

Warranty

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 VMS™, or purchase of the finished coach with the VMS™ 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.

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



VMS 440 CL™

Owner's Manual

RV Version 4.0



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Quick Start Guide



To Start a Trip

Press TRIP. The Trip Screen should appear.

Press CLEAR. The trip data should reset to zero. The VMS will now automatically begin accumulating trip information. The previous trip will be stored in the Trip History.

To Set Your Destination "Miles-To-Go"

Press TRIP. The Trip Screen should appear.

Turn the KNOB. The Miles To Go number near the bottom should adjust up or down accordingly. Press the KNOB to add 100 miles.

To Read Diagnostic Information

If the Check Engine indicator on the dash lights up, press DIAG. The Engine Diagnostics Screen should appear, showing the cause of the problem. Press CLEAR to clear the top of the screen. If the problem is still occurring, the code will quickly reappear.

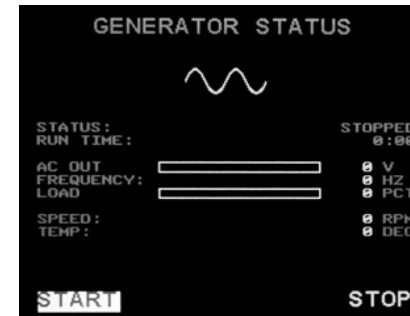
To Set the Time

Press PROG once. Press the KNOB. Turn the KNOB to adjust the hours, and press the KNOB. Turn the KNOB to adjust the minutes, and press the KNOB. Turn the KNOB to adjust the AM/PM indicator, and press the KNOB. The clock is now set.

To Scan Multiple Gauges or Watch a Particular Gauge

Pressing SCAN will either start or stop scanning of the gauges at the top of the gauge cluster on the Drive Screen. At the top of the screen there will be an arrow indicating that the gauges will cycle one by one. Pressing SCAN again will stop it on the gauge being displayed and instead of an arrow, a stop sign will appear indicating that the VMS is currently stopped on that particular gauge. You can also simply turn the knob to a specific gauge you would like to watch and it will automatically hold on that gauge until SCAN is pressed again.

Automatic Generator Start: Add this function to your VMS and allow monitoring of battery voltage and starting of the generator in the event of low batteries. Programmable quiet time, start voltage, and will even top your batteries off before quiet time begins! You can also set it to start the generator on a schedule. This is also useful for exercising the generator while in storage. Add a thermostat and be able to run the air conditioners to maintain temperature automatically. Ideal for safeguarding your pets while you are away. No direct wiring to the air conditioning is required.



Holding Tank Monitoring: Allows monitoring of onboard holding tanks right on the VMS display.



Ask Us About Available Accessories To Compliment Your VMS

Tire Pressure Monitoring: Tire pressure monitoring gives internal pressure and temperature readings of each tire while driving down the road right on your VMS screen! Acts as an early warning system in the event of loss of tire pressure, or extreme rise in temperature for coach and towed vehicles.

Weather Station: Gives outside air temperature, barometric pressure, altimeter, heat index, and humidity readings.

Ultrasonic Fuel Tank Sensor: The ultimate fuel tank sensor! This sensor uses ultrasonic technology to accurately determine the amount of fuel left in your fuel tank. The VMS will display Distance to Empty, fuel in percent, and fuel in gallons. This sensor will also drive the dash mounted analog gauge. Requires replacing existing top tank fuel sensor.

Road Temperature Sensor: Using infrared, this accessory allows the VMS to show road temperature and outside air temperature.

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Drive Screens

When the VMS first comes on, after a few seconds it will automatically display the main "Drive Screen". This screen displays some of the most valuable information available. Regardless of what screen being displayed by the VMS, you can always return to this screen by pressing DRIVE. On the Drive Screen, you can press the BRIGHT button on the VMS400 to adjust the brightness of the display.

