IntelliTrac X1

Protocol Document

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General notes

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1 Introduction to IntelliTrac X Series Protocol

This document describes the protocol of the IntelliTrac X Series devices. The S&T proprietary messaging protocol is used for all communications between the base and the device. This protocol incorporates error checking, message sequencing with full acknowledgement of received messages on request. The base station sends messages to the device and waits for an acknowledgement message from the device to indicates the status of the request. So this guide covers all protocol information you need to design and set up AVL applications incorporating the IntelliTrac X Series devices.

2 Version History

Date	Version	What's new	Firmware Version required	Hardware Version equired
2005.09.01	1.0	New release	V1.0 or above	Rev.B
2005.10.18	1.0.1	Modified $ST+GETPOSITION command	V1.012 or above	Rev.B or above
252005.10.27	1.0.2	Modified $ST+PMGR command Modified $ST+IMEI command Modified $ST+TOW command Modified $ST+MILE command Modified $ST+TEST command	V1.013 or above	RevC or above
2005.11.04	1.0.3	Modified $ST+BBCTRL command	V1.013 or above	RevC or above
2005.11.07	1.0.4	Modified $ST+TRACKING command Modified $ST+PMGR command	V1.016 or above	RevC or above
2005.12.06	1.0.5	Modified $ST+RESET command Modified $ST+PMGR command Modified the STD error code table Added the notes for $ST+COMM command Added $ST+CLRP command	V1.018 or above	RevC or above
2006. 01.13	1.0.6	Modify $ST+RMSK command	V1.022 or above	RevC or above
2006. 02.22	1.0.7	Added $ST+TEST Error code Added new param in $ST+RESET command	V1.030 or above	RevC or above
2006. 03.08	1.0.8	Added $ST+VERSION command Modified $ST+CLRP command notes Modified $ST+PMGR command notes	V1.033 or above	RevC or above
2006. 03.17	1.0.9	Added $ST+BAUD command Added $ST+NMEA command Added $ST+MMSG command Added $ST+TMSG command	V1.036 or above	RevC or above

2006. 04.06	1.1.0	Added $ST+SPEED command Added $ST+SMID command Correct “read syntax” for $ST+REPORT command Modified $ST+PMGR parameter setting	V1.041 or above V1.041 or above V1.045 or above	RevC or above

3 Scope of the Document

This document presents the ST Command Set for the IntelliTrac X Series devices.

3.1 Related Documents

IntelliTrac X1 Hardware Installation Guide

3.2 ST Command Syntax

The “$ST” or “$st” prefix must be set at the beginning of each command line. To terminate a command line enter <CR>.

Commands are usually followed by a response that includes <response><CR><LF>

Throughout this document, only the responses are presented, <CR><LF> are omitted intentionally.

Types of ST commands and responses :

Read command. This command returns the currently set value of the parameter or parameters

Test command $ST+XXXX=<…>,?<CR><LF>

Returns $XXXX=<…>,<…>,<…>, …<CR><LF>

Write command. This command sets user-definable parameter values.

Test command $ST+XXX=<…>,?<CR><LF>

Returns $OK:XXXX<CR><LF>

Default parameters are underlined throughout this document.

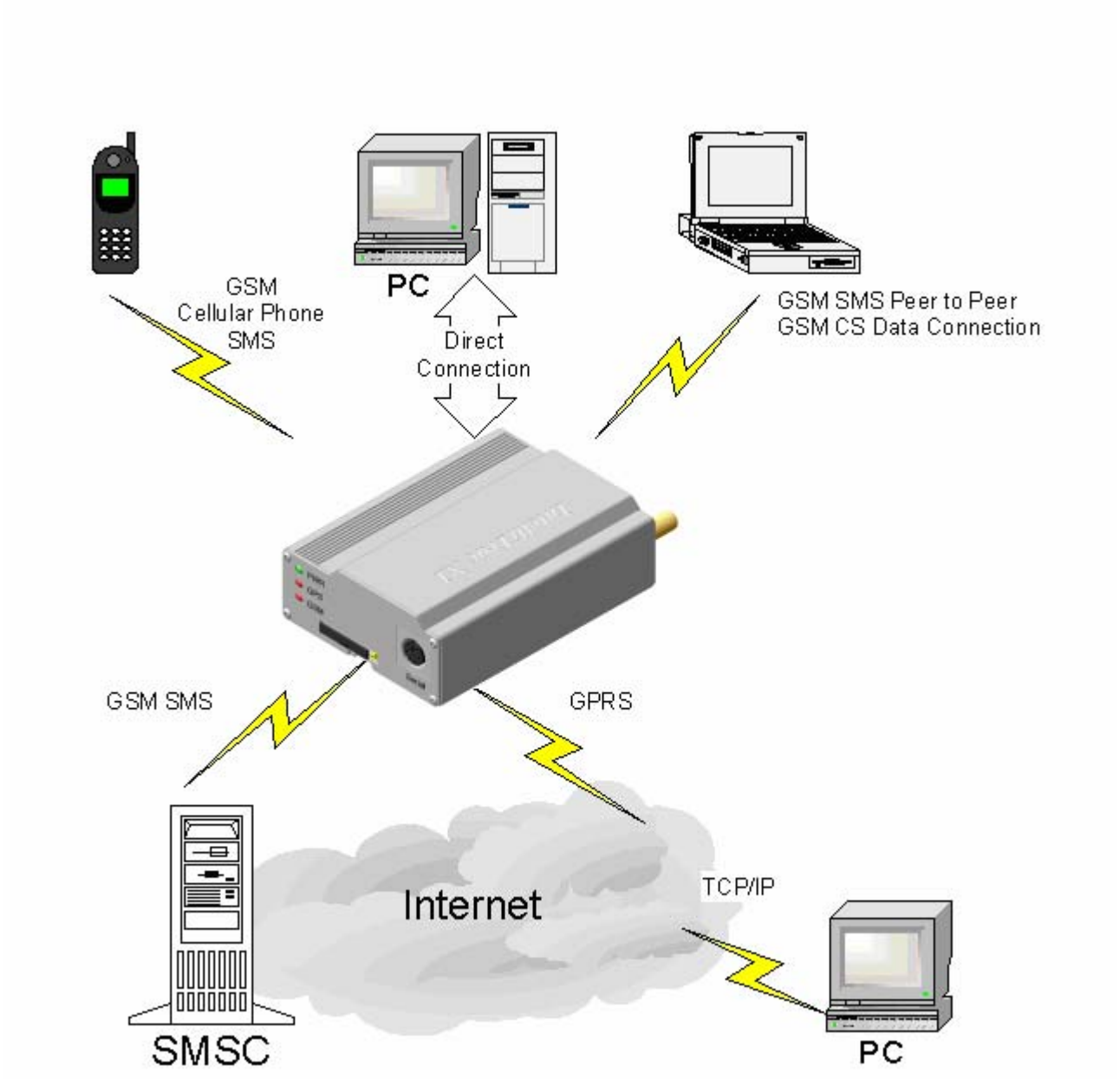
3.3 Entering Successive ST Commands on Separate Lines

When you enter a series of ST commands on separate lines, leave a pause between the preceding and the following command until the final response (for example $OK:XXXX) appears. This avoids sending too many ST commands at a time without waiting for a response for each.

3.4 Communications

The IntelliTrac X Series protocol could be transmitted to the IntelliTrac unit by several communication methods. Such as :

- Direct connection (Baud Rate : 57600bps)
- GSM CS Data connection (Baud Rate : 9600bps)
- GSM SMS messages (Peer to peer and TCP/IP network)
- GPRS TCP/IP, UDP/IP connection



For more detail GSM CS Data, SMS, TCP/IP information, please refer to GSM related documents.

