

**PM-001, PM-002**  
**Total Power™**  
**System Controller**  
**Owner's Manual**



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## Overview

The Total Power™ system integrates the features of your CMP™ Coach Monitor Panel, Prosine™ Inverter, and optionally the Onan QD™ Generator and allows you to control and monitor them from a VMS™. The heart of the system is the PM-001 or PM-002 Total Power System Controller, which communicates with each of the other components. It serves as the translator and central controller for the system.

## **Features**

### PM-001

The PM-001 controller connects the CMP, Prosine, and VMS. With it you can access the following features:

- Read all CMP data - tank levels and AC and DC power levels - on the VMS.
- Read all Prosine data on the VMS, including the AC and DC inputs and outputs for the inverter and charger.
- Turn on and off the inverter, charger, and activate the equalization capabilities of the Prosine unit.
- Adjust the Prosine inverter settings, such as alarm levels and maximum current draw, from the VMS.
- Automatically start the inverter when the coach key is on and no other AC power source is available, thus supplying power to the rear video monitor.

### PM-002

With the PM-002 and a specially equipped Onan QD generator, these additional features are possible:

- Monitor generator performance, including temperature, rpm, and diagnostic data.
- Start and stop the generator from the VMS.
- Set the system to automatically start the generator when the batteries reach a certain charge level, and to top off the batteries just before a defined "quiet time".
- Set the system to automatically exercise the generator at defined times.
- Set the generator to start automatically when the thermostat activates the air conditioning.

Specific features will vary according to the installation.

The Total Power™ system can utilize any VMS™ model. The layout of each screen will vary with the model of VMS™ installed in the coach, and in some cases screens may be combined to take advantage of the capabilities of the particular VMS™ model. Where possible these variations are noted in this manual.

## VMS™ Screens

The Total Power™ system adds several new screens to the capabilities of your VMS. These screens appear as new features activated by pressing the various buttons on the face of the VMS. In some cases you may have to press a button more than once to cycle through to the desired screen. The following lists indicate the new screens provided on each model.

### VMS 200 EL

<u>Button</u>	<u>Screen Name</u>	<u>Data Source</u>
Info	Tank Levels	CMP Tank Sensors
Info	Power Systems	CMP Power Sensors, Prosine Inverter
Info	Generator Status	Onan Genset
Spec	Genstart Status	PM-002 Genstart System
Spec	Genstart Settings	PM-002 Genstart System
Spec	Prosine Status	Prosine Inverter
Spec	Prosine Settings	Prosine Inverter

### VMS 320 EL, VMS 600 CL

<u>Button</u>	<u>Screen Name</u>	<u>Data Source</u>
Diag	House Diagnostics	CMP, Prosine Inverter
Info	Generator Status	Onan Genset
Info	House Systems	CMP Sensors, Prosine Inverter
Info	Prosine Status	Prosine Inverter
Prog	Prosine Settings	Prosine Inverter
Spec	Genstart Status	PM-002 Genstart System

Many screens allow you to change system settings or turn a component on or off. These actions are accomplished using the knob on the VMS. Turning the knob will cycle through the various options on the screen, pressing the knob will select that item - either to activate the component or change the setting. When changing a setting, after selecting the particular item to change, turning the knob will change the value, and pressing the knob again will set the item to that value and allow you to select another item.

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*Please note that there can be a several second delay between when a setting is selected or component activated and when that setting takes effect or the component responds. In some cases a setting or activation may fail, either for safety reasons or possibly a component or communications malfunction. It may take several seconds for the system to detect such failures and for the VMS to update the display accordingly.*

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## House Monitoring

### *Tank Levels*

Tank levels are read from the CMP sensors, and displayed in three ways. For each tank (Fresh Water, Gray and Black Waste, and LPG) the VMS displays a bar graph showing the relative level, the level as a percent of full, and the level in gallons.

The CMP system requires the CMP panel to provide power to the sensors, and also to poll the sensors at certain intervals. Thus if the CMP is off, the VMS will only show the most recent readings available.

The VMS is programmed with the tank sizes in the "hidden" options screen. Consult the VMS manual for details on accessing this screen to adjust these values.

### *Power Systems*

The AC and DC information provided on the Power Systems or House Systems screen is a combination of data from the CMP and the Prosine unit. It is divided into three sections - DC Sources, DC Loads, and AC Sources. For each item, both the voltage and amperage is provided, with both a bar graph and a numeric reading.

