AX7
User Manual

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1. Notification

1.1. Disclaimer

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1.3. Warning

Connecting the wire inputs can be hazardous to both the installer and your vehicle's electrical system if not done by an experienced installer. This document assumes you are aware of the inherent dangers of working in and around a vehicle and have a working understanding of electricity.

2. Introduction

Thank you for purchasing the ATrack AX7 GPS device, combining with the most comprehensive and economical vehicle diagnostics technology, which provides real-time engine monitoring. The engine diagnostic data is collected through the vehicle's OBD-II communication port and is transmitted along with GPS data to the control center over a mobile network, for instance, GSM, GPRS, UMTS or CDMA. In this way, potential engine problems can be identified earlier before the vehicle breaks down at an inopportune time. Furthermore, you may configure other advanced driving behavior events such as harsh braking, sudden acceleration, speeding, cornering, and much more in order to reduce the risks of vehicle damage and drive down the costs of fuel. Depending on your needs, the AX7 will come with either an embedded Wireless module (refer to the section 3.5 of this manual for more information) or with an embedded Bluetooth module (refer to Chapter 6 for more information). This user manual is intended to guide you through the installation and configuration process. It also highlights the hardware features and Bluetooth applications.

The AX7 with an embedded Wireless module

The AX7 with an embedded Bluetooth module

2.1. Package Content

Each package contains the following standard device/accessories:

- AX7 Device * 1   • USB Cable * 1

Optional accessories:

- Low Profile OBD-II Extension Cable   • Wireless Relay

2.2. AX7 OBD-II Compliant

OBD-II is a set of standards and practices defined by SAE (Society of Automotive Engineers) in the early 1990s. But some automobile manufactures do not follow it completely. Therefore, ATrack cannot guarantee each vehicle's OBD-II connected performance. For more information about the AX7 OBD-II compliance, please refer to the "ATrack AX Series OBD-II Compliant Guide" document for details.

3. Hardware Features

3.1. OBD-II Protocol

There are five signaling protocols that are permitted with the OBD-II interface. Most vehicles have been implemented with only one of the protocols. The AX7 features a superior protocol detection algorithm that ensures the device connects reliably even to vehicles that do not fully conform to the OBD-II standards. The AX7 supports the following legislated OBD-II protocols:

- J1850 PWM (Ford vehicles)
- J1850 VPW (GM vehicles)
- ISO9141-2 (Asian, European, Chrysler vehicles)
- ISO 14230-4 KWP
- ISO 15765-4 CAN (11/29 bit ID,250/500 Kbaud)

The AXTool provides the "OBD Live Data" viewer for showing OBD data in real time. Refer to Section 4.2 for details.

3.2. Micro USB Connection

The Micro USB connection is used for the following purposes: configuring parameters and firmware upgrade. When the AX7 is connected to your laptop/PC via a Micro USB cable, the OBD-II and GSM/GPRS functions are switched off unless the main power is applied to the AX7 at the same time.

3.3. Buzzer Operation

The internal buzzer of the AX7 can be configured by any events or triggered by a remote server. Refer to the ATrack Protocol Document for details.

3.4. Power Supply

The AX7 device is connected to the OBD-II SAE J1962 connector of a vehicle and draws power from the OBD port. No additional power cabling is required for the operation. If the OBD port of a vehicle is covered or you need to install AX7 in another place for better GPS reception, the optional low profile OBD-II extension cable is required.

3.5. Wireless Relay

The optional wireless relay is used for immobilizing vehicle when the AX7 device is unplugged. Using the short range RF technology, the Wireless Relay will keep receiving RF data from the AX7. Once the Wireless Relay loses connection from the AX7 for 30 seconds, the Wireless Relay will be switched off. For safety reasons it is recommended to connect the Wireless Relay to control the starter of a vehicle. Do NOT use a Wireless Relay to control fuel pump or power train of a vehicle. See the following diagram for the wiring connection. Please refer to the Wireless Relay User Manual for details.
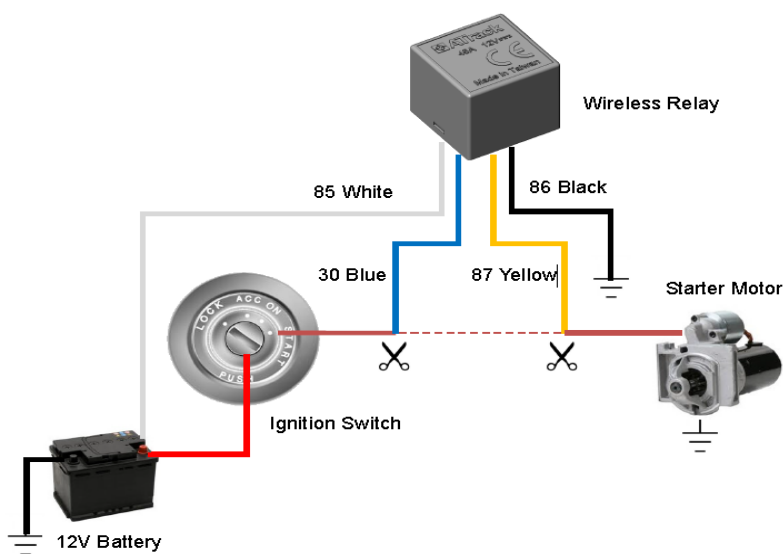
3.6. LED Indication

The following table describes the LED states:

LED Indicators	Color	LED Status	Description
OBD	Green	Solid OFF	OBD Protocol not found
		Fast blinking	OBD-II data transmission.
		Blinking every 10 seconds	Deep sleep mode
GPS	Blue	Solid OFF	GPS power OFF
		Blinking every 1 second	GPS not fix
		Solid ON	GPS Location Fix
GSM	Red	Solid OFF	GSM Power OFF
		Blinking every 1 second	GSM no signal
		Blinking every 2 second	GSM registered
		Blinking twice every 2 second	GPRS connected

4. Configuration

4.1. USB Driver Installation

In this section, we will demonstrate how to correctly install a USB driver on a Windows platform. The installation process will vary from one platform to another. Hence, you may see different installation screens comparing to the ones which are shown here; however, most of these steps involved during the installation remain the same.

System Requirements

The AX7 supports the following operating systems: Windows 2000, Windows XP, Windows Vista, Windows 7, and Windows 8.

Installing an Unsigned Driver on Windows 8

The USB Device Driver can be requested from the ATrack Technical Support Team via email or from the Partner Login section on the ATrack website at www.atrack.com.tw. Following is a demonstration of how to install an unsigned USB driver on a Windows 8 platform through the manual installation process. Before plugging in your device, follow these instructions to disable driver signature enforcement.

1. Move your mouse cursor to the upper right corner on the window screen and click on **Settings**.
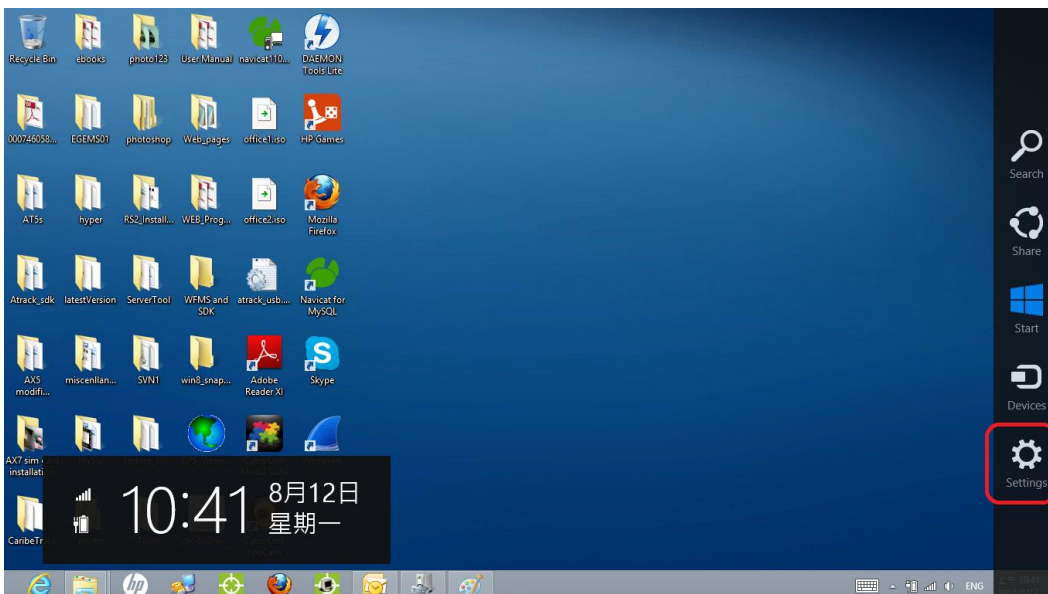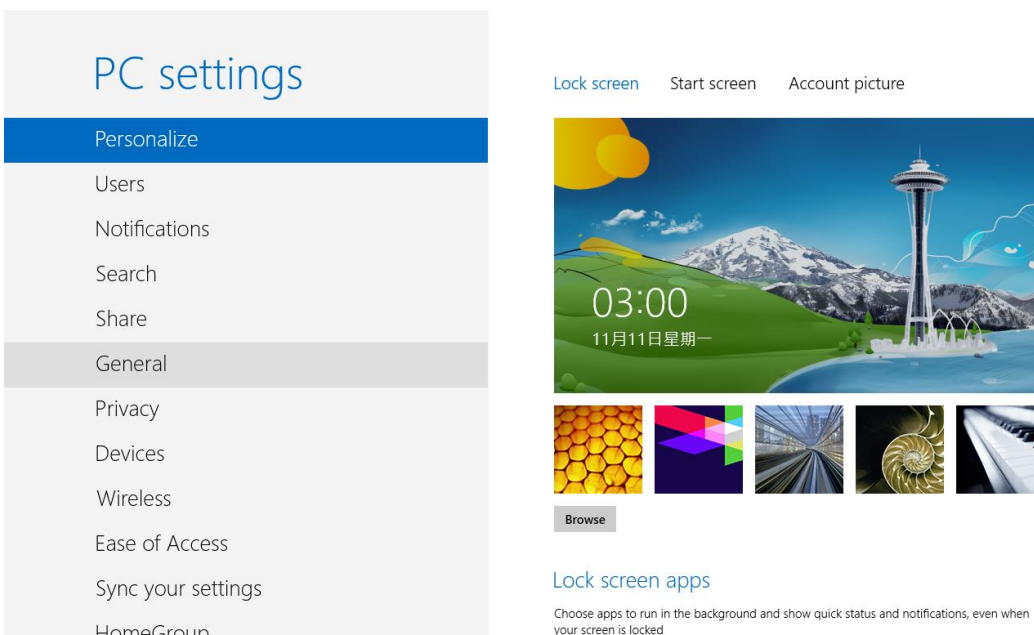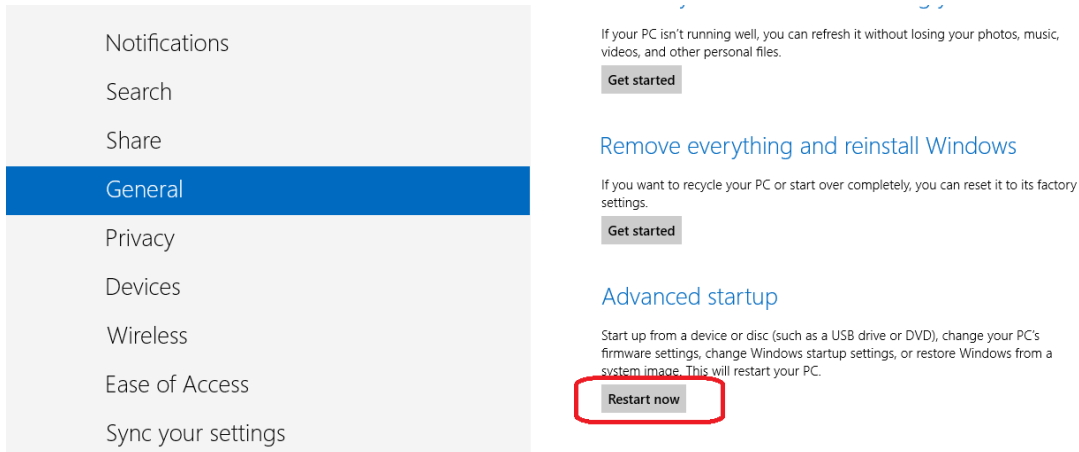