4 ST Commands

Command	Description
$ST+UNPM	Set/Read unit parameters
$ST+COMM	Set/Read unit communication parameters
$ST+GETPOSITION	Get current vehicle location
$ST+TRACKING	Tracking the unit continuously
$ST+STOPTRACKING	Stop tracking the unit
$ST+STARTLOG	Set/Read default logging parameters
$ST+STOPLOG	Stop default logging function
$ST+CLEARLOG	Clear all default logging data
$ST+GETLOG	Download logging data from the unit.
$ST+GETLOGSEL	Selective download logging data from the unit.
$ST+CANCELLOG	Stop download logging data from the unit.
$ST+BBCTRL	Set/Read backup battery parameters
$ST+OUTS	Set outputs state
$ST+REBOOT	Reboot the unit
$ST+RESET	Reset all parameters to the manufactory default
$ST+RMSK	Set/Read default report mask
$ST+REPORT	Set/Read user defined report
$ST+CLRP	Clear the user defined reports
$ST+PMGR	Set/Read power management parameters
$ST+IMEI	Read GSM IMEI number
$ST+VMON	Voice wiretap / monitoring
$ST+TOW	Set/Read vehicle towed parameters
$ST+MILE	Set/Read mileage accumulator function
$ST+TEST	Unit hardware diagnostic
$ST+VERSION	This command is used to get the revised firmware version.
$ST+BAUD	Set/Read baudrate of serial port
$ST+NMEA	Enable/Disable GPS NMEA string output
$ST+SPEED	Set the speeding report
$ST+MMSG	Send MDT messages to the base station
$ST+TMSG	Send messages from the base station to the MDT
$ST+SMID	Query ID of sim card

$ST+UNPM	Set/Read unit parameters	
Description	Execute this command to set or query unit parameters.	
Syntax	**Write** Command: $ST+UNPM+[Tag]=[Password],[UnitID],[NewPassword],[PINCODE],[Input1Delay],[Input2Delay],[Input3Delay],[Input4Delay] **Read** Command: $ST+UNPM+[Tag]=[Password],?	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
	UnitID	The identification number of the unit. The default unit ID is 1010000001.
	NewPassword	The new password of the unit. (Max. 4 characters)
	PINCODE	The PIN code of the GSM/GPRS SIM card. (Max. 4 digits)
	Input1Delay	The de-bounce delay for positive Input 1. Default is 7 (700ms). Max. 255 (255ms).
	Input2Delay	The de-bounce delay for positive Input 2. Default is 7 (700ms). Max. 255 (255ms).
	Input3Delay	The de-bounce delay for negative Input 3. Default is 7 (700ms). Max. 255 (255ms).
	Input4Delay	The de-bounce delay for negative Input 4. Default is 7 (700ms). Max. 255 (255ms).
Return Value	**Write** Command: $OK:UNPM+[Tag] **Read** Command: $QR:UNPM+[Tag]=[UnitID],[NewPassword],[PINCODE],[Input1Delay],[Input2Delay],[Input3Delay],[Input4Delay] **Error** Response: $ER:UNPM+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+UNPM=0000,1010000002,0000,,7,7,7,7 $OK:UNPM	
Note	(1) If the Pin-Code does not enabled in the SIM card, the value in the Pin-Code column will not take effect.	

$ST+COMM	Set/Read unit communication parameters	
Description	Execute this command to set or query unit communication parameters.	
Syntax	**Write** Command: $ST+COMM+[Tag]=[Password],[CommType],[SMSBaseNumber],[CSDBaseNumber], [GPRS_APN],[GPRS_Username],[GPRS_Password],[GPRS_IPType], [GPRS_HostAddress],[GPRS_HostPort],[GPRS_SyncInterval],[GPRS_DNS] **Read** Command: $ST+COMM+[Tag]=[Password],?	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
	CommType	Set the primary communication type. 0: Serial (Direct connect mode) 1: *Reserved for CSD (Circuit Switched Data) communication* 2: SMS communication 3: GPRS communication
	SMSBaseNumber	SMS base phone number (Max. 16 digits)
	CSDBaseNumber	CSD base phone number (Max. 16 digits)
	GPRS_APN	GPRS Access Point Name. (Max. 35 characters)
	GPRS_Username	GPRS login user name (Max. 15 characters)
	GPRS_Password	GPRS login password (Max. 15 characters)
	GPRS_IPType	GPRS package format 0: UDP 1:TCP
	GPRS_HostAddress	The base station static WAN IP/DNS address. (Max. 30 characters)
	GPRS_HostPort	The base station application port number of the UDP/TCP (Please note that do not conflict with Well Known Ports)
	GPRS_SyncInterval	Synchronization message sending interval in seconds. (10 ~ 65535 seconds) 0: Only one sync message be transmited when the unit connected to the server.
	GPRS_DNS	DNS IP address.

Return Value	**Write** Command: $OK:COMM+[Tag] **Read** Command: $QR:COMM+[Tag]=[CommType],[SMSBaseNumber],[CSDBaseNumber], [GPRS_APN],[GPRS_Username],[GPRS_Password],[GPRS_IPType], [GPRS_HostAddress],[GPRS_HostPort],[GPRS_SyncInterval],[GPRS_DNS] **Error** Response: $ER:COMM+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*
Example	GPRS TCP with static WAN IP address $ST+COMM=0000,3,,,Internet,,,1,60.243.21.20,6080,0.0.0.0 $OK:COMM GPRS TCP with dynamic domain name service $ST+COMM=0000,3,,,Internet,,,1,myserver.dns.com,6080,168.95.1.1 $OK:COMM

Notes:

(1) You have to contact your telecom provider to enable the GPRS service on your SIM card in advance then starting to use GPRS function.

(2) Synchronization message format

```
typedef struct
{
  WORD     SyncHeader;
  WORD     SyncID;
  DWORD    UnitID;
} SyncStruct;
```

SyncHeader is always 0xf8fa
SyncID is a message sequence number
UnitID is the unit identification number

For example, received message is

0xFA 0xF8 0x1B 0x01 0x81 0x60 0x33 0x3C

SyncHeader = 0xF8 0xFA
SyncID = 0x01 0x1B (Decimal = 283)
UnitID = 0x3C 0x33 0x60 0x81 (Decimal = 1010000001)

(3) When you develop your own socket base station software, remember to echo the same Synchronization message to the IntelliTrac unit when the base station software received Synchronization message from the IntelliTrac unit. If the IntelliTrac units have not received the echo Synchronization Message more than 3 times, the IntelliTrac unit will disconnect GPRS communication and retry to connect to the GPRS network again.

(4) The base station PC must have a static Internet IP address. You have to enable the specific port number if the base station PC has firewall protection.

(5) If the base station is set inside the Intranet, you have to setup the router and assign a specific port to a specific Intranet IP address. Please refer to SUA (Single User Access) or Virtual Server function of your router user manual. And also, the HostIPAddress parameter should be set to this router IP address.

(6) Please reboot the unit after uploading configuration under “direct connection”.

(7) The unit will reboot automatically when $ST+COMM command is sent remotely.

