

# PROFESSOR GPS/GPRS SECURITY SYSTEM PROTOCOL

## GPM500-V 10.0

### Introduction

There are 3 main group: (1) Keep alive procedure, (2) Automatic report format and (3) server control command.

In order to make the UNIT work under both GPRS and SMS, the server command may need to send the control commands via GPRS or SMS, except some omissions explained in the following sections.

#### Pocket header:

(1) Sent by the UNIT: %%[ID] (the UNIT will always send its ID right after the header‘%%’)

(2) Sent by the server: &&

#### Pocket end byte:

[CR][LF] (0x0D 0x0A)

If it is a acknowledge packet from the UNIT, the end bye will have this format:

‘OK[CR][LF]’

### Communication Protocol for Professor AVL unit

#### 1. Keep alive Packet.

The UNIT will automatically send this packet to the server every ‘x’ seconds in order to maintain connection in UDP or TCP modes. It can be programmed outside from the PC setup program, SMS command, or define by the server. By default, the time interval is 180 seconds (3 minutes). When the server received the packet, it will return it without the ‘ID’ to reduce the cost.

The Keep alive Packet will use the following format:

Sent by the UNIT

%%[ID],[Counter] [CR][LF]

Return by the SERVER

&&[Counter] [CR][LF]

For example Sent by the UNIT Return by the SERVER

**ASCII** 1<sup>st</sup> send:

%%PTM01,0[CR][LF]

&&0[CR][LF]

**HEX** 25 25 50 54 4D 30 31 2C 30 0D 0A 26 26 30 0D 0A

**ASCII** 2<sup>nd</sup> send:

%%PTM01,1[CR][LF]

&&1[CR][LF]

**HEX** 25 25 50 54 4D 30 31 2C 31 0D 0A 26 26 30 0D 0A

%% and && are the packet headers

[CR] [LF] (0X0D, 0X0A) is the end byte.

**[ID]:** The UNIT ID in alphanumeric string, which can be as long as 15 characters.

For example, PTM01, or 1234567890...

**[Counter]:** 1 byte in ASCII from 0 to 9. UNIT will automatically increase '1' every time.

### **For example:**

1st send: %%PTM01,0[CR][LF]

back: &&0[CR][LF]

2nd send: %% PTM01,1[CR][LF]

back: &&1[CR][LF]

...

.. send: %% PTM01,9[CR][LF]

back &&9[CR][LF]

.. send: %% PTM01,0[CR][LF]

back &&0[CR][LF]

## **2. UNIT Report Packet.**

The UNIT will regularly send the message to the server and the report packet will use the following format:

%%

**[ID],[GPS Valid],[Date & Time],[Loc],[Speed],[Dir],[Temp],[Status],[Event],[Message]**  
**[CR][LF]**

DESCRIPTION:

'%%' is the header and '[CR][LF]' is the end byte.

**[ID]** : The UNIT ID in alphanumeric string, which can be as long as 15 characters.

For example, PROFESSOR00001, or 1234567890...

**[GPS Valid]:** This string will be only L or A.

If it is A, it means that the GPS data is valid.

If it is L, then the current GPS data is not valid. The report will be represented with the last known GPS data.

**[Date & Time]:** The string contains the date and time from GPS data. (GMT Greenwich Mean Time) Fixed length in 12 digits.

The format is:

Year month day hour minute second

For example, the string 040315131415 means:

The date is "Year 2004, March, Day 15 "

and the time is "13:14:15 "

**[Loc]:** The string contains the GPS location.

For example, the string N2446.5321E12120.4231 means

"North 24 degrees 46.5321 minutes

"East 121 degrees 20.4231 minutes"

Or S2446.5281W01234.5678 means

“South 24 degrees 46. 5281 minutes” = “South 24.7755 degrees” = “South 24 degrees 46 minutes 31.69 seconds”

“West 12 degrees 34.5678 minutes” = “West 12.57613 degrees” = “West 12 degrees 34 minutes 34.07 seconds”

**[Speed]:** The string provides the GPS speed in kilometers per hour. NON-fixed length and the value is from 0 to 999.

For example, 20 means 20 km per hour. 1 means 1 km/h, and 110 means 110km/h.

