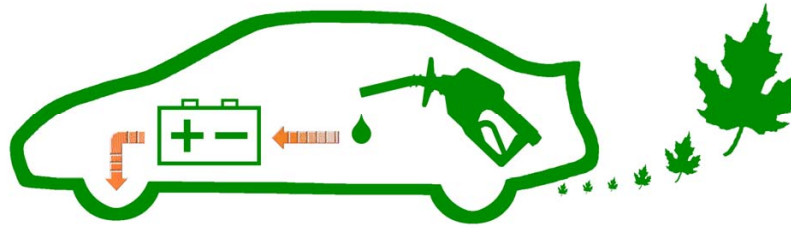


Toyota Prius User-Guide

Seventh Edition, Second Revision for the **HSD** (2004-2007) model



DRIVING.....2

Just Drive It !.....	2
Startup.....	2
Shutdown.....	3
Cruise-Control.....	3
Neutral.....	3
Reverse.....	4
Hybrid Driving.....	5
Brakes.....	5
Stealth Driving.....	6
"B" Mode.....	6
Charge-Level.....	7
Radio.....	7
Multi-Display.....	8
Steering-Wheel.....	8
CD Player.....	8
Audio Buttons.....	8
Inside Air.....	8
Outside Air.....	9

UNDERSTANDING.....10

MPG Measurement.....	10
Increasing MPG.....	10

EPA Estimates.....	13
Seasonal Cycles.....	15
Emissions.....	16
Gas Prices.....	17

NURTURING.....18

Filling the Tank.....	18
Multi-Display Care.....	19
Long-Term Storing.....	19
Polishing.....	20
Tire Care.....	20
Tire Upgrades.....	22
Washing.....	24
Valet Use.....	24

MAINTENANCE.....25

Oil Changes.....	25
Engine Air-Filter.....	26
Window Wipers.....	27
Fuel Door.....	28
Air-Conditioning.....	29

OPTIONS.....30

SKS: Smart-Entry.....	30
SKS: Smart-Start.....	30
Homelink.....	31

Electrochromic Mirror.....	31
Navigation.....	32
Bluetooth.....	32
Voice-Recognition.....	32

VOICE-RECOGNITION.....33

Help.....	33
Navigation - Commands.....	33
Navigation - Locations.....	34
Audio.....	35
Climate.....	35
Screen.....	35

OTHER.....36

Battery-Pack.....	36
Rear Hatch.....	36
External Cargo.....	39
Side Mirrors.....	41
Internal Storage.....	42
Transmission.....	42
Information Sources.....	43
Informational Materials.....	45

GLOSSARY.....50

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DRIVING

Just Drive It !

Vital Info

Ignore the advanced technology!

It's too easy to get preoccupied with everything Prius automatically does for you, especially with the Multi-Display providing constant performance information. The hybrid system was designed so you could drive it like a traditional car. That way, you can enjoy the remarkably smooth & quiet ride. Let the computer worry about how to save gas and reduce emissions.

Startup

Step On the Brake

New owners sometimes fall victim to this, not being able to figure out why the car won't start.

For safety, stepping on the brake before starting has always been highly recommended in all types of vehicles anyway. But in Prius, it is required. Because if you don't, you'll find that only the accessories will power-up. The hybrid system itself won't start until you push the power button while also stepping on the brake at the same time.

If you do make the mistake of not pressing the brake pedal far enough to the floor, a collection of warning lights by the speedometer will come on. In that case, lift your foot off the brake. Wait a few seconds, and then press it again... only harder this time. Wait a few more seconds, and then press the PARK button. That will reset the system.

12-Volt Jumping

If the 12-volt auxiliary battery is ever drained completely, you can jump it similar to a traditional vehicle. With the Prius OFF (hybrid system & lights), connect the positive-cable to the jump-start terminal (within the black plastic fuse-box, under the Prius hood) then to the positive-terminal on the 12-volt battery of the supplying vehicle (as it is running). Next, connect the negative-cable to the negative-terminal on the 12-volt battery of the supplying vehicle. Then the other end of the negative-cable can be connected to an unpainted metal component under the hood; a very good place for this is the support attaching the engine & motor to the body of the vehicle in the front driver's side corner under the Prius hood. At this point, start the hybrid system. When "READY" appears on the Prius speedometer cluster, you should then disconnect the cables following the opposite order they were connected.

For safety information, greater detail, and illustrations, please refer to your Owner's Manual.

A very simple way to confirm you have a good electrical connection before attempting to start is to just turn on the ceiling light. If it illuminates brightly, you know that the supply coming from the donor vehicle is sufficient to successfully jump the Prius. If the light is dim, the connection is bad and you must fix it before proceeding.

Winter Heat

Creating heat for the emissions system and heat to keep you warm is fastest and most efficient if you simply drive gently immediately after starting the Prius in the winter. Allowing the engine to run while the Prius is parked takes longer and is less efficient. "Just Drive It !"

Once the heater warms up, resist the temptation to turn up the fan-speed on too high. That will actually decrease the potential heat. Air blasting over the fins of the core too quickly prevents the opportunity to absorb as much heat as possible. Slower air doesn't. In other words, don't exceed the medium speed setting.

Engine Warm-Up

Reducing Emissions is the highest priority for Prius. It strives to remain a **AT-PZEV** (Advanced Technology - Partial Zero Emission Vehicle) at all times, which means the catalytic-converter must be kept hot... even if it requires consuming some gas to accomplish that. Fortunately, you still get better than average mileage, even though the engine may run more than you'd expect.

Shutdown

Off Confirm

Use the remote or push a door-button (or the one on the hatch) when leaving your Prius. That will confirm that all the doors really did get shut tightly and the power for the hybrid system is off. If you don't, the 12-volt auxiliary battery may get drained completely or the alarm might not be able to protect the car.

Whirring Sound

There is a small electric-pump that pumps 3 liters of coolant into a thermal container (to keep it hot) every time you turn the hybrid system power OFF. When the power is turned back ON, the coolant is pump back into the engine. This process reduces emissions, by achieving warm-up much faster than with an engine that would normally have to heat itself up. This process also helps to reduce wear & tear on the engine.

Cruise-Control

24 MPH minimum

Slowing down to less than 24 MPH (39 km/h) will cause the cruise-control "resume" memory to reset. So if you have to slow down or stop, you'll need to set the speed again.

MPG

Some owners have observed an increase in MPG from using the cruise-control, others have not. Results vary depending on your particular driving habits and road conditions.

Stealth

If you don't have a sensitive enough foot but would still like to enjoy stealth driving on a light traffic road, just set the cruise-control. This can be done all the way up to 42 MPH (68 km/h) on flat or declining terrain without making the engine startup.

Smooooooth

The CVT (Continuously Variable Transmission, "Planetary" type) makes the cruise-control in Prius remarkably smooth. You'll notice the "no shifting" characteristic of the drive when going up hills and accelerating aggressively. Many consider this smoothness as a luxury feature.

Neutral

No Engine

To shift into neutral and keep it there without any chance of the engine starting, do the following:

1. Insert the FOB (not necessary if you have SKS, formally known as SE/SS).
2. Without stepping on the brake pedal, press the "Power" button twice.
3. Use the lever to shift in the Neutral position.

Reverse

Beeper Disable

Some people find the reverse beeper distracting. Although there isn't a method to change the repetitive beeping to just a short warning, there is a way to disable it completely. To do that, carefully follow these steps:

1. Switch to the odometer/trip value to display "ODO" by pushing the "ODO TRIP" button shown in the lower-right corner of the photo below. If the speedometer-cluster was already showing "ODO", make sure to cycle thru each option back to "ODO" again.



2. Power OFF (push the "Power" button).
3. Power ON (push the "Power" button again).
4. Within 6 seconds of powering back ON, push & hold the button for "ODO" for a minimum of 10 seconds.
5. While still holding the button for "ODO", shift into "R" (Reverse), then to "P" (Park).
6. "b-on" should display on the odometer/trip-meter now. Push the "ODO TRIP" button to switch the mode to "b-off", as shown here:



7. Power OFF (push the "Power" button). That's it! The beep should now be disabled.

Note #1: If the sequence above failed, it may have due to the "ODO" setting not having been visible recently. In that case, all you have to do is drive with it that way for a few miles. The next time you try to disable the beeper, the process should work.

Note #2: If you ever disconnect the 12-volt auxiliary battery from the system (or drain it dead), you may have to repeat the disable process again.

