HTL MOTORWAY / EXPRESSWAY VMS

Model: MV MOTOWAY

Operation

&

Maintenance Manual

Version 1.1

Index

Release / Change	Version	Release Date
Initial Release	1.0	August 2024
Layout Update	1.1	December 2024

Safety Instructions

WARNING: Ensure all safety instructions have been followed prior to servicing.

WARNING: Ensure that no items fall onto the lanes below at any time.

WARNING: The equipment is powered by 230VAC. Appropriate qualifications are required relevant to the work being carried out on this equipment.

CAUTION: When the door/cover of the equipment is opened, please ensure it is fixed before performing next procedure. After finishing maintenance, ensure the door/cover is locked.

CAUTION: The LEDs on LED Module of the equipment are ESD (Electro-Static Discharge) sensitive. Take necessary precautions to prevent damage to the LED.

1.   Health and Safety

All personnel involved in carrying out the work must be aware of any site working regulations and required certification.

Before taking any installation or maintenance action, service personal must follow the above safe working practices:

- Only allow sufficiently experienced personnel to do maintenance.
- Provide sufficient illumination for the job, especially during non-daylight hours.
- Wear personal protective gear when working near or with energized parts.
- Use insulated tools and equipment when working near or with energized parts.
- Take measures to avoid inadvertent contact of conductive materials or equipment with energized parts of VMS

**CAUTION – HEAVY EQUIPMENT**

The VMS should be adequately supported during installation, replacement or maintenance. All lifting and moving jobs must be performed by mobile crane or other suitable lifting device.

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2. General Overview

2.1. Cabinet Specifications

Cabinet height:	2000mm
Cabinet width:	7600mm
Cabinet thickness:	200mm
Weight:	675 kg
Cabinet Material:	Aluminium
Paint Colour:	Front – Matt Black RAL9005
	Rear – Aircraft Grey RAL7037
Maintenance method:	Rear doors
Pixel Pitch:	P20