One key advantage to this system is the ability to get voltage readings from multiple sources simultaneously. A large voltage difference between components can signify wiring or component problems in the coach.

#### DC Sources

This indicates the power provided from the principle sources of DC power. The CMP includes sensors on the house battery output and the solar panel, while the Prosine charger reports its output directly. This accounts for all DC power available in the coach, assuming the engine is not running.

#### DC Loads

These two indicators show where DC power is being consumed. The battery indicator shows the amount of power the batteries are absorbing to charge, assuming that AC power is available. The inverter shows how much power is being consumed to provide AC power when the generator or shore line are unavailable.

#### AC Sources

The CMP monitors the AC input from the shore line or generator, which is divided into two legs. Consult your manual for details regarding the configuration of the AC legs and your appliances. The Prosine reports its AC output here, as well.

#### What to Expect

When the inverter is on, and the coach has no other source of AC power, this screen should show amperage coming from the battery and solar sources, going to the inverter as a DC load, and coming out as an AC source. When AC power is otherwise available and the charger is running, this should show as amperage under at least one of the AC legs, the charger should show as a DC source, and the battery as a DC load unless it is already fully charged.

## Prosine Monitoring

### *Prosine Status Screen*

#### Gauges

The Prosine gauges show the amperage and voltage going in and out of the inverter and charger. These indicators duplicate the information on the House Systems screens described in the previous section, but present them in a Prosine-centered way. When the unit is converting AC power to DC, the DC Out and AC In gauges should show the amount of power consumed and provided. Similarly, when the unit is inverting DC power to AC, the DC In and AC Out gauges will reflect this.

#### Charger Status

The Prosine charger has four modes. In normal charging, the unit will start in Bulk mode until the batteries near their capacity. It then changes to Absorb mode to complete the charging without overheating the batteries. Finally, it enters Float mode to keep the batteries in top condition while AC power is still available. It enters Equalization mode when commanded to "equalize" the batteries. Consult the Prosine manual for further details. The current mode is indicated in the Charger status area. The accompanying bar graph only indicates the current charging stage, not the charge level of the battery.

#### Prosine Activation

From this screen it is possible to turn on and off the inverter and charger, and activate the battery equalization feature. Simply highlight the feature you wish to activate (or deactivate), and press the knob. The VMS will initially indicate "standby" rather than "on", until the Prosine can verify the presence of input power and notify the VMS. If power is not available for that component, the system will remain in standby mode until power becomes available or the unit is turned off.

### *Prosine Settings*

This screen allows you to set a number of parameters that determine how the Prosine treats your batteries and electrical system. Please consult the Prosine manual before changing these settings.

Only the first few items on the list are initially accessible. These are the "safe" items - it is unlikely that you can do any damage to your system by improperly adjusting them. The remaining items can't be changed without entering a code into the VMS. If you wish to adjust any of these, you must first activate the VMS Settings Screen and set the "Prosine Installer Code" to 42. The VMS will then allow access to these items.

## **Generator Features (PM-002 Only)**

### ***Generator Status***

This screen allows you to monitor the generator from the VMS, and also to start and stop it. The screen shows the current run status of the unit, the output voltage, engine load, and the temperature and speed.

To start the generator, simply turn the knob to the left to highlight "start", and press the knob. You do not have to keep pressing the knob until the generator starts - the start sequence is accomplished automatically. To stop the generator, turn the knob to the right to highlight "stop" and press the knob again.

### ***Genstart Status***

This screen shows the status of the Genstart system. The system has four components monitored here.

The Genstart itself shows whether the module is active, or has been disabled by the safety override switch. The coach manufacturer may have wired a switch that will disable the genstart module, for the safety and convenience of service technicians.

The thermostat indicator shows whether the thermostat input has been activated, or whether this feature has been disabled. If enabled, the PM-002 will monitor a thermostat input, and start the generator as appropriate to provide power for air conditioning.

The autocharger indicator shows the status of the battery Autocharging feature. The PM-002 can monitor the battery status, as measured by the inverter, and start the generator as required.

The exerciser indicator shows the status of the Exercise feature, which starts the genset periodically. This is recommended for use when the coach is in storage for extended periods.

This screen also shows the date and time stored in the PM-002 module's internal clock. If it is off, selecting "Synchronize to VMS" will download the current time from the VMS to the PM-002. This allows the PM-002 to monitor the quiet time and exercise intervals even when the VMS is off.

