High Occupancy Vehicle Sign
User Manual

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1. Introduction

1.1 Pre-requisites

If you are installing High Occupancy Vehicle (HOV) Sign hardware you must perform the following tasks:

Manage your own safety and that of other people by carrying out a comprehensive risk assessment and putting in place mitigation methods which either remove the risk or mitigate it to as low a level as reasonably practicable.

Develop and implement a Method Statement detailing the stages needed to complete installation and commissioning of each individual sign.

Gather the required equipment and organize/implement Traffic Management arrangements as required by the specific site conditions and also any Federal/Local laws or regulations in force at the time of installation.

Have experience installing electrical equipment at height and hold any relevant in date qualifications required.

1.2 Important Safety Information

Please review the following information before installation.

WARNING

READ ALL INSTRUCTIONS BEFORE USE AND SAVE THIS MANUAL FOR FUTURE REFERENCE. If you require further copies please contact Unipart Dorman.

Installers are required to ensure that all Federal and Local regulatory requirements are fully complied with prior to and during the installation, and also in the day to day operation of the equipment.

Use the HOV Sign only for the application it was designed and supplied for.

Changes or modifications not expressly approved by Unipart Dorman could void any warranty or guarantee on the equipment.

Safety Information

The following safety information and warnings enable you to avoid potential harm to yourself and others and possible damage to the equipment being installed/maintained.

This is not an exhaustive list of hazards you may encounter with the equipment and should never be considered as a substitute for your judgment, experience or current legislative requirements.

Please read and observe all the safety information and instructions contained in this manual before installing or operating any equipment. You should keep this Manual in a safe place for future reference.

If you are unsure about any part of this installation or of the potential hazards listed, please contact Unipart Dorman immediately using the details at the back of this Manual.

This section contains important information to help you recognize, understand and mitigate some of the risks involved with operating and maintaining a HOV Sign.

Please read all the following safety advisory messages before carrying out any work on this equipment.

The HOV Sign is supplied with AC Power which can cause serious injury or death. To reduce the risk associated with electric shock injury:

Operate any AC Power isolation equipment fitted to support structures.

Open the main fuse holder and also the beige fuse holder located on the DIN Rail (as illustrated in Section 2) to electrically isolate the equipment within the sign.

All electrical equipment must be serviced by suitably qualified personnel.

Qualifications should be valid where there is a time expiry clause attached to them.

An accidental short circuit may instantly heat conductive jewelry, tools, etc to skin-burning temperatures. Furthermore, flammable material near to the site of the short circuit may ignite causing a spread of fire. To reduce this risk**:**

Keep tools, jewelry, and other conductive objects away from live equipment.

Each HOV Sign is 950 x 600 x 325 mm (37.5 x 23.5 x 12.75 inches) and weighs 22Kg (48.5 lbs.). To reduce the hazards resulting from manual handling, falls, accidents with passing vehicles, and from unstable equipment:

Use appropriate traffic control methods, work equipment, and procedures.

Adopt good lifting posture as strain or back injury may result from lifting equipment incorrectly.

To reduce the risk of strain or back injury, always use proper lifting techniques and have adequate help. Strong consideration should be given to the use of mechanical lifting equipment such as cranes during installation.

To avoid the possibility of injury due to falling or unstable equipment:

Be certain the sign is mounted to an appropriately rated pole or equivalent mounting surface.

Use appropriately rated mounting hardware.

NOTICE
Changes or modifications not expressly approved by Unipart Dorman could void the user's authority to operate the equipment and invalidate any warranty.

1.3 Scope of this Document

The Unipart Dorman HOV Sign is supplied for a specific application as shown in the description below only. Any use outside this application is not permitted and Unipart Dorman does not accept any liability for death, injury or damage to property caused by any such inappropriate use.

Every effort has been made to ensure the accuracy of the information given in our Publications, but in accordance with our policy of continually improving our products we reserve the right to modify designs and specifications whenever necessary.

Great care is taken to ensure that, as far as reasonably practical, equipment supplied will perform without risk to health. It is essential that accepted codes of professional practice are followed in the installation, commissioning and use of the equipment. If you are in any doubt with respect to any of these instructions, please consult Unipart Dorman before installing the device.

Please note that equipment and components described in this document are protected by patent and no part of this document may be reproduced in any form without the written permission of Unipart Dorman.

1.4 Description

High Occupancy Vehicle (HOV) lanes are restricted to certain types of vehicles carrying at least 2 people. They are an effective way of enabling the same volume of people to use the roads but by greatly reducing the amount of vehicles travelling on the highway they significantly decrease pollution and congestion.

HOV Signs are installed on masts above the designated lane and use high quality LED displays subject to auto luminosity control which illuminate at times set by an internal electronic calendar to customer requirements.

The calendar is set and modified using software installed on a laptop and then transferred to the sign over a dedicated USB interface unit (IFU) supplied with 15 metres (49 feet) of cable. This allows the connection between the laptop and IFU to be made at ground level using the USB cable supplied having accessed the IFU through an access point in the mounting post.
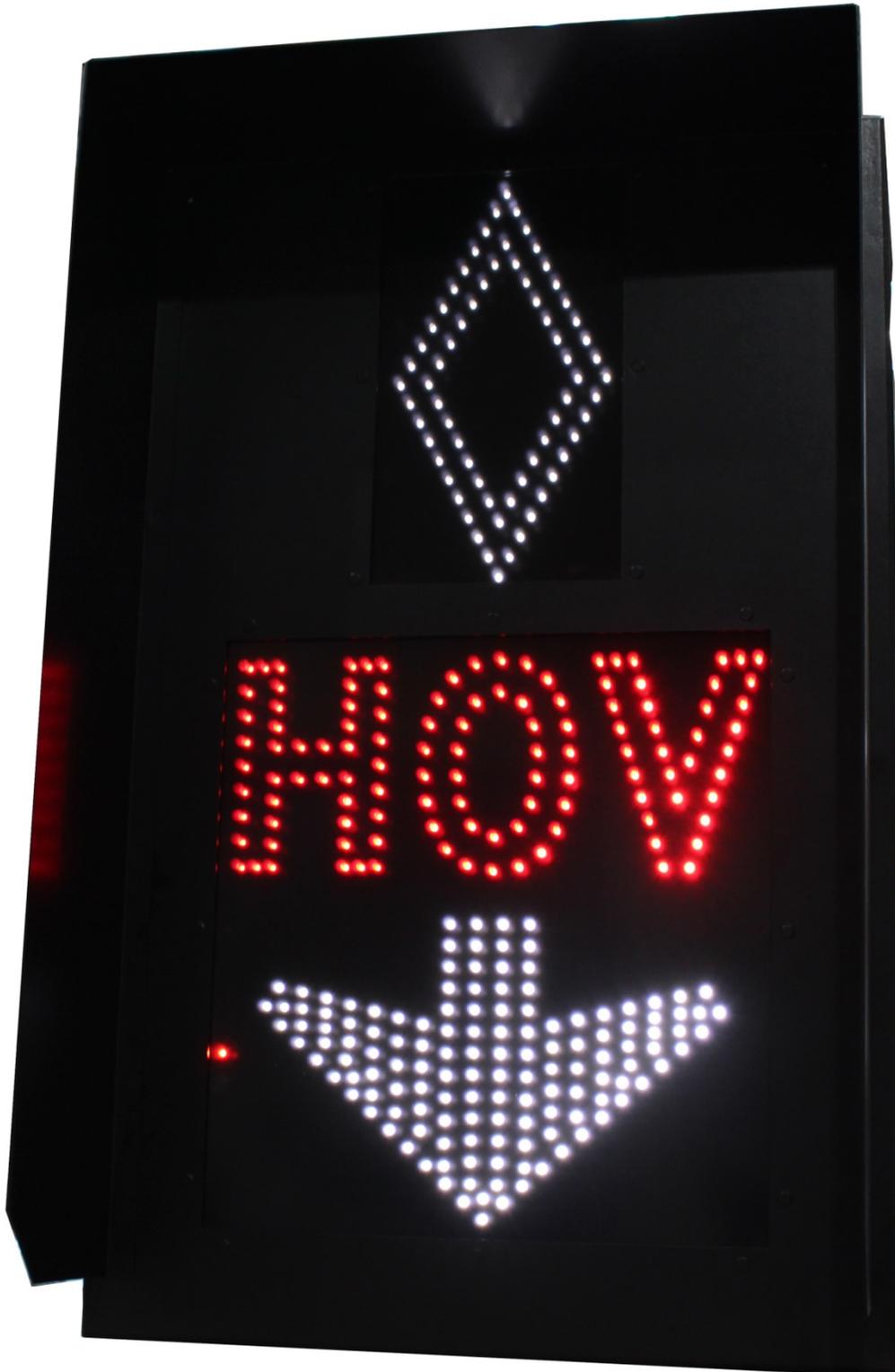
The signs are attached to the Mast using a PELCO Astra-Brac Assembly (AS-0116-4-29-PNC) and are also fitted with a PELCO Safety Rope (SH-1867-48-SS).

