LS1M

User's Guide

PDA OBD2 Scanner

Version 1.7e

Optimized for GM LS1 and L67/L36 Engine

Introduction

Thank you for your purchase of the LS1M Scanner.

The LS1M Scanner is a scan tool that can retrieve engine parameters and trouble codes from GM vehicle using the VPW OBD-2 protocol. That includes most GM cars & trucks from 1996 to 2006. To verify compatibility of your vehicle to the LS1M scanner, look for the diagnostic connector under the dash, on the driver's side. It's a 16-pin connector with pins 1-8 across the top & pins 9-16 across the bottom. The VPW protocol uses pins 2, 4, 5 & 16, so these positions should have a metal insert present.


LS1M has been optimized for use in GM's LS1 and L67 series engines. Enhanced data parameters for these engine types are supported; there's a list of them in the appendix. Some of these enhanced parameters will also work on other GM vehicles.

The basic LS1M scanner comes with an OBD2 interface cable, software CD and this User's Guide:

OB2 Cable

User's Guide   Software CD
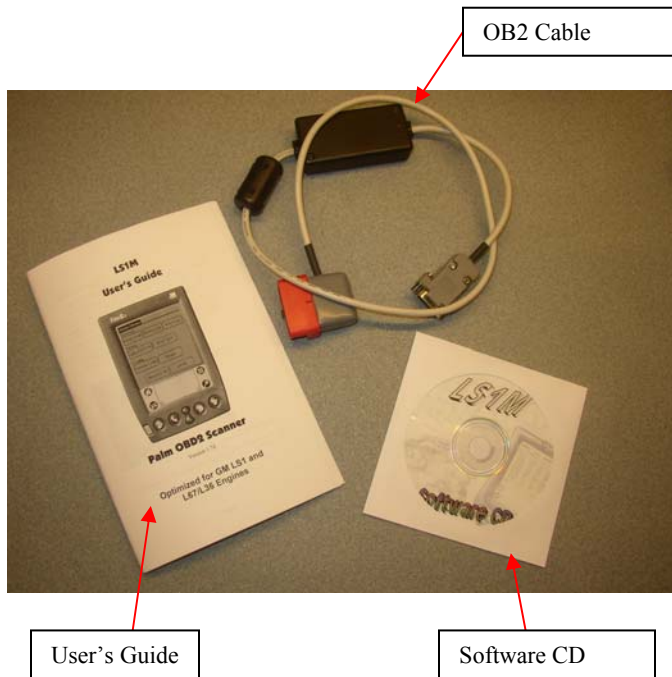
Also available is a custom PDA for use with the LS1M scanner. It comes with a PDA, USB hotsync cable, serial hotsync cable, home charger, car charger, Getting Started guide and a PDA software CD.

| Serial Cable | Car Charger | Home Charger | USB Cable |

| Getting Started | PDA | PDA Software CD |
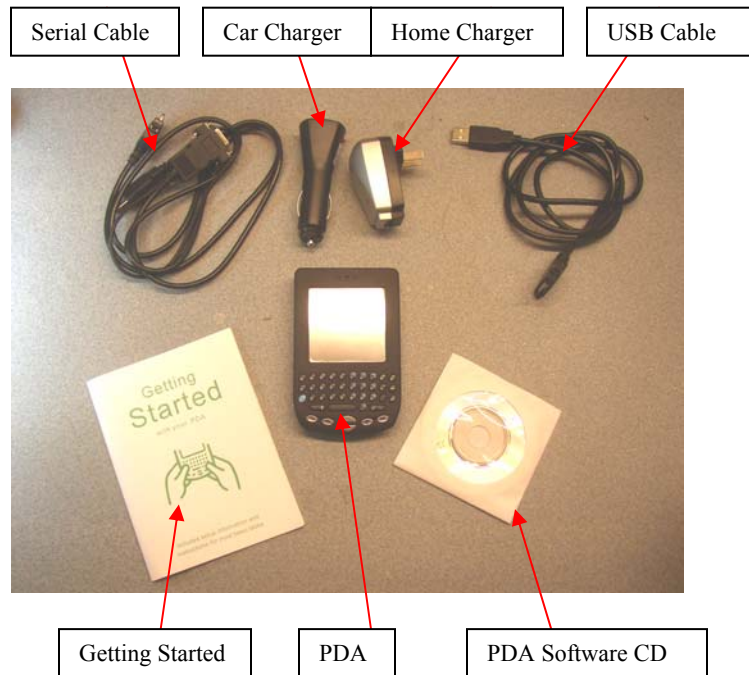
The PDA software CD has some extra programs on it and some more online documentation, but everything you need is contained on the LS1M CD. When the term "CD" is used in this User's Guide, it's referring to the LS1M CD.

The serial cable also has a charge connector on it, which connects to the car charger so the PDA can be charged up in the vehicle.

To connect to the car, the PDA plugs into the serial cable and the serial cable plugs into the LS1M cable. The serial cable's charge connector plugs into the car charger, which plugs into the cigarette lighter. Make sure the car's ignition key is in the "RUN" position, or start the engine before scanning.

There are a pair of internal DIP switches in the little black box of the OBD2 cable. Turning these switches "ON" will provide enough power to the PDA for scanning, but not for charging. If you use the car charger, you can leave these DIP switches "OFF" (facory default). Turn these switches "ON" if you don't want to use the car charger, or if you are using your own Handspring PDA. If you have a Palm PDA, leave the switches "OFF".

Both switches ON
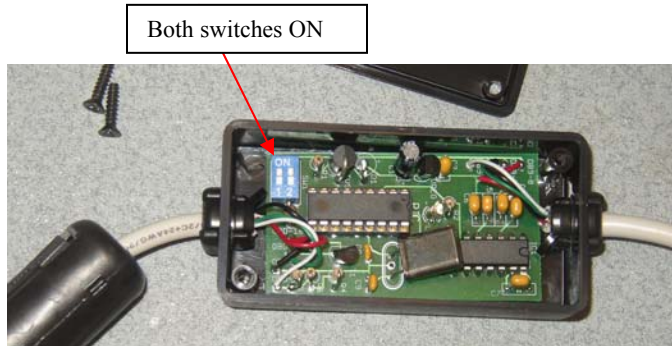
Turn on the PDA with the power button, located on the top of the PDA. Find the LS1M icon: and tap it with the stylus. The stylus is tucked away near the back of the PDA. To return to the application screen later, click the blue button on the keyboard, and then the Home button (picture of a blue house on it, lower right of the PDA keyboard).

Before your first scan, be sure to check the engine type on the Config screen. Once you start the LS1M program, click Config and then select the appropriate engine type. You can also change the units to metric by selecting the Units button.

Engine Type

Units
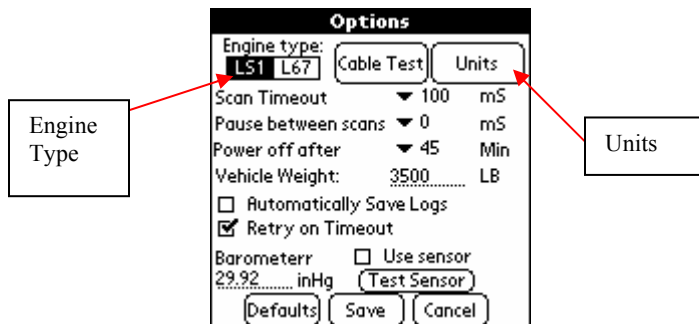
Click on Save to save your settings, then click on Scan from the Main Menu to start scanning. If you get the message "Can't Find OBD2 Cable", that means the PDA can't communicate with the LS1M cable. Double-check your cables are pushed in all the way and the ignition key is "ON". If it still won't work, your car's OBD2 connector may have blown a fuse. Check for 12 volts between pins 16 and 4 with a voltmeter, or open up the LS1M cable's little box and see if the LED is on. If there is no voltage, check your cigarette or accessory fuse, which is usually the one that powers the OBD2 port.

Warning

Operation of the LS1M scanner while driving can pose a danger to you, your passengers and other drivers. Please always keep your eyes on the road. If necessary, have someone else operate the scanner while you drive, or use the logging functions to record data for later playback.

PDA Basics

No software installation is required before using LS1M, if you purchased the PDA with your scanner. (If you purchased just the cable & software, see sections "Hotsynching" and "Installing LS1M" below.) The program has been pre-loaded on the PDA. However, if you are not familiar with PDA's, the following basic information should give you enough skill to use the program. For a full introduction to your new PDA, see the "Getting Started with your PDA" booklet or the "PDA Docs" folder on the LS1M CD. PDA docs are in Adobe Acrobat format. If you don't have Acrobat Reader installed yet (it's a widely used, free program for viewing .pdf files), you can install it off the LS1M CD from the "Acroread" folder, or download it from http://www.adobe.com/reader.

The PDA included with your scanner is intended to be used primarily for scanning with the LS1M. However, it is a fully functional PDA with address book, date book and many other standard programs. Other third-party programs can be loaded if desired, using Palm Desktop. Refer to the PDA Docs folder for more information.

