

PRM-2

Line marking computer



User Manual

Document V1.2
September 2012

UNIT ID _____

Subject to change without notice.

**Designed & Manufactured in Australia
By Permatronics**

www.permatronics.com.au

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1 Unit Description

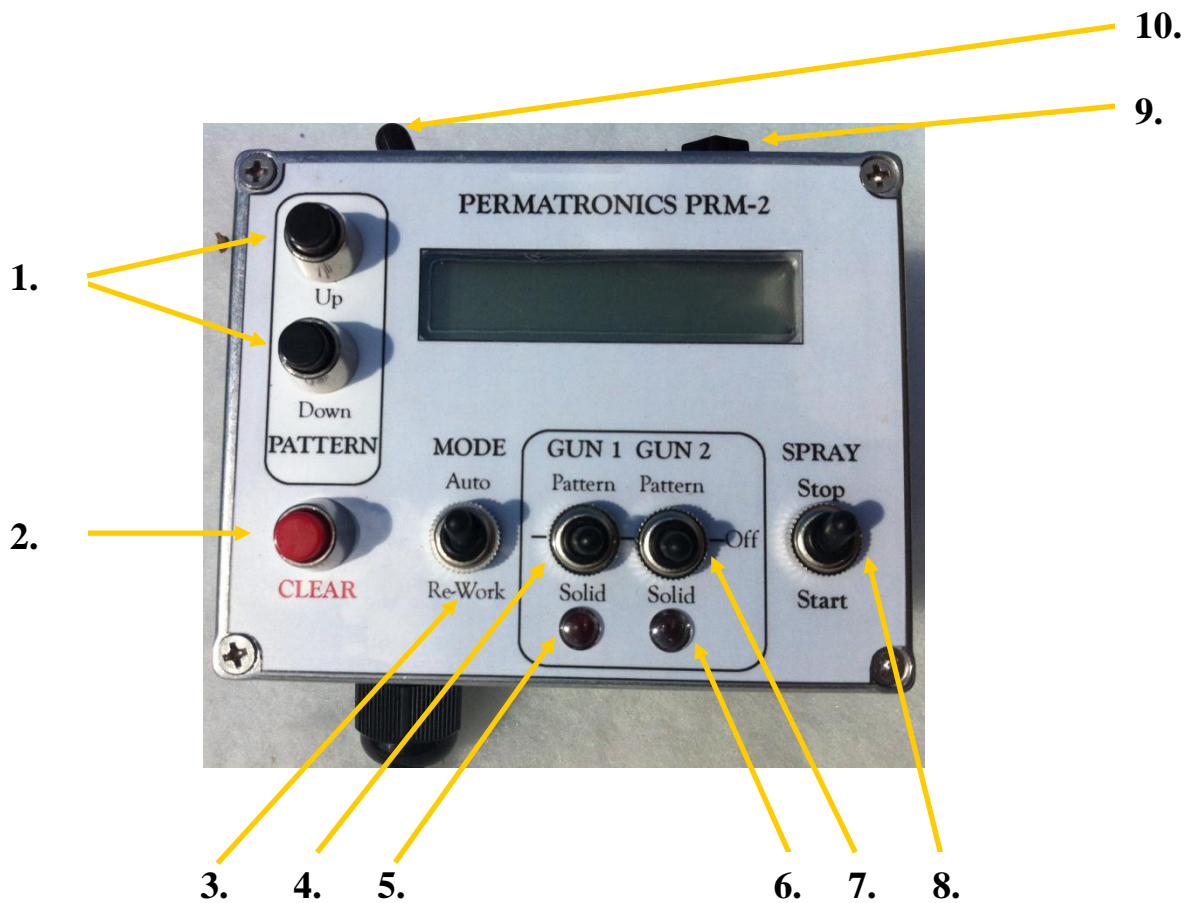
The PRM-2 Line marker is a simple to use, versatile multi-gun line marking computer designed for controlling 2 independent solenoids and with up to 39 individually selected patterns.

Fully Designed, Manufactured and Supported in Australia, functions can be customized to meet individual user requirements.

Features include.

