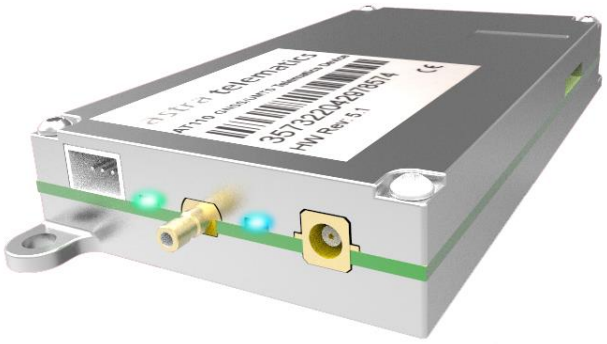
astra telematics



Device Configuration Guide
Generic Command Reference

Version: 2.1

Date: 02 May 2018

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
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 3 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

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

GPRS Access Point Username (APUN) ALL DEVICES
APN username or specify "NONE" for a blank username.

GPRS Access Point Password (APPW) ALL DEVICES
APN password or specify "NONE" for a blank password.

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**

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.

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 30 seconds. A value of zero will disable the acknowledgment feature (not recommended).

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

Please refer to the relevant communication protocol description for more details regarding the LOGIN option.

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.

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@gps-telematics.co.uk 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)

The command format is:

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

where:

`<protocol>` defines the base comms protocol, selected from the table above
`<protocol-mask>` *defines the required modules as specified in protocol 'X'

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

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.

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.

Journey Timed Message Interval (JTIM) ALL DEVICES

In-journey timed reporting interval in minutes. The determination of stationary and in-journey modes is dictated by the IGNM parameter, which is described on page 8. Setting the JTIM to zero will disable time based journey reports. The default value is 2 minutes.

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.

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.

The command format is:

$STIM,<time-interval>,<disable-gps-on-timed-wake>

where:

<time-interval>	is the stationary timed reporting internal in minutes
<disable-gps-on-timed-wake>	is set to disable the GNSS during timed stationary reports in low-power mode (i.e. on wake-up)

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.

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.

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.

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.

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.

Journey Detection Settings:

Ignition Mode (IGNM) ALL DEVICES

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

The command format is:

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

where:

<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 IGMN=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.

Driver ID Settings:

Driver ID Configuration (DRIC) ALL DEVICES

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>,<drid-progress-indicator>,
<combined-reminder+progress>

where:

<driver-id-source>	0=none, 1=iButton, 2=Mifare card, 3=Bluetooth, 4=PicoPass Card
<reminder>	Set to 1 to enable a reminder buzzer when ignition is turned ON until iButton is presented
<confirm>	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>	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 remote override control of immobiliser state using OTA commands, to allow a vehicle to be started without driver ID, for one journey only. 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
<drid-progress-indicator>	Set to 1 to enable a progress indicator when the Driver ID is being authenticated by the server
<combined-rem+prog>	Set to 1 to enable both the reminder and the DRID progress indicator to be combined on a single digital output

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

Authorised Driver Implementation (DRID) ALL DEVICES

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 be empty
<serial-number>	ID serial number, variable length, typically 12 – 16 hexadecimal digits (6 – 8 bytes), but can be longer, e.g. 0000125408C9
<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 – Approved:

`$DRID,AT110,CHECK,351777042187300,01,0000125408C9,01`	query
`$DRID,APPROVE,01,0000125408C9`	response

MiFare card (8-byte ID) – Approved:

`$DRID,AT240V8,CHECK,351777042187300,,0000009B200F2E,02`	query
`$DRID,APPROVE,,0000009B200F2E`	response

Bluetooth (6-byte ID)- Declined:

`$DRID,AT00V3,CHECK,351777042187300,,FF254A2A548E,03`	query
`$DRID,DECLINE,,FF254A2A548E`	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.

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.

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).

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

Pass Through Data Mode Related Settings:

PTDM Host IP Address (IPAD2) ALL DEVICES
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**

PTDM Host Port Number (PORT2) ALL DEVICES
Port number to be used in Pass Through Data Mode. Please refer to the appropriate application note for further details.

Pass Through Data Mode (PTDM) ALL DEVICES

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	Disabled Enabled Garmin FMI incl. CONNECT message
<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

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

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

<canbus-event-mask>	Bit	Default
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

`$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

`$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

`$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).

Configure Power Monitoring (CPWR) ALL DEVICES

This command sets the conditions for sending external power alarms.

`$CPWR,<low-ext-volt-level>,<low-ext-volt-delay>,<ext-volt-event-delay>`

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

If the external voltage falls below `<low-ext-volt-level>` for `<low-ext-volt-delay>` seconds, an SMS alert is sent. If external power is lost (below 6.0V) for `<external-power-event-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.

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 the SMSL feature. Default SMSL is 50.

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
```

GSM Cell ID Mode (CLID) ALL DEVICES

Enables 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 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 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 or TCP modes. 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
$STAT

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) ALL DEVICES

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	0 100–65535	no distance check default=500
<speed-kmh>	speed which must be exceed <speed-seconds> to trigger an alert	0 20 – 65535	no speed check 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 1 – 10	no accelerometer based motion detection (1=most sensitive, 10=least sensitive, default=5)
<trembler-sensitivity>	Tremble sensor based motion detection sensitivity for triggering a tow alert	0 1 – 10	no trembler based detection (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

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

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> and <window> 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.

NOTE: All MEMS arguments must be entered in hexadecimal

The MEMS command has the following format:

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

Where:

<config>: Set value 0x15 for single click detection mode and 0x2A for double click detection mode on all axes. 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.

Example:

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

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,15,5,ff,1,1`

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.

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.

Set Digital Output (SDIG)

Allows setting and re-setting of the 5 digital outputs as listed for the CDIG command.

Examples:

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

Configure Digital Outputs (CDOP) ALL DEVICES

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     Will display the application assigned to digital output 1
$CDOP       Will 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-and-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) ALL DEVICES

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

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

Serial Port Configuration (SRAL) ALL DEVICES

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>`

Where:

<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

<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

Example:

`$SRAL,2,3` configure RS232 port 2 for use with CR001 card reader

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) ALL DEVICES

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 (IMOS) ALL DEVICES

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:

- The output used must be assigned to <immobiliser> using the CDOP command
- <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>.

ADC Configuration (ADCC) AT110, AT240

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	1-65535 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.

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.

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><CR><LF>`

Reboot (BOOT) ALL DEVICES

Trigger a device reboot.

Firmware Version (ATSW) ALL DEVICES

Returns the device firmware version

IMEI Query (IMEI) ALL DEVICES

Returns the device IMEI

Status Check (STAT) ALL DEVICES

Device status check. Also see $TEST for user-friendly version.

Response format for $STAT can be found in the Appendix section, at the end of this document.

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>

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	Default 5

	sleep	
<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)

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).

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)

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 DBUG to enable/disable other serial output). Default is 1.

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

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.

Over The Air Device Test Command (TEST) ALL DEVICES

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 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
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
REPQ:0
```

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

```
TEST:AT240
7.0.18.0
357322045896451
O2 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
REPQ: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 within 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 cause 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>

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). Whist 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;O2 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 reporting protocol	Integer
For PROT,16 only:	
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