**[Dir]:** The string provides the GPS direction in degrees. And this value is between 0 and 359 degree. (no decimal)

For example, 311 means 311 degree to the north. 0 means 0 degree to the north.

**[Status]:** We use eight ASCII characters to represent 32 bit binary number. Each bit represents a flag in the UNIT's status register. The status string will be represented in HEX for each set of the byte. To display a four-byte string, there will be 8 digits string

The first two bytes indicate the external alarm status, the third byte indicate the direct inputs from the UNIT and the forth byte indicates the GPRS/GPS status of the UNIT.

#### Bit | description

-----  
0 | Panic function (External Alarm) (External Alarm no support)

1 | Not in use

2 | Engine Starter Disable (on/off) (internal real output)

3 | Alarm armed on/off (External Alarm)

4 | Anti-car jack function on/off (External Alarm no support)

5 | Not in use

6 | Anti-car jack engine starter disable on/off (External Alarm no support)

7 | Shock sensor (External Alarm no support)

8 | Ignition Trigger on/off

-----  
17 | Ignition Status on /off (Internal Real input)

22 | Over speed Limit status on/off

-----  
24 | Fixed timing report mode on/off

25 | Intelligent time report mode on /off

26 | **UNIT in (GPRS mode(1)/ SMS mode(0)) \_ always =1**

27 | Keep alive procedure is on/off

28 | Fix Distance report mode on/off

29 | Self-diagnostic procedure on/off

30 | Speeding report on/off

31 | TOW report mode on/off

Example:

When the server receives the status string (in HEX) '01034802', it can be translated as:

01 means : >>> 00000001

Fixed timing report mode on

03 means : >>>00000011

DOOR status and Ignition Status is on.

02 means : >>> 00000010

Not in use

**[Event]: Only one event will be sent at a time.**

**GROUP A: (BASIC event)**

ASCII Description

101 Over the defined maximum speed limit

102 Self-diagnostic report

108 Fix time report

109 Fix distance report

110 Intelligent report

112 External battery is removed.

118 Unit Wake up report.

150 Help Button trigger

Group B

201 Enter panic mode (External Alarm no support)

202 Exit panic mode (External Alarm no support)

253 Ignition Trigger on

Example: if the STATUS BIT '17' has been changed from '0' to '1', the 'EVENT 253' will be generated and sent to the server.

254 Ignition Trigger off

Example: if the STATUS BIT '17' has been changed from '1' to '0', the 'EVENT 254' will be generated and sent to the server.

401 Request current location

406 Read the UNIT's firmware version.

409 Reset UNIT

Report Setup ACK event

505 Setup SMS or dial out number

506 Setup monitor telephone number

510 Setup APN, user name, password

531 Setup Fixed time report

532 Setup Intelligent report

533 Setup Intelligent history report

534 Setup the Maximum speed limit

536 Setup the fixed distance report

539 Remote setup server IP and port

**565 Set Report for Engine Starter Disable on/off (internal real output)**

569 Report for kill start control/4<sup>th</sup> stage of the anti-car jacking mode to Enable or Disable (External Alarm no support)

591 Unit send bar code information from the Bar code scanner (no support)

598 Unit send "message" to server via GPRS or SMS

### **[Message]: Report configuration information and text**

Format: [any text message] |

CFG: xxxx,xxxx |

No starting character for the plain text, but the end character ‘|’ will need to be added.

The configuration message will start will head ‘CFG:’ and end by a end character ‘|’.

At the moment, we will use this field to transmit text info from the external terminal and also the command configuration parameters.

### **For G500:**

When G500 try to send a un-delivered report, CFG message will as below:

%%G500,A,050916070549,N2240.8887E11359.2994,0,000,NA,D3800000,150,CFG:resend|

It defined the re-sent reports.

### **For TLU:**

As for the meaning of TLU CFG message, there is some related description text marked with

1) Duty-On report: it has an additional User-ID segment.

%%8888,A,050929003153,N2240.6927E11359.3980,60,185,C+28,C3800000,151,CFG:1234|

2) Duty-Off report: it has the following additional message segment. CFG:User-ID, Maximum speed, Average speed, Total trip distance, Total duration, Total time over speed duration

%%8888,A,050929003153,N2240.6927E11359.3980,60,185,C+28,C3800000,152,CFG:1234,110km/h,80km/h,40km,30min,10min|

## **3. Server Control / Command Packet.**

The server has the ability to control the UNIT by sending the commands defined in this section.

