IntelliTrac A Series

User Guide

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Status: Preliminary

General notes

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1. Introduction

Thank you for your purchasing IntelliTrac A1 GPS Vehicle Tracking device. The benefits are:

● Improve Safety

● Ensure Security

● Good efficiency on Fleet management and Dispatch solution

● Asset and resource management

● Economic operation and improving productivity

● Keep the Journey record for future analysis or accident report

● Where is the Car? When it will arrive? What is its speed now?

If you add the CAN-Bus Option, You will get the following features:

● Reduce Vehicle maintenance cost

● Schedule maintenance

● Vehicle performance information

  · Engine coolant temperature

  · Air intake temperature

  · Oil pressure

  · OBD II/EOBD Data collection

  · Vehicle monitor data statistics

  · Idle time (Engine is ON, Speed is Zero)

  · Odometer reading

  · Fuel economy

  · Oxygen sensor status

  · Catalyst status

  · Vehicle out of tune

  · Speed, Calculation load, Throttle position

  · Remote Diagnostics --- Trouble code reporting

1.1 Scope

The purpose of this document is to describe how to getting started with the IntelliTrac A Series devices. The document contains basic device configuration. For advanced users, please refer to the IntelliTrac A Series Protocol Document for detailed information.

1.2 About IntelliTrac A1

The IntelliTrac A1 GPS Unit wirelessly transmits location, peripheral, and vehicle control data to a control center.   Location data, including speed, direction, mileage, and altitude, is provided by an onboard GPS receiver. Wireless transmission is achieved using an onboard GSM/GPRS module. A microcontroller is used to poll location and command data at regular intervals, derive actions based on location, peripheral, and control data, and execute those actions.

One of the best feature of A series AVL is that they can transit data on ASCII mode (Intellitrac X series compatible mode) or Binary mode.

Peripheral data indicates the status of the various peripherals that are connected to and/or controlled by the unit. Peripherals include, but not limited to, door locks/un-locks , starter interrupt, ignition, battery, engine and panic button.

Firmware on the device applies intelligent filtering to overcome coverage limitations for both GPS and GSM/GPRS networks.

Motion sensor is used to control the status of the unit, either sleep, idle, or full power, there by controlling the amount of current the unit consumes.

Backup battery and tamper sensing GPS Antennas are primarily used to indicate loss of Main Power and loss of GPS antenna connectivity.

Device supports Over-the-air firmware upgrade to deliver added functionality without physically touching the device once installed.

1.3　　Hardware Architecture

The IntelliTrac A1 hardware includes Micro-controller, GPS receiver, GSM/GPRS modem, G-Force sensor, Audio interface, I/Os interface and CAN bus interface.
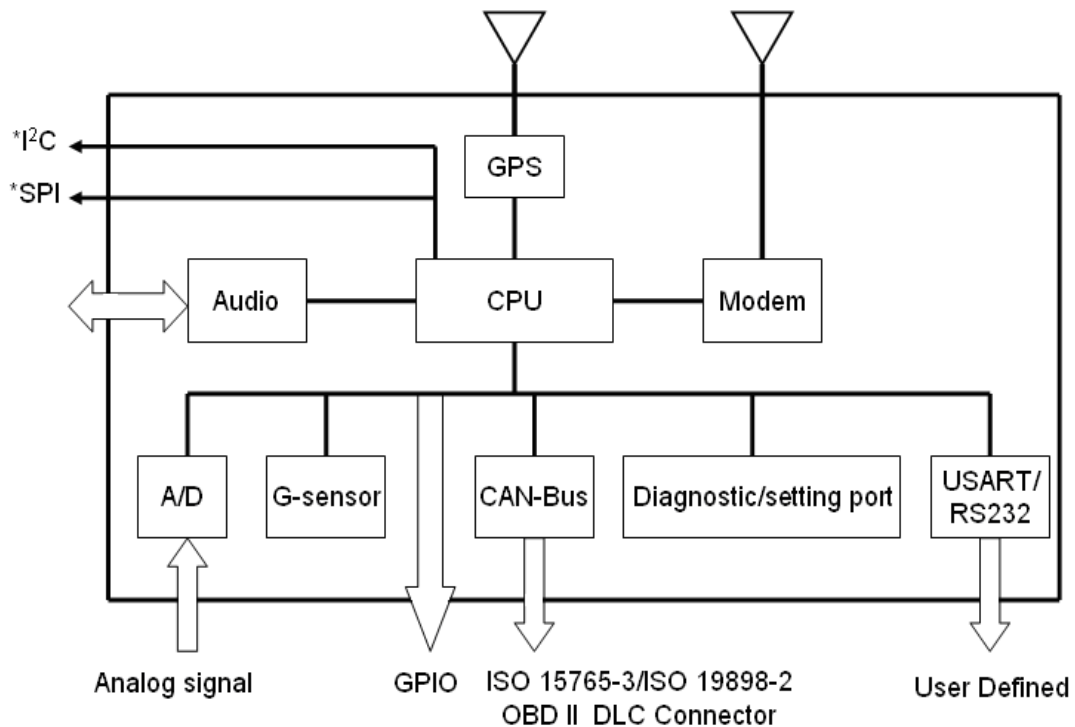
* The options can be used to connect to CCD Camera, fuel sensor, Altimeter, SAE J1939, Bluetooth and Zigbee.