2.2. Sign Drawing
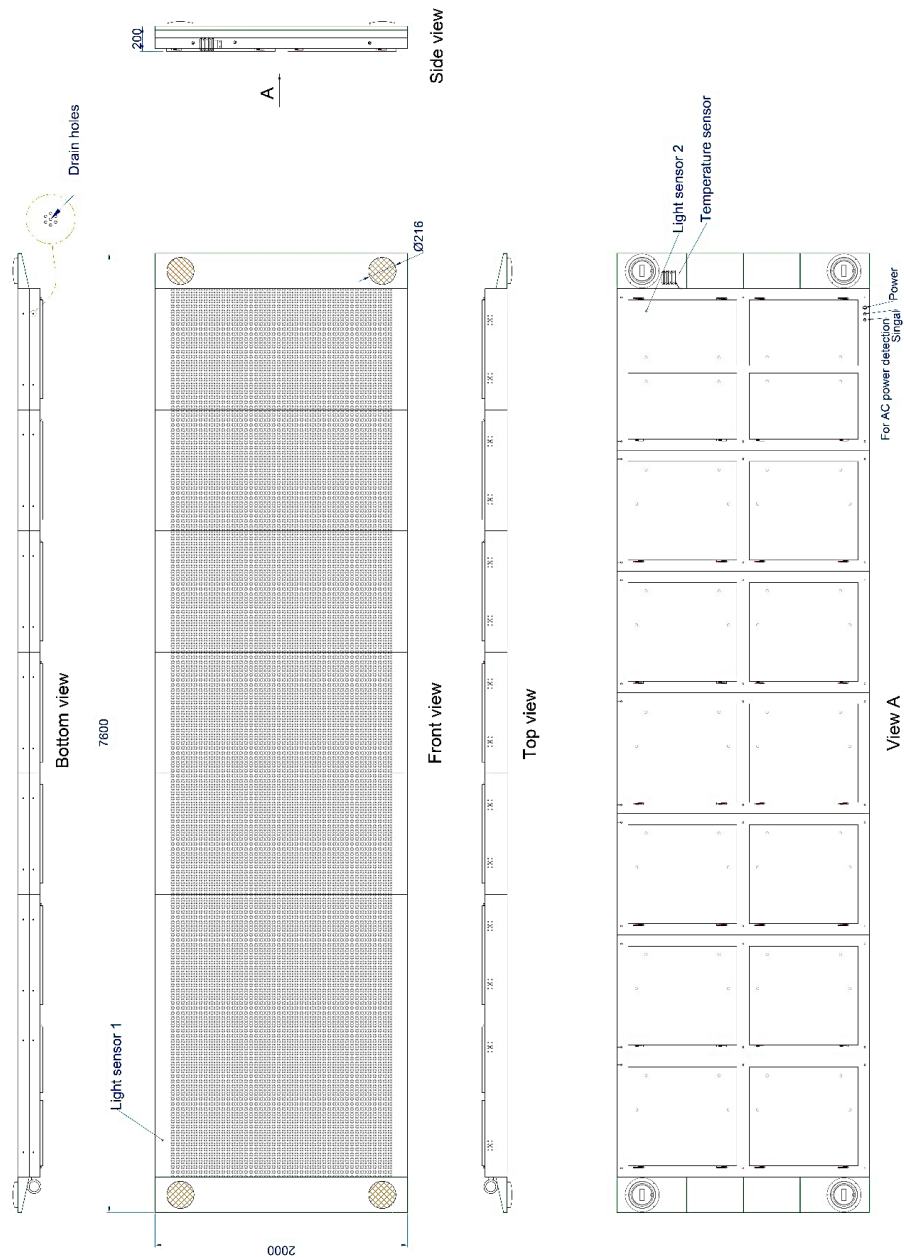
2.3. Optical Characteristics

Pixel pitch	20mm	
Matrix height	1760mm	
Matrix width	7040mm	
Luminance	EN12966	L3
Luminance ratio	EN12966	R3
Colour	EN12966	C2
Beam width	EN12966	(H: 30°, V: -10°)

MV MOTORWAY (NZTA ITS-01-002 Motorway VMS) **Dec 2024**

2.4. Electrical Characteristics

Power supply	12V/24V DC
Power consumption (Max)*	50W
Power consumption (Average)	20W
Internal voltage - LED boards	4.2VDC
Internal voltage - Controller	5VDC

*Max power consumption is only ever achieved within a manually initiated test. Max power is with all LED's on, in white and manually set to full brightness.
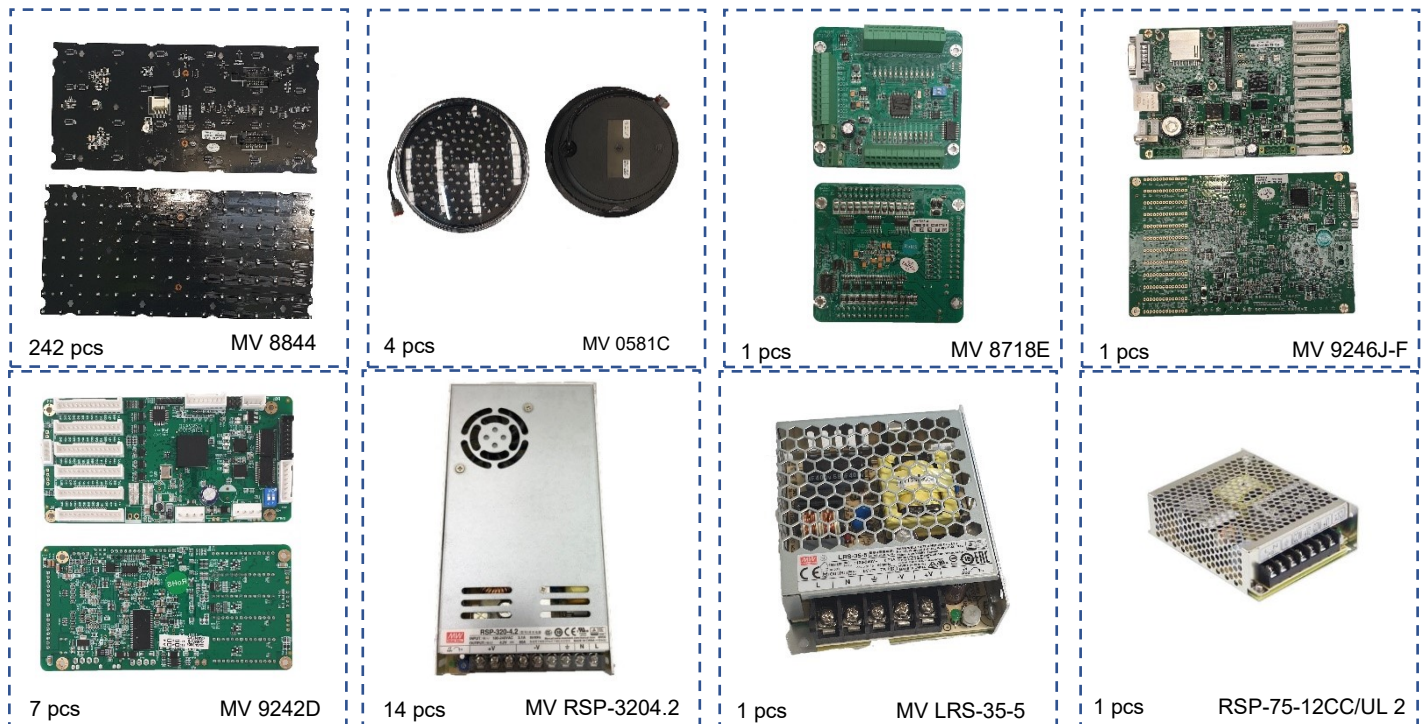
2.5. Major Components