$ST+GETPOSITION	Get current vehicle location	
Description	Execute this command to ask the unit to report back current GPS positional information to the base station.	
Syntax	**Write** Command: $ST+GETPOSITION+[Tag]=[Password]	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000

Return Value	**Write** Command:
	Command without Tag :
	Unit ID, DateTime, Longitude, Latitude, Speed, Heading, Altitude, Satellite, Report ID, Inputs, Outputs
	
	Command with Tag :
	$RP:Tag,Unit ID, DateTime, Longitude, Latitude, Speed, Heading, Altitude, Satellite, Report ID, Inputs, Outputs
	
	Unit ID: The ID of the unit.
	DateTime: YYYYMMDDhhmmss (GMT Date and Time)
	Longitude: WGS-84 Longitude/Latitude coordinate system
	Latitude: WGS-84 Longitude/Latitude coordinate system
	Speed: 0~65535 km/h
	Heading: 0~360 degrees
	Altitude: Always 0
	Satellite: 0~12
	Report ID:xxx (*Please refer to appendix for detailed description*)
	Inputs: Bitwise operation
	For example: When Inputs=11(decimal) =0x0b(hexadecimal) =00001011(binary), then
	Input1 = ON
	Input2 = ON
	Input3 = OFF
	Input4 = ON
	
	Outputs: Bitwise operation
	For example: When Outputs=15(decimal) =0x0f(hexadecimal) =00001111(binary), then
	Output1 = ON
	Output2 = ON
	Output3 = ON
	Output4 = ON	

Example	*Command without Tag :* $ST+GETPOSITION=0000 1010000002,20030217132813,121.646060,25.061725,20,157,0,7,0,11,15 *Command with Tag :* $ST+GETPOSITION+12345=0000 $RP:12345,1010000002,20030217132813,121.646060,25.061725,20,157,0,7,0,11,15	

	Unit ID = 1010000002 Year = 2003 Month = 02 Day = 17 Hour = 13 Minute = 28 Second = 13 Longitude = 121.646060 Latitude = 25.061725 Speed = 20 km/h Heading = 157 degrees	Altitude = 0 meters Satellites = 7 Report ID = 0 Input1 = ON Input2 = ON Input3 = OFF Input4 = ON Output1 = ON Output2 = ON Output3 = ON Output4 = ON

$ST+TRACKING	Tracking the unit continuously	
Description	Execute this command to ask the unit to report back current GPS positional information to the control center according to the tracking mode parameter.	
Syntax	**Write** Command: $ST+TRACKING+[Tag]=[Password],[Mode],[Time],[Distance],[Times],[Basis],[CommType] **Read** Command: $ST+TRACKING +[Tag]=[Password],?	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
	Mode	**1:Time mode** A positional record is sent to the application when the time elapsed since the last position sent is greater than or equal to the time specified in parameter Time. **2:Distance mode** A positional record is sent to the application when the distance between the current GPS position and the last position sent is greater than or equal to the distance specified in parameter Distance. **3:IntelliTrac mode** A positional record is sent to the application as determined by proprietary algorithms. These algorithms attempt to minimize the amount of data sent back to the application while maintaining a high degree of map replay accuracy. **5: Time + ACC ON mode** If ACC is off, the tracking function will be stopped. **6: Distance + ACC ON mode** If ACC is off, the tracking function will be stopped. **7: IntelliTrac + ACC ON mode** If ACC is off, the tracking function will be stopped.
	Time	Specify elapsed time. The time specified is in seconds and can be any number from 0 to 65535 seconds. Only whole numbers can be used. The minimum time interval in SMS mode is 15 seconds, CSD/GPRS mode is 5 seconds, and Direct Connection is 1 second.

	Distance	Specify elapsed distance. The distance specified is in meters and can be any number from 0 to 65535 meters. Only whole numbers can be used. The minimum distance interval in SMS mode is 300 meters, CSD/GPRS mode is 100 meters, and Direct Connection is 15 meters.
	Times	Specify total tracking times. The range is from 0 to 65535. If Times=0, it means forever tracking.
	Basis	0: Ignore no GPS signal tracking report. 1: Continuously tracking regardless of GPS signal.
	CommType	0: Serial Port 1: CS Data 2: SMS 3: GPRS
Return Value	**Write** Command: $OK:TRACKING +[Tag] **Read** Command: $QR:TRACKING+[Tag]= [Password],[Mode],[Time],[Distance],[Times],[Basis],[CommType] **Error** Response: $ER:TRACKING+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	Tracking through serial port $ST+TRACKING=0000,1,15,0,5,0,0 $OK:TRACKING 1010000002,20030217144230,121.646102,25.061398,0,0,0,7,2,0,0 1010000002,20030217144245,121.646102,25.061398,0,0,0,6,2,0,0 1010000002,20030217144300,121.646102,25.061398,0,0,0,7,2,0,0 1010000002,20030217144315,121.646102,25.061398,0,0,0,8,2,0,0 1010000002,20030217144330,121.646102,25.061398,0,0,0,7,2,0,0 Tracking through GPRS $ST+TRACKING=0000,1,15,0,5,0,3 $OK:TRACKING 1010000002,20030217144230,121.646102,25.061398,0,0,0,7,2,0,0 1010000002,20030217144245,121.646102,25.061398,0,0,0,6,2,0,0 1010000002,20030217144300,121.646102,25.061398,0,0,0,7,2,0,0 1010000002,20030217144315,121.646102,25.061398,0,0,0,8,2,0,0 1010000002,20030217144330,121.646102,25.061398,0,0,0,7,2,0,0 Command with Tag : $ST+TRACKING+12345=0000,1,15,0,5,0,3 $OK:TRACKING+12345 $RP:12345,1010000002,20030217144230,121.646102,25.061398,0,0,0,7,2,0,0 $RP:12345,1010000002,20030217144245,121.646102,25.061398,0,0,0,6,2,0,0 $RP:12345,1010000002,20030217144300,121.646102,25.061398,0,0,0,7,2,0,0 $RP:12345,1010000002,20030217144315,121.646102,25.061398,0,0,0,8,2,0,0 $RP:12345,1010000002,20030217144330,121.646102,25.061398,0,0,0,7,2,0,0	

Notes	1. If the “CommType” sets to “GSM SMS” or “GSM CS DATA”, the “SMSBaseNumber” or “CSDBaseNumber” must be entered respectively before using this function. 2. If the GPS antenna is disconnected from the X1, the Tracking function will not work until the GPS antenna is re-connected to the X1.

$ST+STOPTRACKING	Stop tracking the unit	
Description	Execute this command to ask the unit stop reporting tracking positions to the base station.	
Syntax	**Write** Command: $ST+STOPTRACKING+[Tag]=[Password]	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
Return Value	**Write** Command: $OK:STOPTRACKING+[Tag] **Error** Response: $ER:STOPTRACKING+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+STOPTRACKING=0000 $OK:STOPTRACKING	

$ST+STARTLOG	Set/Read default logging parameters	
Description	Execute this command to start recording current GPS positional information to the non-volatile memory of the unit according to the logging mode parameter.	
Syntax	**Write** Command: $ST+STARTLOG+[Tag]=[Password],[Mode],[Time],[Distance],[Times],[Basis] **Read** Command: $ST+STARTLOG +[Tag]=[Password],?	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
	Mode	**1: Time mode** A positional record is sent to the application when the time elapsed since the last position sent is greater than or equal to the time specified in parameter Time Min 1 seconds; Max. 65535 seconds. **2: Distance mode** A positional record is sent to the application when the distance between the current GPS position and the last position sent is greater than or equal to the distance specified in parameter Distance. Max. 15 meters; Max. 65535 meters. **3: IntelliTrac mode** A positional record is sent to the application as determined by proprietary algorithms. These algorithms attempt to minimize the amount of data sent back to the application while maintaining a high degree of map replay accuracy. **5: Time + ACC ON mode** If ACC is off, the logging function will be stopped. **6: Distance + ACC ON mode** If ACC is off, the logging function will be stopped. **7: IntelliTrac + ACC ON mode** If ACC is off, the logging function will be stopped.
	Time	Specify elapsed time. The time specified is in seconds and can be any number from 1 to 65535 seconds. Only whole numbers can be used.
	Distance	Specify elapsed distance. The distance specified is in meters and can be any number from 15 to 65535 meters. Only whole numbers can be used.
	Times	Specify total Logging times. The range is from 0 to 65535. If Times=0, it means forever logging.

