

M2500 Engine Controller Operator Manual

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1 Preface

The M2500 – Engine Controller is designed for control and monitoring of marine engines.

Together with the optional M2600 - Shutdown Unit the M2500 forms a complete alarm, control and protective safety system for marine engines.

Typical applications are auxiliary generators, emergency generators, harbour generators and propulsion engines.

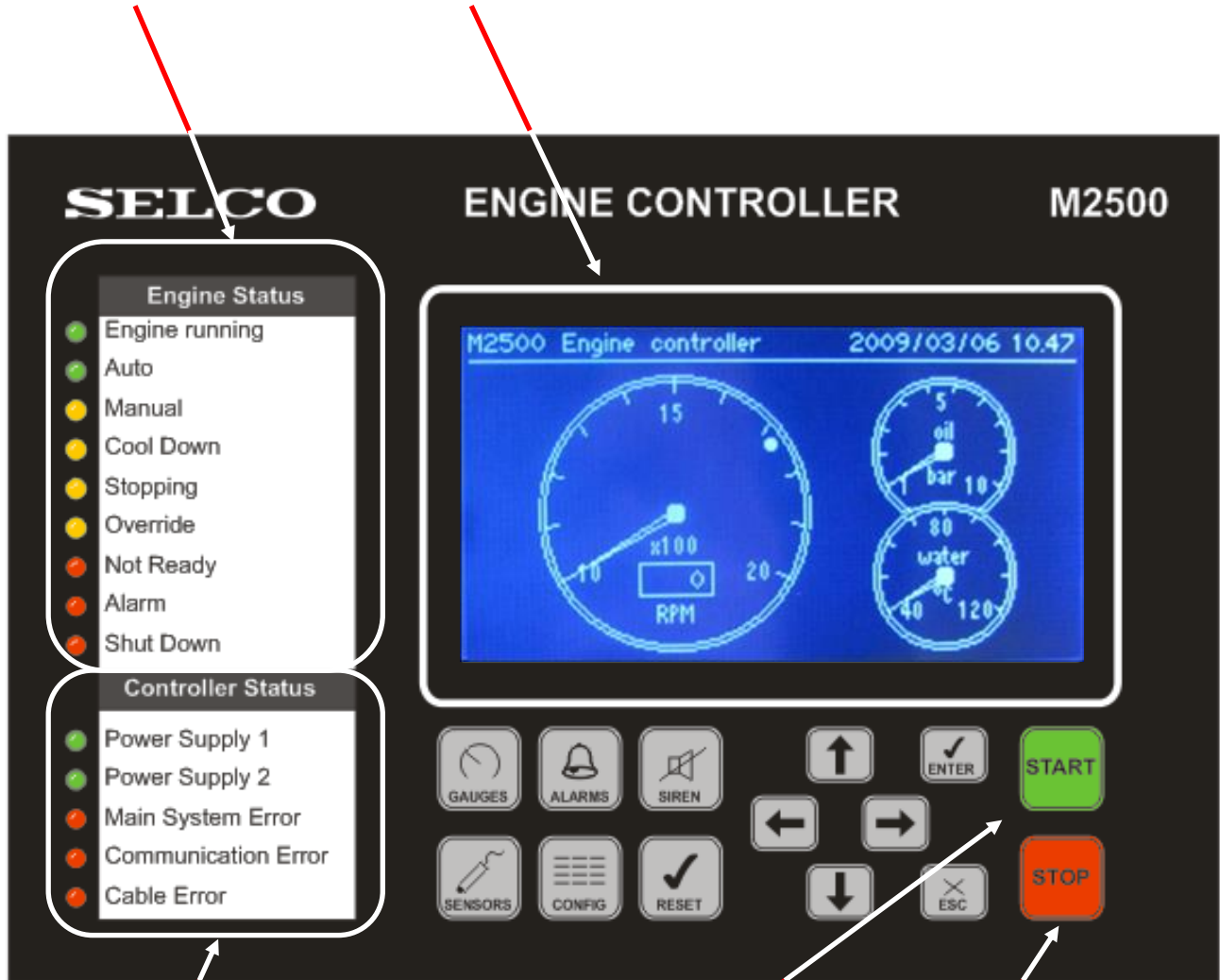
The M2500 is designed for assembly in the main switchboard or at the engine.

