

TR-151A

Vehicle/Asset Tracker

User Manual

Version 0.9.9



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1. Introduction and Features

1.1 Introduction

TR-151A is a durable and water resistant GPS/GSM/GPRS tracker. Users can install TR-151A on vehicles or assets for tracking. It can send out SMS with its location (longitude and latitude) to user's cell phone by GSM network or to personal computer by internet connection of GPRS network. Then users can track the location of their vehicles or assets. TR-151A is designed to equip with high capacity of Li-ion battery for long operation time. There is one SOS button on the TR-151A for emergency help. It is very easy to install or hide TR-151A in the car to perform tracking. TR-151A is ideal application for vehicle tracking and equipment/assets monitoring.

1.2 Features

- High sensitive GPS chipset
- Combination of GPS ,GSM/GPRS wireless network
- Durable and water resistant GPS tracker
- Easy to install or hide in the car to perform tracking. No external wires needed.
- Ideal application for vehicle tracking and equipment/assets monitoring
- Optional external antenna for GPS reception
- Rechargeable 2100mA high capacity Li-ion battery for long operation time
- External DC power supply
- Configuration can be done via SMS commands or by application software via USB interface.
- SOS (emergency) button.
- Voice monitor function to monitor the sound/conversation live.
- Geofence function

NOTE: Voice Monitoring function allows user to send a SMS with voice monitoring command by a cellular phone to TR-151A. TR-151A will call back to the returned number in the SMS. And then user can listen to the sound or voice around TR-151A. While users listen to the sounds or voice around TR-151A, people who around TR-151A won't know they are under voice monitoring. Please refer to page29 to get the detailed method of making voice monitoring.

NOTE: Geofence feature allows user to set up to 10 permissible or restricted areas whose shape is either circular or rectangular for tracking the vehicles or monitoring the equipment/assets. Users can choose to receive alarm message if TR-151A enters the restricted areas or to receive alarm message if TR-151A gets out the permissible areas. Please refer to page 26-28 to get the detailed setting method of Geofence.

1.3 Hardware

GSM module:	TR-151A: Siemens GSM 850/1800/1900			
Frequency range(Uplink):	Min	Typ	Max	Unit
GSM850:	824		849	MHz
GSM1800:	1710		1785	MHz
GSM1900:	1850		1910	MHz
Frequency range(Downlink):	Min	Typ	Max	Unit
GSM850:	869		894	MHz
GSM1800:	1805		1880	MHz
GSM1900:	1930		1990	MHz
RF power:	Min	Typ	Max	Unit
GSM850:	31	33	35	
GSM1800:	28	30	32	
GSM1900:	28	30	32	
GSM Class	Small MS			
GPRS connectivity	<ul style="list-style-type: none"> • GPRS multi-slot class 10 • GPRS mobile station class B 			
GPS Chipset:	MT3318			
Frequency:	L1, 1575.42 MHz			
C/A code:	1.023 MHz chip rate			
Channels:	32 channel all-in-view tracking			
Horizontal Position Accuracy:	10 meters, 2D RMS			
Hot start:	1 sec., average			
Warm start:	38 sec., average			
Cold start:	42 sec., average			
Altitude Limit:	18,000 meters (60,000 feet) max.			
Velocity Limit:	515 meters/second (1000 knots) max.			
Acceleration Limit:	Less than 4g			
Jerk Limit:	20 m/sec ³			
Operating temperature:	-20° to 55° C			
Antenna Type:	GPS patch antenna			
Dimension:	86.7*48.9*32.5 mm			
Battery:	2100mA rechargeable Li-ion battery			
LED indicator:	For Charging, GPS, GSM and Status.			
Interface:	Mini USB port for connecting to PC			
Casing:	Water resistant (IPX4)			
GPS external antenna port:	MMCX port			

2. Start-up

2.1 Accessories



TR-151A



AC charger



USB Cable



Battery



Belt Clip (optional)

2.2 Install SIM card and Battery



- Use a coin or screwdriver to loosen the screw on back cover.



- Lift up the back cover and remove it as the direction shown.



- Push forward the cover of SIM card slot to the position marked with “OPEN”. Then lift up the cover.
 - Insert the SIM card with its metal contacts facing down and the cut corner at the top left.
- Note:** It is suggested to disable the SIM PIN protection function (asks SIM PIN entry while turn on the device) by your cellular phone before installing the SIM card in TR-151A



- Plug the battery connector into socket. Be aware that the **red wire** must be plugged on the top side.



- Please put the connector wire under the battery, and then put the battery into battery compartment.

NOTE: After installing the battery, the status LED will emit red light. After the LED go out, please wait for 5 seconds before turning on the power.

NOTE: Please take out the battery if you do not use TR-151A for a long time.

2.3 Charging the battery



Before using TR-151A for the first time, please fully charge it by connecting to AC power adapter under the power-off condition. (The attached battery is specially designed for TR-151A. Please do not use other type of battery; otherwise it will damage the device. If you need to change the battery of TR-151A, please contact your local dealer.) You can also charge the TR-151A by connect it to PC or Notebook via USB cable. (The power of PC or of notebook should be turned on.)

2.4 TR-151A with Belt Clip



- Insert the TR-151A with the Power button side facing out.



- Push TR-151A into the Belt Clip until it clicks in position.



- There are 4 circular magnets on back of the Belt Clip for attaching TR-151A onto the metal material of vehicle or machine.



- To remove TR-151A, slightly push outward the two sides of holder, and slide out the TR-151A.

2.5 Turn on/off the device

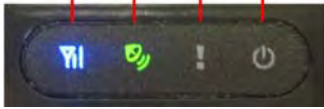
- **Turn on:** After installing the battery, the status LED will emit red light. After the LED go out, please wait for 5 seconds before turning on the power. Press the power button for 3~4 seconds. When the device is turned on, GPS will do cold start to get fixed its position for the first time with the green GPS LED on. If location is fixed, the LED will blink. It is suggested that you stay at outdoor places or near the window where TR-151A can receive the better GPS signal when you turn on the device.

NOTICE: If it does not successfully get the location fixed after turning the power on, TR-151A may be located in the weak signal area or on the move.

- **Turn off:** Press the Power button for 3~4 seconds. When the power is turned off, LED will go out.

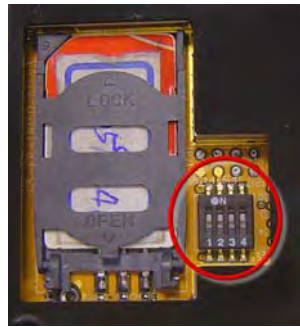
2.6 Button Description



Power button	<ol style="list-style-type: none"> 1. Power On: Press and hold the power button for 3-4 seconds. The status LED will flash 2 times 2. Power Off: Press and hold the power button for 3-4 seconds. The status LED will flash 1 time. 3. Enter parking mode: Press the power button once to enter parking mode. When power button is pressed, LED will flash slowly (once per second) first, and then enter parking mode. The flash number is the second number you set in Park_Time.
SOS button	<p>Press the SOS Button, the status LED will flash 3 times to indicate the button is activated. TR-151A will immediately send out emergency messages along with its GPS report to 3 preset phone numbers.</p>
Indicator	<div style="text-align: center;">  </div> <ol style="list-style-type: none"> 1. GSM LED: <ul style="list-style-type: none"> • Voice monitoring: LED keeps on. • When no SIM card is inserted, network searches in progress, ongoing user authentication, or network login in progress: LED blinks quickly (about once per second). • In standby mode: LED blinks slowly (once for 3 seconds) 2. GPS LED: The LED keeps on when it is fixing the location. The LED blinks when TR-151A's location has been fixed. When GPS function is disabled, GPS LED will be off. 3. Status LED: <ul style="list-style-type: none"> • When battery low: LED keeps on. • When enter setup mode: LED keeps on. • Press power button to turn on: LED flashes quickly 2 times. • Press power button to turn off: LED flashes quickly 1 time. • When SOS button is pressed: LED flashes slowly 3 times. • When error occurs: LED flashes quickly 5 times. • Parking mode: When power button is pressed, LED will flash slowly (once per second) first, and then enter parking mode. The flash number is the second number you set in Park_Time. If you want to stop parking mode, press the power button again. The LED flashes quickly 3 times and it will exit parking mode. • Sleeping mode: LED will flash slowly 60 times and then it enters sleeping mode. 4. Power LED: <ul style="list-style-type: none"> • The LED emits orange light when charger is plugged for charging the battery. • The LED goes off after the battery has been fully charged.

