



## Technical Guide



# AVL75

## Auto Vehicle Locator System

[www.avl.tw](http://www.avl.tw)







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The serial number of this commodity is located at the bottom chassis of your AVL75 SYSTEM. Refer to the model and serial number when you contact your nearest dealer or DMP offices for services. The Model No. of this product is also indicated on the product label of your gift box as: AVL750/751/752/753MWB (NWB/NXB/NXX/MWB/MXB/MXX/ ... etc). Please check the description of your model no. in **Chapter 2**.

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## Safety Information

### WARNING

- ▶ Do not expose your AVL75 SYSTEM to the rain or moisture, in order to prevent shock and fire hazard.
- ▶ Never install your AVL75 SYSTEM in wet locations.
- ▶ Do not attempt to open the cabinet of your AVL system to avoid electrical shock. Refer to your nearest dealer for qualified personnel servicing.
- ▶ Never touch un-insulated terminals or wire of your AVL75 SYSTEM unless your vehicle engine is turned off.

In the service laboratory:

- ▶ Never touch un-insulated terminals, unless the power adaptor and the display monitor are disconnected.
- ▶ Locate your AVL75 SYSTEM as close as possible to the electrical socket outline for easy access, while avoiding force caused by entangling of your arms with surrounding cables from the system.
- ▶ Avoid using or installing the modem to the serial port of your AVL SYSTEM during a storm or a lightning.
- ▶ Do not use the telephone to report a gas leak in the vicinity of your AVL75 SYSTEM still working. Turn off the system immediately.
- ▶ USB connectors are not supplied with Limited Power Sources.

**DO NOT ATTEMPT TO OPEN OR TO DISASSEMBLE THE CHASSIS  
(ENCASING) OF THIS COMMODITY. PLEASE CONTACT YOUR  
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## Regulatory

## FCC Class A Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference in which case the user will be required to correct the interference at his own expense. Testing was done with shielded cables. Therefore, in order to comply with the FCC regulations, you must use shielded cables with your installation.



## WARNING

This product Complies with EN55022 Class A. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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

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 digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference - causing equipment standard entitled "Digital Apparatus", ICES-003 of the Department of Communications.

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe (A) prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques",NMB-003 édictée par le ministre des Communications.

## Manufacturer's Declaration of Conformity

This equipment has been tested and found to comply with the requirements of European Community Council Directives 89/336/EEC and 73/23/EEC relating to electromagnetic compatibility and product safety respectively.



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Underwriters Laboratories Inc. ("UL") has not tested the performance or reliability of the Global Positioning System ("GPS") hardware, operating software or other aspects of this product. UL has only tested for fire, shock or casualty hazards as outlined in UL's Standard, UL60950-1, 1st. Edition, Information Technology Equipment – Safety – Part 1: General Requirements. **UL Certification does not cover the performance or reliability of the GPS hardware and GPS operating software. UL MAKES NO REPRESENTATIONS, WARRANTIES OR CERTIFICATIONS WHATSOEVER REGARDING THE PERFORMANCE OR RELIABILITY OF ANY GPS RELATED FUNCTIONS OF THIS PRODUCT.**



# Purchase Agreement

Version 1.1

## Purpose

**In accordance to the general commercial conduct of Trust and Fair Trade, herewith below is the agreement for the protection for both parties, DMP and Users in pursuant of trading.**

## Product Description

With this product, herewith also known as AVL75, which is a simplified & an economical design of an embedded computer for Automotive Computing. The basic specification of this product comprises of the latest x86 technology design, which runs at a speed of 166MHz, with onboard 128MB System memory, 512KB SRAM, GPS, GSM/GPRS, WIFI LAN, OBD-II, Display, Audio, USB, and serial port Interfaces.

## Distribution Convention

1. This Product includes a Gift box, an inner case, AVL PC system, , User's Manual, Utilities & Drivers CD, and cable package (for cable definition, please refer to chapter 1, section 1.1 – Unpacking your AVL75). Upon receiving this product, kindly please refer to the User' Manual to check for the contents and appearance of this product; contact immediately your nearest dealer or DMP office for any defective or missing parts. The supplier will not be responsible for any reported discrepancy thereafter the expiration period of 3-days from the date of purchase.
2. In consideration of transportation and the cost of storage, the supplier provides to the distribution channel, a warranty of 13-months (12-months is granted to the end-user). This warranty covers the failure caused by hardware breakdown, but does not cover the act of misuse and mishandling.
3. The supplier will not accept unknown post, therefore if you wish to repair or to return your goods – kindly please contact your nearest dealer to make your declaration, and at the same time, apply for a RMA number (RMA stands for Return Merchandise Authorization – please see the RMA form and fill-up for authorization).
4. The freight for Return goods for repair will follow the International customary practice and convention: Both parties is to pay for freight of one shipment each. The shipper is required to prepaid the freight from the place of origin (This means that the Returnee (user) covers the freight for return goods, while the Supplier covers the freight for goods after the repair).
5. Obsolete warranty is referred to as: (1)Expiration of warranty or (2)Damage due to misuse within warranty. The Supplier will be taken into consideration of the circumstances, to provide repair service with charges expense for obsolete warranty. This expense includes the cost of material plus labor.

## Note

**If there is other particular issue not listed in the above conditions, both parties agreed to follow the General Law of Commerce with fair and reasonable discussion in handling and resolving any occurrence of argument.**

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# Chapter 1

## 1. Introduction

Auto Vehicle Locator System is popularly known as AVL (Auto stands for Automatic). The AVL75 (Auto Vehicle Locator System) is a highly integration of 4-in-1 hardware unit which consists of the following hardware component:

- Embedded Vortex86 computer/computing system
- 4-band GPRS communication module or any other type of communication Module.
- 24 GPS Global Satellite Positioning Receiver devices
- 5-in-1 Automobile/Vehicle/Car OBD2 real-time diagnosis system.

The term AVL is also known as Automatic, or Automated Vehicle Locator. Mostly Auto is a short cut term for Automatic.

Aside from the above features , the Windows WINCE is the primary core and principal open source control software.