Main Drive Screen

The Drive Screen displays engine performance and transmission status information. The "C" icon in the top left side indicates Cruise Status.

Transmission Status

The two large numbers at the top right indicate the Gear Selected and Gear Attained by the transmission (WTEC v8 or newer required). You should see these update as the transmission shifts. Beside that, the VMS displays the Transmission Mode. The Mode indicates the aggressiveness of the transmission; on most coaches Mode On indicates less aggressive shifting for better fuel economy. The Error icon (an exclamation mark) will appear to indicate problems.

Engine Performance

In this example, the VMS displays three important engine indicators: Rolling MPG, Transmission Temperature, and Coolant Temperature. More information on how these numbers are determined is provided in the section on the Scan Screen. These items can be changed to any of the gauges on the VMS Settings Screen by pressing the PROG button once and changing Gauge 1,2, and 3 to the desired gauges.

Clock, Calendar and Alarm Clock

The clock, calendar, and alarm clock can be set also by using the VMS Settings Screen, activated by pressing the PROG button once.

Display Modes

On the bottom right portion of the screen, the VMS has several different display modes.



Long Rolling M.P.G.

Rolling M.P.G. is calculated over roughly a one minute time interval, the Long Rolling M.P.G. extends that calculation out to roughly a ten minute time interval.

Trouble Monitor

When the Trouble Monitor is activated, an immediately switch of the Display to the Engine Diagnostics screen on the occurrence of an Engine Fault code, or switch to the appropriate Scan Screen on these events; Engine Coolant Temperature greater than 215°F, Transmission Oil Temperature greater than 240°F, Battery Voltage less than 12.5 VDC.

Video Configuration screen

By pressing the Video and Bright simultaneously and holding them for three seconds. The Video Configuration screen will appear. There are several items on this screen, which you can scroll through using the Knob.

Enabled

This selection determines if the VMS will display the Video signal.

Orientation

This selection determines if the display is Normal or Rear. This provides a Mirror Image.

Brightness

This selection allows a value in the range of 0 to 255. 0 being the Darkest, 255 being the Brightest.

Contrast

This selection allows a value in the range of 0 to 255. 0 being the least contrast, 255 being the most contrast.

Saturation

This selection allows a value in the range of 0 to 255. Adjust to taste.

Hue

This selection allows a value in the range of 0 to 255. Adjust to taste.

Configuration

This selection is for future options, and will always be set at Standard.

Reset To Defaults

This selection resets the current video screen selected to the factory defaults.

Go to Video 1,2,3, or 4

This selection switches between the Video Inputs.

Hidden Screens

In addition to all the features already described, the VMS also has a set of hidden screens that provide diagnostic information on the VMS and data bus, and allow further settings to be adjusted. Usually these screens are useful only in the installation of the VMS. But in certain situations they may prove useful, so some brief mention is made here.

VMS Options screen

The most important hidden screens are accessed by pressing **DRIVE** and **SCAN** simultaneously and holding them for three seconds. The VMS Options Screen or Video Screen will appear. There are several items on this screen, which you can scroll through using the **Knob**.

Clear Trip History

Highlight this and press the **Knob** to clear all the trips in the Trip History Screen. The current number of trip in the history is provided. The maximum capacity is 4096.

Clear Engine Diagnostic History

Highlight this and press the **Knob** to clear all the diagnostic codes in the Engine History. The current number of events in the history is provided. The maximum capacity is 4096.

Clear Current Trips

Highlight this and press the **Knob** to reset the trip information in the Main Trip and Alternate Trip Screens. Those screens will show the current trip as having started when the engine was built.

Clear Maintenance History

Highlight this and press the **Knob** to clear the Maintenance Manager.

Reset To Defaults

Select this to reset all VMS settings to their factory default values.

OEM

This determines the logo presented at startup.

Reset to OEM Defaults

Select this to reset all VMS settings to the selected OEM's factory default values.

