GPS&GPRS TRACKING SYSTEM

MODULE: GT3000 SERIES

User Manual

I. INTRODUCTION

GPS GPRS tracking system GT3000 utilize the GPS tracking function and car alarm functions in one unit. You can monitor the vehicle location and control the car alarm remotely. In addition, the unit will send event report if any trigger occurs. It has built-in 8 outputs and 5 inputs to perform essential alarm functions.

1.1 REPORT STRUCTURE

The standard report sent by the unit includes the information: (1) unit's ID, (2) status, (3) time, (4) GPS's latitude and longitude, (5) speed, (6) direction, (7) temperature, (8) device's status, (9) event number, and (10) report configuration parameters.

(1) Unit's ID: each device has its own unique ID and must be registered in the server in order to perform monitoring or controlling.

(2) Status: A=Valid, L=Last known

(3) Time: report time in Greenwich Mean time zone.

(4) GPS's latitude and longitude.

(5) Speed: in km/H

(6) Direction: in degree to the North.

(7) Temperature: in Celsius. If the temperature is not connected, 'NA' will be shown in this field.

(8) Device's status: there are 32 states to represent the I/O and working modes for the both the device and the build in alarm.

(9) Event number: all the generated reports will include a unique event number to indicate why it has been sent.

(10) Report configuration parameters: user can remotely change the report configuration, and the configuration parameters will be shown in this field.

1.2 REPORT SETUP

GT3000 must be initialized by PC setup program in order to make communication with the remote server /call center. There are four main sections that allow users to program the

device, (1) User detail (Device ID, server IP, and port, SMS number, GPRS APN…) (2) In-built Geo-fence definition (up to 5 circular, 5 rectangular and 20 point Geo-fence shapes can be set in the device) (3) Report setting (Time, Distance, Intelligent mode, Temperature, Low battery, Course change…) (4) ALARM report (to enable or disable the event generated by the inputs, e.g. ignition, DOOR). Those data will have been saved in device's EEPROM and will not be lost even if the power is failure.

Note that the device ID, GPRS APN name, GPRS login name and password need to be set in initial PC setup in order to make the connection to the server. All the reports configuration or Geo-fence setup can be changed at anytime via over the air commands.

The automatic reporting mode can be categorized as 'time' report, 'distance' report, or 'time & velocity' report. User can choose the reporting mode and related parameters via the PC setup program or the remote sever.

The event trigger report is also configurable. User can turn on or off any event-generated report from the PC setup program or via the air command. The event-triggered report include (1) In-vehicle Door close/open (2) In-vehicle ignition on/off (3) Temperature range in/out the preset range.

The server cannot only configure the device just like the PC setup program does, but it also can send the command to control the device. The server can control both the device and the build in alarm.

1.3 GEO-FENCE FUNCTION

The device has built-in 30 Geo-fence sets (1 immediate Geo-fence, 4 circular, 5 rectangular and 20 point); it will send the report to the server if the Geo-fence event is triggered. User can setup the Geo-fence area from the PC setup program or sending the defined.

A unique immediate Geo-fence function:

'Immediate-Geo-fence function' is a circular type Geo-fence that can be activated or deactivated from a single button. When activated, the system will record the current position and use the pre-defined radius as a circular Geo-fence to guard the vehicle. If the vehicle moves out of the preset Geo-fence zone, a report will be generated to the server. User can deactivate the self-Geo-fence at any time by pressing the valet switch again. If the

GPS cannot be located when the Immediate Geo-fence function is been executed, GT3000 will use the last known position as the origin of the circular Geo-fence zone to perform the protection.

US Patten for immediate Geo-fence function is pending.

1.4 STORE AND FORWARD ABILITY

When there is no GPRS service or the server close. The unit will send short message to the server if defined SMS number. All the stored report will be forward to the server when GPRS connection is completed next time.

1.5 TCP AND UDP SOCKET SUPPORT

GT3000 supports both UDP and TCP socket communication. The server IP, port number and socket type can be selected from the PC-setup program or remote server command. In addition, the connection can be swap over to any server IP or port (either UDP or TCP) via the air command.

1.6 THE SERVER CAN SEND THE COMMAND TO CONTROL THE DEVICE AND THE BUILD IN ALARM.

Command for in-vehicle control:

We design 8 commands that can be integrated into the server, so that the users can control their vehicles. Those commands are: (1) Door lock, (2) Door unlock, (3) Arming, (4) Panic, (5) Enable anti-car jacking, (6) Emergency release, (7) Trunk release, (8) Channel 2 outputs.

NOTES:

1. Arming (this command is valid only if when ignition is off): If ignition Off, Server send arming command. The door will lock and the Engine will be Disable starter (if the starter cut relay connected), after the unit received the command.
2. Panic: (can be performed at any time) If Server send panic command, the horn will sound and parking lights will flash for 30 seconds after the unit received the command.

3. Enable anti-car jacking: (can be performed at any time) If Server sends anti-car jacking command, the system will enter anti-carjacking mode after the unit received the command. When the anti-carjacking has activated, from the beginning to 30 seconds, the parking light will flash once and horn chirp once interval 10 seconds, from 31 to 60 seconds, the parking light will flash once and horn chirp once interval 5 seconds, from 61 to 120 seconds, the parking light will flash once and horn chirp once interval 1 seconds, after 120 seconds, system will locked ignition and parking light will flash once and horn will chirp once interval 1 seconds. To release anti carjacking: To send emergency commands or ignition ON, press emergency button to release anti carjacking.
4. Emergency release: (can be performed at any time) If Server send Emergency release command while at Arming mode, panic mode, anti-car jacking mode. Then system will exit 'Arming', 'Anti-carjacking', 'Panic' mode. The 'Arming', 'parking light' and 'horn' outputs will back to normal (Disarm) status.

1.7 VALET SWITCH OPERATION

User can use the supplied Valet switch to perform 5 essential tasks, including (1) sending help report (2) activate or deactivate Immediate Geo-fence (3) Panic (4) sending 'Duty on' or 'Duty off' report to the server (5) Emergency release to exit 'ARM', 'Anti-carjacking' or 'Panic' modes

(1) Sending 'HELP' report

Press the button once, The LED will flash once and a 'HELP' report will be generated.

(2) Activate or deactivate Immediate Geo-fence

Press the button and release it when the LED flashes once. After releasing it, the LED will stay continuously on to indicate the 'Immediate Geo-fence' is on. To deactivate: Press the button (the LED will be temporally off), and release it when the LED flashes once. After releasing it, the LED will then stay continuously off. A report will be sent out if the vehicle goes out/in to the Geo-fence zone.

(3) Panic

Press the button (the LED will be temporally stay off) and release it when the LED flashes

twice. After releasing it, a panic action will be generated.

(4) ‘Duty on’ or ‘Duty off’ reports / ‘Status on’ Status off’ reports

Press the button (the LED will be temporally stay off) and release it when the LED flashes 3 times. After releasing it, a ‘Duty on’ report will be sent out. To deactivate: Press the button (the LED will be temporally stay off) and release it when the LED flashes 3 times. After releasing it, a ‘Duty off’ report will be sent out.

(5) Emergency release to exit ‘ARM’, ‘Anti-carjacking’ modes.

ignition ON, press and hold the button (the LED will be temporally stay off) and release it when the LED flashes 5 times. After releasing it, ‘ARM’, ‘parking light’, and ‘horn’ outputs will back to normal (Disarm) status.

