

PENTA L User Manual



mobileView

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1 INTRODUCTION




Figure 1: PENTA L

The *MobileView™* PENTA L digital recorder is the central on-vehicle security recorder and controller that integrates the vehicle’s video and audio security surveillance system with other vehicle parameters and systems, including:

- Vehicle location tracking
- Driver analysis
- Passenger information systems
- Infotainment, including advertising and public information
- Vehicle operational parameters, including engine data

The PENTA L can be used with centralized systems:

- Real-time vehicle monitoring
- Surveillance data storage, automatic data retrieval and management
- Vehicle fleet management
- Schedule adherence and route management
- Equipment maintenance, call center and fleet support services

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1.1 PURPOSE AND SCOPE

This manual is intended for use by PENTA L installation and first-line maintenance staff.

This scope of this manual is to describe how to:

- Connect power, cameras, audio and vehicle data to the PENTA L
- Retrieve data from the PENTA L
- Configure the PENTA L
- Confirm that the PENTA L is operating correctly
- Perform basic troubleshooting and storage drive replacement

This manual does not include:

- Transit vehicle security system wiring and interconnections
- Transit vehicle security system troubleshooting
- Full descriptions of the UTC *Fleet Manager* or the UTC *Video Manager*. This information is provided in the respective manuals.

No testing or work procedures described in this document are intended to replace the role of a qualified UTC technician. Any activities undertaken on the PENTA L beyond the scope of this document may risk voiding the warranty of the system and its components.

To use this document effectively, you should have the following minimum qualifications:


- A basic knowledge of transit vehicle security systems and components.
- A minimum knowledge and competency in the use of the *Microsoft Windows* operating environment.
- Knowledge of computer networking including workgroups and IP addresses may be required to connect and to access remote PENTA Ls.

NOTE: A qualified service person, complying with all applicable codes, should perform all required hardware installation.

1.2 COMPUTER SYSTEM REQUIREMENTS

When connecting the PENTA L to a laptop or desktop computer system, the minimum requirements of this computer system are:

- **Computer operating system and support software:**
 - *Microsoft Windows XP 32-bit, Windows Vista Business 32-bit, or Windows 7/8 Professional 32/64-bit*
 - *Microsoft .NET Framework SP1.1 and 2.0*
- **Computer hardware:**
 - Intel CPU, Core 2 duo 1.86 GHz or better
 - Intel 945 graphics GPU or equivalent
 - 2 GBytes RAM minimum, 4 GBytes recommended
 - 20 GByte hard disk space (60 GByte recommended)
 - DVD-RW drive
- **SVGA monitor:** minimum 1028 x 768 pixel resolution

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1.3 TERMINOLOGY

Table 1 provides a list of the terms, acronyms and abbreviations used in this document.

Table 1: Terms, Acronyms and Abbreviations

Term	Definition
3G	3 rd Generation, or the third generation of mobile telecommunications technology that complies with international standard IMT-2000.
AVC	Advanced Video Coding
CE	The CE mark is a mandatory conformity marking for products placed on the market in the European Economic Area, with the manufacturer declaring that the product conforms with the essential requirements of the applicable EC directives.
CCTV	Closed Circuit TV
CIF	Common Intermediate Format: A video resolution format, where the standard resolution is 352 x 288 pixels.
DE-15 connector	A 15-pin electrical connector, using a D-shaped subminiature shell. Commonly used for VGA and SVGA connections.
DHCP	Dynamic Host Configuration Protocol: Network protocol used to configure network devices to communicate on an IP network.
DIG	Digital
EDGE	Enhanced Data rates for GSM Evolution: A digital mobile phone technology that allows improved data rates for GSM. Considered pre-3G.
fps	Frames Per Second
GB	Gigabyte, one thousand million bytes of data, or 10 ⁹ bytes.
GND	Ground connection
GPS	Global Positioning System: a navigational system involving satellites and computers that can determine the latitude and longitude of a receiver on Earth by computing the time difference for signals from different satellites to reach the receiver.
GSM	Global System for Mobile communications: A set of standards that define 2 nd generation (2G) protocols for mobile phone networks.
H.264	A ITU-T standard for recording, compression and distribution of high-definition video. Same as ISO/IEC MPEG-4, Part 10.
HDD	Hard Disk Drive
HDMI	High-Definition Multimedia Interface: a compact audio/visual interface for transferring digital audio/visual data from a HDMI-compliant device to a compatible device.
HSPA	High Speed Packet Access: Amalgamation of two previous mobile network protocols that extends and improves the performance of 3 rd generation mobile telecommunications networks using W-CDMA protocols.
IEEE	Institute of Electrical and Electronics Engineers: A not-for-profit professional association that is one of the main publishers of international electronic standards.
I/O	Input/Output
IP	Internet Protocol: Primary network protocol used on the Internet.
LAN	Local Area Network
LCD	Liquid Crystal Display
LED	Light Emitting Diode
Local PENTA L	A physically-localized PENTA L.
MDR	Mobile Data Recorder
MPEG	Moving Picture Experts Group. Mainly used to refer to a type of multimedia file, using file extensions “.mpg” or “.mpeg.” These files are compressed movies that can contain both

Term	Definition
	audio and video.
MPEG-4	The ISO/IEC AVC standard for recording, compression and distribution of high-definition video. Part 10 is the same as ITU-T H.264.
ms	Milliseconds, or one thousandth of a second.
nc	No Connection
NC	Normally Closed (Contact)
NO	Normally Open (Contact)
NTSC	National Television System Committee: A TV analog system used in North America and other countries.
OC	Open Connection
PAL	Phase Alternating Line: A TV analog system used in Europe, Australia and other countries.
PC	For the purpose of this manual, refers to a desktop or laptop computer running a <i>Microsoft Windows XP</i> or <i>Windows 7</i> operating system and installed with the relevant application(s).
pixel	Picture element: A physical point in a raster image, or the smallest addressable element in a display device.
Remote PENTA L	A PENTA L connected via a network.
RF	Radio Frequency
RJ45	Registered Jack 45: Modular connector standard for telephone or Ethernet cables.
RoHS	Restriction of Hazardous Substances Directive: A European Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
RS-232	A serial single-ended communication interface standard. Commonly used for PC serial interfaces.
RxD	Received Data: RS-232 connection for data from device to terminal.
SMA	A small 50-ohm coaxial RF connector.
SSD	Solid-state drive: A data storage device that uses integrated circuit assemblies to store non-volatile data.
SVGA	Super Video Graphics Array: A video standard, nominally 800 x 600 pixels.
TB	Terabyte, 1000 Gigabytes or 10 ¹² bytes.
TNC	Threaded Neill-Concelman: A threaded version of the 50-ohm Bayonet Neill-Concelman (BNC) RF connector.
TxD	Transmitted Data: RS-232 connection for data from terminal to device.
UMTS	Universal Mobile Telecommunications System: A 3 rd generation (3G) mobile cellular system for GSM networks. Uses W-CDMA.
USB	Universal Serial Bus: A standard that defines the cables, connectors and communications protocols used for connection, communication and power supply between computers and electronic devices.
UTC	UTC Building & Industrial Systems, A United Technologies Company
VDC	Volts Direct Current
VGA	Video Graphics Array: A video standard, nominally 640 x 480 pixels.
Viewer	Refers to the UTC <i>Video Manager</i> software incorporating the Video Editing features.
W-CDMA	Wideband Code Division Multiple Access: A wireless 3G mobile telecommunications standard. Used to achieve higher speeds and support more users. Used in UMTS systems.
Wi-Fi	A WLAN communications medium that allows two devices to communicate wirelessly, based on IEEE 802.11 standards.
WLAN	Wireless LAN

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2 PENTA L INSTALLATION

2.1 TOOLS AND MATERIAL REQUIRED

The following tools and materials may be required for the various tests and maintenance procedures in this document:

- PENTA L Drive caddy key
- Laptop or computer and LAN cable (where on-vehicle analysis is required)
- Hand tools including screwdrivers, sockets, wire cutters, pliers and cordless drill
- Cleaning products including mild soap, microfiber cloths, isopropyl alcohol and compressed air

2.2 INSTALLATION CONSIDERATIONS

The following points should be considered when selecting a suitable location:

- Avoid exposing the unit to extreme heat or cold conditions. It is recommended that the unit not be installed where it will be exposed to direct sunlight.
- Ensure that the installation location will provide the required environmental conditions of heat, humidity and dust to meet design specifications.
- Ensure that there is free flowing air around the PENTA L and if installed inside an enclosure that adequate ventilation is provided.
- Ensure that the ventilation holes on the sides of the PENTA L are not obstructed.
- Ensure that the Vibration Mounting Cradle is free from obstructions and is able to move freely in all directions on the four shock dampening feet as well as the side latches. It is recommended that a minimum clearance of 1" be provided between the PENTA L and the nearest surface.
- Ensure that the PENTA L vibration mounting cradle is used and installed correctly for all mobile installations where the unit will be exposed to vibration and shock conditions.
- Avoid installing the unit where moisture, dust and smoke are evident.
- Keep the unit away from areas where strong magnetic fields exist.
- Ensure that all power cables and feeds to the unit are suitably fused, are of suitably high grade and are of the correct specification for the purpose.
- Ensure that the power source used for the PENTA L is reliable, is of good supply quality and that the PENTA L will not be affected by other devices sharing the same power source.
- Always ensure that the installation is carried out in accordance with all relevant design standards and regulations.

2.3 MOUNTING

See Figure 2 and Figure 3. Securely fasten the PENTA L to a mounting surface using the **four** mounting bracket holes, drill size #16 (11/64”).

It is recommended that **four** #8 x 3/4” machine screws are used, together with a flat washer under a Nylock® nut. All items should be stainless steel, either 304 or 316.



Figure 2: PENTA L Mounting

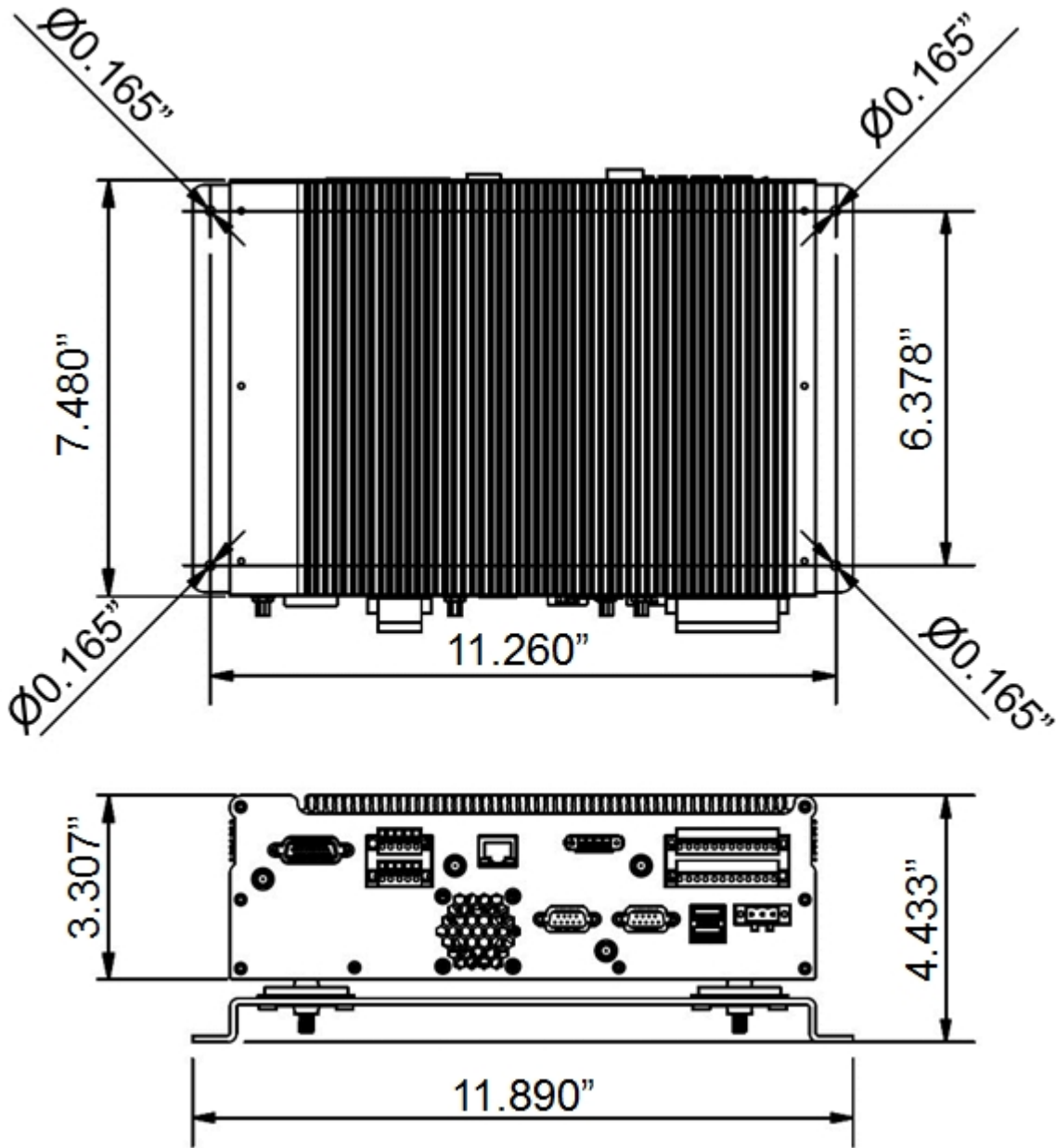


Figure 3: PENTA L Mounting Dimensions

2.3.1 PENTA L Mobile Data Recorder Front Panel Features

Figure 4 shows the front panel features of the PENTA L.

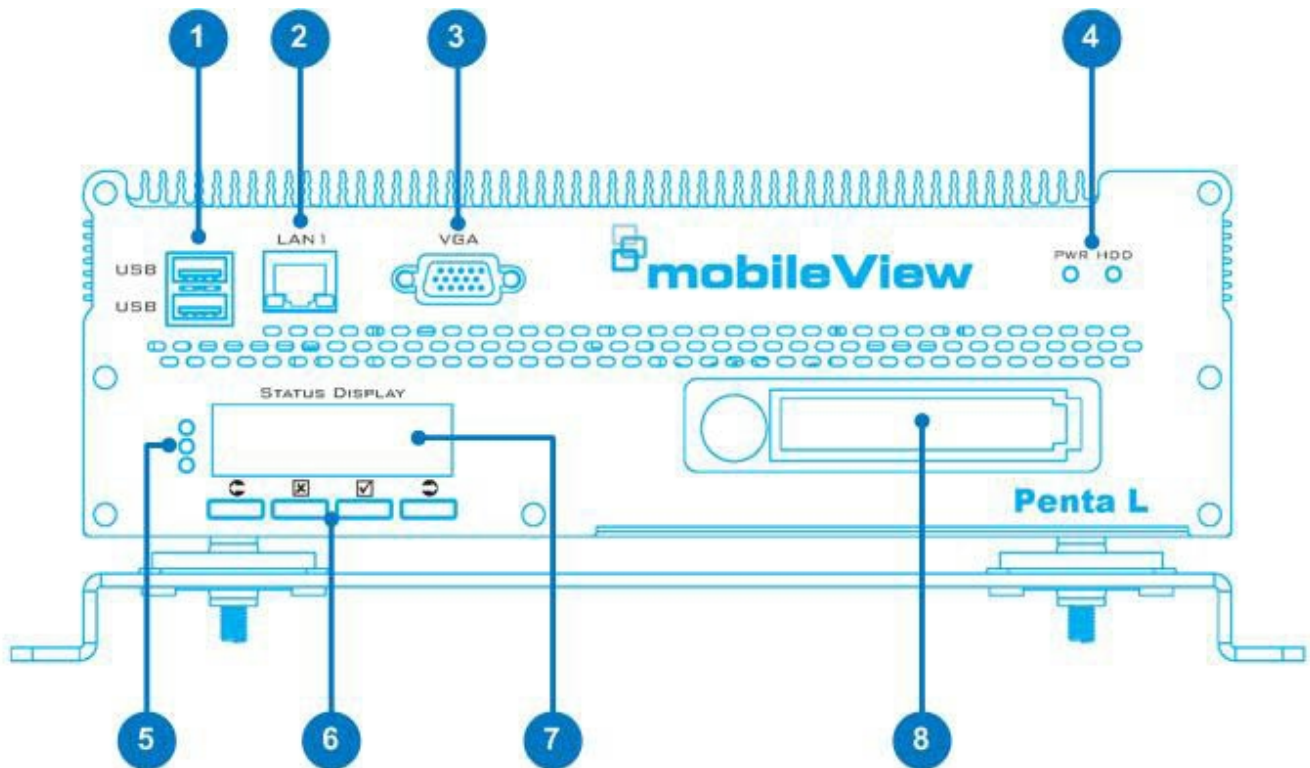


Figure 4: PENTA L Front Panel

Nbr	Feature	Description
1	USB	Dual USB 2.0 ports for mouse and keyboard
2	LAN 1	LAN port 1 for fixed connection to viewer laptop
3	VGA	SVGA video output (DE-15 connector)
4	PWR HDD	Status LEDs for power and HDD activity
5	LEDs	For future use: not operational
6	Navigation buttons	Menu navigation and selection
7	Status Display	System LCD screen to display system status
8	Removable drive caddy	Lockable removable drive caddy containing Hard Disk Drive (HDD)

2.3.2 PENTA L Mobile Data Recorder Rear Panel connections

Figure 5 shows the rear panel connections.