At present, this type of AVL is widely used in the vehicle transporting market; hence 'twas the most advanced vehicle carrying locator (and also it is known as the automobile black box). Also the AVL will be the best sharp weapon for future supervisor monitoring and management of the business transporting and public vehicles enterprising.

### 1.1. Unpacking your AVL75

AVL75 system has been tested through a series of function test and quality audit before being shipped out from the factory. To ensure that your AVL75 system is QC certified product, we have included an AVL75 test program for your verification.

#### 1.1.1 Packaging Contents

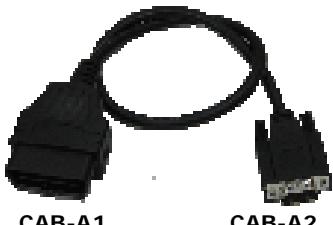
The contents of your AVL75 Package include:

|   |                           |            |
|---|---------------------------|------------|
| 1 | AVL75 system              | x1 unit    |
| 2 | AVL75 Technical Guide     | x1 booklet |
| 3 | AVL75 Driver & Utility CD | x1 unit    |
| 4 | Cable package             | x1 unit    |
|   | • CABLE-AVL-OBDII         | x1 pce.    |
|   | • CABLE-AVL-DVI           | x1 pce.    |
|   | • CABLE-AVL-PWR           | x1 pce.    |

#### 1.2 Cable Package

| DM&P Part Number | CABLE Description   | Dimension in Length |
|------------------|---|---------------------|
| CABLE-AVL-OBDII  | OBD2 Cable, RS232C(Female)-to-SAE J1962 connector(Male)                 | 57.5mm(L)           |
| CABLE-AVL-DVI    | DVI Cable, DVI(Male)-to-VGA/RS232/USB/ Special power cable (+12V/+3.3V) | 40.5mm(L)           |
| CABLE-AVL-PWR    | DC with Fuse socket power cable   | 23.5mm(L)           |

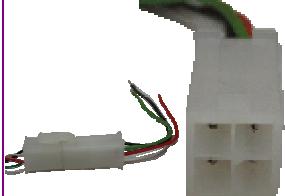
• CABLE-AVL-OBDII

| Photo of CABLE-AVL-OBDII  | From (CAB-A1)   | To (CAB-A2)  |
|---|---|--|
|  |  |  |

• CABLE-AVL-PWR

| Photo of CABLE-AVL-PWR  | From (CAB-B1)   | To (CAB-B2)  |
|---|---|--|
|  |  |  |

• CABLE-AVL-DVI

| Photo of CABLE-AVL-DVI  | From (CAB-C1)   | To (CAB-C2)  | To (CAB-C4)   |
|---|---|--|---|
|  |  |  |  |
|   |   | To (CAB-C3)  | To (CAB-C5)   |
|   |   |  |  |

## 1.2. Ordering Information

**TABLE 1.1 : Basic Standard Products**

|                  |   |
|------------------|---|
| <b>AVL750NXX</b> | Auto Vehicle Locator / Vortex86-166 with 128MB SDRAM/32MB DOM/GPS/GPRS  |
| <b>AVL751NXX</b> | Auto Vehicle Locator / Vortex86-166 with 128MB SDRAM/64MB DOM/GPS/GPRS  |
| <b>AVL752NXX</b> | Auto Vehicle Locator / Vortex86-166 with 128MB SDRAM/128MB DOM/GPS/GPRS |
| <b>AVL753NXX</b> | Auto Vehicle Locator / Vortex86-166 with 128MB SDRAM/256MB DOM/GPS/GPRS |
| <b>AVL754NXX</b> | Auto Vehicle Locator / Vortex86-166 with 128MB SDRAM/512MB DOM/GPS/GPRS |

**TABLE 1.2 : Software and Test Kit**

|                   |   |
|-------------------|---|
| <b>AVL750TEST</b> | AVL75 series Test Proof Evaluation Kit (Include hardware + software + MS WinCE License) |
| <b>AVL750BSP</b>  | WinCE5.0 BSP  |

**TABLE 1.3 : Optional Modules**

|                   |               |
|-------------------|---------------|
| <b>AVLDOM-64</b>  | DMP DOM 64MB  |
| <b>AVLDOM-128</b> | DMP DOM 128MB |
| <b>AVLDOM-256</b> | DMP DOM 256MB |
| <b>AVLDOM-512</b> | DMP DOM 512MB |

**TABLE 1.4 : Product Selection Table**

| DOM Memory capacity | BASIC (GPS+GPRS) | BASIC +OBD-II |
|---------------------|------------------|---------------|
| 32MB                | AVL750N          | AVL750NB      |
| 64MB                | AVL751N          | AVL751NB      |
| 128MB               | AVL752N          | AVL752NB      |
| 256MB               | AVL753N          | AVL753NB      |
| 512MB               | AVL754N          | AVL754NB      |