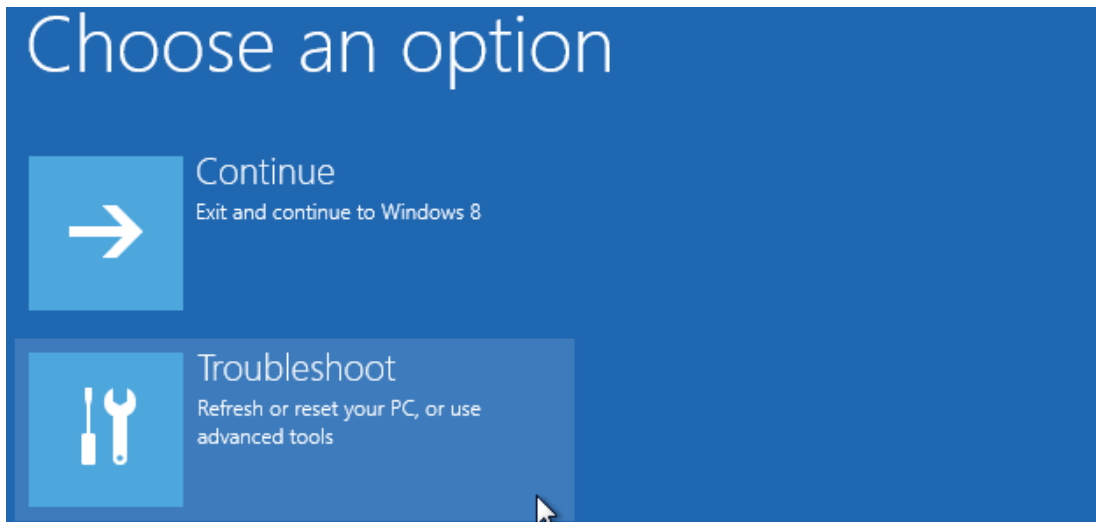2. Click on **Change PC settings**.
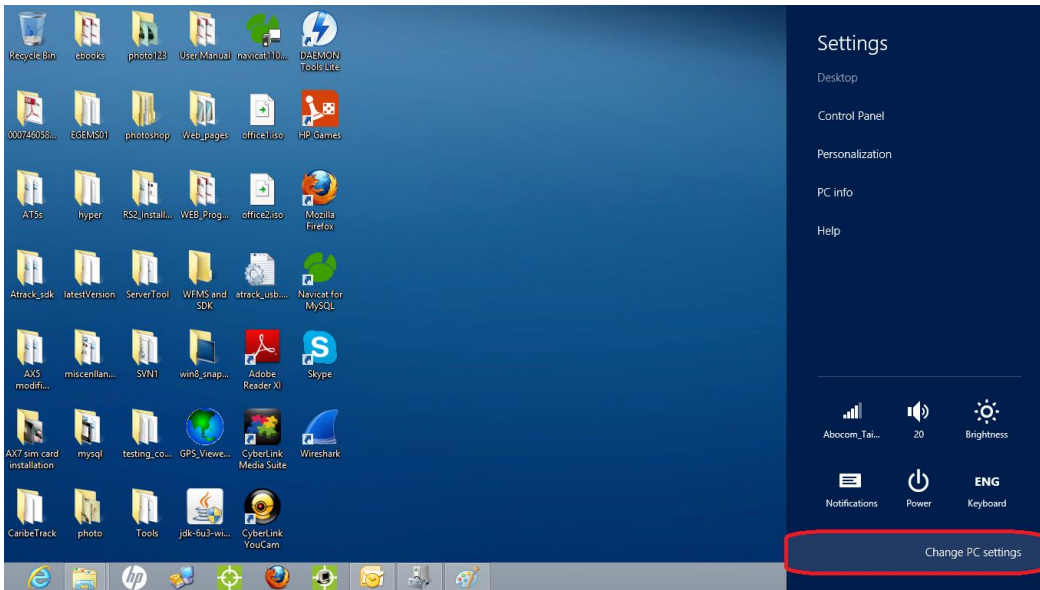
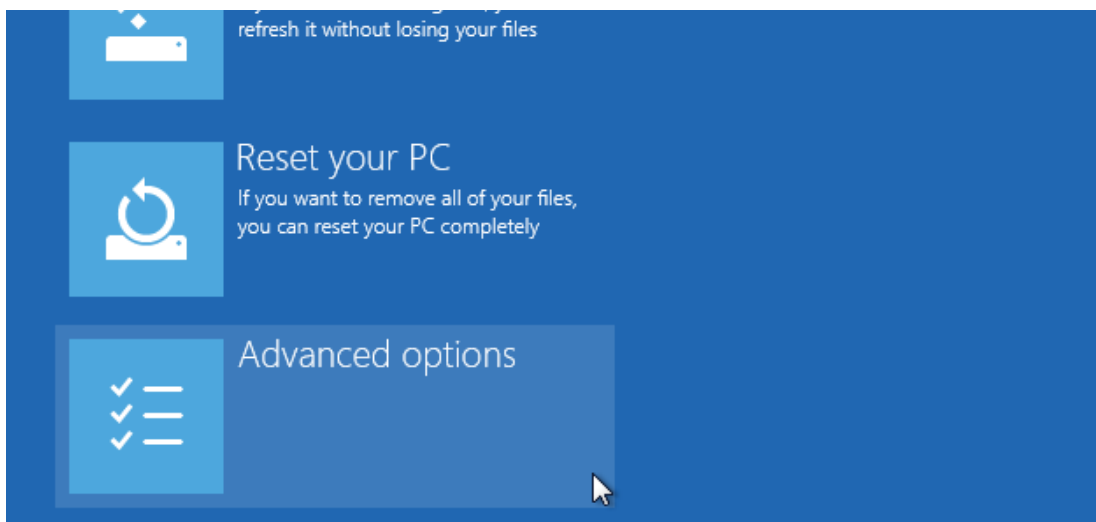3. Click on **General**.

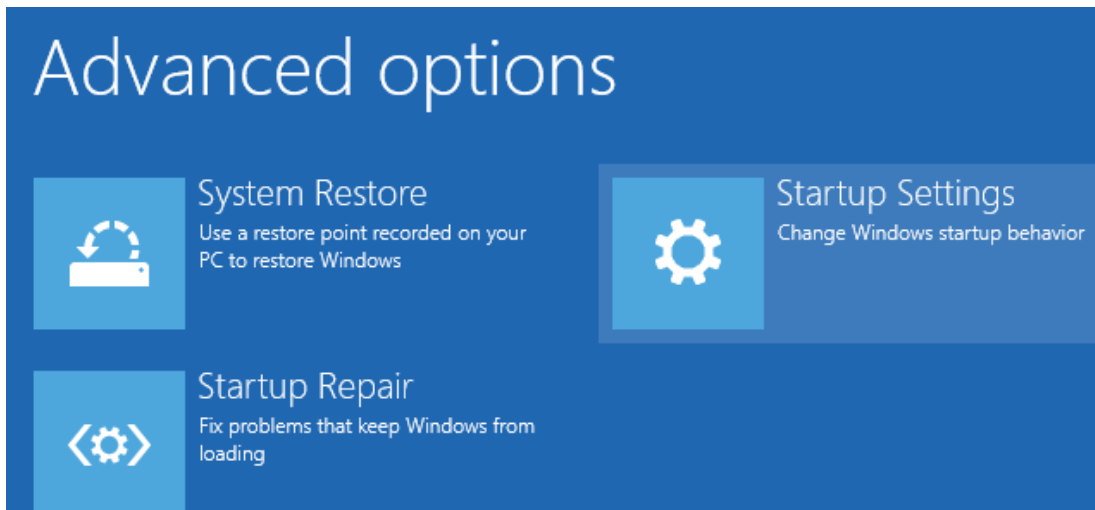4. Click on **Restart now** under Advanced startup.