These command data will be sent to the UNIT via either SMS or GPRS. There are three groups for the commands: (a) alarm control (b) single line command and (c) command and settings.

Generally when the UNIT receives the command, it will acknowledge it and return a data.

Server can verify the acknowledgement to determine whether the transmission is successful or not.

Syntax

&& is the packet header

[CR][LF] is the end byte.

The Packet has following format:

a) Command for the external car alarm and the in-vehicle outputs

&&X [command1] [CR][LF]

b) Single Command

&&Y [command2] [CR][LF]

c) Command with other parameters

&&Z [command3], [parameters1], [parameters2], [parametersX][CR][LF]

The confirmation packet will include the UNIT’s ID and the corresponding data. For example,

%% [ID],[GPS Valid],[Date & Time],[Loc],[Speed],[Dir],[Temp],[Status],[Event],

[Message][CR][LF]

*a) Command for in-vehicle control*

Direct control: the server will have the ability to directly control the UNIT's outputs. There are outputs directly connected to the UNIT, so the server can set commands to perform some alarm functions.

**Command from the server Acknowledgement from the UNIT**

Command from the server	Acknowledgement from the UNIT
&&XA[Command][CR][LF]	%% [ID],[GPS Valid],[Date & Time] ,[Loc],[Speed],[Dir],[Temp],[Status],[Event][CR][LF]

The commands can be summarized in the following table.

<b>Activate Anti-carjacking mode:</b>	
&&XA5[CR][LF]	%% [ID],[GPS Valid],[Date & Time],[Loc],[Speed],[Dir],[Temp],[Status],305[CR][LF]
	Description Turn off the relay for the engine starter <b>no matters if the ACC is off or on.</b>
<b>Emergency release (to deactivate Blocking and Anti-carjacking mode)</b>	
&&XA6[CR][LF]	%% [ID],[GPS Valid],[Date & Time],[Loc],[Speed],[Dir],[Temp],[Status],306[CR][LF]
	Description Deactivates the Blocking ignition and the Anti-carjacking modes.

*b) Single Command*

The single command contains only one action, and no parameter will be included in the transmitting data. These commands can will be send to the UNIT via either GPRS or SMS. The command and acknowledge formats are listed as below:

The structure of the single command can be summarized as,

Command from the server	Acknowledgement from the UNIT
&&Y[Command2][CR][LF]	%% [ID],[GPS Valid],[Date & Time] ,[Loc],[Speed],[Dir],[Temp],[Status],[Event],[Message][CR][LF]

FULL description:

Server to GPRS UNIT	Acknowledgement form the UNIT (HEX) (ASCII)
<b>Request current location</b>	
&&Y01[CR][LF]	%% [ID],[GPS Valid],[Date & Time],[Loc],[Speed],[Dir],[Temp],[Status][CR][LF]
	Description Request the UNIT to report location. &&Y01[CR][LF] The UNIT will send back the standard full report, including its location.

	%%[ID],[GPS Valid],[Date & Time] , [Loc], [Speed], [Dir], [Temp], [Status] [CR][LF] Note that no [Message] field.
&&Y03[CR][LF]	%%[ID],[GPS Valid],[Date & Time],[Loc],[Speed],[Dir],[Temp],[Status], 403 [CR][LF]
<b>Note: the sleep mode in this case will be interrupted or stopped by the, the unit will wake up and send the report for this change.</b>	Description Let the UNIT to go offline in GSM mode. &&Y03[CR][LF] When disconnected, the unit will send a SMS report %%[ID],[GPS Valid],[Date & Time],[Loc],[Speed],[Dir],[Temp],[Status], 403 [CR][LF] (Note that this message will send to the UNIT by GPRS only.)
<b>Read firmware version</b>	
<b>Event 406</b>	
<b>Message: CFG:Y06,firmware version</b>	
&&Y06[CR][LF]	%%[ID],[GPS Valid],[Date & Time],[Loc],[Speed],[Dir],[Temp],[Status], 406, CFG:Y06, [firmware version]  [CR][LF]
	Description Request the UNIT's firmware version. &&Y06[CR][LF] %%[ID],[GPS Valid],[Date & Time],[Loc],[Speed],[Dir],[Temp],[Status], 406, CFG:Y06, Vx.x  [CR][LF]
<b>reset the unit</b>	
&&Y09[CR][LF]	Description reset the unit &&Y09[CR][LF]
<b>Clear GPS module internal ephemeris</b>	
&&Y10[CR][LF]	Description <b>Clear</b> the unit &&Y10[CR][LF]