Special Modes

There are some *Special Modes* that are activated from the **Hidden Screens**, under the **Miscellaneous** section, these *Special Modes* do not require any additional purchases from Silverleaf Electronics.

Cruise Monitor

When the Cruise Monitor is activated, the *Display* will switch automatically to the Cruise Set Speed screen while you are setting your Cruise Control, and then return to the screen visible before the switch.

Video Inputs

Video Input 1, Video Input 2, or Both either Alternating on a timer, or by the users selection by pressing the **Knob**. See Hidden Screen section for configuration.

Trip Status

Estimated-Time-of-Arrival (ETA), Miles-To-Go (MTG), Gallons-To-Go (GTG), and Rolling MPG. The MTG is set on the primary Trip Screen (see the Quick Start page), and will slowly count down as you drive.

The GTG and ETA are constantly being recalculated based on your fuel economy and speed. In the first miles of each trip it will fluctuate before settling in on it's best estimate, which will change as conditions warrant. These can be set to read in Metric using the VMS Settings Screen.

Scanning Gauge Line

The Scanning Gauge Line provides the equivalent of over a dozen gauges in one package. The specific gauges depend on the engine model and configuration, and additional items may be available if additional modules are installed.

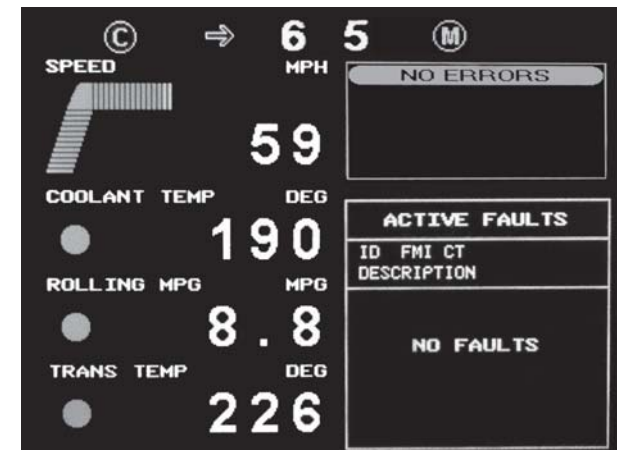
Press **SCAN** to switch between stopped and scanning. Near the top center is an icon that indicates the screen "mode", Scan or Watch. An arrow icon indicates Scan, a stop sign indicates Watch.

Note: For the Scan Line to work properly, the correct engine must be selected. The engine type is set in the VMS Preferences Screen, described on page 12.

Scan Mode

In Scan Mode, the VMS will cycle from gauge to gauge, displaying each one for a set amount of time. You can program the gauges displayed in this mode, and the duration displayed, using the VMS settings and Scan Preference Screens. (See those sections for details.)

The gauge is represented with a Title, and a numeric value. At the top of the screen is the title of the gauge, and underneath is the numeric value.



Press **SCAN** to enter Watch Mode. The VMS will stop scanning, and stay on the current gauge.

Turn the **KNOB** to dial in a particular gauge. The unit will automatically enter Watch Mode.

Watch Mode

In Watch Mode, the gauge will not change. This is useful when you are keenly interested in one particular gauge - such as the Coolant Temperature during a very hot day. You can change the gauge by dialing with the **KNOB**. The gauges are arranged in alphabetical order.

Press **SCAN** to resume Scan Mode.

Gauge Items

All gauge items are obtained directly from the engine and transmission, and are digitally accurate. In general, the VMS is much more reliable and accurate than the conventional dash gauges.

Most gauges are self-explanatory. Some, such as Accelerator Position, are useful only in certain troubleshooting situations. Some duplicate the dash gauges, but are more accurate and precise than the conventional gauge. Others are truly unique.

Engine Coolant Temperature

When driving in hot weather and working the engine hard, we recommend watching this gauge. Most engine experts agree that you should start "managing" your temperature when it reaches about 210 degrees. From that point on your goal should be to stabilize the temperature before it reaches 225 or higher. (Engines models vary somewhat in their tolerance for heat. Check your engine manual for details on your engine.)