Power | Mute | Stylus

LS1M Icon

Battery Indicator

Shift

Home/ Menu

Page up/down

Hotsync connector (on bottom)

Charging the PDA

Your PDA has been fully charged before shipping, so it shouldn't require any charging before first use. To recharge it, plug the USB cable into the bottom connection on the PDA, and plug the other end into any USB port or to the PDA home charger. The light on the top, next to the power button, will turn orange indicating charge mode. When charging is complete, the light will turn green. You can also charge it in the car, using the car charger and the serial cable with charge connector. The Battery Indicator on the applications (home) screen will also show the charge status.

Muting the Sound

The PDA will make sounds during certain operations. The most noticeable is the alarm sound that occurs when you reach your upper speed limit on the Accel Test. The sounds can be defeated by sliding the sound defeat button to the right. It's located on the top of the PDA, next to the power button.

Turning the PDA On

To turn the PDA on, press the power button, located on the top of the PDA. To turn off the PDA, simply press the power button again. To adjust for daylight or nighttime viewing, "double-click" the power button (press it twice real fast). Don't hold the power button down for more than 2 seconds, though. That will cause an error and may require the PDA to be reset.

PDAs are designed to be used for brief periods many times during the day. As such, they don't require long boot-up times or shutdown procedures like a PC does. The PDA remembers exactly what screen is being displayed when you turn it off, and when you turn it on again it will be at the same place. Also, PDAs will typically turn themselves off after a couple of minutes if no key is pressed to save batteries. However, since this can be quite annoying when you're scanning a car, LS1M has an option on the Config screen for changing the "sleep" time while scanning. If the PDA is left on for a considerable amount of time, the PDA's internal rechargeable batteries will go dead.

Using the Stylus

For clicking buttons on a PDA, you use a stylus, which is just a plastic pointer. The stylus should be in its holder on the back of the PDA. To use it, pull it out & tap the display where you want to "click". If you don't have the sounds silenced, you should hear a little ticking noise when you click, and whatever icon you click on will cause its associated program to run.

When you first start your PDA, you should see a screen full of program icons. To start a particular program, tap the stylus on that program's icon. To return to the main menu (set of icons), you need to press the Home button (see Keyboard section below).

Other pointing devices can be used (like a fingernail if you lose the stylus), but may damage the touch screen.

Calibrating the Touch Screen

The screen on the PDA must be calibrated so the PDA knows where you're "clicking". Calibration has already been done before your scanner was shipped, but to redo the calibration, click the Welcome icon. On the main screen of icons (as shown above), there is a scroll bar on the right, since all of the icons won't fit on one page. Drag the scroll bar down or press the page-down button until the Welcome icon shows up. Then just follow the directions to recalibrate the touch screen.

Setting the Contrast

To set the contrast, press the blue Shift button, then the letter Q on the keyboard. Use the on-screen slider to set the contrast lighter or darker.

Using the Keyboard

Users of other Palm devices will notice the "graffiti" area is missing. To enter text with this PDA, you use the ASCII keyboard. To enter text, just click on the letters with your finger just like you would use a standard keyboard. On the right side of the keyboard, you will see the backspace key and arrow key, and the space bar is the big wide one at the bottom of the keyboard. Next to the space bar is an up-arrow for capital letters. To use it, click it once and the following letter will be capitalized. To the far right of the space bar is a key with a dot and line on it. This is the "menu" button. Click it to drop-down the menu's on certain programs. (Drop-down menu's are not used in the LS1M program.)

Notice that the keys have white letters but also some blue characters to the upper right. Those are the shift-mode keys. You use them by pressing the blue shift button (lower left) and then press the key. So, for instance, if you want to enter a number 5, press the blue shift key and then the J button. On the Menu button, notice the picture of a little blue house. That's the Home button. To get back to the Home screen (list of program icons), press the blue shift button and then the Home key.

Using the Page-Up and Page-Down Buttons

Under the ASCII keyboard are some silver keys. The two buttons in the middle are the page-up and page-down buttons. They are programmed to do certain things in the LS1M program, such as start/stop scanning on the Scan screen. The other four silver buttons are shortcuts to various built-in programs on the PDA.

Installing Palm Desktop

Your PDA is shipped ready to use immediately, but if you would like to save data from the PDA to your computer, you must install Palm Desktop and the LS1M Synchronizer. Palm Desktop software for Windows or Macintosh is available as a free download from the Palm website:

http://www.palm.com/us/software/desktop/

The Windows version 4.1 is also available on the LS1M CD. To install it, navigate to the CD drive in the "Palm Desktop Software" directory and run the install program "PDADesktop41ENG". Follow the on-screen instructions to install Palm Desktop on your computer.
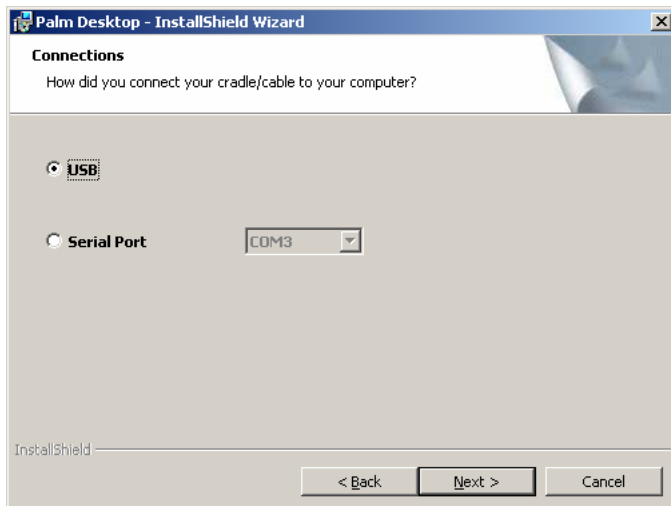
When prompted, select "Complete Installation"
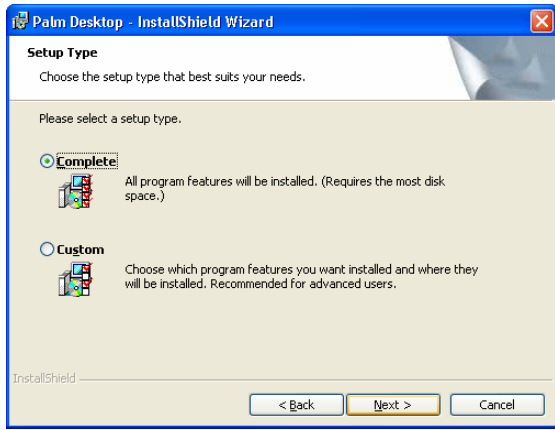
Create a new user named "LS1M"
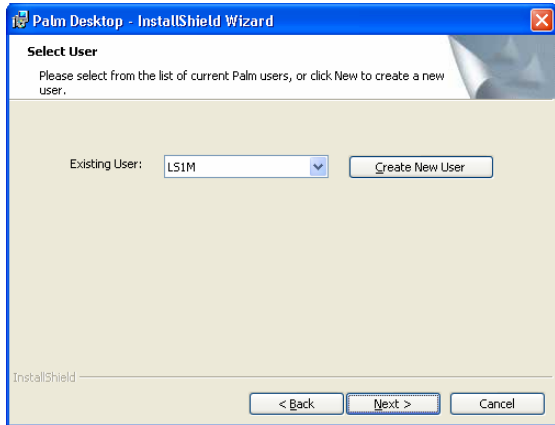

Select "USB"

Click Next, and the Install. It may be necessary to reboot your computer after the installation is complete.

Installing LS1M Synchronizer

To enable you to save logs to text files on the PC, you must install LS1M Synchronizer. First install Palm Desktop as described above. If you already have Palm Desktop installed, verify it's version 4.1 or better (select to Help->About Palm Desktop). Be sure you are logged into the computer with administrator rights to avoid errors.

Insert the LS1M CD and find the file "Setup.exe" in the "LS1M Synchronizer" folder. Double-click on this file to start the installation routine. You should see a window like this:
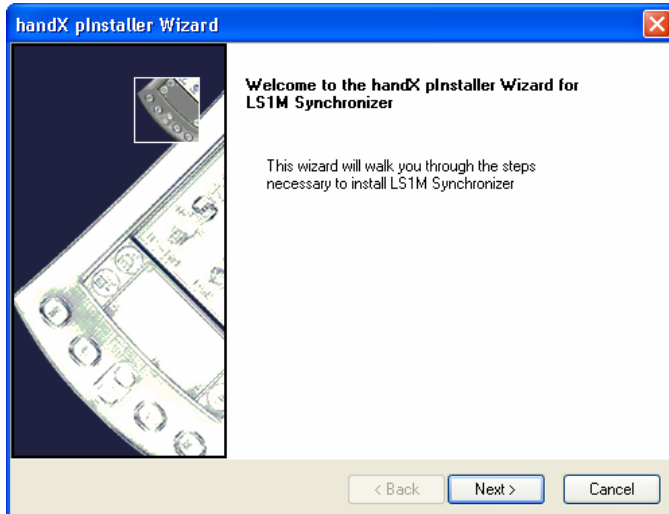
Click the Next button, then wait. On a slower PC, it may take up to a minute to install. Then click the Finish button. You can verify the install is complete from Palm Desktop, by selecting menu item Hotsynch, Custom. In the dialog box titled "Custom", you should see "LS1M Synch" in the list. Before attempting your first hotsynch with the Synchronizer, be sure to reboot the computer after installation is complete.