Hybrid Driving

From a Stop

The gasoline engine is most efficient when running around 70% maximum. So if you can't press lightly enough on the pedal to accelerate using only electricity, go ahead and press a little harder than usual. That brisk (but not aggressive) increase in speed will save a small amount of gas, resulting in an overall efficiency gain.

Climbing Hills

The hybrid system has two electric motors. When you encounter a large hill, those motors are automatically taken advantage of. The gasoline engine will rev to its most efficient high-power RPM. That provides thrust directly to the tires, generates electricity for the motor, and recharges the battery-pack all at the same time. So to the surprise of many new owners, large hills don't drain the system. You'll still have plenty of reserve power available when you reach the top.

On the Highway

Just like with traditional vehicles, efficiency drops the faster you drive on the highway. 60 MPH (96 km/h) is more efficient than 70 MPH (113 km/h). Speeding up to 75 MPH (121 km/h), you'll observe MPG drop even more. It is beneficial to drive slower.

Without the Pack

The large electric motor doesn't actually need electricity from the battery-pack. The gasoline engine generates electricity while you drive for immediate use. So quite frequently, you'll see on the multi-display that the motor is being fed directly from the engine and the battery-pack isn't being used. Sometimes, while both the engine and motor are providing thrust, the engine will also recharge the battery-pack at the same time.

A/C Instead

At highway speeds, using the A/C (air-conditioner, cold setting) or vent to remain cool will likely result in slightly higher MPG than having the windows open.

Cruising

A beneficial technique for efficient cruising is to feather the accelerator pedal at particular times.

Learning to do this is simple and will quickly become second nature with very little practice. (In fact, you may already have that foot control if you in-line skate or bicycle occasionally.) To do it, just lightly reduce pressure on the accelerator-pedal whenever you encounter a section of road that's perfectly flat or has a slight decline. The MPG indicator will sometimes jump all the way to the +100 mark, even though your speed ends up dropping only 1 MPH. Then lightly push the accelerator-pedal to efficiently regain that speed afterward. Overall, MPG will climb a little bit when each time you do that.

You'll end up taking advantage of the hybrid design. Changes in the road pitch naturally cause changes in speed anyway. Using the multi-display and large digital speedometer helps you discover when gains from that are possible.

Brakes

Regenerator

When you reduce pressure on the accelerator-pedal or use the brake-pedal, excess speed turns a motor, causing regeneration of electricity to recharge the battery-pack. The regenerator takes advantage of the kinetic energy that would have otherwise been lost. The brake pads & shoes are not used as much as in a traditional vehicle. This not only makes the Prius more efficient, it also indicates the brakes will last longer.

Stealth Driving

Engine Off

While the gasoline engine is off and you're driving using just battery power, the mode you're in is called "stealth" (since the vehicle motion is totally silent).

Invoking "stealth" is easy once the engine has warmed up (and you aren't running the A/C or Heater too heavily). While driving, just find a street section without any inclines then lift your foot from the accelerator-pedal. The engine will shut off within a few moments. Once it does, lightly place your foot back on the accelerator-pedal to continue driving with only electricity. Another way to invoke stealth is to just stop completely, that will make the engine shut off.

Up to 42 MPH

The 50 kW electric motor is designed to propel the Prius up to 42 MPH (68 km/h). It takes a steady foot though. Slower speeds, like 35 MPH (56 km/h) and 30 MPH (48 km/h), are easier. Beyond that maximum speed or in conditions when additional power is needed, the electric motor works in combination with the gasoline engine. Though, you will discover above 42 MPH (68 km/h) that there are times when the engine will spin (pistons in motion) without any fuel being consumed; it is a normal function of the Planetary-CVT.

Acceleration

Accelerating in "stealth" can be very slow. Also using the gasoline engine is both quicker and more efficient, so don't be afraid to consume a little bit of gas. Remember that even if you use the battery and get "+100 MPG", the engine must run later to recharge it. So short-term gains may actually result in an overall loss.

A/C & Heater

Only the lowest setting for the air-conditioner & heater work in "stealth". Higher settings and airflow durations longer than a minute or two will require the gasoline engine to run.

Be Careful !

Be careful while driving in "stealth", especially in parking lots. Some people use only their ears to verify that it's safe, not their eyes! So having a car that's completely silent means you'll probably have someone step out in front of it without even realizing you're driving right at him or her. And fortunately, the quiet actually makes it easier to hear children (who commonly don't look anyway).

"B" Mode

On/Off Anytime

You can engage or disengage engine-braking at anytime while driving.

Engine-Braking

Avoid using this mode unless absolutely necessary, since it will cause MPG to drop. There is no charging benefit over regular (foot pedal) braking either.

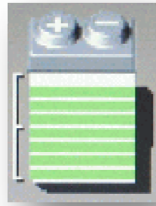
"B" mode works like an exhaust brake on a large truck (except, it's totally silent). The engine is used to slow down the vehicle, allowing you to reduce reliance on the regular brakes. So for steep declines, like driving down a mountain, it's a great way to avoid overheating caused by friction from the brake drums & shoes.

Winter Slowing

A special use of "B" is the ability to shift into it on-the-fly without having to take your eyes off the road. Finding yourself taking a turn on snow or ice a little bit too fast, you'll discover "B" does an absolutely fantastic job of slowing the car enough to retain traction without any risk whatsoever of the wheels slipping from braking too hard... since you aren't using the brakes at all.

Charge-Level

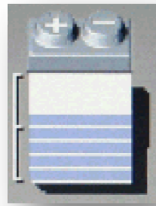
Green



When the charge-level of the battery-pack (displayed on the Energy Screen) exceeds 6 bars, the color will change to **Green**. This is simply a convenience feature to make the SOC (State-Of-Charge) easier to notice.

Once the level reaches 8 bars, no further detail is shown even though charging continues. That is because the battery-pack isn't actually full. What you see is actually just 80% capacity. The range above that is rarely utilized, since that shortens the lifetime of the battery-pack. So, it isn't included on the display.

Blue

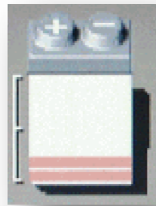


When the SOC is 3 to 6 bars, the color will be displayed as **Blue**.

This level is what the battery-pack will be at the most. For maximum life, it is the ideal. So you'll often witness behavior on the Energy Screen that contributes to a SOC within this range.

In short, don't get too preoccupied with SOC. The system will properly maintain it for you automatically.

Pink



From time to time, you may witness the **Pink** color. That's when the SOC drops below 3 bars.

When this happens, don't panic! New owners often do, even though there is absolutely nothing wrong. It is simply an indication that the engine will begin running soon to replenish the SOC. That's all.

Even without any bars showing at all, the battery-pack still has 40% capacity available. But since deep-discharges (a condition that shortens the life of the battery-pack) are automatically prevented, there is no reason to ever display anything below that level. So, it doesn't.

Radio

Channel Scan

Press the "SCAN" button by the radio tuner knob. It will begin scanning for radio channels. When it does find a station, a few seconds will play, then it will automatically scan for the next. Press the "SCAN" button again when you want the scanning to stop.

If you press then hold the "SCAN" button, only your preset radio channels will be scanned.

Tuner Adjust

In addition to using the knob on the dashboard, you also have the option of adjusting the tuner for the radio via the buttons on the steering-wheel. Just press & hold either the up or down button with your left thumb.

Multi-Display

Screen Off !

Many new owners accidentally discover the off button. Innocently pressing it causes them to panic, because the Multi-Display unexpectedly goes black. Don't worry though. It's easy to turn back on.

1. Press the **"INFO"** button on the left, next to the Multi-Display.
2. On the screen that appears, press the **"Trip Info"** button.

That's it!

Steering-Wheel

Tilting

You won't notice the lever unless you're specifically looking for it. Reach underneath, feeling for an opening. When you find it push forward. The lever will swing out, releasing the steering-wheel. Then you can tilt it. Pulling the lever back toward you afterward will lock the steering-wheel into the new position.

CD Player

Changing

Holding the track-change button on the steering-wheel, rather than just quickly pressing it, will cause the CD to be changed instead.

Audio Buttons

Audio Button

Pressing the "Audio" button next to the Multi-Display will reveal the Radio Preset or CD Control screen, depending on what is playing at that moment.

Pressing the "Audio" button an additional time will return you to the screen you were previously viewing, "Consumption" or "Energy Monitor" or "Navigation".