- User can use PC HyperTerminal connect to the Diagnostic / setting port to configure the AVL.
- The G-Sensor is used for car accident. Car tow-away warning and power management.
- Audio interface offer hands free phone call.
- GPIO can be used to connect to any customer monitoring points (door switch, anti-thief) or Actuators.
- A/D Input is used to connect the analog signal sensor into the AVL. Like the fuel or temperature sensor.
- OPTIONAL CAN-Bus Interface can be used for Emission Related monitoring of the vehicle. Fleet management and vehicle Diagnostic.
- OPTIONAL I2 C Bus. SPI Bus can be used for sophisticated peripherals to hook up to the AVL.
- RS232 Expansion port 1-2. Dedicated for A3. It can be used to add on RS232 I/O peripherals.

● RTOS OPTION: We will have A1, A3 professional version with Real Time operation system in JUN.2009..
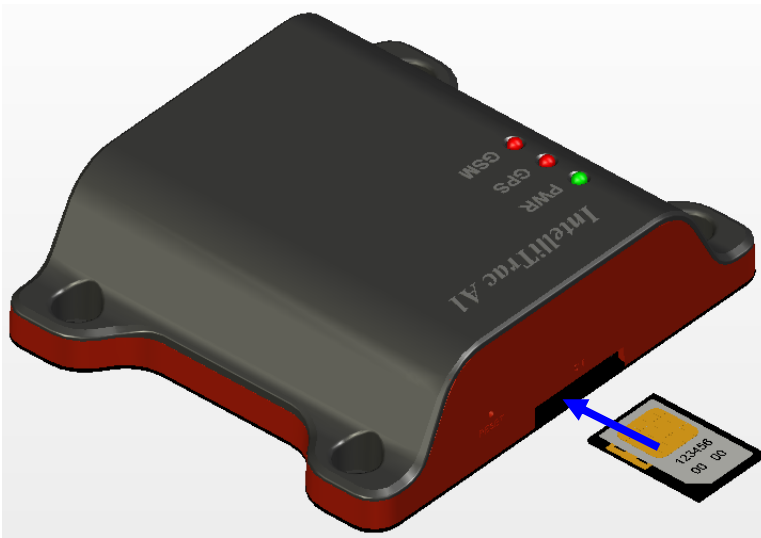
1.4 Related Documents

[1] IntelliTrac A Series Protocol Document

2. Basic Operations

2.1　Hardware Installation

(1) SIM Card Installation

- ● Press yellow button to eject the SIM card holder.
- ● Put the SIM card on the SIM card holder.
- ● Insert the SIM card holder to the device correctly.

(2) GPS Antenna Installation

- ● Connect the GPS antenna to the right-down corner SMA connector.
- ● Recommended mating torque for the SMA connector is 7-10 inch pounds (80-110 N.cm).
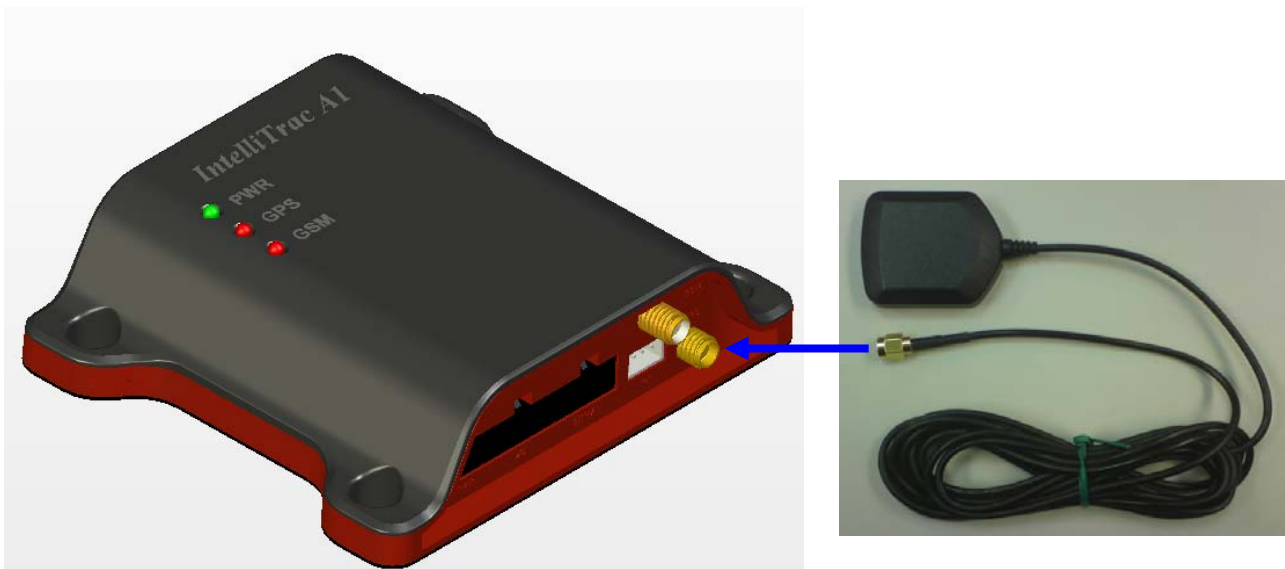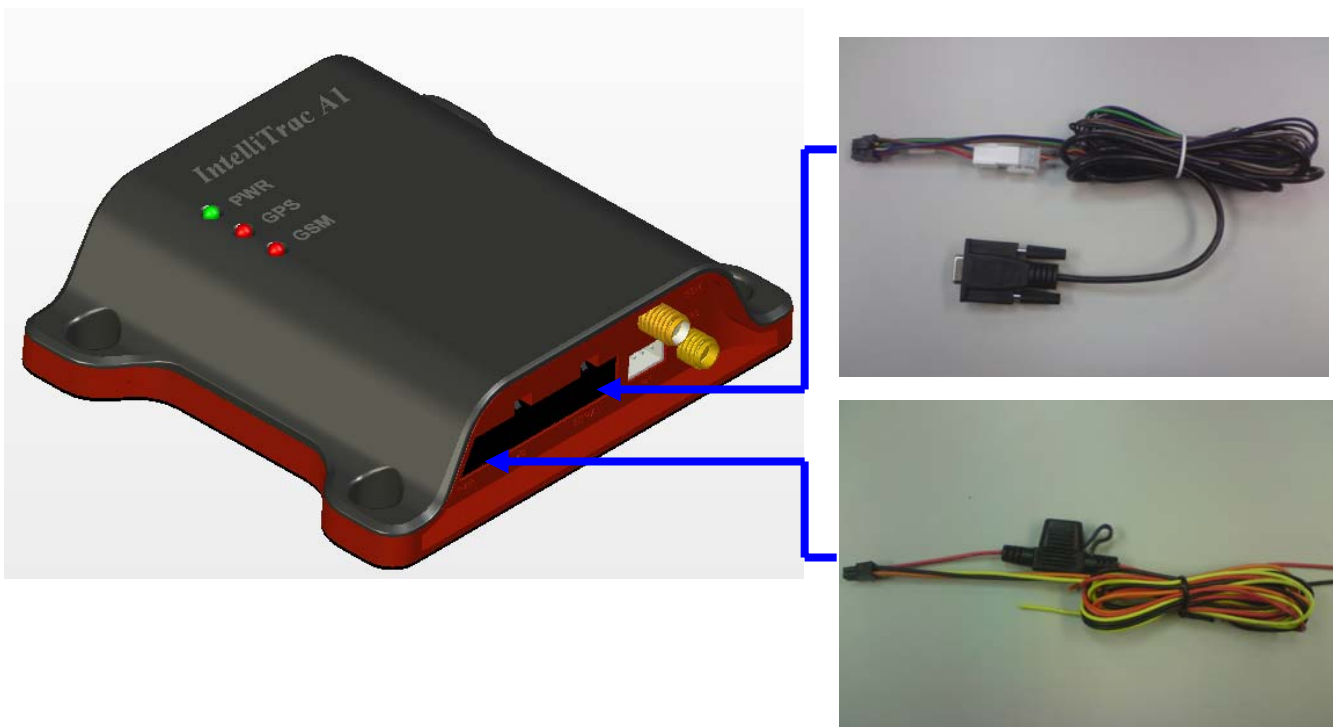
(3) GSM Antenna Installation