- 12V operation.
- 2 x M6 bolt mounting.
- 2 Independently controlled outputs
- 34 pre-programmed patterns.
- 5 user custom patterns which can easily be modified within the unit.
- Easy to read backlit display showing Line information, Current speed, Line adjustment, and pattern distance.
- Start / Stop switch to instantly turn off all guns.
- Semi-Auto switch input for rework.
- Auto pattern finish with hand trigger.
- Offset trim pot to compensate for lazy gun outputs.
- Pre-programmed patterns include leading gap patterns and barrier patterns.

2 Button description



1. "UP" "DOWN" pattern selector switches
2. CLEAR button
3. AUTO / SEMI-AUTO mode selector
4. GUN 1 selector switch
5. GUN 1 solenoid indicator
6. GUN 2 solenoid indicator
7. GUN 2 selector switch
8. START / STOP switch
9. Line Offset Trim Potentiometer
10. Main On/Off Power Switch

3 Display Description

The PRM-2 has been fitted with an easy to read 16 x 2 line backlit display. This allows the user to easily see what the unit is doing without the need for external lighting at night.

The display tells the user information about which pattern has been selected, if the unit is Marking/ Paused or Stopped.

When power is applied to the PRM-2, the display will show a greeting message identifying the unit version and serial number then show the last selected pattern.

	P	E	R	M	A	T	R	O	N	I	C	S		
		P	R	M	-	2		V	1	.	1			

3 seconds

	U	N	I	T		S	E	R	I	A	L		N	O
						1	0	0	1					

3 seconds

When the unit “START/STOP” switch is in the “STOP” position, the bottom line will toggle between a “UNIT STOPPED” message and the unit and pattern information.

An example of this is seen below.

0	9	-		9	X	3		T	U	R	N		O	U	T
	-	U	N	I	T		S	T	O	P	P	E	D	-	

1 second

0	9	-		9	X	3		T	U	R	N		O	U	T
0	4	k	P	H		0	0	3	5	0	M		+	0	3

This is showing that the unit is stopped and that the user has marked 350M of 9 x 3 TURNOUT line. The vehicle is currently traveling at 4kPH and the gun offset is +03

When the unit “START/STOP” switch is in the “START” position, the unit will always default to a PAUSED state and the bottom line will toggle between a “UNIT PAUSED” message and the unit pattern information.

An example of this is seen below.

1	1	-	1	x	3		C	O	N	T		L	I	N	E
	-	U	N	I	T		P	A	U	S	E	D	-		

1 second

1	1	-	1	x	3		C	O	N	T		L	I	N	E
0	2	k	P	H		0	0	1	2	9	M		-	0	1

This is showing that the unit is paused, the vehicle is travelling at 2 km/h, the current selected pattern has been used for 129 meters of marking and there is a -01 gun offset

4 Pattern Selection

The PRM-2 patterns are selected either using the “UP” or “DOWN” buttons located in the upper left hand corner of the unit. The unit will increment or decrement through the selected patterns then loop around once the first or last pattern is reached.

Patterns C1-C5 are user custom patterns which can be modified by the operator to create custom mark and gap patterns. The remaining patterns are pre-programmed by Permatronics but can be customised to your requirements if needed.

Once the required pattern is selected, the user uses the three position “GUN” toggle switches to determine which gun or guns will output the pattern. The three position toggle switch is configured as follows.

“PATTERN” or switch flicked in up position will output the selected pattern on that gun.
 “OFF” or switch in centre position will not engage the gun at all and it will remain off.
 “SOLID” or switch flicked in down position will turn the gun on solid regardless of the pattern.

The exception to the above is when a “BARRIER” pattern is selected on the unit. In this situation, both GUN1 and GUN2 should be in the “PATTERN” position and the computer will automatically apply solid line to one gun and the pattern to the other. This is useful to ensure barrier lines start and end cleanly together.

Patterns can be changed while the unit is mid marking but it is recommended to pause or stop the unit before changing patterns to avoid unexpected results.

5 Auto Mode Operation

Operation in Auto mode is designed for use when marking new roads or roads where alignment to previous markings is not required. Selecting AUTO on the unit's toggle switch means that any pattern selected on the screen will mark repeatedly until either a new pattern is selected or the unit is paused / stopped.