Mode Button

Pressing the "Mode" button on the Steering-Wheel toggles between the AM, FM1, FM2, and CD modes of the audio system.

Holding the "Mode" button for a few seconds will toggle the power for the audio system on & off.

Inside Air

Recirculate

Avoid using this mode during the winter, since it contributes to frost on the inside of the windows.

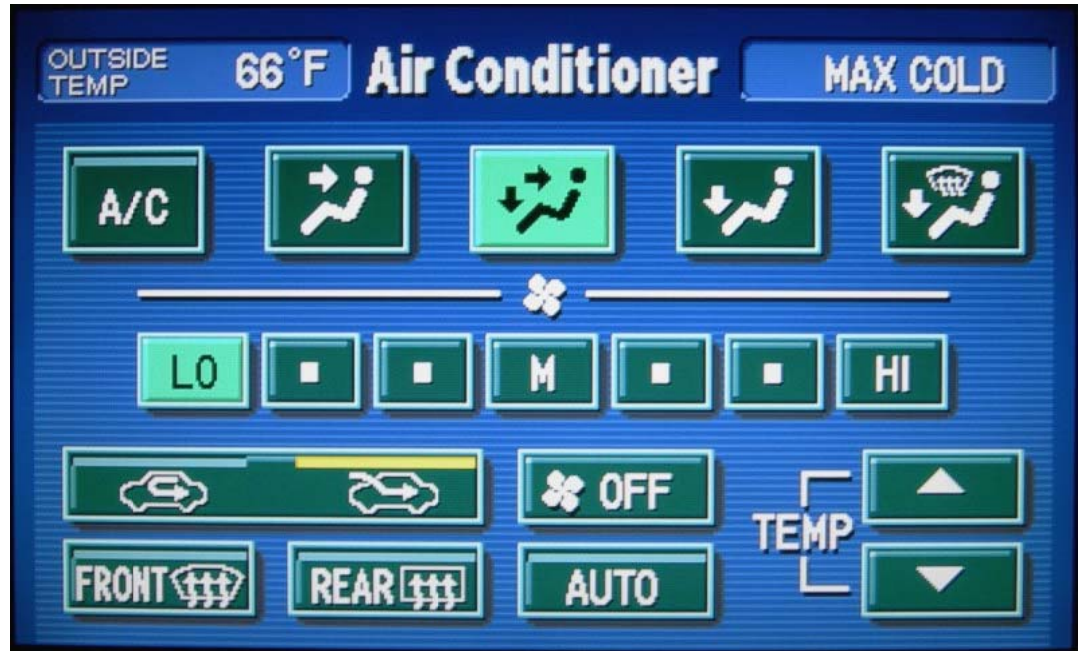
Recirculating warm inside air will prevent the engine from needing to run as often; however, the moisture you naturally exhale will build up after awhile. Allowing the fresh cold air from outside to be drawn in will keep the humidity low. The resulting minor MPG penalty is well worth always having clear glass.

Outside Air

Vent

Changing the "Air Conditioner" mode to draw in air directly from the outside for cooling rather than allowing it to be influenced by the heater-core isn't an obvious process, but it is surprisingly easily once you know how.

Many people call this "opening the vent" and it is used most frequently in the summer when you want to avoid having to turn on the A/C.

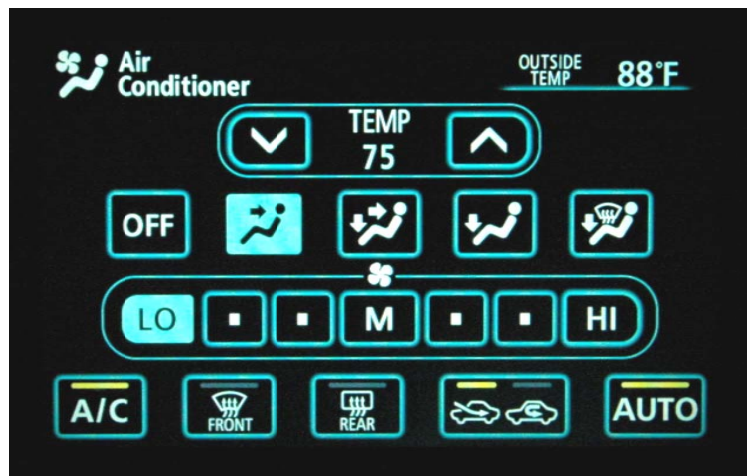


Here's how:

1. Press the "A/C" button so the yellow-bar above it disappears.
2. Press the circulation button so the yellow-bar above the "outside car arrow" appears.
3. Reduce the temperature to the lowest setting, called "Max Cold".

The Multi-Display will then resemble the example above. Below is a photo of the button layout for the newer model; different settings are enabled (not vent).

You may alter the blowing location to any of the 4 settings available and the blowing speed to any of the 7 settings available.



UNDERSTANDING

MPG Measurement

Lifetime

LIFETIME is the most useful measurement. Total miles driven, divided by total gallons consumed, informs you how efficiently the car has performed overall.

Tank

TANK is the measurement between each fill up. You press the RESET button when the tank is full. The results are informative, but not perfectly accurate. In cold weather, the bladder inside the gas tank shrinks. This reduces the overall capacity making the "full" level variable. Also, "full" can be misrepresented if the pump doesn't shut off at the proper time. These factors make calculations based on fill-up less accurate.

Trip

TRIP is mostly for fun, since a multitude of variables can affect the measurement to a single destination. Watch the 5-minute summary segments shown on the multi-display. Remember though, if you were to start a drive downhill, with a tail wind, a warm engine, a fully charged battery-pack, and a warm outside temperature, the MPG would be very *impressive* for that particular trip. But then if the return trip back was uphill, against the wind, with a cold engine, a drained battery-pack, and a cold outside temperature, the MPG would appear very *disappointing*. In summary, trip results can vary greatly. The overall average is what really matters.

Sudden Drop

Tire pressure may have gone down. For every 10 F degrees colder, pressure will naturally decrease by 1 PSI. Verify you still have as much air in the tires as you think they do.

Increased use of the heater or air-conditioner (which includes the defroster) will force the engine to run more often. Try a less demanding setting.

When the temperature drops below freezing, you'll probably notice the engine has to run quite a bit longer to create heat for the catalytic-converter. This is to keep the Prius emissions extremely low. Avoid driving short trips; instead, take advantage of the time after warm up is complete by running several errands at once.

A dirty engine air-filter will also cause the MPG to drop. Check it routinely, especially as the seasons change. Once flow becomes visibly restricted (dark colored rather than white), the time has come to replace it.

Tire Break-In

Don't forget that new tires require a break-in period. Before that the tire surface and tread edges will be rough, causing MPG to be lower than you expect. It takes about 1,000 miles (1,600 km) before enough wear (barely visible to a trained eye) occurs to allow less abrasive contact with the road. And since front tires wear more than those in the rear, expect another break-in period the first time the rear tires are rotated to the front. Fortunately, that reduced MPG will only last a few hundred miles.

Increasing MPG

A/C & Heater

Minimal use is the key. Using the Heater or the A/C (which includes the defroster) on anything but a low setting may prevent the engine from shutting off. That will reduce MPG. So, try to avoid high demand use. Fortunately, on the highway using the A/C is still more efficient than opening the windows.

On the Highway

Just like with traditional vehicles, efficiency drops the faster you drive on a highway. 60 MPH (96 km/h) is more efficient than 70 MPH (113 km/h). Speeding up to 75 MPH (121 km/h), you'll observe MPG drop even more. It pays to drive slower (obey the speed-limit). Think of it this way, pedaling a bicycle rapidly takes much more energy than pedaling at a moderate rate.

YMMV

"Your Mileage May Vary" That simple statement about the EPA estimates shown on the new vehicle window sticker is often overlooked, yet it makes a significant difference depending on the type of driving you do. Reading this quote provided by the EPA about Prius reveals why: *"Actual Mileage will vary with options, driving conditions, driving habits and vehicle's condition. Results reported to EPA indicate that the majority of vehicles with these estimates will achieve between 51 and 69 mpg in the city and between 43 and 59 on the highway."*

EPA tests are basic generalizations (performed under *ideal* conditions) intended to make vehicle comparisons easier, not to specify what MPG you will actually get. In fact, they rarely actually reflect the MPG in real-world driving experiences.

Driving

Brisk Acceleration is an often misunderstood benefit. There's no need to hold back. A gasoline engine works more efficiently when running at higher RPM, about 70 percent of maximum. Take advantage of that by getting to cruising speed quickly (but not aggressively, please drive safely). And remember, while the engine running it is also generating electricity for later use.