## **Chapter 2**

### **2. Function Description**

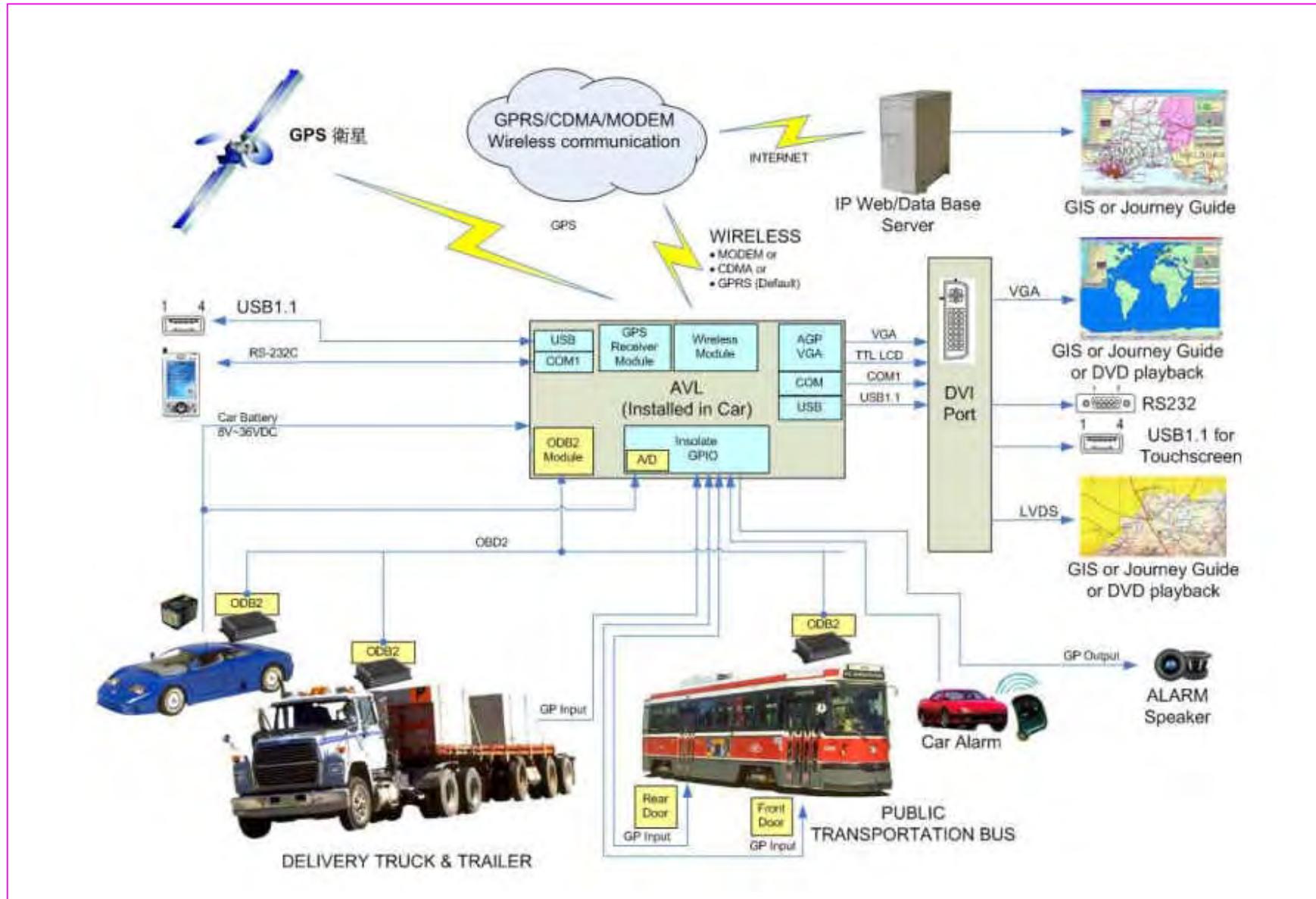
1. Automatic supervision monitoring of the automobile engine start-up – if the engine starts, the AVL will then automatically starts the inbound control system to make the surveillance and the record movement. The AVL here is referred to as AVL75.
2. After the automobile engine stops, the AVL turns off the control system. The length of time for the machine or system to be turn-off is software adjustable. This is to prevent short stops phenomenon and abnormal unloading/loading of cargo.
3. May record the Vehicle GPS utilizing the global satellite positioning information, the recording precision is highly accurate up to one second at a time.
4. In our Memory design using Flash + NVSRAM, this helps extend the life of the Flash registers for recording, surpassing the life usage of over 10 years.
5. The GPRS communication Module has 4-band frequencies 850/900/1800/1900 MHz supporting the TCP/IP communication protocol, enabling the monitoring program platform for easy application development.
6. Complete integrity supporting J1850PWM /J1850VPWM/ KWP2000/ KWP1281/ ISO9141-2 (with the exclusion of CAN BUS?), a total of 5 kinds of OBD-II for immediate real-time automobile diagnosis hardware interface that provide breakdown diagnosis code.
7. May establish wake-up time setting or remote control awakening supervisory monitoring, enabling to keep track of the vehicle position at any time.
8. It constitutes with the construction of 4 groups of belts onboard, with light partner isolation for the input of the specific/specified monitor contact, this is utilize to detect the compartment or the vehicle door when it opens.
9. It constructs another 4 groups of belts onboard, with light partner isolation for the output of the specific control in contact, this output may be utilize to provide reports to the police.
10. Provides connection to outside communication, using a group of external standard RS232 interface, enabling the manual installation for the expansion of these devices.
11. Provides lamp indication for status condition on PWR/SAVE/GPS/GPRS/OBD2/SLEEP LED.
12. Supports the input source range from DC 8V ~ DC 36V, suits different types of big and small vehicles.
13. Provides connection to outside storage, using external USB device for storage of transmission medium, or using the GPRS communication transmission, or the downloading of updated software.
14. Provides connection to DVI port monitor, or extended LVDS interface to LCD monitor, for the demonstration and display of electronic map and DVD broadcast.
15. Operating temperature range is from -30 to +70°C

## Chapter 3

### 3. Hardware Specification

- Vortex86-166/166MHz SOC
- System memory SDRAM 128MB
- SRAM 512KB for data backup
- IDE interface for DOM / EmbedDisk (Factory default standard 32MB).
- BIOS 256KB
- External USB x2
- Internal USB x1
- LPC-MIO W83697UF
- AC97 CODEC ALC202A
- Power Management Control chip with I2C interface
- DC power input 12V/24V Auto Detect
- Photo Isolate input x4 with LED display
- Photo Isolate output x4 with LED display
- COM1 D type 9-pin RS232
- COM2 OBD-II / Option D type 9-pin RS232
- COM3 GPRS module MC55/56 or SIM200 or other CDMA
- COM4 GPS module GN80-V
- GPIO Port **2,3,4,8**
- VGA, LVDS LCD display output
- LED display status
- XPCI expand connector
- Power Voltage detect.
- Wake on Timer
- Wake on Photo Isolate input x4
- Wake on GPRS(Ring, Voice, GPRS data, Modem, SMS)
- System Auto Power on by detect input volt
- Manual push button power on/off
- Software control power off.
- GPRS module SIM card easy changeable.
- Power consumption: +12V @ 600mA
- Operating temperature range is from -30 to +70°C
- Volume Size Dimension 140mm X 98mm X 36mm

### 3.1. System Block diagram



# **Chapter 4**

## **4. Connectors Description:**

### **4.1. Connectors Summary**

- DC Power input: 14PIN(7x2)-4.20mm (0.165") Wafer Dual Row connector x1  
(Include Photo Isolate INx4, OUTx4, Temperature sensor input x1)
- COM2 OBD-II Connector DSUB-9 Male or COM2 RS232 DSUB-9 Female
- USB 90 degree connector x1
- COM1 RS232 DSUB-9 Female or DVI 29pin connector x1  
(DVI connector include VGA, LVDS LCD, USBx1, RS232(TX/RX))
- Power on/off Switch Pushbutton x1
- GPRS Antenna SMA type x1 (Female)
- GPS Antenna SMA type x1 (Female)
- Internal GPRS Module interface connector x1
- Interface OBD-II Module interface connector x1
- Internal IDE interface for DOM x1
- Internal GPIO 16Bits expand connector.(Option) x1

Note: For pin assignment information, please refer to the Appendices section.