Shown below is a schematic diagram which depicts the interfacing of the various components which go to make up a HOV Sign unit.

1.5 Schematic Diagram

LED Display with Light Detector
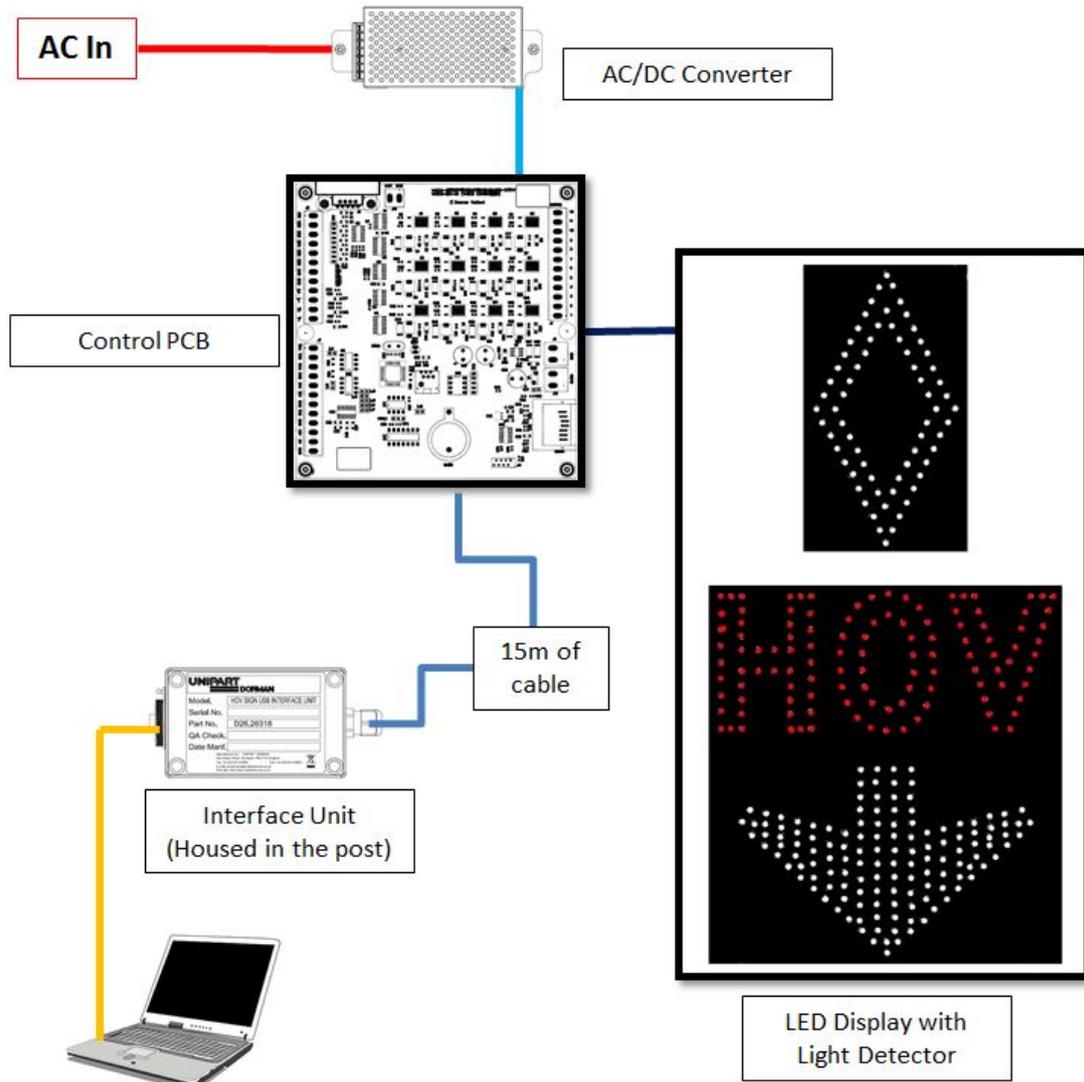
1.6 Firmware Version

The firmware version and serial number is appended to a yellow decal on the main PCB

2. Installation

The mounting of the HOV Sign should be undertaken using the locally generated Method Statement and Risk Assessment mentioned in the safety information above.

2.1 Fitting the Visor

The HOV sign visors are fitted to the sign door using the 10 x M5 PEMs locating through the pre-drilled holes and secured at the back by nuts, spring and flat washers. Care should be taken not to overtighten the nuts.

> ⚠️ **The uninstalled visor is vulnerable to distortion if not handled correctly – do not remove from the protective packaging until it is ready to be fitted.**

2.2 Electrical Hook Up

All HOV Signs operate using AC power

Actions to install:

Open the sign using the access key provided and secure the door against sudden closure using the sliding door stay.

Open the beige fuse holder located on the internal power din rail by pulling the fuse carriage
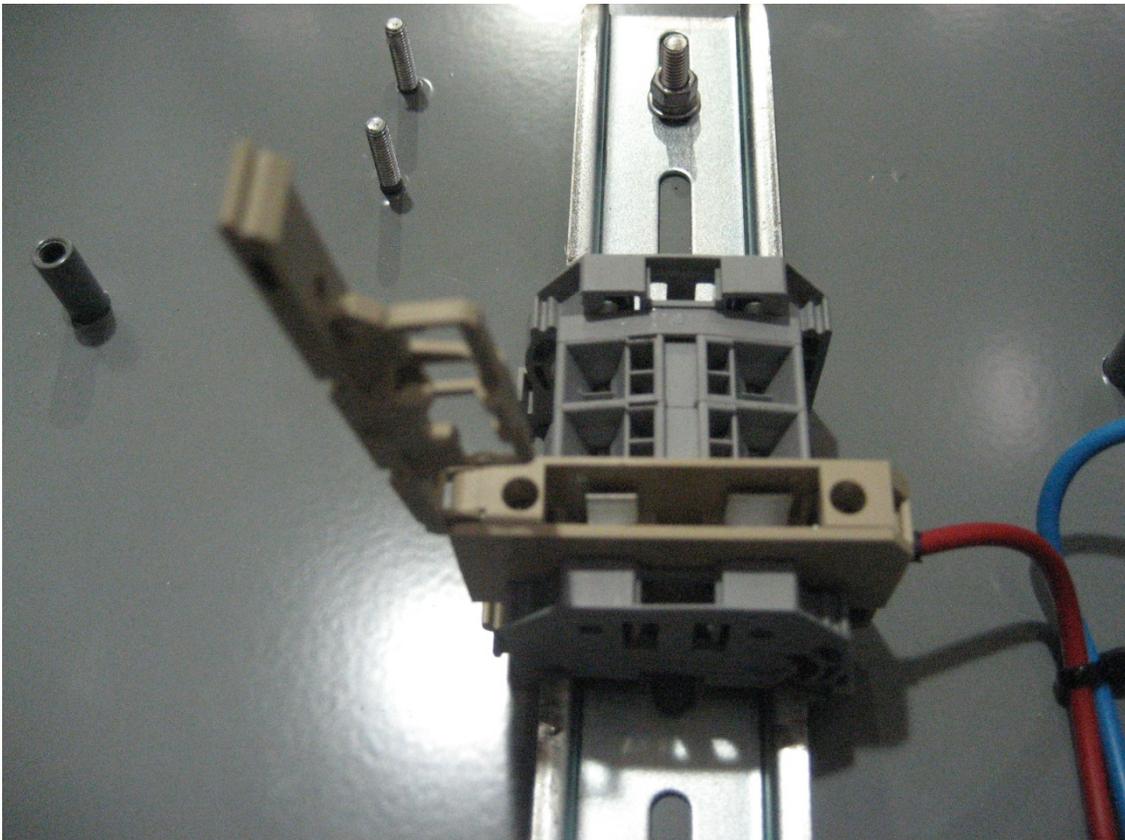
Illustration shows the fuse holder open with no fuse fitted

The power supply cable should be routed through the mast and PELCO bracket into the bottom of the sign ensuring there are no kinks or pinch points which could compromise the integrity of the cable.