USB connector	There are two functions of the USB connector: <ol style="list-style-type: none">1. Connect TR-151A to PC by a Mini USB cable and setup all its features and functions from application software through PC.2. Charge the battery by connecting a USB cable.
Microphone	For voice monitoring use.
External antenna connector	For you to connect a MMCX external GPS antenna.

2.7 DIP switch



	On	Off
Switch 1	Enable TR-151A to automatically power on when it is connected to external power.	Users have to press the power button to power on TR-151A whether external power is connected or not.
Switch 2	All LED works as user mode.	Make all LED except status LED go off for secret tracking. Status LED works as user mode.
Switch 3	Setting Mode (Status LED keeps emitting red light)	User Mode
Switch 4	Sleeping Mode	User Mode

Note: You can set the switch by a little tweezers or pen point or toothpick.

3. TR-151A Setup and Call Center Operation

3.1 Install the USB driver

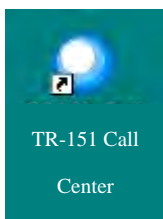


- 1.) Insert the Driver CD into your CD-ROM driver.
- 2.) AutoRun installation window will appear.
- 3.) Click “Install USB Driver” button to install the USB driver.
- 4.) You will see two folders. If your Windows is Vista version, please double click to open “**PL2303_USB_Driver_for_Windows_Vista**” folder and double click on “**PL-2303 Vista Driver Installer.exe**” to begin installation. Follow the instruction to complete the installation process.
- 5.) If your Windows is XP or 2000 version, please double click to open “**PL2303_USB_Driver_for_Windows_2000_XP**” folder and double click on “**PL-2303 Driver Installer.exe**” to begin installation. Follow the instruction to complete the installation process.

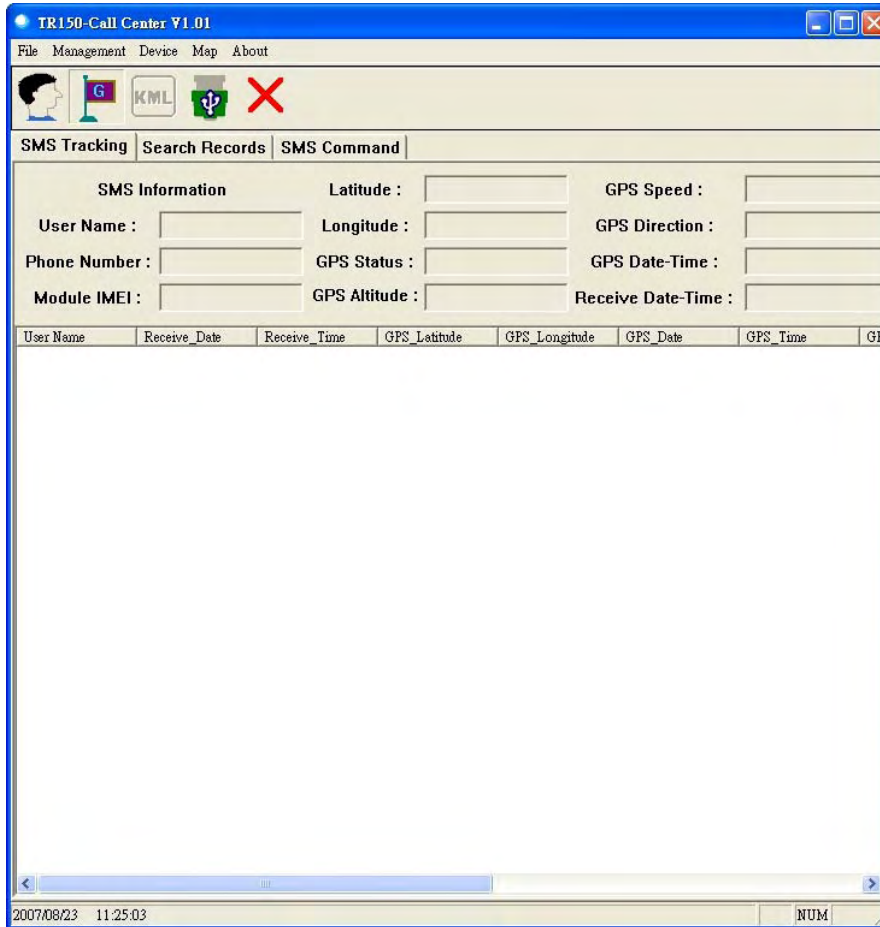
3.2 Install the Call Center program




- 1.) Click “Install PC Software” button to install the Call Center program.
- 2.) Follow the instruction to complete the installation process.
- 3.) After the installation is completed, you will see the icon “TR151-Call Center” appears on desktop. Double click on this icon to start TR151 Call Center program.



3.3 Call Center Operation



3.3.1 Set TR-151A by call center for the first time.

1. Make TR-151A enter setting mode by setting DIP switch 3 to the “ON” position.
2. Connect TR-151A and PC by the USB cable.
3. Turn on the power of TR-151A. (The status LED will emit red light showing it is under setting mode.)
4. Start call center.
5. Click Device → TR151 Setup. Or click . Then the window below will be brought up.



6. If you do not know TR-151A which COM port is connected to, please click “**Scan COM Port**” button to automatically scan it. Then click “**Setup**” button to enter setup window.
7. Then the window below will be brought up.

8. Write down the IMEI code.
9. Enter a name for TR-151A device in the field of **User Name**. Enter the phone number of SIM card installed in TR-151A in the field of **Phone Number**. Enter the three phone numbers of emergency help in the field of **SOS Number 1~SOS Number3**. (ESSENTIAL)
10. Check “**SMS Default Return Phone Number**” and enter a phone number for receiving confirmed message or data report. (OPTIONAL)
11. Select the time for GPS fixing in the pull-down menu of **Maximum GPS Fixing Time**. The unit is minute. If GPS fixing is not achieved within time, it will close GPS and send back the previous location info. (OPTIONAL)
12. Select a report mode (Stop Report, Immediate Report, and Period Report) for **Default Report Mode** and enter the concerning parameters. (OPTIONAL)
13. **Park Mode Setting**: Set the time length between entering Parking Mode after pressing the power button under power on condition in the field of **Park Time**. Set the interval of sending Park mode reporting SMS in the field of **Park Interval**. Set how many Park mode reporting SMS will be sent in the field of **Park Number of Reports**. Enter the phone number for receiving Park mode reporting SMS in the field of **Park Return Phone Number**.
14. **Sleep Moe Setting**: Set the time length of Sleep mode in the field of Sleep Time. Set the

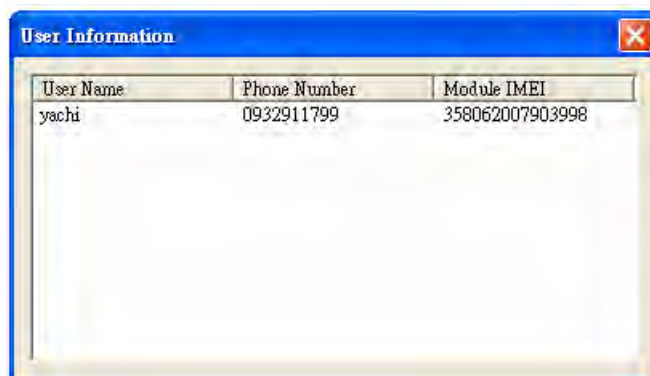
interval of sending Sleep mode reporting SMS in the field of **Sleep Interval**. Set how many Park mode reporting SMS will be sent in the field of **Sleep Number of Reports**. Enter the phone number for receiving Park mode reporting SMS in the field of **Sleep Return Phone Number**.