5. Windows will restart and the boot menu will show up after few minutes. When you see the following menu, click on **Troubleshoot**.
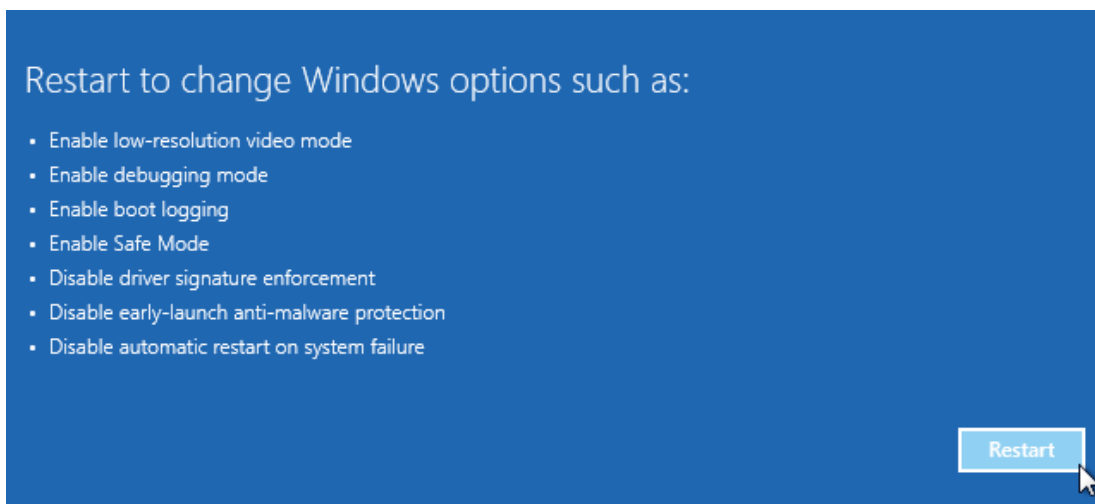

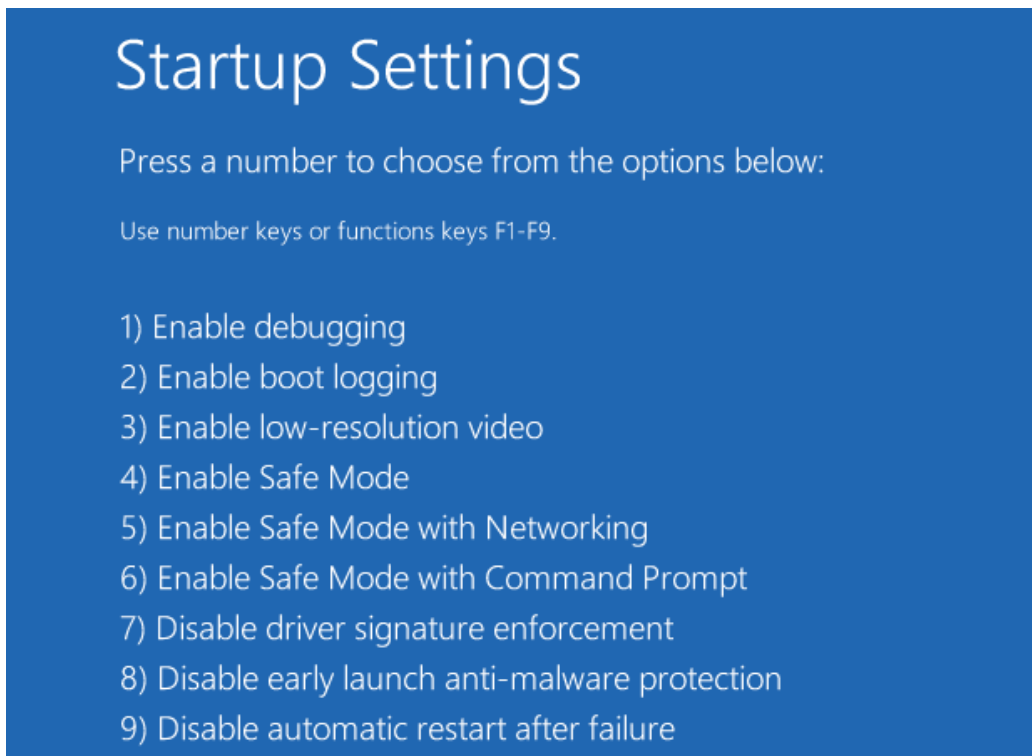6. Click on **Advanced options** on the Troubleshoot menu.

7. Click on **Startup Settings** on the Advance options menu.

8. Click on **Restart** on the Startup Settings menu to restart Windows.

9. Press **[F7]** on your key board to disable driver signature enforcement. Windows will start and you are now able to install the unsigned driver.


Installing an Unsigned Driver on Windows 7

The USB Device Driver can be requested from the ATrack Technical Support Team via email or from the Partner Login section on the ATrack website at www.atrack.com.tw. Following is a demonstration of how to install an unsigned USB driver on a Windows 7 platform through the manual installation process.

1. Once the AX7 is connected to a USB port on your laptop/PC. You will see the following message saying "no driver found", click on **[Close]** to close the screen.


---
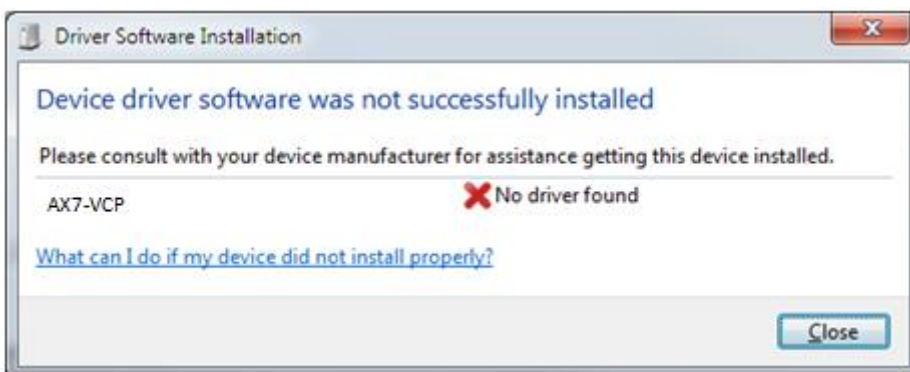
2. To manually install the driver, go to the Device Manger, right-click on the device and select update driver under the COM port section. Then, click on **Browse my computer for driver software**.
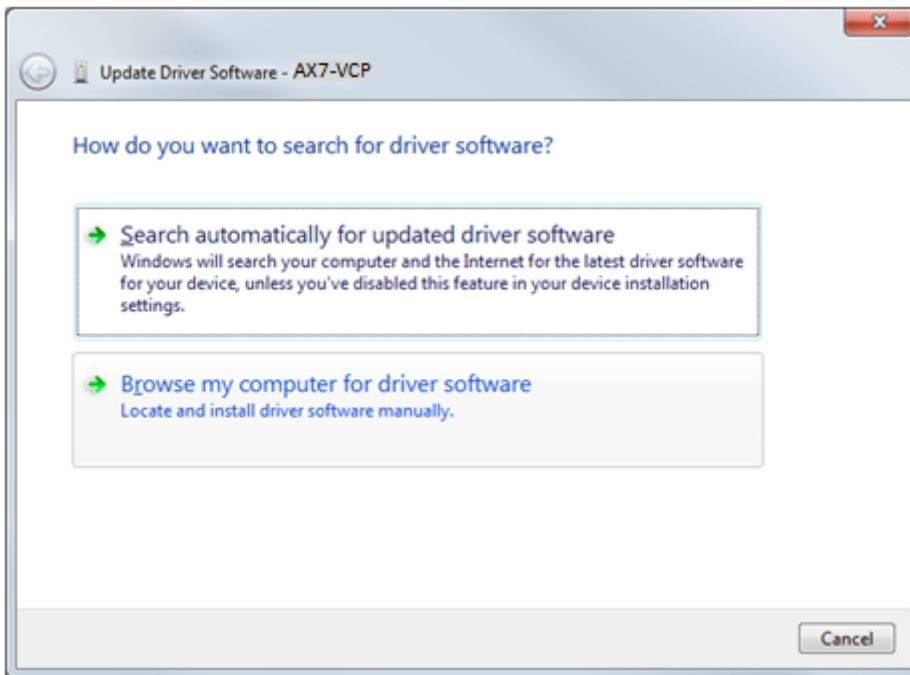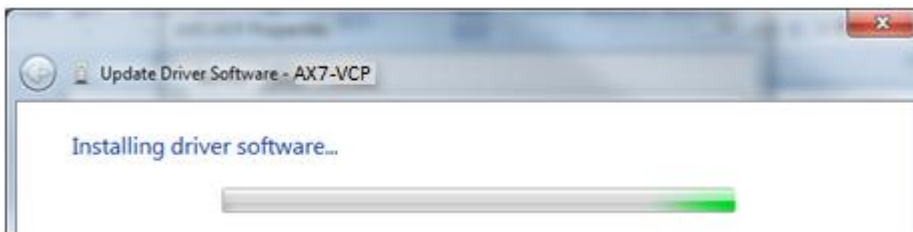