This manual describes the operation indications of the M2500 and is intended for the daily user.

2 Front View of M2500

Engine status LEDs for indication of engine condition, alarms and shutdowns

Graphical display for indication of measurements, alarms and configuration



Controller status LEDs for indication of controller condition

Manual Engine Start
(only active in Local Mode)

Manual Engine Stop
(only active in Local Mode)

3 Front panel LEDs

3.1 Engine running LED



Engine running

LED State	Description
Steady light	Engine running at rated speed Detected via pick-up input or crank disconnect input
Quick flash (5Hz +/- 10%)	Cranking Start attempt in progress
Slow flash (1,25Hz +/- 10%)	Stop procedure active or delay time between two start attempts
Off	Engine stopped

3.2 Remote LED



Auto

LED State	Description
Steady light	Engine in Remote mode
Off	Engine in Local mode or selector switch on terminal 7 in OFF position

3.3 Local LED



Manual

LED State	Description
Steady light	Engine in Local mode
Off	Engine in automatic mode or selector switch on terminal 7 in OFF position

3.4 Cool Down LED



Cool Down

LED State	Description
Steady light	Engine running in cool down mode; engine running without load (open breaker) before stopping after receipt of automatic stop command.
Off	All other conditions

3.5 Stopping LED

Stopping

LED State	Description
Steady light	Engine stopping (Stop procedure active)
Off	All other conditions

3.6 Override LED

Override

LED State	Description
Steady light	Override Mode active (terminal 10 connected to com) (all shutdowns marked override will be treated as alarms only as long as this LED is active).
Off	Override Mode deactivated.

3.7 Not ready LED

Not Ready

LED State	Description
Steady light	Any condition that pre-alarms the engine from being started from the automatic start command (e.g. engine in local mode, selector switch on terminal 7 in OFF position or any active shutdown).
Off	Engine ready for automatic start or running in automatic mode.

3.8 Alarm LED

Alarm

LED State	Description
Quick flash (5Hz +/- 10%)	One or more unacknowledged alarms present
Steady light	Acknowledged alarm present
Off	No alarm present

3.9 Shut Down LED

Shut Down

LED State	Description
Quick flash (5Hz +/- 10%)	Unacknowledged shutdown present
Steady light	Acknowledged shutdown present
Off	No shutdown present

3.10 Power Supply 1 LED

Power Supply 1

LED State	Description
Steady light	Indicates that the primary power supply is connected to the unit and the voltage is within the specified limits.
Off	Indicates that the primary power supply is not connected to the unit or the voltage is outside the specified limits.

3.11 Power Supply 2 LED

Power Supply 2

LED State	Description
Steady light	Indicates that the secondary power supply is connected to the unit and the voltage is within the specified limits.
Off	Indicates that the secondary power supply is not connected to the unit or the voltage is outside the specified limits.

3.12 Main System Error LED

Main System Error

LED State	Description
Steady light	Fatal system error has been encountered – System reboot is eminent.
Off	All other situations

3.13 Communication Error LED



Communication Error

LED State	Description
Quick flash	One or more unacknowledged communication errors on the CAN J1939 bus (Can bus not connected or no communication on can bus) (5Hz +/- 10%)
Steady light	All present communication errors acknowledged. Off CAN communication ok

3.14 Cable Error LED



Cable Error

LED State	Description
Quick flash (5Hz +/- 10%)	First unacknowledged cable or sensor error present
Steady light	Acknowledged cable or sensor error present
Off	All other situations