On the LS1M CD, there is a procedure to manually install the synchronizer instead of using the setup routine. See the file "ManualInstall.txt" in the "LS1M Sychronizer" folder. Use this procedure if there is an error during the setup routine.

Conduit registration error

If you're getting an error "Failed to register conduit" or something similar when trying to install the LS1M Synchronizer, be sure you're following the steps below. Usually, this is caused by failing to reboot between steps.

1. Install Palm Desktop 4.1 or newer (file PDADesktop41ENG.exe from the CD).
2. Install the LS1MSynchronizer (file setup.exe from the LS1M Synchronizer folder on the CD).
3. Reboot the PC.

Hot-Synching

Hot-Synching is term applied to connecting the PDA to the computer, through the USB port, and synchronizing data between the two. First, insert the USB hotsynch cable into the PDA, then plug the other end into an available USB port on your computer.

To hot-synch, first make sure Hotsync Manager is running. If it is, you'll see the hotsync icon ⟲ in the system tray. If not, select it under Start, All Programs, Palm Desktop, Hotsync Manager. Right-click the icon in the system tray, and make sure Local USB is selected. To initiate the hotsynch, you must find the Hosync icon on the PDA. Press the Home button (don't forget to press the blue shift button first) to get back to the list of program icons. The Hotsync icon will look just like the one on your computer's system tray (red and blue with arrows). Click on it with the stylus, then click the big button in the middle of the screen to start the hotsync operation. The first time you do this, you will see "Found New Hardware" displayed around the system tray area. It will take a couple of minutes while Windows installs the USB drivers for the PDA, then you will have to repeat the hotsync by pressing the icon on the PDA again. Then you should see a dialog box pop up on your computer indicating a hotsync is in progress,

and another dialog box "LS1M Sycnchronizer" will pop up, which is what you use to save logged data from the PDA to the computer. See "Exporting Logs to the PC" on page 18.

Resetting the PDA

PDA's are little computers, and like computers hang up sometimes, every once in a while the PDA can get "stuck". There's usually an error message on the screen, or the screen simply freezes. If this happens, you need to do a reset. Unscrew the tip of the stylus to reveal a thin little pointer. On the back of the PDA, locate the "reset" hole to the right of the serial number sticker. Press the thin pointer into this hole until you feel a "click". That will "reboot" the PDA.

If it's really stuck and a regular reset doesn't fix it, then you need to do a "hard reset". This will wipe out the PDA memory and put it back to how it was when you bought it. To do a hard reset, hold the power button down, press the reset button (hole), wait for the "Palm Powered" screen to show up, then let go of the power button. Press the page-up button to confirm, and the Palm will reset itself. It will prompt you to recalibrate the touch screen. Just follow the directions and when you've completed the calibration, your PDA will be ready to use again. Any lost programs can be restored by doing a hotsync, which will put it back to the same condition it was when the last hotsync was performed.
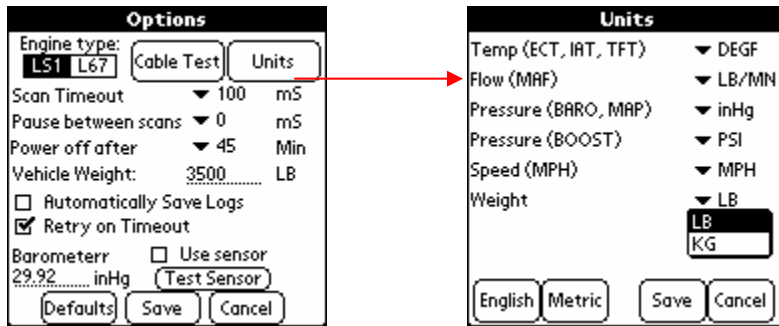
Using LS1M
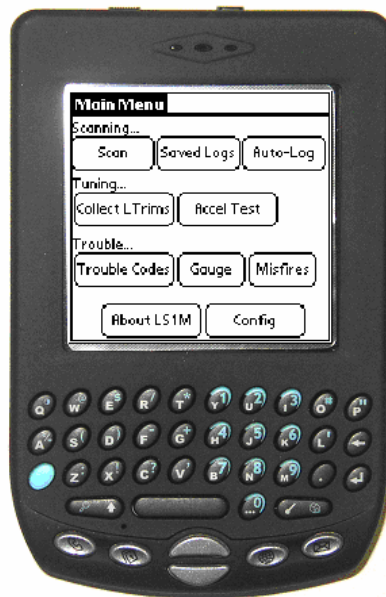
Starting LS1M

To start LS1M, click the "home" button until you see the LS1M icon. Tap the LS1M icon to bring up the LS1M Main Menu. From this main menu, tap any of the buttons to bring up the screen you want to use:

- Scan: The basic scanning screen. Use this to view and log engine parameters.

- Saved Logs: Use this screen to recall data that was logged in the Scan screen.

- Auto-Log: Set up the scanner to automatically log data based on any set of conditions, such as SPD > 30 or TPS >= 90.

- Collect LTrims: This screen will work on cars equipped with LS1 & L67/L36 engines and certain other GM vehicles. It extracts the long-term fuel trims that the computer uses to adjust the air/fuel ratio. Used mainly for computer tuning for modified vehicles.

- Accel Test: This screen is used to measure a vehicle's acceleration by timing it from a standing start to 60 mph, or other user-selected speeds.

- Trouble Codes: Use this screen to view the trouble codes reported by the vehicle's computer & reset the Service Engine Soon light.

- Gauge: Displays just a few parameters in a large font. Useful for in-car monitoring.

- Misfires: This screen will count up the reported misfires on each cylinder to help isolate an engine misfire.

- About LS1M: Version info and available memory.

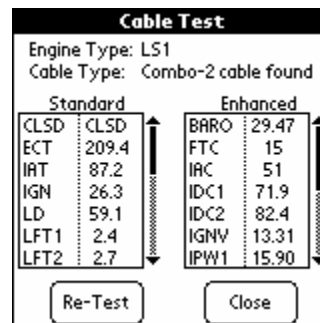- Config: Set options on the behavior of the scanner.

Engine type and other configurable items:

LS1M supports enhanced parameters on two types of engines: the LS1 V8 and the L67/L36 V6. Click on the Config button to bring up the Config screen.

Options

Engine type:
| LS1 | L67 | Cable Test | Units |

Scan Timeout ▼ 100 mS
Pause between scans ▼ 0 mS
Power off after ▼ 45 Min
Vehicle Weight: 3500 LB
☐ Automatically Save Logs
☑ Retry on Timeout
Barometerr ☐ Use sensor
29.92 inHg (Test Sensor)
[Defaults] [Save] [Cancel]

Units

Temp (ECT, IAT, TFT) ▼ DEGF
Flow (MAF) ▼ LB/MN
Pressure (BARO, MAP) ▼ inHg
Pressure (BOOST) ▼ PSI
Speed (MPH) ▼ MPH
Weight ▼ LB
LB
KG
[English] [Metric] [Save] [Cancel]

Select which vehicle you intend to scan by clicking on the appropriate box on the screen, as shown above. (Note that support for the L67 is only available with a combo LS1/L67 cable. Cables purchased before July 2003 may not have the new chip installed.) You can also click the Units button to change from default English units to Metric units.

Click the "Cable Test" button while the cable is connected to the car and the car's key is in the "run" position. A dialog box will pop up telling you which cable was detected and will poll the vehicle for all available parameters. This can be useful when troubleshooting connection problems.

Cable Test

Engine Type: LS1
Cable Type: Combo-2 cable found

| Standard		Enhanced	
CLSD	CLSD	BARO	29.47
ECT	209.4	FTC	15
IAT	87.2	IAC	51
IGN	26.3	IDC1	71.9
LD	59.1	IDC2	82.4
LFT1	2.4	IGNV	13.31
LFT2	2.7	IPW1	15.90

[Re-Test] [Close]

Other items that can be configured on the Config screen are:

- Scan Timeout: How many milliseconds the scanner will wait for a response from the vehicle before giving up.

- Pause between scans: How many milliseconds the scanner will wait after receiving a reply, before polling the vehicle again.

- Power off after: How many minutes the PDA will stay on with no user input, while running LS1M

- Vehicle weight: Enter approx vehicle weight here. Used for estimated horsepower on the Accel Test screen. See "Using the Keyboard" above for how to enter numbers here.

- Automatically save logs: Click this to have your logged data automatically saved every time you switch off of the Scan screen. This can prevent logged data from being accidentally lost. Also consider using the Auto-Log screen to automatically record data.