Coast whenever you have the opportunity. Using the feather technique helps. By lifting your foot lightly from the accelerator-pedal, you can invoke an efficient computer-controlled glide without decelerating much at all (less than 1 MPH). With good road conditions and a bit of practice, you'll find yourself doing this instinctively.

Look Ahead. If you see a light turning red or a need to slow down in the distance, there's no reason to continue holding the accelerator-pedal. Remove your foot and allow the generator to decelerate the Prius. That will increase your MPG, charge the battery-pack, and prolong the life of your brakes.

Tire Care

42/40 PSI (2.9/2.8 bar) is what many Prius owners *strongly* recommend. The original tires for the Classic Prius support a maximum cold pressure of 50 PSI (3.4 bar) and for the HSD Prius 44 PSI (3.0 bar). So that pressure increase is well within the design specifications. Many of the alternate tires available support a maximum cold pressure of 44 PSI (3.0 bar) too. Whatever you decide, just remember that low pressure results in a MPG drop and the tires wear out faster. Tires will not bulge like in decades past; manufacturers provide much better quality now which maintains a flat contact surface all the way up to the maximum pressure.

Every 5,000 miles (8,000 km) the tires should be rotated, for best lifetime performance. Rotation is preferred in a roll-back, roll-forward pattern.

Measuring the PSI should be done only when the tires are cold, since driving heats up the air inside the tires making the results inaccurate... giving you the impression more pressure is higher than it really is.

Check Often since temperature causing pressure to drop, 1 PSI for every 10 F degrees. Air will naturally leak out from normal use too.

87 Octane Gas

Prius was designed to run with 87 Octane gasoline (85 in high altitudes). Some owners have experimented with higher octanes, but found there wasn't any MPG improvement. Also, bear in mind that higher octane gasoline may trigger an emission sensor alert. So just save money and continue using the less expensive 87 octane gas.

"B" Mode

Avoid using this mode unless absolutely necessary, since it will reduce MPG.

External Loads

Any type of accessory rack for carrying external loads (Receiver, Roof, or Strap-On) will cause aerodynamic drag. So, expect a MPG drop when you use one.

Engine Warm-Up

Short Trips are horribly inefficient for all vehicles. Prius is no exception; however, it's far more noticeable since the Multi-Display provides immediate feedback to actually show you the lower MPG. The efficiency benefits of the system are not utilized until after warm-up is complete... that's engine, emissions system, and tires. So try to run several errands at once to take advantage of an already warmed up car.

PZEV (Partial Zero Emission Vehicle) is what Prius strives to remain whenever active, even during warm-up. That means the catalytic-converter must be kept hot even if that requires using some gas to do it. Fortunately, you still get better than average mileage, even if the engine doesn't shut off right away.

5W-30 Oil

5W-30 oil is strongly recommended (real or synthetic).

If a service person puts 10W-30 in by mistake, you may complain since it will negatively impact your MPG slightly and may affect performance in below freezing temperatures. The text printed on the engine oil cap clearly states 5W-30 should be used.

Synthetic Oil

Owners have observed minor MPG improvements by switching to synthetic oil.

Plus, since it protects the engine better than real oil and makes extremely cold startups even easier, switching from real oil should be a simple choice.

Oil Level

Too much oil can decrease MPG. Verify the level is never above the max mark on the dipstick.

Unfortunately, overfilling is a problem commonly overlooked. Oil change services routinely pump oil from large barrels, rather than using quart-size bottles. That makes overfilling very easy to do. Taking a moment afterward to check afterward is truly beneficial.

Measurement

The multi-display averages optimistically, so it will usually read about 1.4 MPG too high for most owners. The "bladder effect" (caused by the bladder in the gas tank shrinking due to temperatures below freezing), which is very noticeable in the Spring & Fall, causes the readout value and manual calculations to vary greatly for individual tank measurements. Averaging several fill up amounts documented at the gas station will provide the actual MPG you've been getting. For an example of how to do this, refer to this webpage... <http://john1701a.com/prius/prius-data.htm>

Break-In

For the first **200 Miles (322 km)**:

- avoid rapid deceleration (hard stops)
- avoid high speeds (more than 70 MPH, 113 km/h)

For the first **600 Miles (966 km)**:

- avoid rapid acceleration
- avoid racing (high RPM) the engine

After roughly **10,000 Miles (16,100 km)**:

- enjoy a MPG increase, from the moving parts having loosened

Even at **30,000 Miles (48,300 km)**:

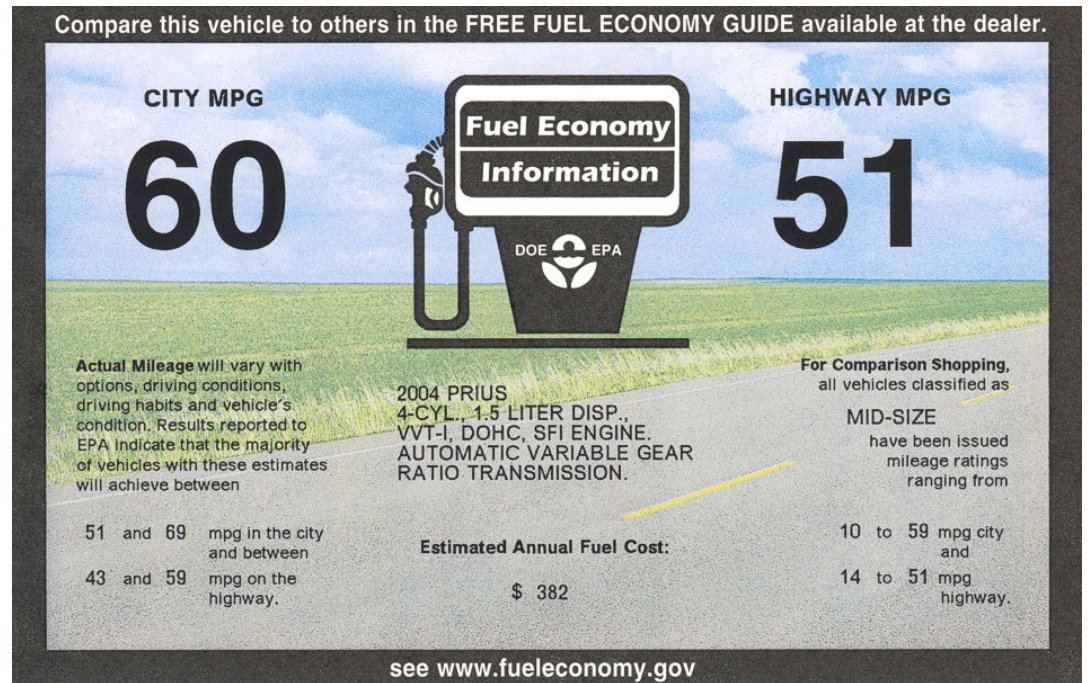
- you may continue observe minor MPG increases as the car ages

EPA Estimates

Purpose

The intent of the EPA efficiency values posted on each new vehicle window-sticker is only to provide a basis for comparison, not an actual MPG expectation... as commonly believed.

Read the fine-print on this digital scan of an actual 2004 Prius window-sticker:



Don't be misled by those large numbers. Real-World results vary significantly.

Ideal Conditions

Pay very close attention to the fact that the EPA tests are all performed under ideal conditions, those that don't actually reflect real-world temperature or driving habits. Think of those values reported as optimal, not realistic. You may be able to achieve them from occasionally, but not on a routine basis.

Ranging Values

As mentioned on the window-sticker, there is a range of expected efficiency values. The large numbers are really nothing but an average. In fact, the MPG isn't even constant for each vehicle. Driving conditions, method of driving, and the influence of multiple drivers can all have a major impact, causing fluctuation. Tank-to-tank measurements can vary quite a bit as a result, without even taking into account the effect of seasonal cycles. None of these factors are represented when the EPA tests are performed.

Unrealistic Speed

Back when the testing procedures were established way back in 1977, the speed limit on most highways was only 55 MPH (88.5 km/h). That's quite unrealistic for travel nowadays. Many drivers cruise at speeds much faster. That causes a significant efficiency reduction, which is not indicated on the window-sticker.

