-volatile flash memory

Guidance for Resolution of Errors

GNSS Error or poor GNSS availability (low % GNSS availability)

A GNSS 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 GNSS 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 GNSS receiver has detected CW interference which could be caused by the use of a GNSS 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>
```

Where <apn-address>, <apn-username> and <apn-password> are the APN settings for the network operator or service provider, appropriate to the SIM being used in the device.

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 GNSS speed / accelerometer data for journey mode detection  
$IGNM,3 // use external voltage for journey mode detection
```

CANbus Inactivity Error

This error is set when no CANBus data has been received for 60 seconds or more, whilst the vehicle ignition is ON (i.e. device digital input 1 is HIGH). Whilst the ignition is off, the status will be based on the presence of CANbus data during the last ignition ON period.

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.

Reports Stored in Non-Volatile Memory Queue

When there are communications issues, either with the device itself, or with the host server, reports cannot be successfully sent and will be stored in non-volatile flash memory. Each device will hold several thousand reports until they can be successfully sent, and acknowledgment received from the server. This number indicates the quantity of reports stored and awaiting transmission. Device comms errors (possibly caused by configuration) or server issues must be resolved, in order for the device to be able to successfully send the reports. Please check for comms related errors in the \$TEST reply and resolve using the guidance on the previous page. Also conform correct device configuration and server operational status / availability.

\$TEST M2M Version

The \$TEST OTA device self-test is intended for use with mobile phone handsets, and hence the response is formatted in a user-friendly readable format. For machine-to-machine applications, a semi-colon delimited version is available. Add an argument as below to specify the m2m formatted response:

\$TEST,1

Example response:

```
TEST:AT200;7.0.18.0;357322042745742;02 UK;PWR:12.5V (100%);BAT:100%;GPS:OK (95%);GPRS:OK (98%);APN:OK;SKT:OK;ACK:OK;IGN:OK (OFF);CAN:N/A;IMOB:OFF;REPQ:0
```

Response content is identical, except for the delimiters. Note however, that the m2m response is a common format for all device models, and hence CAN status will be included, even when used with devices that do not support CANBus.

Parameter Check (PARA) – Response Format

PARA:	Fixed packet header
Software version number	Floating point number
ALRM SMS alarm recipient number	International format telephone number
IPAD primary TCP IP address	TCP IP address
PORT primary TCP port number	TCP port number - integer
IPAD2 TCP IP address for PTDM mode	TCP IP address
PORT2 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 (degrees)	Integer
JTIM in-journey timed reporting interval (minutes)	Integer
STIM stationary timed report interval (minutes)	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,[MASK] reporting protocol	Integer [mask included only for protocol X]
PROT report module mask	Integer
REPL reporting level	Integer
SMSL maximum monthly SMS usage	Integer
IGNM ignition mode	Integer
GPSQ minimum GNSS 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)
Protocols M, V and X only:	
ACMX max accel event threshold	Integer
DCMX max decel event threshold	Integer
ACMY max cornering event threshold	Integer
DCMY max corenring event threshold	Integer
COLN collision event threshold	Integer
Protocols V and X only:	
RPEC RPM event threshold	Integer
RPEC RPM event hold time	Integer
RPEC RPM event inhibit time	Integer
TPEC throttle event threshold	Integer
TPEC throttle event hold time	integer
TPEC throttle event inhibit time	Integer
ELEC engine load event threshold	Integer
ELEC engine load event hold time	Integer
ELEC engine load event inhibit time	Integer
CANC silent mode	Integer
CANC bit rate	Integer
CANC extended IDs	Integer

Parameter Check (\$PARA,1) – Response Format

From firmware version 7.0.22, there is an optional format to query all parameters over TCP only, with a response format which is similar to the way in which the configuration is displayed at boot-up, starting with a header, followed by comms configs, and then other configs.

Maximum packet size is 1024 bytes, and if the configs exceed that, there will be a 2nd packet, indicated by the PKT field in the header (1/2 will mean packet 1 or 2, for example)

CFG-VER will update whenever the format of the config changes.

Each packet end is indicated with END-OF-PKT

The end of the complete file is indicated with END-OF-FILE

This format is supported in TCP mode only, due to the length of the response, SMS mode is not supported.

Example:

```
$PARA-TCP<CR><LF>
HW:AT240V8<CR><LF>
FW:7.0.22.0<CR><LF>
CFG-VER:1.1<CR><LF>
GSM:+441234567890<CR><LF>
NET:02 UK<CR><LF>
ICCID: 89373022100010327945<CR><LF>
PKT:1/2<CR><LF>
$APAD,m2mdata<CR><LF>
$APUN,user<CR><LF>
$APPW,password<CR><LF>
$IPAD1,193.108.82.111<CR><LF>
$MODE,6<CR><LF>
$PORT1,90<CR><LF>
$TCPT,30<CR><LF>
$PROT,16,2495<CR><LF>
$ACMX,35<CR><LF>
$ACMY,50<CR><LF>
$ADCC,0,10,5<CR><LF>
$ALRM,NONE<CR><LF>
$CANC,0,1,1,1<CR><LF>
$CANM,2044<CR><LF>
$CDOP,1,3<CR><LF>
$CDOP,2,2<CR><LF>
$CDOP,3,1<CR><LF>
$CDOP,4,0<CR><LF>
$CDOP,5,0<CR><LF>
$CDIP,1,0<CR><LF>
$CLID,0,10<CR><LF>
$COLN,100<CR><LF>
$CPWR,11.5,30,30<CR><LF>
$DCMX,40<CR><LF>
$DCMY,50<CR><LF>
$DEBUG,2<CR><LF>
$DIST,5000<CR><LF>
$DRIC,0,0,0,0,0,7200,30,1,0,0,0,0,0<CR><LF>
$ELEC,30,60,90<CR><LF>
$GPSQ,50,3,5<CR><LF>
$HEAD,45<CR><LF>
```

\$IDLE,180<CR><LF>
\$IGNM,1,0<CR><LF>
\$IMOS,0,0,0<CR><LF>
\$IMOS,1,0,0<CR><LF>
\$IMOS,2,0,0<CR><LF>
\$IMOS,3,0,0<CR><LF>
\$IMOS,4,0,0<CR><LF>
\$IMOS,5,0,0<CR><LF>
\$IMOS,6,0,0<CR><LF>
\$IPAD2,<CR><LF>
\$ITIM,5<CR><LF>
\$JSEC,120<CR><LF>
\$NMEA,1<CR><LF>
\$ORTN,0<CR><LF>
\$OSHT,30<CR><LF>
\$OSIT,120<CR><LF>
\$OSST,120<CR><LF>
\$PORT2,0<CR><LF>
\$PTDM,0,9600,100,1024,0<CR><LF>
\$REPL,4294967295<CR><LF>
END-OF-PKT<CR><LF>

[second packet]

\$PARA-TCP<CR><LF>
PKT:2/2<CR><LF>
\$ROAM,1<CR><LF>
\$RPEC,30,60,4000<CR><LF>
\$SMSL,50<CR><LF>
\$SRAL,1,1,115200,2,0,9600<CR><LF>
\$STIM,60,0<CR><LF>
\$STPD,60<CR><LF>
\$TPEC,30,60,75<CR><LF>
\$TOWP,500,60,10,3,10,10<CR><LF>
END-OF-PKT<CR><LF>
END-OF-FILE<CR><LF>

Note: <CR><LF> indicate the ascii characters for CARRIAGE RETURN and LINE FEED