- Retry on Timeout: If the car's computer doesn't respond within the configured timeout period, LS1M will display "T.O." instead of a number for that scan. This can happen especially during wide-open throttle when the computer may be too busy to answer a request from a scan tool. Click this retry option to have the scanner retry once after getting no response from the vehicle.

- Barometer: Enter the current barometric pressure here. This is used in the Boost calculation for supercharged engines (L67). You can also select the vehicle's BARO sensor as the source of this information, if your vehicle supports it. Use the "Test Sensor" button to see if your vehicle's BARO sensor is compatible with LS1M.

- Click on Defaults to set config parameters to factory values.

Scan

To start the Scan screen, click the "Scan" button on the main menu. This will bring up Page 1 of the Scan screen.
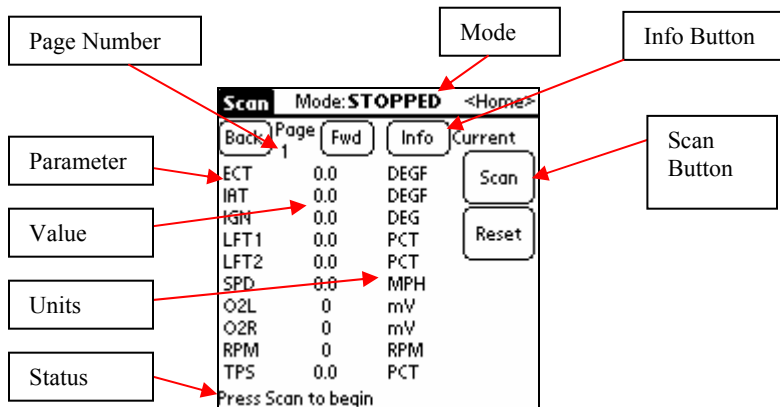
To start scanning, click the "Scan" button on the screen, or press the Page-Up button. The mode at the top of the screen should change from "Stopped" to "Scanning", and you should see some values display on the screen. If you see "T.O." instead, that means there's been a timeout error (no response from vehicle). Double-check the cables are all in place & the vehicle key is "on".

To go back to the main menu, tap the <Home> button at the very upper right corner of the Scan screen.

In the lower part of the screen, the status text will update to show you the current scan number and how many milliseconds it took to complete.

In the upper right of the screen, click the "Info" button. This will change the data displayed from current (live) values, to min, max, or averages for the listed parameters.

At the upper left of the screen, try clicking the "Page Back" and "Page Fwd" buttons. When you start the Scan screen for the first time, page 1 displays. There are 10 different pages of parameters which can be displayed. By default, the first 6 are configured. Pressing the "Fwd" & "Back" buttons will cycle through the different pages. (Note that only the visible parameters on the current page are being scanned.)

To stop the scan, click the "Stop" button or press the "Page Down" button. To reset everything to zero (erase all min/max/average values too), click the "Reset" button or press "Page Down" a second time. The status will change to "Resetting" for a couple of seconds, then return to "Stopped." All parameters should will then show zero value.

When the scanner is in STOPPED mode, you can click on a parameter in the list, and a Config button will appear. Click the Config button, then select the desired parameter from the list.
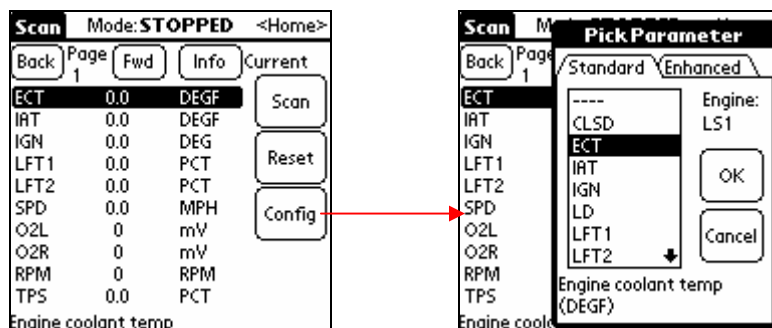
A list of all the parameters and their meanings is in the Appendix on page 26.

Sample Pages

The first six pages of the Scan screen are pre-configured with scan parameters. Any of these can be customized; they are just a good starting point.

```
Scan    Mode:STOPPED    <Home>
Back  Page  Fwd   Info   Current
      1
ECT      0.0    DEGF    Scan
IAT      0.0    DEGF
IGN      0.0    DEG
LFT1     0.0    PCT     Reset
LFT2     0.0    PCT
SPD      0.0    MPH
O2L      0      mV       Config
O2R      0      mV
RPM      0      RPM
TPS      0.0    PCT
```

The first page is filled with some of the most common, basic engine parameters, from temperatures & ignition advance, to fuel trims & O2 sensor values.

```
Scan    Mode:STOPPED    <Home>
Back  Page  Fwd   Info   Current
      2
IGNV     0.00    V       Scan
----     ----    ----
----     ----    ----
----     ----    ----    Reset
----     ----    ----
----     ----    ----
----     ----    ----    Config
----     ----    ----
----     ----    ----
----     ----    ----
```

The second page is configured for just ignition voltage. This can be useful to determine the state of health of your battery. Turn the key on, start scanning this page, then start the car. Then click the "Info" button to see the minimum voltage that occurred while cranking the engine over. If it's less than 9.5V, your battery may be on its way out.

```
Scan    Mode:STOPPED    <Home>
Back  Page  Fwd   Info   Current
      3
RPM      0      RPM     Scan
IPW1     0.00   mS
IDC1     0.0    PCT
----     ----   ----    Reset
RPM      0      RPM
IPW2     0.00   mS
IDC2     0.0    PCT     Config
----     ----   ----
LD       0.0    PCT
----     ----   ----
```

This page shows how injector duty cycle is monitored. First you configure RPM and the injector pulse width, then the IDC1 parameter calculates the duty cycle. You can use IDC1 & IDC2 to see if your fuel injectors are being over-worked. Scan this page & do a wide-open-throttle run, then click the "Info" button to see how high your duty cycle went. If it's over 90%, your injectors may need upgrading.

```
Scan    Mode:STOPPED    <Home>
Back  Page  Fwd   Info   Current
      4
FTC      0      CELL    Scan
O2L      0      mV
O2R      0      mV
SFT1     0.0    PCT     Reset
SFT2     0.0    PCT
LFT1     0.0    PCT
LFT2     0.0    PCT     Config
CLSD     OPEN   LOOP
----     ----   ----
----     ----   ----
```

Page 4 contains some fuel-specific parameters. FTC is the fuel trim cell number, followed by O2 voltages, short & long-term fuel trims, and closed-loop status.

Page 5 has some of the diagnostic parameters. MAF and MAFF show mass air flow sensor output. MISP and MISR are used for misfire diagnosis. MAP shows the manifold air pressure, while IAC shows the idle air controller position in counts, and TPSV shows the throttle position switch output in volts.

The final sample page is an example of how you might diagnose engine knock (pinging). You can log these parameters and determine under what conditions – speed, rpm, throttle position – the knock retard (KR) is occurring.

Remember that these are just starting points. Any parameter on any page can be customized. Just click on the item, then click Config. Your changes will be saved so whichever page you customize will still be customized the next time you use your scanner.

Logging

LS1M can save the data in an internal database for later playback. This is called logging. To initiate a log, first start scanning. The Scan button will change to a Log button. Click the Log button and the mode will change to LOGGING. You can also do this by pressing the Page Up button twice in a row.

All of the data you see on the current page will be recorded in memory. In the lower left of the screen, the Status field will show you how many scans have been logged.

During logging, while the scan number is incrementing, you can switch from Current data (with the "Info" button) to Min, Max or Average. If you switch to another page (different parameters), it will empty out the buffer and start scanning (not logging) the new page of parameters instead.

If you click the Stop button after logging, two new buttons will appear: Filter and Range. You can use options on this screen to filter the logged data to only include certain scans, or just get a range of scans with a given start & stop condition.
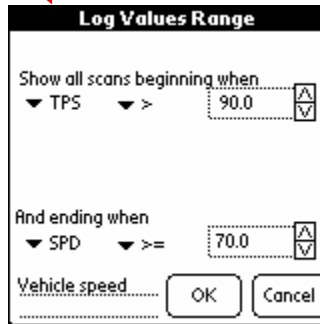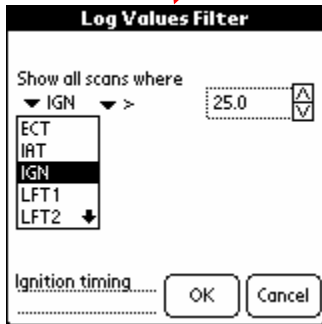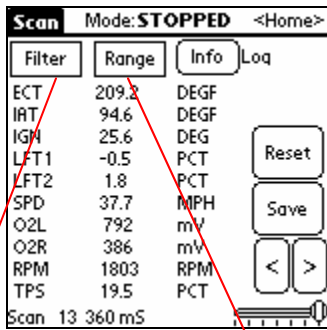
Pick a parameter from the drop-down list, pick a condition, then enter a value. In the example on the left, all scans will be shown that contain ignition timing advance greater than 25 degrees. In the example on the right, scans will be filtered starting when the throttle is over 90% open and stopping when the SPD reaches 70 mph.