1.8 HISTORY REPORT

Flash memory for recording reports up to 3000 reports. It can be read out from the PC setup program via serial port.

1.9 BACKUP BATTERY (OPTIONAL)

The system has a built-in rechargeable battery for emergency use. The system will send a power cut report when all the external power is disconnected.

1.10 LED INDICATION

Three LED indicate the status of the POWER, GPRS signal and GPS signal.

1.11 KEEP ALIVE PROCEDURE

Keep alive procedure (in order keep connection in GPRS network, the unit can be set to send short keep alive report to the server in order to prevent the disconnection from the mobile service provider)

II. BASIC FUNCTIONS

FUNCTIONS	APPLICATIONS
GPS	GPS receiver will output a complete position, velocity, and time (PVT) solution in the NMEA Version 3.0 protocol
GPRS, SMS	GPRS use standard TCP or UDP communicate protocol. If the GPRS service is failed, the SMS mode will be turned on for emergency use.
5 input	In-vehicle Door+ In-vehicle Door- In-vehicle ignition Temperature sensor port (optional) Valet switch port
8 output	1. Parking light (-300mA) 2. Door Lock (-300mA) 3. Door Unlock (-300mA) 4. Start kill output (-300mA) 5. Horn output 6. Trunk Release (-300mA) 7. Channel 2 output (-300mA) 8. GPS output
GPS output interface	GPS port will output NMEA 0183 GPS data. Data rate: 4800 bps
Valet Switch	(1) Sending HELP report (2) activate or deactivate Immediate Geo-fence (3) panic (4) sending 'Duty on' or 'Duty off' report to the server (5) Emergency release to exit 'ARM', 'Anti-carjacking' or 'Panic' modes
PC-setup	Initialize the unit and program the device, including Network APN, server IP address, user message, report control, and Geo-fence setting, etc … Note that Network APN and server IP details must be set before the installation.
Standard Report	Automatic report for AVL tracking purpose: Fixed time report Fixed distance report

	Intelligent report (combine time and distance) Keep alive report
Event Report	Temperature report Speeding report Low battery report Geo-fence trigger report ALARM trigger report, e.g. PANIC mode, ARM, ignition inputs, etc …
History data store	3000 report can be saved in unit, and read from server and pc-setup

III. STATUS INDICATOR

SYSTEM LED:

RED: Power indicator. When the unit power on, the led will light all the time. When power cut off the unit works with backup battery, the led will flash until all the report is sent to server.

YELLOW: GSM/GPRS indicator. Yellow LED will flash when the device is connected to the server with valid GPRS connection. It will stay continuously on when it is in GSM mode. It will stay off if there is no GSM reception.

GREEN: GPS indicator. This LED will be ON when the unit received a valid GPS data. Note that the YELLOW and Green LEDs indication will not be valid until the system goes to the working mode, normally 30 seconds after power on.

IV. PC SETUP AND SYSTEM INITIATION

PC setup Procedure:

(1.) Connect the 4 pin USB cable to the DB9 port.

(2.) Open the PC setup program.

(3.) Select the correct COM port for communication.

(4.) Power on the device or press the reset button for at least 2 second.

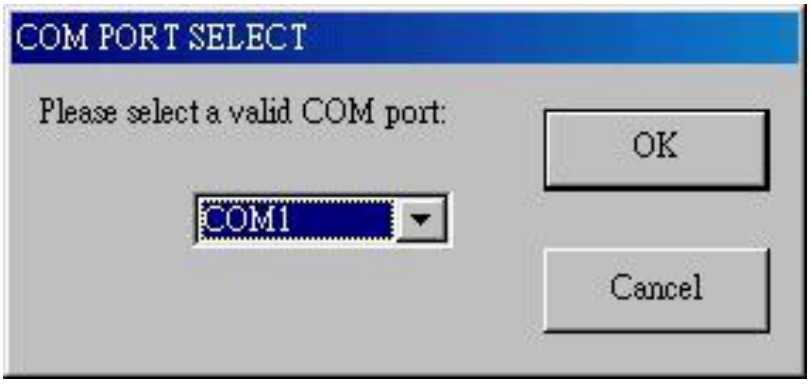
(5.) Click “ok” to start the program

Note that, if the connection fails, please check the cable connection is secured correctly.

Press the reset button for a longer time, e.g. another 3 seconds.

A. LOGIN DIALOG WINDOW

Select the correct COM port number, then “reset” the unit by pressing the reset button, and next click “OK”.

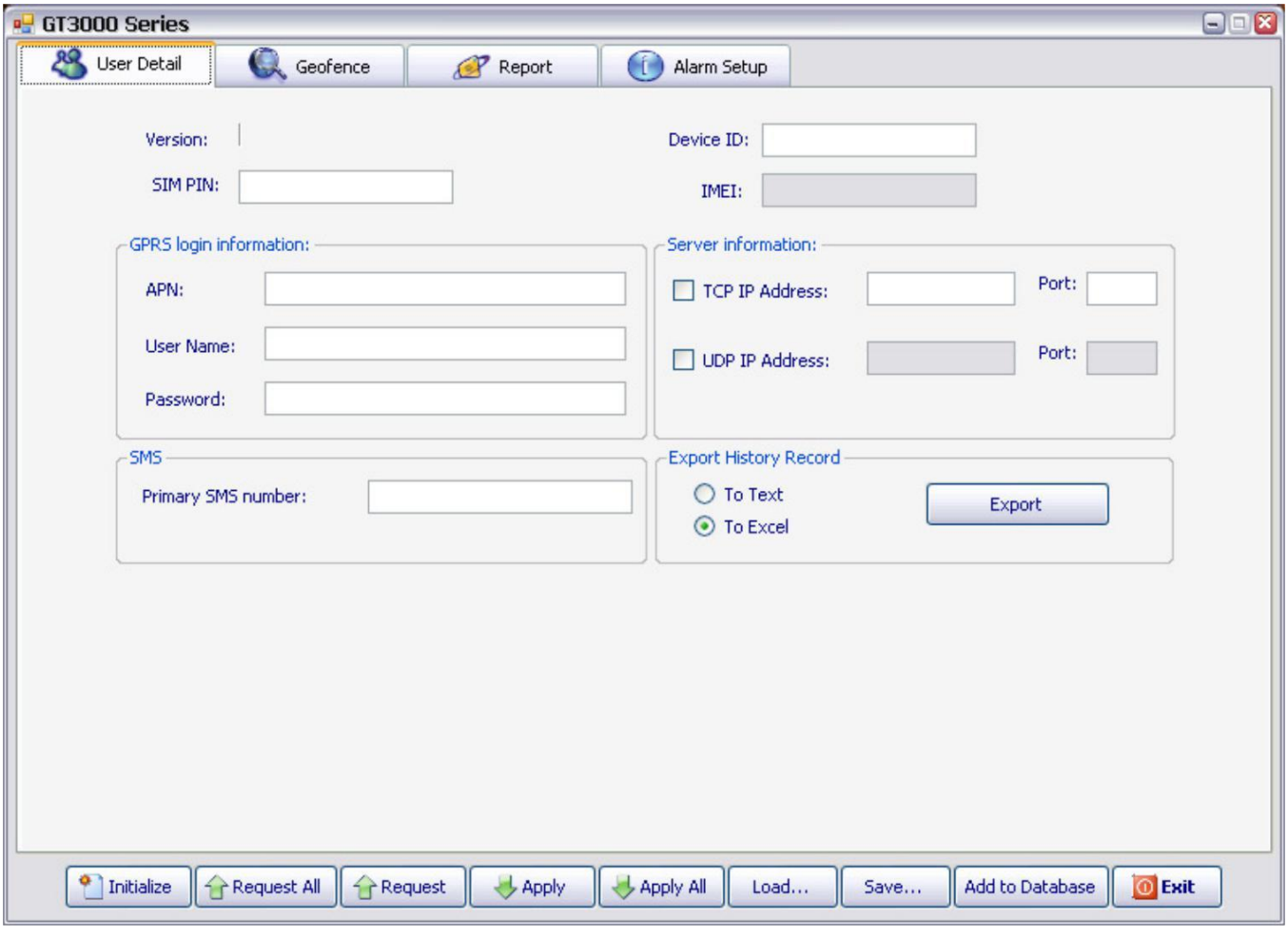


Note that: it is necessary to power on and reset the device soon after click the “ok” button. PC setup program will detect the hardware for 60 seconds. If no hardware is detected, it will exit.