3. Click on **[Browse]** to browse the file location where you saved the USB driver. Select the check box next to **Include subfolders** and Click on **[Next]** to continue the installation process.
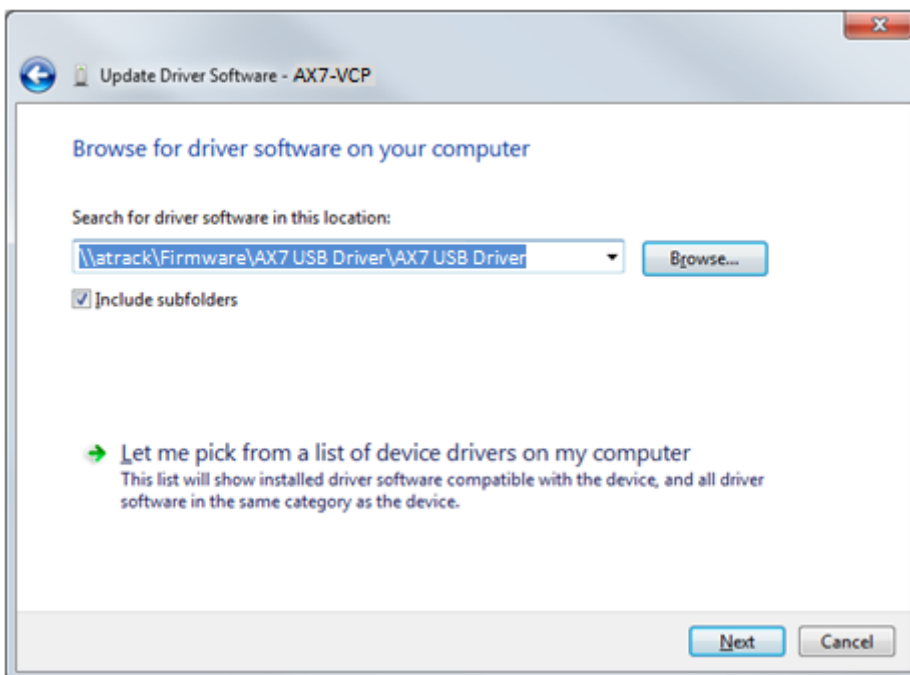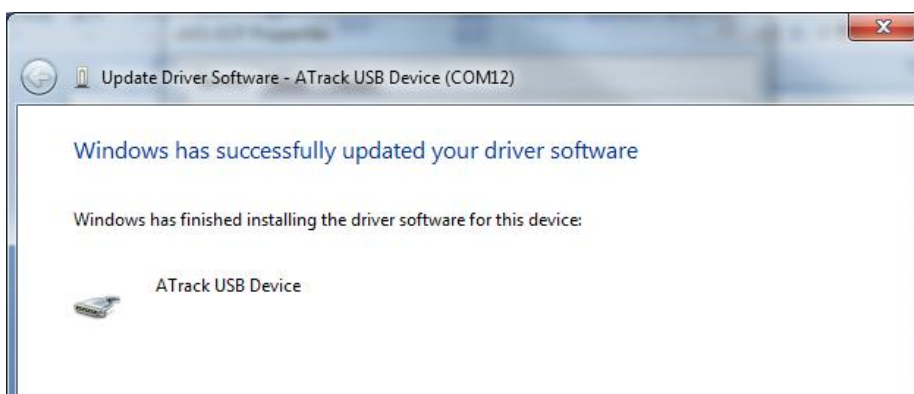
4. When you see the following warning message, click on **Install this driver software anyway** to proceed.
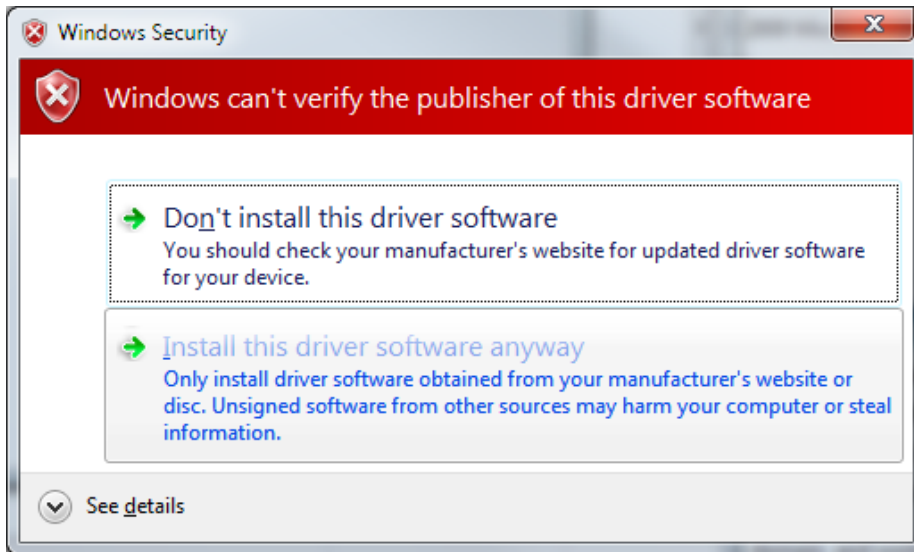
5. The driver is being installed.

6. Once the installation is completed, you should be able to see the COM port showing. This will be the COM port you use for communicate with the AX7 when USB is plugged in.

4.2. Configuring the AX7 device

The AXTool is a simple configuration tool which is useful for users to configure the basic settings of the AX7. For advanced configurations, please refer to the ATrack Protocol Document for details.

- **General Setting**

  [Device Password]: The device password is used for protecting device configurations. You can have the maximum of 6 characters.

  [SIM Card PIN Code]: Enter the PIN code of a SIM card if you a PIN code enabled.

  [Position Format]: Select position format for all reports.

  [Power Saving Mode]: Enable/Disable the power saving mode. When the power saving mode is enabled, the AX7 device will go into deep sleep mode after 1 minute of engine off.
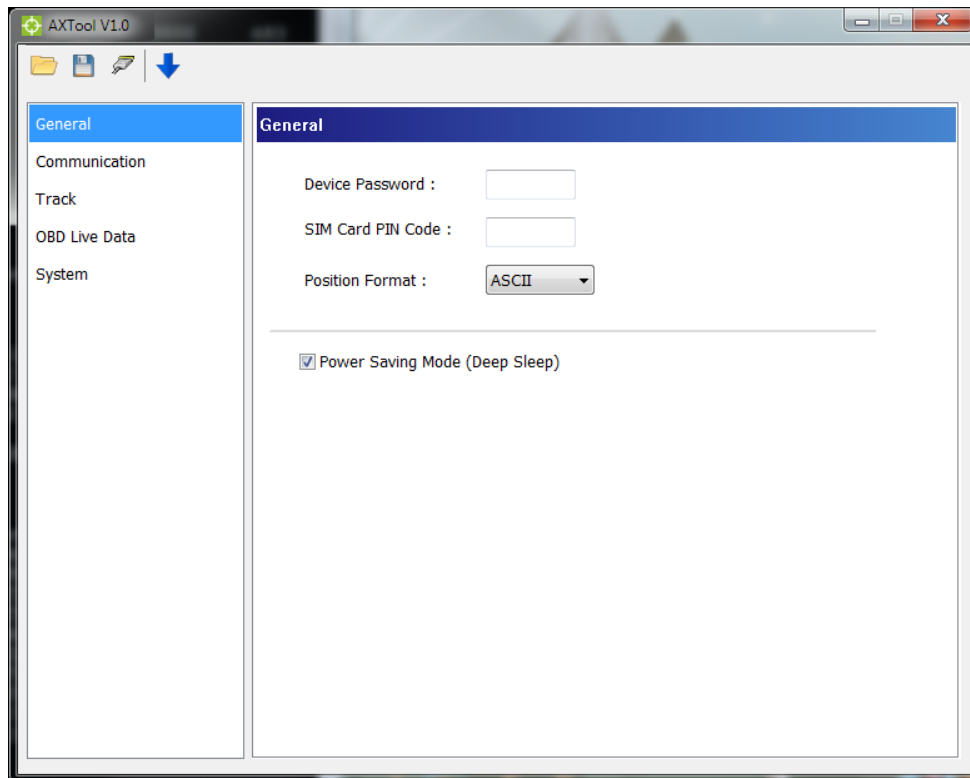
- ● **Communication Setting**

  [GPRS Enable]: Enable GPRS communication

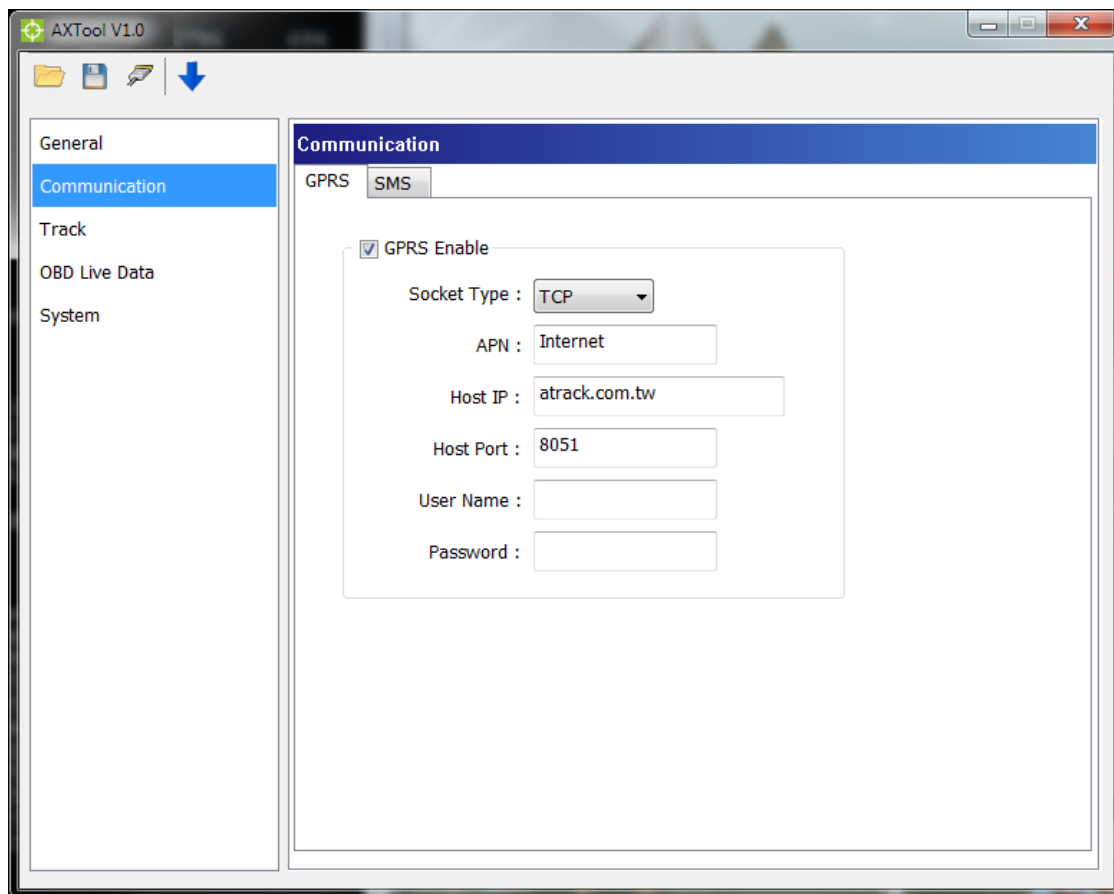 [Socket Type]: Select TCP or UDP for GPRS communication

  [APN]: Access Point Name for GPRS connection. (Please contact your cellular network carrier for the information)

  [Host IP]: Enter the IP address or domain name of host server

  [Host Port]: Enter Port number of the remote host server

  [User Name]: The GPRS user name. (Please contact your cellular network carrier for the information)