When a Filter or Range is active, the button will be highlighted as shown below.

Fwd/Rev Buttons
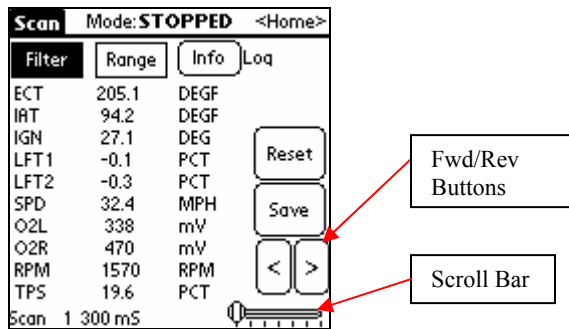
Scroll Bar

To remove the filter, just press the Filter button again. To step through the log, use the < and > arrow buttons, the Page Up/Page Down buttons, or drag the scroll bar.
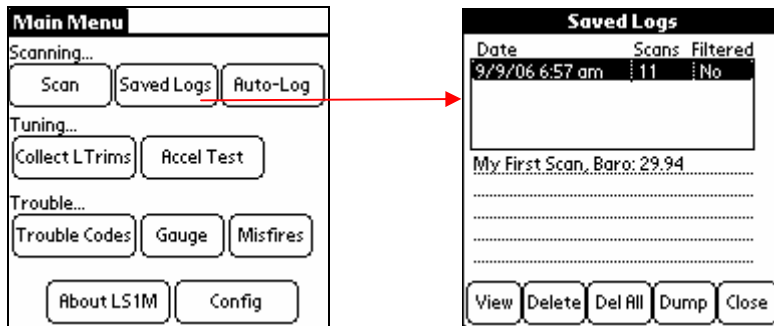
To save a log, after logging data, click the Save button.
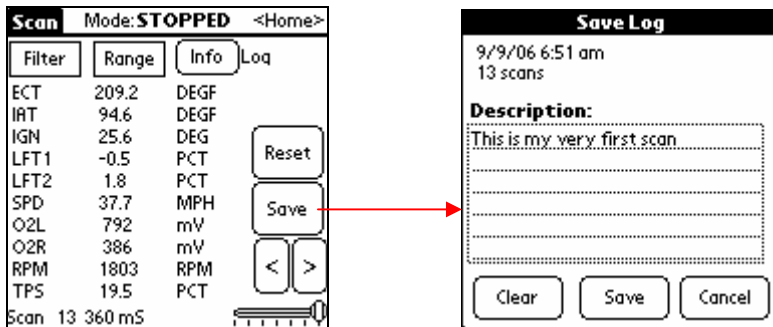
Enter a description, then click Save. The Clear button will clear the description. See "Using the Keyboard" above for more information on entering characters and numbers.

Playing Back a Log

On the main menu, click the Saved Logs button.

All of your internally saved logs will appear in the list at the top. Click an entry to view the description. Click View to load the saved data into the Scan screen. Delete will delete the currently selected entry. Delete All will delete all entries.

Dump will send the log out the serial hotsync cable. This feature is for mainly Mac and Linux users. The LS1M Synchronizer is designed to work with Palm Desktop for Windows only. On a Mac or Linux PC, there is no way to run a Windows application. So, instead, you can use the Dump feature, along with a communication application like Term, to capture the data serially. Click Dump and follow the on-screen instructions for setting baud rate & data bits on your Term program.

Once you click View, the Scan screen will appear with the saved data so you can view and filter the values.

Saving Data with the Auto-Log Screen

To start the auto-logger, click Auto-Log on the main menu.
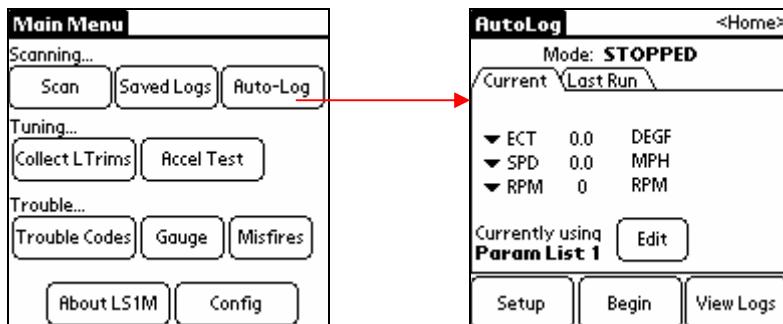

This is the main Auto-Log screen. Here, you can specify three parameters to "keep an eye on" while you're waiting for the logging to start. Click on one of the parameters on the left (ECT, MPH or RPM in this picture) and a window pops up with a list of all the parameters that are available.
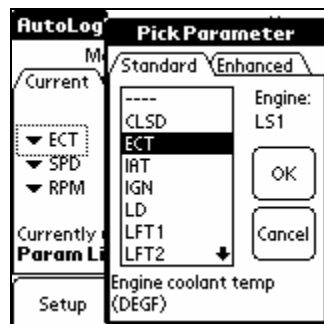

Click the parameter you'd like to watch, then click OK to return to the main screen.

On the main screen, you can see that it says you're using "Parameter List 1". To edit the list of parameters that will be automatically recorded, press the Edit button.
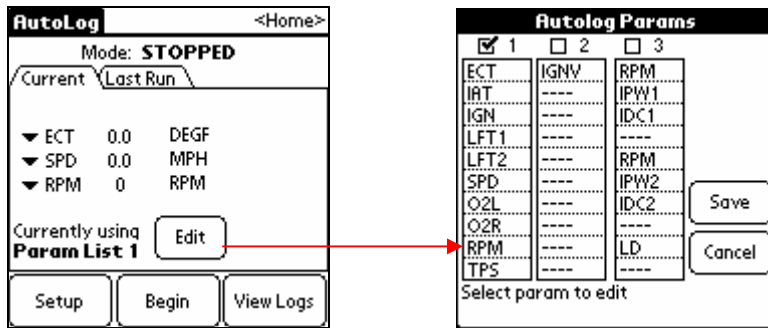
There are three lists that you can cycle between by clicking the List 1, List 2 or List 3 check boxes. To modify the list, click on an item, and then click Change to select a new one. (These lists are kept separate from the Scan screen, so any changes you make here only affect the Auto-Log screen.)

Click Save or Cancel to get back to the main screen. Now, to select what conditions will trigger the automatic logging, click the Setup button from the main Auto-Log screen.
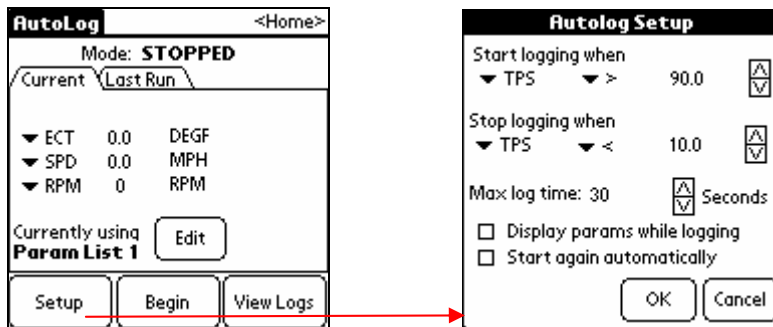
In this example, the scanner will automatically log when the TPS (throttle position sensor) is reading > 90%, and will continue to log until the TPS is reading below 10%, for a maximum of 30 seconds. To change which conditions start & stop the automatic logging, click the parameter name, the condition "<", or click on the value to type in a new one. You can also use the up & down arrows to "spin" the values up or down quickly.

There are a couple of options at the bottom. The first, Display params while logging, is used to specify that the 3 parameters on the main screen continue to be updated even when automatic logging starts. It's useful if you want to continue to monitor them, but it does slow the scan rate down somewhat. The other option, Start again automatically, means that after the "Stop Logging" condition is true, and the logged data is saved to the internal PDA database, it will automatically start monitoring the "Start Logging" conditions again. Otherwise, you will have to start it up by clicking the Begin button yourself.

Once everything is set up the way you want it, on the main screen click the Begin button to start scanning.
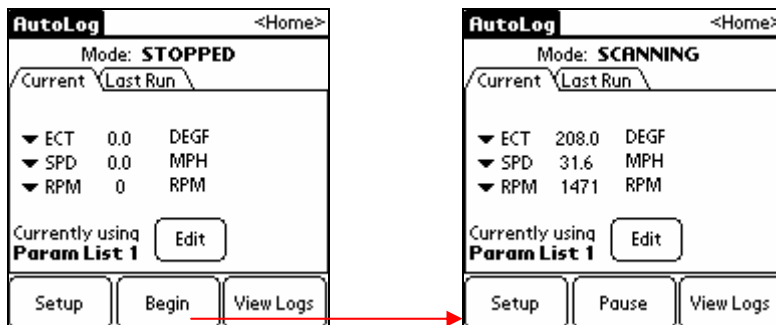
The AutoLog status at the top will change from STOPPED to SCANNING, and will continuously monitor the configured Start parameter & see if it's time to start logging. When the conditions are met, the status will change from SCANNING to LOGGING, and will stay that way until the Stop Logging condition is true, or the max number of seconds is reached.