4 Front panel

4.1 Gauges



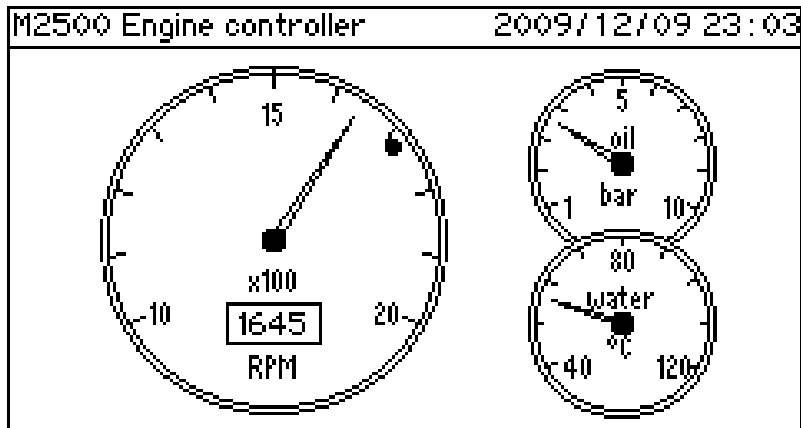
Pressing the Gauges button will bring up the gauges display, regardless of the current display. It can be thought of as a *Home* button.

Long pressing Gauges button will initiate LED test.



Note:

The Gauges display is the default screen for the M2500. Therefore after a 5 minute period without activity, the system will automatically return to the gauges display.



Left: Instrument shows always the rpm reading. Depending on the configuration of the system, the source may be the pick-up inputs (terminals 14-16) or the J1939 signal SPN 190. -

The small dot in the RPM meter shows the overspeed shutdown limit according to the system configuration.

Top right: Instrument shows the engine oil pressure. Depending on system configuration, the source may be analogue input "Sensor 1" (Terminal 27) or the J1939 Signal SPN 100.

Bottom right: Instrument shows engine coolant temperature. Depending on system configuration, the source may be analogue input "Sensor 2" (Terminal 28) or the J1939 signal SPN 110.




4.2 Alarms



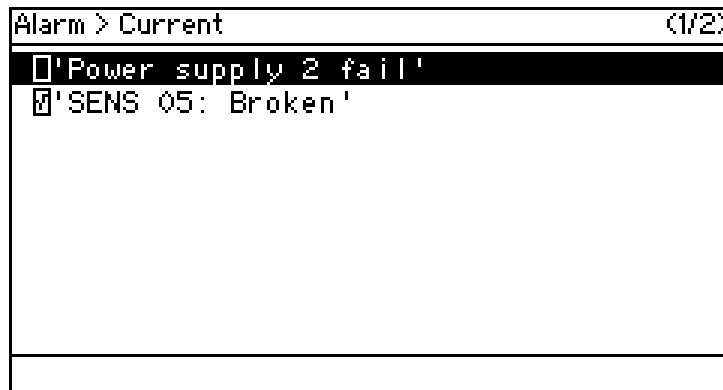
Pressing the alarm button will show the Current Alarm display, which shows all present alarms and shutdowns.





In case a new alarm or shutdown appears M2500 will automatically change to the Current Alarm display.

For viewing the Alarm Log move to the Current Alarm display and press the cursor right key.

- Push the alarm button  for viewing the present alarms and shutdowns
- Push the alarm button  followed by the cursor right key  to view the Alarm Log

Current Alarm display:






- Push the cursor up and down keys   for choosing individual alarms and shutdown
- Push SIREN button  for resetting the siren
- Push RESET button  for resetting the siren and accepting all present alarms and shutdown
- Acknowledged alarms are marked with ✓

Alarm Log display:

```

Alarm > Log                               2009/12/10 00:55
12/10 00:55:41  0'Power supply 2 fail'
12/10 00:55:38  x'SENS 05: Broken'
12/10 00:55:34  j'SENS 05: Broken'
12/10 00:55:32  4'SENS 05: Broken'

```

- Push the cursor up and down keys   for choosing individual alarms and shutdowns
- Push RESET button  for resetting the siren and accepting all present alarms and shutdowns

**Note:**

The alarm events presented in the alarm log display are cleared when M2500 is powered off (Or the list is manually cleared by pressing “Enter” for 2 seconds”). However all alarm related events are logged in the event log (log.txt on the log drive), which cannot be deleted.