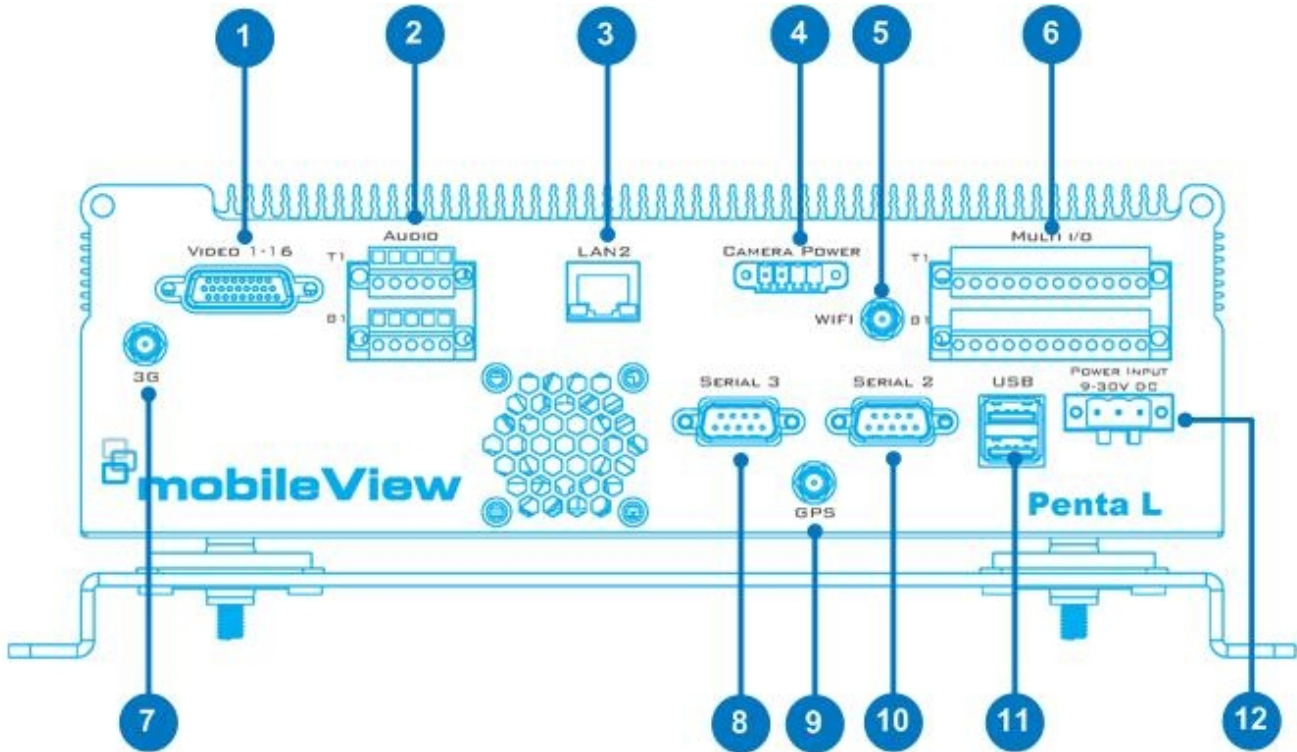


Figure 5: PENTA L Rear Panel

Nbr	Feature	Description
1	VIDEO 1-16	Video inputs for up to 16 cameras
2	AUDIO I/O	T1: Audio in left and right; B1: Audio out left and right
3	LAN 2	LAN port 2 for DHCP connection
4	Camera Power	12 volt power output connector for cameras
5	WiFi	External Wi-Fi antenna connection (Reverse SMA)
6	MULTI I/O	Multiple inputs and outputs for system connections
7	3G	External 3G antenna connection (SMA)
8	Serial 3	RS-232 for external serial devices, i.e. accelerometer or GPS
9	GPS	External GPS antenna connection (SMA)
10	Serial 2	RS-232 for external serial devices for vehicle GPS
11	USB	Dual USB 2.0 ports for mouse and keyboard
12	Power Input 9-30V DC	PENTA L power input: 9-30VDC

2.3.3 PENTA L External Connections

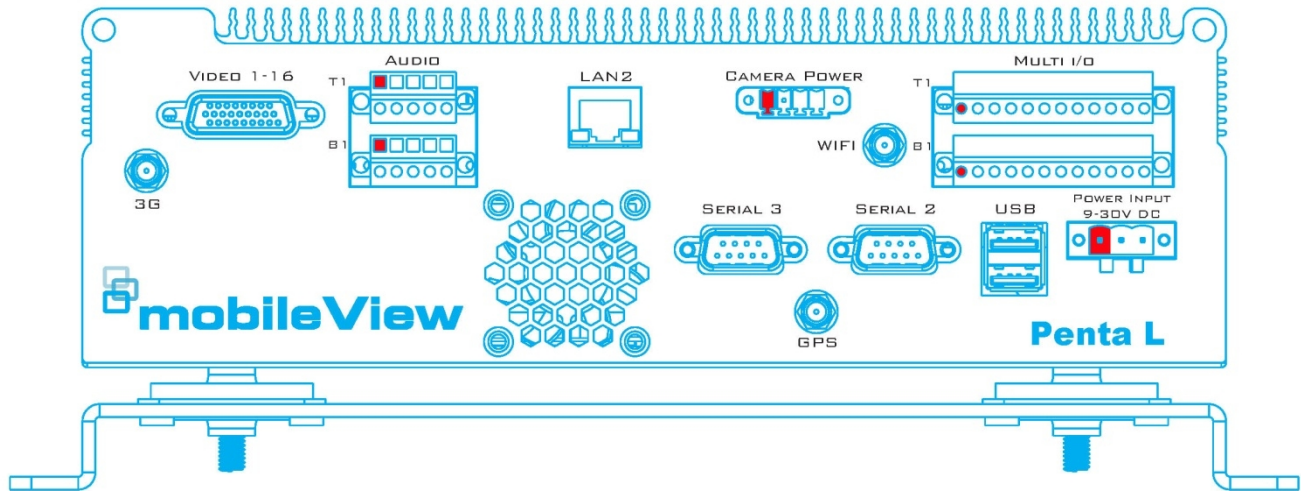


Figure 6: PENTA L Rear Panel Connections

Table 2: PENTA L Rear Panel Connections

	Power Input	AUDIO		Camera Power	Multi I/O	
		Top T1	Bottom B1		Top T1	Bottom B1
Pin 1	Ignition	Audio In R	Audio Out R	GND	Relay 2 NC	Relay 1 NC
Pin 2	Power -ve			GND	Relay 2 C	Relay 1 C
Pin 3	Power +ve	Audio GND	Audio GND	12V Out	Relay 2 NO	Relay 1 NO
Pin 4		Audio In L	Audio Out L	12V Out	OC Out 2	Camera LED
Pin 5		Audio GND	Audio GND		OC Out 1	Software LED
Pin 6					+12V Out	Analog In 2
Pin 7					+12V Out	Analog In 1
Pin 8					GND	DIG In 4
Pin 9					GND	DIG In 3
Pin 10					GND	DIG In 2
Pin 11					GND	DIG In 1
Pin 12					COM6 RxD	COM6 TxD

3 PENTA L CONNECTIONS

Connection types: You can connect to the PENTA L by:

- Connecting a keyboard, mouse and display directly to the PENTA L.
- Connecting a Laptop or desktop computer to the PENTA L using the LAN connections.
- If these options are installed in either the transit vehicle or PENTA L, remote connection via either:
 - Wireless LAN (WLAN)

3.1 LOCAL CONNECTION VIA KEYBOARD, MOUSE AND DISPLAY

Figure 7 shows how to connect a Laptop or desktop computer to a local PENTA L for downloading and configuration purposes, using the Laptop/Desktop computer's USB connections.

Keyboard and Mouse: Connect the Laptop/Desktop computer's keyboard and mouse to either the PENTA L front panel or rear panel LAN connection USB connections. Any one of the four USB ports on the PENTA L can be used.

Video connection: From the PENTA L's VGA output connection to a standard SVGA monitor.

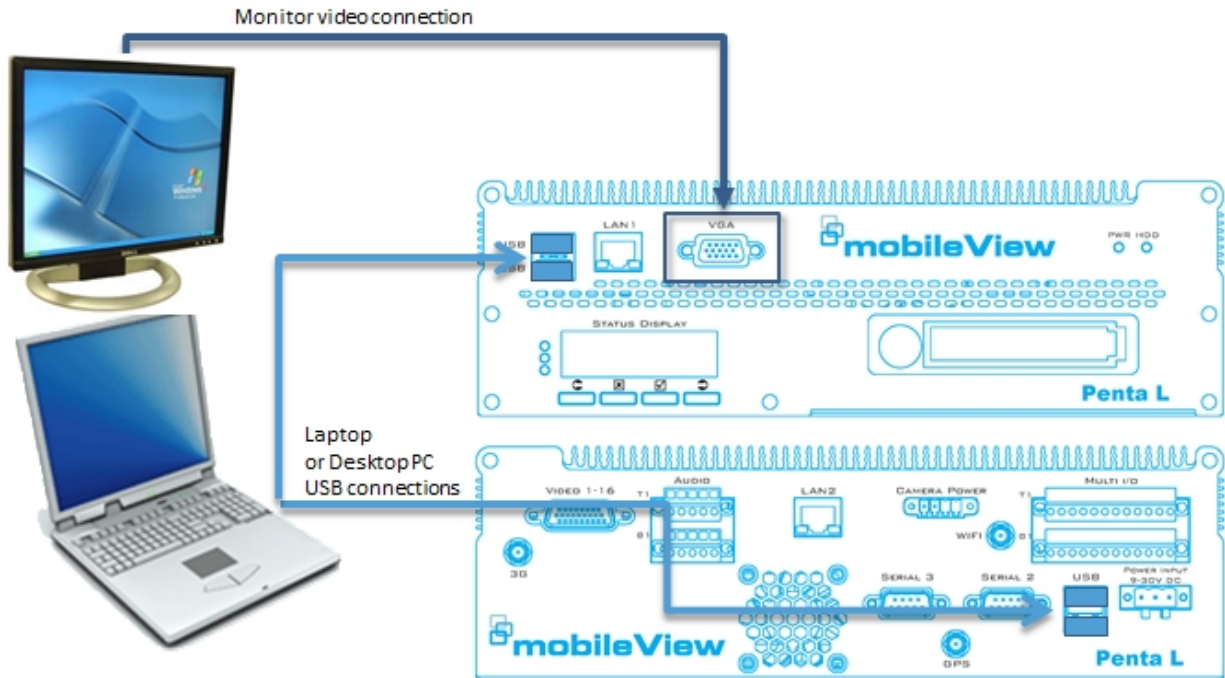


Figure 7: PENTA L Desktop Computer USB/Video Connections

Logon to the PENTA L using your username and password.



3.2 LOCAL CONNECTION VIA LAN

LAN connections can be used for:

- PENTA L to Laptop or Desktop computer, for PENTA L configuration, together with *Video Manager*.
- PENTA L to Laptop or Desktop computer, for PENTA L software downloading.
- *Video Manager* to PENTA L (locally or remotely), for PENTA L camera checks.
- A Remote Desktop Session to PENTA L (locally or remotely), for advanced configuration, advanced troubleshooting, software and firmware upgrades.
- IP camera connections.
- External Wi-Fi unit connection.
- External GPS module connection.

Figure 8 shows how to connect a Laptop/Desktop computer to a local PENTA L for downloading and configuration purposes. Using a normal Ethernet LAN cable, connect the Laptop/Desktop computer's LAN connection to either the PENTA L front panel or rear panel LAN connection.

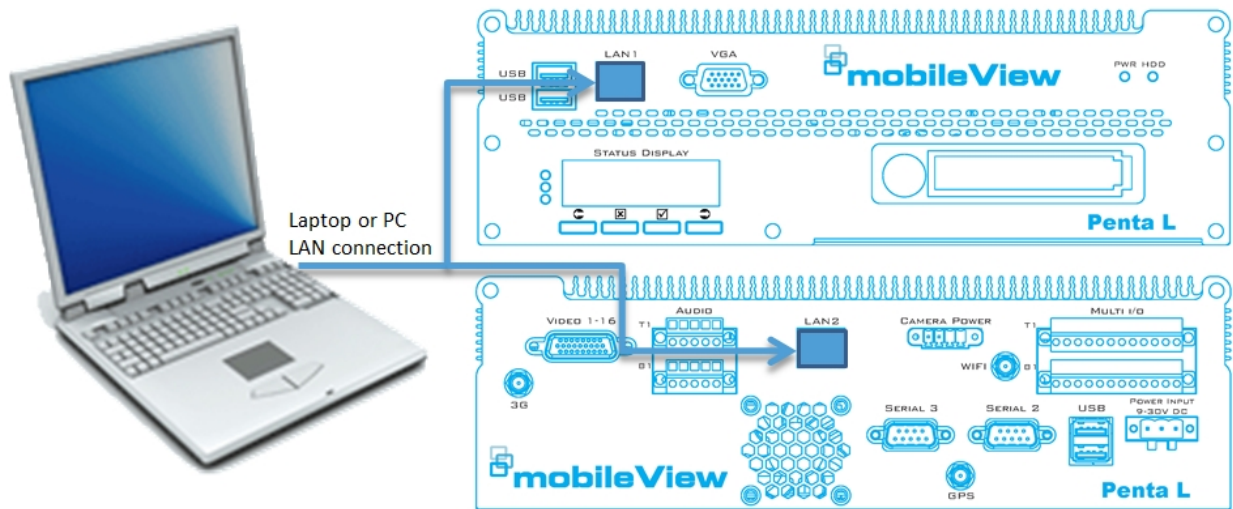


Figure 8: PENTA L Laptop or Desktop Computer LAN Connections

3.2.1 Front and Rear Panel LAN Port Differences

Front panel LAN ports: Normally a laptop or desktop computer is connected to the front panel LAN ports, which have fixed IP addresses.

- **PENTA L:** IP Address **192.168.0.100**, Subnet **255.255.255.0**.
- **Laptop/Desktop computer:** An IP address in the same subnet e.g. **192.168.0.101**; Subnet **255.255.255.0**.

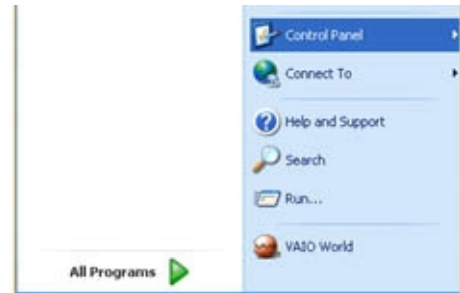
See Sections 3.2.2 and 3.2.3 for details on how to connect the PENTA L front-panel LAN ports to a laptop or desktop computer.

Rear panel LAN ports: The rear-panel LAN ports are set to normally use Dynamic Host Configuration Protocol (DHCP), so expect to receive their IP addresses from a server.

These ports are normally used to connect to IP cameras. When IP cameras are to be connected to these ports, the port setup will need to be changed to use a fixed IP address. See Section 3.2.4 for details on how to change this LAN connection.