During the opening up screen shown as below, user can press “Esc” key to terminate the program.

C. MAIN INTERFACE

1. [USER DETAIL:]

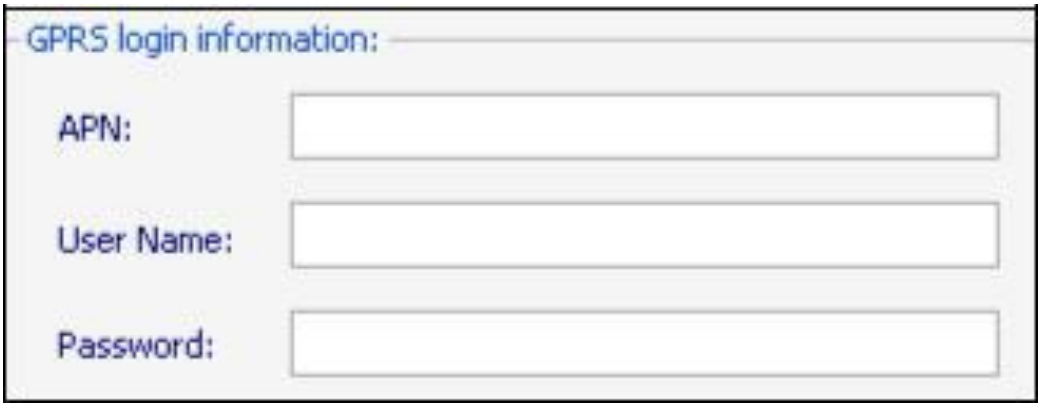


If the SIM card is password protected, user can input the “SIM PIN” window to set password of SIM Card.

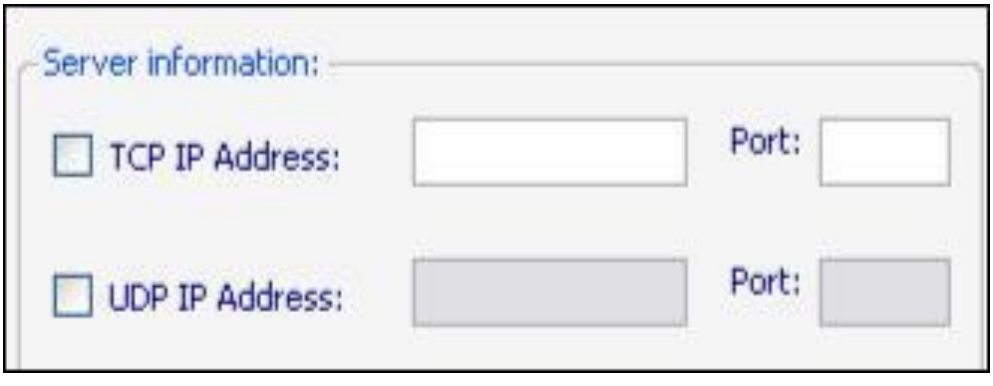
Device ID: Set UNIT ID for the device.

IMEI: Any operate with ‘request or request all’ after GPRS power on, the module series

number will display automatically, otherwise it displayed with space.



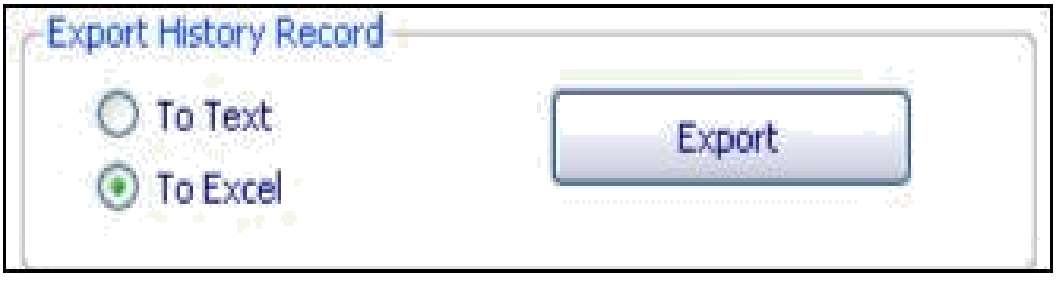
Set Access Point Name (APN), User Name, Password. The maximum length of the APN, User name and Password is 49 characters.



TCP/UDP address and Port number of the remote server being set, UNIT will send report to these address.

Note that only one TCP or UDP server will be used at the same time.

Set the SMS Number of the server. The unit will send reports to the server if GPRS connection is failed.



UNIT can save 3000 reports (3000-1) recently; Click ‘Export’ button can export them with Excel or Text format.

Initialize: clear all data in UNIT.

Request All: read out the whole existing setting from GT3000.

Request: read out the setting in the current page.

Apply: transfer the setting to GT3000 in the current pages.

Apply All: transfer the whole setting to GT3000.

Load: load the saved configuration files.