15. GPRS Setting: Set the GPRS concerning parameters. For the GPRS setting, please consult with your GPRS network service provider. (**NOTE:** GPRS Server Host Name must be a physical IP of the installed TR-151A call center's PC)
16. Click OK to save the setting and then unplug the USB cable from PC and TR-151A.
17. Press power button to turn off TR-151A.
18. **Remember to make TR-151A exit from setting mode by setting DIP Switch 3 to "OFF" position.**

3.3.2 View the IMEI code and phone number of TR-151A device

Users can view the IMEI code and phone number of TR-151A that has been made basic setup by management center.

Click Management → User Information. Or click  . Then the window below will be brought up.

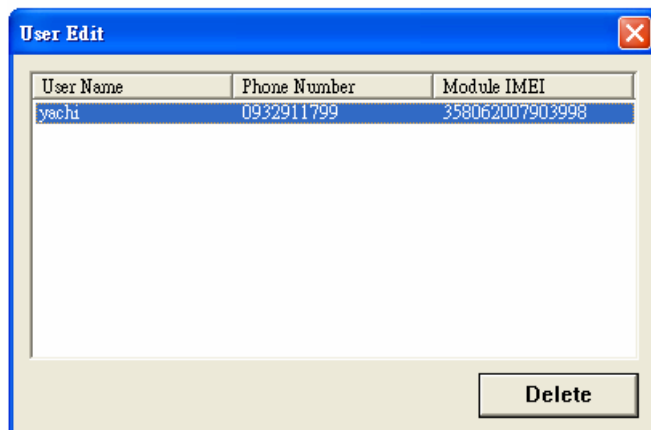


User Name	Phone Number	Module IMEI
yachi	0932911799	358062007903998

3.3.3 Delete a user (TR-151A device) from Call center






Management center can only store five sets of TR-151A's information. If user would like to add the 6th set of TR-151A, please delete one set of the existing TR-151A.

Click Management → User Edit. Or click . Then the window below will be brought up.



Highlight the TR-151A you'd like to delete, and then click **Delete** button.

3.4 Description of the Call Center UI

Menu item	Description
File > Exit	Close the Call Center program.
Management > User Information 	Display the User (TR-151A) Information. You can setup up to 5 users in the Call Center. (Each Call Center can manage up to 5 sets of TR-151A.)
Management > User Edit 	For deleting a user. The Call Center can only hold 5 users' information at most. If you want to add a new user after you have already set 5 users, please delete an existing one.
Device > TR151 Setup 	When a TR-151A is connected to your PC, you can do the basic setup for TR-151A.
Map > View Tracking Points 	Check this item to mark returned location in the Google Map. When you receive the latest data report from TR-151A, it will automatically update the point on Google Map. This function only works under the " SMS Tracking " mode.
Map > Export KML File 	Save the records as the KML format. You can import the KML file to Google Earth, and it will display the location route. This function only works under the " Search Records " mode.
About	Version information.

Setup File

Information Firmware Version : TR-151 v.test_2.06 by Nat Lin 070927(F-OTR-0Q-0710111) Module IMEI : 352022004442958 Set Time Zone : On User Name : Phone Number :	Park Mode Setting Park Time : 30 Park Interval : 60 Park Number of Reports : 1 Park Return Phone Number : 0910190643
SMS Default Return Phone Number <input type="checkbox"/> SMS Default Return Phone Number :	Sleep Mode Setting Sleep Time : 12 Sleep Interval : 60 Sleep Number of Reports : 1 Sleep Return Phone Number : 0910190643
Maximum GPS Fixing Time Maximum GPS Fixing Time : 3	GPRS Setting GPRS Port : GPRS apn : GPRS user name : GPRS user password : GPRS_dns1 : GPRS_dns2 : GPRS Server Host Name :
Default Report Mode Setting Default Report Mode : Stop Report Report Interval : 30 Report Format : Format 1 Number of Reports : Return Phone Number for Default Report Mode : 0910190643	
SOS Number SOS Number 1 : 0910190643 SOS Number 2 : SOS Number 3 :	

OK Reset Default Cancel

Information: the basic information of TR-151A

Item	Description
Firmware Version	Firmware version of TR-151A
Module IMEI	International Mobile Equipment Identity
Set Time Zone	On: The SMS returned by TR-151A will contain a local time. Off: The SMS returned by TR-151A will contain a Coordinated Universal Time, abbreviated UTC.
User Name	Enter a user name here.
Phone Number	Enter the phone number of SIM card installed in this TR-151A.

SMS Default Return Phone Number

Item	Description
SMS Default Return Phone Number	TR-151A will send data report or confirmed message back to this return phone number that is in the last field of all SMS tracking commands. If user leaves "Return Phone Number" empty in the tracking commands, TR-151A will send report back to "SMS Default Return Phone Number". If "Return Phone Number" and "SMS Default Return Phone Number" are both empty, TR will send report back to caller ID.

Maximum GPS Tracking Time

Item	Description
Maximum GPS Fixing Time	The time that allows for GPS fixing. If GPS fixing is not achieved in time, it will close GPS and send back the previous location info.

Default Report Mode Setting

Item	Description
Default Report Mode	User can configure TR-151A to perform the “Default Report Mode”. There are 3 report modes: immediate report, period report, stop report (standby). When you select some report mode, the unavailable item will be disabled. After power on the device, TR-151A will perform the “Default Report Mode” automatically. For example, if the default report mode is set to “Period Report” mode, every time when user power on the TR-151A, it will send out period reports by default.
Report Interval	Time interval of sending data report for period report mode. The unit is second.
Report Format	Set TR-151A to return message by Format0 or Format1 . (Please see description later in this user manual.)
Number of Reports	Set how many reports will be sent for period report mode?
Return Phone Number for Default Report Mode	After turn on the TR-151A, it will perform default report mode and send the data report to this number.

SOS Number

Item	Description
SOS Number	When SOS button is pressed, TR-151A will call these 3 numbers and send the SMS of location information.
OK	OK to confirm and save.
Reset Default	Reset system to Factory Default.
Cancel	Cancel the Setup.

Park Mode Setting

Item	Description
Park Time	The time of entering Parking Mode after pressing the power button under power on condition. The value is between 1-300 second, and the default is 30 seconds
Park Interval	The interval of sending alarm SMS when TR-151A senses vibration under parking mode
Park Number of Reports	Set how many alarm SMS will be sent when TR-151A senses vibration under parking mode
Park Return Phone Number	The phone number for receiving Park mode reporting SMS

Sleep Mode Setting

Item	Description
Sleep Time	The time length of Sleep mode. The default is 12 hours
Sleep Interval	The interval of sending alarm SMS when TR-151A senses vibration under

	sleep mode
Sleep Number of Reports	Set how many alarm SMS will be sent when TR-151A senses vibration under sleep mode
Sleep Return Phone Number	The phone number for receiving alarm SMS under sleep mode

GPRS Setting

Item	Description
GPRS Port	The communication port for connecting GPRS network
GPRS apn	The APN of GPRS network station
GPRS user name	The account for connecting GPRS network
GPRS user password	The password for connecting GPRS network
GPRS DNS 1/ DNS 2	The DNS for connecting GPRS network
GPRS Server Host Name	GPRS server address (It should be a physical IP of the PC where you install TR-151A call center)

NOTE: About GPRS setting, please contact with your GPRS network service provider.