- Apply power to Unit from Main unit Switch.
- Place mode switch to “AUTO” position.
- Select the desired pattern using the “UP” and “DOWN” buttons
- Place the “START/STOP” switch in “START” position.

The unit will then display information corresponding to the pattern selected and a flashing pause message indicating the unit is ready for marking.

0	2	-		9	x	3		T	U	R	N		O	U	T
	-	U	N	I	T		P	A	U	S	E	D	-		

1 second

0	2	-		9	x	3		T	U	R	N		O	U	T
1	0	k	P	H		0	0	0	0	0	M		+	0	0

Bring vehicle to desired speed and position then press either the external trigger to take the unit out of pause and begin the marking process.

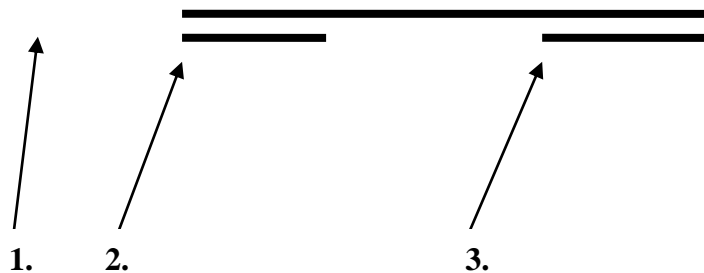
To stop marking you can either press the external trigger again to have the unit finish off the current line and end the marking sequence or flick the “START/STOP” to the “STOP” position to instantly turn off all outputs.

6 Semi Auto Operation

Semi-Auto operation allows the user to manually set the start point of each line made by the unit. This is useful when re-marking existing lines to ensure that the lines start at the same point.

In this mode, once a pattern has been selected and enabled by pressing the “external trigger”, the pattern will begin. Once the pattern is marking any solid line will continue to spray but broken lines will not spray until the external trigger has been activated. Once the external trigger has been activated, the unit will spray 1 cycle of the broken line then stop until it receives the next external trigger.

See diagram below



1. Barrier (Solid Left / Broken right) pattern selected.

2. Momentary external trigger from the user hand/foot switch starts the painting of the barrier line, once the painted section of the line is finished the gun turns off and waits for the next external trigger.


3. Next momentary trigger from the user starts painting the next section of the broken line. During the whole period the solid line gun remains on.

6.1 Auto painting in Semi-Auto mode

In situations where the starting point of the existing line is missing or a section of the painted pattern is missing completely it is possible to have the semi-auto mode automatically fill the missing area. This is done by the pressing and holding the external trigger in semi-auto mode. In this situation, the unit will mark a line to its correct length, leave the correct space and automatically start to mark the next line. It is equivalent to flicking the mode switch from “SEMI” to “AUTO” for a short period of time while the external trigger is kept pressed.

7 Offset Adjustment.

0	2	-		9	x	3		T	U	R	N		O	U	T
1	0	k	P	H		0	0	0	0	0	M		+	0	0



In most situations road marking machines suffer from lazy gun solenoids, this is a common occurrence in air activated systems which can lead to delays in either the activation of the output (causing a shorter line than expected), or when the output is de-activated (causing a longer line than expected). To compensate for this, the unit has an adjustable offset knob which lengthens or shortens the duration of the line pattern to increase accuracy.

This knob is located on the top of the unit and has a maximum range of ± 24 . This means the knob is capable of changing the length of a line by + or - 24 pulses from the input sensor¹.

A “+” value on the display will increase the length of the line, and should be used when experiencing delays in gun solenoids switching ON.

A “-” value on the display will decrease the length of the line and should be used for delays when experiencing delays in gun solenoids switching OFF.

The Offset adjustment figure is always shown in the bottom right hand corner of the display while marking, and the number is updated whenever the adjustment knob is moved. For this reason care should be taken to ensure the adjustment knob has not been moved without the operator’s knowledge.

(If both the line and the gap of a pattern are too long or too short the unit may need to be recalibrated. See “10.1 Calibrate Unit”)

8 Marking “Gap Start” Patterns

In some situations it is useful to trigger a line at the start of a gap rather than the start of the line. This is done when going from a “Barrier” line to a standard stripe where you wish to leave the gap before painting the stripe. Selecting any of the pre-programmed “GAP START” lines allows this feature. When the external trigger is triggered on a gap start pattern, the pattern will first leave the gap length then start marking mark and gap as usual.