- Connect the GSM antenna to the right-up corner SMA connector.
- Recommended mating torque for the SMA connector is 7-10 inch pounds (80-110 N.cm).
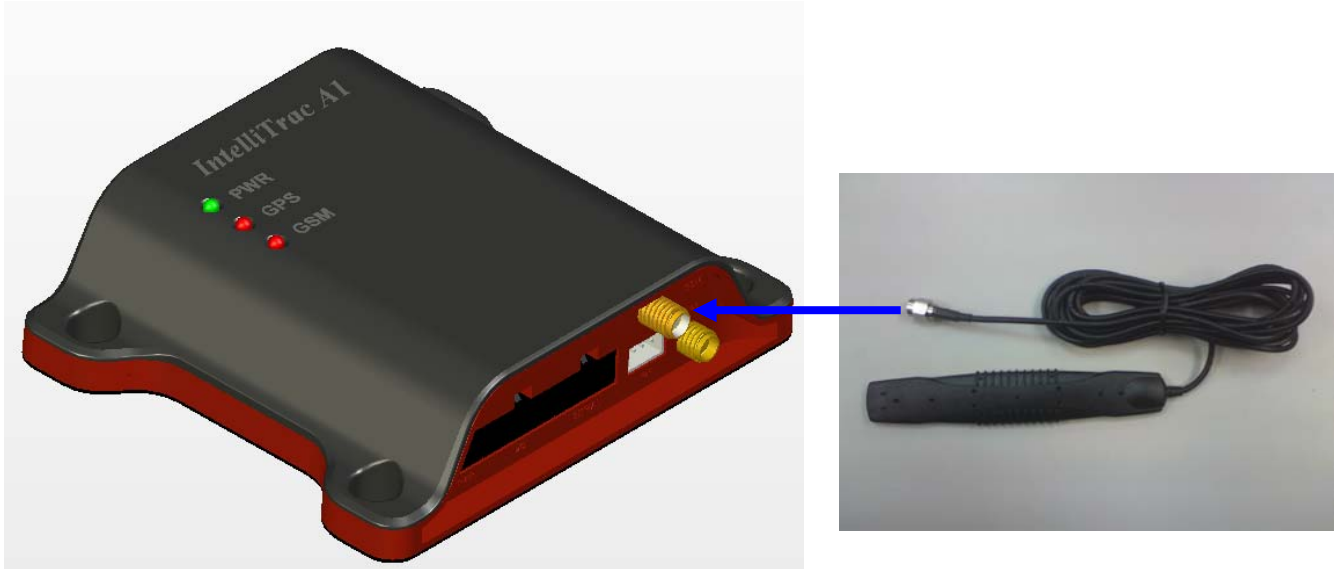
(4) Power and RS-232 Cable Installation

- Connect 4-wires power cable to the device and plug on a DC power supply (8~30V).
- Connect 8-wires cable to the device. The D-SUB can be connected to the COM port of PC.