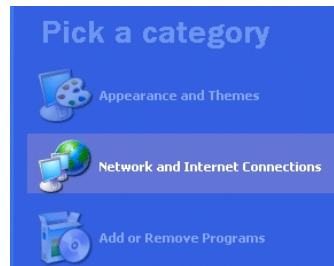
3.2.2 Windows XP LAN Connection Process

1. Click on Windows **Start** button.
2. Click on **Control Panel**.



3. Select **Network and Internet Connections**, using either normal or Classic view.

Normal view:

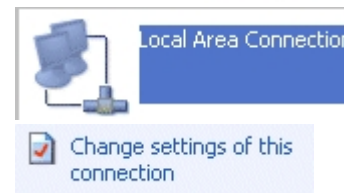


Then click  **Network Connections**

Classic view:



4. Click on the LAN connection you want to change.



5. Select **Change settings of this connection**.

6. In the **General** tab, click on **Internet Protocol (TCP/IP)**.
7. While still in this tab, click on the **Properties** button.
8. Click on the **Use the following IP address** radio button, then enter the IP address and Subnet mask values as shown:
9. Click **OK**, then **Close**.



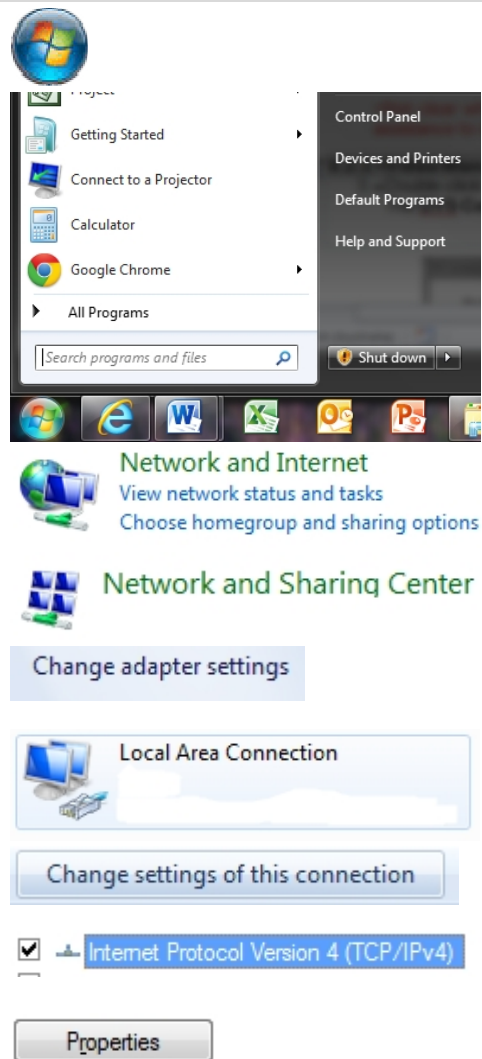
Use the following IP address:

IP address:

Subnet mask:

3.2.3 Windows 7 LAN Connection Process

1. Click on Windows **Start** orb.
2. Click on **Control Panel**.
3. Select **Network and Internet**.
4. Click on **Network and Sharing Center**
5. Click on **Change adapter settings** in the left-hand column.
6. Select **Local Area Connection**.
7. Select **Change settings of this connection** on the top toolbar
8. In the **Networking** tab, Select **Internet Protocol Version 4 (TCP/IPv4)**.
9. While still in this tab, click on the **Properties** button.



10. Click on the **Use the following IP address** radio button, then enter the IP address and Subnet mask values as shown:

Use the following IP address:

IP address:

Subnet mask:

11. Click **OK**, then **Close**.

12. To confirm that the LAN connection is working, double-click on the **Local Area Connection** and check the **Activity** for packets sent and received.



13. Close the **Network Connections** window by clicking on the  button.

3.2.4 Changing PENTA L Rear LAN Port Settings

1. Connect a keyboard, mouse and display to the PENTA L as detailed in section 3.1.
2. Click the **Windows start** button, select **Settings** then **Control Panel**. Go to Step 4.

OR

3. Find the LAN **Rear Port** icon on the bottom right-hand taskbar, right-click on this icon, select **Properties** and click on **Open Network Connections**. Go to Step 5.
4. Double-click on **Network Connections**.



5. Right-click on the **Rear Port** icon and select **Properties**.
6. Scroll down and select **Internet Protocol (TCP/IP)**.
7. Click on the **Properties** button.



8. Click on the **Use the following IP address** radio button, then enter the IP address and Subnet mask values as shown:
9. Click **OK**.

Use the following IP address:

IP address:

Subnet mask:

Default gateway:

10. If you enter a Host address that is already used, the screen will display a warning message to abort the change and try another Host address. Click **No** to abort the change repeat steps 6 to 9 with another Host address.



NOTE: Other Host addresses other than 110 can be used, as long as the address is not the same as the connecting computer Host address.

11. Click **Close**

3.3 CONNECTING TO VIDEO MANAGER

Used for:

- PENTA L configuration.
- To check the stored data or real-time vehicle monitoring.

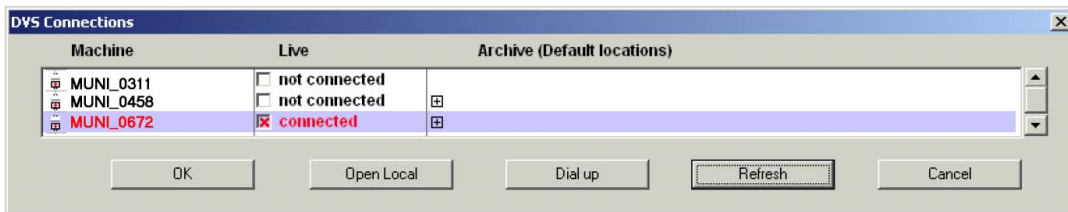
Connections can be either:

- **Local** using a direct LAN connection between the computer with *Video Manager* and PENTA L
- **Remote** using:
 - A LAN connection via a router/server and Internet.
 - A Wireless LAN (WLAN) Wi-Fi connection.

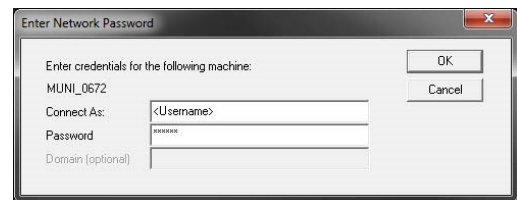
1. Double-click on the Laptop/PC **Video Manager** icon. The **DVS Connections** window is shown.



2. To establish a connection to the PENTA L, click on the **Open** button. The **DVS Connections** dialog box appears.



3. Find the PENTA L name in the **Machine** column.
4. Select the check box in the **Live** column and click **OK**.
5. When prompted, enter the Username and password for the PENTA L, then click **OK**.
6. A LAN connection will now be established between your computer and the PENTA L.



PENTA L: Configuration: See Section 5.

3.4 CONNECTING USING A REMOTE DESKTOP SESSION

Used for:

- Advanced configuration settings that are not supported via *Video Manager*. These include registry edits and commit changes.
- Advanced troubleshooting, including low-level daughterboard diagnostics
- Manual upgrades of PENTA L software and firmware.
- Diagnostics for capture card and internal GPS, when fitted.

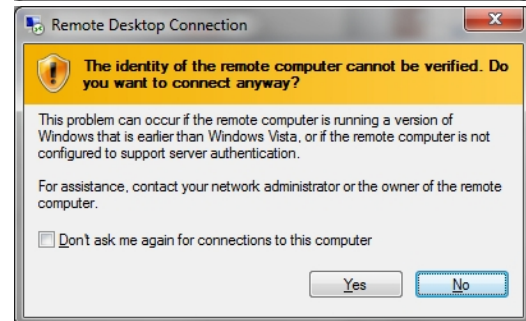
Connections can be either:

- **Local** using a direct LAN connection between the computer with *Video Manager* and the PENTA L

OR

- **Remote** using:
 - A LAN connection via a router/server and Internet.
 - A Wireless LAN (WLAN) Wi-Fi connection.

1. Open a *Windows* remote desktop connection by clicking **Start > All Programs > Accessories > Remote Desktop Connection**.
2. Enter the PENTA L's IP address into the Remote Desktop **Computer** box.
(default IP address is **192.168.0.100** – i.e. front panel LAN.)
3. Click **Connect**.
4. The identity alert window is shown. Click **Yes** to proceed.
5. Enter PENTA L credential information, which is case sensitive:
 - Default login: **administrator**
 - Default password: Provided separately



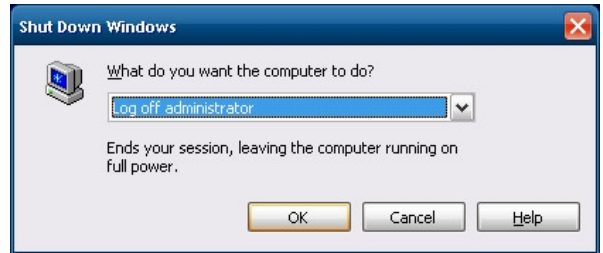
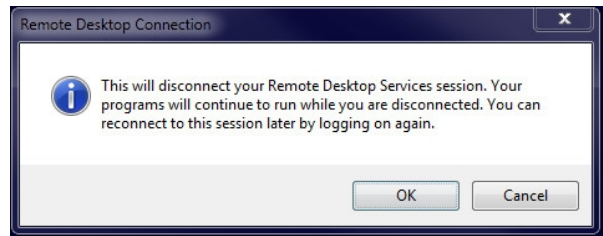
Once the PENTA L displays its remote desktop, you may operate as if you are directly connected to the PENTA L.

To disconnect: Close all windows on the remote desktop.

5. Click on the remote desktop to ensure that the desktop window is selected.
6. Click on the  button in the right-hand corner of the Remote Desktop screen bar. Click **OK**.

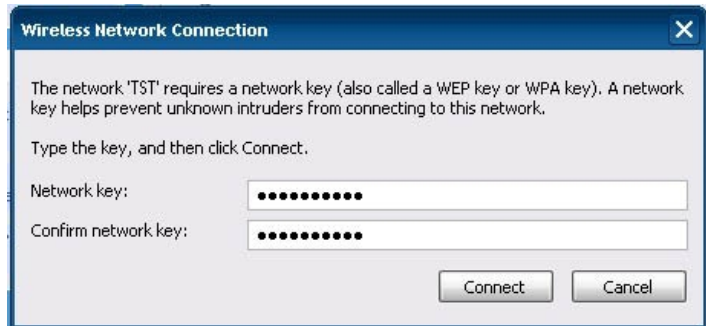
OR

1. Use the keyboard and press **Alt+F4** to display the shutdown window.
2. Select **Log off Administrator** and click **OK**.



3.5 CONNECTIONS USING WLAN

1. On the PENTA L display, right-click on the **WLAN** icon on the bottom right-hand taskbar and select **View Available Wireless Networks**.
2. Choose the network from the list of available wireless networks and click **Connect**.
3. Normally a security password is required. Enter the network password in both locations and click **Connect**.



4 PENTA L DATA RECOVERY

Data recorded in the PENTA L can be retrieved by either:

- Removing the drive caddy and loading the caddy into the Docking Station or
- Connecting an external HDD drive to the PENTA L; or
- Connecting a laptop computer to the PENTA L to retrieve the data. This is the slowest method.

4.1 DRIVE CADDY REMOVAL

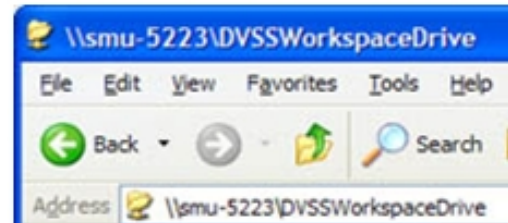
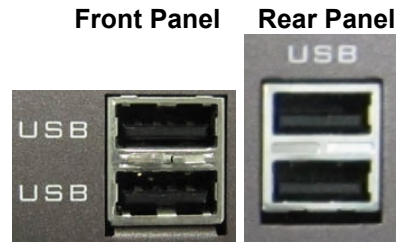
1. Unlock the drive caddy by inserting the caddy key and turning the key anti-clockwise.
2. Wait until the PENTA L powers down to **Warm Standby mode**. This is indicated by the Status Display and all front panel LEDs turning off.
3. Remove the drive caddy by gently pushing the left-hand caddy section left until the drive removal handle ejects.
4. Pull out the caddy removal arm then use the arm to remove the caddy.



Bypassing any of these procedural steps may cause data corruption.

4.2 CONNECTING EXTERNAL HDD

1. Connect the external HDD to one of the PENTA L's USB connectors on either front or rear panels.
2. Using *Windows Explorer*, navigate to the PENTA L's DVSSWorkspaceDrive share, then select the file(s) to download.



4.3 USING LAPTOP TO RETRIEVE DATA

This method requires **Video Manager** software to view the video data.

1. Connect the laptop to the PENTA L as detailed in Section 3.2.
2. Start **Video Manager** on the laptop, logon then press the **Open** button in the player control window.
For full details on how to use **Video Manager** to view the stored data, see *Video Manager User Manual*.



4.4 DRIVE CADDY REPLACEMENT

1. Insert the caddy by gently pushing in on the caddy front face (**NOT THE HANDLE**) and sliding it into the cradle. You will hear a click once the caddy seats flush with the fascia. Then gently press the caddy arm until it locks into position.
2. Lock the caddy by inserting the caddy key and turning the key clockwise.
3. When the caddy is locked, the PENTA L will power-up. After the power-up (1 minute longer if the caddy contains a new HDD), the PENTA L Status Display shows normal operation.




4. Check the Status Display (Status Check 7) for the HDD message **PRESENT / LOCKED**.



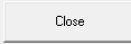


Bypassing any of these procedural steps may cause data corruption.

5 PENTA L CONFIGURATION

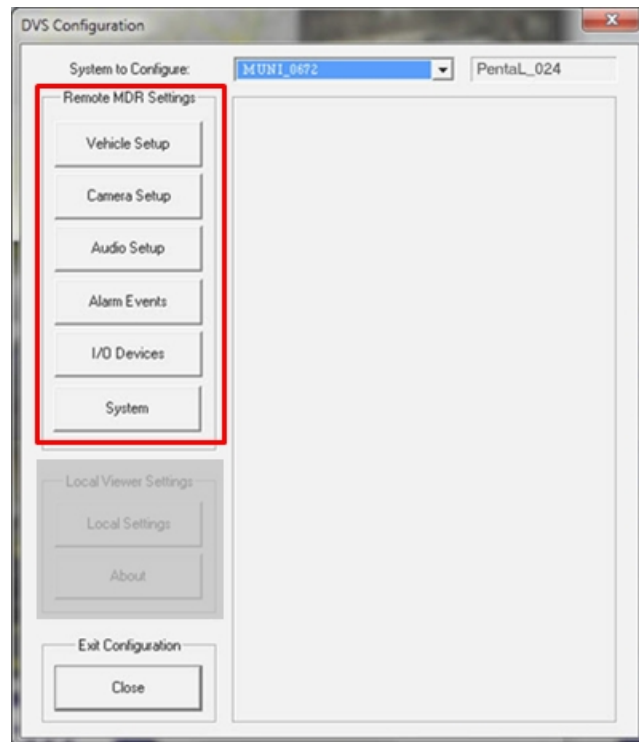
The settings of all PENTA Ls in the system and the *Video Manager* can be configured by pressing the **CONFIG** button  in the *Video Manager's System Control* area.

All changes to the PENTA L's configuration settings require user name and password confirmation prior to acceptance of the changes. Once verified, it is not necessary to re-enter the account and password again for further operations during this configuration setting session.


1. **Local PENTA L:** Connect a laptop or desktop PC to the PENTA L as detailed in Section 3.2.
2. **Remote PENTA L:** Connect a laptop or desktop PC to the PENTA L using either the Internet, Wi-Fi.
3. Connect to the required PENTA L by clicking on the Video Manager's **OPEN** button .
4. To access the PENTA L's configuration settings, click on the Video Manager's **CONFIG** button . This displays the main configuration screen.
5. To exit the configuration process, click the **Close** button .

The following sections provide the configuration details:

- Vehicle setup** See Section 5.1.
- Camera setup:** See Section 0.
- Audio setup:** See Section 5.3
- Alarm events setup:** See Section 5.4.
- Input and Output devices setup:** See Section 5.5
- System setup:** See Section 5.6



5.1 VEHICLE SETUP

1. Press the **Vehicle Setup** button  on the configuration screen.
2. Enter the Depot ID (PENTA L number) and its corresponding vehicle ID.
3. Designate how the vehicle is tracked or monitored:
 - Fixed location: Check the **Fixed location** radio button and enter the location's coordinates.
 - Mobile recorder: Check the **Mobile recorder** radio button.
4. Note the software version information.
5. Do not select the **Display Disk Full as Fault** check box. If selected the PENTA L's event button, turns on when the archive partition is full.
6. Select the **Display Future Recording Time Warning** check box. The PENTA L's camera status output turns on when the current time precedes recorded time by more than 5 minutes.
7. Click **Apply** on the configuration screen.
8. To authorize the change, enter your username and password then click **OK**.
9. Click **Close**.