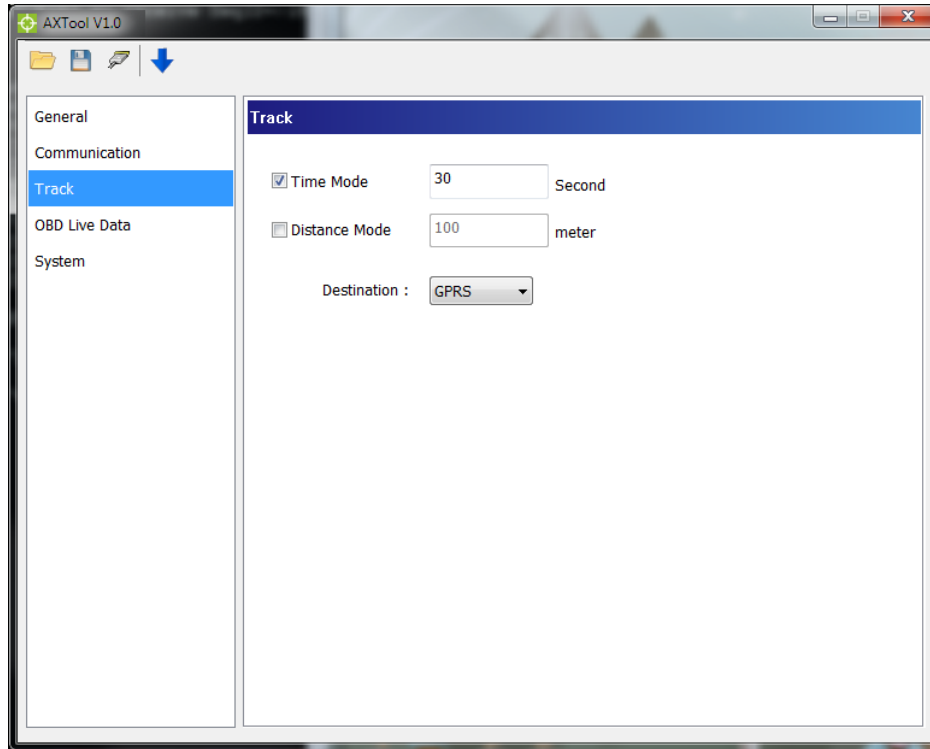 [Password]: The GPRS password. (Please contact your cellular network carrier for the information)

● **Track Setting**

You may configure a tracking interval when the vehicle engine is ON. When [Time Mode] and [Distance Mode] are both selected, the tracking behavior will operate in AND condition.

● **OBD Live Data**

When the AX7 is connected to a vehicle's OBD-II port, you will see the OBD live data such as VIN, Speed, RPM, MAF air flow rate, Engine Load, Throttle Position, Engine Temperature, Fuel Level, MIL Status, Odometer, Fuel Used, and Main Voltage.
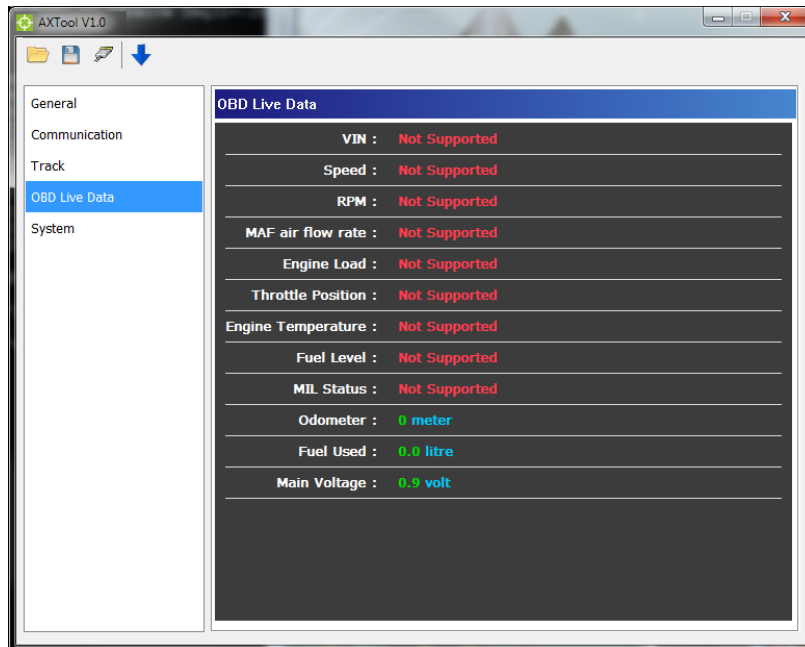
● **System Setting**

The [System] setting will show the current connected device information. The [Reset/Action] function can be used to reset parameters or clear buffered messages of the device.
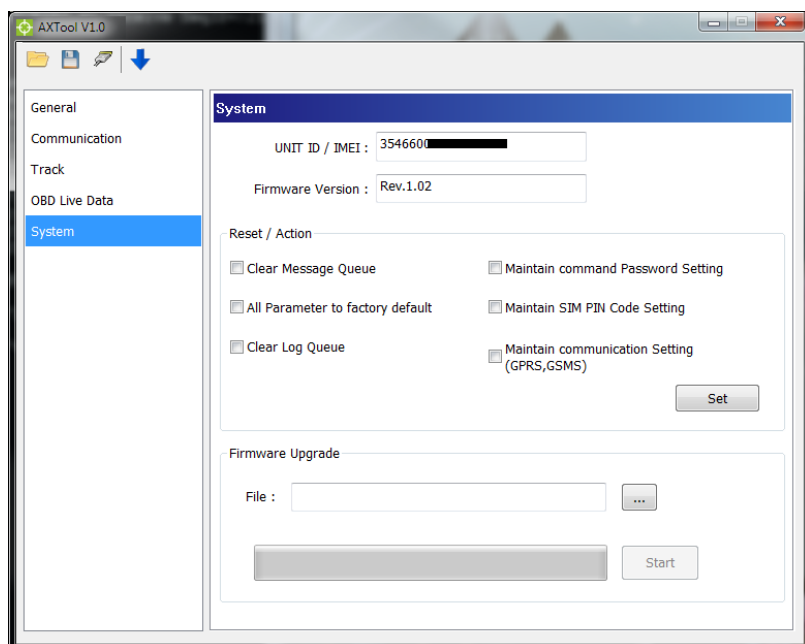
- **Uploading Setting To Device**

  Once all the settings are entered, use the Blue Downward Arrow ( ) to upload the settings to the device. A popup window will show the progress. When it finishes, the popup window will close.
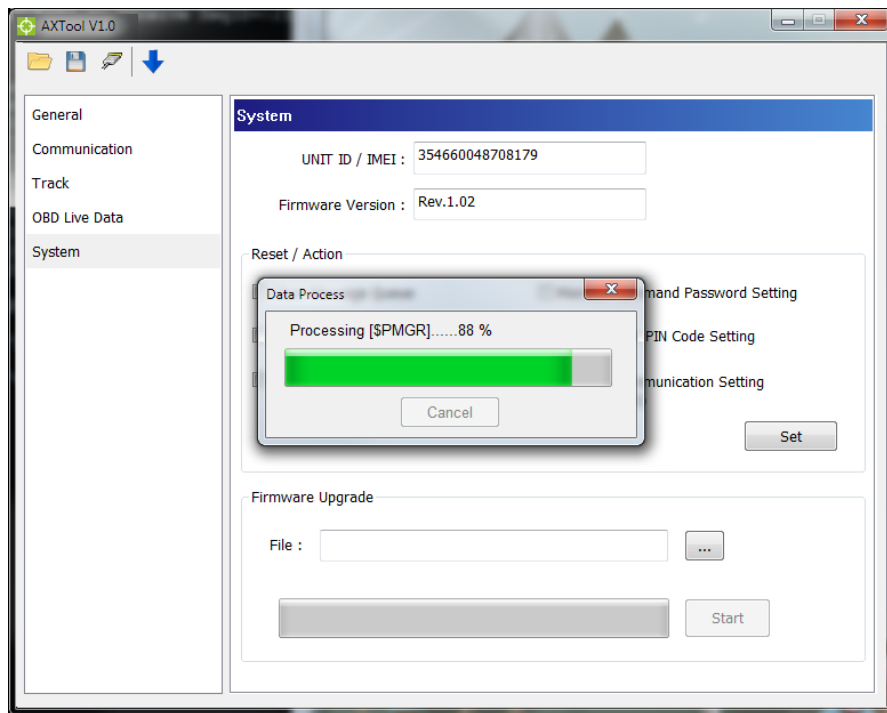
4.3. Firmware Upgrade

Open the AXTool program and click on [System] on the menu.

Browse the firmware file which is provided by ATrack and click on the [Start] button.
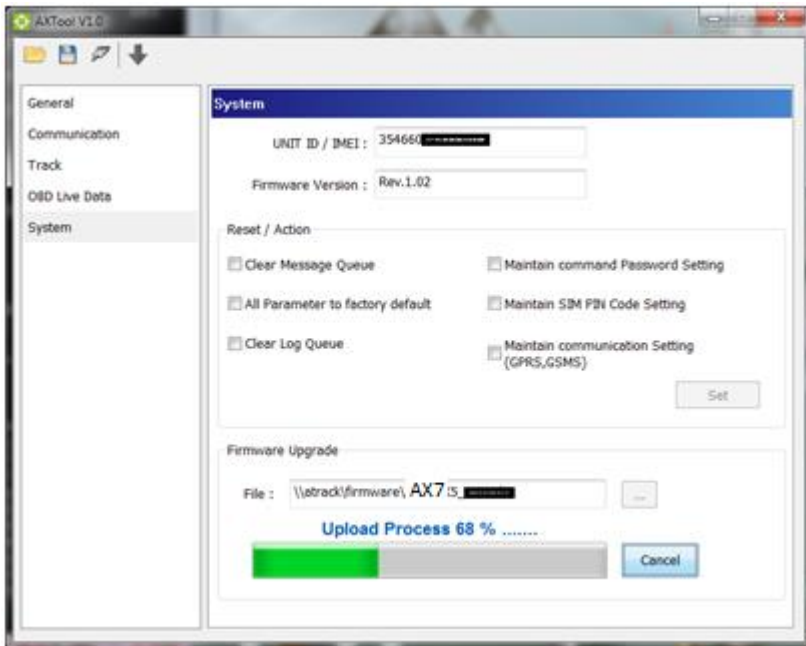
When "Waiting Device Restart…" message is prompted, please do not turn off the device.