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The cable is terminated at the input fused screw terminal shown below as follows:
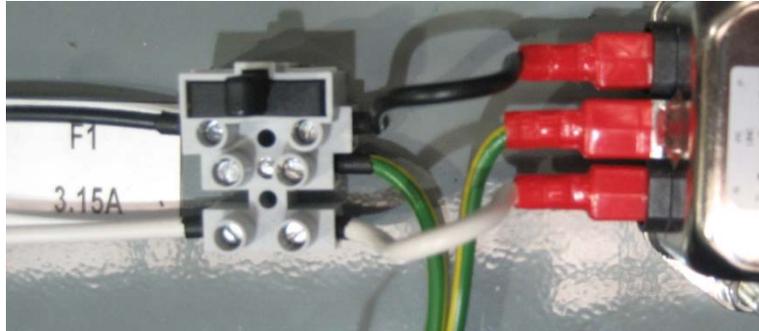
Strip back each core 6mm (1/4″) and connect the earth core into the terminal marked $\perp$ (the middle terminal). Connect the live core to the live fused terminal and the neutral core into the neutral terminal. Ensure the fuse in the black fuseholder is the correct rating (3.15A slow blow) and refit to the screw terminals.

IT IS ESSENTIAL THAT ALL THE TERMINATIONS AND CONNECTIONS ARE FULLY INSULATED AND THAT NO LIVE CONDUCTOR IS LEFT EXPOSED

Check the fuse is fitted correctly in the connection block and then close the beige fuse holder and ensure the red LED on the main controller board flashes continuously.

This space intentionally blank

3.0 Configuration and Setup

This section provides a guide to configuration of HOV Signs once physical installation and electrical power supply activities have been completed.

3.1 Introduction

HOV PC V.1 is the Unipart Dorman switching timetable editing application for the Signs. V-AMP provides tools for designing timetables which will instruct the sign to automatically change display modes. Timetables created using V-AMP can then be uploaded from a Laptop via the USB Interface Unit (IFU) housed in the bottom of the post.

Insert the CD provided with the sign and when prompted open the folder.
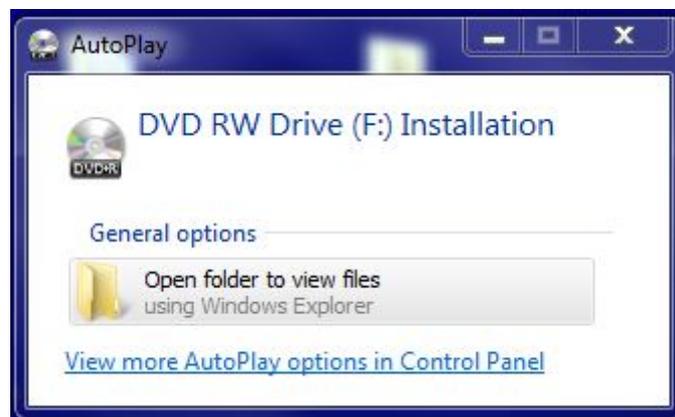
Double click to open the VAMP Folder
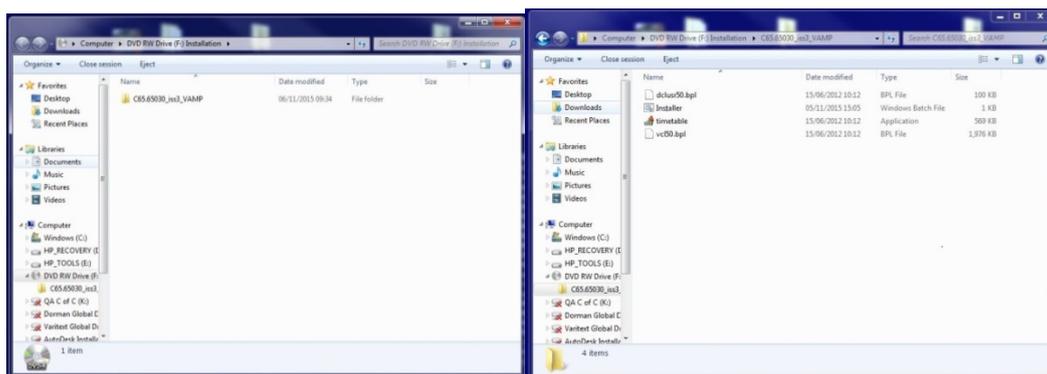
Then click on Installer and allow it to run, accepting any permission tabs which may appear. Once the installer is complete click on the Start Button in the Task Bar

And then select All Programs
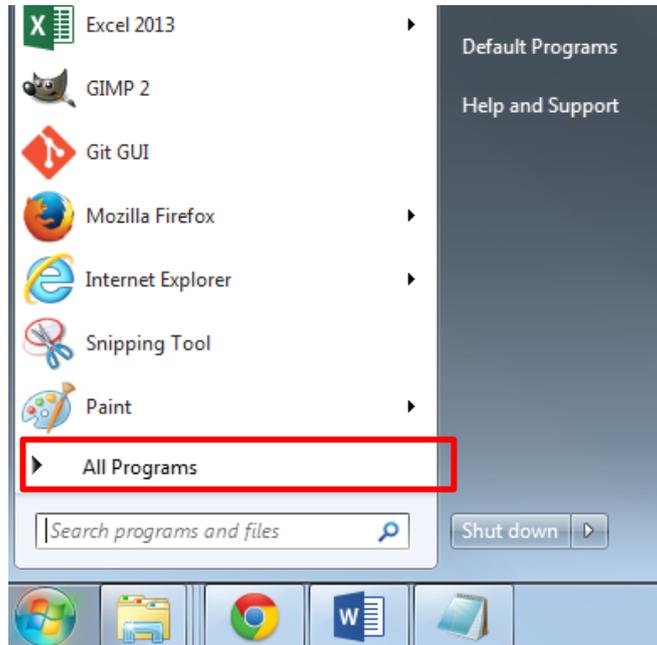
Then Timetable
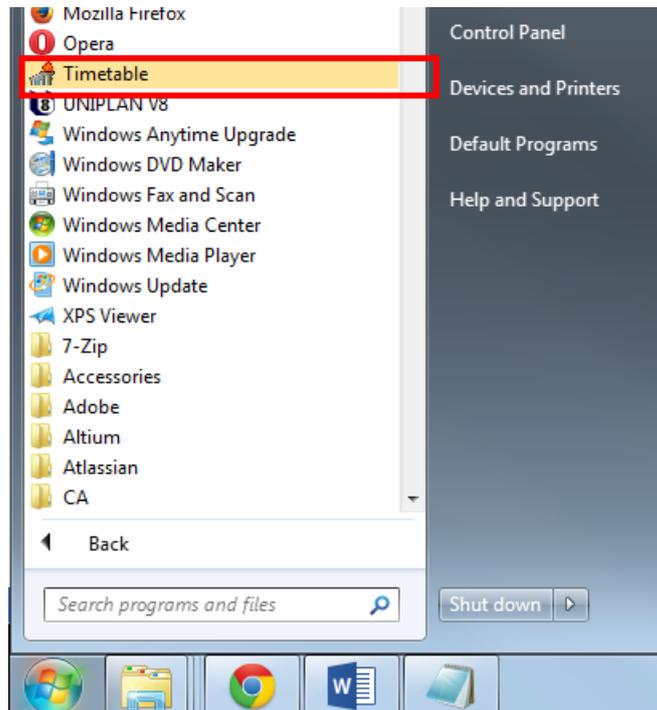
3.2 Overview of Timetable System

V-AMP provides a simple method of creating a switching timetable for your HOV Sign. Each timetable created using V-AMP will contain, as a minimum, a base timetable. The base timetable is a weekly, Monday to Sunday timetable which will repeat every week of every year.