The screenshot shows a configuration window with the following sections:

- Depot and Vehicle Information:**
 - Depot ID: NORTH DEPOT
 - Vehicle ID: BUS# 1234
- Vehicle Location / Tracking Mode:**
 - None - no geographic site reference used
 - Fixed location [WGS84 latitude, longitude]
 - Latitude: []
 - Longitude: []
 - Mobile recorder
- Software Version Information:**
 - Remote server version: Version 4.43.10
 - Local client version: Version 4.43.10
- Display panel Information:**
 - Display Disk Full as Fault
 - Display Future Recording Time Warning



The screenshot shows an "Account Details" dialog box with the following content:

You must enter the name and password of an administrator account on the acquisition system

Account Name: Administrator

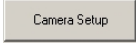
Password: ****

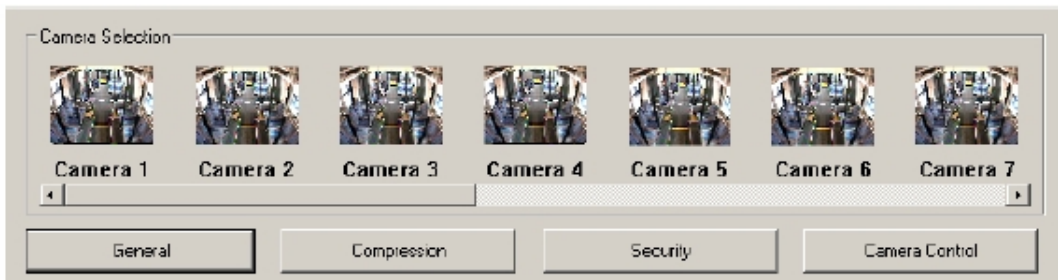
Confirm Password: ****

Buttons: OK, Cancel

5.2 CAMERA SETUP

These settings control the camera settings for the selected PENTA L.

Camera Selection: Press the **Camera Setup** button  on the configuration screen.



Select the camera channel to be configured from the horizontal list of camera thumbnails located in the upper portion of the Camera configuration screen. The camera name is also listed in the **Camera name/description** window for further identification.

Camera name/description

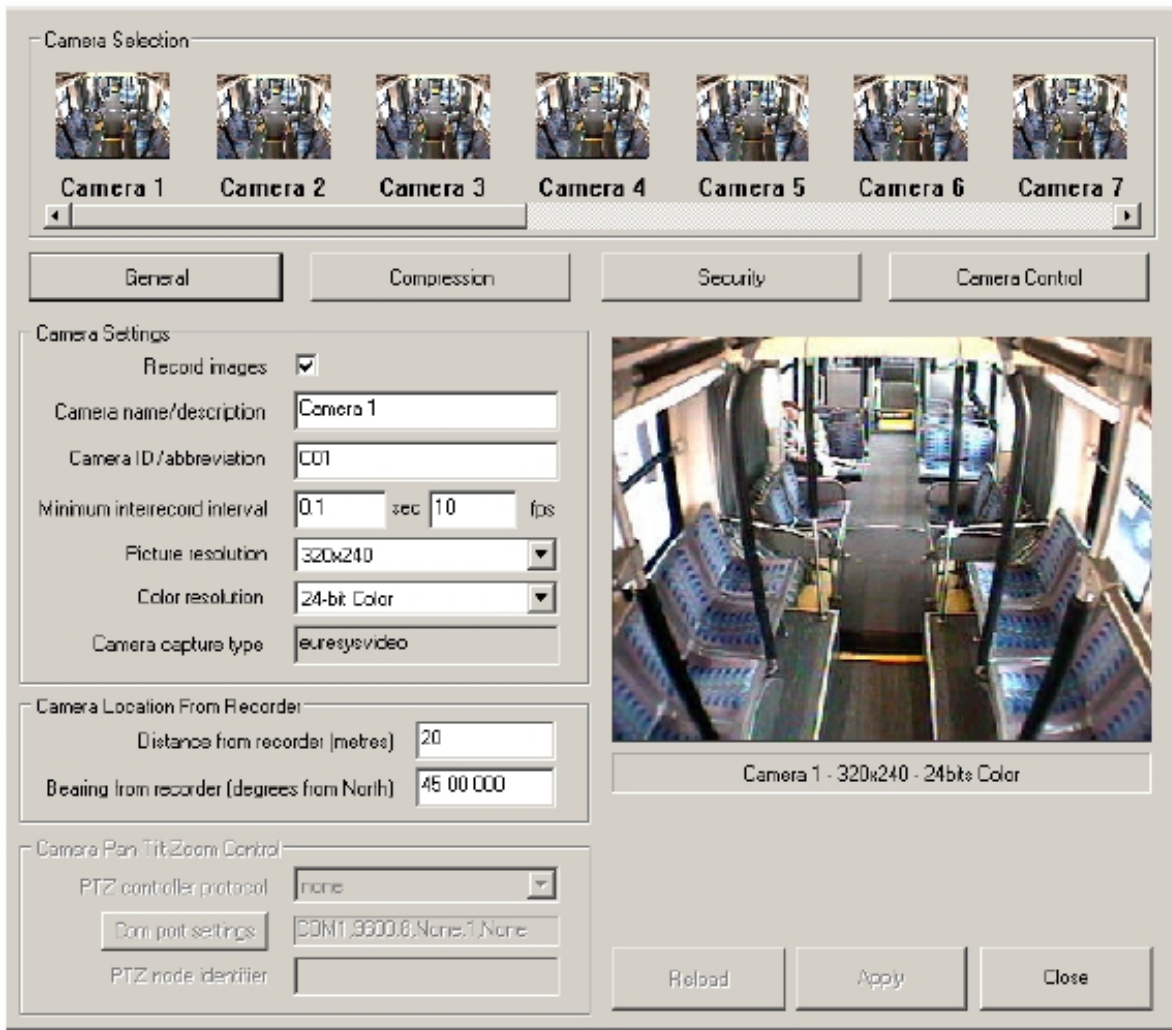
You can scroll the thumbnail display left and right to reveal further cameras using the slider bar at the base of the camera selection area. Use the mouse to choose the required camera channel to configure.

The buttons located beneath the Camera selection area provide access to the following camera settings:

- **General:** Setting of camera names, picture resolution, color depth, and frame rates.
- **Compression:** Selection of compression algorithm and compression levels.
- **Security:** Access to camera images and image identification information.
- **Camera control:** Camera adjustments such as brightness, contrast, and color levels.

All camera settings in the camera configuration area apply to an individual camera giving the flexibility of tailoring each camera to its specific view requirements.

If you want to apply the same settings to all cameras, click **Apply Settings to All Cameras**.



5.2.1 General Button

This screen contains the following fields:

- **Record images:** Turns the recording of images to the PENTA L's data file on and off for this camera.
- **Camera name/description:** A user-entered description or name for the camera. Use this field as a reference to enable easy identification of the camera. This field will also appear on camera information text overlays and on printed images.
- **Camera ID/abbreviation:** Similar to the camera name field above except that this is an alternative camera name or identification reference. For example, the camera name in the field above may be Forward Facing, while this field may be a camera ID code such as FF.
- **Minimum interrecord interval:** Use this field to control the recorded frame rate for this camera. Enter as either as the time interval between image frames, or frames per second (fps).
Example: At 20 fps, the time between images is 50 ms or 0.05 seconds.

The default value for this field is 0, which delivers the maximum camera frame rate.

- **Picture resolution:** Select the required camera resolution from the dropdown list. Increasing camera resolution will improve picture quality and improve identification but will increase the image size and storage space required; therefore reducing the PENTA L’s effective recording time. Table 3 shows the camera resolutions supported.

Table 3: Camera Resolutions Supported

CIF	Resolution	NTSC or PAL
1CIF	Low	320 x 240 pixels
2CIF	Medium	640 x 240 pixels
4CIF/D1	High	640 x 480 pixels

- **Color resolution:** Select the required color resolution or color depth. Color images typically require more storage space than grayscale images but have a greater depth color. Table 4 shows the color resolutions supported.

Table 4: Camera Color Resolutions Supported

Color Resolution	Bytes per image	Color Depth
Grayscale	1 Byte	256 colors
Color	3 Bytes	1.67 million colors

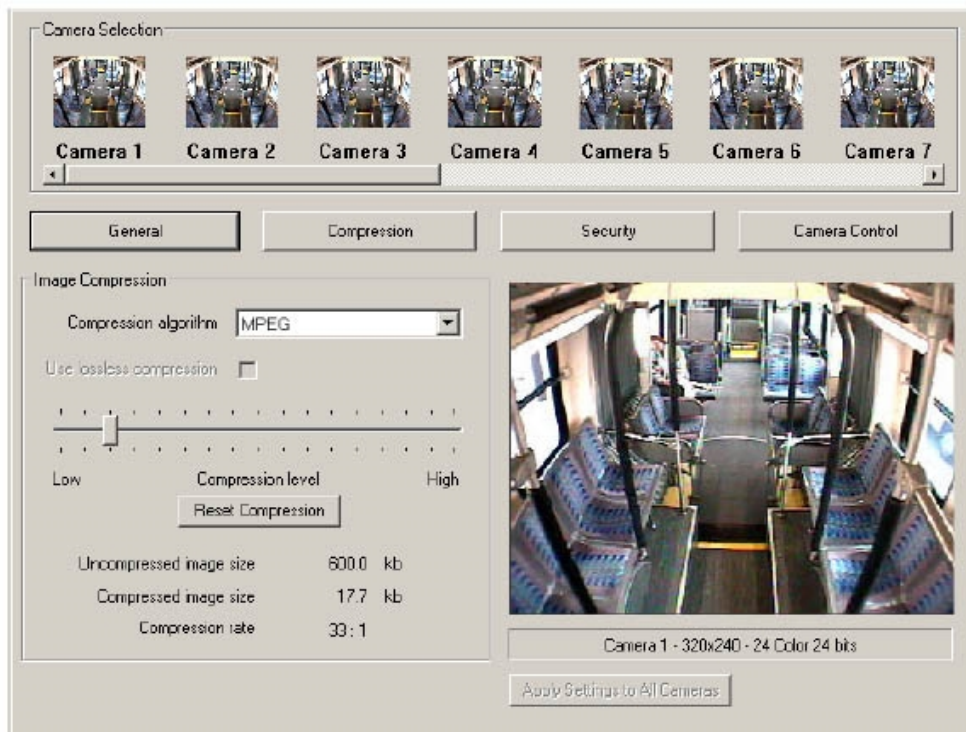
- **Camera capture type:** This field is for information only and indicates the type of model of the camera capture hardware used for this camera channel. This setting is hardware dependent and is not user configurable.
- **Camera Location from Recorder:** You must enter the camera distance from the recorder if the camera is to be specifically and individually located on the map display window. The location of the camera is specified relative to the recorder’s position with the bearing angle entered with respect to geographic north. If you use camera locations, you must configure the site as either fixed-location or mobile.

5.2.2 Compression Button

The compression algorithm refers to the mathematical method or process used to reduce the size of the original image for recording and storage. The compression level controls the extent of compression applied. The default compression algorithm used by the PENTA L is **H.264**.

Increasing the compression level reduces the size of the resulting image and extends the storage capacity of the recording system; however a highly compressed image may suffer loss of useful image content and may adversely affect the ability to analyze, authenticate, and identify the content of the image. Reducing the compression level ensures preservation of image content and quality but increases the size of each stored image and reduces the storage capacity of the recording system.

Slide the compression slider left to decrease image compression or right to increase image compression.



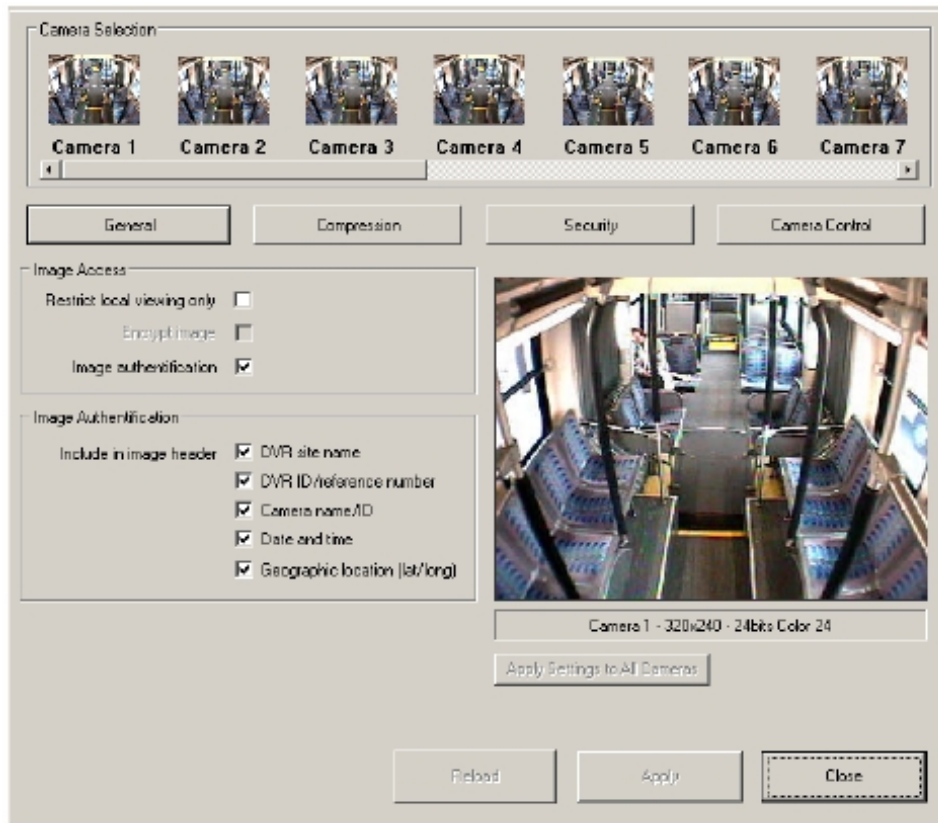
You can set the compression algorithm and compression level for each camera to optimize the quality and storage capacity for each camera and to best suit the playback analysis requirements.

Image statistics are provided to show the original source image size and the resulting compressed image size.

5.2.3 Security Button

For enhanced security and for image authentication purposes, you can electronically attach a unique secure authentication signature and embed recorded pictures with specific site and camera information. This information is stored in a protected region of the image and does not alter the content or structure of the picture. Similarly, alterations made to the picture do not affect the authentication information.

In the **Restrict local viewing only** mode, you can only view specific camera images from your local PENTA L. Remote users connected to the DVR across a network or other remote means cannot view the images from this camera regardless of security access account and password level. The default mode for this option is disabled.



5.2.4 Camera Control Button

Use the camera control settings to adjust the appearance of images such as brightness and contrast. Most of these settings make changes at the hardware level and relate to the hardware of the image capturing device.



The camera control screen contains the following fields:

- **Brightness:** Lightens or darkens the image. Move the slider bar to the left to reduce the image lightness, right to increase.
- **Contrast:** Adjusts the distribution of light and dark regions across the image. Move the slider bar to the left to reduce the contrast, right to increase.
- **Color:** Adjusts the color levels within the image. Move the slider bar to the left to reduce the color levels, right to increase.
- **Saturation:** Enhances the color within the image. Move the slider bar to the left to reduce the saturation, right to increase.
- **Video stabilization:** Not applicable for PENTA L.
- **Reset settings:** Returns all the camera control settings to their factory defaults.

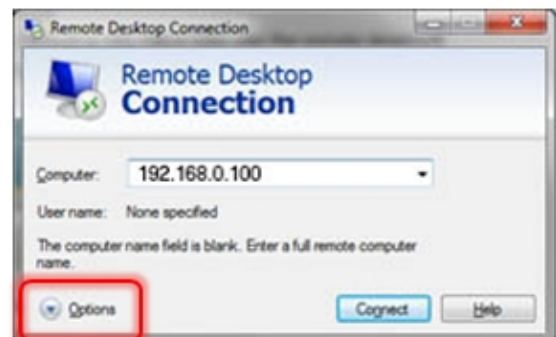
The brightness, contrast, color, and saturation settings are commonly used to compensate for poor light conditions or other environmental characteristics affecting the quality of the recorded pictures.

5.3 AUDIO SETUP

5.3.1 Using Remote Desktop Connection

10. When connecting to a PENTA L using a Remote Desktop Connections, you need to configure the PENTA L's remote audio settings.