Once the logging is complete, you can click on the Last Run tab (at the top) to get a summary of what was recorded.
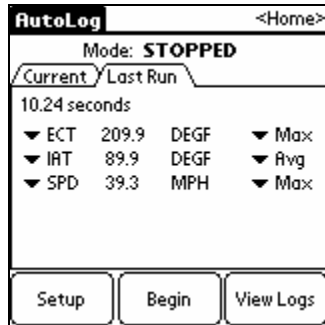
In this example, the engine coolant temperature reached a maximum of 209.9 degrees F, the average intake air temperature was 89.9 degrees F, and the maximum vehicle speed was 39.3 MPH. Click on a parameter name or the word "Max" to change the display. Note that only the parameters that were selected to log will be included here. For instance, if KR (knock retard) was not included in parameter list 1, then you can't view the Min, Max or Avg value of KR during this run.

To view the logged data frame by frame, click the View Logs button & it'll take you to the Saved Logs screen, where you can load the logged run into the Scan screen.

Exporting Logs to the PC

Once logs have been saved on the PDA, you can export them to files on your PC during a hot-synch operation. This requires that Palm Desktop 4.1 and the LS1M Synchronizer are both installed on your computer. See the section below on Palm Desktop for installation instructions.

If both Palm Desktop 4.1 and LS1M Synchronizer are installed, you will see this window appear when you hot-synch:
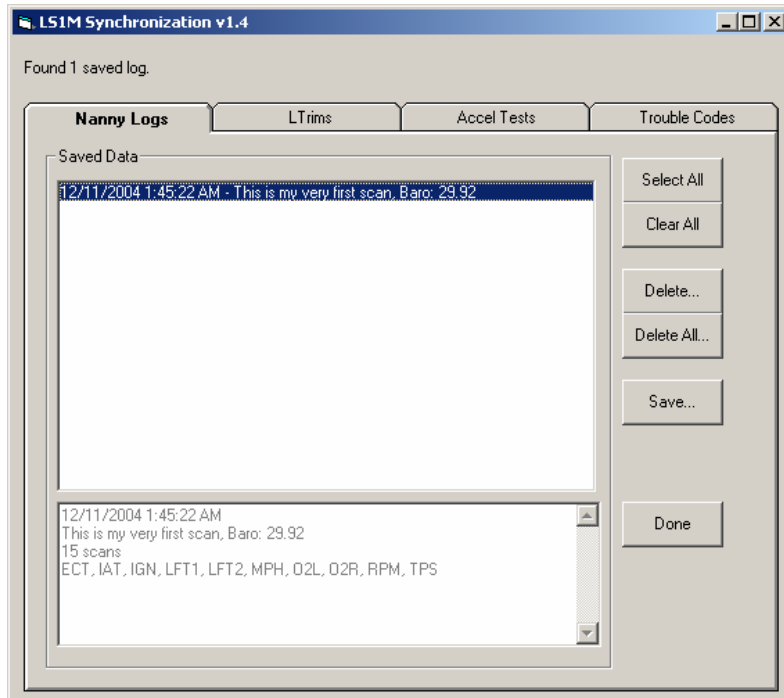
The saved logs will appear in the list. Click on one to get more information at the bottom of the screen. You can also select multiple items by holding down the Control key on the PC keyboard or using the Select All button. You can Delete the selected logs, or use Delete All to delete all saved logs from the PDA.

To save the selected log(s), click the Save button. A dialog box will appear asking for an appropriate file name or file location. Be sure to select what file type you want to save the data as.
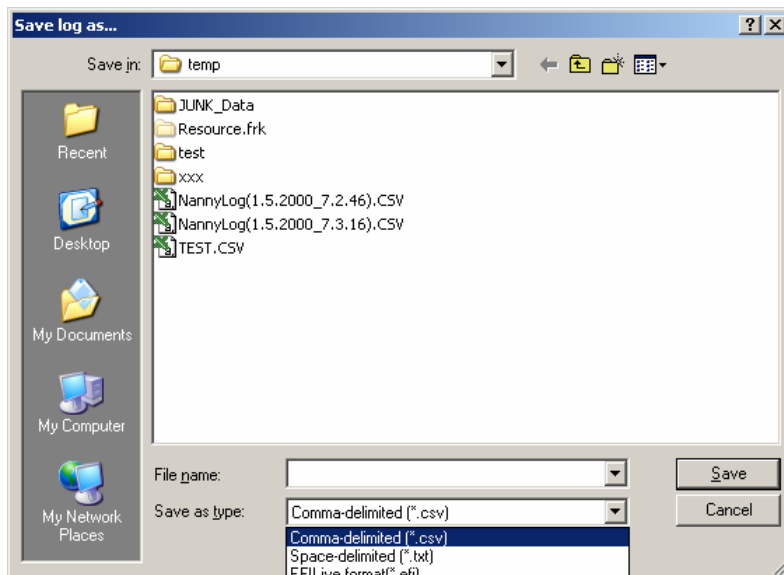

A comma-delimited file contains all the values separated by commas (eg 35,2.5,3253,10.8 etc). This is a format spreadsheets like Excel can easily read. A space-delimited file is readable in Notepad or other text editors. The

EFILive format is for compatibility with the EFILive scan tool program. Note that if you selected metric units on the LS1M Config screen, then metric units will be saved to the log file by the synchronizer.

Clicking the other tabs across the top of the synchronizer window – Ltrims, Accel Tests, Trouble Codes – will show the saved data from the other scan screens. Each time LTrims are collected, or an Accel test is competed, or trouble codes are scanned, the results are saved in an internal log database in the PDA. These saved results can be saved here in text-file format.
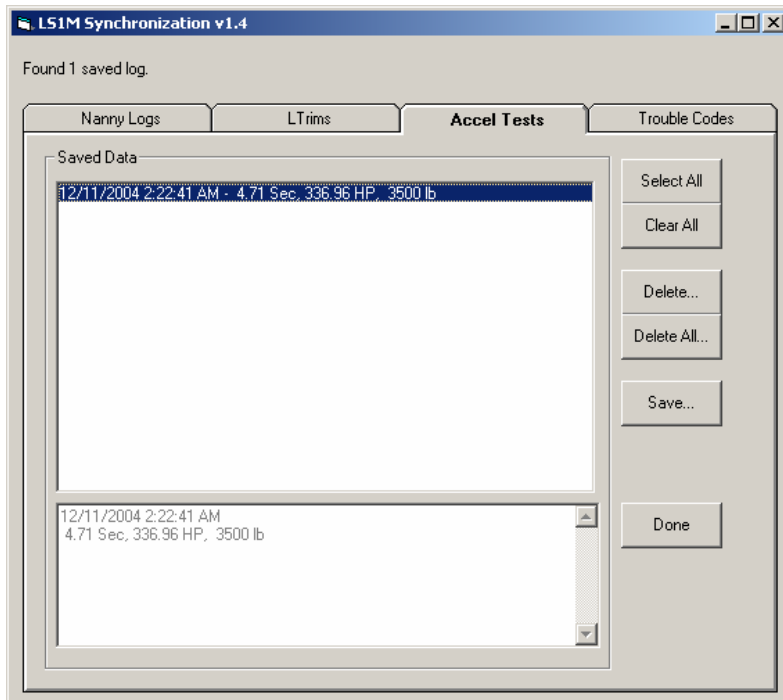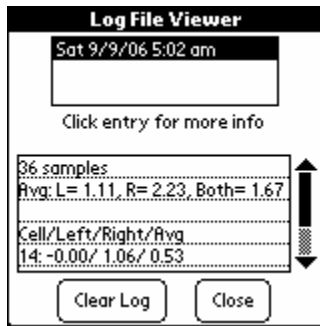

LTrims
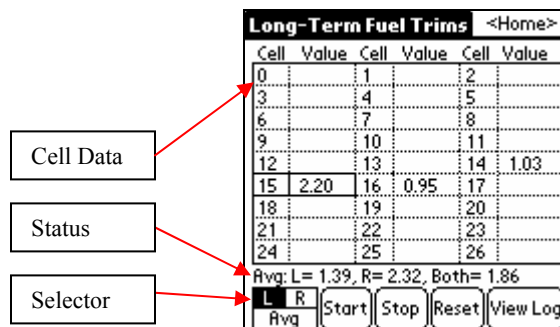
This screen is used to collect the LTRIM's (Long-Term Fuel Trims). These are the amounts by which the computer has increased or decreased the amount of fuel delivered under different conditions, in order to maintain a perfect 14.7:1 air/fuel ratio, as seen by the O2 sensors. Each set of conditions is called a "cell". Cell 16, for instance, is normally used when the car is idling.