Unrealistic Climate

The "perfect summer day" climate portrayed during the testing is not what people actually drive their vehicle in a great majority of the year. Winter extremes cause efficiency to drop significantly, as do the Summer extremes. Factors such as temperature, wind, and moisture have a major influence, causing the vehicle performance to be reduced in the form of lower MPG. To make matters worse, the use of the Heater or A/C also contribute to lower MPG.

Gentle Acceleration

The testing procedures utilize gentle acceleration, which does not represent the way people actually drive anymore. For example, when merging onto a highway now, much more harsh acceleration is required. The tests don't reflect the MPG penalty that causes. So unless you accelerate as slowly as when the test was performed, efficiency will be lower.

Fuel Type

EPA testing is done using 100% gasoline, which is the most efficient fuel available for a Prius to run on. Those owners using the cleaner fuel alternative called "E10", which is a 10% ethanol and 90% gasoline blend, have a clear disadvantage. That blend is approximated 3.4% less efficient. In simple terms, that means achieving 50 MPG using E10 could actually achieve 51.7 MPG using 100% gasoline instead.

Testing Procedures

(will change for 2008)

The following (from <http://www.fueleconomy.gov/feg/info.shtml>) explains how the EPA tests are actually performed, notice how results can be quite a bit lower if you live in the north or if you drive fast:

The fuel economy estimates are based on results of tests required by the U.S. Environmental Protection Agency (EPA). These tests are used to certify that vehicles meet the Federal emissions and fuel economy standards. Manufacturers test pre-production prototypes of the new vehicle models and submit the test results to EPA. EPA re-tests about 10% of the tested vehicles to confirm manufacturer's results in EPA's lab. The vehicles are driven by a professional driver under controlled laboratory conditions, on an instrument similar to a treadmill. These procedures ensure that each vehicle is tested under identical conditions; therefore, the results can be compared with confidence.

There are two different fuel economy estimates for each vehicle in the Fuel Economy Guide, one for city driving and one for highway driving. To generate these two estimates, separate tests are used to represent typical everyday driving in a city and in a rural setting. Two kinds of engine starts are used: the cold start, which is similar to starting a car in the morning after it has been parked all night; and the hot start, similar to restarting a vehicle after it has been warmed up, driven, and stopped for a short time.

The test used to determine the city fuel economy estimate simulates an 11-mile, stop-and-go trip with an average speed of 20 miles per hour (mph). The trip takes 31 minutes and has 23 stops. About 18 percent of the time is spent idling, as in waiting at traffic lights or in rush hour traffic. The maximum speed is 56 mph. The engine is initially started after being parked overnight. Vehicles are tested at 68 F to 86 F ambient temperature.

The test to determine the highway fuel economy estimate represents a mixture of "non-city" driving. Segments corresponding to different kinds of rural roads and interstate highways are included. The test simulates a 10-mile trip and averages 48 mph. The maximum speed is 60 mph. The test is run with the engine warmed up and has little idling time and no stops (except at the end of the test).

NOTE: To make the numbers in the Fuel Economy Guide more useful for consumers, the EPA adjusts these laboratory test results to account for the difference between controlled laboratory conditions and actual driving on the road. The laboratory fuel economy results are adjusted downward to arrive at the estimates in the Fuel Economy Guide and on the labels seen on new cars, light trucks, and vans. The city estimate is lowered by 10% and the highway estimate by 22% from the laboratory test results. Experience has proven that these adjustments make the mileage estimates in the Fuel Economy Guide correspond more closely to the actual fuel economy realized by the average driver.

Seasonal Cycles

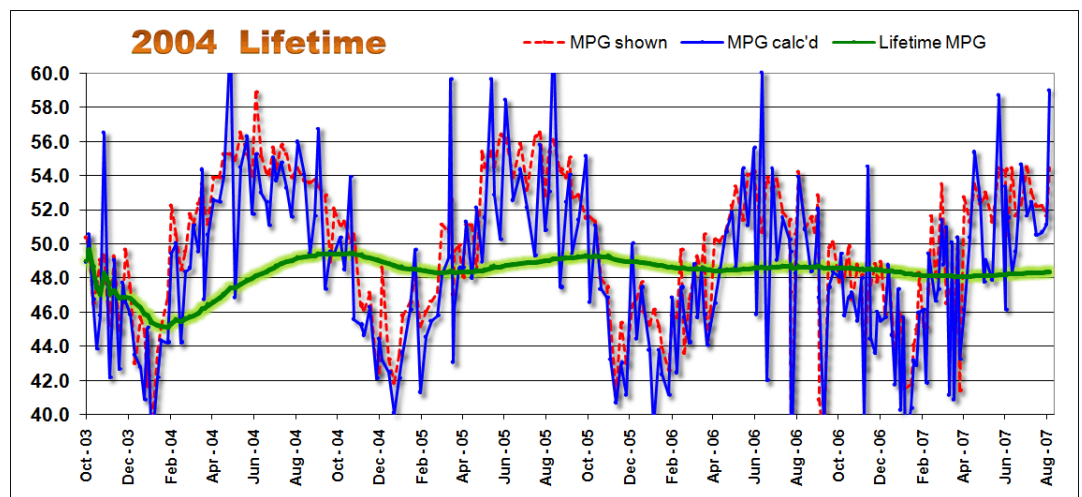
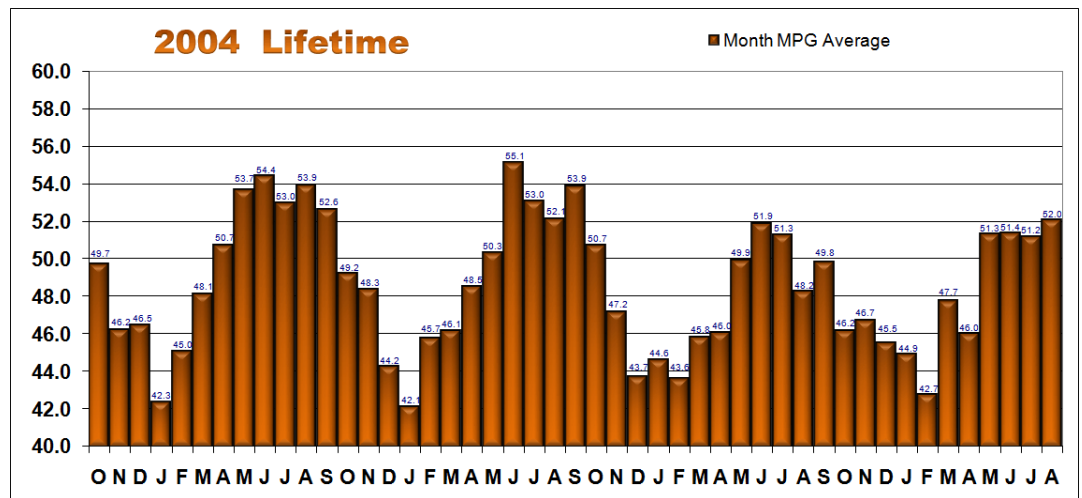
All Vehicles

Seasonal cycles affect all vehicles, not just hybrids. But with a Prius, you are much more aware of the MPG changes due to having a Multi-Display constantly informing you of efficiency differences. With traditional vehicles, owners typically were not aware how much of an affect climate has on their vehicle's performance. They just assume MPG remains relatively constant throughout the entire year. In reality, that isn't even remotely correct. Large fluctuations are actually normal.

Temperature & Lifetime Measure

The difference between the warm & cold months is a significant change in MPG. In the winter, the engine takes longer to warm-up, and the engine is needed to operate the heater. Both cause more fuel to be consumed. The density of cold air is thicker, making it hard to push through. This reduces efficiency. In the summer, running the A/C to keep you cool requires electricity from the battery-pack. That electricity is ultimately derived from the engine, which consumes fuel to accomplish that. So, the more you use the A/C, the lower MPG will be.

These examples of real-world data (from <http://john1701a.com/prius/prius-data.htm>) clearly shows a cyclical effect of efficiency caused by winter and summer (specifically in Minnesota):



The top graph, spanning 3.75 years of time, is a summary of month averages. Below it is data plotted using individual fill-up points instead. It clearly shows wild fluctuations. These are based heavily on the influence of temperature. This is why the measure of Lifetime MPG is the only method for judging true efficiency performance. Long durations will reveal an on-going average value, which is extremely easy to see by that nearly straight line among the otherwise seemingly chaotic graph.

Traffic

It is common for people to forget how much traffic patterns change during the winter. Slippery roads cause major delays, increasing driving time significantly. So even with the benefit of the hybrid system, there is still a very real plenty for getting stuck in that traffic heavy traffic.