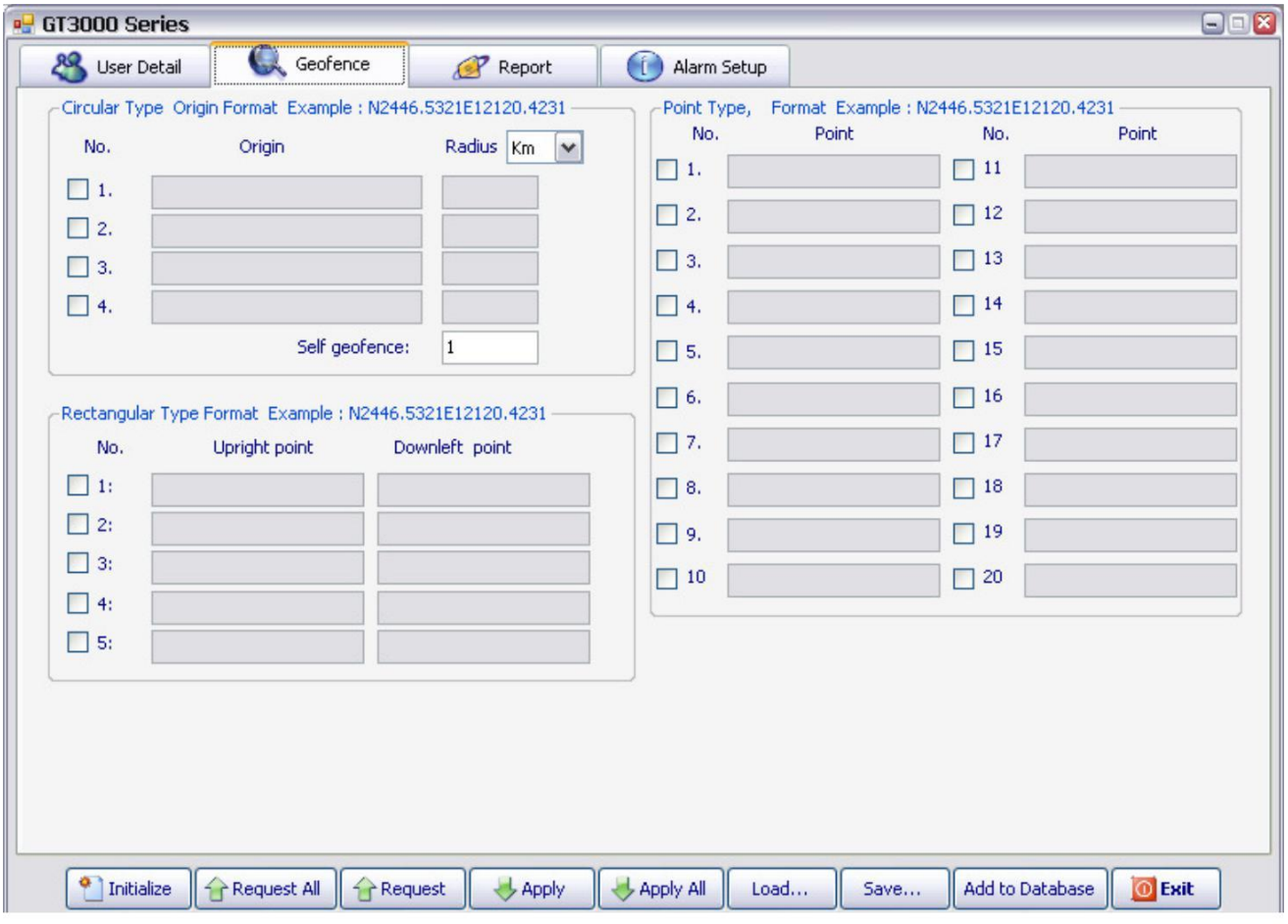
Save: save the current configuration setting to a file.

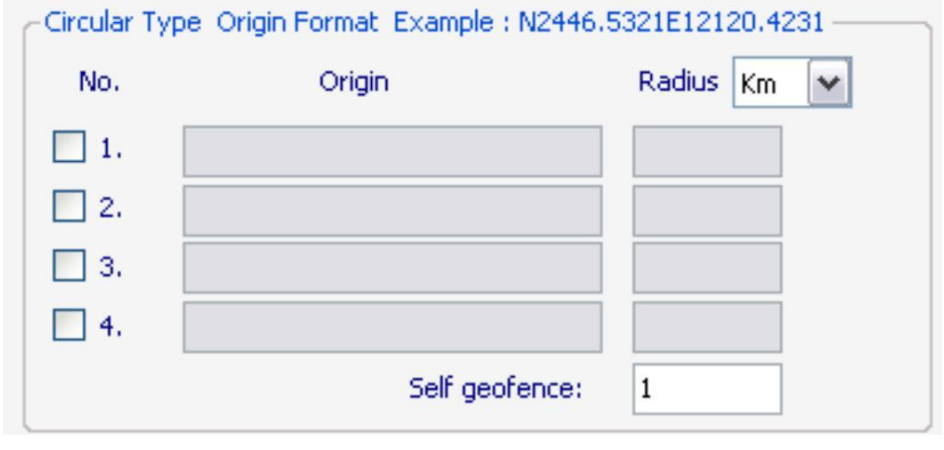
Add to database: Add the current configuration to database

Exit: exit PC-Setup to main program.

Note that Device ID, GPRS Login and server IP/Port information need to be input correctly in order to make the connection. If the report sending using GPRS connection fails, the report will be sent to the ‘primary’ SMS number first. The report will be resent, when the GPRS connection becomes available.

2. [GEO-FENCE:]





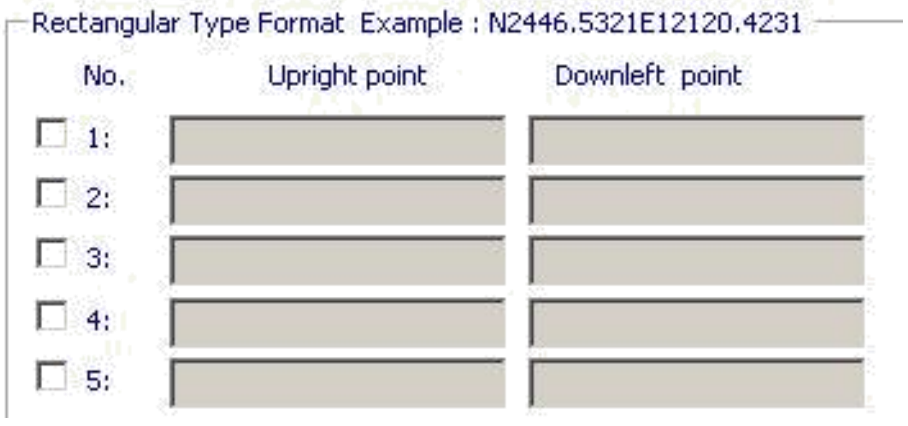
Four Circular Geofence and one self-geofence:

Circular Geofence must set origin and radius:

Origin format :N2446.5321E12120.4231;

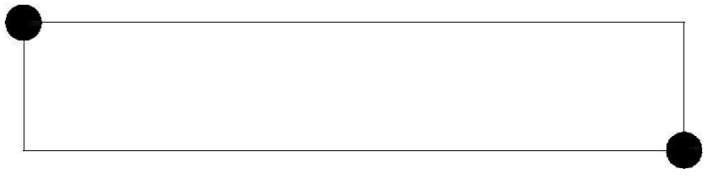
N2446.5321 is latitude, E12120.4231 is longitude.

Radius from 0.1 km to 1000km.