3.5 SMS Tracking commands and Configuration for SMS Call Center software developer

You can connect one TR-151A to PC and use GlobalSat PC software Call Center to send **SMS tracking commands** and **SMS configurations** to control the other TR-151A which is outside on the road. It can help Call Center service providers to evaluate TR-151A and build their own SMS Call Center efficiently.

Please refer to “SMS_Call_Center_software_Development_manual_VX.X_EN.doc” for details.

4. Operating the TR-151A

4.1 How to set SOS number of TR-151A?

Users can set SOS number of TR-151A by sending SMS via mobile phone.

The format of SMS is following as:

?7,IMEI,4,SOS1,SOS2,SOS3,Return_Phone_Number!

The table below explains the content of the SMS.

Format	Description
?	Start sign
7	Function code
IMEI	IMEI code of the TR-151A
4	Setting code of SOS number
SOS1, SOS2, SOS3	The phone number for receiving SOS message
Return_Phone_Number	The phone number for TR-151A to send an SMS to inform the setting is OK.
!	End sign

Example 1, if user only wants to set 1 set of SOS, and return phone number as 616123456, you can send SMS as:

?7,355632000166323,4,616123456,,,626123456!

(You still have to add 2 commas after the set of SOS.)

Example 2, if user wants to set SOS1, SOS2, SOS3, and return phone number as 616123456, 717123456, 818123456, and 626123456, you can send the SMS as.

?7,355632000166323,4,616123456,717123456,818123456,626123456!

NOTE: You can also set SOS number by management center. Please refer to page 18 for the detail.

4.2 How to set TR-151A to immediately report its position by SMS?

Users can send an SMS by mobile phone to ask TR-151A to immediately report its position.

The format of SMS is following as:

?0,IMEI,Report_Format,Return_Phone_Number!

The table below explains the content of the SMS.

Format	Description
?	Start sign
0	Function code
IMEI	IMEI code of the TR-151A
Report_Format	0 or 1. 0 is for end user, and 1 is for SMS management center development
Return_Phone_Number	The phone number for receiving the reporting SMS.
!	End sign

TR-151A will send an SMS whose format is “?0,IMEI,OK!” to the return phone number to confirm it has received the request. And then it will start to get fixed the position. After getting fixed the position, it will send SMS with its location to the return phone number.

For example: If you'd like to ask TR-151A to send immediate report in format0 to 626-123456.

You have to enter **?0,355632000166323,0,626123456!**

And then you will get **?0,355632000166323,OK!**. After TR-151A get fixed of the position, you will get the position report like

```
Position report
Name
2008/12/15 10:20:39
N2459.8915,E12129.2186
GPS fixed
```

NOTE:

If TR-151A can not get fixed the position within the “Maximum GPS Fixing Time”, it will return the previous location. When the GPS position is fixed, it will again return the position data.

Please refer to page 18 to set “Maximum GPS Fixing Time.”

4.3 How to set TR-151A to periodically report its position by SMS?

Users can send an SMS by mobile phone to ask TR-151A to periodically report its position. The format of SMS is as below.

?1,IMEI,Report_Interval,Number_of_Reports,Report_Format,Return_Phone_Number!

The table below explains the content of the SMS.

Format	Description
?	Start sign
1	Function code
IMEI	IMEI code of the TR-151A
Report_Interval	Set the interval between two reporting SMS
Number_of_Reports	Set how many reporting SMS should be sent
Report_Format	0 or 1. 0 is for end user, and 1 is for SMS management center development
Return_Phone_Number	The phone number for receiving the reporting SMS.
!	End sign

TR-151A will send an SMS whose format is “?1,IMEI,OK!” to the return phone number to confirm it has received the request. And then TR-151A will send the SMS with its location to the return phone number according to the report interval.

NOTE:

If user sets the number of reports as 0, TR-151A will keeps sending the periodical report until user send the SMS of ?2,IMEI,Return_Phone_Number! to stop the periodical report.

Example 1: Require continuous 120-sec period report in format0 sent to 626123456

You have to enter “? 1,355632000166323,120,0,0,626123456!”

TR-151A will send “? 1,355632000166323,OK!” And then you will get the position report like

Position report

Name

2008/12/15 10:20:39

N2459.8915,E12129.2186

GPS fixed

TR-151A will send position report every 120 seconds until you stop periodical report.

Stop periodical report:

Users can send an SMS to stop periodical report.

The format of SMS is following as?2,IMEI,Return_Phone_Number!

4.4 How to set TR-151A to immediately report its position by GPRS?

Users can send an SMS by mobile phone to ask TR-151A to immediately report its position via GPRS network to TR-151A call center or GPRS server.

The format of SMS is following as:

?8,IMEI,Return_Phone_Number!

The table below explains the content of the SMS.

The description of SMS

Format	Description
?8	Start sign and function code
IMEI	IMEI of TR-151A
Return_Phone_Number	The phone number for receiving OK message.
!	End sign

TR-151A will send an SMS whose format is “?8,IMEI,OK!” to the return phone number to confirm it has received the request. And then it will start to get fixed the position. After getting fixed the position, it will send its location to the TR-151A call center or GPRS server.

Example: Require GPRS immediate report sent to 626-123456

You have to enter “?8,355632000166323,626123456!”

And then you will get “? 8,355632000166323,OK!”

4.5 How to set TR-151A to periodically report its position by GPRS?

Users can send an SMS by mobile phone to ask TR-151A to periodically report its position via GPRS network to GPRS server (TR-151A call center).

The format of SMS is as below.

?9,IMEI,Report_Interval,Return_Phone_Number!

The description of SMS

Format	Description
?9	Start sign and function code
IMEI	IMEI of TR-151A
Report_Interval	Time interval of sending data report. The unit is second.
Return_Phone_Number	The phone number for receiving OK message.
!	End sign

TR-151A will send an SMS whose format is“?9,IMEI,OK!” to the return phone number to confirm it has received the request. Then it will periodically send the periodical report according to the report interval.

Example 1: Require 120-sec period report sent to 626123456
You have to enter “?9,355632000166323,120,626123456!”

Example 2: Require 180-sec period report sent to 626123456
?9,355632000166323,180,626123456!

Stop GPRS periodical report:

Users can send an SMS to stop periodical report.

The format of SMS is following as:

?2,IMEI,Return_Phone_Number!

4.6 Tracking/Monitoring TR-151A by GPRS

Users can make commands to TR-151A for asking immediate report, periodical report, or stop report via GPRS server and network.

	Report type	Format	Note	Example	TR-151A will return
0	Immediate report	\$0,IMEI!	*note1	\$0,355632000166323!	\$OK!
1	Period report	\$1,IMEI,sec!	*note2 sec= 5~86400	\$1,355632000166323,30! Report every 30 seconds	\$OK!
2	Stop connect	\$2,IMEI!	*note3	\$2,355632000166323!	\$OK!

*note1: When TR-151A receives this command, it will send the report back immediately. It will send only one time, and the GPRS connection is still on.

*note2: When TR-151A receives this command, it will send back the report every specified second. And the GPRS connection is still on. The time error of return could be 1~3 seconds, or larger if the GPRS connection is not stable.

*note3: When TR-151A receives this command, it will disconnect from GPRS and go to standby mode.

4.7 Displaying the location on map

The format of longitudes and latitudes got from TR-151A differs from the format of Google map/earth's longitudes and latitudes. So users have to convert the format of longitudes and latitudes got from TR-151A into the format Google map/earth's longitudes and latitudes before displaying the location on map.