Heater

Heat to keep you warm in the winter comes from the engine. Hot coolant is circulated through the heater-core as long as possible to continue heating the air. But eventually, it cools. At that point, the engine must restart to warm the coolant again.

A/C

The A/C system in Prius is powered by an electric pump, not a pump powered by a belt connected directly to the engine. That means it can run for a modest amount of time exclusively using only the battery-pack, providing a significant efficiency benefit during the summer.

Emissions

Prius Rating

Prius (HSD model) has earned a CARB emission rating of: **AT-PZEV**

Engine Light !

After filling the gas tank, failing to completely tighten the cap will trigger the engine light. That warning informs you that the unsecured cap is allowing evaporative emissions to escape from the system. Simply twist the cap a little bit more. The light will automatically turn off afterward.

Categories

Just because a vehicle is labeled as a "Hybrid", that does *not* mean the vehicle is actually any cleaner. In fact, some hybrids emit the same amount of smog-related pollution as a common traditional vehicle.

CARB (California Air Resources Board) defines the following categories to help you identify how clean the vehicle is (from <http://www.arb.ca.gov/msprog/zevprog/factsheets/driveclean.pdf>):

LEV (*Low Emission Vehicle*)

The least stringent emission standard for all new cars sold in California beyond 2004.

ULEV (*Ultra Low Emission Vehicle*)

50% cleaner than the average new 2003 model year vehicle; rated for 100,000 miles.

SULEV (*Super Ultra Low Emission Vehicle*)

90% cleaner than the average new 2003 model year vehicle; rated for 120,000 miles.

PZEV (*Partial Zero Emission Vehicle*):

Meets SULEV tailpipe emission standards, has a 15-year / 150,000 mile warranty, and has zero evaporative emissions.

AT-PZEV (*Advanced Technology - PZEV*):

Meets SULEV tailpipe emission standards, has a 15-year / 150,000 mile warranty, has zero evaporative emissions and includes advanced technology components.

ZEV (*Zero Emission Vehicle*):

Zero tailpipe emissions, 98% cleaner than the average new 2003 model year vehicle.

<http://www.fueleconomy.gov/feg/findacar.htm> to look up detail, including emission-rating and efficiency-estimates, for vehicles dating all the back to 1985.

Measurements

California LEV II Emission Standards for Passenger Cars and Light Duty vehicles less than 8,500 lbs. (grams/mile for 120,000 miles/11 years) as measured by tailpipe emissions:

Rating	NMOG	CO	NOx	PM	HCHO
LEV	0.090	4.2	0.07	0.01	0.018
ULEV	0.055	2.1	0.07	0.01	0.011
SULEV	0.010	1.0	0.02	0.01	0.004
PZEV	0.010	1.0	0.02	0.01	0.004

NMOG = non-methane organic gases

CO = carbon monoxide

NOx = nitrous oxides

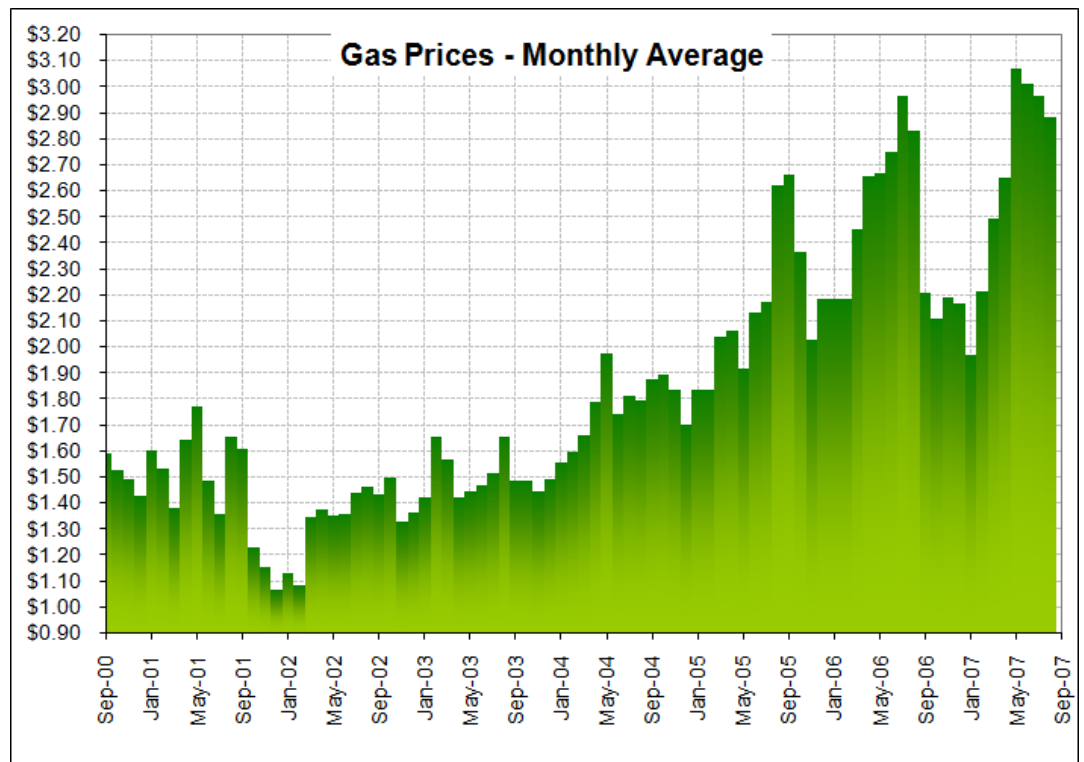
PM = particulate matter

HCHO = formaldehyde

Gas Prices

Planning Ahead

This graph was generated using data from actual fill-ups over the past 6.75 years in Minnesota. It was added to the document simply for the benefit of Prius (and other hybrid) owners, to make them feel better about their purchase decision. Rather than believing the so-called experts that claimed this would never happen to the price of gas, the owners planned ahead.



With traffic conditions steadily growing worse and the population ever increasing, anticipating continued high demand is very realistic. So expecting prices to return back to the way they were not too long ago is not wise. And along with the MPG benefit from a hybrid like Prius, you also get significantly reduced emissions.

NURTURING

Filling the Tank

Fill Speed

It is best to use the slowest setting (the farthest latch on the pump-handle); otherwise, the pump could shut off prematurely giving you an inaccurate indication of "full".

Topping Off

Don't! Once the pump automatically stops, don't try squeezing any more fuel into the tank. More causes the bladder to stretch. Too much force will result in spitting out of fuel onto the ground. So never, ever pump more than 12 gallons.

Also, pumping too much fuel into the tank will result in gas filling up the vapor-capture canister. That defeats part of the emissions system. So if you want your Prius to remain the very cleanest possible, avoid ever doing this.

Important Note: As with all vehicles, repeated flooding of the vapor-capture canister cause damage to it... leading to eventual failure.

87 Octane Gas

Prius was designed to run with 87 Octane gasoline (85 in high altitudes). Several owners have experimented with 90 & 93 Octane; however, there wasn't any improvement to MPG. Since engine knocking is non-existent with Prius, there's no benefit in that respect either. Additionally, higher octane may trigger an emission sensor alert. Therefore, save some money by using 87 Octane.

Low-Sulfur Gas

Without the loss of performance or power, low sulfur gasoline helps to reduce emissions by preventing efficiency loss within the catalytic-converter (a pollution control device) due to sulfur build up. This also extends the life of the emission components. All gasoline sold in the United States was mandated to be low-sulfur beginning January 2006.

10% Ethanol

90% Gasoline blended with 10% Ethanol, better known as E10, will not harm any part of the Prius fuel or emission system. Owners in Minnesota, where E10 is mandated by law, have used this type of fuel in their Prius for many years without experiencing any problems at all. So there is no need for concern.

Empty

Don't ever run out of gas!

Not having the engine available makes driving a Prius using just electricity very risky. Without gasoline it is very easy to push the motor & battery-pack beyond the tolerances they were designed to operate. The battery-pack is never supposed to be fully depleted, that shortens its life. Also, without gas there's no way to prevent certain mechanical & electrical components (like the fuel pump) from overheating. Since Prius can go quite a bit further between fill-ups than most vehicles, there's really no reason you should ever run out of gas anyway. But if you do, drive very slowly and just enough far to get out of harm's way then stop. Don't keep driving.