When you see "Upgrade Successfully!!", that means the device firmware is upgraded.

5. Installation

Designed for ease of use, simply just plug the AX7 into your OBD-II DLC Connector and it will be up and running.

5.1. What is the OBD-II DLC Connector

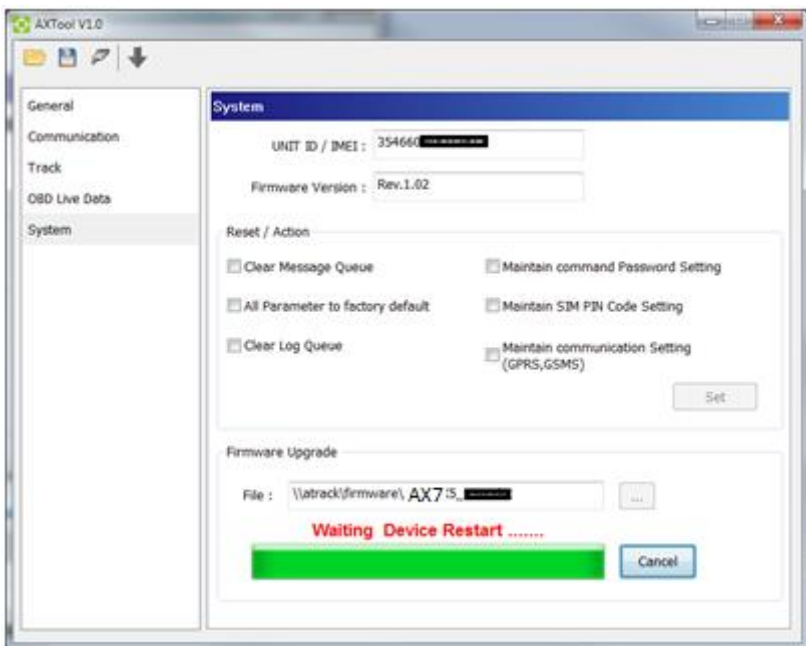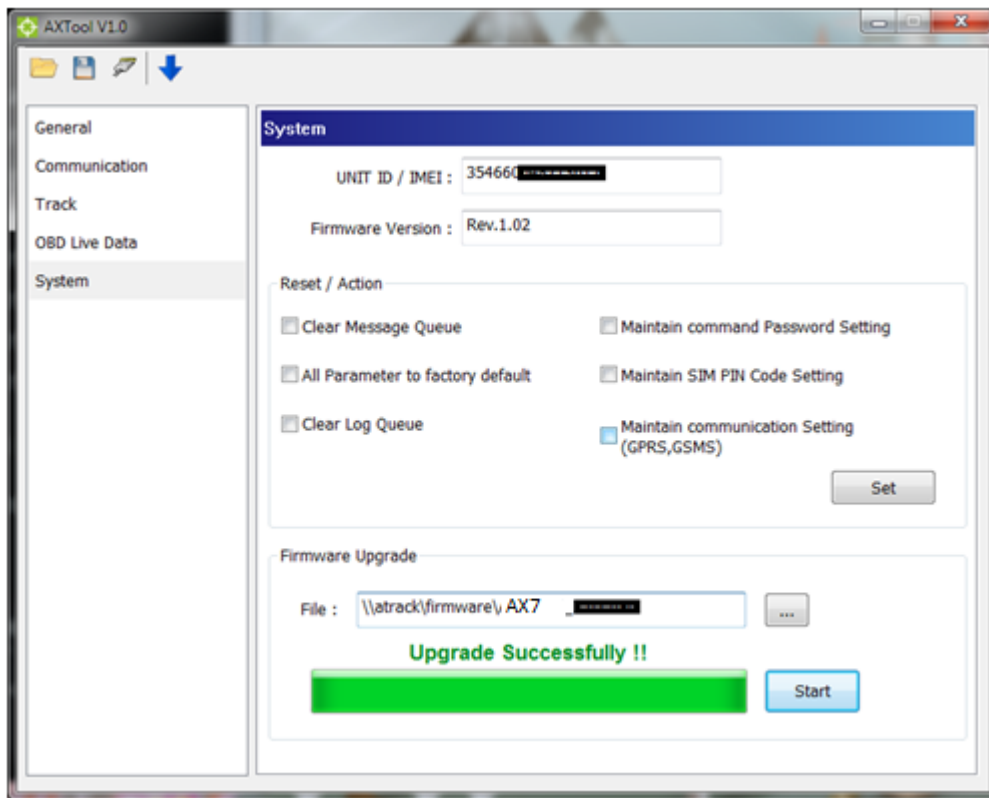The OBD-II DLC connector is a standard connector for all vehicles which OBD-II compliant. The OBD-II DLC connector is shown below:
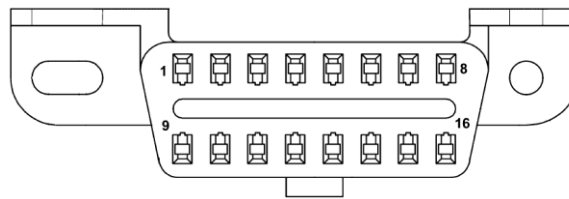
The OBD-II DLC connector shall be located in the passenger or driver's compartment in the area bounded by the driver's end of the instrument panel to 300 mm beyond the vehicle centerline. See the following figure for DLC location for most of vehicle. Location #1~#3 is under the dashboard of the driver side. Location #4~#5 is on the dashboard instrument/gauge area. Location #6~#7 is near radio and climate controller. Location #8 is near armrest and handbrake area.
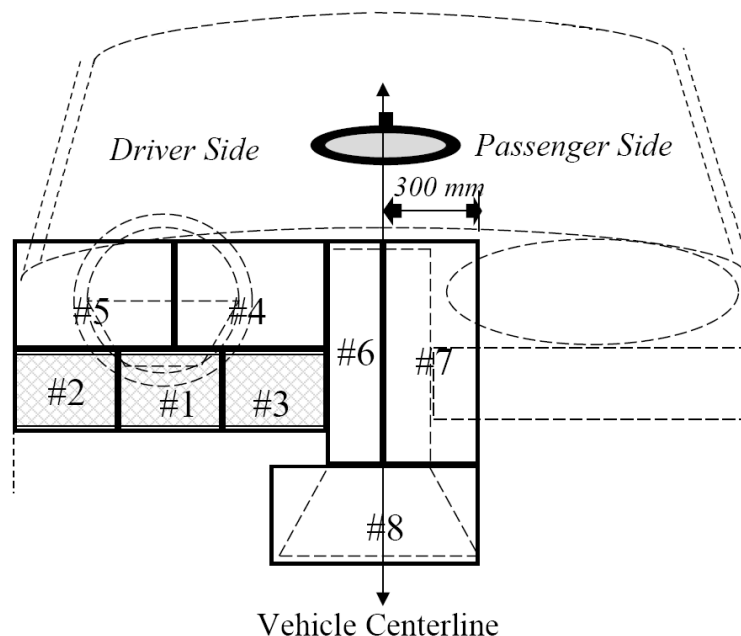
5.2. Micro SIM Card Access

Remove the cover of the AX7.

Follow the arrow direction to insert a normal SIM card. The gold contacts on the SIM card are facing downward. When you slide the SIM into the metal bracket slot, make sure the SIM has reached to the end of the slot.
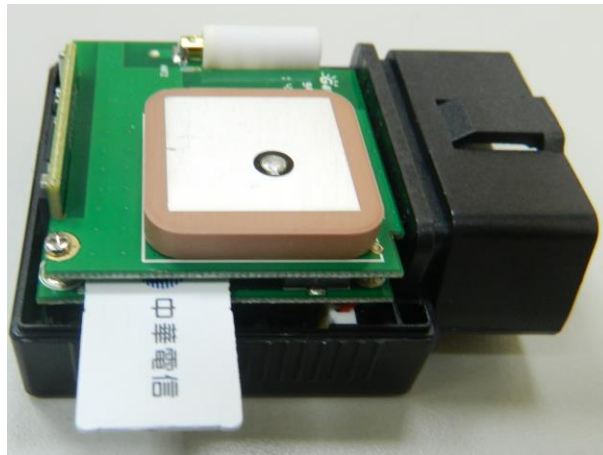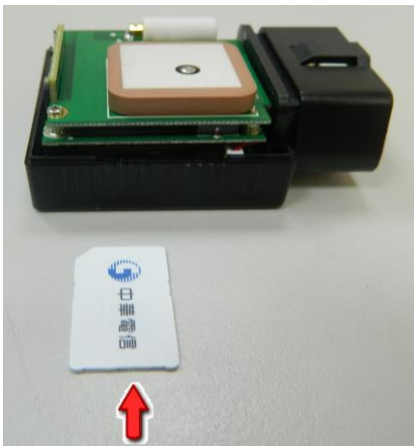
Reject the SIM by using your fingernail to push the SIM slightly deeper into its slot until you hear a click.
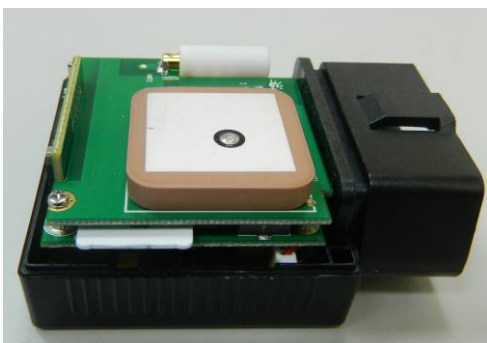
5.3. Using Low Profile OBD-II Extension Cable

The ODB-II DLC location of each vehicle is different. For example, the DLC is covered by a plastic cover as shown below. In this case, if the AX7 is plugged into that DLC connector directly, the plastic cover cannot be closed. Hence, the low profile OBD-II extension can solve this issue by relocating the device in a better position.