To collect the LTrims, click the "Start" button or press "Page Up". As data is collected, the different cell values in the display will be updated. The current cell will be outlined. In the example above, for instance, the current cell number is 15, with a positive value of 2.20 percent. The overall averages for the left and right bank are listed on the Status line. If the vehicle is a V8 (LS1), then you can select the left or right bank to view, or an average of the two. V6 vehicles (L67/L36) typically only have the Left values, since there's usually only one oxygen sensor on those engines. (Values for the left and right are collected, regardless of whether Left, Right or Avg is selected.)

Pressing the Stop button will stop data collection. Reset will zero all values on the display. Results of LTrim collections are saved in the internal PDA database. To view the saved results, click theView Log button.

Log File Viewer

Sat 9/9/06 5:02 am

Click entry for more info

36 samples
Avg: L= 1.11, R= 2.23, Both= 1.67

Cell/Left/Right/Avg
14: -0.00/ 1.06/ 0.53

Clear Log   Close

Click the saved entry at the top. Detailed information will be displayed in the bottom part of the screen. Use the scroll bar to the right of this data to page down & see all the collected cell values. The Clear Log button will erase all saved LTrim collections.

Accel Test

Accel Test   <Home>

Start/Stop Speeds

Speed

Status

▼ 0   TO   ▼ 60   MPH
Speed: **61.1**
Seconds: **4.71**
Est. HP: **336.96**
Test complete
Actual speed 0.0 to 61.1 MPH

Vehicle weight: **3500** LB

Config   Start   View Log

Elapsed Time

Estimated horsepower

Vehicle weight
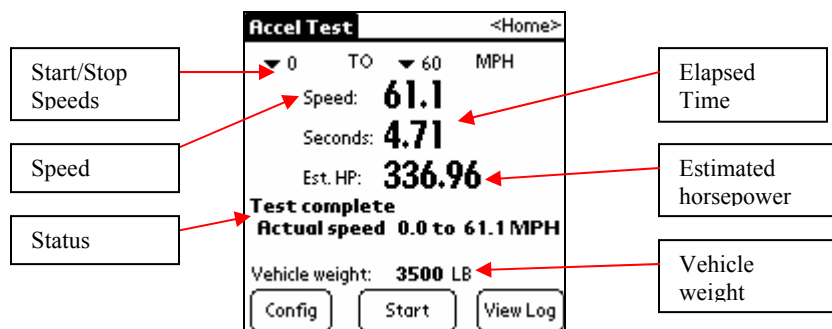
This screen will perform an acceleration test of your vehicle. First, select the start & stop speeds you wish for the test (0-60mph in the example above). Click the down arrows to select the desired values. Then click the Start button or press Page Up. Your current speed will read out on the screen. The test will not actually start until you slow down to the first speed point and then accelerate. So, for instance, if you're going 35 mph and press start, then you can slow down to a full stop, and then accelerate when you're ready. When the timer starts, you'll hear a short beep, then when you pass the second speed point there will be an alarm sound (if the sounds are not muted – see "Muting the Sound" on page 5. Your elapsed time will be shown, in seconds, as well as your estimated horsepower. Estimated horsepower is based on vehicle weight. You can flip over to the config screen to change this value by pressing the Config button.

Each accel test is logged to an internal database. To view the saved accel tests, click on View Log.

Log File Viewer

Sat 9/9/06 5:03 am

Click entry for more info

0.0 to 61.1 MPH
4.71 Sec, 336.96 HP, 3500 lb

Clear Log   Close

Click the saved entry at the top. Detailed information will be displayed in the bottom part of the screen. The Clear Log button will erase all saved Accel tests.

Trouble Codes

To go to the Trouble Codes screen, click the Trouble Codes button on the Main Menu.

Current Trouble Codes → [Tab Control] ← [Code Description]
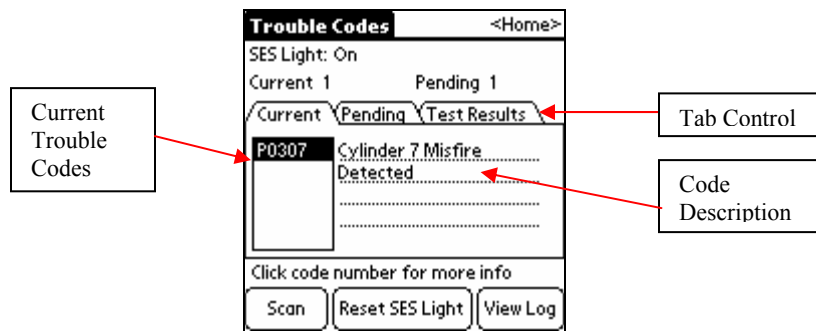
From this screen you can scan for current and pending trouble codes and reset the SES light. Click the Scan button to scan for trouble codes. The list of current trouble codes is shown by default. Click the Tab control to switch to Pending codes. Pending trouble codes are problems that have not occurred consistently enough to be reported as a trouble code, but will become a current trouble code if they persist. Click on an item in either list to see a description of the code. Click the Reset SES Light button to reset the vehicle's Service-Engine-Soon light if it is on.

Click on Test Results to get the EPA emissions test status.
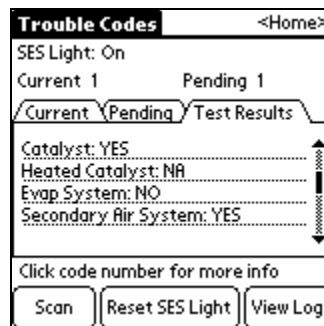
These are the self-diagnostic tests that the computer does to make sure the equipment is working. Tests are listed by name, then their status. In the example above, the Catalyst self-test has been completed (YES), the Heated Catalyst test is not supported in this car (NA – means this car doesn't have one), and the Evap System test has not been completed (NO).

Each time a scan is completed or the SES light is reset, that event is logged. To view the saved Trouble Code activity, click the View Log button.
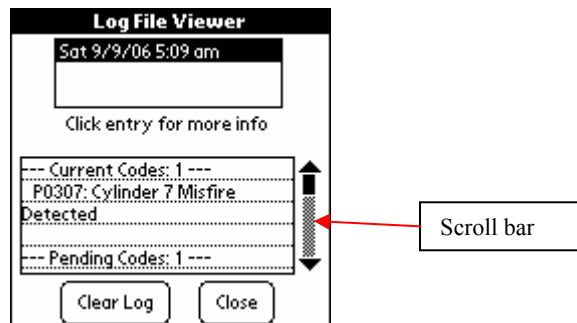
[Scroll bar]

The saved events are listed by date on the top. Click an entry to see what the results were of the scan on that day & time. On the lower part of the screen, the saved text log will appear. Use the stylus to click & drag the scroll bar down to see more, just like a Windows scroll bar. Click Close to return to the previous screen, or Clear Log to erase all saved Trouble Code activity.

Gauge

To go to the Gauge screen, click the Gauge button on the Main Menu. The Gauge screen is useful for a quick check in the car. The font is much bigger than the Scan screen.
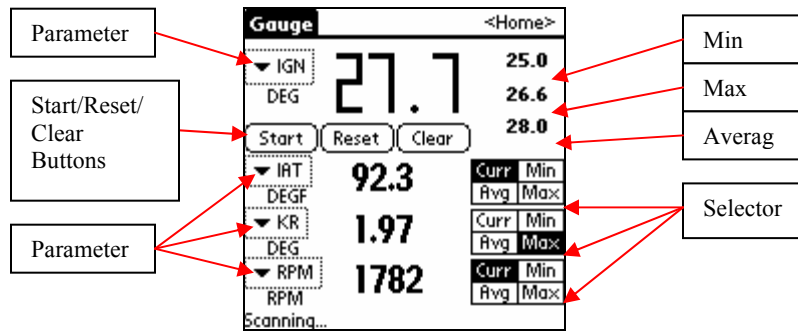

Select a parameter (the little down arrow) to change it. Click the Clear button to clear all selected parameters. Click the Start button to begin scanning. The parameters you picked will be updated on the screen. The big number at the top is the value for your first parameter (Ignition timing in the example above). To the right of that first parameter are the minimum, maximum and average values, calculated since the Start button was pressed. Click the Reset button to clear these totals.

On the lower part of the screen, you can monitor up to 3 additional parameters. Each value that shows up can be individually set to the current value, minimum, maximum or average, with the appropriate Selector. In the example above, the current RPM is displayed at the bottom, and the Maximum Knock Retard is displayed above that. To return to the main menu, click the <Home> button at the top right of the screen.

Misfires

To go to the Misfires screen, click the Misfires button on the Main Menu. The Misfires screen is used to count how many times each cylinder is identified as the "primary misfiring cylinder" by the computer.
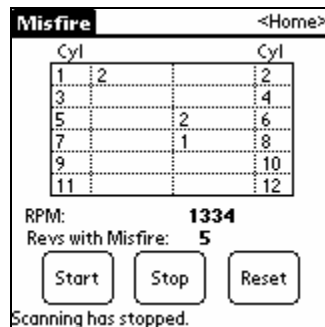
Press the Start button to start scanning. The chart will be updated as misfires are detected. In the example above, cylinders 1 & 6 have had 2 misfires, and cylinder 8 has had one. You can see the current RPM and how many rev's have had misfires below the chart. The status is at the very bottom. The Reset button will set all misfire counts back to zero & clear the chart, and the Stop button will suspend scanning.