4.3 Siren button

Pressing this button resets the siren. Alarms will not be reset by this button.



4.4 Reset button

Pressing this button resets the siren and all unacknowledged alarms. It will also send the log and debugging file to the SD card. In case it is necessary to send a log file of the engine to the engine manufacturer or to SELCO (for example due to problems with the engine or the controller), it is possible to save these files to the SD card. After that the files from the SD card or the SD card itself can be sent.

4.5 Sensors button



After pressing this button the display will move to the sensor display mode. In this mode, it is possible to inspect all system inputs via a number of dedicated displays.

Use the  and  to navigate between the displays.



Note:

When leaving the sensor view, e.g. due an alarm being raised or pressing the Gauges button, the sensor view remembers which display was the last viewed. When pressing the sensor button next time, the display will move back to the last sensor display viewed.

4.5.1 Analogue inputs

Example for the analogue sensors:

Sensors > Analogue inputs		
SENS 1:	Oil Pressure:	3.5 bar
SENS 2:	Coolant water temp.:	57 °C
SENS 3:	Alternator temp.:	97 °C
SENS 4:	Exhaust temperature:	205 °C
SENS 5:	Fuel level:	10 %
SENS 6:	Undefined text:	---- ?
SENS 7:	Undefined text:	---- ?
SENS 8:	Undefined text:	---- ?
PICKUP:		1647 RPMs
Input range: 4-20 mA, scale 0-160 °C, reading: 9.8 mA		

Sensor number	Sensor Name (Configured)	Measurement
SENS 2:	Coolant water temp. :	57 °C


This view presents the operator with a summary of the configuration of the analogue inputs as well as the current signal present at the input terminal.

By moving the cursor over the individual inputs, the signal currently applied to the input can be monitored.

The display simply indicates the current input values, regardless of the value triggering any alarms.

4.5.2 Analogue input statistics

Sensors > Analogue input statistics	
SENS 1:	3.5 bar (min 3.4/max 4.9)
SENS 2:	57 °C (min 57/max 91)
SENS 3:	97 °C (min 97/max 99)
SENS 4:	205 °C (min 205/max 205)
SENS 5:	10 % (min 0/max 47)
SENS 6:	---- ? (min 0/max 300)
SENS 7:	---- ? (min 0/max 270)
SENS 8:	---- ? (min 0/max 228)
PICKUP:	1648 RPMs (min 1142/max 1775)
Input range: 4-20 mA, scale 0-160 °C, reading: 9.8 mA	

The screen shows the sensor number, the measurement and the minimum and maximum values measured since last statistic reset. The statistic reset can be done separately for each sensor by choosing the sensor and then pressing  for 2 seconds.

Please note that the statistics are reset when the M2500 is powered off.

4.5.3 Digital inputs

Example for the digital sensors:

Sensors > Digital inputs	
IN 1:	[Open] 'Undefined text'
IN 2:	[Closed] 'Undefined text'
IN 3:	[Open] 'Undefined text'
IN 4:	[Open] 'Undefined text'
IN 5:	[Open] 'Undefined text'
IN 6:	[Open] 'Undefined text'
IN 7:	[Open] 'Undefined text'
IN 8:	[Open] 'Undefined text'
IN 9:	[Open] 'Undefined text'
Cable monitoring disabled	

The screen shows the digital input number, the condition of this input [open, closed or cable fail] and the input name.

4.5.4 J1939 inputs

Sensors > J1939 inputs
Engine oil pressure [bar]: -.-
Engine Coolant temp. [°C]: ----
Engine speed [RPM]: ----
Disabled

This display presents the operator with a list of the current values on the specified inputs (J1939 SPNs). The display does not indicate if the input values are resulting in alarms being triggered.

4.5.5 J1939 active diagnostics codes

Sensors > J1939 active diagnostics codes (0/0)
No active diagnostic codes
Disabled

This display presents the operator with a list of present diagnostics codes as reported by the ECU via J1939.