2.5.1   CPU / Controller Card - 9246

No.	Name	Description
1	DVI Input	DVI signal input port
2	GPIO	Input and output of IO
3	Network interface-RJ45	Ethernet interface for major network to control 9246
4	USB1/USB2	USB supported; Audio devices accessible;
5	Temperature and humidity sensor port	For connecting temperature and humidity sensor P1:VCC_5V,5V Power positive P2:CH, High potential P3:CL, Low potential P4:GND, Wire grounding end
6	RS232+RS485 PORT	RS232/RS48 port for Customer to self-define 9246 P1:TXD, pin for sending data P2:GND, Wire grounding end P3:RXD, pin for receiving data P4:NC, P5:RS+,485 Communication positive P6:RS-,485 Communication negative
7	Light sensor port	To connect with environment light sensors; two can be connected.
8	Remote Switch Control Board Interface	 P1:PWR P2:Door, open door detection P3:OUT1 P4:OUT0 P5:GND P6: VDD_5V, 5V power positive P7: AD1 P8:AD
9	5V Power Port	To connect with 5V power input
10	Receiving Card Signal Output Port	Requiring receiving card mode（8Pin*2Ports）：supports maximum:1.26 million full-color pixels
11	Extended Card Port	For connecting extended modules like 3G modem or GPS modem, etc.
12	SD Card Slot	For reading extended SD cards

2.5.2 Other components

242 pcs MV 8844	4 pcs MV 0581C	1 pcs MV 8718E	1 pcs MV 9246J-F
7 pcs MV 9242D	14 pcs MV RSP-3204.2	1 pcs MV LRS-35-5	1 pcs RSP-75-12CC/UL 2