When used in a SEMI-AUTO mode, the unit will leave the specified gap and then turn the pattern solenoid on constantly until the next external trigger or the units “START/STOP” switch is switched to “STOP”

This feature may be handy when re-marking edge line that requires a 1M gap every 35M of line, here the user is actually triggering the 1M gap rather than the 35M line.

¹ Input sensor may be a 5th wheel or gearbox sensor and pulses can vary from unit to unit.

9 Clearing Pattern distances

One of the features of the PRM-2 Road marker is the ability to record the distances travelled with each pattern. The distance is shown on the display is in metres and has a range of 65000M or 65 KM for each pattern.

Any distance travelled while the unit is in a “Run” mode (not stopped or paused) is added to the selected pattern’s total.

To clear the tallied distance on a pattern, “**START/STOP**” switch must be in the “**STOP**” position. In this mode the user can freely flick between patterns to look at distances travelled knowing the unit will not start marking.

Once in the “**STOP**” position select the pattern to clear then press the “**CLEAR**” button. The display will prompt “**CLEAR DISTANCE? Press 'CLEAR'** ”. Press the “**CLEAR**” button again within 3 seconds to clear the distance and paint usage for the selected pattern.

If the “**CLEAR**” button is not pressed within the 3 seconds, the screen reverts back to showing the travelled distance without clearing it.

See section 10.1 *Clear All Distances* for information on clearing all pattern distances at once.

10 Diagnostic Mode

D	I	A	G	N	O	S	T	I	C	S		V	x	.	X
	R	E	L	E	A	S	E		B	U	T	T	O	N	

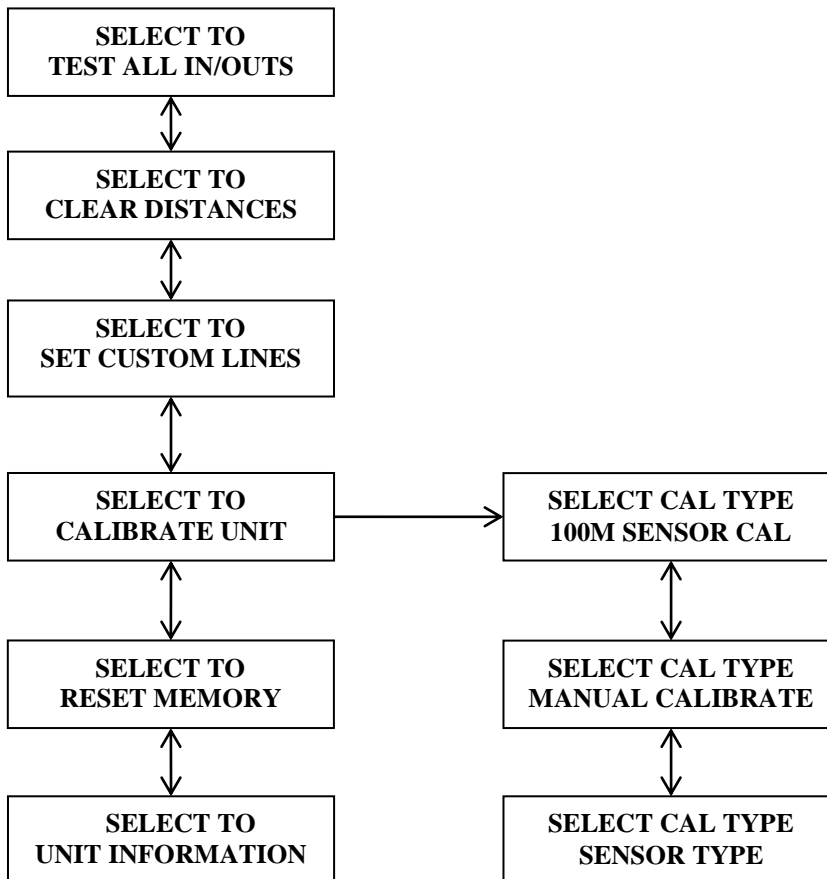
The PRM-6 contains a diagnostic mode which allows users to View/Clear paint data, Test Gun outputs, Test the units Inputs and Setup the PRM-6.