Another Gauge

When there is less than half a tank of gas remaining, the gas gauge is less accurate due to the flexible nature of the bladder within. A helpful measurement alternative is to base refill timing on the mileage you drive. Just reset one of the three odometers (A, B, or the one on the multi-display) every time you fill the tank.

450 miles (725 km) in the summer and **400 miles** (644 km) in the winter is a good distance to start with. You'll quickly figure out what works well for your particular needs.

Emission Bladder

Inside the gas tank is a flexible bladder. It contracts and expands to fill the empty void that would otherwise be filled with vapor as gasoline is consumed. The reduction of vapor emissions helps to keep Prius extraordinarily clean.

Overfilling should be avoided, since adding gas after the pump automatically stops can create pressure within the bladder. This could cause gas to be expelled afterward. So just don't top off.

Capacity reduces during the winter since cold temperatures cause the bladder to contract, up to 1.5 gallons (5.7 liters) in extreme conditions (below 0F / -18C degrees). That means you'll have to fill up sooner. But when temperatures are that dangerously low, you should really fill up at the halfway point anyway.

Gas Cap & Door

Twist the cap until it clicks. If it is not tightly secured, you may trigger an alert from the emission sensor. After all, Prius wouldn't be so clean if vapor were allowed to leak out. In the event of an alert, turn off the Prius and tighten the cap. Normal status should return after you restart.

Tuck the tether holding the cap to the car into the interior. Simply allowing it to be pushed by the door may cause a tangle making the door hard to open later.

Lubricate the hinge (WD-40 works well). After extended exposure to dust, sand, and salt, the spring may struggle to open the door due to the hinge being dry.

Adjust the latch. It's possible to accidentally bend it. Too much can make the door difficult to open. You may need to straighten it.

Multi-Display Care

Cleaning

The best way to remove fingerprints from the touch-screen is actually simpler than some owners realize. You don't need a special solvent or material. Just a plain old soft cotton fabric, like a well softened t-shirt or handkerchief. That's it! But if you must use a liquid too, try purified drinking water.

Also, make sure to only clean when the Multi-Display is off (or even better, the Prius itself is off). This will make the fingerprints easy to see and will prevent the "Reset" button from accidentally being pushed.

Long-Term Storing

Less than 3 Weeks

Nothing is needed, at room temperature. The engine should startup just fine. Be aware that this duration can be shortened by the age of the auxiliary-battery and the extreme cold.

More than 3 Weeks

If you have SKS (formally known as SS/SE), press the "SMART" button directly underneath the steering-wheel to disable it. The proximity detector actually only causes a continuous draw from that 12-volt auxiliary battery for the first 10 days of storage, then it automatically disables itself. But it is better to just do it yourself immediately.

If you have an alarm system, it is best to manually disconnect the 12-volt auxiliary battery passenger side in the hatch area. With it disconnected, that continuous drain will be eliminated. (Make note of the radio buttons you have programmed, since you'll need to manually restore them after reconnecting the 12-volt auxiliary battery.)

Draining the 201.6-volt battery-pack while in long-term storage is never a concern. When you shut off the Prius, an electric-relay automatically deactivates to cut the connection to the hybrid system. So it isn't even connected to the rest of the system until you turn the key again.

Polishing

Owner Tests

"Nu Finish" is one of the products that works well. The great polished look lasts for about 6 months, enough to get through an entire winter. But when you wipe the dried residue off, it actually leaves lightly faded streaks at first. Don't let that deter you. It disappears, leaving a protective layer after a few days.

Tire Care

To prevent accelerated wear and maximize miles before replacement, follow these suggestions:

Monthly Checking

At the very least, check your tires monthly. Every two weeks is better. Pressure loss is normal and especially rapid when temperatures drop. Uneven wear is an indication that either you've been driving with tires below the minimum PSI or balancing/alignment is required. Also, don't forget about checking the spare tire in the trunk too.

Front Bias

Prius is a little heavier in front. To properly support that weight load, you must make sure the front tires have 2 PSI more in them than the ones in the rear.

Turning

Never turn the wheels unless they're rolling. That causes unnecessary wear, just as with other vehicles. The electric-steering is so powerful, you can't feel the friction caused by turning. But your tires can. So, make sure the wheels are moving before you turn them.

Rotation

Every 5,000 to 7,500 miles (8,000 to 12,000 km) the tires should be rotated, for best lifetime performance. Rotation should be in a "roll-back, roll-forward" pattern. (That's swapping the front and rear tires without ever changing sides.)

Lug Nuts

When initially tightening the lug nuts after having put a wheel back on and when you re-torque them after having driven around 100 miles, make certain the pressure you use is 76 ft-lb (103Nm).

Alignment

0.05 DEGREES of Toe IN each side, for a total of 0.10 DEGREES.

If steering feels like it wanders at high speeds, it's probably because the alignment isn't adjusted correctly. Remember, "within factory-specified tolerance" is an answer you *don't* have to accept from a service provider; you can *insist* that alignment be adjusted to this "exact" setting.

PSI minimum

35/33 PSI (2.4/2.3 bar) is the PSI for the Prius tires (noted on the driver's door-jam of the car itself).

42/40 PSI (2.9/2.8 bar) is what many Prius owners recommend for optimum performance. For maximum performance, use a pressure of 44 PSI (3.0 bar). Whatever you decide, just remember that low pressure results in lower MPG drop and a shorter tire life.

Note 1: Measuring PSI should always be done when the tires are cold, since driving heats up tires making the results inaccurate due to the air inside expanding (which creates a false impression of higher pressure).

Note 2: For every 10 F degrees colder, pressure will automatically drop 1 PSI. The reverse is true too. So in the Spring, carefully monitor pressure to ensure it doesn't exceed the maximum as the temperature increases.

PSI convenience

Tire pressure needs to be routinely checked (for all vehicles, not just Prius). Temperature drops cause PSI to decrease. Heat caused by driving increases PSI, making measurements inaccurate until cool. MPG & Safety are directly dependent on properly maintained PSI. Prius owners have found a way to make this simple: use a cordless inflator.

Cordless inflators (as shown to the right below) cost around \$40. They are small & powerful, allowing you to increase PSI in the convenience & comfort of your own garage when the tires are still cool. As an added bonus, the battery in the cordless inflator can be used as a portable 12-volt power-supply to plug your automotive accessories into. Some even offer additional features, like a built-in light and even the ability to jump-start a vehicle.



Make sure to purchase a high-quality tire-gauge. For about \$30 (as show to the left above), you'll find that it is both easier to hold and easier to read than a less expensive one. That price will also deliver a 0.5 PSI accuracy that you can depend on for many years and a tough case to protect it.

Tire Upgrades

HSD Prius comes with standard, run-of-the-mill tires. In other words, they are fairly typical. So some owners are pleased with them and others choose to upgrade.

DISCLAIMER: *The ideas, suggestions, and opinions offered here have not been endorsed by the manufacturer of those specific components or Toyota Motor Corporation. Any harm or damage that may result from the application of or the following of any ideas, suggestions, or opinions contained in this document is the sole responsibility of the individual that applied or followed said ideas, suggestions or opinions. The authors of this document hereby declare that they cannot and will not be held liable, in any fashion, for the content or the use of this information.*

PSI

HSD Prius is average weight, exactly what you'd expect a vehicle that size to weigh. It does not need special tires, since there is nothing extra to support. (In other words, XL rated tires are not required.)

Like with many vehicles, a minimum of 35 PSI (2.4 bar) is required for tire-pressure. Less than that will cause premature wear.

42/40 PSI (2.9/2.8 bar) is what many Prius owners recommend, since it increases the handling abilities and allows the tread to last its longest. (That's 42 front & 40 back, since a 2 PSI bias is required for the front tires.) The standard tires, as well as many other tires, support a maximum cold pressure of 44 PSI (3.0 bar). So using 42/40 is no big deal. In fact, some owners even use 44/42 PSI (3.0/2.9 bar).

LRR

HSD Prius comes with standard tires. There are not LRR (Low Rolling Resistance), as many people believe. If you desire, you may switch to LRR tires. That will maximize MPG, offering a minor improvement over most standard tires.

Treadwear

460 is the treadwear rating for the standard HSD Prius tires. That's what many typical family vehicle tires come with. **800** is what you'll find on the ultra-long-life tires. So there is an obvious upgrade opportunity, if you want a set tires to last as long as possible.

The rating number represents the wear resistance of the tire. It does not correlate directly with the amount of mileage you'll be able to drive. Don't rely exclusively on this value when selecting a tire. Check the warranty, it will usually state an approximate distance expectation.