CODE	DESCRIPTION	PURPOSE	FIELD TEST
MV 8844	LED TILE / PCB BOARD P20 8*16 (MOTORWAY SIGN)	This board contains the LED's that form the actual display. An array of them forms the sign face.	If any issue is encountered, swap the tile with another tile and see if the issue moves with the tile or remains with the location. If the issue moves with the tile, then the issue is most likely a tile issue.
MV 0581C	AMBER LAMP BOARD (200/128/12V) (MOTORWAY SIGN)		
MV 8718E	220v INPUT DETECTION BOARD (TYPEC)		
MV 9246J-F	VMS MOTHERBOARD	This is the sign CPU. All internal inputs and external comms connections terminate on this board. This controls the sign, the interaction and is where the firmware resides.	It is difficult to test this board as generally, any issue with this board will present as a complete failure. First check is for external communications. This can be verified by an external communication (from Harding) and possibly by swapping the communication path – i.e. swap the connection with another sign. This will determine of the board is operating or not. If the board is operating then alternatives may need to be checked such as DC power through the sign (refer PSU) and connections to peripherals such as Tile cards or receiving cards.
MV 9242D	RECEIVING CARD	The receiving card are the signal distribution and processing cards. On larger signs where there are too many tiles cards, the data is distributed via serial communications to these cards which then break it out into signals for the tiles cards	If there is one section of the sign out then trace the ribbon cables from the tiles back to the receiving card (or the CPU) as appropriate. Swap with a cable from another section of tiles. If the problem moves with the cables, then the issue is likely to be this board or the cable from this board to the first tile in the section (they are daisy chained). If the issue stays with the same section of tiles, then refer to the tile card for diagnosis.
MV RSP-3204.2	POWER SUPPLY RSP-320-4.2QS1	Provides the DC power for the sign. There may be one or several power supplies in a sign.	Check that the output of the power supply is providing an appropriate DC voltage. Typically either 5VDC or 12 VDC. Check that the voltage remains when the power supply is under load e.g. sign in use or ideally under test conditions. If the voltage is not present, check input voltage, fuses etc. If voltage is ok under no or low load conditions but not under full load conditions, try and determine the current consumption. If this is excessively high then there may be a fault elsewhere. If this is not excessively high then there may be an issue with the psu.
MV LRS-35-5	POWER SUPPLY LRS-35-5		
RSP-75-12CC/UL	POWER SUPPLY RSP-75-12		

3. Installation

3.1. Precautions

Important Safety Notes Before Commencing Tasks

Power Supply Safety:
- The VMS operates on a 230 VAC mains power supply.
- Before performing any installation work involving 230V AC mains, ensure all connection points are isolated from the mains power supply.
- Verify that the points to be worked on are de-energised using appropriate test equipment.
- Any maintenance involving prescribed electrical work must be carried out by qualified and licensed personnel.

Manual Handling Precautions:
- The VMS is heavy, so all personnel involved must be familiar with proper manual lifting techniques.
- Enforce appropriate safety measures throughout the installation process, especially when working at height.
- Lifting equipment is required to safely position the sign.

Lifting the Sign:
- Use the eye-bolts on the top of the sign to lift it close to the installation location.
- Carefully and slowly manoeuvre the sign to its installation point.

Structural Integrity:
- Ensure all gantries and fixings comply with the necessary engineering standards and requirements.

Adhering to these guidelines will help ensure a safe and efficient installation process.

4. Operation

4.1. Energise VMS

Before Energising the VMS

Check All Connections:
- Inspect all connected cables to ensure they are secure and correctly installed.
- Confirm that all components, including the circuit breaker, SPD (Surge Protection Device), and grounding, are in their correct status or position.

Energise the Power Cable:
- From the ground power cabinet, energise the power cable.
- Use a multimeter to measure the voltage and confirm it is 230 VAC.

Power On the VMS:
- Turn on the circuit breaker to supply power to the VMS.

When the VMS is Powered On

Self-Test:
- The controller will automatically run a self-test upon powering up.
- Once the self-test is complete, the controller will output a signal to the display module, enabling it to show the desired information.

Powering Down the VMS

Turn Off the Circuit Breaker:
- The circuit breaker functions as the main switch. Turning it off will power down the VMS.

Wait Before Maintenance:
- After switching off the breaker, wait for at least **30 seconds to 1 minute** before starting any maintenance work to ensure the system is fully de-energised.

NTCIP Controlled Systems

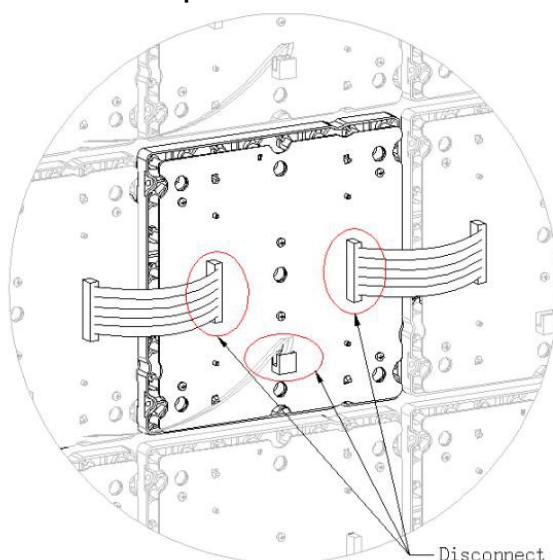Images and text are all controlled using the NTCIP protocol via the ethernet port provided