Diagnostic mode is entered by applying power to the PRM-6 with the “**CLEAR**” button pressed and held.

The screen will then prompt the user to release the clear button after which time the display will scroll through the menu options in the diagnostic menu.

The user uses the “**UP**” and “**DOWN**” buttons to scroll through the menu options and presses the “**CLEAR**” button to enter the selected menu item.

Below is a table of the Diagnostic mode. (Refer to screen prompts for further details.)



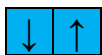
10.1 Diagnostics –Clear Distances.

Selecting this option will clear the distance information on all 30+ patterns. Users must be aware that selecting this option clears all the information and that once cleared the distance information cannot be retrieved. This function is useful for ensuring all distances are cleared before the start of a day or starting a new job.

10.2 Test all In/Outs.

Selecting this option enables the user to easily test all the inputs and outputs on the PRM-2 unit. Each input and output can be tested and should be signalled on the display.

↑↓	C	L	R	A	U	T	O	S	T	A	R	T	
T	R	I	G	M				S	0	0	1	6	



If the “UP” or “DOWN” buttons are pressed the corresponding symbol is shown.



When the “CLEAR” button is pressed CLR will be displayed.



“MODE” switch position either AUTO or SEMI.



“SPRAY” switch position either START or STOP.



External Trigger, when pushed TRIG will be displayed.



GUN 1 Output and Input switch.

When switched to Pattern (Up), unit displays “M” GUN 1 solenoid pulses.

When switched to Off (Middle), unit displays blank and GUN1 solenoid is off.

When switched to Solid (Down), unit displays “S” GUN 1 solenoid stays on.



GUN 2 Output and Input switch.

When switched to Pattern (Up), unit displays “M” GUN 2 solenoid pulses.

When switched to Off (Middle), unit displays blank and GUN2 solenoid is off.

When switched to Solid (Down), unit displays “S” GUN 2 solenoid stays on.



“Input pulses from 5th wheel or encoder. Count increments with each pulse.

This number can also be reset to 0000 by pressing the “CLEAR” button.

TURN OFF UNIT TO EXIT THIS MODE.

10.3 Set Custom Lines.

Selecting this option enables the user setup or modify the 5 custom line patterns on the PRM-2.

When this option is selected the display will then show “CUSTOM LINE” on the top line and pattern “C1” on the bottom line.

Use the “UP” and “DOWN” buttons to scroll through the 5 custom patterns to find the desired pattern to be modified and press the “CLEAR” button to select.

		C	U	S	T	O	M		L	I	N	E		
C	1	-	0	1	2	0	x	0	3	2	0	c	m	

The screen will then prompt the user to set the line length. Use the “UP” and “DOWN” buttons to modify the pattern “MARK” or “LINE LENGTH” then press “CLEAR” to continue.

S	E	T		L	I	N	E		L	E	N	G	T	H
				0	1	2	0	c	m					

The screen will then prompt the user to set the gap length. Use the “UP” and “DOWN” buttons to modify the pattern “SPACE” or “GAP LENGTH” then press “CLEAR” to continue.

	S	E	T		G	A	P		L	E	N	G	T	H
					0	3	2	0	c	m				

The screen will then prompt the user that the setup is complete and modify the pattern to suit. Once this is done, the patterns description will also be modified to reflect the new pattern information

10.4 Calibrate Unit.

Selecting this option allows a qualified user to setup the sensor type and calibrate the unit for use with a 5th wheel or gearbox sensor.

Upon entering this option, the user can then select one of the following options using the “UP” and “DOWN” buttons to scroll through the options and the “CLEAR” button to select.

Each of the three options is described below.

10.4.1 100m Sensor Calibration

S	E	L	E	C	T		C	A	L		T	Y	P	E	
1	0	0	M		S	E	N	S	O	R		C	A	L	

The 100M Sensor calibration option is used to automatically calculate and calibrate the 5th wheel/ gearbox sensor by driving exactly 100M. This function is useful for easily setting up the PRM-2 line-marking computer and also for routine calibration of 5th wheels to ensure accuracy.

To do a 100M sensor calibration follow the following steps.