## 4.2. OBD-II Connector

OBD-II was introduced in the United States on January 1, 1996, all cars and light trucks built and sold were required to be OBD II equipped (models built in late 1995 then on were OBD-II compliant).

There are two factors to identify if your vehicle is definitely OBD II equipped:

- 1) There will be an OBD II connector as shown in Figure 1A below, and
- 2) There will be a sticker note or nameplate under the hood indicating: "OBD II compliant".

### 4.2.1. The Physical Connector



FIGURE 1. SAE J1962 connector provides access to the diagnostic network

FIGURE 4.1 : SAE J1962 connector

### 4.2.2. The Connector Outline

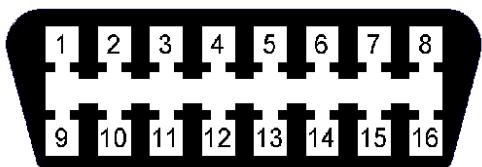


TABLE 4.1 OBD-II Pin Assignment

#### Pin Assignment

|        |                     |
|--------|---------------------|
| Pin 2  | - J1850 Bus+        |
| Pin 4  | - Chassis Ground    |
| Pin 5  | - Signal Ground     |
| Pin 6  | - CAN High (J-2284) |
| Pin 7  | - ISO 9141-2 K Line |
| Pin 10 | - J1850 Bus         |
| Pin 14 | - CAN Low (J-2284)  |
| Pin 15 | - ISO 9141-2 L Line |
| Pin 16 | - Battery Power     |

FIGURE 4.2 : OBD-II Connector

### 4.2.3. The Connector Pin Defined

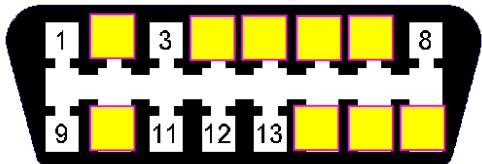


FIGURE 1C. shows the pin assignment used in compliant with OBD-II specification.

FIGURE 4.3 : OBD-II Connector Pin Defined

#### 4.2.4. Location of OBD-II connector

Look for your OBD-II under the dash and behind ashtrays. The OBD-II connector must be located within three feet (0.914 meter) of the driver, and must not require any tools to be revealed.

#### 4.2.5. Communications Protocol

The protocol used in vehicle varies for different manufacturers – the GM cars and light trucks use SAE J1850 VPW (Variable Pulse Width Modulation), while Fords use SAE J1850 PWM (Pulse Width Modulation). Chrysler products, all European and most Asian imports use ISO 9141 circuitry.

There are some variations among captive imports such as the Cadillac Catera, a German Opel derivative, which uses the European ISO 9141 protocol.

On 1996 and later vehicles, you can tell which protocol is used by examining the OBD II connector:

**TABLE 4.2 OBD-II Types Summary**

|                          |  |  |
|--------------------------|--|--|
| <b>SAE J1850 VPW</b>     | GM   | GM cars and light trucks: The connector should have metallic contacts in pins <b>2, 4, 5, and 16</b> , but <b>not 10</b> .   |
| <b>SAE J1850 PWM</b>     | Ford   | The connector should have metallic contacts in pins <b>2, 4, 5, 10, and 16</b> .   |
| <b>ISO 9141-2</b>        | Chrysler, all European and most Asian imports  | The connector should have metallic contacts in pins <b>4, 5, 7, 15, and 16</b> .   |
| <b>ISO 9141 protocol</b> | Cadillac and Opel  | Others like Cadillac Catera and German Opel have some variations with the connector pin assignment.  |
| <b>KWP2000</b>           | Similar to ISO 9141 protocol   | Daewoo, Hyundai, KIA, Subaru STi, and some Mercedes. Dual K-Line that supports bi-directional and unidirectional L-Line signal                                       |
| <b>KWP1281</b>           | Similar to ISO 9141 protocol with the exception of support for ABS and year 2002+ engines/ transmissions/ airbags  | Same as above. Dual K-Line that supports bi-directional and unidirectional L-Line signal   |
| <b>CAN</b>               | CAN is widely used in European vehicles and North American manufacturers. By strategy, newer GM vehicles is entirely based on the CAN protocol: GMLAN. Like J1939, OBD-II, J1587 & LIN: GMLAN is a higher level protocol (HLP) that is implemented on top of the hardware in software either on the host or the device hardware itself (firmware). | 2004 and newer Ford, Jaguar, Mazda, Mercedes, Nissan, and Toyota. GMLAN: CAN operates at speeds up to 1 Megabit - this is 100 times faster than a J1850 VPW network. |

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If your vehicle has this style connector, but doesn't have these pins populated, you probably have a pre-OBD-II vehicle. Adding to some other confusion, even having the connector with the contacts shown above is not a guarantee of OBD II compliance. This style connector has been seen on some pre-1996 vehicles which were not OBD II compliant.

# **Chapter 5**

## **5. Application**

### **5.1 Application Scope**

The AVL75 is highly integrated hardware device that provides communication and automation, which is built on the embedded WinCE O/S software, enabling the users to make the necessary modification, while achieving different industrial application.

AVL75 is equipped with the following external connectors – the GSM antenna connector, the GPS antenna connector, WIFI antenna connector, the RS232C connector, the power connector, and an internal SIM card holder connector.