4.5.6 Engine Controller

Sensors > Engine Controller		Output terminals
Input terminals		<input type="checkbox"/> [36] READY
<input type="checkbox"/> [05] REMOTE		<input type="checkbox"/> [37] START WARN
<input checked="" type="checkbox"/> [06] LOCAL		<input checked="" type="checkbox"/> [38] RUN
<input type="checkbox"/> [07] OFF		<input type="checkbox"/> [39] COOL DOWN
<input type="checkbox"/> [08] AUTO START		<input type="checkbox"/> [41] LUBE PUMP
<input type="checkbox"/> [09] AUTO STOP		<input type="checkbox"/> [42] CRANK
<input type="checkbox"/> [10] OVERRIDE		<input type="checkbox"/> [43] C/B TRIP
<input type="checkbox"/> [11] CRANK DISC		<input type="checkbox"/> [44] AIR INTAKE
RPM: 1513 @Pickup		<input type="checkbox"/> [64] ENGINE STOP
Running		<input checked="" type="checkbox"/> [66] RUN/STOP

√ means that the in or output is activated.

This display presents the operator with an instant overview of all I/O directly related to controlling and monitoring the engine – Inputs are presented on the left, and outputs are presented on the right.

The RPM signal can be delivered by either pick-up or J1939. The input source is indicated after the '@'.

The state of the engine controller component is indicated at the bottom of the screen (Stopped, starting, running, stopping, blocked etc.).

4.6 Config button



This button opens the configuration menu of the M2500 Engine Controller. Before getting access to the configuration the unit will ask for a pin code.

4.7 Cursor keys



Used for scrolling the cursor in the display and shifting between display pages.

In the configuration menu the up and down keys are also used for increasing and decreasing set points.

4.8 ESC button



Return to the previous display or when in programming settings in configuration mode, return to the last page without saving changes.

4.9 Enter button



In Configuration mode pressing the Enter button will accept a change in the configuration.

4.10 Start button



Start of the engine in local mode.

If the start signal is configured as a pulse signal, cranking will take place until the pre-configured crank time has expired or the M2500 has detected that the engine has fired (crank disconnect speed).

If the start signal is configured as a continuous signal, cranking will only take place as long as the start button is pushed. However the cranking will be interrupted as soon as the M2500 detects that the engine has fired or the pre-configured crank time has expired.

4.11 Stop button



Stop of the engine in local mode.

After pushing the stop button M2500 will activate the stop procedure, regardless if the engine was detected as running (crank disconnect speed) or not.

5 Download of log and configuration files

If there are questions regarding the operation of the engine or the controller, it can be useful to share the log and configuration files of the engine with the engine manufacturer or SELCO. For this no special software is required. Both, configuration and log file can be viewed from your Web Browser.

The log file can be downloaded and send from the unit by 2 different ways:

- Connect the M2500 to your PC via the USB type A to type B cable
- Takeout SD card from unit and download the file via SD card Reader

In case no computer is available; take out the SD card and send it by courier (the SD card is not required for operation of the engine).

5.1 SD Card

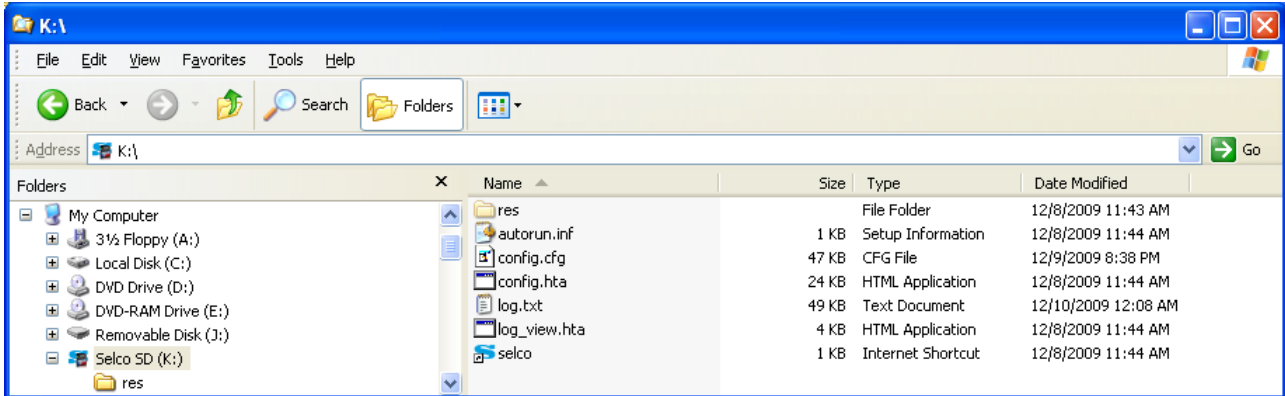
The M2500 includes a slot for an SD card.. Purpose of this SD card is to share log and configuration files.