Horsepower and Torque

These gauges shows the calculated engine output. The VMS cannot compensate for fans, belts, and other parasitic loads on the engine, and this value may be thrown off by a malfunction in the engine. But it does provide an effective indicator of engine performance. Of the two, Torque is more indicative of motive force and efficiency. When working the engine, try to maximize your torque output.

At very low RPMS these values cannot be accurately calculated. Under these conditions both of these gauges will read zero.

Cruise Control Mode

The Caterpillar cruise control has two operating modes: "Hard" and "Soft". In the Hard mode the engine aggressively works to maintain its speed, while in Soft mode it allows the speed to vary somewhat to save fuel and wear. In most conditions, Soft mode is preferable. However, in mountainous terrain Hard mode will help keep the speed up better.

The display will show the mode, Hard or Soft. ("Checking" indicates that the VMS has requested the mode information from the engine and is awaiting its response.) To change modes, turn the **KNOB** to highlight "Cruise", and press the **KNOB**. The mode should change within a few moments.

Daily Data

Pressing **INFO** activates the Daily Data screen. This feature keeps track of day to day travel indications automatically. It displays Distance traveled, Average MPH, Hours driven, Gallons consumed, and MPG for that particular day. After each day of traveling passes, it will automatically log the data on the screen showing the info of the travel days.

Video Scanning Speed

When multiple Video Inputs are selected, the display will alternate between the various inputs. The value of this setting in Seconds. A value of 0 will disable scanning.

Scan Preferences Screen

Press PROG a second time to activate the Scan Preferences Screen. A list of gauges available in the Scan Screen will appear, with their settings for the Watch and Scan modes. Each gauge may be set to Watch or Hide, and Scan or Skip. A gauge set to Hide will not appear in the Watch mode at all, while if it set to Watch it will be accessible in the Watch mode by turning the knob. A gauge set to Scan will appear periodically in the Scan mode. Typically most gauges should be set to Watch, but only the most important should be set to Scan.

Turn the KNOB to select a particular item - there are more than can fit on the screen at one time. Press the KNOB to change the values.

Automatic Sensor Detection

No engine supports all the gauge functions the VMS is capable of displaying. The VMS is capable of querying the engine to determine its capabilities, and it can automatically set the unsupported gauges to "Hide". To activate the sensor detector, let the VMS run for at least ten seconds while this screen is activated, and press CLEAR. All features supported by the engine should be set to Watch and Scan, while others are set to Hide and Skip.

Rolling MPG, Recent MPG, Instantaneous MPG, and Power Factor

Instantaneous MPG indicates the fuel economy calculated on a moment-by-moment basis. It generally fluctuates too rapidly to be useful for guiding your driving, so the VMS calculates a Rolling MPG. Rolling MPG considers fuel consumption over roughly a one minute time interval, while ignoring very low speed driving and idling. Recent MPG is over a 20 minute period. It provides a very good indication of your current fuel economy, and is a useful tool for adjusting your driving to get the best fuel economy. Power Factor indicates the efficiency with which the engine is converting fuel to power. Although it is a good indicator of pure engine efficiency, it is generally not correlated to overall vehicle efficiency, since it does not consider air resistance, rolling resistance, and parasitic loads.

Trip Screens

Press TRIP to activate the Main Trip Screen. Press TRIP again to activate the Second Trip Screen. Press TRIP a third time to activate the Third Trip Screen. Press TRIP a fourth time to activate the Trip History Screen. You can convert these screens to metric units using the VMS Settings Screen.

Main Trip Screen

The top portion of the screen show the Distance travelled during this "trip", the number of hours and minutes the engine was running, the average speed, and the gallons of fuel used. The hours and MPH values are based on engine run time, not the total elapsed time. Sitting and idling the engine will affect these values, but sitting with the engine off will not.