Attaching the GSM/GPRS antennas, it would provide communication for vehicle security and monitoring. Whilst the RS232C connector is used for the interaction with personal computer (or with notebook) – for the configuration to the business enterprise in providing a stand-alone tracking operation mode. In some cases, GPS data collecting and the Map representation for user application can be done without GSM network.

### **5.2 Vehicle Security & Monitoring**

The security monitoring plays an important role for AVL. Most AVL suppliers integrate security connector with external sensors, like shock-sensor and microwave-sensor. Suppliers provide interfaces with a central lock of a vehicle, with a parking vehicle's lights, with the system of ignition's blockage and with the siren.

Such security interface may include control activities like:

#### **A. Inputs**

- o Sensor input (different ranges)
- o Opened/closed doors
- o Ignition wire

#### **B. Outputs**

- o External 433 MHZ RF Antenna
- o Ignition blockage
- o Siren output
- o Central Lock (close and open the doors),
- o Automotive Parking Lights
- o External LED
- o 12V power wires.

AVL75 can work independently without security control and other add-on components/parts. It needs no changing of the software, just remove the additional modules from the AVL unit.

# Chapter 6

## 6. Hardware Overview

The AVL Unit is a device, designed for Vehicle's Tracking and Guarding that transfers data from this device to the designated or assigned WEB server and transfer back using GPRS terminal for SMS (Short Message Service) or TCP/IP data transferring. Also the SMS messaging is organized in the stand-alone operation mode, i.e. data transferring toward and back to the user's mobile phone.

The AVL75 unit is organized on the principle of modular expandability.

A principal basic base module (Vortex86 CPU board) of the AVL75 represents a computer system, with other related communication and tracking module in the designated option electronic add-on modules..

**Table 6. AVL75 Parts and Modules**

| Model No. | PCB Board no. | Description                            |
|-----------|---------------|--|
| AVL-1     | DM38          | Auto Vehicle Locator (COM1/DVI Option) |
| AVL-2     | DM39          | AVL MC2 MC55/56 GPRS Modem Module      |
| AVL-3     | DM40          | AVL SIM200 GPRS Modem Module           |
| AVL-5     | DM42          | AVL OBD-II Module / XH78 EOBD/OBD-II   |

### 6.1. LED DESCRIPTION



**FIGURE 6.1 : Front panel LEDs overview**

The AVL unit is equipped with sixteen (16) LEDs, showing status of the unit during its period of functioning.

**TABLE 7. LED FUNCTION DESCRIPTION**

| Name | Description | LED color and status         | Name      | Description | LED color and status                      |
|------|-------------|------------------------------|-----------|-------------|---|
| D24  | Power       | Orange, Fixed                | D29       | OBD-II      | Green, Lit-On, Fixed                      |
| D25  | HDD         | Yellow, Blinking             | D30       | AUX1        | Green, Fixed (user defined)               |
| D26  | GPS         | Green, Blinking              | D31       | AUX2        | Green, Fixed (user defined)               |
| D27  | GPRS        | Green, Blinking              | LED1~LED4 | IN          | Green, Double-layer, GPIO Input, Blinking |
| D28  | WAKE        | Green, Blinking, Wake-On-LAN | LED1~LED4 | OUT         | Green, Double-layer GPIO Output, Blinking |

## 6.2. LED OPERATION

| Description | LED color and status | LED color and status   |
|-------------|----------------------|--|
| Power       | Orange (Fixed)       | Indicates that the power of the system is On.  |
| HDD         | Yellow (Blinking)    | Indicates when the HDD is reading and writing.   |
| GPS         | Green (Blinking)     | Indicates when the GPS is receiving the coordinates information.                                     |
| GPRS        | Green (Blinking)     | Indicates when the GPRS in the transceiving state.   |
| WAKE        | Green (Blinking)     | Wake-On-LAN – Indicates when the LAN is transmitting or receiving information.                       |
| OBD-II      | Green (Fixed)        | The LED is Lit-On when the OBD-II is connected to the diagnosis system for vehicle diagnostic check. |
| AUX1        | Green (Fixed)        | Indicates when the specified function is in activated in use or an error is detected.                |
| AUX2        | Green (Fixed)        | Indicates when the specified function is in activated in use or an error is detected.                |
| IN          | Green (Blinking)     | Double-layer LED showing active GPIO Input.  |
| OUT         | Green (Blinking)     | Double-layer LED showing active GPIO Output  |

### 6.3. EXTERNAL CONNECTOR SUMMARY

AVL75 Back panel comes in two versions: OBD2+DVI and OBD2+Serial port.

#### Back panel connectors

AVL75 Back panel comes in two versions: OBD2 + DVI and OBD2 + Serial port.