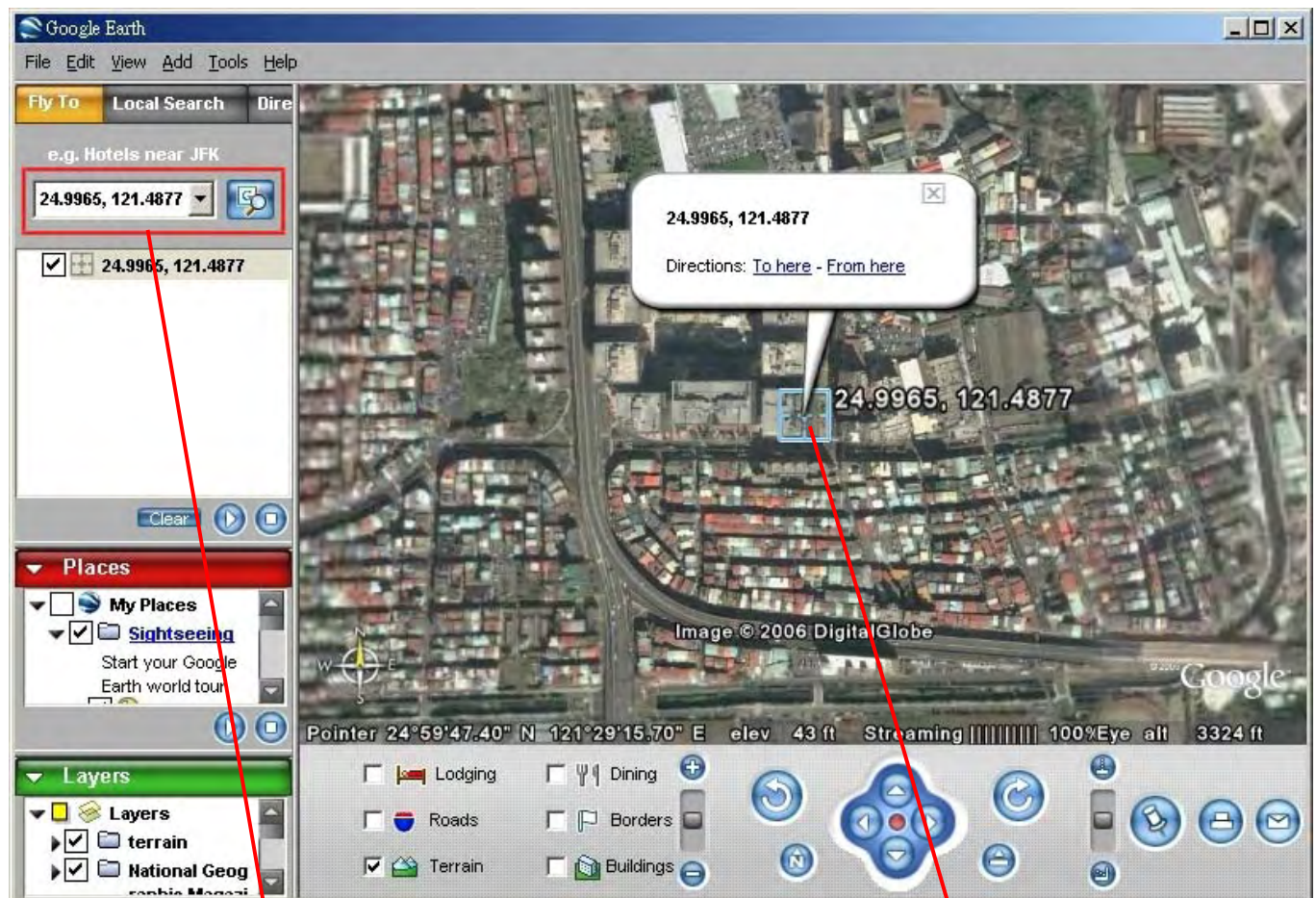
The format of longitudes and latitudes got from TR-151A is like E2459.79 and N12129.26. E2459.79 means E24°59.79'. N12129.26 means N121°29.26' Please take the digits at the right side of the degree to be divided by 60. The number you get is the number at the right side of decimal.

For example, the longitudes and latitudes got from is E2459.79 and N12129.26

You have to take $59.79 \div 60 = 0.9965$; $29.26 \div 60 = 0.487666 \approx 0.4877$

Then you can enter 24.9965 and 121.4877 into Google earth or Google map to display the location.

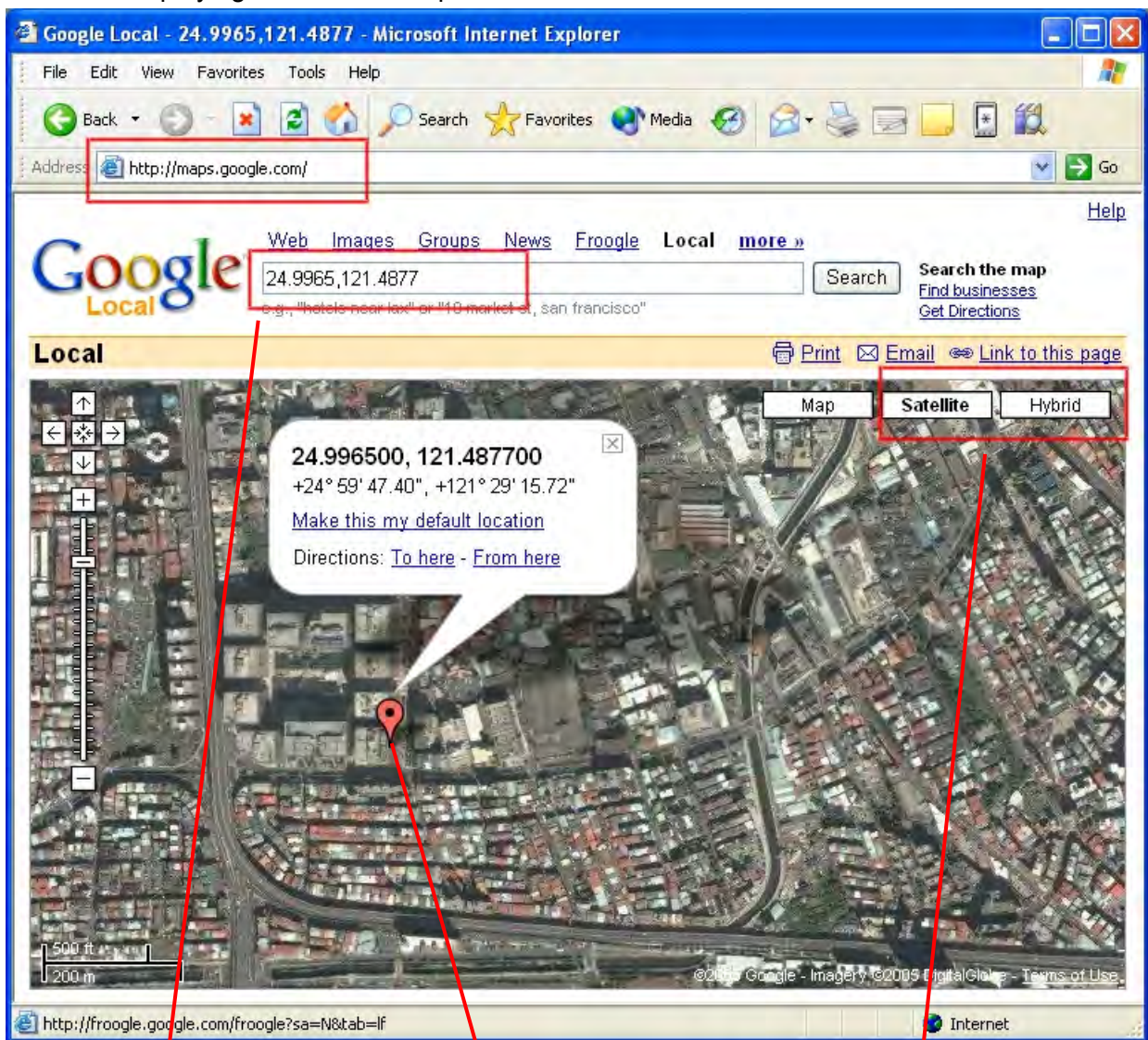
- Start the Google Earth software.