	Basis	0: Ignore no GPS signal logging report. 1: Continuously logging regardless of GPS signal.
Return Value	**Write** Command: $OK:STARTLOG+[Tag] **Read** Command: $QR:STARTLOG+[Tag]= [Mode],[Time],[Distance],[Times],[Basis] **Error** Response: $ER:STARTLOG+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+STARTLOG=0000,1,5,0,0,0 $OK:STARTLOG	

$ST+STOPLOG	Stop default logging function	
Description	Execute this command to stop default logging.	
Syntax	**Write** Command: $ST+STOPLOG+[Tag]=[Password]	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
Return Value	**Write** Command: $OK:STOPLOG+[Tag] **Error** Response: $ER:STOPLOG+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+STOPLOG=0000 $OK:STOPLOG	

$ST+CLEARLOG	Clear all default logging data	
Description	Execute this command to clear all default logging data.	
Syntax	**Write** Command: $ST+CLEARLOG+[Tag]=[Password]	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
Return Value	**Write** Command: $OK:CLEARLOG+[Tag] **Error** Response: $ER:CLEARLOG+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+CLEARLOG=0000 $OK:CLEARLOG	

$ST+GETLOG	**Download logging data from the unit.**	
Description	Execute this command to download all logging data from the unit.	
Syntax	**Write** Command: $ST+GETLOG+[Tag]=[Password]	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
Return Value	**Write** Command: $OK:GETLOG+[Tag] Unit ID , Datetime, Longitude, Latitude, Speed, Heading, Altitude, Satellite, Report ID, Inputs, Outputs $MSG:Download Completed **Error** Response: $ER:GETLOG+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+GETLOG=0000 $OK:GETLOG 1010000001, 20030105092129, 121.651598, 25.052325, 0, 0, 33, 0, 1, 0, 0 1010000001, 20030105092130, 121.651598, 25.052325, 0, 0, 33, 0, 1, 0, 0 1010000001, 20030105092131, 121.651598, 25.052325, 0, 0, 33, 0, 1, 0, 0 1010000001, 20030105092132, 121.651598, 25.052325, 0, 0, 33, 0, 1, 0, 0 1010000001, 20030105092133, 121.651598, 25.052325, 0, 0, 33, 0, 1, 0, 0 1010000001, 20030105092134, 121.651598, 25.052325, 0, 0, 33, 0, 1, 0, 0 $MSG:Download Completed	
Notes	1. The report triggering would interrupt the process of remotely download logs and the unit would send a “$ER:STD 8” back to the server. 2. The $ST+GETLOG command does not support “resuming broken downloads” function.	

$ST+GETLOGSEL	Selective download logging data from the unit.	
Description	Execute this command to download all logging data from the unit.	
Syntax	**Write** Command: $ST+GETLOGSEL+[Tag]=[Password],[StartDateTime],[EndDateTime]	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
	StartDateTime	The year, month, day, hour, minute and second of the starting date time in GMT.
	EndDateTime	The year, month, day, hour, minute and second of the ending date time in GMT.
Return Value	**Write** Command: $OK:GETLOGSEL+[Tag] Unit ID , Datetime, Longitude, Latitude, Speed, Heading, Altitude, Satellite, Report ID, Inputs, Outputs $MSG:Download Completed **Error** Response: $ER:GETLOGSEL+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+GETLOGSEL=0000,20030112103050,20030115142015 $OK:GETLOGSEL 1010000001, 20030112103050, 121.651598, 25.052325, 0, 0, 33, 0, 1, 0, 0 1010000001, 20030112103051, 121.651598, 25.052325, 0, 0, 33, 0, 1, 0, 0 1010000001, 20030112103052, 121.651598, 25.052325, 0, 0, 33, 0, 1, 0, 0 …….. …….. …….. 1010000001, 20030115142013, 121.651598, 25.052325, 0, 0, 33, 0, 1, 0, 0 1010000001, 20030115142014, 121.651598, 25.052325, 0, 0, 33, 0, 1, 0, 0 1010000001, 20030115142015, 121.651598, 25.052325, 0, 0, 33, 0, 1, 0, 0 $MSG:Download Completed	

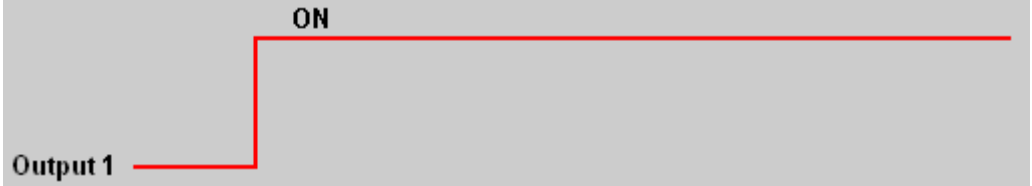
$ST+CANCELLOG	**Stop download logging data from the unit.**	
Description	Execute this command to stop download all logging data from the unit.	
Syntax	**Write** Command: $ST+CANCELLOG+[Tag]=[Password]	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
Return Value	**Write** Command: $OK:CANCELLOG+[Tag] **Error** Response: $ER:CANCELLOG+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+CANCELLOG=0000 $OK:CANCELLOG	

$ST+BBCTRL	Set/Read backup battery parameters	
Description	Execute this command to set or query backup battery status. When backup battery voltage is lower than 3.7V, a backup battery low report will be sent to the base station. When backup battery voltage is lower than 3.4V, the unit will be shut down automatically to avoid battery over discharge.	
Syntax	**Write** Command: $ST+BBCTRL+[Tag]=[Password],[Enable] **Read** Command: $ST+BBCTRL+[Tag]=[Password],?	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
	Enable	0: Turn off backup battery 1: Turn on backup battery
Return Value	**Write** Command: $OK:BBCTRL+[Tag] **Read** Command: $QR:BBCTRL+[Tag]=[Enable] **Error** Response: $ER:BBCTRL+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+BBCTRL=0000,1 $OK:BBCTRL	

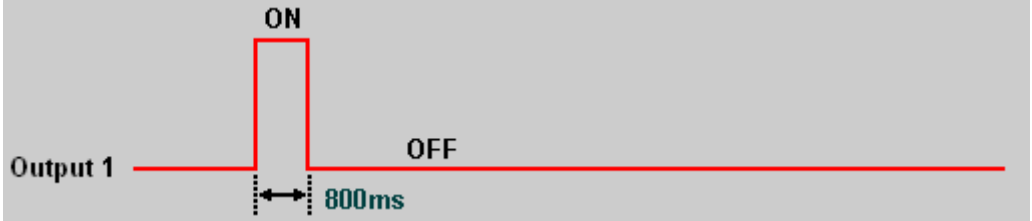
$ST+OUTS	**Set outputs state**	
Description	Execute this command to set outputs state.	
Syntax	**Write** Command: $ST+OUTS+[Tag]=[Password],[OutputID],[OutputControl],[Duration],[ToggleTimes]	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
	OutputID	The unit hardware output number. Outputs are numbered 1 though 4.
	OutputControl	0: Set output inactive 1: Set output active
	Duration	Unit of duration is 100 milliseconds. Ex: if want to setup duration for 2 seconds, you have to give a 20 value. (Min. 1= 0.1 second; Max. 255 = 25.5 seconds)
	ToggleTimes	The times from its current state to its alternate state and back again. Min. 1 times; Max. 255 times
Return Value	**Write** Command: $OK:OUTS+[Tag] **Error** Response: $ER:OUTS+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Note	1. “Duration” and “Toggle time” must be used at the same time. Otherwise, both of them must be ‘0’.	