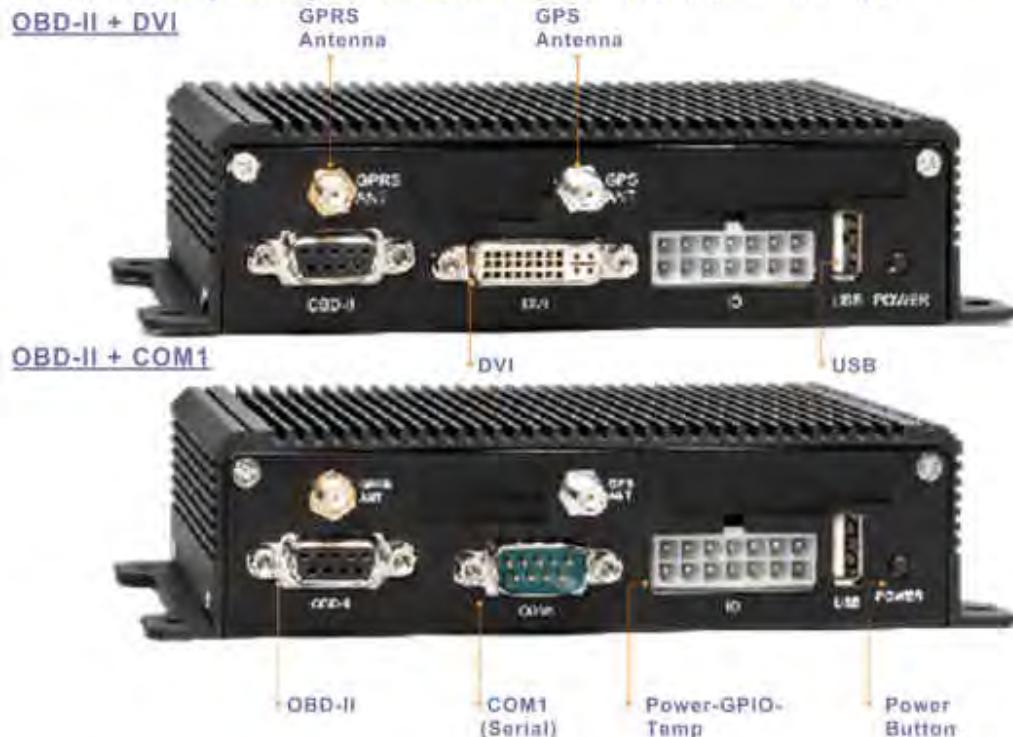


FIGURE 6.2 : Back panel connectors overview

TABLE 8. There are nine visible connectors and one power switch as follow:

|           |                                   |  |
|-----------|-----------------------------------|--|
| /J1(DM39) | FME connector (SMA)               | GSM Antenna attachment                         |
| J8        | SMA connector                     | COM3 / GPS Antenna attachment                  |
| J12       | RS232C connector                  | COM2 / GPS Data output (or ODB-II), select one |
| J2        | DVI connector                     | For DVD player display connection              |
| J17       | Double line, 7-Position connector | For Power source, GPIO connection              |
| J5        | USB Type A connector              | USB1.1 connection                              |
| S2        | 2-Pole push button switch         | Power switch                                   |

Note: For Pin Assignments, please refer to Appendix A for details.

# Chapter 7

## 7. General Hardware Specification

**AVL75** is the main operating hardware unit of the system is intended for installation in a vehicle. The main operating unit (**AVL75**) represents equipment for vehicle easy locating in the real time mode with the help of Internet based application software. With the help of security subsystem the costumer obtains a lot of possibilities to resist the hijacking of the vehicle. With the help of MapPoint© or OziExplorer© mapping software, or costumer's own scanned maps. it is very easy to locate the vehicles up to street level.

Note: MapPoint© and OziExplorer© are the copyright of Microsoft and Des Newman respectively.

**AVL has two versions with similar selective communication function:**

■ **First version: OBD2 + DVI**

**Selective communication: GPRS Modem and OBD2**



Figure 7.1A : AVL750MXB Front Panel



Figure 7.1B : AVL750MXB Rear Panel

■ **Second version: OBD2 + Serial port**

**Selective communication: GPRS Modem and OBD2**



Figure 7.2A : AVL750MXB Front Panel



Figure 7.2B: AVL750MXR Rear Panel

### 7.1. About AVL System

**The AVL75 unit consists of the following major feature:**

1. **GPS** Internal GPS receiver and active antenna;
2. **GSM** 3-band Internal GSM/GPRS module 850/1800/1900 MHz and antenna; selectable for another 3-band option module of 900/1800/1900 MHz
3. **OBD-II** Vehicle engine diagnosis
4. **Digital I/O** 4 digital outputs and 4 digital inputs;
5. **IDE Flash Disk** 32 Mbytes of EmbedDisk (upgradable)
6. **Flash** 512 Kbytes for data backup;
7. **RS232** RS232 interface for notebook/laptop connection;

# Chapter 8

## 8. SIM Card Installation

Make sure to place a SIM card of your GSM operator into the AVL75 SYSTEM properly, before in-vehicle installation. Follow these simple steps:

1. Cancel a PIN code query in your SIM card. You can cancel PIN code from your telephone menu. For different models, the procedure may vary, though generally Call Barring option is under: Settings / Security Settings / Access.
2. Make sure that GPRS service is activated - contact your GSM service provider.
3. Find out the exact GPRS service settings of your GSM operator.
4. Make sure there are enough funds on the GSM account

### 8.1. Steps for SIM card installation



Figure 8.1 : SIM card Lid cover

1. Make sure that the AVL unit is turned off.
2. With the rear panel facing you, turn the AVL unit upside down. See Figure 8.1.
3. At the upper end of the base, you can find a lid cover, unlock the screw with a philips screw driver.
4. Take off the lid cover, and you can find a conventional SIM card holder. See Figure 8.2.

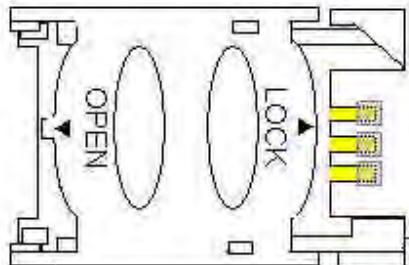


Figure 8.2 : SIM card holder overview (closed cover)

5. Using your index finger, push softly to the left, to uncover of the SIM card holder, according to the indicated "OPEN" direction, and then turn vertically upwards to the open position.

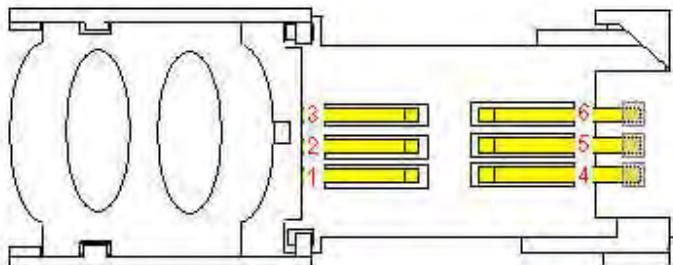


Figure 8.3 : SIM card

6. Get a SIM card from your GPRS service provider, as shown on the Figure 8.3.



7. Prepare to install your SIM card, by turning the card to the position where the cut is facing the correct orientation of the SIM card holder (See Figure 8.4).