# 5. Maintenance Guide
5.1. Maintenance Tool List

| Maintenance Tool List			
Item	**Tool**	**Quantity**	**Remarks**
1.	Torx screwdriver	1	
2.	Long Phillips screwdriver	1	
3.	Slotted screwdriver	1	
4.	Multimeter	1	
5	Cabinet Keys	1	

5.2. Replace Major Components
5.2.1   Replace LED Module

1) Unplug and disconnect the power supply cable and the two signal connectors of the LED Display Board (refer to the following drawing).
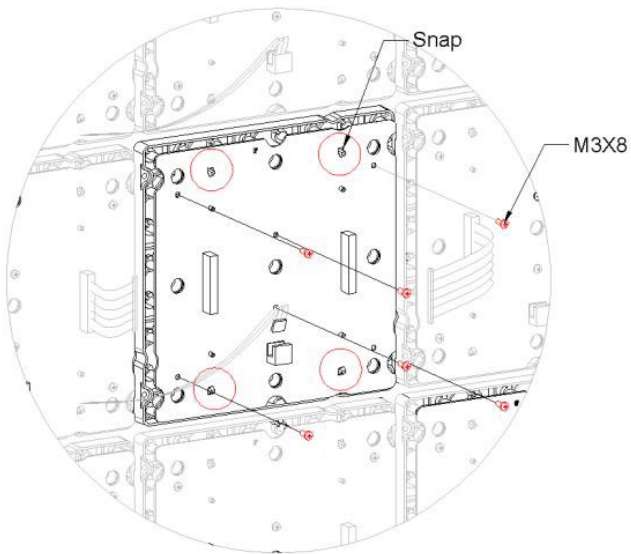
Snap

M3X8

2) Unscrew six M3x8 screws off the LED Display Board. Unclip the four snap fixtures (circled in the following drawing) by hand.
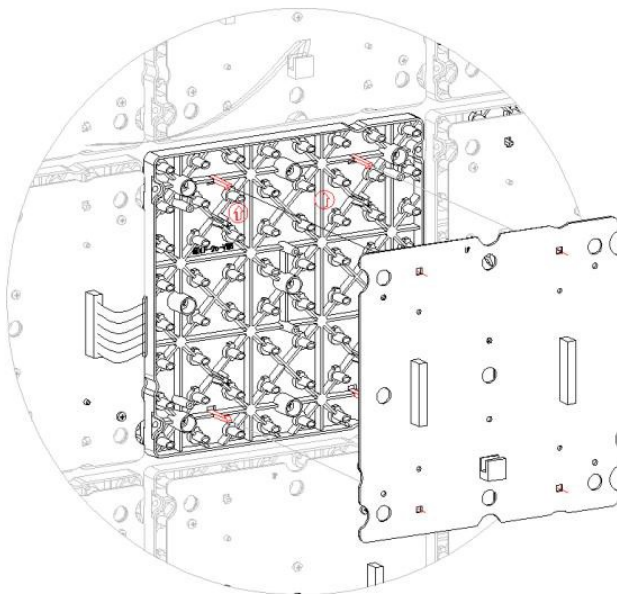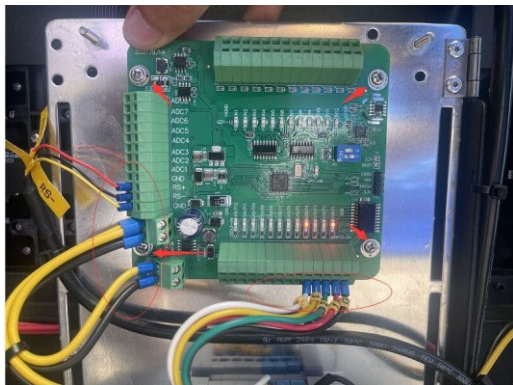

3) Pull gently to remove the LED Display Board.