2.2 Connectors Pins Assignment

PWR Connector

Pin#	Signal Name	Description	IO	Electrical Characteristic
1	B+	Power supply input	I	V_I = DC8V to 30V, Inormal = 70mA @ 12V
2	GND	Signal ground	—	
3	Ignition	Ignition(ACC) Input	I	V_{IH}min = 7.0V, V_{IL}max = 6.0V
4	Output1	Open-Collector Output1	O	Imax = 300mA

I/O Connector

Pin#	Signal Name	Description	IO	Electrical Characteristic
1	Input3	Positive Trigger input3	I	V_{IH}min = 7.0V, V_{IL}max = 6.0V
2	Input4	Positive Trigger input4	I	V_{IH}min = 7.0V, V_{IL}max = 6.0V
3	Input1	Negative Trigger input1	I	V_{IH}max = 30V, V_{IL}max = 0.7V
4	Input2	Negative Trigger input2	I	V_{IH}max = 30V, V_{IL}max = 0.7V
5	Analog Input	Analog input	I	V_I = DC0V to 30V
6	GND	Signal ground	—	
7	Output2	Open-Collector Output2	O	Imax = 300mA
8	Output3	Open-Collector Output3	O	Imax = 300mA
9	CANH	CAN High	I	V_I = 2.75V to 4.5V
10	CANL	CAN Low	I	V_I = 0.5V to 2.25V

SERIAL Connector

| Pin#	Signal Name	Description	IO	Electrical Characteristic
1	Vout	Supply voltage output	O	Vo = 5.0V, Imax = 300mA
2	GND	Signal ground	—	
3	TX	RS232 Data output	O	
4	RX	RS232 Data input	I	
5	SPK+	Audio output	O	$V_O$max = 3.7Vpp
6	SPK-	Audio output	O	
7	MIC+	Microphone Input	I	RI $\approx$ 50kΩ differential
8	MIC-	Microphone Input	I	VImax = 1.03Vpp