For each day of this weekly schedule, up to 10 sign switchovers can be defined. A single switch-over defines a time at which the sign should change and to which preset parameters it should change to.

Often a weekly schedule repeating throughout the year is inappropriate for a sign's intended application. A common example of this is the occurrence of holidays etc. V-AMP provides tools to allow periodic alternatives to the base timetable. And once a base timetable is set, V- AMP allows up to 40 alternative time periods to be defined.

Between the dates defined by an alternative timetable, V-AMP will override the base timetable and instead switch the sign using the alternative schedule. An alternative period can be defined in the same way as the base timetable by creating a weekly schedule which will repeat during the defined period.

3.3 Creating a Timetable

After the V-AMP application is opened, the user is presented with the following menu screen, please select the VATCS button.

A blank timetable is presented and this allows you to begin editing straight away. If a timetable is already open, a new timetable can be created by selecting File>New Timetable from the menu bar. If the current timetable has unsaved changes, you will be prompted to save, ignore or cancel.

3.4 Creating a Base Timetable

To create the base timetable for your schedule, click on the Base Timetable tab. You will be presented with a blank schedule table.
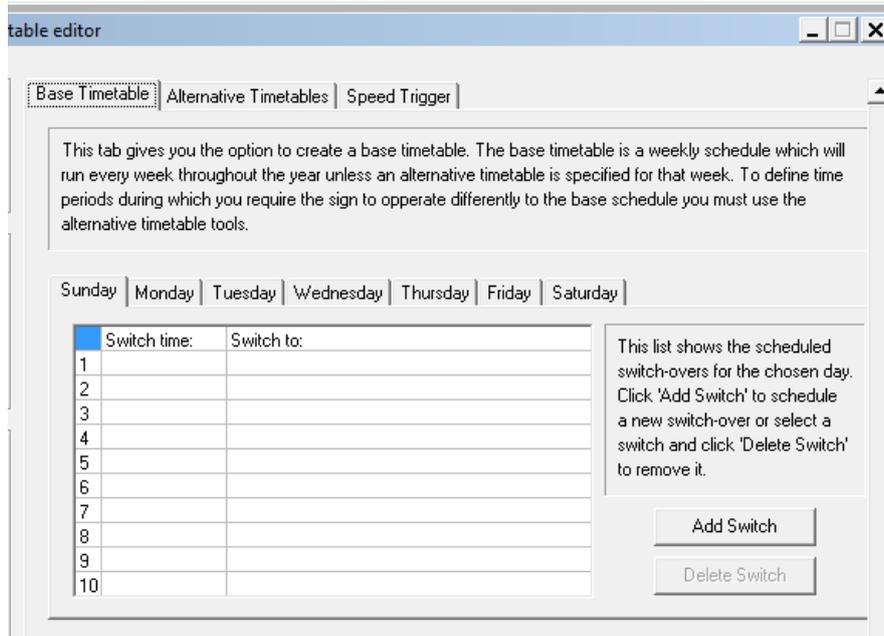
3.5 Adding a Switch-Over to a Schedule

To add a switch-over, first click the 'Add Switch' button.
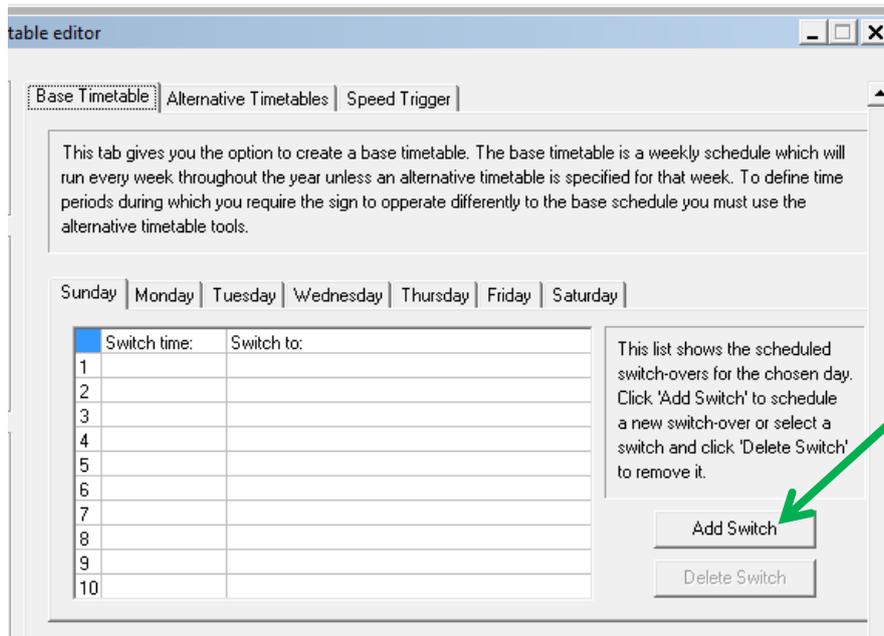
A new window will appear as shown below, giving the various options relating to the switch. The switch-over can be applied to multiple days during the weekly schedule by checking the boxes for the required days. The 'All', 'Weekdays' and 'Weekend' buttons provide a quick method of selecting days.

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To set the time at which the switch over is to take place, select the appropriate hours (hh) and minutes (mm) from the drop down boxes. Finally, using the 'Switch Sign To' dropdown, select the state to switch the sign to.
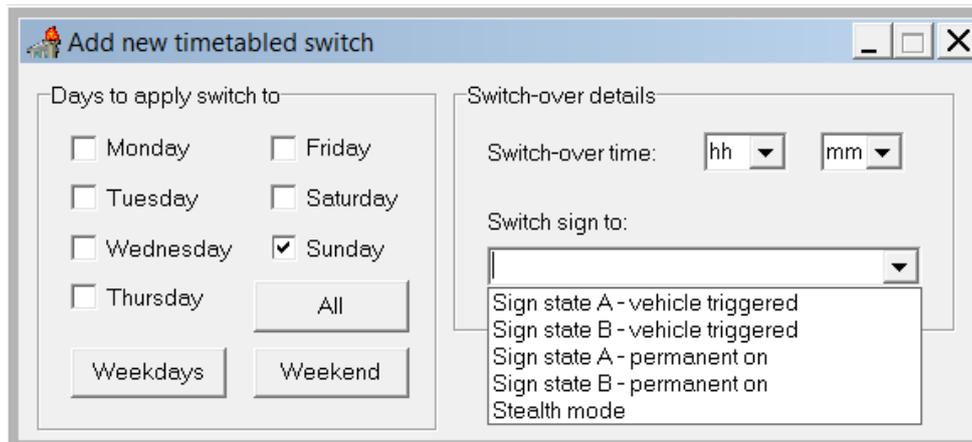
The settings required are Sign State A – Permanent On to set the time the sign illuminates and Stealth Mode to turn the sign off.