TOTAL		TRIP	
20002	MILES	19745	.5
500.0	HOURS	495	:08
40.0	MPH	39	.9
2500	GAL	2470	.3
8.0	MPG	8	.0
GALS TO GO		.0	
MILES TO GO		0	
ARRIVAL TIME		8:56 AM	

The center of the screen shows the Miles Per Gallon achieved on this trip.

Trip Planning

The bottom portion of the screen is dedicated to the Trip Planning feature. Use the knob to set the expected number of miles you plan to travel today. The VMS will slowly count down as you drive, and calculate the gallons of fuel required to reach your destination, and the estimated time of arrival. These will constantly be recalculated as you drive, and are based on your average fuel economy and speed for this particular trip.

Press CLEAR to start a new "trip". All values on the screen will reset to zero. The information on previous trip will be stored and is available on the Trip History Screen. (Trips

of less than .2 miles are not saved.)

Turn the KNOB to adjust the Miles-To-Go. Press the KNOB to add 100 to the Miles-To-Go.

Second and Third Trip Screens

The Second and Third Trip Screens are identical to the Main Trip Screen, with two exceptions. First, there is no Miles-To-Go feature on these screens. Second, trips on these screens are *not* saved in the Trip History. This screen can be used to provide a "grand total", or for a tank-by-tank tracking of fuel. Clearing either of these trips has no effect on the Main Trip.

Press CLEAR to start a new "trip". All values on the screen will reset to zero.

Trip History

The VMS stores up to over 4000 trips as they are cleared from the Main Trip Screen. They can be viewed on this screen. The screen displays the date the trip *ended*, the miles travelled, fuel used, engine running time, average speed, and fuel economy (MPG). The most recent trip will be on the top, with previous trips following, sorted by date.

Turn the KNOB to scroll through the history.

Diagnostic Screen

Whenever the engine detects a problem, it activates the Check Engine light on the

TOTAL		SECOND
20002	MILES	20001.7
500.0	HOURS	500:00
40.0	MPH	40.0
2500	GAL	2500.0
8.0	MPG	8.0

TOTAL		THIRD
20002	MILES	20001.7
500.0	HOURS	500:00
40.0	MPH	40.0
2500	GAL	2500.0
8.0	MPG	8.0

TRIP HISTORY					
END DATE	MILES	FUEL	HOURS	SPD	MPG
11/11/11	4.1	7.7	0:08	0	9.2
11/11/11	251.2	29.7	1:48	52.3	6.6

corollate to the Palette settings.

Scanning Speed

This is the number of seconds that the Scan Screen will spend on each gauge when in Scan Mode. A lower number will make it scan faster.

Engine

This indicates the engine make and model. This must be set correctly to allow all features to function properly.

Transmission

This setting allows you to select which type of transmission is installed in your vehicle. Most coaches will have the WTEC, Starting in 1998, the WTEC Version 8 (WTEC v8) replaced the previous versions. Your VMS can display additional information (Gear Selected and Gear Attained) if your coach has a WTEC v8 and you have the VMS set to *WTEC v8*. New coaches will have J1939 Transmissions, set the VMS accordingly.

Chassis

This selection is required for the Maintenance Tracking screens. If your chassis is not in the list, select "OTHER" to get a fairly representative set of maintenance intervals.

AntiTheft

This setting allows you to disable the Theft Deterrent feature, available with Caterpillar engines. Disabling this feature prevents inattentive people from accidentally locking the engine and forgetting the code.

Trip Units

This determines whether trip information is displayed in Metric or Standard units.

Gauge 1,2,3

These determine the gauges shown on the Drive Screen.

Startup Screen

This setting allows you to select which screen will be Displayed when the VMS is first Powered On.

Auto Rear View

This selects the Video Input (Video 1 or Video 2) that *expands* to Full Screen when the transmission is placed in reverse. You should select the Video Input that your Backup Camera is connected to.