Example

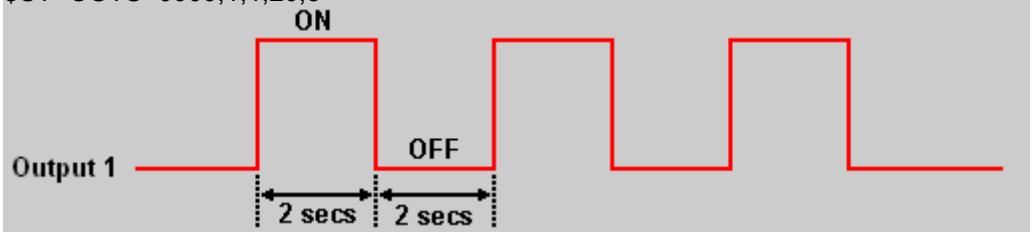
$ST+OUTS=0000,1,1, 0,0



$ST+OUTS=0000,1,1,8,0



$ST+OUTS=0000,1,1,20,3



$ST+REBOOT	**Reboot the unit**	
Description	Execute this command to reboot the unit	
Syntax	**Write** Command: $ST+REBOOT+[Tag]=[Password]	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
Return Value	**Write** Command: $OK:REBOOT+[Tag] **Error** Response: $ER:REBOOT+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+REBOOT=0000 $OK:REBOOT	

$ST+RESET	**Reset all parameters to the manufactory default**	
Description	Execute this command to reset the unit. After resetting the unit, the previous upload parameters will be cleared. Include phone numbers, user reports and logging data…etc.	
Syntax	**Write** Command: $ST+RESET+[Tag]=[Password],[Band]	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The following two numbers would be accepted by the unit: 1. The unit password, which is setup in the "$ST+UNPM" command. 2. The last 4 digit numbers of the IMEI NO.
	Band	Reset the unit to the specific mobile frequency band 0: EGSM/DCS (900/1800MHz) 1: EGSM/PCS (900/1900MHz)
Return Value	**Write** Command: $OK:RESET+[Tag] **Error** Response: $ER:RESET+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+RESET=0630 $OK:RESET $ST+RESET=0000 $OK:RESET Reset the unit to 900/1900MHz band $ST+RESET=0000,1 $OK:RESET	

$ST+RMSK	Set/Read default report mask	
Description	Execute this command to set or query default report mask.	
Syntax	**Write** Command: $ST+RMSK+[Tag]=[Password],[Report Polling Mask],[Report Logging Mask] **Read** Command: $ST+RMSK+[Tag]=[Password],?	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
	Report Polling Mask	Specify which default report will be used for real time reporting. Default is all reports will be used. (Report Polling Mask=255) Bitwise operation (0: Off, 1: On) Bit0: Input1 state changed report Bit1: Input2 state changed report Bit2: Input3 state changed report Bit3: Input4 state changed report Bit4: Main power low report Bit5: Main power destroyed report Bit6: Backup battery low report Bit7: GPS destroyed report
	Report Logging Mask	Specify which default report will be used for logging report. Default is all reports will be used. (Report Logging Mask=255) Bitwise operation (0: Off, 1: On) Bit0: Input1 state changed report Bit1: Input2 state changed report Bit2: Input3 state changed report Bit3: Input4 state changed report Bit4: Main power low report Bit5: Main power destroyed report Bit6: Backup battery low report Bit7: GPS destroyed report
Return Value	**Write** Command: $OK:RMSK+[Tag] **Read** Command: $QR:RMSK+[Tag]= [Report Polling Mask],[Report Logging Mask] **Error** Response: $ER:RMSK+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	

Example	Turn off Input1~Input4 state changed reports for real time reports and logging. $ST+RMSK=0000,240,240 $OK:RMSK
Note	(1) The “GPS destroyed report” can not be used when the GPS state set to ‘0’.

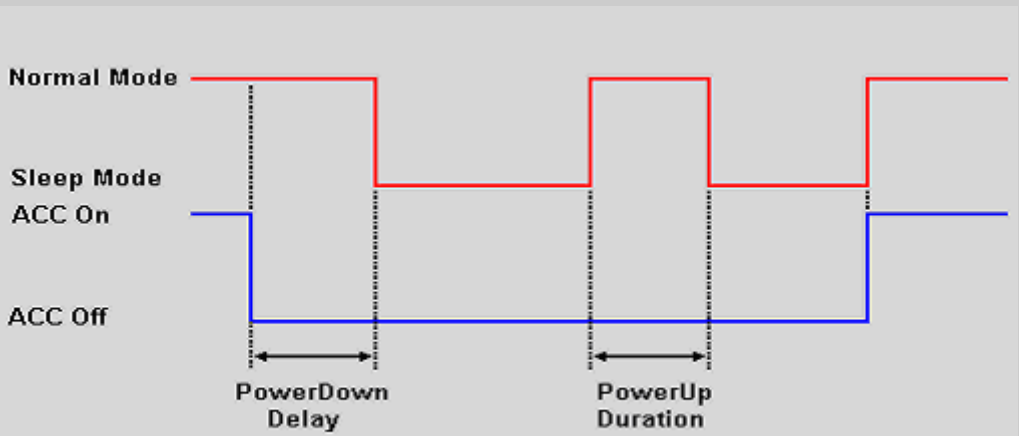
$ST+REPORT	Set/Read user defined report	
Description	Execute this command to set or query user defined report parameters.	
Syntax	**Write** Command: $ST+REPORT+[Tag]=[Password],[ReportID],[Enable],[InputMask],[InputControl],[Longitude],[Latitude],[ZoneTolerence],[ZoneControl],[ReportAction],[OutputID],[OutputControl] **Read** Command: $ST+REPORT=[Password],[ReportID],?	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
	ReportID	The report's numeric identifier. This number is defined by programmer and can be any number from 100 through 109
	Enable	0: Disable 1: Enable
	InputMask	This parameter defines which inputs to be the condition. One or more inputs can be specificed in this parameter.
	InputControl	Defines how the inputs specificed in parameter InputMask are considered during processing. The bit value of 0 means OFF and 1 means ON.
	Longitude	The longitude of the circle zone. If zone condition is not used, left this field empty.
	Latitude	The latitude of the circle zone. If zone condition is not used, left this field empty.
	ZoneTolerence	The radius of the circle zone in meters. If zone condition is not used, left this field empty. (50..65535) meters

	ZoneControl	Defines how the geographic zone specificed in parameter ZoneID is considered during report processing. If zone condition is not used, left this field empty. **0: Disable zone** **1: Entering the Zone** The report initiates defined actions when the current (valid) GPS position transitions from outside the zone to inside of the zone boundaries. **2: Exiting the Zone** The report initiates defined actions when the current (valid) GPS position transitions from inside the zone to outside of the zone boundaries. **3: Inside the Zone** The report initiates defined actions when the current (valid) GPS position is within the specified zone boundaries. **4: Outside the Zone** The report initiates defined actions when the current (valid) GPS is outside of the specified zone boundaries
	ReportAction	This parameter defines the actions to be taken once the report is in an active state. One or more actions can be specified on any report. The following list defines all available action types: **1: Logging** When all defined report conditions are true, log the most recent GPS position to non-volatile flash memory for future retrieval. **2: Polling** When all defined report conditions are true, send the latest GPS position to the remote base station. **3:Logging + polling** When all defined report conditions are true, log the most recent GPS position to non-volatile flash memory and send the latest GPS position to the remote base station. **4: Set Output** When all defined report conditions are true, set the output relay. **5: Logging + Set output** When all defined conditions are true, log the most recent GPS position to non-volatile flash memory and set the output relay. **6. Polling + Set Output** When all defined conditions are true, send the latest GPS position to the remote base station and set the output relay. **7. Logging + Polling + Set Output** When all defined conditions are true, log the most recent GPS position to non-volatile flash memory, send the latest GPS position to the remote base station, and set the output relay