11. **Before** you click **Connect**, select **Options**.



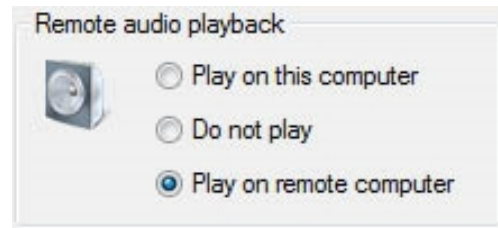
12. Click on the **Local Resources** tab.



13. In the **Remote audio** box, click on the **Settings** button.


14. Select the **Play on remote computer** radio button.

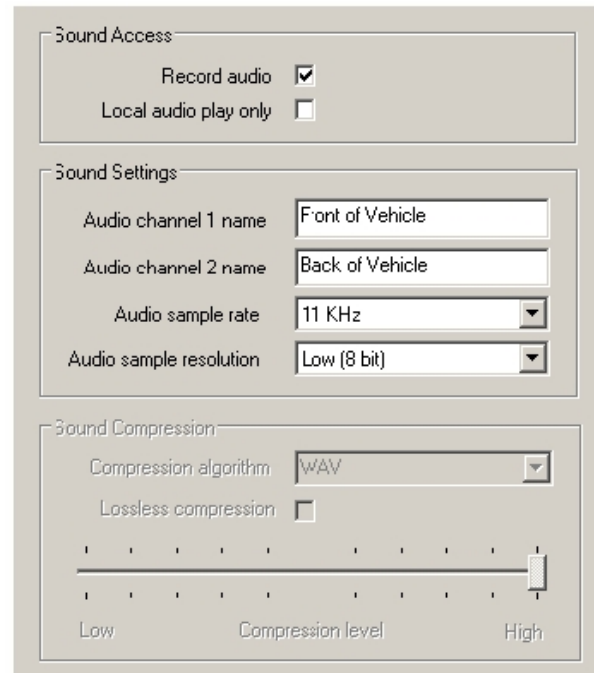
NOTE: You cannot simultaneously play and record remotely – one or the other.



15. Click **OK** then **Connect** to complete the remote connection.

5.3.2 Configuration Settings

Press the **Audio Setup** button  on the configuration screen.




The Audio setup screen contains the following fields:

- **Record audio:** Turns the recording of audio channels to the data file on and off. Normally this would be set on for a recorder (the default mode).
- **Local audio play only:** When turned on, the sound channels can only be played (heard) from the local PENTA L making the recording. Remote users connecting to the PENTA L across a network or other remote means are unable to listen to audio recordings regardless of security access account and password level. When the remote users function is turned off, users who have valid account and password access can play sound recordings. The default mode for this option is disabled.
- **Audio channel 1 name:** The name or description for the first sound channel.
- **Audio channel 2 name:** The name or description for the second sound channel.
- **Audio sample rate:** This rate is locked at 11 KHz.
- **Audio sample resolution:** This resolution is locked at 8-bit.

The PENTA L uses only the WAV sound compression algorithm. The compression algorithm selection settings are disabled. The associated compression level is preset to provide the best audio standard and space efficiency.

5.3.3 Audio Input: Left and Right Channel Adjustments

These adjustments are implemented using the PENTA L's *Windows Volume Control* adjustments.

1. Click on the *Windows Volume* icon  on the lower right-hand taskbar and select **Open Volume Control**. The **Master Volume** window is displayed.
2. Select **Options** then **Properties**.



3. In the **Mixer device** drop-down, select **Audio Input** and click OK.




4. The **Recording Control** window is displayed.
5. Apply two matching test audio inputs to the **Audio In L** and **Audio in R** inputs, either using the PENTA L rear panel **AUDIO** connector, or the test audio inputs on the Test Interface PCB.
6. To check the levels, connect a pair of headphones or a pair of sound level meters to the **Audio Out L** and **Audio Out R** outputs, either using the PENTA L rear panel **AUDIO** connector, or the test audio outputs on the Test Interface PCB.

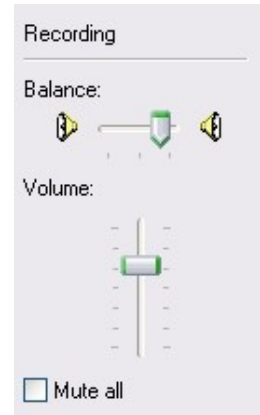



7. Enable the *Windows Sound Recorder*, either by clicking on a linked desktop icon (if one exists, or **start > Run > C:\Windows\System32\sndrec32.exe > Enter**).



8. Start the *Windows Sound Recorder* by clicking on the **Record** button . The *Recorder* should display the recording sound.

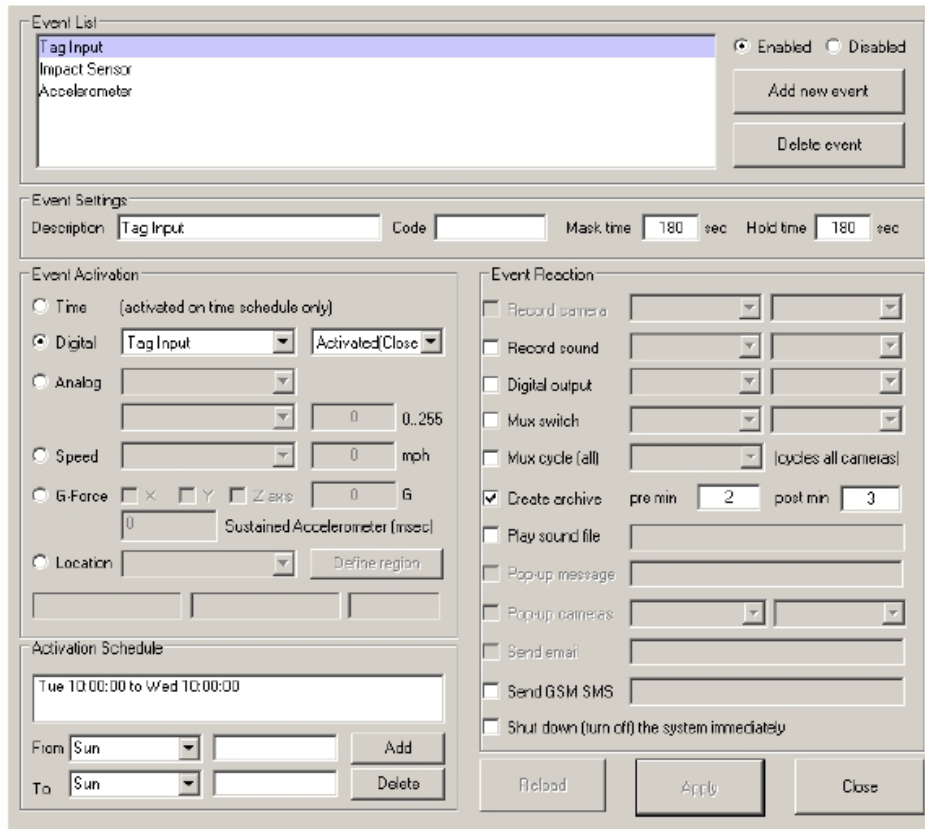
9. Using the *Recording Control* **Recording** controls (**Volume** and **Balance**), adjust the level of each audio input.
10. Play back the recorded audio, confirming that the left and right audio recordings have the same audio levels.
11. Repeat steps 9 and 10 until matching audio levels are obtained.



12. When audio adjustments are complete, close the **Recording Control** window and the *Windows Sound Recorder* by clicking on their **Exit** buttons .

5.4 ALARM EVENTS SETUP

Press the **Alarm Events** button  on the configuration screen.



The screenshot shows the 'Alarm Events Setup' configuration screen. It is divided into several sections:


- Event List:** A list containing 'Tag Input', 'Impact Sensor', and 'Accelerometer'. To the right are radio buttons for 'Enabled' (selected) and 'Disabled', and buttons for 'Add new event' and 'Delete event'.
- Event Settings:** Fields for 'Description' (Tag Input), 'Code', 'Mask time' (180 sec), and 'Hold time' (180 sec).
- Event Activation:** Radio buttons for 'Time', 'Digital', 'Analog', 'Speed', 'G-Force', and 'Location'. The 'Digital' option is selected, with 'Tag Input' in the dropdown and 'Activated/Close' in the second dropdown. There are also input fields for values like '0' and '0.255'.
- Event Reaction:** A list of checkboxes for actions: 'Record camera', 'Record sound', 'Digital output', 'Mux switch', 'Mux cycle (all)', 'Create archive' (checked), 'Play sound file', 'Popup message', 'Popup cameras', 'Send email', 'Send GSM SMS', and 'Shut down (turn off) the system immediately'. The 'Create archive' section has 'pre min' set to 2 and 'post min' set to 3.
- Activation Schedule:** A text field showing 'Tue 10:00:00 to Wed 10:00:00'. Below are 'From' and 'To' dropdowns (both set to 'Sun') and 'Add' and 'Delete' buttons.
- Buttons:** 'Refresh', 'Apply', and 'Close' buttons at the bottom right.

To add a new alarm event, do the following:

1. Click the Add new event button under event list.
2. Enter event settings:
 - **Description:** Enter a description of the alarm event.
 - **Mask time:** Mask any actions associated with the same event over the defined time period in seconds.
 - **Hold time:** Halts event activation for the specified time period in seconds.
3. Select the event activation:
 - **Digital:** Select and set the digital input channel settings to deactivated (open) or activated (closed).
 - **Analog:** Select and set the analog input channel settings to falls below or rises above between the ranges of 0 to 255.
 - **Speed:** Set the speed to falls below or rises above in mph or km/h.
 - **G-force:** If this option is fitted, select and set the X- Y- and Z-axis accelerometer.
4. Select the event reaction:
 - **Record sound:** Option forces the PENTA L to start recording sound for that period defined in the post min section if there is space allocated for recording audio.
 - **Digital output:** Option triggers the specified digital output to high or low when the associated event begins.
 - **Mux switch:** Option triggers the specified multiplexer on a channel when an event begins.
 - **Mux cycle (all):** Option triggers the specified multiplexer on all channels when an event begins.
 - **Create archive:** Option forces the PENTA L to start creating archives for that period defined in pre min and post min.
 - **Send GSM SMS:** Option to send a message to your GSM mobile phone (only enabled when the optional GSM module is attached).
 - **Shutdown (turn off) the system immediately:** Option to turn off the PENTA L immediately.
5. **Optional settings:** Add activation schedule. This setting is defaulted to Sunday 0:00:00 to Saturday 23:59:59.
 - Manually delete the default settings by highlighting default time and press **Delete**.
 - Manually enter the desired from day, from time, today and to time - to schedule of the alarm event (weekly operation).
 - Click **Add**.
6. Click **Apply**.

5.5 INPUT AND OUTPUT DEVICES SETUP

The I/O devices feature identifies the names of digital alarm events. This feature is helpful when you use multiple cameras.

1. Press the **I/O Devices** button  on the configuration screen.



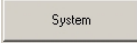
The screenshot displays the I/O Devices configuration interface with the following sections:

- Digital Input Channel Settings:** A list of 16 channels with labels from 'Tag Input' to 'Digital Input 16'.
- Relay Output Channel Settings:** A list of 4 channels with labels 'Digital Output 1' through 'Digital Output 4'.
- Analog input channel settings:** A list of 8 channels with labels 'Analog Input 1' through 'Analog Input 8'.
- Multiplexer Camera Selection:** A grid of 16 channels (01-16) with checkboxes for '01', '02', and '03' camera selection. Channels 13-16 are marked as 'UNAVAILABLE'.
- Multiplexer Settings:** A table for configuring three multiplexer channels.

#	Channel label	Resting state camera	Cycle dwell time	Auto display off speed
01	Drivers screen 1	05: Camera 5	5 sec	2232.4624 mph
02	Mux Channel 2	01: Camera 1	1 sec	2232.4624 mph
03	Mux Channel 3	01: Camera 1	1 sec	2232.4624 mph

2. Enter specific identities in the following categories:
 - Channel label
 - Relay output channel settings
 - Analog input channel settings
 - Multiplexer settings
 - Resting state camera
3. Click **OK**.

5.6 SYSTEM SETUP

Press the **System** button  on the configuration screen.

Storage Allocation and Usage

Total space available		455.683	Gb
Total space to allocate	100 %	455.683	Gb
Video data	94 %	428.342	Gb
Sound data	5 %	22.784	Gb
GPS data	1 %	4.557	Gb
System/Alarm event logs	0 %	0.000	Gb

Storage mode Use once (do not overwrite) Loop back (recycle and overwrite)

Changing any of the above settings may require that the data file be re-initialised and consequently existing data will be lost.

System Settings

Shutdown dwell time	0	min	10	seconds
Minimum temperature				Celcius
Maximum temperature				Celcius
Minimum fan speed				rpm

Cameras Settings

Number of cameras installed	12
Camera restart dwell time	60 seconds
Camera shutdown dwell time	0 min 5 seconds

5.6.1 Storage Allocation and Usage

The settings in this system area control the core structure of the recorder's data file. This structure covers attributes such as the total amount of available disk space to allocate for the recording data file and the sub-allocation of space within this data file for individual components such as video and sound.

NOTE: Many of these parameters cannot be changed without the data file being erased and recreated. In this case, you will permanently lose all existing recorded data. Only experienced users should use the storage allocation.

Storage Allocation and Usage

Total space available		455.683	Gb
Total space to allocate	100 %	455.683	Gb
Video data	94 %	428.342	Gb
Sound data	5 %	22.784	Gb
GPS data	1 %	4.557	Gb
System/Alarm event logs	0 %	0.000	Gb

Storage mode Use once (do not overwrite) Loop back (recycle and overwrite)

Changing any of the above settings may require that the data file be re-initialised and consequently existing data will be lost.

Your PENTA L ships configured for correct operation and space allocation. Do not change these settings.

The **system data file** is where all recorded video, audio, GPS, and other recorded information and site details are stored. The system data file is a single data file. The following rules apply to the creation and management of the system data file:

- The system data file is a single file that contains all recorded parameters, indexes, and other necessary structures.
- Only experienced operators should manage the system data file.
- You must locate the system data file on its own private partition or drive. No other data or files should be stored on the same drive or partition.
- You cannot change the structure of the data file once it is created without deleting and recreating the file, or you will lose data.
- The space allocation for the data file structure must allow space for all parameters that are to be recorded (video, sound, GPS).



WARNING: If the system data file is tampered with or does not provide space allocation for the parameters that are to be recorded, the system will not operate correctly and will report a terminal fault.

This area contains the following fields:

- **Total space available:** The total amount of disk space available on the drive where the data file resides. This should be the full size of the storage drive.
- **Space to allocate:** The amount of disk space to allocate on the storage drive for the system data file expressed as a percentage of the total space available. As the storage drive should not be used for any other storage purpose, this setting should always be set to 100% for normal operation.
- **Video data:** The amount of storage space within the system data file to allocate to the storage of video data expressed as a percentage of the whole data file size. As video pictures are generally the most storage intensive of the recorded parameters, most space should be allocated to the storage of video data.
- **Sound data:** The amount of storage space within the system data file to allocate to the storage of sound data expressed as a percentage of the whole data file size. Space for sound recording is only required if sound recording is set up in the Audio setup (Section 5.3) or if you need that sound recording at a later time.
- **GPS data:** The amount of storage space within the system data file to allocate to the storage of recorder or site positions (GPS locations from the internal optional GPS module or from an external GPS module) and expressed as a percentage of the whole data file size. As site locations or GPS data have minimal space requirements, the percentage allocated to this can be small.
- **System/alarm events:** The amount of storage space within the system data file to allocate to the storage of alarm system event logs. As the event log requires a comparatively small amount of storage space, the percentage allocated to this can be minimal.

Enter storage allocation parameters as a percentage value. The equivalent storage capacity in gigabytes is calculated by the system and displayed besides the entered percentage value.

The space allocation you enter must total 100%. The system will automatically adjust percentage allocation values to ensure 100% allocation is maintained.

Table 5 provides example values for the different recorder configurations and the estimated space allocation values to use.