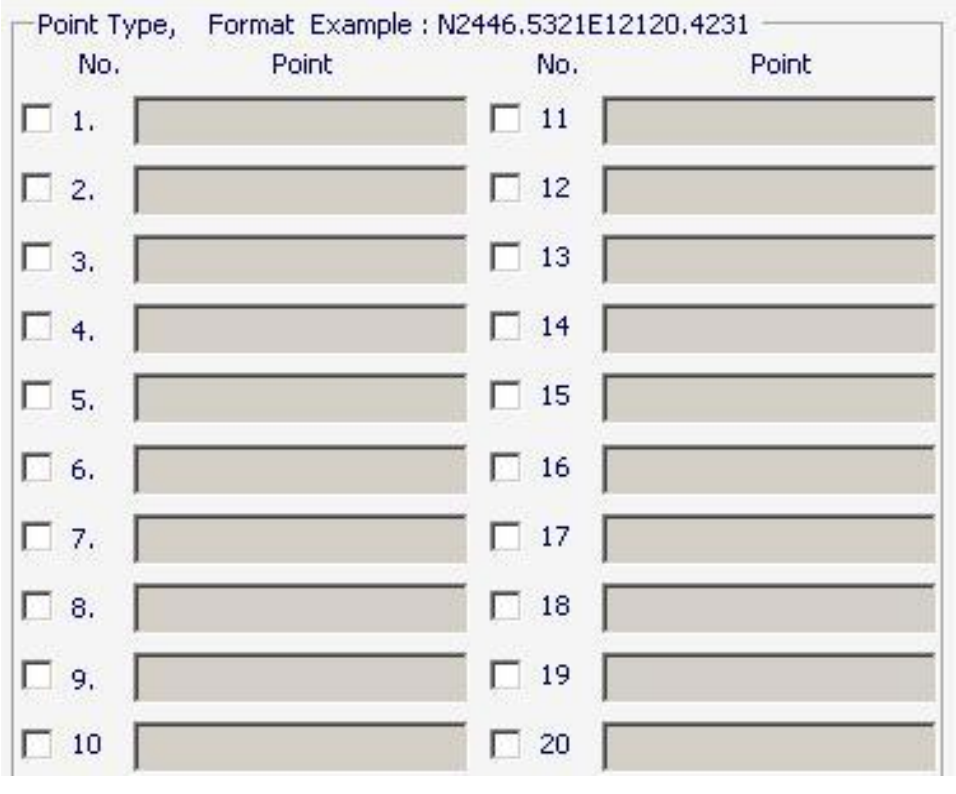


Five rectangular geofence:

Set two points position, the point format is N2446.5321E12120.4231;

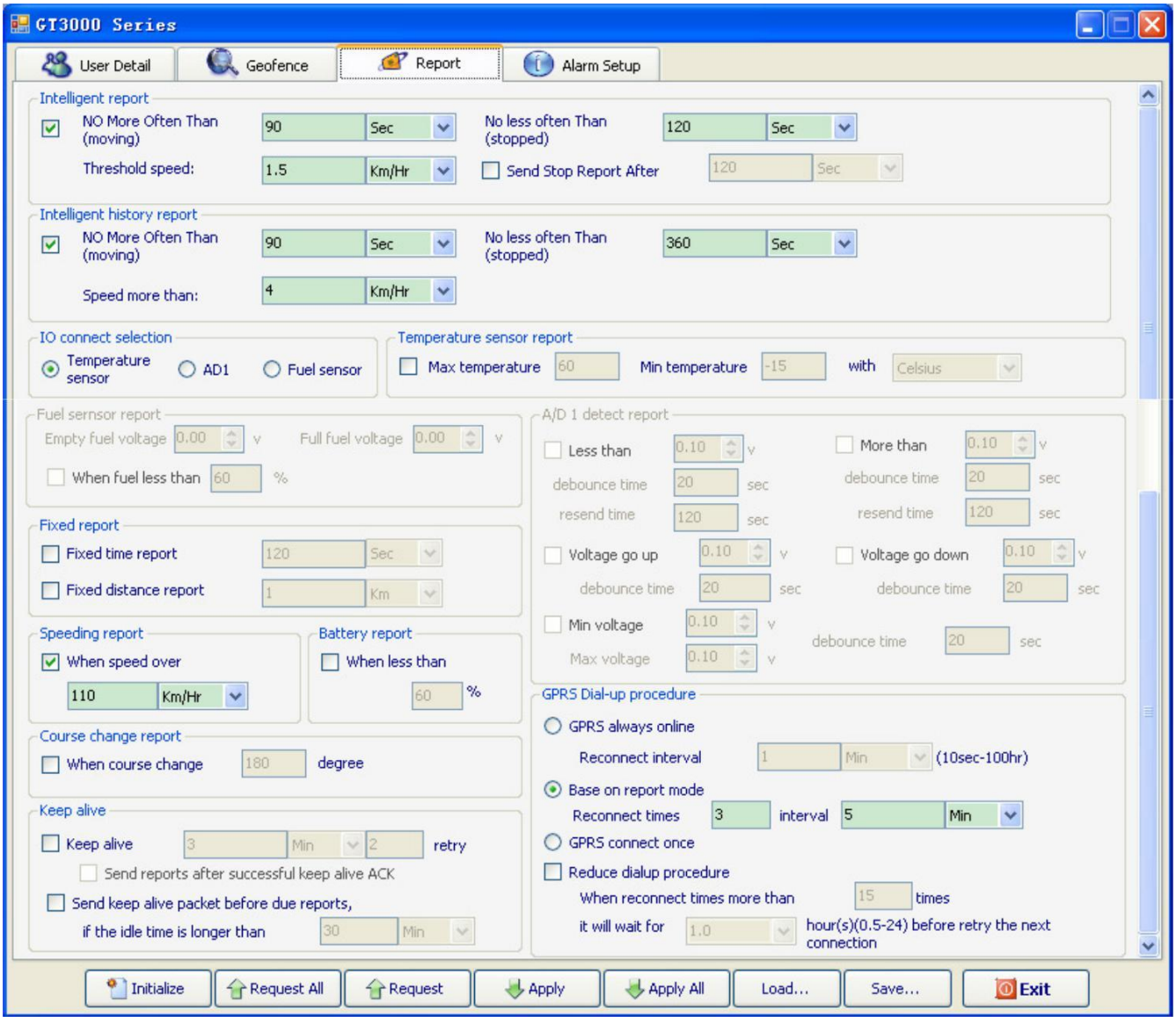


With two points, generate one rectangle. Unit will detect whether in rectangle. When unit enter or leave rectangle, will send one message out.



20 point Geo-fence areas can be set. When UNIT is out of these predefined zones, a report will be generated.

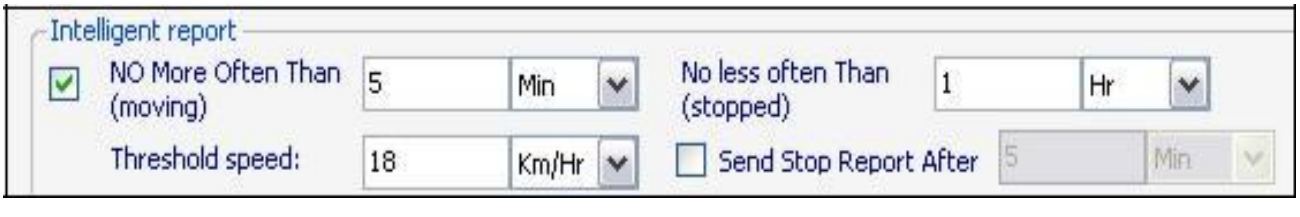
3. [REPORT:]



Automatic report can be configured in this section. To activate the function(s), please select "√" in checkbox and fill in data in the textbox.

The reports will be summarized as

(1) INTELLIGENT REPORT



Parameters: On/Off, Report time when moving, Report time when stop, threshold speed and stop duration. For example:

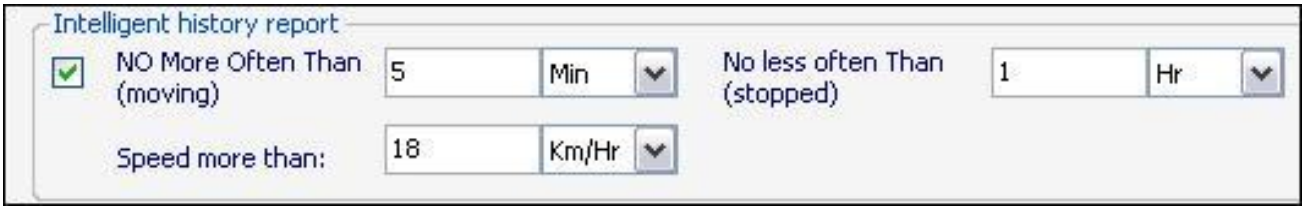
If "√" is selected in the two checkboxes and fill the above data in the textbox, then:

The vehicle will send a moving report every 5 minutes when vehicle speed exceed 18km/hr

The vehicle will send a stopped report every 1 hours when vehicle speed lower than 18km/hr

Even the vehicle speed lower than 18km/hr, and over 5 minutes, unit will send a stop report.