	OutputID	The outputs are numbered through 1 to 4. This parameter is used in conjunction with parameter ReportAction=4(Set Output). A value 0 means ignore output control.
	OutputControl	Defines how the output specified in parameter OutputID is controlled while the report is active. 0:OFF 1:ON
Return Value	**Write** Command: $OK:REPORT+[Tag] **Read** Command: $QR:REPORT+[Tag]= [ReportID],[Enable],[InputMask],[InputControl], [Longitude],[Latitude],[ZoneTolerence],[ZoneControl],[ReportAction],[OutputID], [OutputControl] **Error** Response: $ER:REPORT+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	(1) Entering specific zone polling $ST+REPORT=0000,100,1,0,0,121.123956,25.065321,200,1,2,0,0 (2) Input1 & Input3 ON polling $ST+REPORT=0000,101,1,5,5,0,0,0,0,2,0,0 (3) Read command $ST+REPORT=0000,100,? $QR:REPORT=100,1,0,0,121.123956,25.065321,200,1,2,0,0	

$ST+CLRP	**Clear the user defined reports**	
Description	Execute this command to clear all of the user defined reports.	
Syntax	**Write** Command: $ST+CLRP+[Tag]=[Password]	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
Return Value	**Write** Command: $OK:CLRP+[Tag] **Error** Response: $ER:CLRP+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+CLRP=0000 $OK:CLRP	
Notes	This command is only for clearing all of the user defined reports. If you want to clear single report, you can use ST+REPORT command to set [Enable] field to 0.	

$ST+PMGR	**Set/Read power management parameters of the unit.**	
Description	Execute this command to setup or query the power management parameters of the unit. If the power saving mode is enabled, all the power saving features will be triggered by ACC (Input1).	
Syntax	**Write** Command: $ST+PMGR+[Tag]=[Password],[Enable],[LowVoltage],[GSMState],[GPSState],[PowerDownDelay],[PowerUpDuration],[SleepPriority] **Read** Command: $ST+PMGR+[Tag]=[Password],?	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
	Enable	Enable power saving mode. 0: Disable 1: Enable
	LowVoltage	If the vehicle battery voltage is below the LowVoltage, unit will send a alarm message to the control center. The default voltage value is 12.0 volts.
	GSMState	Set GSM status when unit enter power saving mode. 0: GSM OFF (*Reserved for future use*) 1: GSM ON
	GPSState	Set GPS status when unit enter power saving mode. 0: GPS OFF 1: GPS ON
	PowerDownDelay	After ACC off for the delay time, the unit will go into power saving mode. (0..65535 seconds) When SleepPriority = 1, the minimum value of PowerDownDelay is 180. When SleepPriority = 0, the minimum value of PowerDownDelay is 0.
	PowerUpDuration	Full power duration after alarm triggered. (180..65535 seconds)
	SleepPriority	Enable priority sleep mode. 0: Disable Unit will finish executing the tracking command such as number of tracking times, then goes to sleeping mode. 1: Enable Unit will be forced to enter sleep mode regardless of any tracking command in progress.

	
Return Value	**Write** Command: $OK:PMGR+[Tag] **Read** Command: $QR:PMGR+[Tag]=[Enable],[LowVoltage],[GSMState],[GPSState],[PowerDownDelay],[PowerUpDuration],[SleepPriority] **Error** Response: $ER:PMGR+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*
Example	Turn off GPS when enter power saving mode $ST+PMGR=0000,1,12.00,1,0,30,180,1 $OK:PMGR
Notes	1. When the unit wakes up by report triggering or receiving commands (GSM on while sleeping mode), it goes to sleep mode again when the “PowerUpDuration” period is reached. 2. If there is nothing happening, the unit remains in “Power Down” state once it accesses the sleeping mode until report/input triggering. 3. In sleep mode, if GSM on, the unit will wake up after receiving command through remote access. 4. While power down delay and power up duration time period, if any other more event trigger, time period of power down delay and power up duration will be recounted.

$ST+IMEI	**Read telephone IMEI number**	
Description	Execute this command to read the IMEI (International Mobile station Equipment Identity) of the unit.	
Syntax	**Read** Command: $ST+IMEI+[Tag]=[Password]	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
Return Value	**Read** Command: $QR:IMEI+[Tag]=[IMEI] **Error** Response: $ER:IMEI+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+IMEI=0000 $QR:IMEI=355117003358879	

$ST+VMON	**Voice wiretap / monitoring**	
Description	Execute this command to wiretap the voice conversation inside the car. When the unit receives this command, the unit will call out to the specific phone number automatically.	
Syntax	**Write** Command: $ST+VMON+[Tag]=[Password], [PhoneNumber]	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
	PhoneNumber	The specific phone number for unit to dial up.
Return Value	**Write** Command: $OK:VMON+[Tag] **Error** Response: $ER:VMON+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+VMON=0000,0933123456 $OK:VMON	
Note	1. This command is temporarily not available until the “Communication Kit” available.	

$ST+TOW	Enable/Disable vehicle towed function	
Description	Execute this command set/read vehicle towed parameters. The vehicle towed report will be sent to the base station when ACC (Input1) OFF and vehicle speed between MinSpeed and MaxSpeed for a Duration time.	
Syntax	**Write** Command: $ST+TOW+[Tag]=[Password],[Enable],[SatelliteUsed],[MinSpeed],[MaxSpeed],[Duration] **Read** Command: $ST+TOW+[Tag]=[Password],?	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
	Enable/Disable	Enable vehicle towed function 0: Disable 1: Enable
	SatelliteUsed	Minimum GPS satellites reception. (0..16)
	MinSpeed	Minimun vehicle speed. (0..65535) Km/h
	MaxSpeed	Maximum vehicle speed. (0..65535) Km/h
	Duration	The time duration after satelliteUsed, MinSpeed and MaxSpeed conditions are true. (0..65535 seconds)
Return Value	**Write** Command: $OK:TOW+[Tag] **Read** Command: $QR:TOW+[Tag]=[Enable],[SatelliteUsed],[MinSpeed],[MaxSpeed],[Duration] **Error** Response: $ER:TOW+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.* When the vehicle towed condition is true, the unit will send a report position with ReportID=9 to the base station.	
Example	$ST+TOW=0000,3,10,255,30 $OK:TOW	

$ST+MILE	**Enable/Disable mileage accumulator function**	
Description	Execute this command set/read mileage accumulator function.	
Syntax	**Write** Command: $ST+MILE+[Tag]=[Password],[Enable],[InitialMileage] **Read** Command: $ST+MILE+[Tag]=[Password],?	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
	Enable	Enable mileage accumulator function. If mileage function is enabled, the current mileage will be added to the end of each report position. 0: Disable 1: Enable
	InitialMileage	Set initial mileage (0.0 ~ 4294967.0) Km
Return Value	**Write** Command: $OK:MILE+[Tag] **Read** Command: $QR:MILE+[Tag]=[Enable],[CurrentMileage] **Error** Response: $ER:MILE+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+MILE=0000,1,21520.3 $OK:MILE	
Note	(1) If the mileage reaches the max. number, the mileage resets to ‘0’ then start accumulation from ‘0’	