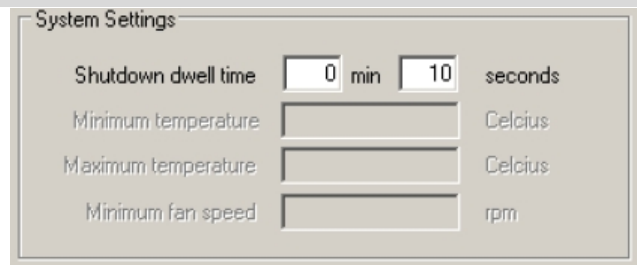
Table 5: PENTA L Space allocations

PENTA L Setup	Resolution	Sound	Video	GPS	Event
No GPS	320 x 240	No	99%	0	1%
GPS installed	320 x 240	No	98%	1%	1%
GPS installed	320 x 240	Yes	90%	1%	1%
GPS installed	640 x 480	Yes	94%	1%	1%

5.6.2 System settings

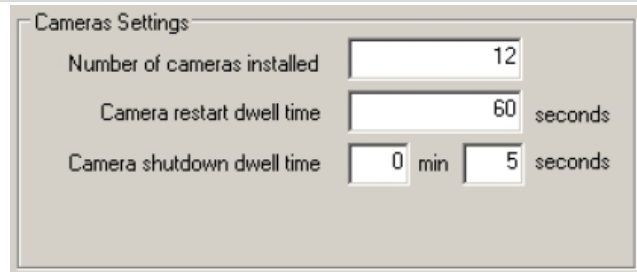
Shutdown dwell time: Sets the length of time that the recorder will continue to operate and record after the ignition or engine run signals are removed.

This setting only applies to recorders with the shutdown dwell feature enabled. Setting the value to 0 deactivates the feature. For the setting shown, the DVR will continue recording for 10 seconds after the ignition or engine run signals are removed.



5.6.3 Camera settings

When you enter the number of cameras into the system that are physically attached to a recorder through the Number of cameras installed field, the recording system will periodically check to ensure that pictures are being received and recorded for all expected cameras.



When the number of cameras being recorded falls below the expected number of cameras, the PENTA L sends an error report to the system log file, and the red LED on the Status indicator will turn on (Event Button/Tag Switch if installed).

The system will periodically check whether a lost video signal has returned. This action requires momentarily resetting the video acquisition hardware. The time between resets is controlled by the **Camera restart dwell time** system variable. Setting this value too low will negatively affect system performance. The default and recommended time period is 60 seconds.

When the ignition or engine run signals end, the PENTA L enters shutdown mode. The camera shutdown delay period function is controlled by the **Camera shutdown dwell time** system variable. Shutting down camera recording has the benefit of freeing processor cycles to perform other tasks such as video uploads or scheduled maintenance activities.

5.7 DATE AND TIME SETUP

Before the PENTA L can capture images, the date, time, time zone, daylight saving adjustment and time server must be setup.

1. Establish a remote connection to the PENTA L using a **Remote Desktop Session** – see Section 3.4.
2. Double-click the system clock in the taskbar. The **Date and Time Properties** dialog box will open.
3. Select the **Date and Time** tab and adjust settings to local date/time.
4. Select the Time Zone tab and adjust settings to the correct time zone.
5. Apply the **Daylight Savings** time adjustment, if applicable.
6. Select the **Internet Time** tab and adjust time server settings.
7. Click **Apply**.

NOTE: The changes will be made to the write-protected drive C, so Commit PENTA L changes needs to follow these changes. See Section 5.8.

5.8 COMMIT PENTA L CHANGES

The PENTA L's solid-state drive C is write protected. Any changes to the Operating System (OS) or *Windows* registry, such as setting the time zone or loading an application upgrade, require permanent writing to the PENTA L's drive C. The PENTA L provides an on-board utility to "commit" the changes to drive C.

To permanently write changes to drive C, do the following:

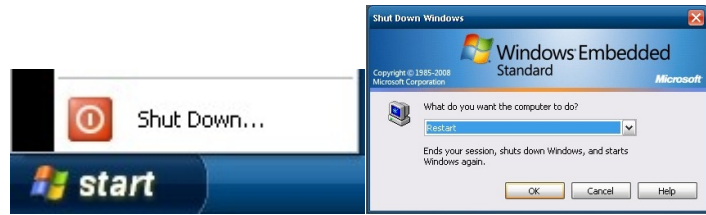
1. Establish a connection to the PENTA L, either local or remote.
2. Make system changes as required – e.g. registry settings, file system clean-up and program updates.
3. When all system changes are complete, double-click the **Commit** icon to launch the Commit application.
4. Press any key to close the Commit application window.



Do the following to perform an orderly shutdown to finalize a commit:

5. If using a Remote Desktop Connection, close all Windows on the Remote Desktop. Then click on the Remote Desktop to ensure it is the selected Window and press the **Alt+F4** to display the shutdown dialog. Select **Restart** from the dropdown and click OK. The Remote Desktop Session closes.

6. If using a local connection, click on **Start > Shut Down**, then select **Restart** in the drop down box and click **OK**.
7. The system changes will take effect upon PENTA L restart.



5.9 DELETE FILES AFTER SETUP

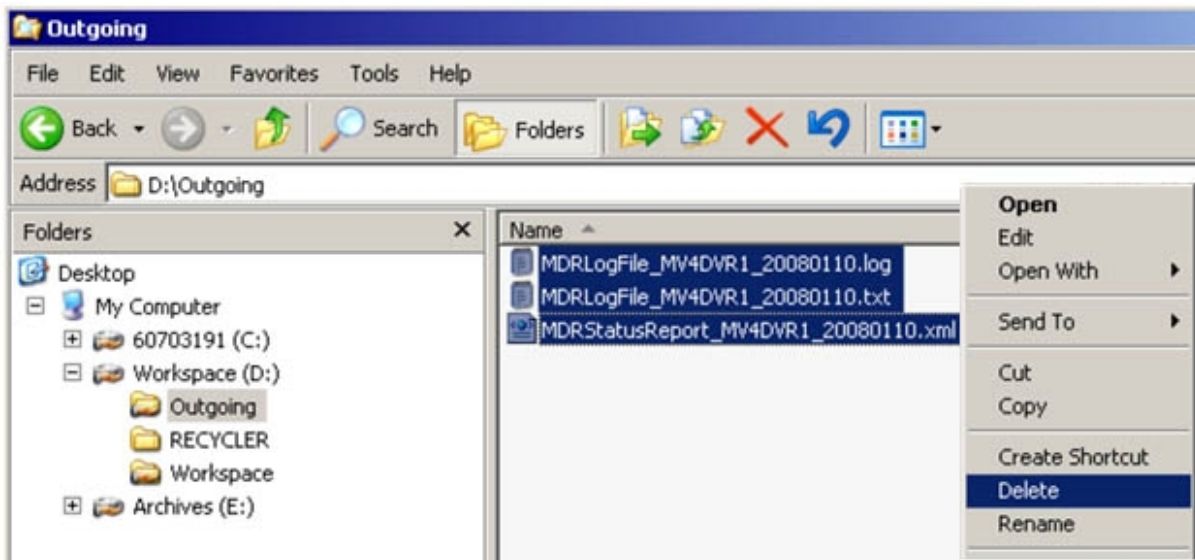
After PENTA L installation, configuration and testing is complete, any files created during these processes will need to be deleted before commissioning the PENTA L.

1. Establish a connection to the PENTA L, either local or remote.
2. Double-click the **Services** icon on the PENTA L desktop.
3. Navigate the right Window pane to the service name **DVSS Server** and double-click the service name.
4. Select **Stop** to stop the service.



5.9.1 Delete PENTA L Files

1. Start **Windows Explorer** then navigate to the **Outgoing** folder, usually **D:\Outgoing**. (Sometimes C:\Camera\Outgoing.)
2. Delete all files and folders in **D:\Outgoing** folder. Do not delete the Outgoing folder itself.
3. Navigate to the Archive folder, usually Drive **E:**, and delete all files and directories.
4. If any changes to C: drive have been implemented, **Commit** changes, as detailed in Section 5.8.



5.9.2 Restart the PENTA L

If any changes to C: drive have been implemented, the PENTA L requires a restart after the changes have been Committed.

NOTE: If the PENTA L configuration has been changed, a power-down and reboot is also required.

1. Reopen the Services control panel by double-clicking the **Services** icon on the PENTA L desktop.
2. Select **Start**.
3. The PENTA L will recreate new versions of the deleted files compliant with current system settings.

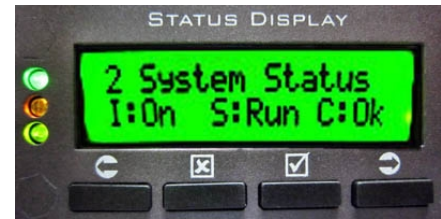


6 PENTA L TESTING AND MAINTENANCE

6.1 POWER-UP SYSTEM CHECKS

The following sections cover system checks required to ensure that the overall system is operating normally.

The PENTA L has a front-panel status screen, three status LEDs and status check selection buttons:



When power is turned on, the PENTA L front-panel Status Display shows:

- **System boot status:** PENTA L firmware version
- **System status:**
 - I:On:** Power present
 - S:RUN:** Software running
 - C:Ok:** All cameras present
- All three LEDs to the left of the Status Display should be on.



Where driver's displays are fitted, the driver's screen will immediately display the default camera.



If the vehicle power is turned off, the PENTA L will immediately begin to shut down (after shutdown time has expired).

6.2 RECORDING SYSTEM CHECKS

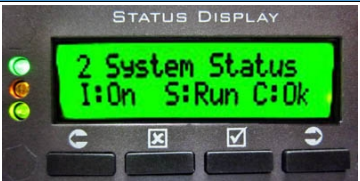

Use the status check buttons to select the status:



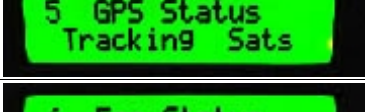
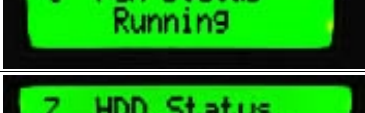
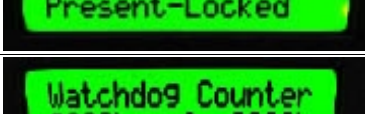

Left buttons: Back.

Right buttons: Forward.



Table 6: PENTA L Status Display Checks

Status Check	Status Display	Remarks
1		When the PENTA L power is on, its Status Display should be illuminated and all three status LEDs should be on.
2		Normal operating display: PENTA L on, software running and all cameras recording.

Status Check	Status Display	Remarks
3		Digital input screen: showing input 3 is active. Other digital inputs can be checked by activating the related function and confirming that the display indicates the input operation.
4		Power Screen: Showing 5 V and 12 V power is present.
5		GPS Screen: Showing the vehicle GPS connected to the PENTA L and tracking.
6		Fan Screen: Showing PENTA L fan running.
7		HDD Status: Shows whether the drive caddy is locked or unlocked.
8		Watchdog Counter Screen: The left-hand counter counts software exception events, while the right-hand counter shows the maximum events required to trigger a PENTA L restart.

6.3 PENTA L MAINTENANCE

Regular preventative maintenance may prolong the life of the PENTA L system as well as reducing the probability and frequency of critical issues. Table 7 shows the recommended frequency for the PENTA L checks.

Table 7: PENTA L Preventative Maintenance Checks

Procedure	Frequency	Reference
Check PENTA L vibration mounts	1 year	Section 6.3.1.

6.3.1 Check PENTA L Vibration Mounts

1. Use a flashlight to closely examine each mount for signs of deterioration or collapse. If the mount is faulty, remove the unit and replace **ALL** mounts.



7 TROUBLESHOOTING AND SUPPORT

This section explains how to troubleshoot the PENTA L.

Figure 9 summarizes the fault finding process:

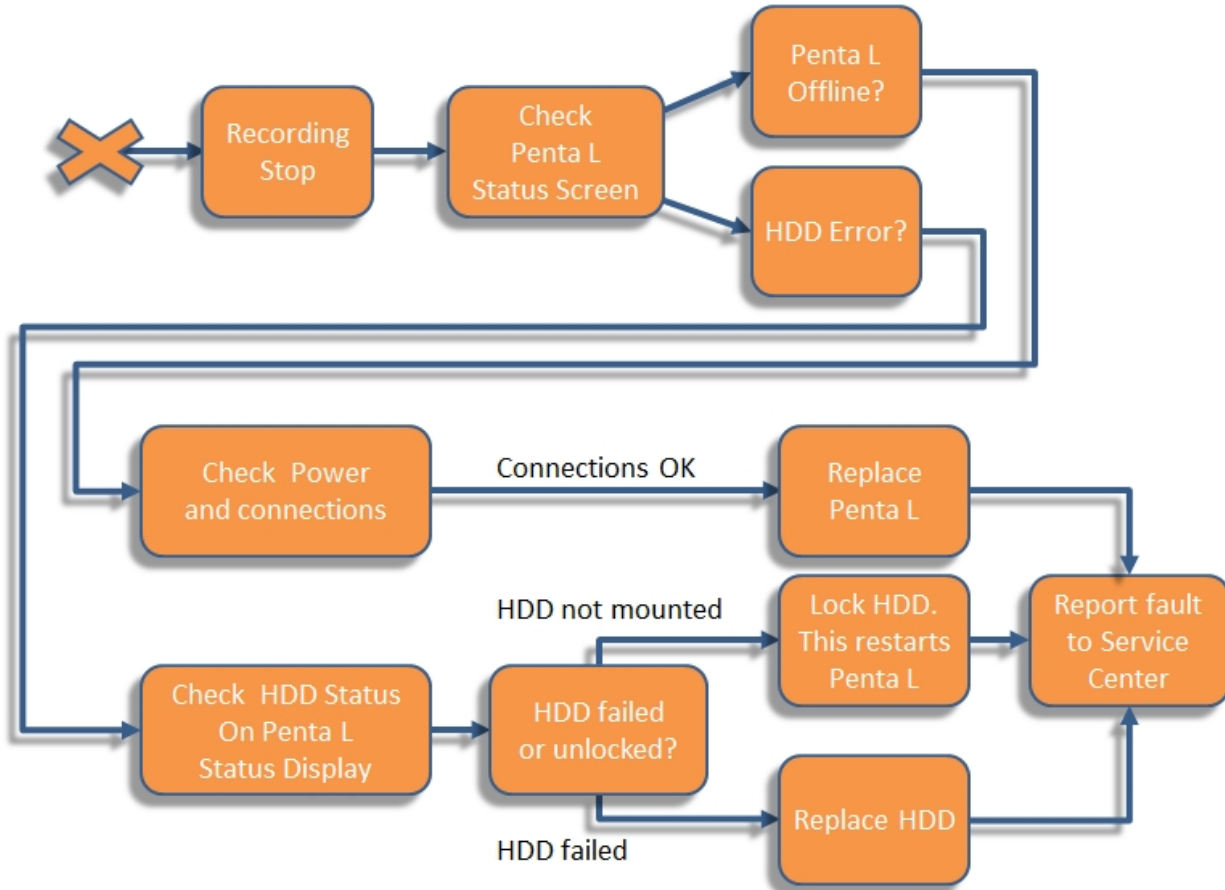


Figure 9: PENTA L Fault Finding Process Summary

7.1 COMMON FAULTS

Table 8 lists some of the common major and minor faults with possible rectification actions. For more detailed fault finding, please refer to the specific fault sections on the following pages.

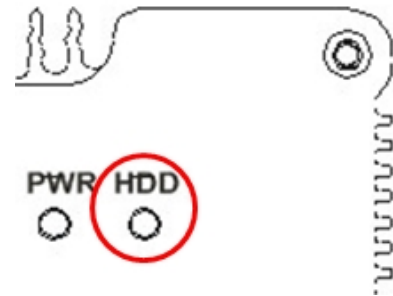
Table 8: PENTA L Common Faults

Major Fault	PENTA L Fault Indication	Common Possible Causes	Rectification	Comments
Complete or Partial system shutdown.	No PENTA L Status display.	Power source failure.	Check PWR LED on the PENTA L rear panel. The LED should be on. If not, check and restore power source.	If fault continues, replace PENTA L.
	S/W :- - displayed on PENTA L status screen.	Connection issue.	Check all system connections.	If fault continues, replace PENTA L.
		Hard Disk Drive (HDD) failure.	HDD LEDs should be flickering. See Section 7.1.1.	Replace drive caddy. If fault continues, replace PENTA L.
		PENTA L failure.	Reset PENTA L power.	If fault continues, replace PENTA L.
Camera in-operative or didn't record on last run.	C :- - displayed on PENTA L status screen. No live camera displayed on monitor screen after 3 min. from power-up.	Camera failure.	Locate and replace camera.	If the camera is functioning but there was no recording it is possible that the camera has reset and rectified itself. Monitor the camera for further dropouts and replace if fault continues.
		Camera to rack cable or connection fault.	Locate and repair cable / connector.	
		Camera or PENTA L power supply failure.	Replace faulty component.	
LRVs only: No live camera displayed on driver's monitor after 3 min. from power-up but PENTA L status screen shows S/W: Run.	C :- - displayed on PENTA L status screen.	Cab camera failure.	Locate and replace cab camera.	
		Camera to rack cable or connection fault.	Locate and repair cable or connector.	
		Camera or PENTA L power supply failure.	Replace faulty component.	
		VGA to composite video converter disconnected or faulty.	Check connections or replace VGA to composite video converter.	