c) Command for Automatic report setup

The GROUP c command contains not only the action, but also number of parameters.

The format of the GROUP c can be summarized as,

<b>Command from the server</b>	<b>Acknowledgement from the UNIT</b>
&&Z[Command3], [p1],[p2]...[CR][LF]	%%[ID],[GPS Valid],[Date & Time],[Loc],[Speed],[Dir],[Temp],[Status],

	[Event], [Message]   [CR][LF]
[Event]	
[Message]: CFG: Z[Command3], [parameters],....	
<b>Setup keep alive parameters</b>	Z01,[keep alive interval], [retry times], [on/off]
<b>Setup APN, user name, password</b>	Z10 ,[APN],[user name],[password]
<b>Setup Group name ID</b>	Z12,[Group name],[ID],[on/off] (only for PC)
<b>Setup Intelligent reporting</b>	Z32,[ACC ON interval],[ACC OFF interval],[on/off]
<b>Setup the Max. speed limit</b>	Z34,[max. speed],[on/off]
<b>Setup IP Address</b>	Z39,[type],[IP Address],[port],[on/off]
<b>Setup Static and dynamic</b>	Z42,[dynamic interval],[ dynamic in distance],[ Static interval],[on/off]

### c-1 Automatic report setup:

Server to GPRS UNIT (HEX) (ASCII)	Acknowledgement form the UNIT (HEX) (ASCII)
<b>Setup the time interval for the 'keep alive' procedure</b>	
<b>Event 501</b>	
<b>Message: CFG: Z01, [time interval],[retry times],[on/off]</b>	
&&Z01,[time interval],[retry times] ,[on/off][CR][LF] [time interval]: in seconds, e.g. 600 means 600 seconds. [retry time]: how many times the keep alive package will be resent. [on/off]: 1 or 0, to enable this procedure or not.	%%[ID],[GPS Valid],[Date & Time],[Loc],[Speed],[Dir],[Temp],[Status], 501 [CR][LF]
&&Z01,?,?,?[CR][LF]	%%[ID],[GPS Valid],[Date & Time],[Loc],[Speed],[Dir],[Temp],[Status], 501, CFG: Z01, [time interval],[retry time], [on/off]   [CR][LF]
	Description Setup the time interval (in seconds) for the 'keep alive procedure'. &&Z01,[time interval], [retry time], [on/off][CR][LF] [time interval]: seconds. [retry time]: how many times the keep alive package will be resent. [on/off]: 1 or 0, to enable this procedure or not. Example 1: &&Z01,600,2,1[CR][LF] means the UNIT will send keep alive message to the server every 600 secs (10 minutes) and it will retry 2 time if the first packet is not received