$ST+TEST	Unit hardware diagnostic	
Description	Execute this command to process unit hardware diagnostic.	
Syntax	**Read** Command: $ST+TEST+[Tag]=[Password]	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
Return Value	**Read** Command: $OK:TEST+[Tag]=[Result],[MainPowerVoltage],[BatteryVoltage],[SystemCode] Result: The test result code is a decimal value. 0: No Error 1: GPS Failed 2: GSM Failed 4: EEPROM Failed 8: SRAM Failed 16: Backup battery failed 64: Modem failed 128: Burn-in test failed MainPowerVoltage: This field indicates main power source voltage. BatteryVoltage: This field indicates backup battery voltage. The backup battery must be turned ON (*Refer to $ST+BBCTRL command*) before excute this command. If the backup battery voltage is lower than 3.6V, it means the backup battery is empty or damage. SystemCode: The system current status code. This system code is only for manufactory reference purpose. **Error** Response: $ER:TEST+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+TEST=0000 $OK:TEST=3,13.45,4.18,0x0005083f (The Result code 3 means GPS & GSM Failed)	

$ST+VERSION	Get the firmware version of the unit.
Description	Execute this command to query firmware version of the unit.
Syntax	$ST+VERSION
Parameters	None
Return Value	$VERSION=x.xxx
Example	$ST+VERSION $VERSION=1.033

$ST+BAUD	**Set/Read baudrate of serial port**	
Description	Execute this command to set/read the baudrate parameter of the serial port. This command only supported for serial configuration.	
Syntax	**Write** Command: $ST+BAUD+[Tag]=[Password],[PortID],[BaudRateID] **Read** Command: $ST+BAUD+[Tag]=[Password],[PortID],?	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
	PortID	Serial Port ID number 1: Serial port 2: *(Reserved for specific purpose)*
	BaudRateID	Serial port baudrate ID 0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps 6: 57600bps (Serial port default)
Return Value	**Write** Command: $OK:BAUD+[Tag] **Read** Command: $QR:BAUD+[Tag]=[PortID],[BaudRateID] **Error** Response: $ER:BAUD+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	Set serial port to 9600bps $ST+BAUD=0000,1,3 $OK:BAUD	

$ST+NMEA	Enable/Disable GPS NMEA string output	
Description	Execute this command to enable or disable GPS NMEA string output. Currently, this function only supported $GPRMC string output and serial port baud rate must be 2400bps at least.	
Syntax	**Write** Command: $ST+NMEA+[Tag]=[Enable]	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Enable	0: Disable 1: Enable
Return Value	**Write** Command: $OK:NMEA+[Tag] **Error** Response: $ER:NMEA+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	Enable GPS NMEA output $ST+NMEA=1 $OK:NMEA	

$ST+SPEED	Set the speeding report	
Description	Execute this command to set the speeding report	
Syntax	**Write** Command: $ST+SPEED+[Tag]=[Password],[Enable],[ReportAction],[MinSpeed],[MaxSpeed],[Duration], [OutputID],[OutputControl] **Read** Command: $ST+SPEED+[Tag]=[Password], ?	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit.
	Enable	Enable speeding report 0: Disable 1: Enable

	ReportAction	This parameter defines the actions to be taken once the speeding report is in an active state. One or more actions can be specified on this report. The following list defines all available action types:
		1:Logging When all defined report conditions are true, log the most recent GPS position to non-volatile flash memory for future retrieval.
		2:Polling When all defined report conditions are true, send the latest GPS position to the remote base station.
		3:Logging and Polling: When all defined report conditions are true, the unit will do following: A. Log the most recent GPS position to non-volatile flash memory for future retrieval. B. Send the latest GPS position to the remote base station.
		4. Set Output: When all defined conditions are true, it set the state of the assigned output port number. When any defined condition becomes false, the assigned output port number backs to the original state.
		5. Logging + Set Output: When all defined conditions are true, log the most recent GPS position to non-volatile flash memory and set the state of the assigned output port number. When any defined condition becomes false, the assigned output port number backs to the original state.
		6. Polling + Set Output: When all defined conditions are true, send the latest GPS position to the remote base station set the state of the assigned output port number. When any defined condition becomes false, the assigned output port number backs to the original state.
		7. Logging + Polling + Set Output: When all defined conditions are true, log the most recent GPS position to non-volatile flash memory, send the most recent GPS position to the remote base station, and set the state of the assigned output port number. When any defined condition becomes false, the assigned output port number backs to the original state.
	MinSpeed	The minimum speed of speed range (0 – 255 km/h)
	MaxSpeed	The maximum speed of speed range (0 – 255 km/h)

	Duration	his parameter defines the speeding report will be actived once the speed range is satisfied for a time duration. Valid value for logging and polling is following: Logging: 1~65535 seconds Polling: 15~65535 seconds Logging + Polling: 15~65535 seconds.
	Output ID	The unit hardware output number. Outputs are numbered 1 through 4.
	Output Control	0 Set output inactive. 1 Set output active.
Return Value	**Write** Command: $OK:SPEED **Read** Command: $SPEED=[Enable],[ReportAction],[MinSpeed],[MaxSpeed],[Duration], [OutputID],[OutputControl]	
Example	(1) Set a speeding report with 100km/h or above for 30seconds then polling and set the output 3 to inactive state. $ST+SPEED=0000,1,2,100,255,30,3,0 $OK:SPEED (2) Set a speeding report with the vehicle stop more than 5 minutes then logging, and set the output 2 to active state. $ST+SPEED=0000,1,1,0,5,300,2,1 $OK:SPEED	

$ST+MMSG	Send MDT messages to the base station	
Description	Execute this command through serial port to send MDT messages to the base station via preset communication type.	
Syntax	**Write** Command: $ST+MMSG=[Message]	
Parameters	Message	The message string. (The max length is 145 characters)
Return Value	**Write** Command: $OK:MMSG **Error** Response: $ER:MMSG=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+MMSG=Goods delivered $OK:MMSG Base station will receive: QR:MMSG=Goods delivered $ST+MMSG=中文 $OK:MMSG Base station will receive: QR:MMSG=中文	

$ST+TMSG	Send messages from the base station to the MDT	
Description	Execute this command to send messages from the base station to the MDT.	
Syntax	**Write** Command: $ST+TMSG+[Tag]=[Password],[Message]	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
	Message	The message string. (The max length is 145 characters)
Return Value	**Write** Command: $OK:TMSG+[Tag] **Error** Response: $ER:TMSG+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	

Example	Send “Please go to No.100, 203th Ave NE, Bellevue, WA” message to the MDT $ST+TMSG=0000, Please go to No.100, 203th Ave NE, Bellevue, WA $OK:TMSG MDT will receive: $MMSG=Please go to No.100, 203th Ave NE, Bellevue, WA

$ST+SMID	**Query ID of sim card**	
Description	Execute this command to query ID of sim card.	
Syntax	**Read** Command: $ST+SMID+[Tag]=[Password],?	
Parameters	Tag	This command tag number/character string can be defined by user application program. The return message will include the same tag and helpful to application program to recognize. This tag could be left it empty if it is not used. (Max. 5 characters)
	Password	The password of the unit. The default password is 0000
Return Value	**Read** Command: QR:SMID+[Tag]=SMID **Error** Response: $ER:SMID+[Tag]=[ErrorCode] *Please refer to appendix for detailed error code descriptions.*	
Example	$ST+SMID=0000,? QR:SMID=89886970312087400033	

5 Firmware Upgrade Commands

The IntelliTrac X1 devices provide a functionality of upgrade firmware through direct serial communication, GSM CSD communication and GPRS network. Currently, GSM SMS communication is not supported. The S&T will provide firmware data file (*.sta) for unit firmware upgrade. The firmware data file (*.sta) is a ASCII text file and each line has two ending characters 0x0d 0x0a. The first line of the file is for $ST+FWUG command used and the others are for $ST+FWDL command. When all $ST+FWDL commands have been sent, send $ST+FWDC command to the unit for complete firmware download processing.