Figure 8.4 : SIM card orientation



Figure 8.5 : SIM card gold fingers contact

8. The gold fingers contact of the SIM card must be touching the contact pins bay of the SIM card holder.

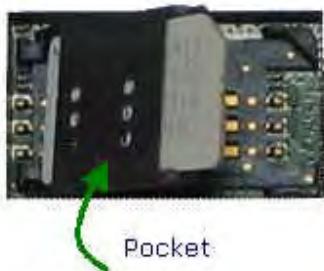
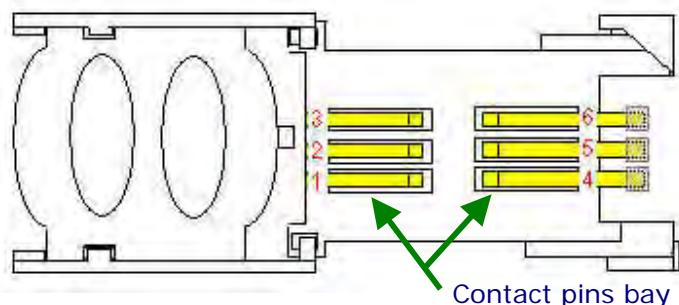


Figure 8.6 : SIM card holder pocket

9. Use the tweezers to avoid the printed circuit board's damage, insert gently the SIM card into the SIM holder of the GSM modem module according to the picture.

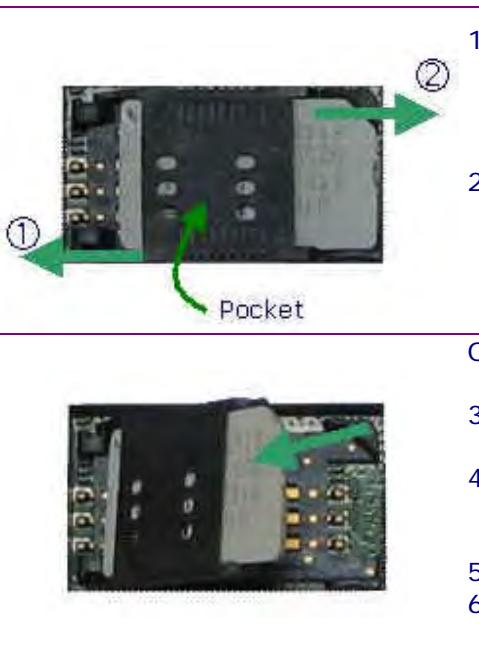
10. Slide the SIM card to the pocket of the SIM card holder.



Figure 8.7 : SIM card holder closed

11. Push the pocket downwards parallel to the contacts of the SIM holder. And slowly push the pocket to the right position with your fingers until the pocket is hold upright and locked.

## 8.2. Reverse procedure for replacing a SIM card



1. To open the SIM card holder, using your fingers, push the plastic lid to the left position, and flip-up to open.  
Indication as ① Push to the left, then ② Hold the lift upwards.
2. Remove the old SIM card by pulling out the SIM card from the pocket.

Or

3. Replace with a new SIM card by following the Installation procedure in section 8.1.
4. Use the tweezers to avoid the printed circuit board's damage, insert the SIM card into the SIM holder of the GSM modem module according to the picture.
5. Slide the SIM card to the pocket of the SIM holder.
6. Attach the front panel back, be aware of unit's internal wires disposition; do not squeeze the wires.

# **Chapter 9**

## **9. Software Support**

DMP provides the AVL75 hardware solution to the software developers who will develop the A/P and SQL database for AVL system.

### **9.1 Summarizing the AVL software**

AVL software is divided into 3 categories, namely:

1. Database server and data transmission server
2. Backstage control software
3. AVL client point software.

### **9.2. Database and Data transmission server**

When the AVL client is hooked up online, the data transmission server would first access to the database to capture the information, then these data is delivered to the client end, and the AVL client will gather all the needed information and write back to the database in return.

### **9.3. Backstage control management program**

We suggest to use MDI method to convert and write a program (this single program can open many map windows/GUI), at the same time, read & retrieve database.

- 9.3.1. This is a new addition of the current windows browsing situation (MAP interface), can either select single task windows fix locked, or free view mode.
- 9.3.2. New history information broadcast on the windows site.
- 9.3.3. All client points history and status summary.

With regards to the client end settings, the backstage program will manage the control. After the user managed the program settings, he can send the information to the internet for transmission or transport (remit) to a USB flash memory, then update the client end settings again.

Setting parameters detailed contents are as follows:

1. GPI Event monitoring setting, can be set as GPI event touch off for power-on time and request for report back of the content of the data. We can also set GPO touch off time and length.
2. Wake on Ring setting, can be set as Wake on ring event touch off for power-on time and request for report back of the content of the data. We can also set GPO touch off time and length.
3. Wake on timer setting, can be set as Wake on timer event touch off for power-on time and request for report back of the content of the data. We can also set GPO touch off time and length.
4. OBD-II monitoring setting, can be set as retrieving of OBD-II condition establishment touch off for power-on time and request for report back of the content of the data. We can also set GPO touch off time and length.
5. Coordinates monitoring setting, we can set a single client end to move the coordinates within the coordinates scope, if it is over the range, it will report back and set GPO touch off time and length.
6. Automobile single-stop monitoring is over the limit of monitoring manageable time, can be set to report back of information, and can also set GPO touch off time and length.
7. Can set partial data transfer to another specific AVL client, or pre-call action.  
As far as backstage software, it can be set as password necessary for use, then multiple password with different authority level (for example, client end is set to monitor the completeness of data).

### **9.4. AVL Client software part**

In accordance to setting and the selection with added decision, and these parameters must report back to the data transmission server.

## **9.5. Principles of operation**

After the installation with the necessary set-up, the AVL75 will start to work immediately. As soon as the internal GPS receiver catches the GPS signals, the device starts to form the packets with the geographical coordinates.

If your local place is covered by GSM provider, the unit will periodically transfer the data with vehicle's tracking movement history, according to the setting that were set up by the client AVL application software.

All the vehicle-tracking records are stored in a database accessible through the Web. The control can check and query any period of vehicle tracing history at any moment round the clock, 24 hours per day. With the help of a mapping software, the vehicle location could be displayed in the real time mode any time up to street level.

The AVL unit's location could be updated in one minute, if vehicle is traveling in areas covered by GPRS service (up to 5 minutes if GPRS service is not provided by GSM operator and the data could be transferred by SMS)\*.