The SD card is not required for operation of the engine. All files on the SD card are copies only. The files are stored in the internal memory of the M2500 and then copied to the SD card. In case the SD card is removed, still all files (including log) are saved in the internal memory.

When a new SD card is plugged into the M2500, the log file is automatically saved to the SD card. Configuration files are not copied automatically to the SD card. If required this can be done manually. It is possible to copy configuration files both ways, from SD card to the controller and vice versa.

5.1.1 Download of log and configuration via SD card

For sharing of configuration files take out the SD card from the M2500 and place it in your SD card reader. After a moment the M2500 will appear in the directory of your Explorer (As the folder named “res” is hidden, it may or may not be visible depending on the settings of your file manager).



It can be seen that both the log-viewer and the configuration tools are made available on the SD card. When M2500 detects an SD card being inserted, it will test if the necessary files are present – If not, M2500 will copy them onto the SD card.



Note:

The file “config.cfg” is not automatically written to the SD card – It must be manually written to the SD card via the configuration menu as described earlier.

5.1.1.1 Log File (log.txt)

The log is saved in the log.txt file. For sharing the log file, simply copy the file to your hard disk or send it attached to an e-mail.



Note: log view

For viewing the log file double click on log_view.hta, which will start the “Selco log viewer” application. Alternatively, the log.txt file can be opened and inspected using any text editor.




5.1.1.2 Configuration file (config.cfg)

M2500 exports its configuration to a file named “config.cfg” (see M2500 Configuration manual).

The configuration can be inspected and edited by double clicking on config.hta, which will bring up the SELCO configuration tool. The configuration tool expects to find a config.cfg file in the same location as the application itself (Here, the SD card root directory). It will load the configuration file and present the content. If changes have been made, they can be saved by clicking the “Save all” button. The changes are saved to a file called “config.cmd” which is placed in the same location as the application (here, the root of the SD card).


When the SD card is inserted into the M2500, the config.cmd file will be recognized as a configuration file. The user interface will prompt the operator for the pincode before it loads the configuration saved from the configuration tool (Immediately after M2500 have consumed the config.cmd file, it will be deleted).

5.1.2 Saving a configuration file from the M2500 module to the SD card


- For this enter the configuration mode by pressing 
- Type pin code and press 
- Choose Save configuration to SD card by pressing  a few times.

```

Setup                                     <12/15>
Modbus configuration
Display and LED configuration
Time and date
Password configuration
Firmware update from SD card
Save configuration to SD card
Load configuration from SD card
Reset all settings to default values
About <SW Revision>
Use <up> <down> to navigate. <Enter> to select.
  
```


- Press 
- Now the configuration is copied to the SD card

5.1.3 Loading a configuration file from the SD card

For loading of a configuration file from the SD card press the  button and choose the “Load configuration from SD card” parameter.

```

Setup                                     <13/15>
Modbus configuration
Display and LED configuration
Time and date
Password configuration
Firmware update from SD card
Save configuration to SD card
Load configuration from SD card
Reset all settings to default values
About <SW Revision>
Use <up> <down> to navigate. <Enter> to select.
  
```

Press  button and the unit will ask for the Pin code.

Type pin code and  press again.

Now the configuration will be uploaded from the SD card and saved on the M2500 module.

6 Terminal Connections