3.6 Removing a Switch-Over from a Schedule

To remove a switch-over from a schedule simply click on its entry on the schedule table to highlight it in blue as shown below and click 'Delete Switch'.
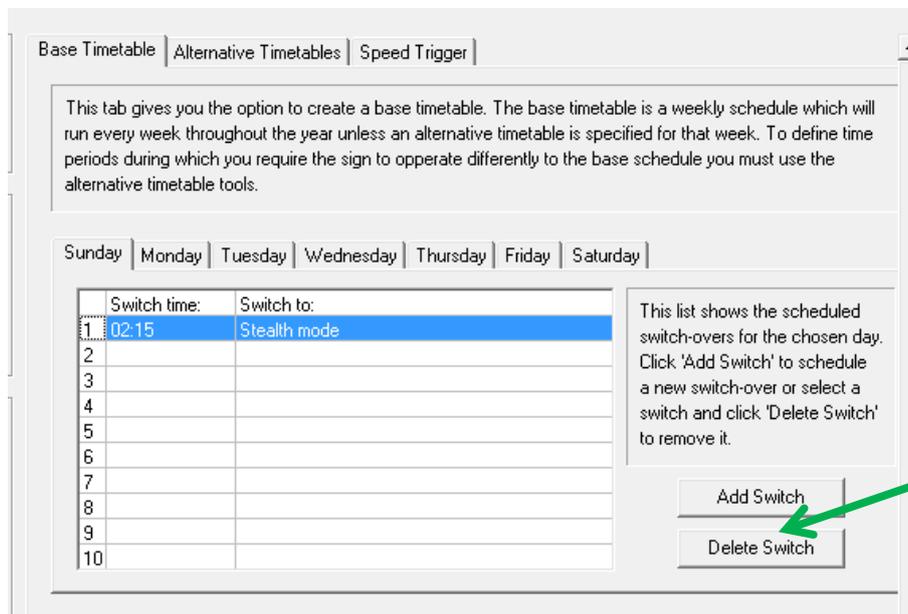
3.7 Creating an Alternative Timetable

When an alternative to the weekly base timetable is required, an 'Alternative Timetable' period can be defined. To create one, select the Alternative Timetables tab within the main application window. This tab will present the list of currently defined timetables.
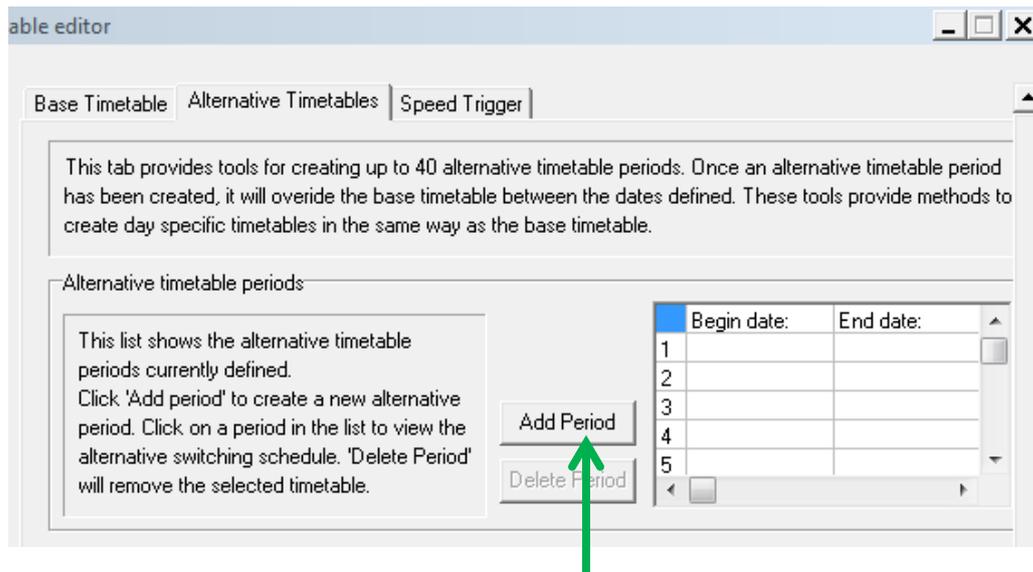
3.8 Adding an Alternative Schedule Period

To define a new period in which to enable an alternative schedule, first click Add Period as indicated by the arrow above. This will present the window shown below. A beginning and an end date can be selected using the drop down calendars provided.
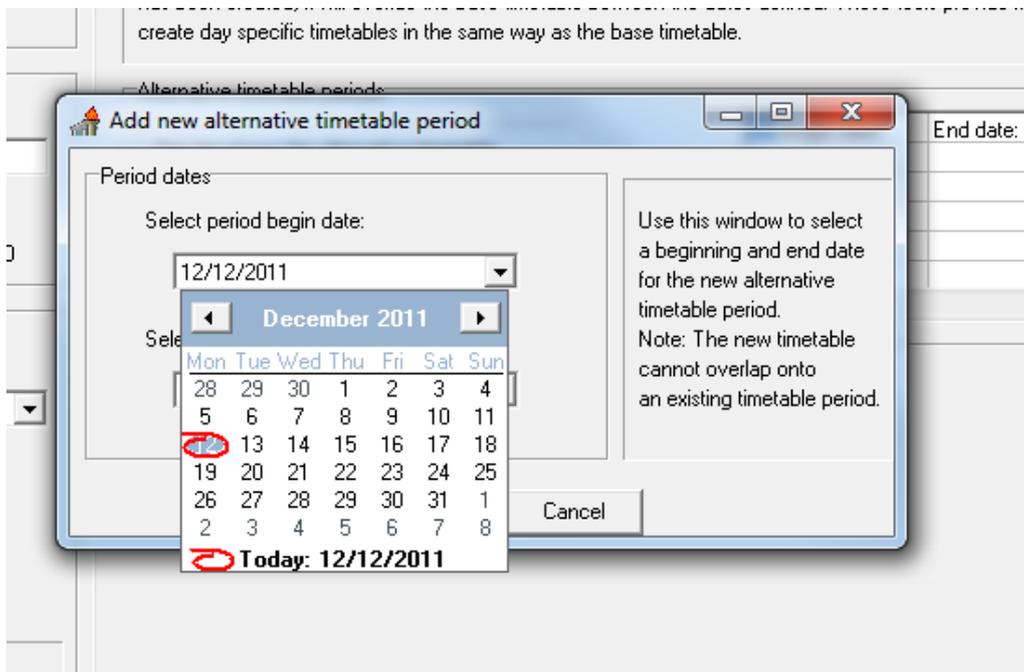
Click Add Period to add the new dates to the list.

create day specific timetables in the same way as the base timetable.

Alternative timetable periods:

Add new alternative timetable period

Period dates

Select period begin date:

12/12/2011

Select end date:

13/12/2011

Use this window to select a beginning and end date for the new alternative timetable period.
Note: The new timetable cannot overlap onto an existing timetable period.

Add Period   Cancel

End date:

NOTE: A newly defined period may not overlap an already defined period. If the dates provided coincide with another alternative period then a warning will be given and different dates must be selected.

3.9 Creating an Alternative Schedule

Once the dates for an alternative period have been defined, the period will appear in the alternative period's table. To define the daily switchovers for the alternative period, click on its entry in the list. This will display the schedule for that period in a new schedule table as shown below. Browsing this schedule as well as adding and deleting switchovers can be performed in exactly the same way as for the base timetable.