Tracing records are displayed in a Mappoint® mapping window showing the direction of movement. You could display the tracing records for any period of time. By using the scanned map images the clients have a possibility to locate their vehicles in areas not covered by Mappoint© mapping software. A simple Map Matching Method allows the user easy to create own maps.

In addition, GPS data coded in standard of NMEA 0183 can be outputted via RS232 interface, allows the connection to the notebook/laptop to get GPS data immediately with the help of mapping software. A wide range of mapping software has a GPS receiver support (for example, Microsoft Streets&Tips, MapPoint, OziExplorer)

## **9.6. System software Overview**

The System Software provides an interface between your PC and a Global Automatic Vehicle Location (AVL) system. Using the software you may locate your vehicle at any moment round the clock, 24 hours per day. You may display the vehicle tracing records for any period of its movement at a detail maps up to street level. The AVL software provides capability of remote system parameters settings. Vehicle's tracing records are automatically stored on a Database. In additional AVL software provides possibility of remote security system managing.

### **9.6.1. Installation**

Minimum System Requirements for AVL software:

- Operating Systems: Windows CE/Embedded XP(Recommended);
- 166 MHz Intel Pentium processor or equivalent;
- 128 MB RAM (recommended);
- 32 MB available flash disk space.

Note: MapPoint© and OziExplorer© are the copyright of Microsoft and Des Newman respectively.

# Chapter 10

## 10. Protocol & Drivers

DMP provides protocols and drivers to application software developers, for the development of their required application software for vehicle management and communication. In this chapter, we posted several examples, to aid and to assist your development for the required function.

### 10.1. SRAM Driver

To utilize the SRAM, please extract the ZIP file: SRAMDISK\_20060127, as shown on the directory list below:



Open the readme file and follow the steps:

----- AVL SRAM DISK driver for WIN CE 5.0 -----

how to install:

1. please copy cesramdisk.exe and sramdisk.dll into

PBWorkspaces\\$(WORK SPACE NAME)\WINCE500\\$(PLATFORM NAME)\OAK\files\

2. modify project.bib, add these lines

```
cesramdisk.exe $_FLATRELEASEDIR\cesramdisk.exe NK S
sramdisk.dll $_FLATRELEASEDIR\sramdisk.dll NK S
```

3. modify project.dat, add this line

```
; sram disk loader
Directory("\Windows\Startup"):-File("cesramdisk.exe", "\windows\cesramdisk.exe")
```

4. sysgen your work space and download image to device,
you will get a new folder name called "SRAM Disk", the disk size will be 504K bytes

There are 512KB SRAM for data backup on AVL. The data can be kept for 7+ days with special battery when AVL lose power. SRAM also can use as buffer for flash disk to enlarge life cycle. In order to make it easy to use, we provide SRAM driver for Windows CE. After adding SRAM driver into Windows CE, SRAM will work as a folder. What programmers have to do is use standard API to read/write files.

End-of-SRAM Driver

## 10.2. Using GPIO on AVL

The GPIO on AVL is from Winbond W83697UF. W83697UF is the LPC (Low Pin Count) interface chip and it also provides 60 GPIO pins. Those 60 GPIO pins are divided into 8 ports. Here are the GPIO usage and description on AVL:

**Port 2, map to I/O address 610H.**

| Port Pin ID | Type   | Bit  | Function                                    |
|-------------|--------|------|---|
| Port20      | Output | Bit0 | "OUT1" LED on AVL panel (Low Active)        |
| Port21      | Output | Bit1 | "OUT2" LED on AVL panel (Low Active)        |
| Port22      | Output | Bit2 | "OUT3" LED on AVL panel (Low Active)        |
| Port23      | Output | Bit3 | "OUT4" LED on AVL panel (Low Active)        |
| Port24      | Output | Bit4 | MC55/56 GPRS Power On control (Low Active)  |
| Port25      | Output | Bit5 | MC55/56 GPRS Power Off control (Low Active) |
| Port26      | Output | Bit6 | Reserved                                    |
| Port27      | Output | Bit7 | Reserved                                    |

**Port 3, map to I/O address 611H.**

| Port Pin ID | Type  | Bit  | Function  |
|-------------|-------|------|---|
| Port30      | Input | Bit0 | Read IN0 status. The status connects to "IN1" LED |
| Port31      | Input | Bit1 | Read IN1 status. The status connects to "IN2" LED |
| Port32      | Input | Bit2 | Read IN2 status. The status connects to "IN3" LED |
| Port33      | Input | Bit3 | Read IN3 status. The status connects to "IN4" LED |
| Port34      | Input | Bit4 | Low indicates GPRS modem is power ON              |
| Port35      | Input | Bit5 | GPRS module type ID                               |
| Port36      | Input | Bit6 | GPRS module type ID                               |
| Port37      | Input | Bit7 | GPRS module type ID                               |

**Port 4, map to I/O address 612H.**

| Port Pin ID | Type  | Bit  | Function                                |
|-------------|-------|------|---|
| Port40      | Input | Bit0 | Reserved                                |
| Port41      | Input | Bit1 | Reserved                                |
| Port42      | Input | Bit2 | Reserved                                |
| Port43      | Input | Bit3 | Reserved                                |
| Port44      | Input | Bit4 | Reserved                                |
| Port45      | Input | Bit5 | Reserved                                |
| Port46      | Input | Bit6 | High indicates OBD-II module is plugged |
| Port47      | Input | Bit7 | High indicates OBD-II cable is plugged  |

**Port 8, map to I/O address 400H.**

| Port Pin ID | Type   | Bit  | Function                       |
|-------------|--------|------|--------------------------------|
| Port80      | Output | Bit0 | Output to OBD-II LED (Option)  |
| Port81      | Output | Bit1 | Output to AUX1 LED             |
| Port82      | Output | Bit2 | Output to AUX2 LED             |
| Port83      | Output | Bit3 | LVDS shutdown control (Option) |
| Port84      | Output | Bit4 | Reserved                       |
| Port85      | Output | Bit5 | Reserved                       |
| Port86      | Output | Bit6 | Reserved                       |
| Port87      | Output | Bit7 | Reserved                       |