Connectors pin definition

2.3 Device Configurations

For the first installation, some basic parameters should be set before installation. The device parameters can be set through RS-232 port by using HyperTerminal program. Please see below for the HyperTerminal settings:
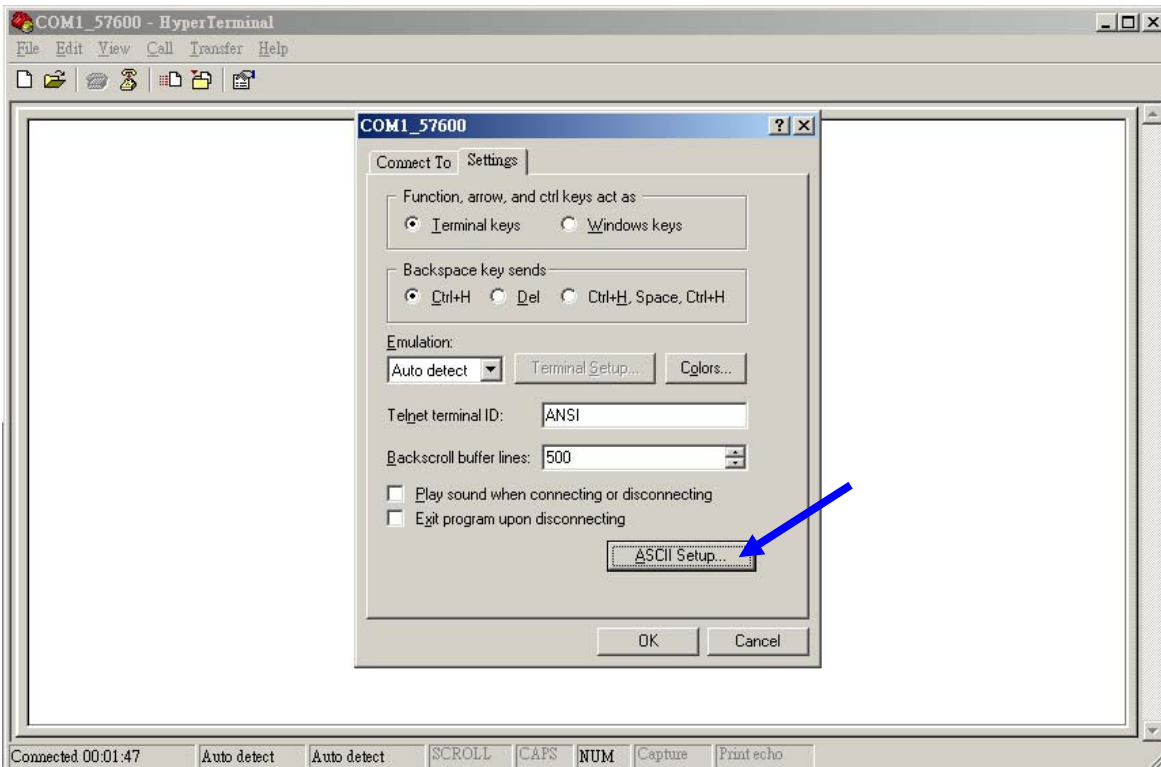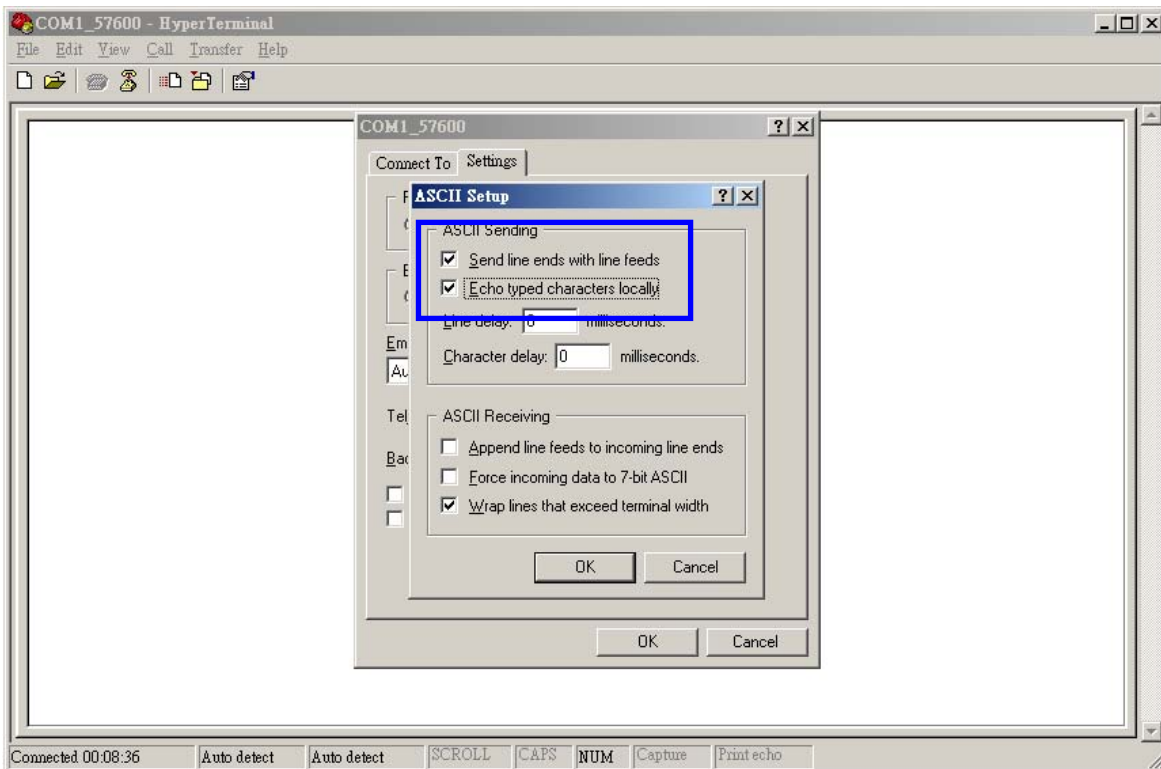
(1) Open HyperTerminal
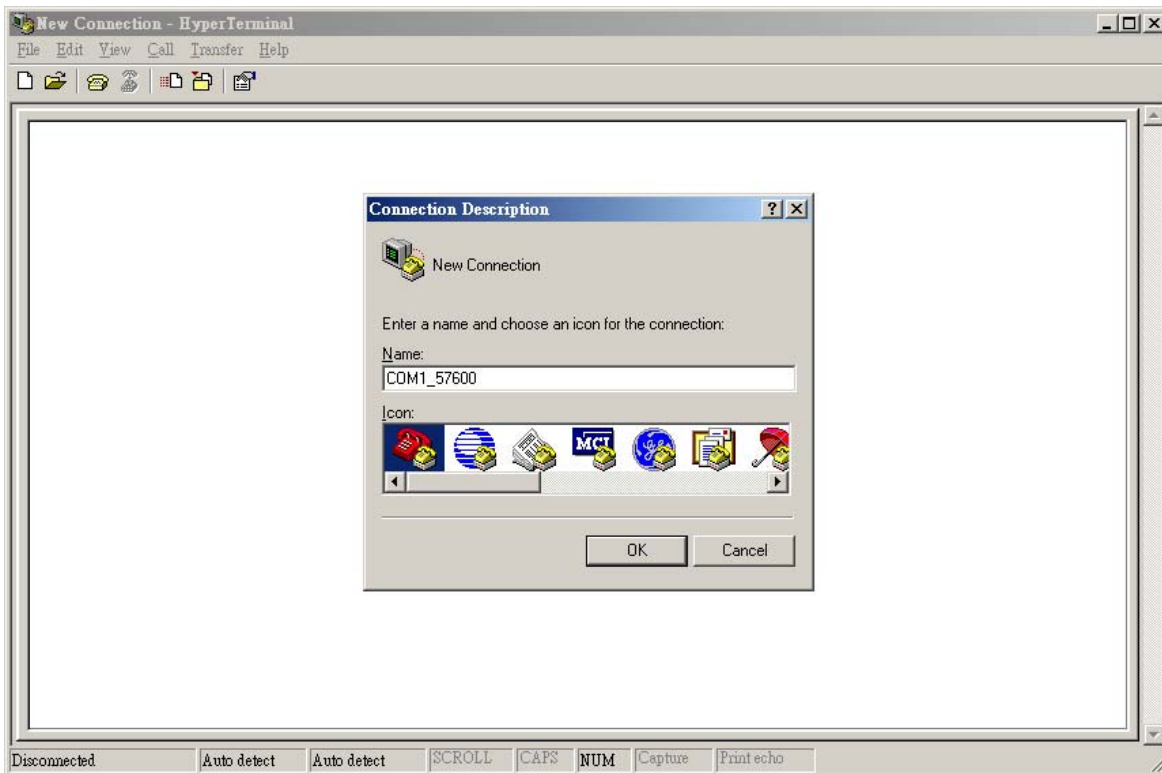
(2) Choose correct COM port