Minor Fault	PENTA L Fault Indication	Common Possible Causes	Rectification	Comments
GPS loss	gps: NOT TRACKING displayed on PENTA L status screen.	PENTA L GPS/Speed signal drop-out.	Reset GPS unit power and monitor fault once vehicle has GPS signal.	If fault continues, first replace GPS unit. If fault continues, go to next step.
			Reset PENTA L power and monitor fault.	If fault continues, first replace PENTA L. If fault continues, go to next step.
			Check interconnection cable and connectors.	If cable faulty, replace.
		PENTA L to vehicle GPS/Speed signal Cable fault.	Check interconnection cable and connectors.	If cable faulty, replace.
		Vehicle GPS/Speed signal loss.	Check and repair GPS/Speed signal source.	

7.1.1 Hard Disk Drive LED Locations

Front panel: The General HDD LED is located in the top right-hand corner of the front panel.



Hard Disk Drive: There is a HDD LED on the HDD in the caddy. This LED is **green** when the HDD is on and flashes **red** when accessing the drive.

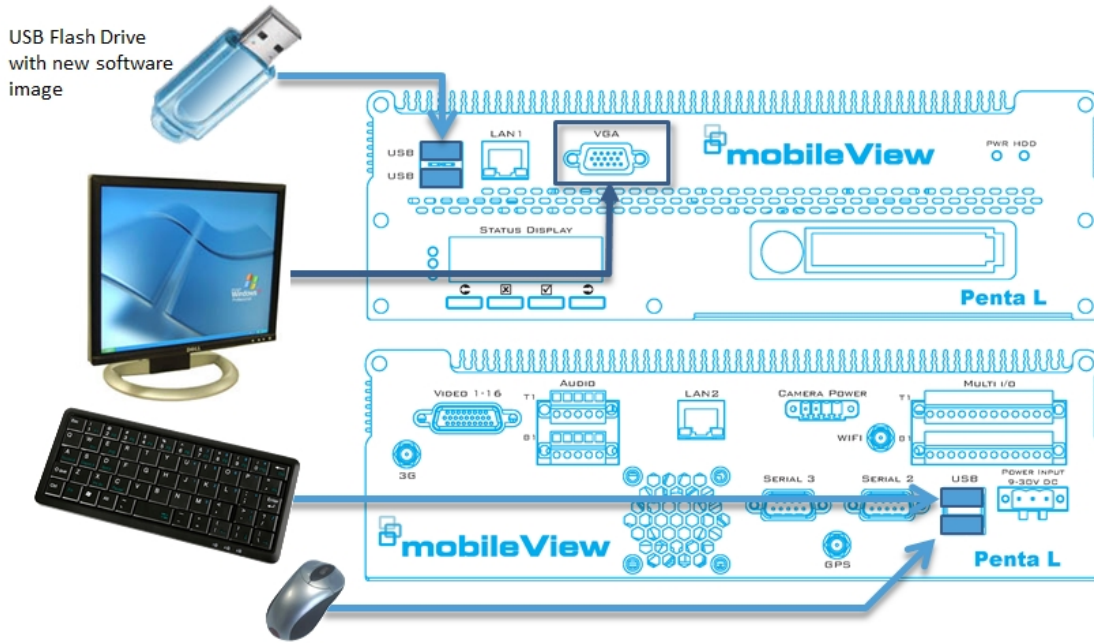


7.2 PENTA L SOFTWARE RE-IMAGING

When a replacement PENTA L is installed in a vehicle, it may be necessary to reimage the PENTA L software for the correct settings. A keyboard, mouse and monitor are recommended but not essential for this process. To re-image:

1. Turn PENTA L unit power and ignition power **off**.
2. Connect a Keyboard and mouse to the PENTA L's USB ports – any USB port can be used.
3. Connect a SVGA monitor to the VGA port on the PENTA L front panel.

4. Connect the UTC re-imaging USB flash drive to one of the PENTA L's USB ports.



5. Turn PENTA L power and ignition power on.
6. As soon as the PENTA L powers up, turn the ignition power **off**.
7. The software re-imaging process start automatically, with progress shown on the PENTA L Status Display and the external monitor, if connected.
8. Within approx. 90 seconds, the PENTA L Status display shows:

```
>System Message<
Please Wait ....
```

9. A short time later, the Status Display shows:

```
>System Message<
RESTORING UNIT
```

The re-imaging process usually takes approximately 3 to 4 minutes to complete.

10. When re-imaging is complete, PENTA L will shut down.

```
>System Message<
SHUTTING DOWN
```

11. When the PENTA L has shut down, remove the USB flash drive.

8 SUPPORT

This section provides information to help you troubleshoot problems and contact technical support in case you need assistance with the PENTA L.

CONTACTING US

For help installing, operating, maintaining, and troubleshooting the PENTA L and associated applications, refer to this document and other related documentation provided. If you still have questions, contact us during business hours, which are Monday through Friday, excluding holidays, between 6:30 a.m. and 3 p.m. Pacific Standard Time (PST).

Telephone: 1-855-MOBVIEW (662-8439)

Fax:

Email: MobileViewTS@fs.utc.com

Website: www.interlogix.com/mobileview

9 APPENDICES

9.1 PENTA L SPECIFICATIONS

NOTE: Not all specifications and features listed are available on all base models. Some features may be provided only as an optional upgrade.

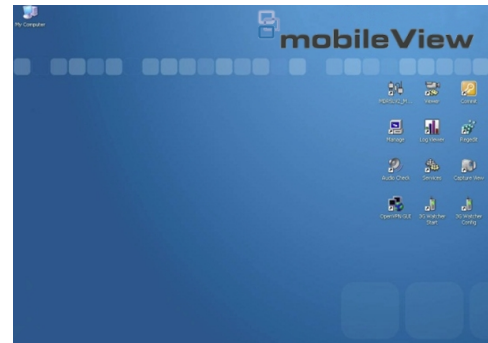
Table 9: PENTA L Specifications

Camera channels:	8 or 16 channels
Camera image resolution (max.):	704 x 480 pixels
Recording rate:	30/25 fps per camera, NTSC/PAL
Camera types supported:	NTSC, PAL, or IP
Camera input signal:	Composite video (NTSC, PAL)
Image compression type:	H.264, user configurable levels
Audio compression:	G.729 Audio (.wav only) and PCM
Digital inputs:	4 contact inputs, 0-30 VDC, optically isolated
Digital outputs:	2 voltage-free, 500 mA max.
Analog inputs:	2 x 8-bit channels, 0-30 VDC
Max. analog recording resolution:	720(H) x 576(W) pixels
Audio inputs:	2 channels: 2 mono or 1 mono, 1 stereo
Audio outputs:	2 channels mono
LAN interfaces:	2 x Gigabit LAN
USB Ports:	4 x USB 2.0
Serial interfaces:	2 x RS-232
Storage mediums:	1 internal 2.5" mobile hard disks, capacity 1 TB
Storage duration:	7-60 days, depending on project requirements
Access security:	Multi-user levels, account and password required
Image security:	Unique secure signatures, using SHA-1 hash appended to stored data.
Image access:	PENTA L Video Manager program
Remote display:	1 x SVGA 1024 x 768 pixels
Remote access:	1 X 10/100 network link (RJ45) 1 X1 0/100/1000Mb network link (RJ45)
Input Voltage:	9-30 Volts DC
Power Consumption:	45 Watts minimum
Dimensions:	11.890" W x 4.433" H x 6.379" D
Weight:	8 Lbs
Operating temperature:	32°F to 120°F 0°C to +50°C
Storage temperature:	Same as Operating Temperature
Certifications:	EN50121-3-2, EN50155, CE, FCC Class A, RoHS pending

9.2 CHANGE INI FILES


During the Installation or replacement of the DVR it can save time configuring each newly installed DVR by copying the FLTSettings ini file from a properly configured DVR onto a USB memory stick then transfer the file to the newly installed DVR into the same location (D: WorkspaceWorkspace). The file will be used to duplicate the configuration of all subsequent DVRs that are installed in vehicles with identical system parameters. Changes to these settings should only be made by qualified support staff or transit staff trained by UTC.

1. Remote Desktop into the PENTA L using your allocated username and password. This opens the PENTA L Desktop.



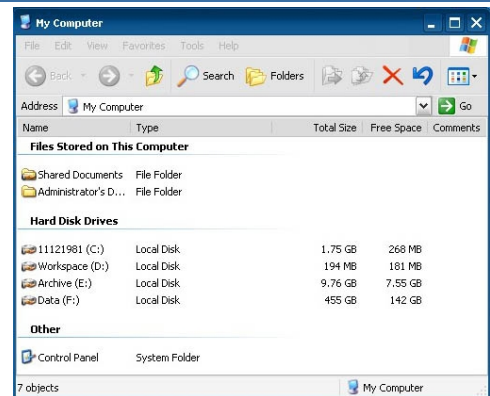
2. Stop the **DVSS Server service**: On the PENTA L Desktop, double-click the **Services** icon, which opens the **Services** window.



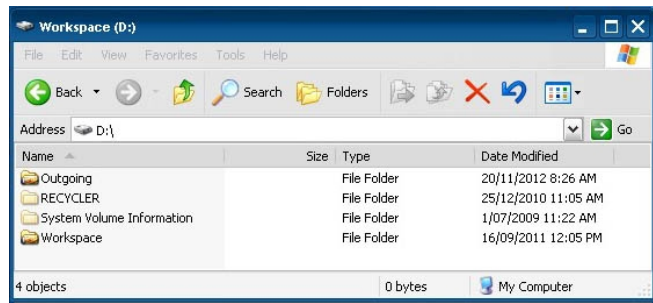
3. In the right-hand pane, select the **DVSS_Server**.
4. In the left-hand pane, click on **Stop the service**.
5. Close this window by clicking on the **Exit** button .



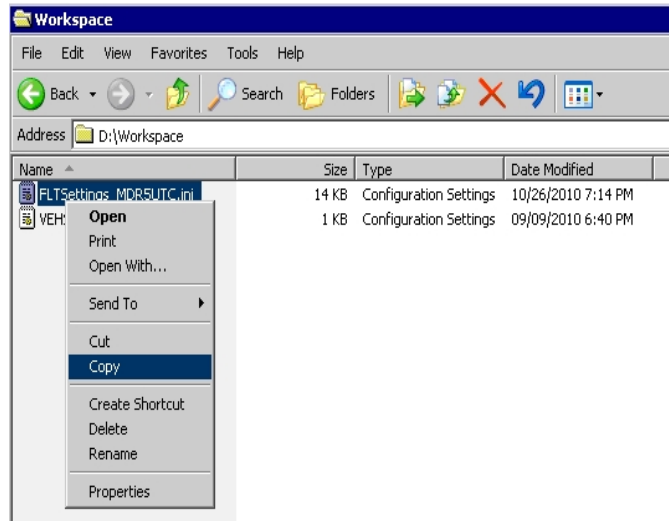
6. Locate the INI files: Double-click on the PENTA L's **My Computer** icon to open the My Computer window.



7. Double-click on the **Workspace D:** drive to open its window.

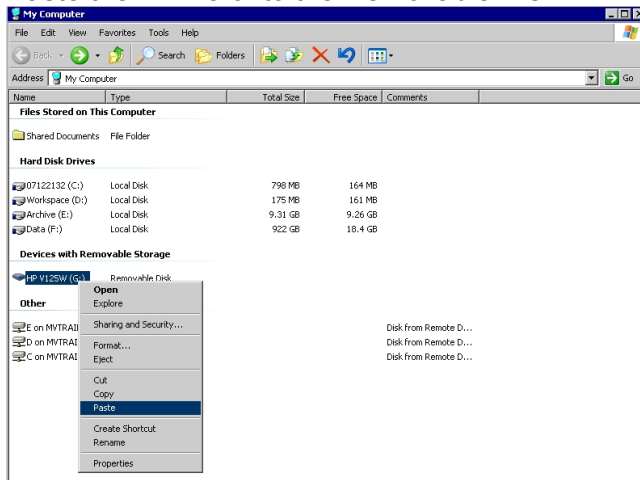


8. Double-click on the **Workspace** folder to access the INI files.
Three INI files are shown.



9. Highlight INI File > Right Click > Select Copy

10. Paste the INI file onto the Removable Disk



11. Eject Memory Stick

12. Log out of the DVR and close Remote Desktop Connection

9.2.1 Copying FLTSettings INI file from the memory stick to the next/new DVR

1. Connect and Login to the DVR as an Administrator (Remote Desktop)
2. Insert the USB memory stick containing the ini file into either of the USB ports on the front/rear of the DVR.

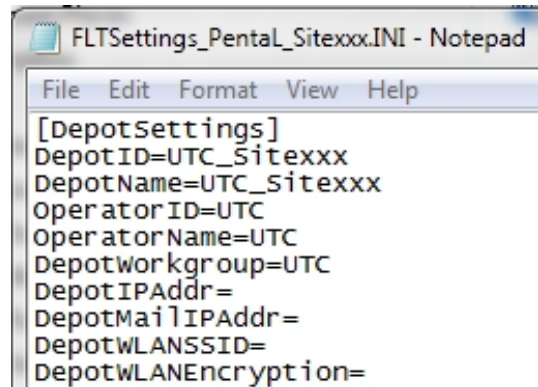
 Note: If the DVR recognizes the memory stick as a new device and prompts you to install/setup new hardware click cancel.
3. Browse to the Memory Stick (G:) and copy the FLTSETTINGS INI
4. Brose to the D: WorkspaceWorkspace directory and paste the FLTSETTINGS INI into the directory.
5. When asked to overwrite existing file > Select Yes
6. When finished close out of any open windows.

9.2.2 Change Depot and Vehicle Details

Note: You may also update the Depot Information & Vehicle ID directly in the Video Manager application. UTC should instruct you on proper update procedures made directly to the INI Files.

Change Depot Details:


1. To change the Depot details, double click on the relevant **FLTSettings** .ini file in the Workspace folder. This will open the file's associated text editor e.g. *Windows Notepad* window with **Depot ID = SacRT01** (actual name will be determined during installation)

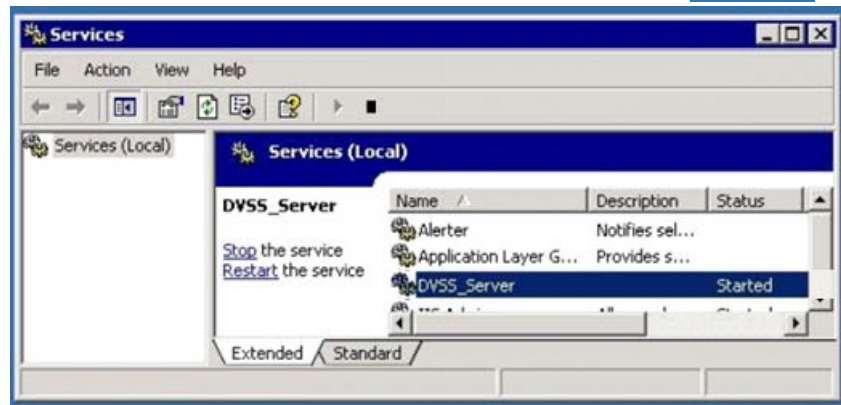


2. Click on **File>Save** and close the text editor window.

3. Go back to the Workspace folder and double click the **VEHSettings** .ini file.
4. Go to D: WorkspaceWorkspace and open the VEHSettings .ini file by double-clicking on the file.
5. Change the VehicleID to match the present vehicle number. Example: SacRT8001
6. Save Changes
7. Close File
8. **Restart DVSS Services:** On the PENTA L Desktop, double-click the **Services** icon, which opens the **Services** window.



9. In the right-hand pane, select the **DVSS_Server**.
10. In the left-hand pane, click on **Restart the service**.
11. Close this window by clicking on the **Exit** button .
12. The PENTA L reboots and the changes are accepted.



9.3 PENTA L HARDWARE MONITORING UTILITY

This monitor allows command, control, testing and monitoring of low-level system processes and operational functions of both the PENTA L and its associated vehicle security system.