(2) INTELLIGENT HISTORY REPORT (RECORD THE REPORT IN THE SYSTEM'S FLASH RAM)



Parameters: On/Off, Report time when moving, Report time when stop, and threshold speed. (min. speed is 0.1 km/Hr, max. speed is 1000 km/Hr).

If "√" is selected in the checkbox and fill the above data in the textbox, then:

The vehicle will store a moving report every 5 minutes when vehicle speed exceed 18km/hr

The vehicle will store a stopped report every 1 hours when vehicle speed lower than 18km/hr

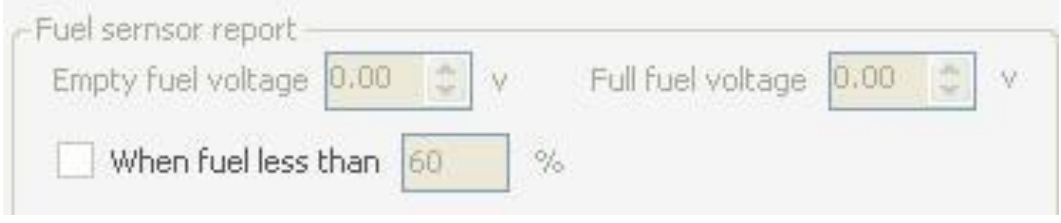
(3) IO CONNECT SELECTION

Parameters: to select unit connect with temperature sensor or with AD1 output or with fuel sensor

(4) TEMPERATURE REPORT

Parameters: On/Off, and min. and max. Temperature.

(5) FUEL SENSOR REPORT



The fuel sensor is used for calculating current fuel volume, if user selected this item, user can define the value discretionarily.

User can set warning fuel level for report. For example, 60 to represent 60% lower level report.

(6) COURSE CHANGE REPORT (TO SEND A REPORT WHEN THE COURSE CHANGE IS BIGGER THAN THE VALUE SET HERE)

Parameters: On/Off, and course change in degree.

(7) FIXED TIME REPORT

Parameters: On/Off, and time.

(8) FIXED DISTANCE REPORT

Parameters: On/Off, and distance. (Min. distance is 0.1 km, max. distance is 100 km).

(9) SPEEDING REPORT: (MIN. SPEED IS 0.1 KM/HR, MAX. SPEED IS 1000 KM/HR).

Parameters: on/off, and speed

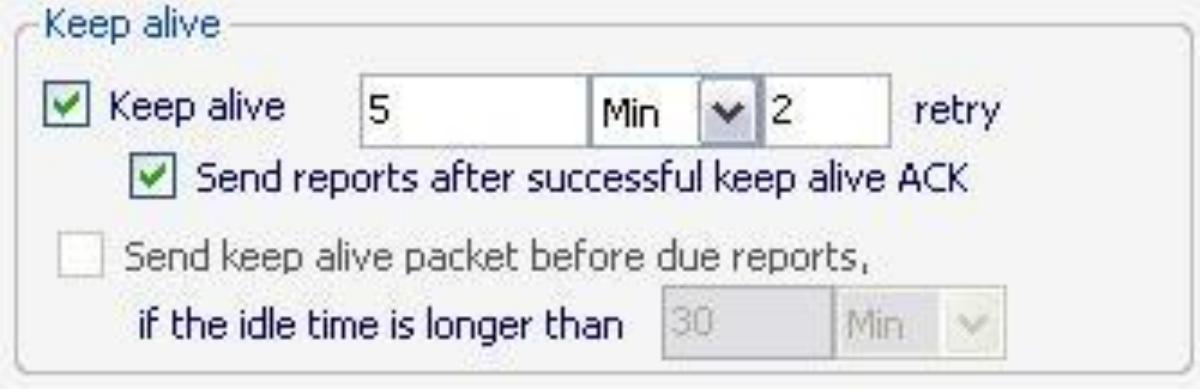
(10) BATTERY REPORT

Low battery warning report (to alert user when the internal battery level is low)

Parameters: On/Off, and warning battery level for report. For example, 60 to represent 60% lower level report.

The system will ignore the parameter with a value ‘0’ to prevent continuous non-stop reporting.

(11) KEEP ALIVE PROCEDURE



Parameters: On/Off, and interval / retry times. In order to keep connection in GPRS network, the unit can be set to send short keep alive report to the server in order to prevent the disconnection from the mobile service provider.

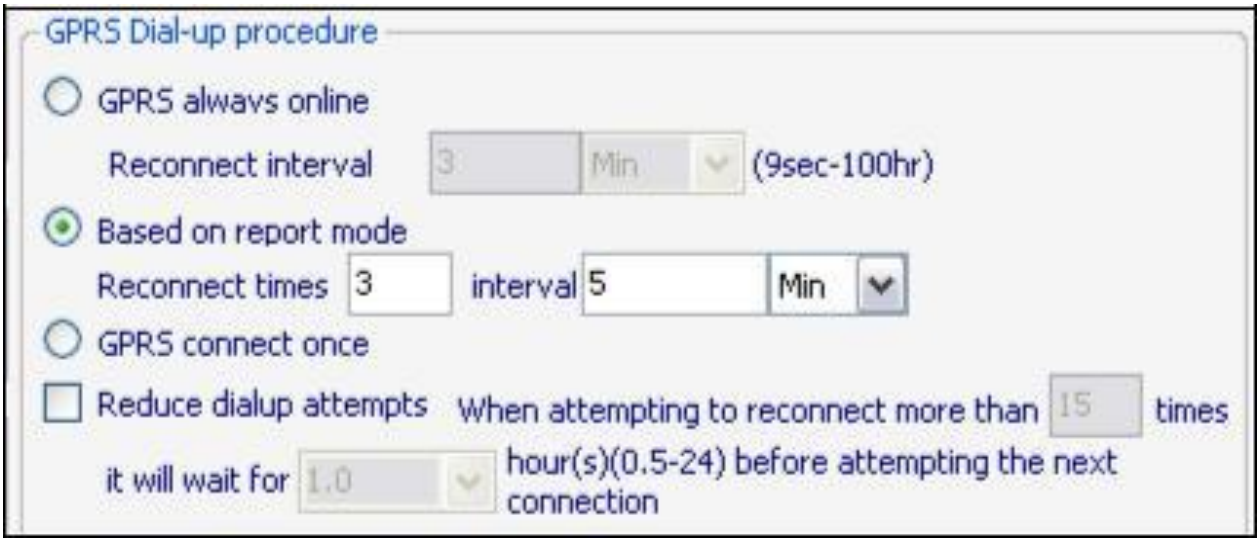
Send reports after a successful keep alive ACK. Parameters: On/Off .

If you select this function, all the reports will only be sent out after a successful keep alive ACK. (So if your keep alive time is shorter then select this function will be OK.) This function is very useful while using UDP to prevent report lost.

Send a keep alive packet right before a due reports if no data stream within certain time:
Parameters: On/Off, and idle time.