For example, the firmware data file like below:

```
C880,CF
0000,40,EDDBE81416218C2AEC7835BD4335982BEC7835BD433598,79
0040,40,EC7835BD43335BD4335982BEDDE35F64321982BEC7893B,9A
0080,40,EC7895BDEE358DE4096EC7E1DD2E655C79095691DB187F,EE
00C0,40,B92D2065DBAD00303E71E5A8AD532C88B658A0CA19F7AE,47
0100,40,7BEFA2A7582F83BD7B4532588B0AE69E5B0B54B3D90AE79,83
0140,40,79EDA0A55B2D80BE55B2D80BE79EDA0A55B2D80BE79EDA,00
0180,40,79EDA0A55B2D80BEE70BE79EDA0A5BE86EDA0A55BD280B,00
```

(1) Send **$ST+FWUG=0000**,C880,CF
(2) Wait for $OK:FWUG response
(3) Send **$ST+FWDL=0000**,0000,40,EDDBE81416218C2AEC7835BD4335982BEC7835BD433598,79
(4) Wait for $OK:FWDL response
(5) Send **$ST+FWDL=0000**,0040,40,EC7835BD43335BD4335982BEDDE35F64321982BEC7893B,9A
(6) Wait for $OK:FWDL response
(7) Send **$ST+FWDL=0000**,0080,40,EC7895BDEE358DE4096EC7E1DD2E655C79095691DB187F,EE
(8) Wait for $OK:FWDL response
(9) Send **$ST+FWDL=0000**,00C0,40,B92D2065DBAD00303E71E5A8AD532C88B658A0CA19F7AE,47
(10)Wait for $OK:FWDL response
(11)Send **$ST+FWDL=0000**,0100,40,7BEFA2A7582F83BD7B4532588B0AE69E5B0B54B3D90AE79,83
(12)Wait for $OK:FWDL response
(13)Send **$ST+FWDL=0000**,0140,40,79EDA0A55B2D80BE55B2D80BE79EDA0A55B2D80BE79EDA,00
(14)Wait for $OK:FWDL response
(15)Send **$ST+FWDL=0000**,0180,40,79EDA0A55B2D80BEE70BE79EDA0A5BE86EDA0A55BD280B,00
(16)Wait for $OK:FWDL response
(17)Send **$ST+FWDC=0000**
(18)Wait for $OK:FWDC response (Finish firmware download process)

6 Appendices

6.1 Report ID Description

Report ID	Description	Remark
0	Position	
1	Log position	
2	Track position	
9	Vehicle towed report	
11	Input1 changed report position	
12	Input2 changed report position	
13	Input3 changed report position	
14	Input4 changed report position	
40	Main power low report position	
41	Main power lose report position	
42	Backup battery low report position	
43	GPS destroyed report position	
100..109	User defined report position	

6.2 Command Error Description

Error Code	Description
0	Unknown command
1	Invalid unit password
2	Invalid command parameters
3	Invalid command process
4	Logging data not found
5	Invalid data checksum

6.3 STD Errors Description

Error Code	Description
0	Unknown communication error
1	Base communication phone number or address not set
3	Unsupported SMS DCS format
4	No GSM signal
5	GPRS connection failed
6	Resend Modem Command Fail
7	SIM Pincode ERROR
8	DOWNLOAD_INTERRUPTED
9	VOICE_CALL_BUSY
10	I/O Port test failed

6.4 CME Errors Description

Error Code	Description
0	Phone failure
3	Operation not allowed
4	Operation not supported
5	PH-SIM PIN required
6	PH-FSIM PIN required
7	PH-FSIM PUK required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	Incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
26	Dial string too long
27	Invalid characters in dial string
30	No network service
31	Network timeout
32	Network not allowed emergency calls only
40	Network personalization PIN required
41	Network personalization PUK required
42	Network subset personalization PIN required
43	Network subset personalization PUK required
44	Service provider personalization PIN required
45	Service provider personalization PUK required
46	Corporate personalization PIN required
47	Corporate personalization PUK required
100	Unknown
100..255	Reserved

6.5 CMS Errors Description

Error Code	Description
1	Unassigned (unallocated) number
8	Operator determined barring
10	Call barred
21	Short message transfer rejected
27	Destination out of service
28	Unidentified subscriber
29	Facility rejected
30	Unknown subscriber
38	Network out of order
41	Temporary failure
42	Congestion
47	Resources unavailable, unspecified
50	Requested facility not subscribed
69	Requested facility not implemented
81	Invalid short message transfer reference value
95	Invalid message, unspecified
96	Invalid mandatory information
97	Message type non-existent or not implemented
98	Message not compatible with short message protocol state
99	Information element non-existent or not implemented
111	Protocol error, unspecified
127	Interworking, unspecified
128	Telematic interworking not supported
129	Short message Type 0 not supported
130	Cannot replace short message
143	Unspecified TP-PID error
144	Data coding scheme (alphabet) not supported
145	Message class not supported
159	Unspecified TP-DCS error
160	Command cannot be actioned
161	Command unsupported
175	Unspecified TP-Command error
176	TPDU not supported
192	SC busy
193	No SC subscription
194	SC system failure
195	Invalid SME address
196	Destination SME barred
197	SM Rejected-Duplicate SM
198	TP-VPF not supported
199	TP-VP not supported
208	D0 SIM SMS storage full
209	No SMS storage capability in SIM
210	Error in MS
211	Memory Capacity Exceeded
212	SIM Application Toolkit Busy
213	SIM data download error
255	Unspecified error cause

300	ME failure
301	SMS service of ME reserved
302	Operation not allowed
303	Operation not supported
304	Invalid PDU mode parameter
305	Invalid text mode parameter
310	SIM not inserted
311	SIM PIN required
312	PH-SIM PIN required
313	SIM failure
314	SIM busy
315	SIM wrong
316	SIM PUK required
317	SIM PIN2 required
318	SIM PUK2 required
320	Memory failure
321	Invalid memory index
322	Memory full
330	SMSC address unknown
331	no network service
332	Network timeout
340	NO +CNMA ACK EXPECTED
500	Unknown error or SMS collision
512	User abort
513	unable to store

6.6 LED Indicators Function

PWR LED Status	Function
Off	Power off
20 ms On / 2 secs Off	The device is running in power saving mode.
500ms On / 500ms Off	Reset procedure is in progress
20ms ON / 20ms Off	Upgrade firmware is in progress
On	Power on

GPS LED Status	Function
Off	The GPS is off or running in power saving mode.
1 sec On / 1 sec Off	No GPS satellites signal received
On	GPS Ready

GSM LED indication for hardware version C

GSM LED Status	Function
Off	The device is off or running in deep sleep mode.
100 ms On / 1sec Off	No SIM card inserted or no PIN entered, or network search in progress, or network login in progress.
100 ms On / 3 secs Off	Logged to network.

GSM LED indication for hardware version D or above

GSM LED Status	Function
Off	The device is off or running in deep sleep mode.
600 ms On / 600ms Off	No SIM card inserted or no PIN entered, or network search in progress, or network login in progress.
90 ms On / 3 secs Off	Logged to network.
90 ms blinking 2 times /3secs Off	GPRS Network connected

6.7 About Systems & Technology Corporation

IntelliTrac X Series AVL device is produced by Systems & Technology Corporation. The company is a key developer and supplier of advanced systems in the Automatic Vehicle Location (AVL), Digital Map and Car Navigation Systems.

If you need information on other maps solutions or products, please contact us at the phone and fax numbers listed below, or visit our web sites.

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Technical Support E-mail	AVL@ms.systech.com.tw
Main Phone	886-2-26981599
Main Fax	886-2-26981211