(3) Baud Rate→57600bps, Data Bits→8, Parity→None, Stop Bits→1, Flow Control→None

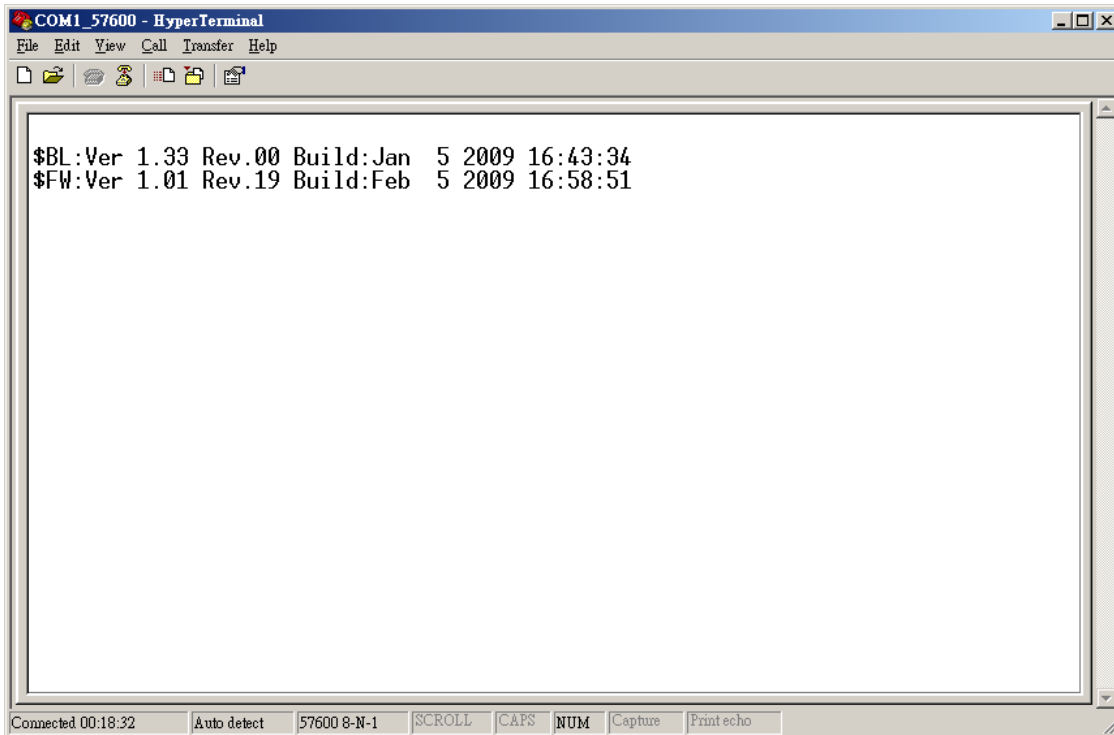(4) Choose [File]→[Properties] and click [ASCII Setup…]

(5) Checked below ASCII Sending options

(5) Connect D-Sub connector to your PC and power on the device.

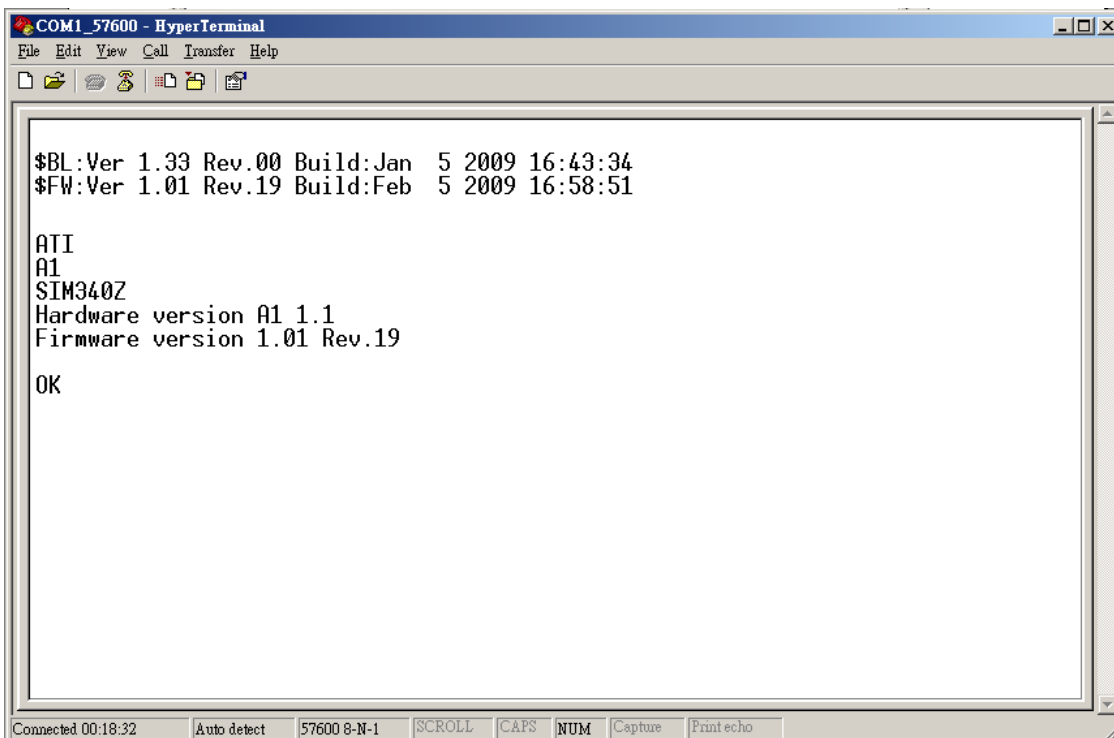The device startup message will be shown on the HyperTerminal.

```
COM1_57600 - HyperTerminal
File  Edit  View  Call  Transfer  Help

$BL:Ver 1.33 Rev.00 Build:Jan  5 2009 16:43:34
$FW:Ver 1.01 Rev.19 Build:Feb  5 2009 16:58:51




Connected 00:18:32    Auto detect    57600 8-N-1    SCROLL  CAPS  NUM  Capture  Print echo
```