### ***Genstart Settings***

On the VMS 320 and 600, this screen is combined with the Genstart Status screen. On the VMS 200, the settings require more space than the screen can display at one time. Turning the knob far enough will reveal a second page of settings.

#### Quiet Time

These settings provide a period of time in which the PM-002 will not run the genset, overriding the Autocharging, Exercising, or Thermostat features. You can still start the genset directly - only the automatic features are turned off. Many parks and events set a quiet time during which you should rely on inverter power.

#### Autocharger

The Autocharger setting allows you to enable or disable the Autocharge feature. The feature has two modes. Normally the unit monitors the battery voltage, and when it drops

below the voltage specified as Start Volts, it starts the genset and runs it until the charger indicates that the batteries are fully charged. It will run no longer than the indicated Run Time. The Run Time should be set at a level adequate to fully recharge the batteries.

To prevent you from running out of power during Quiet Time, the unit checks the battery voltage just before the start of Quiet Time. If it is less than the Topoff Volts it starts the genset and runs it for the amount of time indicated in Topoff Run Time". The Topoff Voltage should be set higher than the ordinary Start Voltage, and the Topoff Run Time should be adequate to recharge the batteries from that level. If the Topoff Volts is less than the Start Volts, the Topoff feature will not activate.

#### Thermostat Switch

This setting allows you to disable the Thermostat feature. Note that the Thermostat feature will not activate if the coach has access to shore power.

#### Exerciser

To use the Exercise feature, first set the feature to "enabled". Then turn the knob to highlight each day of the week, pressing the knob to underline each day that you want to start the genset. Set the run time to the amount of time you want the generator to run each time. Set the start time to the time of day the generator should start. Note that the Start Time must not be within the Quiet Time, and that if the Exerciser is running as Quiet Time begins, the module will turn the generator off.

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*Any automatic start system can be a hazard to a technician servicing the generator or AC wiring. The PM-002 can start the generator unexpectedly, and should be unplugged from the generator before service work is begun.*

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#### Tips and Suggestions

When dry camping, use the Autocharge feature to automatically keep your batteries charged. Set the Start Volts somewhat higher than the inverter's low battery alarm level. Set the Run Time long enough for the charger to reach float mode, plus some additional time. If the batteries reach full charge before the Run Time has expired the unit will stop.

The Topoff feature will prevent your batteries from running down during the night. If you use very little power at night, set it just marginally higher than the Start Volts - 1/2 Volt, for example. If you use a lot of power at night then set the Topoff Volts higher. In either case make sure the Topoff Run Time is roughly enough to fully charge the batteries, but not longer. If the Topoff Run Time is set too long then the feature will trigger too early.

The Exerciser is intended primarily to keep the generator from developing fuel deposits while in storage. When storing your coach, set the Exerciser to run at least once per week. The Exerciser is also useful if you rarely dry camp and operate mostly on shore power. Make sure you store the coach in a ventilated area if you are using the Exerciser.

You can use all these features in any combination. The system automatically senses the presence of shore power, and only the Exerciser will activate when shore power is available. Therefore you generally don't need to change your settings when you dry camp, when you park with shore power, and when you store the coach.

## Warranty

This warranty is only for the PM-001 and PM-002. It does not cover the generator, inverter, monitor panel, sensors, coach wiring, or any other component mentioned in this manual or wired to the PM unit not manufactured by SilverLeaf Electronics, Inc..

The obligation of SilverLeaf Electronics, Inc. under this warranty shall be limited to repair or replacement (at our option) during the warranty period of any part which proves defective in material or workmanship under normal installation, use, and service, provided the product is returned to SilverLeaf Electronics, Inc.. The warranty period shall be one year from date of purchase of the unit, or purchase of the finished coach with the unit installed.

This warranty shall be invalid if the product is damaged as a result of defacement, misuse, abuse, neglect, accident, destruction, alteration, improper electrical voltages or currents, repair or maintenance by any party other than SilverLeaf Electronics Inc. or an authorized service facility, or any use violative of instructions furnished by us.

This one-year warranty is in lieu of all other expressed warranties, obligations, or liabilities. Any implied warranties, obligations, or liabilities, including but not limited to the implied warranties of merchantability and fitness for a particular purpose, shall be limited in duration to the one-year duration of this written limited warranty.

In no event shall SilverLeaf Electronics, Inc. be liable for any special, incidental, or consequential damages for breach of this or any other warranty, expressed or implied, whatsoever.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.



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