![ATrack logo]

5.4. Using Zip Ties to Secure the Device

Fully secure the zip tie around the OBD-II DLC connector and the AX7 by pulling it tight, which ensures that the device will not come loose or easily removed. Refer to the following diagram for reference.
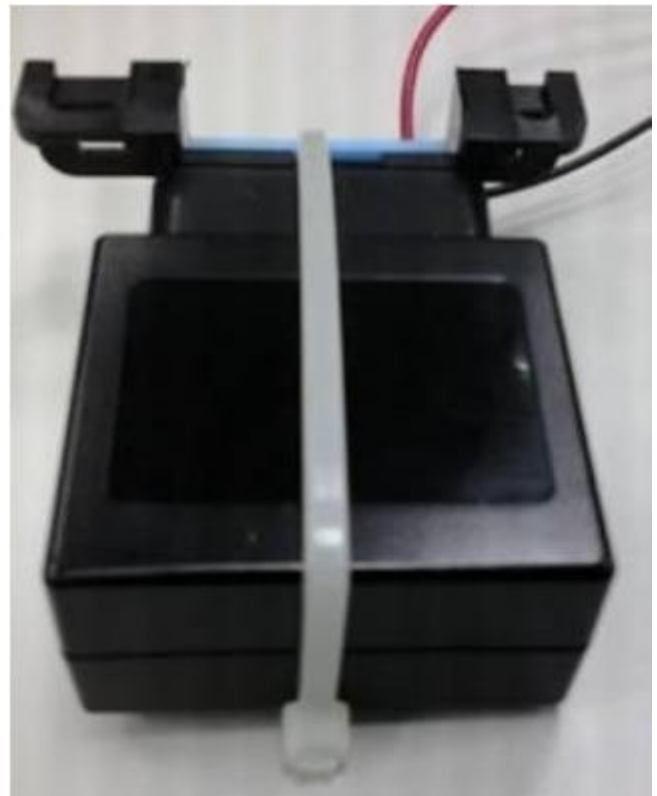
5.5. GPS Performance for Installation

In order to find out the GPS location of your vehicle, the AX7 GPS receiver receives incoming signals from each orbiting satellite. These signals consist of information such as satellite's position and the time that the signal was transmitted by each satellite. The receiver analyzes these data in order to determine how far away each satellite is and it uses the triangulation method to calculate the vehicle's exact position. The AX7 has a built-in GPS antenna, however it is not water proof; therefore, it must be installed interiorly. Please note that the following interior conditions may cause bad GPS reception:

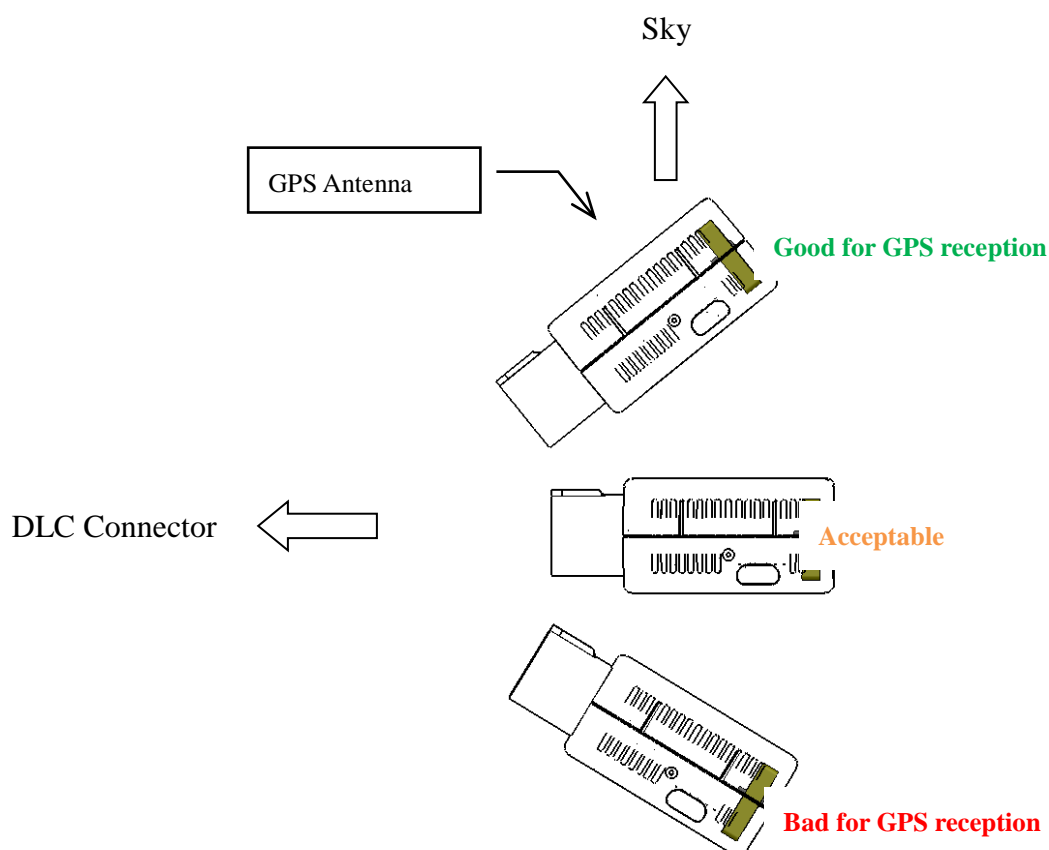- Your vehicle has metallic window tint
- Your vehicle has a windshield mounted radio antenna
- Your vehicle has a solar reflective window
- The MP3 FM transmitter may interfere with GPS reception

The AX7 installation direction shall be considered as well. Please refer to the below diagram for details:

Implemented with the latest GPS autonomous technology, the AX7 accelerates GPS positioning by capitalizing on the periodic nature of GPS satellite orbits. GPS orbit predictions are directly calculated by the GPS receiver and no external aiding data or connectivity is required. Therefore, more satellite signals received are benefit for a position fix in weak signal environment for the next 3~4 days.

5.6. Simple Verification for Installation

When a device is configured and plugged into an OBD-II DLC connector. It performs some basic function tests. You can simply verify whether it is installed properly via buzzer indication. Please refer to the following table for details:

Buzzer Indication	Description
Beep 1 time	Device Power ON
Beep 2 times	OBD Protocol Connected
Beep 3 times	GSM/GPRS Connected
Beep 4 times	GPS Fix

6. Bluetooth Applications

In this section, we will walk you through on how to set up a Bluetooth connection between your AX7 and your Android mobile/PC.

6.1. Using an Android Mobile to Connect to your AX7

For this demonstration purpose, we will use the "Bluetooth SPP Pro" app, which can be downloaded from this website address: https://play.google.com/store/apps/details?id=mobi.dzs.android.BLE_SPP_PRO&hl=en
A 2-D barcode for your phone to scan and download from market:

After the installation, launch the app which scans for available Bluetooth devices. The AX7 device is listed on the list as shown below:
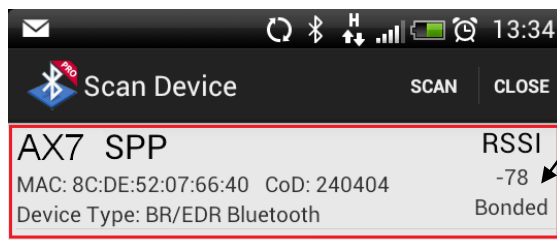
Tap on the area marked in red, then the device details are shown as below:

Tap on the **Connect** button.

Tap on **CMD line mode**.

The command prompt shows up:

After a successful connection, you can see a response message showing "**Rxd>AX7 Bluetooth Connected**". By default, there is no password. Therefore, the AT$BTEN comm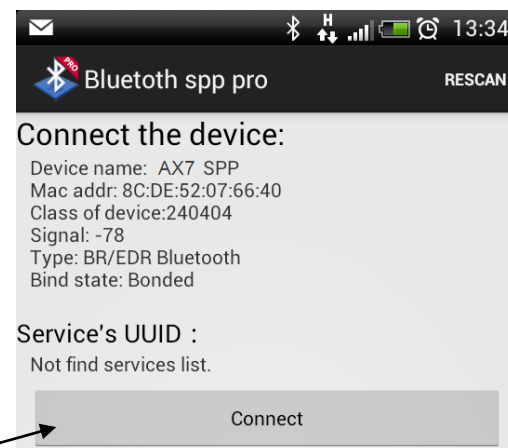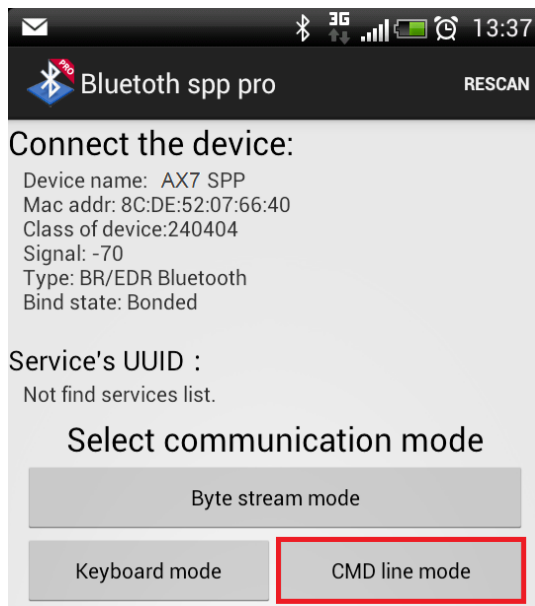and may be used to setup a password for a Bluetooth authentication. If a password is set, then a password prompt would be shown and you would need to type your password in order to communicate with the device.

6.2. Using a PC to connect to your AX7

In this example, Windows 8 is used for this demonstration. The same principle can also be applied when installing a device on a Windows 7 platform. At first, you need to have Hyper-Terminal installed. Next, power up the AX7 device, and then on your PC, go to **Control Panel** -> **Devices and Printers** -> right click on a blank space and select **Add devices and printers**. Double click on **AX7 SPP** to install the device.