(6) Type ATI command and press [Enter] key, the hardware and firmware version will be shown on the HyperTerminal. If the HyperTerminal is shown like below, that means connection between the device and PC is working properly. It is ready to send all configuration commands from now on.

```
COM1_57600 - HyperTerminal
File  Edit  View  Call  Transfer  Help

$BL:Ver 1.33 Rev.00 Build:Jan  5 2009 16:43:34
$FW:Ver 1.01 Rev.19 Build:Feb  5 2009 16:58:51


ATI
A1
SIM340Z
Hardware version A1 1.1
Firmware version 1.01 Rev.19

OK



Connected 00:18:32    Auto detect    57600 8-N-1    SCROLL   CAPS   NUM   Capture   Print echo
```

2.4   Communication Settings

There are two communication modes for the IntelliTrac A series device to communicate to the control center. One is SMS, and the other is GPRS (TCP/UDP). The device should be set communication parameters before install the device to vehicle.

(1) SMS Configuration

Setting SMS control center phone number or short code by using AT$SMSDST command. For example, the SMS control center phone number is +886123456789, issue the AT$SMSDST command in HyperTerminal like below:

AT$SMSDST=+886123456789
OK

Then you can try to use cellular phone or SMS gateway to send a SMS message to the A1 device.

Send a SMS message → "AT$MODID?"

Device will response：
$MODID=101000001
OK
(Type AT&W command to save all command parameters into the non-volatile memory of the device.)
AT&W
OK

This proves the mobile phone SMS connects successfully.

(2) GPRS Configuration

Setting GPRS server using the following commands:

AT$APN=internet,username,password   (APN=internet, Username=username, Password=password)

OK

AT$HOSTS=1,60.148.19.10   (Server IP address = 60.148.19.10)

OK

AT$RETRY=5,10   (Message retry settings)

OK

AT$IPTYPE=1   (Using TCP/IP mode)

OK

AT$PORT=6000   (Host application port)

OK

AT$GPRSEN=1   (GPRS enable)

OK

AT$HB=60   (Heartbeat setting)

OK

(Type AT&W command to save all command parameters into the non-volatile memory of the device.)

AT&W

OK

Please refer to IntelliTrac A Series Protocol Document for detailed command descriptions.

2.5   GPS Tracking Configurations

After the device communication settings are done. The remote GPS tracking function can be performed.

The GPS tracking function can be set by using AT$PDSR command. For example,

AT$PDSR=1,30,0,2,0,0,1,1   (Tracking through GPRS by time interval 30 seconds)

OK

For the simply testing GPRS, open the TCP Server A-Series software which is provided by S&T. It is a simple server software that can wait for device connection and data.
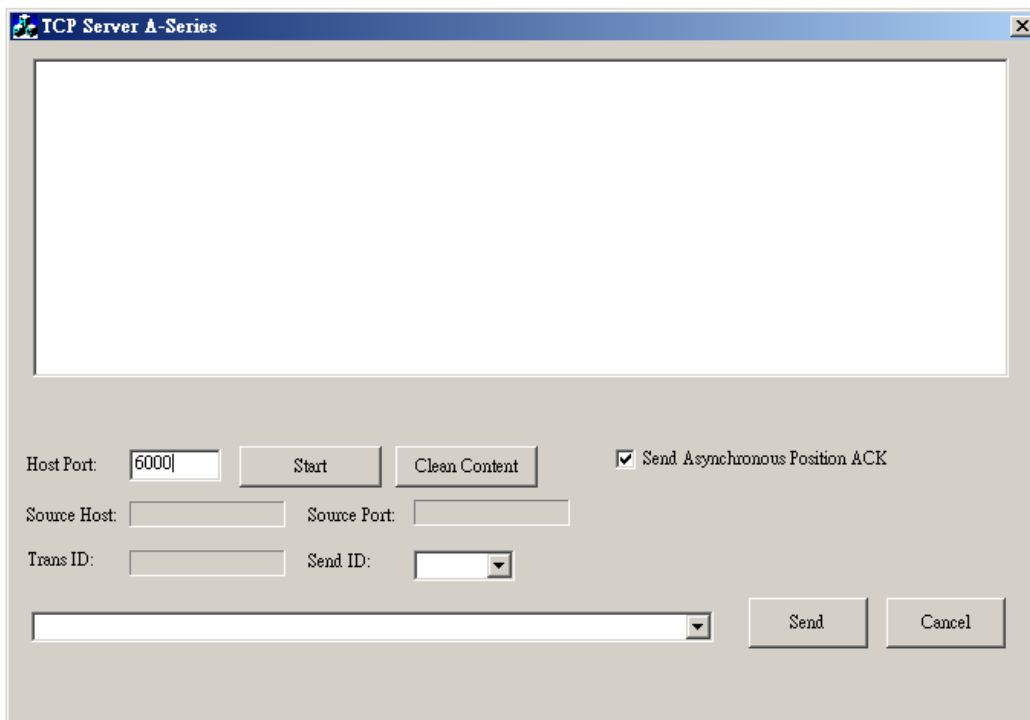
For advanced testing, open the IntelliTrac Tracer software and set communication port properly. The device will start to connect to the Tracer software and report GPS tracking locations.