- Select “**100M SENSOR CAL**” on the PRM-2.
- Drive to the start of your 100M mark and press the “**CLEAR**” button to begin the calibration.
- Drive EXACTLY 100M
- With the vehicle stationary press the “**CLEAR**” button again to complete the calibration.

The PRM-2 will then display the calculated calibration value which can be saved by again pressing the “**CLEAR**” button.

After a calibration has been undertaken, the result should be noted and checked against future calibration to ensure minimal deviation.

If the measured calibration is 0.0 pulses per metre, it is possible the sensor type selected is incorrect and should be programmed. See **10.4.3 - SENSOR TYPE SET.**”

10.4.2 Manual Calibrate

S	E	L	E	C	T		C	A	L		T	Y	P	E	
M	A	N	U	A	L		C	A	L	I	B	R	A	T	E

This manual calibrate option allows the user to manually set or trim the pulses per metre from the input trigger.

After selecting the unit will prompt the user to enter the “PULSES PER METRE”.

The default on any factory programmed unit is 25.0 pulses per meter or 1 pulse every 4cm. Use the “UP” and “DOWN” buttons to adjust the value and the “CLEAR” button to save the new calibration data.

Please note that the accuracy of the line lengths, measured distances and speed readouts all depend on the accurate calibration of the input trigger. It is recommend that the unit receives at least 20.0 pulses per metre giving the unit an accuracy of 5cm or better than 5%.

To test the calibration of the unit it is recommended to select the 12 meter spotting pattern, mark the pattern on the ground and measure the distance between spots. If the distance between spots is less than 12.0M, you may need to increase the calibration value and if the distance is greater than 12.0M you may need to decrease the calibration value.

10.4.3 Sensor Type Set

S	E	L	E	C	T	C	A	L		T	Y	P	E	
S	E	N	S	O	R	T	Y	P	E					

This function allows the user to set the sensor type to NPN or PNP.

Most proximity sensors used for 5th wheels or tail shaft encoders work by either bringing the signal wire down to 0V (NPN) or bringing the signal wire up to rail voltage (PNP).

Depending on the type of sensor installed on the machine, it may be necessary to set the sensor type. It is recommended that this is done by the installer and that the sensor type is noted down if it ever needs to be modified.

Permatronics recommends the genuine OMRON NPN proximity sensors be used. These sensors are available from Permatronics or the installer of the PRM-2.

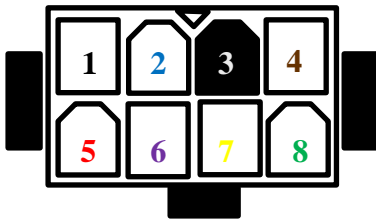
Use the “UP” and “DOWN” buttons to select the desired sensor type and press the “CLEAR” button to save the setting.

10.5 PRM-2 Technical Specifications.

PHYSICAL SPECIFICATIONS	
Physical Dimensions (L x W x D)	120mm x 94mm x 55mm
Mounting	M6 Mounting bolts with hardware.
Harness	8 pin Mini Molex plug and socket
Pattern selection	Up to 30 pre-programmed patterns + 5 custom patterns.
Protection rating	IP42
ELECTRICAL SPECIFICATIONS	
Operating Voltage	11.5V-15.0V DC
Standby Current (No outputs engaged)	110mA
Gun Output rating	5A / output
5 th Wheel input	Open collector NPN or PNP
5 th Wheel / sensor supply voltage	+12V
External Triggers	User supplied Normally open contacts

11 PRM-2 Connections V1.1

8 pin Molex Mini Female Socket



AS VIEWED FROM THE PRM-2 V1.1 PLUG

	Description	PRM-2 Wire Colour
1	Battery Negative INPUT	Black
2	5th Wheel GND	Blue
3	5th Wheel Signal	White
4	5th Wheel Power	Brown
5	Fused +12V INPUT	Red
6	Solenoid Common +12V Feed OUTPUT	Purple
7	Solenoid 1 Output Negative	Yellow
8	Solenoid 2 Output Negative	Green

Note: Purple wire is common +12V to Solenoids 1 & 2. Solenoid outputs are negative switching.

PRM-2 should have an appropriate in-line fuse fitted between battery and Fused +12V wire. Fuse rating should be based on Solenoid output current.