Input the latitude and longitude

The Google Earth will display the location map for you.

- Or you can start the Internet Explorer and type "http://maps.google.com" to connect to Google Map website for displaying the location map.



Input the latitude and longitude and click on **Search** button.

The Google Map will display the location map for you.

Select "Satellite" or "Hybrid". It depends on Google Map whether your area is supported by this mode or not.

4.8 How to set TR-151A enter Geofence mode?

Users can send SMS to TR-151A for setting up to 10 permissible or restricted areas whose shape is circular or rectangular for tracking the vehicles or monitoring the equipment/assets. Users can choose to receive alarm message while TR-151A enters the restricted areas or to receive alarm message while TR-151A gets out the permissible areas. The content of the SMS includes the rectangular or circular areas defined by longitudes and latitudes, getting in the restricted areas or getting out the permissible areas to send alarm, time intervals of alarm report, number of reports, report format and return phone number.

The format of SMS is as below.

	Report type	Format	Return message
4	SMS Geofence	?4,IMEI,{[R,longitude,latitude,longitude,latitude],[C,longitude,latitude,radius(meter)]},In_or_Out,Report_Interval,Number_of_Reports,Report_Format,Return_Phone_Number!	?4,IMEI,OK!
11	GPRS Geofence	?11,IMEI,{[R,longitude,latitude,longitude,latitude],[C,longitude,latitude,radius(meter)]},In_or_Out,Report_Interval,Number_of_Reports,Report_Format,Return_Phone_Number!	?11,IMEI,OK!

The description of SMS

Format	Description
?4 ?11	Start sign and function code ?4 → Send location info to mobile phone. ?11 → Send location info to TR-151A call center
IMEI	IMEI of TR-151A
{[R,longitude,latitude,longitude,latitude],[C,longitude,latitude,radius(meter)]}	Boundary information: R: rectangular shape → Follow by two longitudes, latitudes. C: circular shape → Follow by one longitude, latitude and one radius.
In_or_Out	In_or_Out=in → Send alarm message if TR-151A gets in the restricted areas. In_or_Out=out → Send alarm message if TR-151A gets out the permissible areas.
Report_Interval	Time interval of sending data report. The unit is second.
Number_of_Reports	Set how many reports will be sent? Number_of_Reports=0 → continuous report Number_of_Reports=X → X times report
Report Format	Set TR-151A to return message by Format0 or Format1. (see description below)
Return_Phone_Number	?4: The phone number for receiving return message and alarm message. ?11: The phone number for receiving return message
!	End sign

Note 1:

The format of Google map/earth's longitudes and latitudes differs from the format of TR-151A's. So please convert the format of Google map/earth's longitudes and latitudes into the format of TR-151A's longitudes and latitudes before setting Geofence.

If you get a set of latitude and longitude from Google earth like 24°59'47.40" & 121°29'15.72", you have to convert the format to TR-151A format as below and then set geo-fence.

$47.40 \div 60 = 0.79$ $15.72 \div 60 = 0.262$

Please take E 12129. & 262 N2459.79 to set geo-fence

If you get a set of latitude and longitude from Google earth like 24.9965° & 121.4877°, you have to convert the format to TR-150 format as below and then set geo-fence.

$0.9965 \times 60 = 59.79$ $0.4877 \times 60 = 29.262$

Please take E12129. 262 & N2459.79 to set geo-fence

Note 2:

User can set up to 10 rectangular or circular boundaries. Each SMS contains one boundary setting.

User can send numerous SMS to complete one set of settings, including numerous rectangular or

circular boundaries. For example, if user wants to set the boundary includes 2 rectangles and 1 circle.

User has to send 3 SMS, two with rectangle information, one with circle information.

SMS1:

?4,IMEI,R,longitude,latitude,longitude,latitude,In_or_Out,Report_Interval,

Number_of_Reports,Report_Format,Return_Phone_Number!

SMS2:

?4,IMEI,R,longitude,latitude,longitude,latitude,In_or_Out,Report_Interval,

Number_of_Reports,Report_Format,Return_Phone_Number!

SMS3:

?4,IMEI,C,longitude,latitude,radius,In_or_Out,Report_Interval,

Number_of_Reports,Report_Format,Return_Phone_Number!

If user uses numerous SMS in one setting, the IMEI, In_or_Out, Report_Interval, Number_of_Reports, Report_Format, Return_Phone_Number must be the same between each SMS. If above parameters are not the same between SMS, TR-151A only follows **last SMS**.

Note 3

In Boundary information

{[R,longitude,latitude,longitude,latitude],[C,longitude,latitude,radius],}

User can set

R: rectangular follows by two longitudes and two latitudes.

Or

C: circular follows by one longitude, one latitude and one radius.

Example: Rectangle

R,E12128.1883,N2342.8117,E12129.2186,N2459.8915

Example: Circle (radius is 1000 meters)

C,E12129.2186,N2459.8915,1000

Note 4:

Example:

- Send **one SMS** to setup Geofence.
- Boundary includes **one rectangle** (two longitudes and two latitudes → E12128.1883,N2342.8117,E12129.2186,N2459.8915)
- When TR-151A gets out boundary, it would send format1, 10 times, 120 sec interval, alarm message to 626123456.

?4,355632000166323,R,E12128.1883,N2342.8117,E12129.2186,N2459.8915,out,120,10,1,616123456!

Example:

- Send **three SMS** to setup Geofence.
- Boundary includes **one rectangle** (two longitudes and two latitudes → E12128.1883,N2342.8117,E12129.2186,N2459.8915) and **two circles** (one longitude/latitude is E12228.1883,N2442.8117, and radius is 1000 meter) (the other longitude/latitude is E12328.1883,N2452.8117, and radius is 1500 meter)
- When TR-151A gets out boundary, it would send format1, 10 times, 120 sec interval, alarm message to 626123456.

SMS1:

?4,355632000166323,R,E12128.1883,N2342.8117,E12129.2186,N2459.8915,out,120,10,1,616123456!

SMS2:

?4,355632000166323,C,E12228.1883,N2442.8117,1000,out,120,10,1,616123456!

SMS3:

?4,355632000166323,C,E12328.1883,N2452.8117,1500,out,120,10,1,616123456!

Exit Geofence mode:

Users can send an SMS exit Geofence mode.

The format of SMS is following as:

?2,IMEI,Return_Phone_Number!

Caution:

If you exit Geofence mode, all the settings will be deleted.

4.9 How to make TR-151A do Voice monitor function?

User can send a SMS by a mobile phone to ask TR-151A start the voice monitoring.

The format of SMS is following as:

?6,IMEI,Return_Phone_Number!

The table below explains the content of the SMS

Format	Description
?	Start sign
6	Function code
IMEI	IMEI code of the TR-151A
Return_Phone_Number	The phone number for TR-151A to call back and transmit the sounds.
!	End sign

Note: If return phone number is empty, TR-151A will call back to Caller ID

TR-151A will send an SMS whose format is“?6,IMEI,OK!” to the return phone number to confirm it has received the request. And then it will start to call back to the returned number written in the SMS. And then user can listen to the sound or voice around TR-151A.

Example:

User send voice command and make TR-151A call back to 626123456

?6,355632000166323,626123456!

Stop voice monitoring:

Users can hang up the phone call to stop voice monitoring.

4.10. How to set TR-151A enter Parking Mode?

Parking Mode is for users to make TR-151A to send out an alarm SMS to inform user while it senses vibration.