2.6   Firmware Upgrade

The IntelliTrac A Series device firmware is updated through the serial interface. The firmware update of the device can be performed with the IntelliTrac A series firmware loader tool provided by S&T. It runs on Windows based PCs. Please see the following step-by-step upgrade procedure.

(1) Connect the RS232 cable between device an PC.

(2) Turn on the device.

(3) Run AseriesLoader.exe, the following window is displayed.
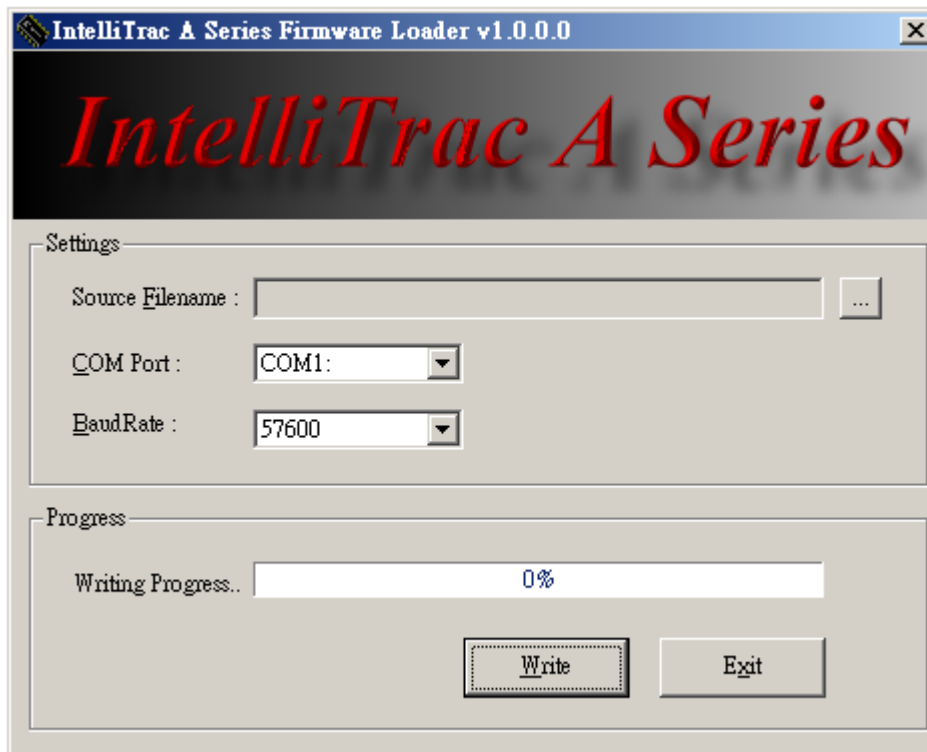
(4) Click […] button to open firmware file which provide by S&T

(5) Click Write button and start firmware programming.

(6) When the writing progress 100% is reached, the device LEDs will start to fast blinking.

(7) Wait until device LEDs stop fast blinking.

(8) Firmware update complete.

3. Technical Specification for IntelliTrac A1

CHARACTERISTICS	
Dimensions (L x W x H)	110.0 x 95.0 x 30.0mm
Weight	110gm
Radio Performance	
Frequency (MHz)	Quad-Band 850/900/1800/1900MHz
Transmit Power	1W/1800MHz,1900Mhz 2W/850MHz, 900MHz
GSM Functionality / GPRS	
GPRS Mode	MultiSlot Class 10 , Mobile Station Class B
GPRS Coding Scheme	CS1,CS2,CS3 and CS4
Connector	SMA
GSM Antenna	External GSM Antenna
SIM Interface	Support SIM card 1.8V, 3V
GPS Functionality	
Receiver	12 Channels or above
Sensitivity (Tracking)	-159dBm
Antenna Type	External GPS Active Antenna , 3.3V
Connector	SMA Female
GPS Protocol	NMEA 0183 Ver3.0
Onboard Components	
MCU	32-bit Microcontroller
Data Memory	2MB flash
Motion Sensor	3-Axes Acceleration Sensor
Led Indicator	3 , Green (Power status) , Red (GPS, GSM status)
Interface I/O	
I/O Connector	3 connectors. 4pin, 10pin, and 8 pin
Serial Data I/O	RS-232 (Default 57600bps)
Inputs	5
Outputs	3
Analog	1
CAN Bus	1 (Optional)
Voice Interface	1
Electrical	
Power Source	DC 8V to 30V
Power Consumption	70mA @ 12V (Full power mode) 15mA @ 12V (Low power mode) 6mA @ 12V (Very low power mode)
Environment	
Operating Temperature	-30°C to +80°C

4. About Systems & Technology Corporation

IntelliTrac A-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.

Contact Information for System & Technology Corp.

S&T Web Site	**http://www.systech.com.tw**
Technical Support Hotline	+886-2-2698-1599
Technical Support E-mail	**AVL@ms.systech.com.tw**
Main Phone	+886-2-2698-1599
Main Fax	+886-2-2698-1211

FCC Regulations:

●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.

●This device 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 radiated radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.
-Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

▶ **RF Exposure Information**

This device meets the government's requirements for exposure to radio waves.
This device is designed and manufactured not to exceed the emission limits for exposure to radio frequency (RF) energy set by the Federal Communications Commission of the U.S. Government.

●This device complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm (8 inches) during normal operation.