Default Video

This selects the Video Input (1,2,3,or 4) that is displayed on Power Up of the VMS.

Programming Screens

VMS Settings Screen

Press **PROG** to activate the VMS Settings Screen. Here is where a variety of parameters can be adjusted to match your coach configuration and personal preferences.

Use the **Knob** to adjust each item. Turn the knob to highlight the parameter name, press the **Knob**, and turn the **Knob** again to adjust the value. Press the **Knob** again to return to the parameter name.

Clock and Alarm

Press the **Knob**, then turn the **Knob** to adjust the hour. Press the **Knob**, then turn it to adjust the minute. Then press it and turn it to adjust the AM/PM value. Press the **Knob** a final time to return to the "TIME" position.

Setting the date follows exactly the same process, as does setting the alarm clock. To use the alarm clock you must set the alarm time and also set the "ALARM SET" value to "SET".

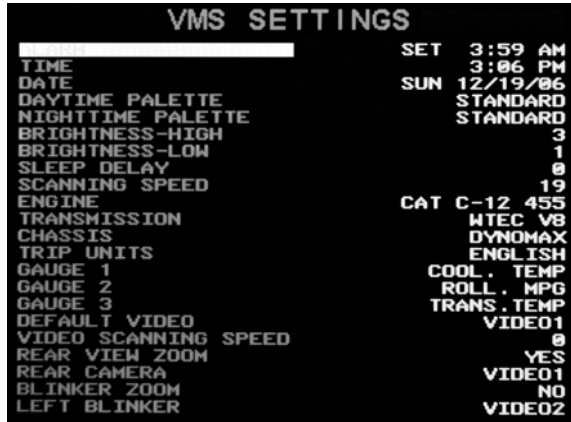
The alarm clock will sound at the appropriate time, but obviously the VMS must be on at that moment. If the VMS is turned off and on again, the alarm clock will remember its status and will sound at its appointed time. The alarm will sound until any key is pressed on the VMS. After sounding, the Alarm Set value will return to OFF.

Daytime/Nighttime Palette

This allows you to select the Color Scheme for your Daytime and Nighttime settings. The Daytime value indicates the Color Scheme when the headlights are *off* - presumably during the day. The Nighttime value indicates the Color Scheme with the headlights *on*. By default the Nighttime is the same as the Daytime value, thus the VMS can be set to different Color Schemes when the headlights are turned on.

Daytime/Nighttime Brightness

This is the display luminance, on a scale from zero (0) to three (3). If you drive with the light on during the day, you may want to adjust the Low value higher. You may Cycle through all the Brightness Modes by pressing the **BRIGHT** button. These two settings



dashboard. At the same time it transmits a series of codes which a mechanic can pick up using his "scan tool". The VMS also picks up those codes, stores them, and translates them for you to read. You can display this information whenever the Check Engine light come on by pressing **DIAG** and activating the Engine Diagnostics Screen.

Note that the VMS can only report what the engine transmits. Problems that are external to the engine may not show up, or may show up in an indirect form. For example, a bad alternator will likely not be immediately detected. But eventually a low voltage condition will probably be detected and displayed. Internal engine problems are much easier to detect, and are generally very precise.

Press **DIAG** to activate the Engine Diagnostic Screen, which shows current engine problems at the top and the Engine Diagnostic History, which displays a history of engine problems.

Engine Diagnostic Section

The top section of the screen shows any diagnostic messages received since the VMS was turned on. The "scan code" is displayed, along with a plain language interpretation of the code. The VMS does not have to be on this screen to receive and store diagnostic messages. You can activate this screen at any time to see all codes that have been generated since the VMS was turned on. The unit can store up to six codes at a time.

Press **CLEAR** to clear out the list of codes. If a problem is still occurring, it should reappear in a few moments.