	<p>successfully.</p> <p>Example 2: &amp;&amp;Z01,600,2,0[CR][LF] means no keep alive procedure.</p> <p>Example 3, &amp;&amp;Z01,?,?,?[CR][LF] means the server is requesting the UNIT to send back the current settings.</p>
<p><b>Setup APN</b></p> <p><b>Event 510</b></p> <p><b>Message: CFG: Z10,[APN],[user],[password],[on/off]</b></p>	
<p>&amp;&amp;Z10,[APN],[user],[password],[on/off][CR][LF]</p> <p>[APN]: max 47 bytes</p>	<p>%%[ID],[GPS Valid],[Date &amp; Time],[Loc],[Speed],[Dir],[Temp],[Satus],510[CR][LF]</p>
<p>[user]: max 31 bytes</p> <p>[password]: max 31 bytes</p> <p>[on/off]: 1 or 0, to enable this procedure or not</p>	
<p>&amp;&amp;Z10,?,?,?[CR][LF]</p>	<p>%%[ID],[GPS Valid],[Date &amp; Time],[Loc],[Speed],[Dir],[Temp],[Satus],510,CFG:Z10,[APN],[user],[password],[on/off][CR][LF]</p>
	<p>Description</p> <p>Setup the APN name, user and password.</p>
<p><b>Setup Group name ID</b></p> <p><b>Event 512</b></p> <p><b>Message: CFG: Z12,[Group name],[ID],[on/off]</b></p>	
<p>&amp;&amp;Z12,[Group name],[ID],[on/off][CR][LF]</p> <p>[Group name]: max 15 bytes</p> <p>[ID]: max 15 bytes</p> <p>[on/off]: 1 or 0, to enable this procedure or not</p>	<p>%%[ID],[GPS Valid],[Date &amp; Time],[Loc],[Speed],[Dir],[Temp],[Satus],512[CR][LF]</p>
<p>&amp;&amp;Z12,?,?,?[CR][LF]</p>	<p>%%[ID],[GPS Valid],[Date &amp; Time],[Loc],[Speed],[Dir],[Temp],[Satus],512,CFG:Z12,[Group name],[ID],[on/off][CR][LF]</p>
<p>NOTE: ID is temporarily a parameter for this command because we do not have the setup application. The ID can not change by OTA commands</p>	<p>Description</p> <p>Setup Group name and ID</p>
<p><b>Setup Intelligent reporting</b></p> <p><b>Event 532</b></p> <p><b>Message: CFG: Z32, [ACC ON interval],[ACC OFF interval],[on/off]</b></p>	
<p>&amp;&amp;Z32,[ACC ON interval],[ACC OFF interval],[on/off][CR][LF]</p> <p>[ACC ON interval]: Report time interval when ACC is ON in seconds.</p> <p>[ACC OFF interval]: Report time interval when</p>	<p>%%[ID],[GPS Valid],[Date &amp; Time],[Loc],[Speed],[Dir],[Temp],[Status],532[CR][LF]</p>

ACC is OFF in seconds. [on/off]: 1 or 0, to enable this report or not.	
&&Z32,?,?,?[CR][LF]	%%[ID],[GPS Valid],[Date & Time],[Loc],[Speed],[Dir],[Temp],[Status],532,CFG:Z32,[ACC ON interval],[ACC OFF interval],[on/off][CR][LF]
	Description The intelligent report will generate a report according to the ACC input of the vehicle. If the input ACC is ON it will report to the server in [ACC ON interval] seconds. If the input ACC is OFF it will report to the server in [ACC OFF interval] seconds. Example 1:
	&&Z32,300,900,1[CR][LF] means the device will send report to the server every 300 seconds when the ACC input is ON. On the other hand when the ACC input is OFF, it will send to the server a report every 900 seconds.
<b>Setup the Maximum speed limit</b>	
<b>Event 534</b>	
<b>Message: CFG: Z34, [max. speed] ,[on/off]</b>	
&&Z34,[max. speed],[on/off][CR][LF] [max. speed]: in km/hour [on/off]: 1 or 0. to enable this report or not.	%%[ID],[GPS Valid],[Date & Time],[Loc],[Speed],[Dir],[Temp],[Status], 534 [CR][LF]
&&Z34,?,?[CR][LF]	%%[ID],[GPS Valid],[Date & Time],[Loc],[Speed],[Dir],[Temp],[Status], 534, CFG: Z34, [max. speed], [on/off]   [CR][LF]
	Description If the vehicle goes beyond preset speed limit, it will generate a report. Example 1: &&Z34,80,1[CR][LF] means the max. speed for reporting is set to 80km, and the UNIT will send the report to the server if the car runs over this speed. Example 2: &&Z34,?,?[CR][LF] to request the speed report configuration.
<b>Remote setup server IP and port</b>	
<b>Event 539</b>	
<b>Message: CFG: Z39, [socket type],[IP Address],[port],[on/off]</b>	
&&Z39,[sck type],[IP Address],[port],[on/off] [CR][LF]	%%[ID],[GPS Valid],[Date & Time],[Loc],[Speed],[Dir],[Temp],[Status],