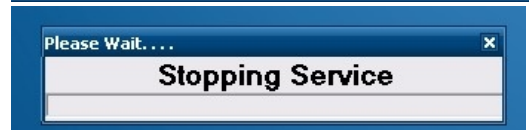
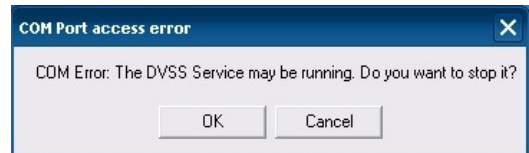
The program can be used by PENTA L installers and service staff to:

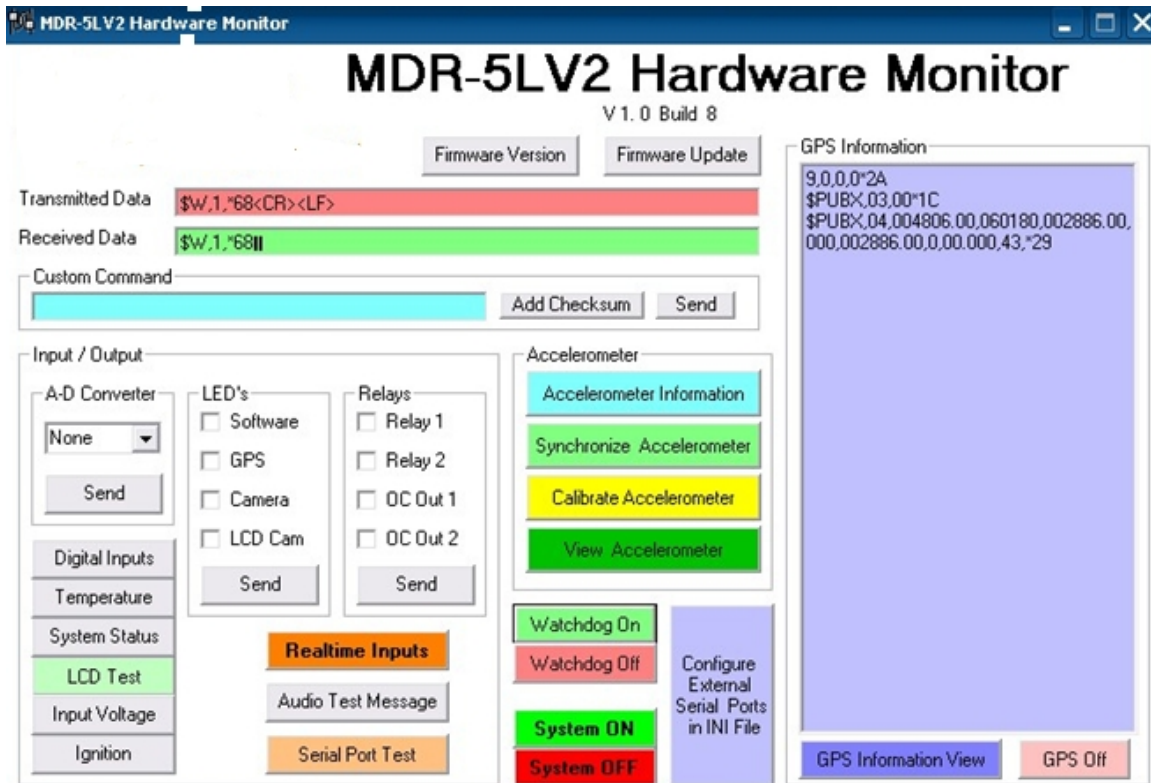
- Perform in-depth PENTA L and vehicle security system troubleshooting.
- Check PENTA L input and output functionality.
- Check PENTA L functionality, including internal voltages, operating temperature, fan operation, status display and drive caddy locking.
- Turn the PENTA L watchdog on and off.
- Check the PENTA L internal GPS unit functionality and data.
- Configure an external accelerometer.
- Update the PENTA L firmware.

9.3.1 Starting Hardware Monitor

The Monitor program can be run remotely via a Remote Desktop Session.

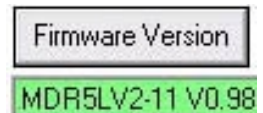
1. Remote Desktop into DVR and login with username and password.
2. Double-click on the Hardware Monitor desktop icon.
3. Stopping the DVSS service window appears. Click **OK** to stop the service.
4. The message **Stopping Service** is displayed for a short time. Then the main monitor screen is displayed.





9.3.2 Using Hardware Monitor

Firmware Version check: Click on the **Firmware Version** button. The PENTA L version is displayed in the **Received Data** box.



Firmware Update: Used to update the PENTA L firmware.

Input / Output: These buttons transmit test data to the PENTA L, which in turn responds with status messages.



NOTE: Most of the Input/Output functions are duplicated in the *Realtime Inputs* section.

The protocol for both send and receive is: <\$command>,<data>,<*checksum>.

The data value is the decimal equivalent (0-255) of the data byte.

Input / Output: A-D Converter: This enables the values of the Analog inputs to be returned in the Received Data. Select the Analog input from the dropdown box.



Input / Output: Digital Inputs: This button returns the values of the Digital inputs to be returned in the Received Data.

The data value returned is the decimal value of the input status byte. In this example shown, the value **09** or **1001** binary indicates that inputs 1 and 4 are on, with inputs 2, 3 off.

Transmitted Data \$I,*6B<CR><LF>
Received Data \$I,09,*4E||

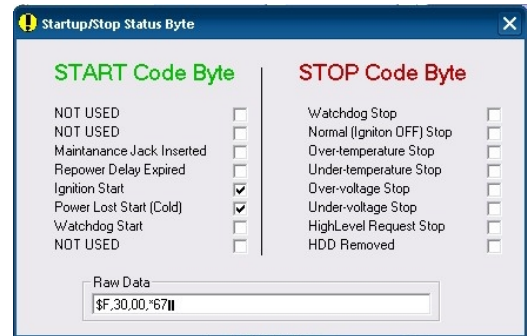
Input / Output: Temperature: This button returns the value of the PENTA L internal microcontroller daughterboard temperature to be returned in the Received Data.

The temperature data is shown in both data values, and is approximately 1 data bit for 2.1°C, based on a non-linear curve.

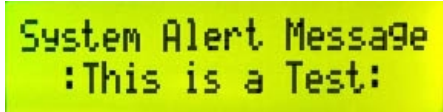
Transmitted Data \$T,*76<CR><LF>
Received Data \$T,2B,2B,*76||

Input / Output: System Status: This button displays the Startup/Stop Status Byte history window.

This display shows the reason for the last PENTA L startup and the reason for the last PENTA L stop.



Input / Output: LCD Status Display check: This button generates a short status message to the PENTA L display.



Input / Output: Input Voltage: This button returns the current PENTA L input voltage, followed by the last five averaged samples of this voltage.

Transmitted Data \$V,*74<CR><LF>
Received Data \$V,5F,=.5F,7B,6B,5F,5F,*64||

Input / Output: Ignition: This button returns the current status of the Ignition input, with 1 = On, 0 = Off.

Transmitted Data \$K,*69<CR><LF>
Received Data \$K,1,*74||

LEDs: These checkboxes turn the Multi I/O connector outputs for these indicators on and off. Two of these indicators, **Software** and **Camera**, can be viewed on LEDs on the Test Interface PCB connected to the Multi I/O. These outputs only operate if the Watchdog is on.

LED's


Software

GPS

Camera

LCD Cam

Send

To enable the Watchdog timer, click on the  button.



Relays: These checkboxes turn the Multi I/O connector relay and open collector outputs on and off. Either the Relay or the Open Collector outputs can be controlled – not both simultaneously.

The status of these outputs can be displayed on the **Alarm Out** LEDs on the MDR4 IO Test Board connected to the Multi I/O.

Relays

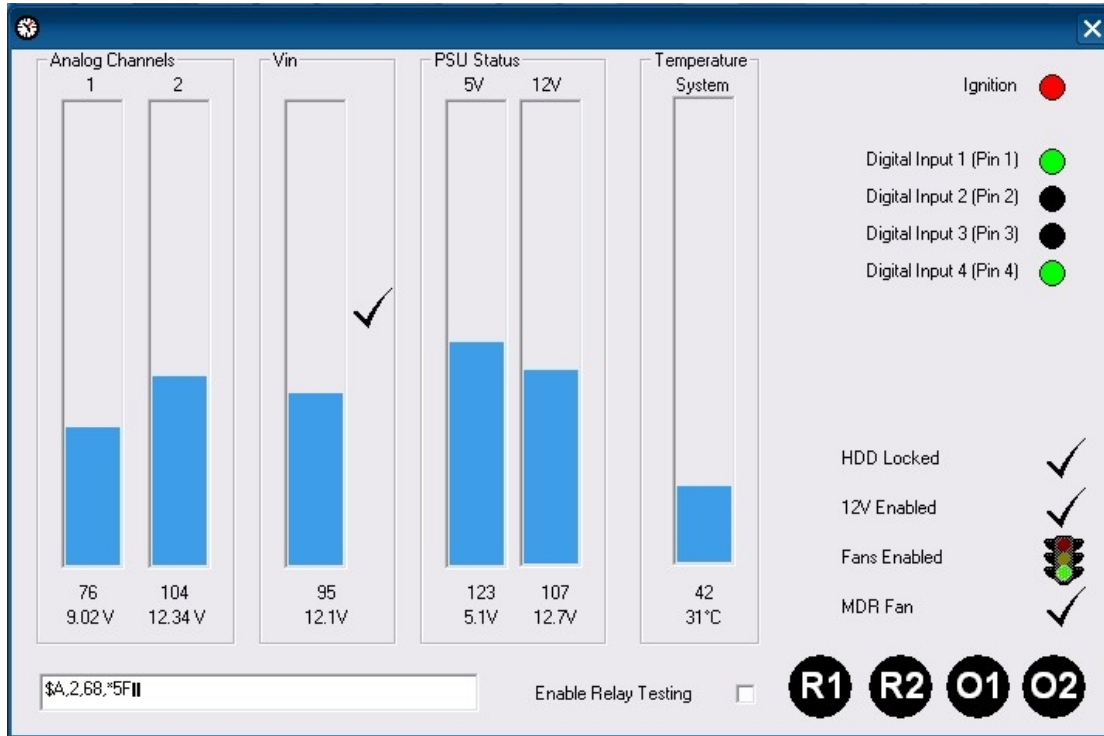
Relay 1

Relay 2

OC Out 1








OC Out 2



Realtime Inputs: This button displays the inputs window.



NOTE: The numbers above the voltage and temperature values are the decimal (0-255) equivalents of the data bytes in the received data.

This shows the current status and values of the:

- PENTA L supply voltages.
- PENTA L internal microcontroller daughterboard temperature.
- Ignition input voltage: On  or Off .
- HDD drive caddy: correctly locked into position  or not locked .
- 12 VDC, measured after the internal fuse. This voltage supplies all external 12 volt connections, including analog camera power.
- PENTA L housing fan: Enabled or Disabled. . (Not operational)
- PENTA L housing fan: working  or not .

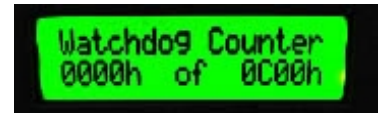
- Analog input voltage on each analog channel.
- Digital input status: On  or Off .

Enable Relay Testing: If this checkbox is checked, each relay output (R1, R2) and open collector output (O1, O2) is tested in sequence.



Audio Test: If the **Audio Test Message** button is clicked, an audio test message is output from the PENTA L on the Audio connector.

Watchdog checks: If the **Watchdog On** button is clicked, the Watchdog Counter on the System Status Display increments. Clicking on the **Watchdog Off** button resets this counter to zero.



System On/Off: Clicking on the **System Off** button display the **Shutdown Reason** screen. Select a test reason then click on **Send**.

Some shutdown reasons, e.g. Watchdog Shutdown, will shutdown and restart the PENTA L.



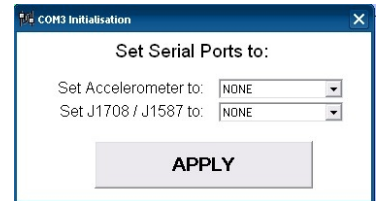
After shutdown and restart, the reason for last shutdown can be confirmed on the **Input / Output System Status Stop Code Byte** display.

Configure Serial Ports: the PENTA L COM1 and COM2 serial ports can be configured to support the Accelerometer or the J1708/J1587 communications protocols in the PENTA L's .ini file.

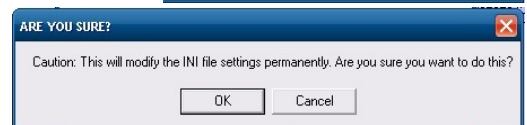


To configure the serial ports, click on the **Configure External Serial Ports in INI File** button.

In the drop down list, select either **COM1** or **COM2** then click on **APPLY**.

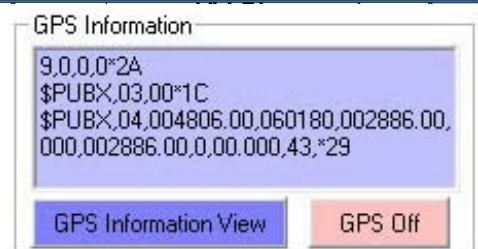


A warning will be displayed, indicating that the ini file changes will be permanent. Click **OK** to proceed.

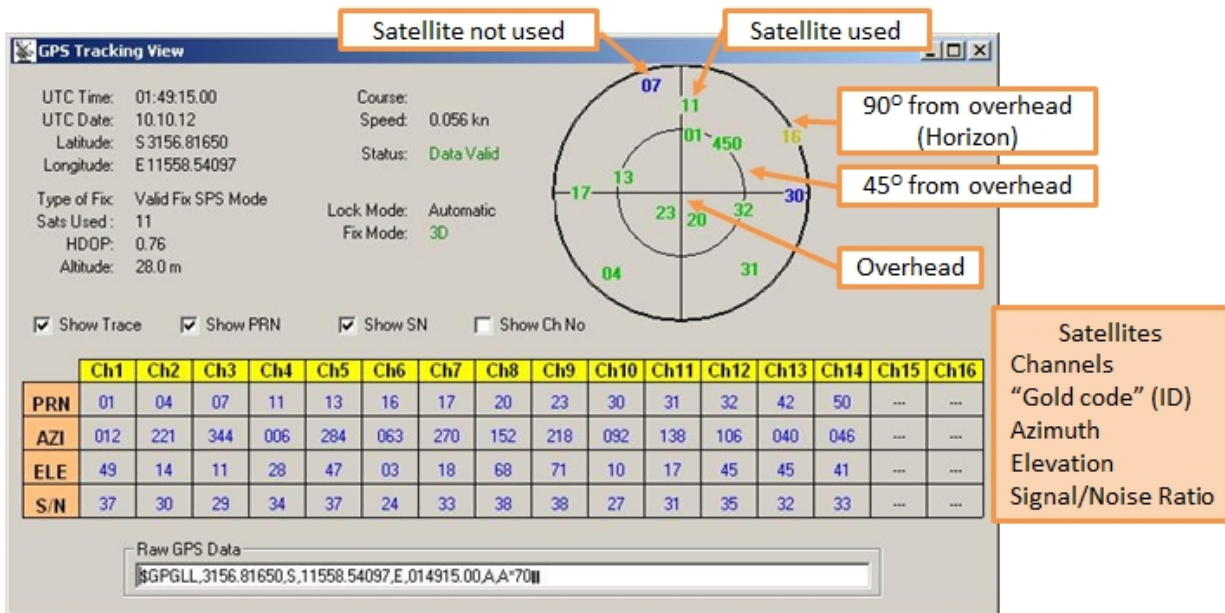


GPS Information: This window shows the information returned from the internal GPS, if this module is fitted to the PENTA L.

The GPS unit can be turned on and off with the **GPS Off**, **GPS On** buttons.



GPS Information View: This button provides a view of the satellites currently being used by the GPS.



9.4 PENTA L DRIVES

Table 10 provides information on the drives fitted to a PENTA L.

Table 10: PENTA L Drives

Drive	Name	Type	Size	Use
C	<Number>	4 GB Compact Flash 1 st partition	2 GB	Operating System and associated <i>Windows</i> programs.
D	Workspace	4 GB Compact Flash 2 nd partition	200 MB	Stores fleet and vehicle settings; old log files.
E	Archive	1 GB Hard Disk Drive 1 st partition	10 GB	Event archive, e.g. duress events that have to be saved; current working log file.
F	Data	Hard Disk Drive 2 nd partition	900 GB	All camera video files.