Engine History Section

This screen shows every diagnostic message ever received by the VMS. It also shows the date, odometer reading, engine rpms, engine load, and temperature at the time the fault first occurred. The VMS only stores the first occurrence of each message, unless the codes were cleared on the Engine Diagnostic Screen. The code will be recorded each time the problem reoccurs after having been cleared on that screen.

The list will display the most recent messages at the top. The history can be cleared using a hidden screen. See the appendix.

Use the **Knob** to scroll through the history.

Information Screens

Engine Status

Pressing **INFO** six times, activates the Engine Status screen. This screen will vary depending on the engine installed. The Caterpillar screen is shown here.

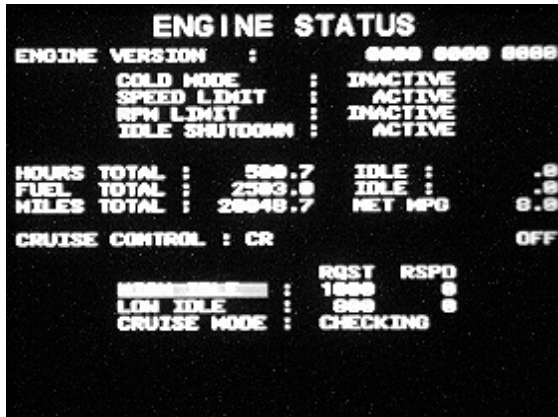


For Cummins engines, only the Total Hours, Fuel, and Miles, Net MPG, Idle Hours, Fuel and Cruise Status will be available.

Included on this screen is data on the engine hours, fuel, miles, and idle time. These values are from the engine's internal memory, and are accurate from the moment the engine was built, regardless of when the engine or VMS was installed. The miles value does meet the requirements as an odometer for reporting purposes when selling the vehicle.

The Net MPG value is calculated from the total engine miles and hours, less idle hours. Note that young engines generally perform less efficiently - a diesel engine typically takes about 10,000 miles to "break in".

The Cruise Control Status indicator at the bottom of the screen shows the status of the various inputs into the cruise control system. It is useful for troubleshooting.



Maintenance Manager

Pressing INFO 3 times on the VMS440 will activate the Maintenance Manager. The VMS has been programmed with maintenance information on a wide variety of chassis. The maintenance items have been organized into about ten groups, such as Radiator Service, Annual Lube/Filter, and Key Inspections. You can use the VMS to indicate when you have each of these groups performed, and the VMS will calculate when each group is due again.

Turn the KNOB to select a particular service group. The items in the group will be displayed, along with the date and odometer reading from the last time the service was performed, and when the service is due to be performed again.

Press CLEAR to indicate that the displayed service group has been performed. The



display should update to show the current date and odometer reading.

Press the KNOB to manually adjust the date and odometer reading. You can use the KNOB to adjust the month, date, year, and odometer reading for each item. Thus if you fail to press CLEAR at the time of service, you can enter the information later.

This feature is not intended to replace your service records. It is always a good idea to keep your service receipts for the protection of your warranties and for the benefit of future owners should you sell your coach.

Warning: Chassis service items and intervals can change. We attempt to make this service information thorough and accurate, but the VMS is not a replacement for your manuals. Please consult your engine, transmission, chassis, and other manuals for up-to-date information on your vehicle.

Pre-Drive Checklist

Press INFO again to activate the Pre-Drive Checklist. This screen shows a long list of items that are occasionally forgotten by drivers before moving the coach. It can be used like a pilot's "pre-flight" checklist.

Turn the KNOB to scroll through the list. The initial list contains over thirty items.

Press the KNOB to indicate that the item has been performed. The VMS puts a checkmark by the item. If you leave this screen and return, the checkmark will still be there. But if you turn the VMS off, the checkmark will disappear.

Press CLEAR to remove an item from the list. The item will remain off the list even after the VMS has been turned off. This allows you to edit the list to your personal liking. The only way to bring the item back onto the list is to clear every item off the list. The VMS will then put every item back on the list, returning the list to its original condition.