Users can use Call Center or SMS to configure parameters: Enable parking time, telephone number, time interval and number of report.

- While the device is powered on, press the power button to enter parking mode. The status LED will flash specific times to indicate the parking mode is enabled.
- Press the power button again to exit from the parking mode.

User can also send an SMS by a mobile phone to set the parameters of parking mode.

The format of SMS is following as:

?7,IMEI,5,Park_Time,Park_Interval,Park_Number_of_Reports,Report_format,Sensitivity,Park_Return_Number,Return_Phone_Number!

The table below explains the content of the SMS

Format	Description
?7	Start sign and function code
IMEI	IMEI of TR-151A
5	Setting code for Parking setting
Park_Time	Set the active time for entering parking mode. The unit is second.
Park_Interval	Time interval of sending data report. The unit is second.
Park_Number_of_Reports	Set how many report will be sent. 0 → continuous report X → X times report
Report format	0 → Format0 1 → Format1
Sensitivity	Set the number of vibration which enables TR-151A to send out alarm. The number you can set is 1~255. Larger value means less sensitive.
Park_Return_Number	Return phone number for default report mode.
Return_Phone_Number	The confirmed SMS sent to the phone number to indicate the setting is successful.
!	End sign

TR-151A will send an SMS whose format is“?7,IMEI,OK!” to the return phone number to confirm it has received the request.

Exit from parking mode:

Users can press the power button or send an SMS to exit from parking mode.

The format of SMS is following as:

?2,IMEI,Return_Phone_Number!

4.11 How to set TR-151A enter Sleeping Mode?

Sleeping Mode is for users to make TR-151A to send out an alarm SMS to inform user while it senses vibration. During sleeping mode, TR-151A does not connect to GSM network. So TR-151A cannot receive SMS during sleeping mode.

DIP switch 4 ON: Enable sleeping mode **DIP switch 4 OFF:** Disable sleeping mode

When DIP switch 4 is on, and the device is powered on, it would enter the sleeping mode. The status LED will flash 60 times to indicate the sleeping mode is enabled.

User can also send an SMS by a mobile phone to configure the parameters of sleeping mode. The format of SMS is following as:

7,IMEI,6,Sleep_Time,Sleep_Interval,Sleep_Number_of_Reports,Report_format,Sensitivity,Sleep_Return_Number,Return_Phone_Number!

The table below explains the content of the SMS

Format	Description
?7	Start sign and function code
IMEI	IMEI of TR-151A
6	Setting code for Sleeping setting
Sleep_Time	Set the time length of sleep mode. The unit is hour. When it reaches the Sleep Time, TR-151A will wake up and send a SMS message, then go back to Sleeping mode.
Sleep_Interval	Time interval of sending data report when TR-151A senses the vibration under sleeping mode. The unit is second.
Sleep_Number_of_Reports	Set how many report will be sent. 0 → continuous report X → X times report
Report format	0 → Format0 1 → Format1
Sensitivity	Set the number of vibration which enables TR-151A to send out alarm. The number you can set is 1~255. Larger value means less sensitive.
Sleep_Return_Number	Return phone number for default report mode.
Return_Phone_Number	The confirmed SMS sent to the phone number to indicate the setting is successful.
!	End sign

Comparison between parking mode, sleeping mode, and normal mode

Function/Mode	Normal mode	Parking mode	Sleeping mode
GPS		Off	Off
GSM	On	On	Off
Motion sensor	Off	On	On

4.12 The return format from TR-151A

Return SMS format from TR-151A

The data format is configurable in the SMS tracking commands. There are two types of the data format as below.

Format0 is for general end users who send SMS commands to TR-151A by their cell phone or PDA phone. This format is very easy to read by end users.

Format1 is specifically read by software Call Center that is developed by service provider.

Data Report Format:

Report_Format=0 → **Format0**

Report_Format=1 → **Format1**

Format0:	Example:
Position report Name Time Date GPS position Fix or not	Position report Name 2006/9/15 10:20:39 N2459.8915,E12129.2186 GPS fixed

Format1:
?IMEI,Status,GPS_Fix,Date,Time,Longitude,Latitude,Altitude,Speed, Heading,Number_of_Satellites_In_Use,HDOP!
Example:
?353857014816785,2,3,280807,035825,E12129.2616,N2459.7918,97.2,0.13,142.31,04,2.4!

The description of Format1

Format	Value	Note
?	?	Command Head
IMEI	The number of IMEI	
Status	0 1 2 4 12 13	0: Immediate report 1: Period report 2: Stop report 4: Geofence 12: Parking 13: Sleeping
GPS_Fix	1 2 3	1: Fix not available 2: GPS 2D Fix 3: GPS 3D Fix
Date	ddmmyy	
Time	hhmmss	
Longitude	(E or W)dddmm.mmmm	Example: E12129.2186 → E 121°29.2186'
Latitude	(N or S)ddmm.mmmm	Example: N2459.8915 → N 24°59.8915'
Altitude	xxxxx.x	unit: meters
Speed	xxxxx.xx	unit: knots (1knots = 1.852km)
Heading	ddd	
Number_of_Satellites_In_Use	xx	

HDOP	x.x	
!	!	Command End

Format of return GPRS from TR-151A

Format:

Command_Head,IMEI,status,GPS_fix,date,time,longitude,latitude,altitude,speed,heading,number of satellites in use,HDOP,Command_End

Example:

\$355632000166323,1,1,040202,093633,E12129.2252,N2459.8891,00161,0.0100,147,07,2.4!

Format	Value	Note
Command_Head	\$	
IMEI	(The number of IMEI)	
Status	0 1 2	0: Immediate report 1: Period report 2: Stop connect
GPS_fix	1 2 3	1: Fix not available 2: GPS 2D Fix 3: GPS 3D Fix
date	ddmmyy	
time	hhmmss	
longitude	(E or W)dddmm.mmmm	Example: E12129.2186 → E 121°29.2186'
latitude	(N or S)ddmm.mmmm	Example: N2459.8915 →N 24°59.8915'
altitude	xxxxx.x	unit: meters
speed	xxxxx.xx	unit: knots (1knots = 1.852km)
heading	ddd	
number of satellites in use	xx	
HDOP	x,x	
Command END	!	

4.13 SMS Configuration

User can configure following parameters into TR-151A by SMS. There are seven settings as below.

- SMS Default Return Phone Number
- Maximum GPS Fixing Time
- Default Report Mode Setting
- SOS Numbers
- Parking setting
- Sleeping setting
- GPRS setting

Report type	Format	Return message
SMS Default Return Phone Number	??,IMEI,1,Enable_SMSDefaultReturnPhoneNumber, SMSDefaultReturnPhoneNumber,Return_Phone_Number!	??,IMEI,OK!
Maximum GPS Fixing Time	??,IMEI,2,Maximum_GPS_Fixing_Time, Return_Phone_Number!	??,IMEI,OK!
Default Report Mode Setting	??,IMEI,3,Default_Report_Mode,Report_Interval, Number_of_Reports,Report_Format, ReturnPhoneNnumberForDefaultReportMode, Return_Phone_Number!	??,IMEI,OK!
SOS Numbers	??,IMEI,4,SOS1,SOS2,SOS3,Return_Phone_Number!	??,IMEI,OK!
Parking Setting	??,IMEI,5,Park_Time,Park_Interval, Park_Number_of_Reports,Report_Format,sensitivity, Park_Return_Number,Return_Phone_Number!	??,IMEI,OK!
Sleeping Setting	??,IMEI,6,Sleep_Time,Sleep_Interval, Sleep_Number_of_Reports,Report_Format,sensitivity, Sleep_Return_Number,Return_Phone_Number!	??,IMEI,OK!
GPRS Setting	??,IMEI,7,Port,APN,GPRS_Name,GPRS_pwd,DNS1,DNS2, Host_Name,Return_Phone_Number!	??,IMEI,OK!