![ATrack logo]
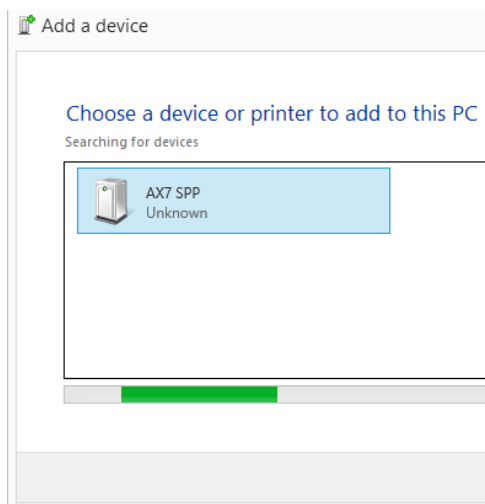
The device is being installed as shown below.
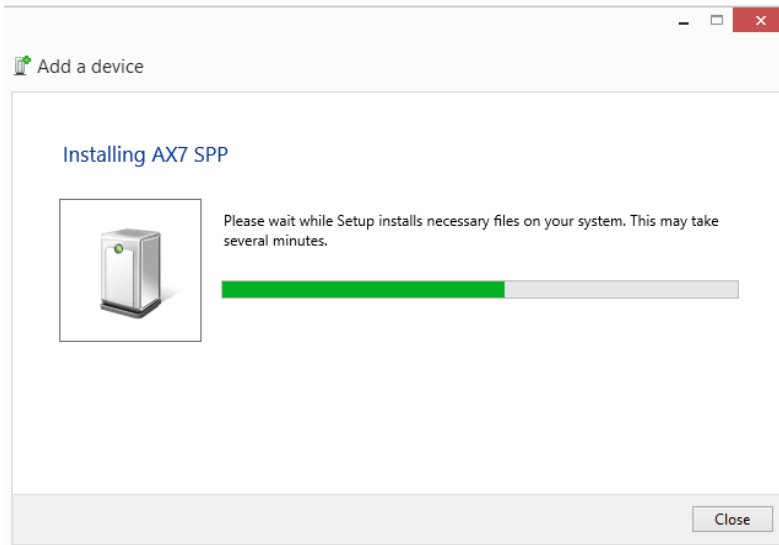
Under Devices and Printers, please right-click on **AX7 SPP** and select **Properties**.
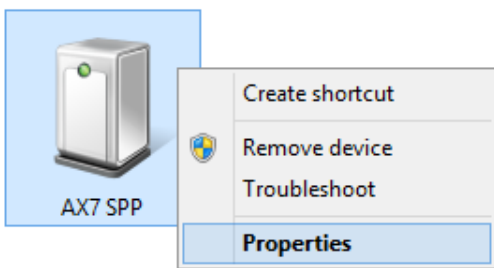
Select **Services** in order to check which COM port the device is connected to. In this example, the device is connected via COM11.
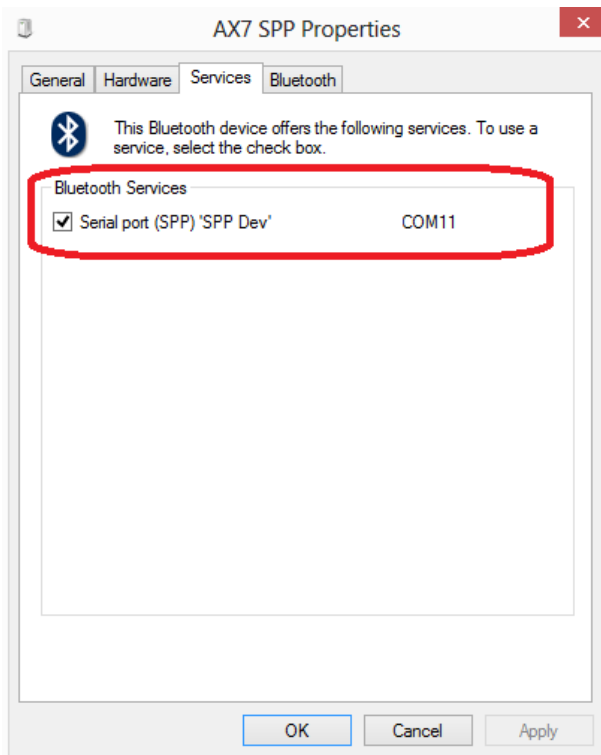
Launch the Hyper-Terminal and select COM11. Please select the following settings during the connection setup.
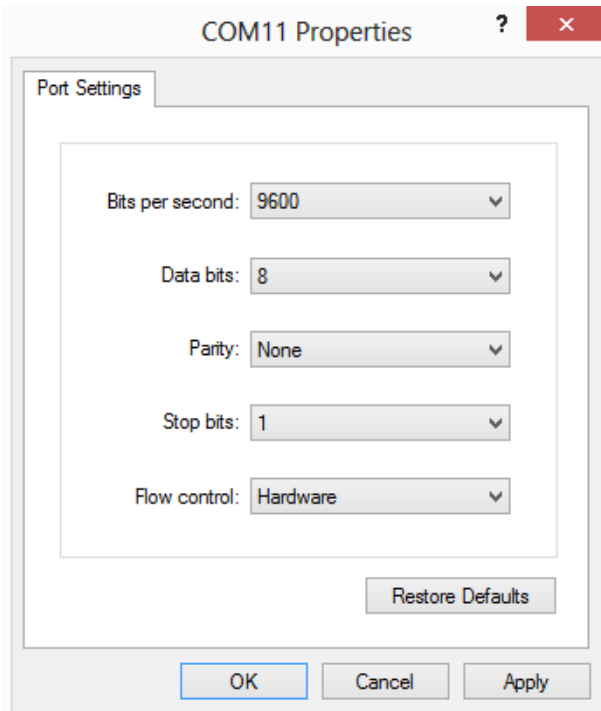
Once it is connected, there is a response message showing **"AX7 Bluetooth Connected"**. You can issue some AT commands later on.
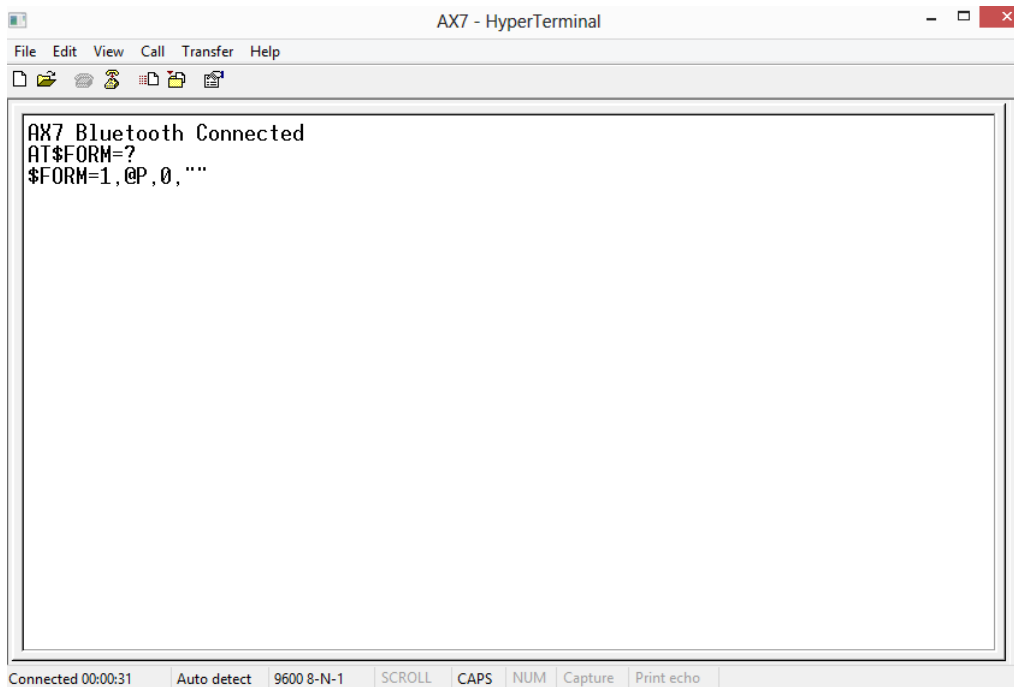
6.3. Bluetooth Commands

AT$BTEN=<Mode>, <Password>

<Mode>: 0 - SPP Profile (Default)

<Password>: 4 characters password for connection authorization.

Example: Set "1234" for the Bluetooth connection password

AT$BTEN=0,"1234"

After connecting to the AX7, you will need to input the password with the ending characters <CR><LF> and send the password to the AX7 in order to establish the connection. This password sending has to be done within 1 minute after a successful pairing. A failure will result in disconnection and cause the pairing process to repeat again.

7. Appendix

7.1. Hardware Specification

Model Number	AX7(UE)	AX7(UA)	AX7(CV)	AX7(CS)
Dimensions (L x W x H)	50 x 46 x 25 mm			
Weight	50g			
Housing	Flame Retardant PC (UL 94 V-0)			
Operating Temperature	-25℃ ~ +70℃			
Electrical Characteristics				
Power Supply	8V ~ 36V DC (±20%)			
Current Consumption	Operating : Max.140mA@12V, Deep Sleep Mode 1.8mA@12V			
Cellular Network Communication				
GSM/GPRS	Quad-Band 850/900/1800/1900MHz		N/A	
UMTS/HSPA	900/2100MHz	850/1900MHz	N/A	
CDMA 1x RTT	N/A		800/1900MHz	
CDMA Carrier Approval	N/A		Verizon	Sprint
Cellular Antenna	Internal Cellular antenna			
SIM Card	1.8V/3V Mini SIM(2FF)		N/A	
GPS				
Receiver	50 Channels, L1 Band, C/A Code, -159dBm, A-GPS Supported			
Accuracy	2.5m CEP			
Data Acquisition Rate	1Hz			
GPS Antenna	Internal GPS active antenna			
GPS Data Buffer Capacity	8 MB			
Accelerometer				
3-Axis	Z,X,Y			
Resolution	±16g, 400Hz			
OBD-II Communication)				
Connector Type	SAE J1962 Male Connector			
Protocol Supported	ISO 15765-4 (CAN), 11/29Bit ID, 250/500Kbaud			
	ISO 14230-4 (KWP2000)			
	ISO 9141-2 (Asian, European, Chrysler vehicles)			
	SAE J1850 VPW (GM vehicles)			
	SAE J1850 PWM (Ford vehicles)			
Optional Accessories				
Backup Battery	Internal 3.7V 90mAh Rechargeable Lithium-ion Polymer Battery			
Wireless Module	ISM 433.92MHz band, -15dBm power, -112dBm sensitivity			
Bluetooth Module	Version 3.0 EDR, 2.4GHz, Class 2, SPP(Serial Port Profile)			

7.2. 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.