NOTE: Alternative timetables can also be used to define periods where no switching is required. Simply leaving an alternative timetable without any switchovers defined will instruct the HOV Sign to remain in its default state for each day defined by the alternative period.
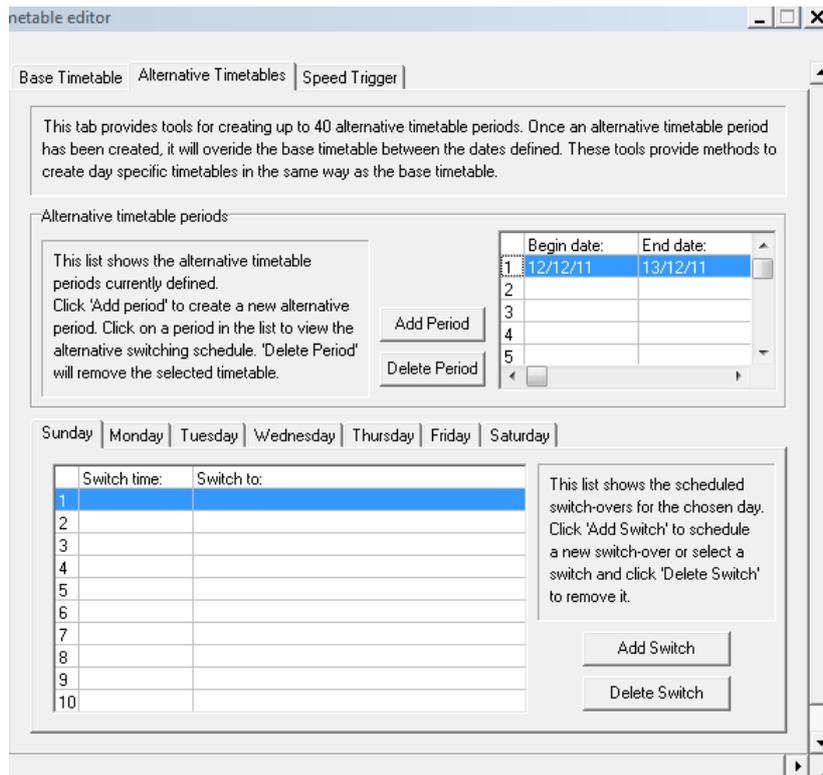
3.10 Removing an Alternative Schedule Period

To remove an alternative schedule period from the list, click on its entry in the period list and click Delete Switch.
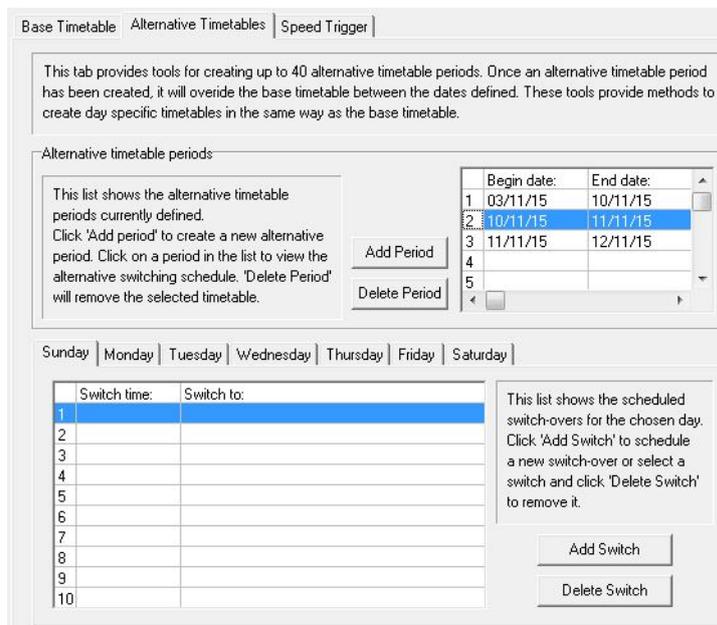
When all editing is complete select File as shown below and Save the timetable in a convenient location.
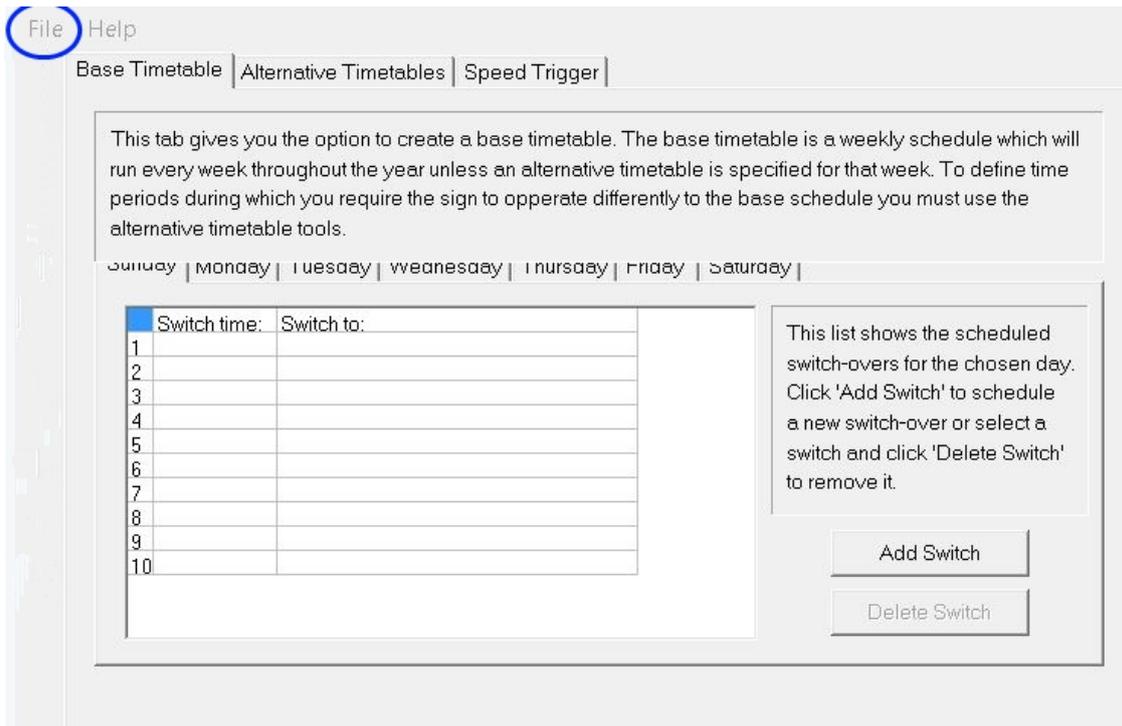
Next open the CD folder and double click to open the HOV PC Folder
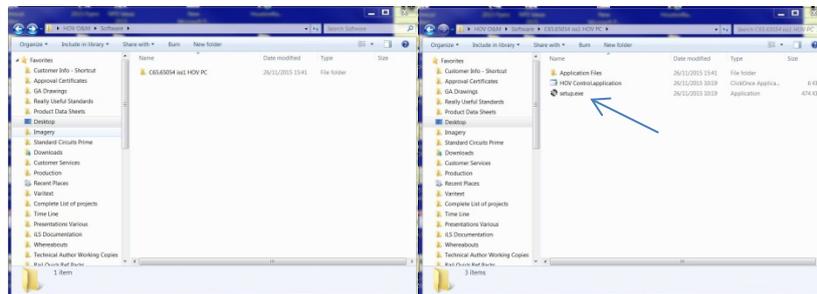
Then click on setup.exe and allow it to run, accepting any permission tabs which may appear. Once the installer is complete click on the Start Button in the Task Bar.

And then select All Programs
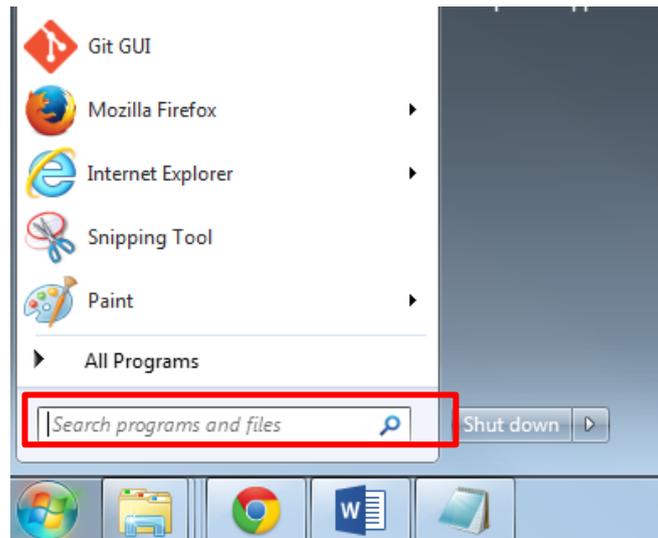
Then HOV PC v1

3.11 Connecting to the Sign

Connect your laptop to the IFU located behind the cover in the base of the post using the USB cable.