Some GSM provider might cut connection, if there is no data within certain time. It might result report lost in this “fake connection” duration. For example, you can set parameters in this region, ex 20 mins. (it means if the unit did not send any data in this 20 mins (including keep alive or normal reports)), then it will send a keep alive packet to check if the GPRS connection is valid or not. If not, it will actively reconnect to GPRS network.

(12) GPRS DIAL-UP PROCEDURE



1) GPRS always one-line
Parameters: Reconnect interval

While using this mode, when the unit can not searched GPRS signal, system will reconnect GPRS interval a preset value. (e.g.: 1minute)

2) Based on report mode

Parameters: Max. reconnect times, reconnect interval

While using this mode, the unit will connect to the server when there is a report to send. If the first connection is failed, it will retry to connect to the server up to the max. reconnect times. Each retry will be separated by the reconnect "interval".

3) GPRS connect once

While using this mode, the unit will connect to the server when there is a report to send (but only try once). If it is not successful, the report will be stored and sent out in the next successful connection. Disconnect GPRS connection when report sending is completed.

4) Reduce dialup attempts

Parameters: On/Off, Max. reconnect times, connect delay

If this method is used, the unit will reduce dialup attempts when attempting to reconnect more than reconnect times. User can define the delay time for the unit before try to reconnect to the server. If there is trigger report, the unit will connect to server immediately.

Special command for SMS mode:

If the GT3000 is not in the GPRS online status, user can send command &&Y02 or &&Y04 to ask unit to connect to server. This command can be sent from any device via SMS;

&&Y02:

When received this command, system will actively try to connect to server in next 600 seconds.

&&Y04,[connection time],[report interval]:

For example: &&Y04, 3600, 60

When received this command, system will connect to server in the next 3600 seconds, and send one report out every 60 seconds.

(13) AD1 DETECT PORT

[on/off] SEND REPORT IF ADC1 LESS THAN [min voltage] V for [debounce time] SEC, RESEND PER [resend time] SEC

[on/off] SEND REPORT IF ADC1 MORE THAN [max voltage] V for [debounce time] SEC, RESEND PER [resend time] SEC

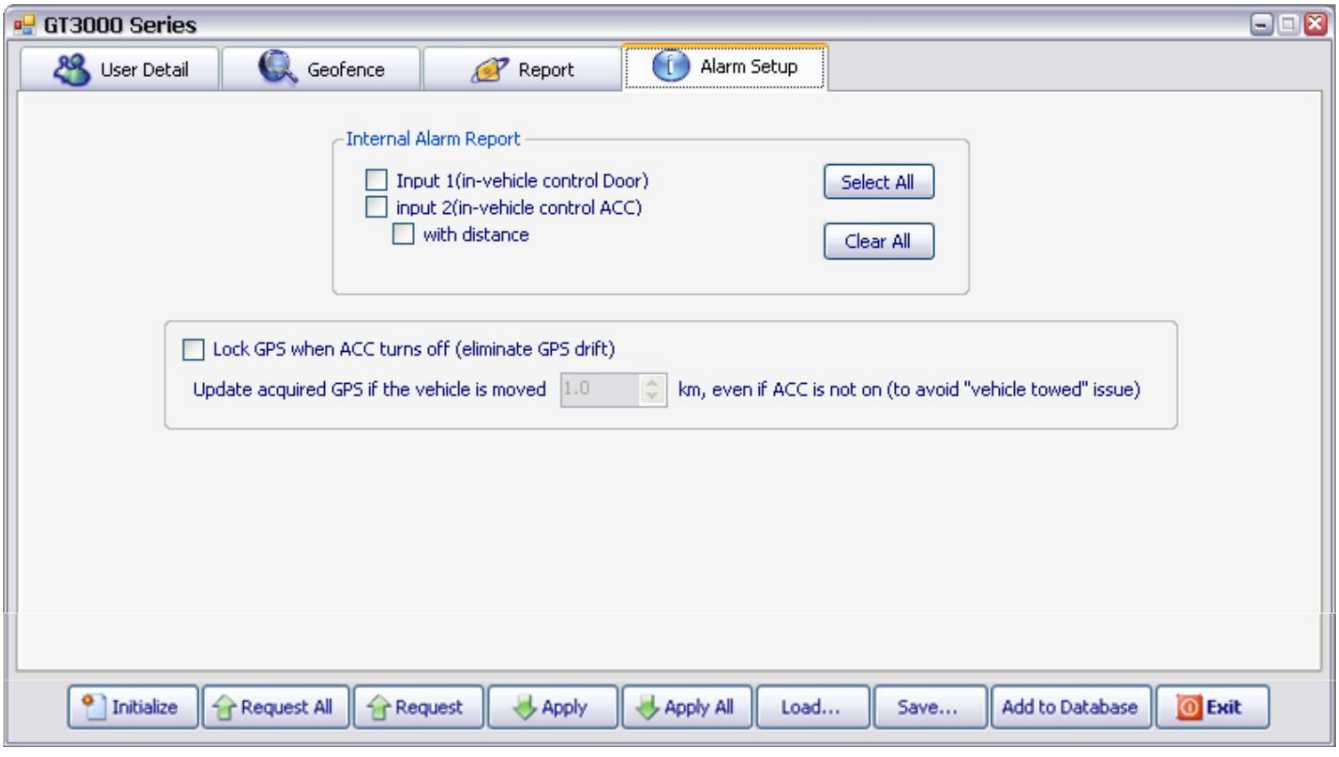
[on/off] SEND REPORT IF ADC1 GO UP [up voltage] V for [debounce time] SEC

[on/off] SEND REPORT IF ADC1 GO DOWN [down voltage] V for [debounce time] SEC

[on/off] SEND REPORT IF ADC1 ENTER/EXIT [min voltage] V TO [max voltage] V for [debounce time] SEC

Note: AD1 input voltage range is 0~3.30v, it must connect a resistance to share the voltage if the detected voltage higher than 3.30v.

4. [ALARM REPORT SETUP]



Alarm report(s) is also configurable. User can customize the events generated by the in-vehicle input or build in car alarm to be sent to the server. If the item(s) were selected (VALID), the related reports will be sent. Otherwise the report will be ignored even when an event is occurred internally.

If input 2 with distance is selected, system will send the distance report every time ignition ON to ignition OFF, for example: %%GT3000, A, 070521024400,

N2240.8929E11359.2030, 000, 270,NA, D7000000, 254, CFG:5, CFG:5 means the current ignition ON to ignition OFF distance is 5km.

Parameter: on/off, mileage

When ignition off, unit will lock GPS, the mileage is the radius of protecting vehicles, if vehicle moved away the range, unit will unlock GPS.