Software Upgrades

Updates to the LS1M software are free for the life of the scanner. Information on revisions will be available on the LS1M web site:

http://www.LS1M.com

The LS1M program, like most all PDA programs, consists of one file (LS1M.PRC). This program can be installed just any other 3rd-party software, with the Palm Desktop, or the downloaded setup file can be used instead. See Installing LS1M below.

Installing LS1M

To install LS1M on your PDA PDA, either after a hard reset (see "Resetting to Factory Defaults" on page 9) or to install an update, you can either use the downloaded setup program, or use Palm Desktop.

The latest version of LS1M software is available on the Download page of the web site (http://www.LS1M.com). Right-click the link (for example, http://www.ls1m.com/demo/LS1M_v1.7d.zip) and select "Save Target As" to save the .zip file on your computer. Then you'll need to unzip its contents, using a utility like Winzip, or you can use the built-in zip file support in Windows XP by double-clicking the downloaded file.
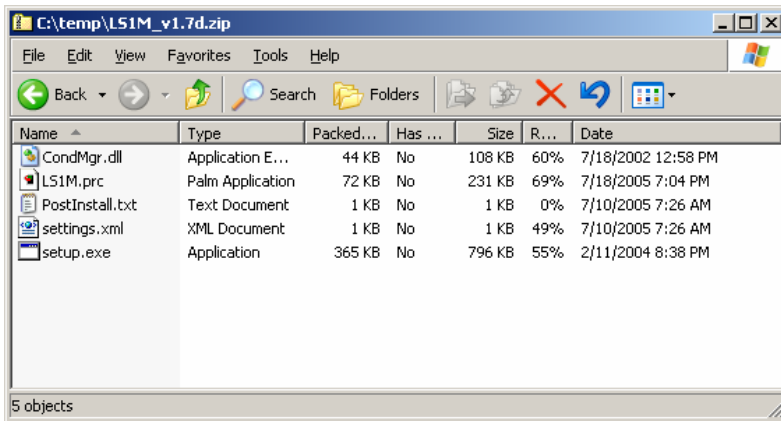
In Windows XP, you'll need to select all the files (shown above for version 1.7d) & copy them to a folder on your hard drive. With WinZip, you double-click the zip file, select all the files & click the Extract button. Either way, you need to get all these files into a folder on your hard drive, then run the setup program from that folder. The program will guide you through the rest of the installation, and the new version will get transferred to the PDA on the next hotsync.

To install LS1M with the Palm Desktop program, you will just need the LS1M.PRC file, which you can extract from the downloaded zip file as mentioned above. Then start Palm Desktop & click the "Install" icon on the left side of the screen.
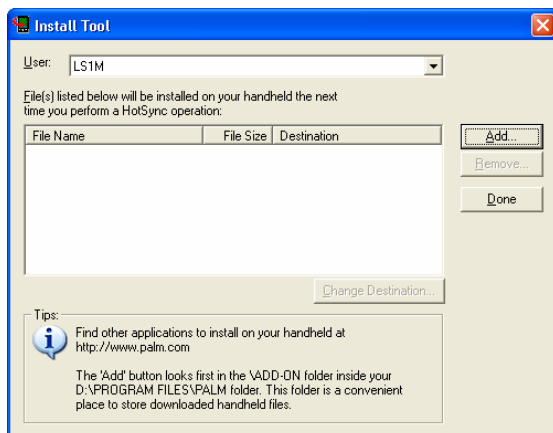
Click the "Add…" button & navigate to the directory where the new LS1M.PRC is. Select the file LS1M.PRC and click "Done". Now, the next time a hot-synch is performed, the new version of LS1M will be installed. To verify that the new version actually got installed, start LS1M on the PDA and note the version number at the bottom of the screen. (Go to the main menu & click "About LS1M" to view the startup screen again.)

More Information

For more information on the PDA, see the "Getting Started with your PDA" booklet or the "Palm Docs" folder of the LS1M CD. The file "Palm Treo 300 User Guide" will have some pertinent information in it, although the LS1M PDA is not exactly a Treo 300, it is very similar. You will need to install the Adobe Acrobat reader, if you computer doesn't already have it, to view these files. Adobe Acrobat reader is a free program available from Adobe at:

http://www.adobe.com/products/acrobat/readstep.html

or you can install it from the "Adobe Acrobat Reader" folder on the LS1M CD.

Getting Support

Support for the LS1M scanner is available through the online forum or directly through email. To get to the forum, go to the main LS1M web site:

http://www.LS1M.com

and click on "Support Forum" on the left.

Email address for technical support:

support@LS1M.com

Appendix

Scan Parameters

Please note that not every vehicle will support every parameter. For example, most V6-equipped vehicles do not have a passenger-side O2 sensor; therefore, codes such as LFT2 & O2R will return "T.O." (timeout). The engine type selected on the Config screen will also determine which parameters are available on the screen when you're configuring the scanner.

Standard OBD2 Parameters: (supported by all compatible vehicles except as stated above)

Parameter	Description	Typical Value
B	Boost (L67 only)	0 to 10 PSI at wide-open throttle
CLSD	Closed-loop status	0 (open loop) when cold 1 (closed loop) after engine warms up
ECT	Engine coolant temperature	185-220 deg F
IAT	Intake air temperature	Depends on the weather; rises above ambient as engine warms up
IGN	Ignition advance	Varies: 15-20 degrees at idle, 20-30 at full throttle
LD	Engine load (calculated by the vehicle's computer)	0-100%, depending on conditions. 2 or 3% or so at idle.
LFT1 LFT2	Long-term fuel trim, driver's side & passenger side	-10 to +10% Zero after battery change or vehicle computer reset
MAF	Mass air flow	From 0.5-1 lb/min at idle to 30-35 at full throttle
MAP	Manifold air pressure	9-10"Hg at idle to near 30 at full throttle
O2L O2R	Oxygen sensor, driver's side Oxygen sensor, passenger side	Should move around a lot after engine warms up; 850mV to 950mV at full throttle
RPM	Engine speed	600-700 at warm idle, up to 6000 or more before shifts at full throttle
SPD	Vehicle speed	Should match speedometer
SFT1 SFT2	Short-term fuel trim, driver's side & passenger side	-10 to +10% Zero after battery change or vehicle computer reset

Enhanced parameters are additional data that can be scanned from most late-model GM vehicles. The LS1 and L67/L36 support all of these listed below.

Enhanced GM Parameters: (may not apply to all vehicles)

Parameter	Description	Typical Value
BARO	Barometric pressure	Depends on weather. Typically 29-30 inches of mercury. NOTE: Doesn't work on all cars
FTC	Fuel trim cell	Varies with engine conditions. In general, numbers go up with load, except for cells 20-22, which may be used for open loop (including full throttle)
IAC	Idle air counts	20-60 at warm idle to 100 while cruising; higher when a/c is on
IDC1 IDC2	Injector duty cycle, driver's side & passenger side	1-2% at idle, up to 85% at full throttle
IGNV	Ignition volts	12 volts or so with key on, down to 9.5-9.8 during starting, then 13.5-14.5 with engine running
IPW1 IPW2	Injector pulse width	2-4 milliseconds up to 15-20 at higher rpm's and full throttle
KR	Knock retard	Zero to 3-4 degrees Ideally, should always be zero
MAFF	Mass air flow frequency	2200-2300 at idle, 9000+ at full throttle
MISP	Primary misfiring cylinder	1-8 if misfires present
MISR	Revolutions with misfires	0-10 revs is common; more than that may indicate problem
TFT	Transmission Fluid Temperature	Ambient to 200 deg F or so. Above 225 and the tranny fluid starts to deteriorate.
TPSV	Throttle position sensor voltage	0-5Volts; typically 0.5 volts at idle & 4.5 at full throttle

Licensing Agreement

As a purchaser of the LS1M scanner, you MAY:

- Use the scanner on as many different vehicles as you want.

- Loan the scanner to a friend to use.

- Sell the scanner. (The new owner will also be bound by the terms of this licensing agreement.)

- Make a backup copy of the program.

You may NOT:

- Give a copy of the program to anyone else. If someone wants a copy, direct him/her to the web site where he/she can download the demo version.

- Reverse-engineer the program or the OBD-2 interface cable.

- Modify the program or the OBD-2 interface cable.

- Export the program or the OBD-2 interface cable to any country which is under a trade embargo with the US Government.

WARNING:

- Monitoring your vehicle while driving poses certain risks. Always keep your eyes on the road, not on the scanner.

- Mark-It Upgrades is not responsible for any damage to your vehicle or engine. If you modify your vehicle, you assume all the associated risks and liabilities.

Warranty:

The LS1M scanner is guaranteed to be free from defect for one year from the date of purchase. Mark-It Upgrades will repair or replace a defective scanner free of charge for one year if such defect or fault is not the result of abuse or neglect. Contact Mark at mark@ls1m.com for more information or instructions on returning a defective unit.