Open the HOV Software from the Start Menu and using the dropdown select the COM Port on your laptop (if it isn't shown wait 2 or 3 minutes and then click Refresh List). Then click on the connect button.
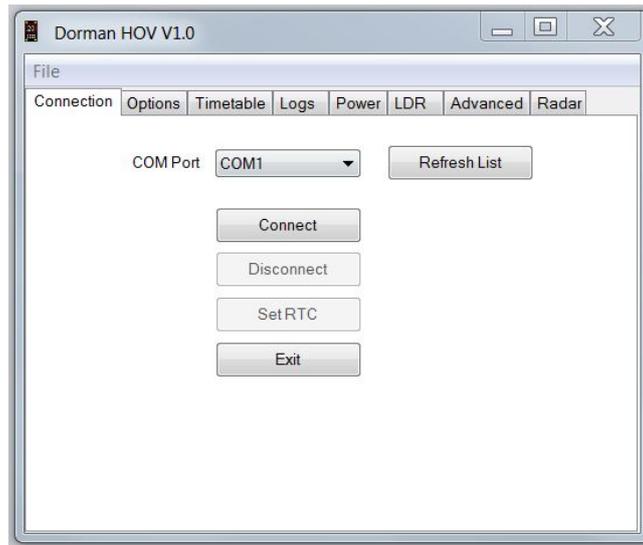
Once the connection is made the screen will show the legend 'Connected' and the Set RTC and Disconnect buttons will become active.

The Set RTC button will allow you to set the system time into the Real Time Clock which will is used as the baseline setting for the switching sequence.

3.12 Setting the Switchover Times

Select the Timetable Tab and after clicking 'Select' find the timetable file saved in the last section and once it is loaded select 'Enable' to start uploading the file to the sign.
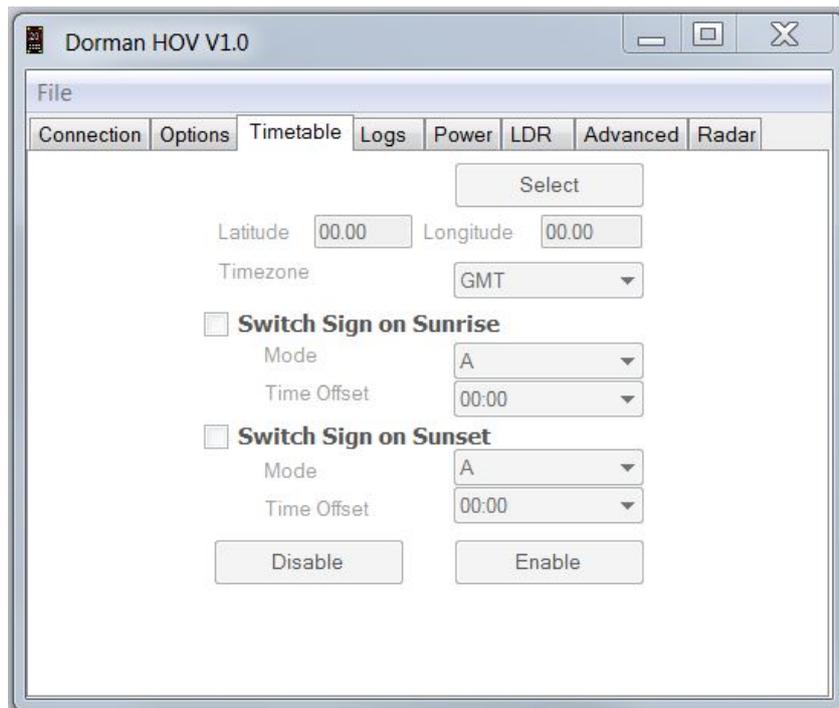
3.13 Disconnecting from the Sign

Return to the Connection Tab and click on disconnect. Remove the cable from the IFU and re-secure the access panel in the pole.

4.0 Repair & Maintenance

It is recommended that routine maintenance is carried out at six monthly intervals as detailed below. This period may need adjusting depending on the conditions of use and should be revised after each maintenance visit.

4.1 Visual Check

Visually check the enclosure and screen, including the case seal for damage. Repair and replace as necessary. Check the cabling to the enclosure is secure and undamaged. Repair or replace as necessary.

Examination of the PELCO bracket and Safety Cable should be carried out in accordance with the manufacturer's instructions.

4.2 Enclosure Cleaning

Clean the enclosure and front screen with a cloth with mild detergent solution. Abrasive materials or solvent based cleaners should never be used.

4.3 First Line LRU Maintenance.

The HOV Signs have no field maintainable components and have been modularly designed so that should any fault occur with the sign, the trained client maintainer may replace/remove the faulty LRU for return and repair.

The HOV series of signs is made up of the following LRUs:

HOV Sign Controller Card*
HOV Sign PSU and Filter
HOV Sign Display Modules
HOV Sign IFU and Cable

*This is specifically programmed by Unipart Dorman for use in HOV Signs. Off the Shelf items will not work and may cause unrecoverable damage to the equipment

It is recommended the client maintains a spares holding of LRUs commensurate with the quantity and types of HOV Sign model deployed to ensure minimum downtime of any HOV Sign due to failure. It is also recommended that the client maintainers are trained in the operation and maintenance of the HOV Sign to ensure a long and trouble free life.

Note: All failures due to manufacturer defects will be replaced or repaired at no cost to client during the warranty period. Full warranty details are available on request.

4.4 Replacing LRUs

After observing all normal safety precautions and considering any traffic management requirements, access to the inside of the sign should be made from a stable working platform.

The sign interior should be examined for any signs of water ingress or excess condensation and the enclosure door seal should be examined for integrity. Any evidence of water accumulation should be investigated and remedial action taken.

4.5 Replacing the Control Board

Activity LED
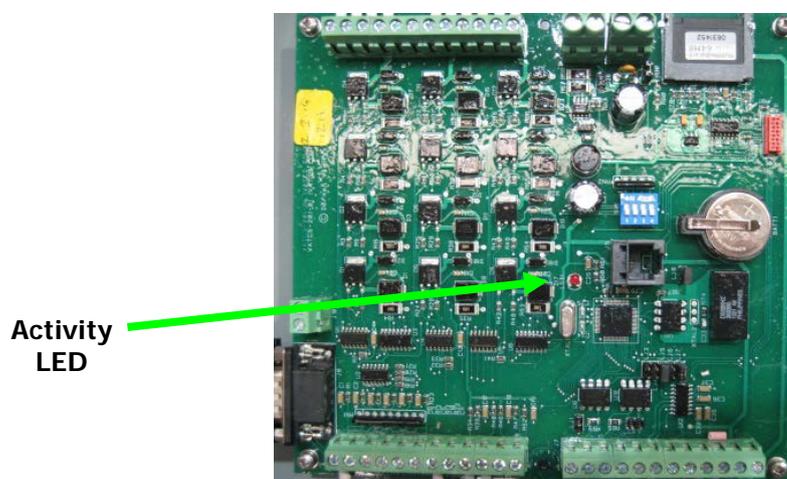
After locating the Control Board, all cables linking it to the rest of the sign should have their positions carefully noted and then be disconnected by undoing the terminal screws securing the cables to the board.

Remove the four cross head screws in each corner of the board and lift it out.

Fitment is a reversal of removal and care should be taken when reconnecting cables that they are returned to the same terminal positions as the original board.