- Default_Report_Mode:
 - Default_Report_Mode = 0 → immediate report
 - Default_Report_Mode = 1 → period report
 - Default_Report_Mode = 2 → stop
- Enable_SMSDefaultReturnPhoneNumber:
 - Enable or disable SMS Default Return Phone Number.
 - Enable_SMSDefaultReturnPhoneNumber = 0 → Disable
 - Enable_SMSDefaultReturnPhoneNumber = 1 → Enable
- Maximum_GPS_Fixing_Time:
 - If GPS is not fixed within the time, it returns previous location and close GPS.
 - The unit is minute.
- Number_of_Reports:
 - Set how many report will be sent.
 - Number_of_Reports = 0 → continuous report
 - Number_of_Reports = X → X times report
- Report_Format: Ask TR-151A to return message by Format0 or Format1.
- Report_Interval: Time interval of sending data report. The unit is second.

- Return_Phone_Number: TR-151A will send confirmed message back to this Return_Phone_Number.
If user let Return_Phone_Number be empty, TR-151A will send report back to SMSDefaultReturnPhoneNumber.
If Return_Phone_Number and SMSDefaultReturnPhoneNumber are both empty, TR-151A will send report back to caller ID.
- ReturnPhoneNnumberForDefaultReportMode: Return phone number for default report mode. TR-151A will send report to this number after it is turned on when Default Report Mode is set to immediate report or period report.
- SMSDefaultReturnPhoneNumber: Set SMS Default Return Phone Number.

4.13.1 SMS Configuration _ SMS Default Return Phone Number

Report type	Format	Return message
SMS Default Return Phone Number	?7,IMEI,1,Enable_SMSDefaultReturnPhoneNumber, SMSDefaultReturnPhoneNumber,Return_Phone_Number!	?7,IMEI,OK!

The description of SMS

Format	Description
?7	Start sign and function code
IMEI	IMEI of TR-151A
1	Setting code for SMS Default Return Phone Number
Enable_SMSDefaultReturnPhoneNumber	0 → Disable 1 → Enable
SMSDefaultReturnPhoneNumber	In the SMS tracking commands (immediate report, period report, stop report, Geofence), if the field Return_Phone_Number is empty, TR-151A will send data report to this SMSDefaultReturnPhoneNumber.
Return_Phone_Number	The confirmed SMS sent to the phone number to indicate the setting is successful.
!	End sign

Example: To configure SMS default return phone number as 313-987654, and send confirmed SMS to 626-123456.

?7,355632000166323,1,1,313987654,626123456!

Example: To Disable SMS default return phone number and send confirmed SMS to 626-123456.

?7,355632000166323,1,0,,626123456!

4.13.2 SMS Configuration _ Maximum GPS Fixing Time

Report type	Format	Return message
Maximum GPS fixing time	?7,IMEI,2,Maximum_GPS_Fixing_Time,Return_Phone_Number!	?7,IMEI,OK!

The description of SMS

Format	Description
?7	Start sign and function code
IMEI	IMEI of TR-151A
2	Setting code for Maximum GPS fixing time
Maximum_GPS_Fixing_Time	The time that allows for GPS fixing. If GPS fixing is not achieved within the time, it will close GPS and send back the previous location info.
Return_Phone_Number	The confirmed SMS sent to the phone number to indicate the setting is successful.
!	End sign

Example: To configure Maximum GPS fixing time to 5 minutes and send confirmed SMS to 626-123456.
?7,355632000166323,2,5,626123456!

4.13.3 SMS Configuration _ Default Report Mode Setting

Report type	Format	Return message
Default report mode setting	?7,IMEI,3,Default_Report_Mode,Report_Interval,Number_of_Reports,Report_Format,ReturnPhoneNnumberForDefaultReportMode,Return_Phone_Number!	?7,IMEI,OK!

The description of SMS

Format	Description
?7	Start sign and function code
IMEI	IMEI of TR-151A
3	Setting code for Default report mode setting
Default_Report_Mode	0 → SMS immediate report 1 → SMS periodical report 2 → stop 8 → GPRS immediate report 9 → GPRS periodical report
Report_Interval	Time interval of sending data report. The unit is second.
Number_of_Reports	Set how many report will be sent. 0 → continuous report X → X times report
Report_Format	0 → Format0 1 → Format1
ReturnPhoneNnumberForDefaultReportMode	Return phone number for default report mode.
Return_Phone_Number	The confirmed SMS sent to the phone number to indicate the setting is successful.
!	End sign

Note:

The configuration is for default report mode (SMS Immediate, SMS Period, Stop, GPRS immediate, GPRS periodical) settings. In immediate and stop settings, some fields are unnecessary, please leave these fields empty and separate them by a comma. Please see following examples for detail.

Example: SMS Immediate report. Configure default report mode as **SMS immediate report**, send format1 report data to 313-987654, and send confirmed SMS to 626-123456.

?7,355632000166323,3,0,,,1,313987654,626123456!

Example: SMS Period report. Configure default report mode as **SMS period report**, send 10 times, 180-sec period report in format0 to 313-987654, and send confirmed SMS to 626-123456.

?7,355632000166323,3,1,180,10,0,313987654,626123456!

Example: Stop. Configure default report mode as **stop (standby)**, and send confirmed SMS to 626-123456.

?7,355632000166323,3,2,,,,,626123456!

Example: GPRS Period report. Configure default report mode as **GPRS period report**, send 180-sec period report, and send confirmed SMS to 626-123456.

?7,355632000166323,3,9,180,,,,,626123456!

4.13.4 SMS Configuration _ GPRS Setting

Report type	Format	Return message
GPRS Setting	?7,IMEI,7,Port,APN,GPRS_Name,GPRS_pwd,DNS1,DNS2,Host_Name,Return_Phone_Number!	?7,IMEI,OK!

The description of SMS

Format	Description
?7	Start sign and function code
IMEI	IMEI of TR-151A
7	Setting code for GPRS setting
Port	GPRS Port of the Server
APN	Please consult your GPRS network service provider for these parameter values.
GPRS_Name	
GPRS_pwd	
DNS1	
DNS2	
Host_Name	Please enter the physical IP of the PC where you install TR-151A call center or the domain name.
Return_Phone_Number	The confirmed SMS sent to the phone number to indicate the setting is successful.
!	End sign

Note: TR-151A is designed for vehicle and asset for tracking purpose, not for carried by people.

Federal Communication Commission Interference Statement :

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 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.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IMPORTANT NOTE :

FCC Radiation Exposure Statement :

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. To maintain compliance with FCC RF exposure compliance requirements, please follow operation instruction as documented in this manual.

“For body worn operation, this Tracker has been tested and meets FCC RF exposure guidelines when used with an accessory that contains no metal and that positions the device a minimum of 1.5 cm from the body. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.”

Radio wave exposure and Specific Absorption Rate (SAR) information :

This mobile Tracker (model number TR-151A) has been designed to comply with applicable safety requirement for exposure to radio waves. This requirement is based on scientific guidelines that include safety margins designed to assure this safety of all persons, regardless of age and health.

The radio wave exposure guidelines employ a unit of measurement known as the Specific Absorption Rate, or SAR. Tests for SAR are conducted using standardized method with the phone transmitting at its highest certified power level in all used frequency bands.

While there may be differences between the SAR levels of various phone models, they are all designed to meet the relevant guidelines for exposure to radio waves.

The highest SAR value for this model phone tested by DASY5 for use at the ear is 0.699 W/kg.

SAR data information for residents in countries/regions that have adopted the SAR limit recommended by the Institute of Electrical and Electronics Engineers (IEEE), which is 1.6 W/kg averaged over one (1) gram of tissue.