<p>[sock type] socket type ,0 or 1, 0 is UDP ,1 is TCP.</p> <p>[IP Address] new IP address of server, e.g. 192.168.1.138</p> <p>[port] new IP port, e.g. 3000</p> <p>[on/off]1</p>	<p>539 [CR][LF]</p>
<p>&amp;&amp;Z39,?,?,?,? [CR][LF]</p>	<p>%%[ID],[GPS Valid],[Date &amp; Time],[Loc],[Speed],[Dir],[Temp],[Status], 539, CFG: z39, [socket type],[IP Address],[port], [on/off]   [CR][LF]</p>
	<p>Description</p> <p>Example1 :&amp;&amp;Z39,1,192.168.1.138,3000,1[CR][LF] means set let the unit connect to “192.168.1.138”,the port is 3000. and use TCP protocol.</p> <p>Example 2, &amp;&amp;Z39,0,?,?,?[CR][LF] means the server is requesting the UNIT to send back the current UDP server settings.</p> <p>Example 3, &amp;&amp;Z39,1,?,?,?[CR][LF] means the server is requesting the UNIT to send back the current TCP server settings.</p>
<p>Setup Intelligent reporting</p> <p>Event 532</p> <p>Message: CFG: Z42, [dynamic interval],[ dynamic in distance],[ Static interval],[on/off]</p>	
	<p>%%[ID],[GPS Valid],[Date &amp; Time],[Loc],[Speed],[Dir],[Temp],[Status],532[CR][LF]</p>
<p>&amp;&amp;Z42,?,?,?,?[CR][LF]</p>	<p>%%[ID],[GPS Valid],[Date &amp; Time],[Loc],[Speed],[Dir],[Temp],[Status],532,CFG:Z42,[ dynamic interval/seconds], [ dynamic interval/m], [ Staticinterval/seconds],[on/off][CR][LF]</p>
<p>&amp;&amp;Z42,180,500,1800,1</p> <p>(<b>Note:</b> Of which 180 for vehicle dynamic many seconds of time to upload data; 500 for vehicle dynamics when many meters to upload data; 1800 for the vehicle in the static state. How many seconds to upload data, 1 to open this command)</p>	<p>Description</p> <p>The intelligent report will generate a report according to the Status input of the vehicle. If the input <b>Static</b> or <b>dynamic</b> it will report to the server in[dynamic ] seconds. If the input Status is <b>Static</b> it will report to the server in [Static] seconds.</p> <p>When the vehicle moves [dynamic ] m, the UNIT will send a event to the server;</p>
	<p>&amp;&amp;Z42,180,500,1800,1[CR][LF] means the device send report to the server every 180 seconds when the <b>dynamic</b> ; When the vehicle moves 500 m, the</p>

	UNIT will send a event to the server; On the other hand when the static , it will send to the server a report every 1800 seconds.
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**The following command only for mobile phone send command in effect**

**Main commands:**

1. Register mobile number (register the mobile number to the tracker and the tracker is only workable for the registered number)

**Commands format: &&S,123456,S03,8613912345678**

86 is country code, 13912345678 is the new mobile number  
The mobile can use the number to send commands like &&X.....&&Z, &&Y... etc.  
to tracker afterward.

2. Modify tracker's passwords (you don't need set the command, if you don't want to modify)

**Commands format: &&S,123456,S01,666666**

Old passwords=123456, New passwords=666666 (original passwords=123456)

3. Turn off LED light (you don't need set the command, if you don't want a hidden installation)

**Commands format: &&S,123456,S05,1#**

1 means to turn off LED display, set "0" to return to normal display  
(Remark: You can turn off LED display after installation if you don't want others to know your installation position.)

4. Set monitoring mobile phone number (When setting up the effective mobile phone numbers, and other numbers cannot access, only to set the number of effective)

**Commands format: &&S,123456,S09,8613912345678#**

In the absence of setting this command, all incoming calls can be automatically answer, when the setting of this command, only this number (**8613912345678**) can automatically answer, the other into the number cannot answer; ( Note: on the device SIM card number must have caller ID function, otherwise unable to answer )

5. Querying a remote oil electric success confirmation order

**Command format: &&Y56**

Equipment will return ON or OFF, ON representative confirmed that the current oil electric state, OFF representative.

END