Set all four DIP Switches to OFF before reconnecting the power
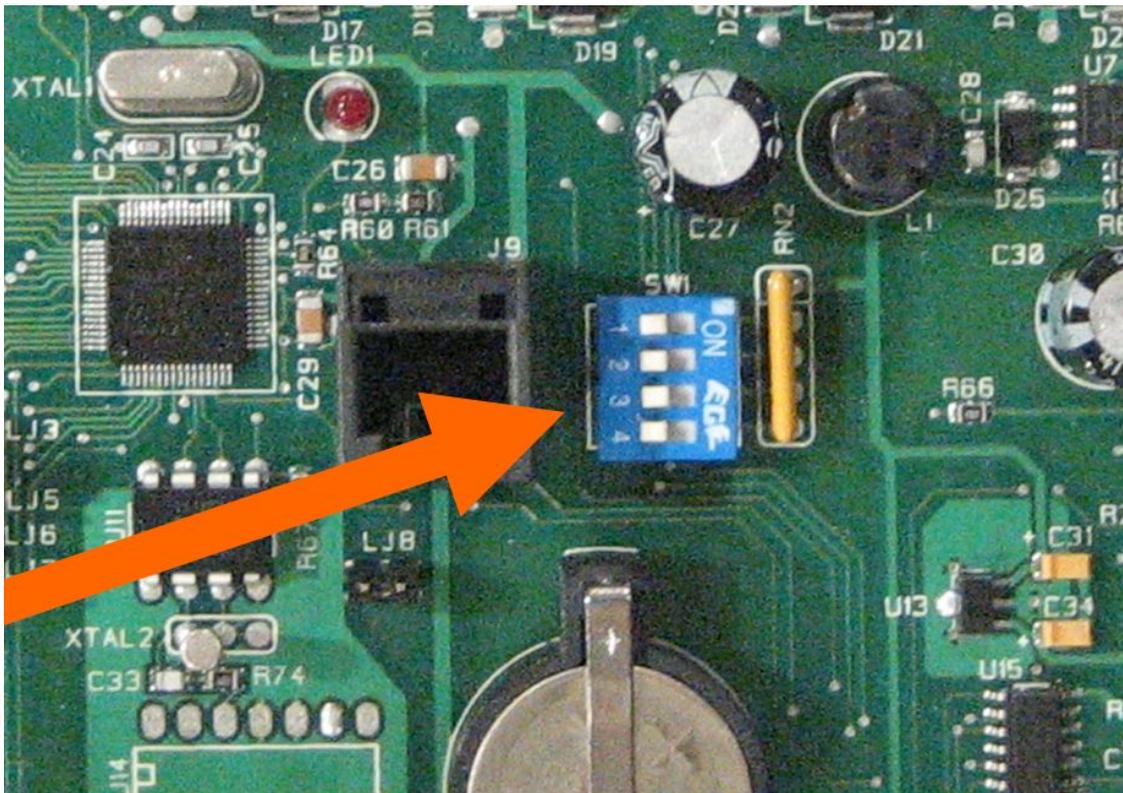
4.6 Fuse ratings and position

This fuse protects the equipment against AC supply voltage anomalies and is a slow blow/Time Delay fuse rated at T3.15A
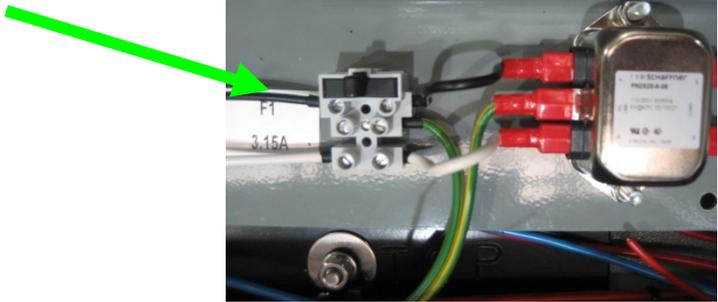
The remaining fuse is also a slow blow/Time Delay type rated at 10 Amps located on the DIN Rail as shown below:
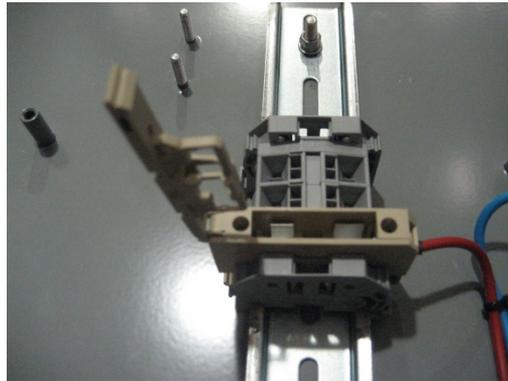
5.0 Annual Maintenance

The following table lists the requirements of an annual maintenance program:

Task	Remarks
Inspect the post, post mountings and the exterior of the sign for signs of tampering, security of attachment and surface finish damage	Ensure Adequate Traffic Management arrangements are in place before starting work. The post and mountings are not supplied or installed by the Contractor therefore any responsibility for installation, operation and maintenance remains with the customer
Ensure the Safety Cable is still fitted and the mountings are secure	
Test the post electrical isolator and all earth/grounding connections for electrical integrity and correct operation. Leave the sign isolated from the AC supply during the remainder of the maintenance procedure. If the sign cannot be electrically isolated at this point any further maintenance should be abandoned until such time as the isolator is repaired.	The isolator manufacturer's instructions should be referred to for the correct operation and test methods. The isolator is not supplied or installed by the Contractor, therefore any responsibility for installation, operation and maintenance remains with the Customer
Clean the sign face using a mild soap solution or approved foam cleaner. **Use of harsh abrasives will cause irreparable damage to the sign front**	Ensure any soap residue is removed after cleaning
Confirm all locking devices are correctly engaged prior to opening the sign and the edge of the door has not suffered any distortion or signs of attempted unlawful entry	
Unlock and open the sign and inspect the door seals for completeness, correct fitment and signs of wear or damage	
Inspect the door stay assembly where fitted for security of attachment and correct operation	
Vacuum clean the interior of the sign	Care should be taken not to damage any

	components or circuits etc with the nozzle.
Inspect the sign interior including cable entry gland nuts/bungs for signs of moisture ingress. This may include presence of water/ heavy condensation, water staining on components and surface finish, or signs of fungal growth	Any sign of excessive moisture ingress MUST be investigated and remedial work carried out. Consider photographing the area affected by moisture ingress to generate a comparison record for future visits and copying the photographs to Unipart Dorman for comment
Inspect each Fuse and ensure that it is of the correct rating and blow rate as shown in the O&M Manual	
Ensure all cable terminations, cable support fittings; nuts, bolts and fixing devices are secured correctly and in good condition	
Ensure all electrical earthing and bonding devices are secured correctly and in good condition.	
Restore electrical power to the sign.	
Check the Light Detector for correct operation by covering the light sensor and ensuring the sign visibly dims to approximately half brightness within 60 seconds. Then assumes the original brilliance within 60 seconds of removing the cover. (This operation can only be carried out during the hours of daylight).	
Close the sign making sure no distortion of the door seal takes place and ensure the locking devices are correctly engaged.	

Fault Finding

The following flow charts illustrate a suggested process to assist diagnosis in the unlikely event the sign fails to activate.

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HOV Sign Fault Finding

Is the red status LED on the front of the sign lit ?

No → Is the sign powered → Refer to the AC power supply fault finding chart for assistance

Yes ↓

Is the red activity LED flashing on the main PCB?

No → Refer to the AC power supply fault finding chart for assistance

Yes ↓

Are the timetable options set correctly?

No → Refer to relevant section of this handbook for checking and

↓

End of Process

HOV Sign AC Power Checks

```
Is there an AC supply at the Mast?
  │ No ──▶ Call Utility Provider
  │ Yes
  ▼
Is Fuse F1 intact?
  │ No ──▶ Replace Fuse ──────────┐
  │ Yes                           │
  ▼                               │
Is PSU delivering 12VDC?          │
  │ No ──▶ Replace PSU ───────────┤
  │ Yes                           │
  ▼                               │
Is the DIN Rail fuse intact?      │
  │ No ──▶ Replace Fuse ──────────┤
  │ Yes                           │
  ▼                               │
Is the red activity LED flashing  │
on the main PCB?                  │
  │ Yes ─────────────────────────┤
  │ No                            │
  ▼                               │
Is there 12VDC at the main        │
control PCB input                 │
  │ No ──▶ Check wiring from PSU ─┤
  │ Yes                           │
  ▼                               │
Replace PCB                       │
  │                               │
  ▼                               ▼
Is the red activity LED flashing  End of Process
on the main PCB?
  │ Yes ─────────────────────────▲
  │ No
  ▼
Contact Unipart Dorman
```

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