GT3000 SPECIFICATIONS

PHYSICAL PARAMETERS

Enclosure dimensions	88(L)*76(W)*25(H)
Unit Weight	About 100g

ELECTRICAL

DC Supply voltage	12V OR 24V
DC Tolerance voltage	9V 36V
Current (GPRS online)	60mA

GPRS*

Frequency Range (MHz) (Be used in GT3000MT/ GT3000FT/GT3000ST)	850/900/1800/1900
Frequency Range (MHz) GPRS* (Be used in GT3000XT)	900&1800&1900 or 850&1800&1900
GPRS connectivity (Be used in GT3000MT/ GT3000FT/GT3000XT/GT3000ST)	GPRS multi-slot class 10 GPRS mobile station class B
SIM card interface (Be used in GT3000ST)	1.8V/3.0V
SIM card interface (Be used in GT3000MT/ GT3000FT/GT3000XT)	3V
Antenna Impedance (Be used in GT3000MT/ GT3000FT/GT3000XT/GT3000ST)	50ohms

GPS*

Channels	20 parallel tracking
Frequency	L1-1575 MHz
Sensitivity	
Tracking	-159 dBm
Acquisition (Cold start)	-142 dBm
Position accuracy (Horizontal)	2.5m CEP autonomous
	2.0m CEP SBAX
Time to first fix	
Hot start 1	1s
Warm start 2	32s
Cold 3	< 35s
Standard GPS software	
NMEA message switchable	GGA, GSA GSV, VTG, RMC, GLL

COMMUNICATION

	GPRS \SMS\USB

ENVIRONMENTAL

Operating Temperature	-20°C to +55°C
Storage Temperature	-40°C to +85°C

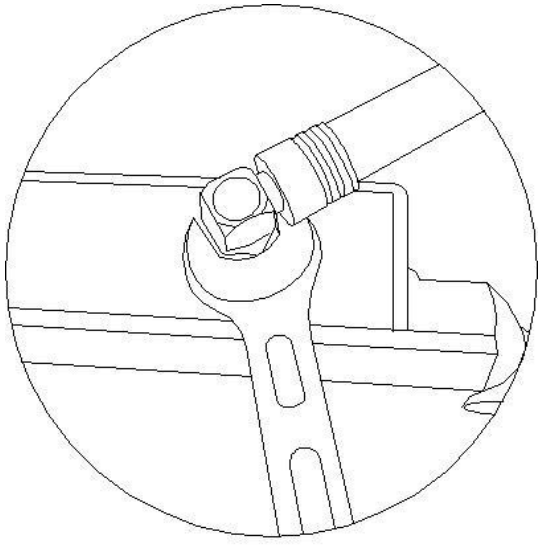
ACCESSORIES

1. Main unit
2. Operation/installer manual
3. Wire harness
4. GSM Antenna
5. GPS Antenna
6. Valet switch (SW-2)
7. LED (LD-4)

OPTIONAL ACCESSORIES

1. Built in backup battery (optional)
2. Combined Antenna (with GPRS and active GPS)
3. Temperature sensor (optional)
4. PC-setup Cable (optional)
5. Starter kill relay (RL-100)

NOTE:



Using wrench to tighten the screw cap of GPS and GPRS antenna and lock the screw cap to fix position, for avoid antenna connect abnormality, user can not using hands to tighten the screw cap.

VI. Federal Communications Commission (FCC) Statement

1)

You are cautioned that changes or modifications not expressly approved by the part

responsible for compliance could void the user's authority to operate the equipment.
2)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

VII Operation is subject to the following two conditions:

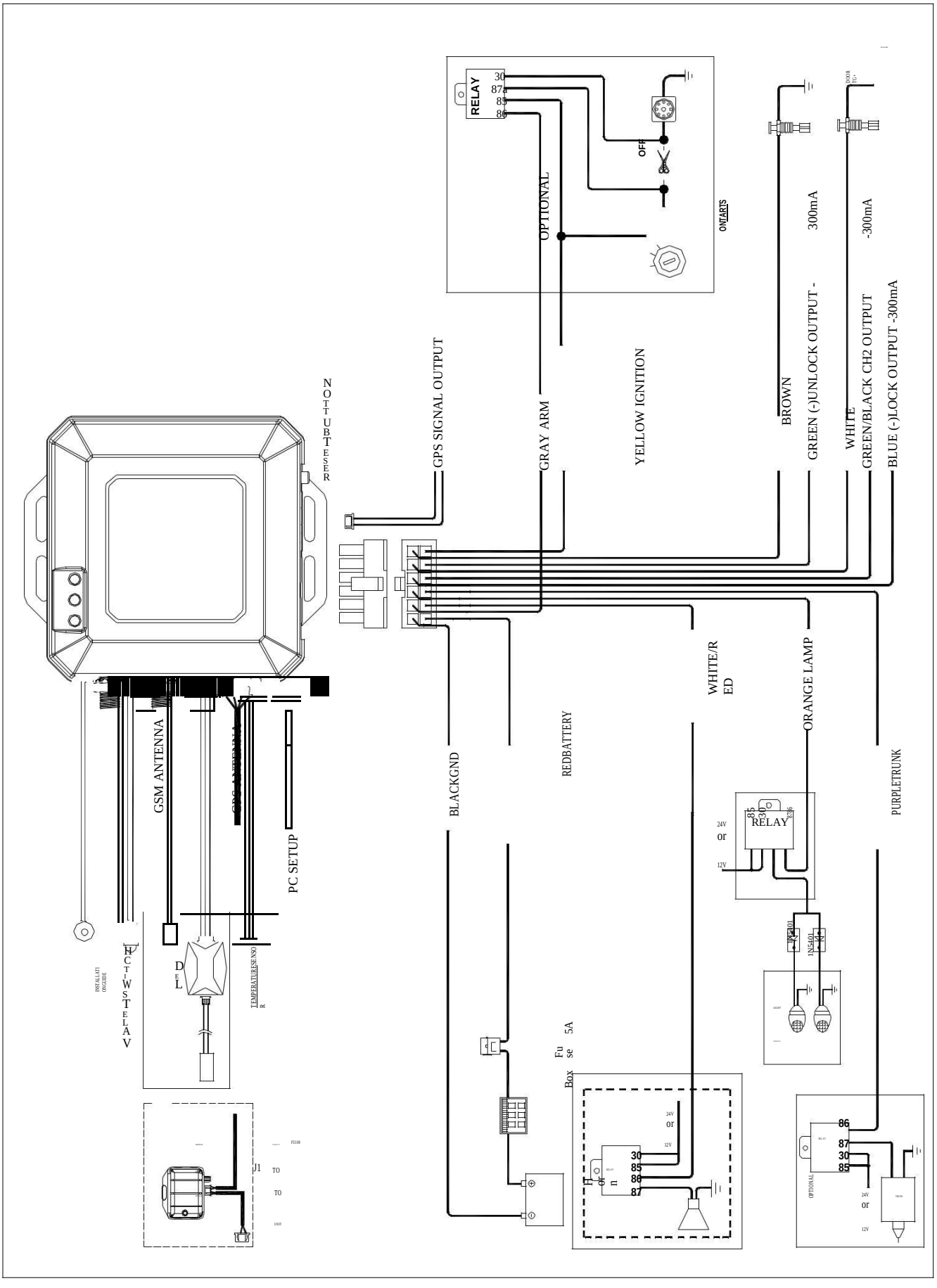
1) This device may not cause interference and

2) This device must accept any interference, including interference that may cause undesired operation of the device.

VIII FCC RF Radiation Exposure Statement:

1) This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

2) This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.


RELAY
30
87
85
86
OFF
ONTARTS
OPTIONAL
GPS SIGNAL OUTPUT
GRAY ARM
YELLOW IGNITION
BROWN
GREEN (-)UNLOCK OUTPUT -
300mA
WHITE
GREEN/BLACK CH2 OUTPUT
-300mA
BLUE (-)LOCK OUTPUT -300mA
NOTTUBTESER
GSM ANTENNA
PC SETUP
BLACKGND
REDBATTERY
WHITE/RED
ORANGE LAMP
PURPLETRUNK
RELAY
24V
or
12V
1N5401
Fuse Box 5A
J1
TO
TO
OPTIONAL
86
87
30
85