Notes: Handle the dismounted LED Display Board with care and avoid electro-static damage to the LEDs.

5.2.2   Replace CPU / Controller Card - 9246 board

1) Remove all the cables connected to controller

2) Use the Phillips screwdriver, remove the M4 screws, then the controller can be replaced.

5.2.3   Replace I/O Board

1) Remove all the cables connected to controller

2) Use the Phillips screwdriver, remove the M3 screws, then the I/O can be replaced.

5.2. Preventative Maintenance

To ensure the continued optimal performance and longevity of your VMS in challenging environments, regular preventive maintenance is recommended. By following these guidelines, you can mitigate potential issues and extend the lifespan of your product:

Cleaning Schedule: Establish a routine cleaning schedule based on the local conditions and usage. While the standard recommendation is maintenance every six months, consider more frequent cleaning if the environment is particularly harsh.

Cabinet Maintenance:
a. Employ a pressure cleaner to clean the rear of the cabinet, removing accumulated dirt and grime.
b. Regularly check the cabinet's interior. Evaluate the operational status and address any anomalies promptly.

Record Keeping: Maintain a record of maintenance activities, including dates, procedures performed, and observations made. This documentation can help track the product's health and guide future maintenance decisions.

Professional Inspection: Periodically, consider engaging professional technicians to conduct a thorough inspection of the VMS. Their expertise can identify potential issues that might not be apparent during routine maintenance.

Faults	Action
Check for marks, scratches, dirt, or cracks	Use an appropriate cleaning solution to remove any visible marks or dirt.
Verify if the lights are receiving on/off commands from the control/battery box	If not, report the fault to Harding Traffic Ltd.
Ensure door locks are secured and check for any broken parts	If loose or broken, use the correct key to lock it securely by turning clockwise or replace any broken parts.
Check that all cable glands are securely fastened.	If any are loose, press the gland back in place and ensure they are securely connected.
Inspect the solar panel for dirt or debris	Clean the panel using a suitable cleaning solution if it appears dirty or obstructed.

5.3. Cabinet Maintenance

Because of its ability to withstand extremely harsh environments, the VMS requires minimal maintenance. However, regular maintenance can help prolong the product's lifespan and ensure optimal display performance.

The suggested maintenance interval is every six months, although this duration can be adapted based on the local conditions.

Maintenance tool:

- Gentle non-woven fabric or a soft brush
- Neutral cleaning solution (non-abrasive)
  Basic maintenance equipment

Recommended Maintenance Procedure

1) Moisten a cloth with the cleaning solution, then use it to gently wipe away dust from the display surface. Rinse the surface with water afterwards.
2) The back of the cabinet can also be cleaned using a pressure cleaner.

Following the VMS wash, open the door to inspect and assess the operational status within the cabinet.

6. Troubleshooting

Item	Description	Solution
No Display	**VMS does not respond and cannot be used**	1. Check power supply: • Check Connections • Check Input Voltage • Check inputs
Partial or Incorrect Display	**Unexpected images**	1. Picture overlap, part of the picture is missing, screen position shift etc, please contact Harding Traffic
	Tile/s failure including LED is always on, bright / dim, flashing or color patches	One module display is not working or has abnormal brightness: • Check power cable for the module • Check Signal Cable for the module • Swap module with another to determine if the fault is related to the input or elsewhere Multiple modules are not working or have abnormal brightness • Check the power supply to the modules
Functional problem	**Optical sensor problem**	• Check whether the Optical sensor connector is reliably connected to the CPU / Controller Card • Check whether the Optical Sensor wire is damaged • Swap with another light sensor to confirm whether the issue is with the sensor or elsewhere
	Door sensor	• Check whether the door switch connector is reliably connected to the CPU / Controller Card • Check if the contact of the door sensor is operating (normally open – closes when door is shut) • Swap with another door switch to confirm whether the issue is with the sensor or elsewhere • If the above method still cannot solve the problem, please contact the manufacturer's professional and technical personnel for handling.

In all other cases, please contact Harding Traffic on 0800 427 346 or at service@hardingtraffic.co.nz