Revs

Revs (Revolutions per Mile) indicate the precise "rolling" size of the tire. This measurement is needed since not all tires with the same specification are actually the same.

855 is the Revs value for the standard HSD Prius tires. When selecting an alternate, a number very close to that is required to insure the speedometer and odometer remain accurate. (Being off by a small amount is acceptable since that value will change as tread wears down anyway.)

Size

185 / 65 R15 is the standard size tire for HSD Prius. You'll find a wide variety of choices available for this size.

Wider sizes may also be used. But keep in mind that larger widths will reduce your traction on snow. A normal tire is better for digging through down to the road itself.

Original Tire

Goodyear Integrity

HSD Prius comes with these tires standard. They are sometimes referred to as OEM (Original Equipment Manufacturer) tires.

185 / 65 R15
44 PSI (3.0 bar) maximum
1168 lbs. (530 kg) load maximum
Standard Rolling Resistance
855 Revs per mile
10/32 inch Tread-Depth
86S Speed & Load Rating
"A" Traction
"B" Temperature
460 Treadwear
50,000 (80,467 km) Mile Warranty

Upgrade Tire

Michelin HydroEdge

These are premium-grade, high-traction tires that can be used on a HSD Prius.

185 / 65 R15
44 PSI (3.0 bar) maximum
1168 lbs. (530 kg) load maximum
Standard Rolling Resistance
856 Revs per mile
11/32 inch Tread-Depth
86T Speed & Load Rating
"A" Traction
"B" Temperature
800 Treadwear
90,000 (144,841km) Mile Warranty



Personal experiences with these tires are documented here... <http://john1701a.com/prius/prius-maintain03.htm#Tires>

Upgrade Tire

Goodyear TripleTred

These are premium-grade, high-traction tires that can be used on a HSD Prius. (Unfortunately, they are not available in the standard size. So you have to use an alternate instead.)

195 / 60 R 15
44 PSI (3.0 bar) maximum
1190 lbs. (540 kg) load maximum
Standard Rolling Resistance
863 Revs per mile
11/32 inch Tread-Depth
86H Speed & Load Rating
"A" Traction
"B" Temperature
740 Treadwear
80,000 (128,748 km) Mile Warranty



Upgrade Tire

Michelin Harmony

185 / 65 R15
44 PSI (3.0 bar) maximum
1168 lbs. (530 kg) load maximum
Standard Rolling Resistance
848 Revs per mile
11/32 inch Tread-Depth
86S Speed & Load Rating
"A" Traction
"B" Temperature
740 Treadwear
80,000 (128,748 km) Mile Warranty

Upgrade Tire

Goodyear ComforTred

185 / 65 R15
44 PSI (3.0 bar) maximum
1168 lbs. (530 kg) load maximum
Standard Rolling Resistance
855 Revs per mile
11/32 inch Tread-Depth
86T Speed & Load Rating
"A" Traction
"B" Temperature
700 Treadwear
80,000 (128,748 km) Mile Warranty

Washing

Antenna

Removing the antenna is easy; just unscrew it (counter-clockwise). Then you don't have to worry about it while going through an automatic car wash.

Valet Use

Valet Card

Providing the valet with a "Valet Card" Toyota includes with the purchase of a new Prius is highly recommended. It illustrates how to start the hybrid system in very simple steps.

Engine On

Stealth can confuse valet drivers, since they expect noise & vibration rather than dead silence. Keeping the engine running could prevent a mishap. Valets may repeatedly try to start the Prius not realizing it's already running. Or worse, they may get out while the Prius is still in "D" (Drive) because they think it's off. To minimize this risk, set the defroster to the maximum cold or hot setting. This forces the engine to continue running.

MAINTENANCE

Oil Changes

Oil

Refer to the "*Increasing MPG*" section.

5,000 Miles *or* 6 Months

5,000 miles (8,000 km) or 6 months, whichever comes first.

Having the engine shut off frequently and not using it as the sole propulsion source will allow oil to last longer than in traditional vehicles. It simply isn't exposed to the strenuous engine conditions found with. Nonetheless, it is still important to routinely change the oil & oil-filter.

Reminder Light

After 4,500 miles (7,250 km), an indicator light will flash for 12 seconds after starting, then it will turn off.

After 5,000 miles (8,000 km), an indicator light will flash for 12 seconds after starting, then it will change to a steady glow and remain on.

If you change the oil (and filter) yourself, here's how to reset the light so it will stay off until the next change interval has expired:

- 1) With the power on, switch to the odometer/trip-meter to display "ODO".
- 2) Power OFF (push the "Power" button).
- 3) Power ON, while holding the button for "ODO".
- 4) Wait for the reminder light to stop flashing, then release.

While the reset is taking place, you'll see the odometer value change to 5 dashes. Then each will disappear, one at a time from the left. When finished, 7 zeroes will briefly appear, indicating the process is complete before the previous odometer mileage returns.

Illustrated Detail



Oil Filter Toyota Part: 90915 - YZZF2
or: 90915 - YZZA2

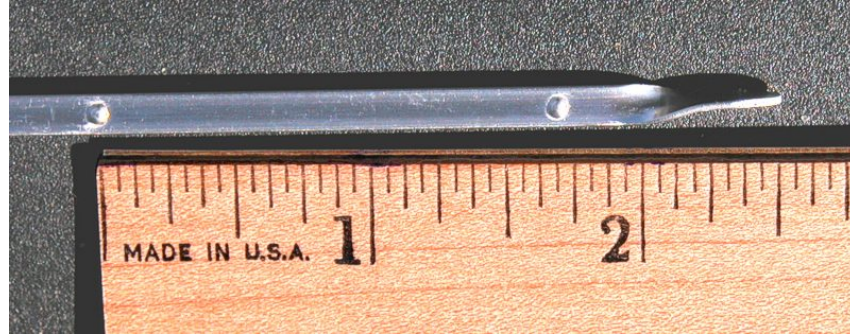
Plug Gasket Toyota Part: 90430 - 12028

http://john1701a.com/prius/prius_oil-change.htm

That link above is for a document with many photos, which provides details about the oil-change process for a Prius. Download a copy to see the underneath of the vehicle along with the components involved and the supplies you'll need to perform an oil-change yourself.

Overfilling

This is an unfortunate reality that far too many owners have to face. Oil pumped from bulk barrels into your engine is commonly not carefully measured by dealers and quick oil-change places. So make sure to check the level yourself after the service is complete. If the oil-level is beyond "full", insist that they remove the excess.



The ideal level is 1/4" (one-quarter inch or 6 millimeters) below the "full" mark, which is between the D and the E on the photo above.

Too much oil causes MPG to be reduced. Way too much oil causes damage to the engine. So it is in your best interest to make sure the oil-level never goes above the "full" marker on the dipstick. 3.9 quarts (3.7 liters) is the maximum capacity, so there is no need to ever use that much. Never pour in more than 3.5 quarts (3.3 liters). Even less is better. It's easy to add more afterward. Removing too much is very, very difficult.

A simple way to avoid overfilling problems is to provide your own oil (which is common for those preferring synthetic anyway) instead. They'll just deduct the price difference from your bill. Only supplying the mechanic with the correct amount will guarantee they won't overfill.

Engine Air-Filter

Checking

Replacement every 30,000 miles (about 48,000 km) is recommended. But you'll want to check it sooner, especially if routinely you drive through areas with a lot of dust (like on dirt roads). The more restricted the air flow becomes due to particles being collected, the more of a negative impact that has on MPG. So for some owners, time may be a better determination of when to check rather than distance.

Replacement

Included with the filter is the rubber gasket. You'll want to replacement both during the routine change. The process itself literally only takes a minute for both, and no tools are required. The black plastic housing which holds filter is located directly above the engine (left side under the hood). Just look for the 3 black metal clips. Unlatch each and lift up. You'll be looking directly at the filter at that point. Simply remove & replace it.

Note that concealed within the top of the plastic housing is a secondary filter. It is a lifetime carbon type, so just ignore it. No replacement of that one is ever needed.

(Toyota Part # 17801-21040)

Window Wipers

Front Blades



Replacing the two wiper blades in the front is surprisingly easy. You don't even have to remove the wiper assembly from the car (though you can, if you want). About every 30,000 miles or so (about 48,000 km) it will become necessary.

Just carefully squeeze the rubber at the far left (shown above) and pull inward a little bit. It will bend just enough to allow you to slide it out of the clamp (shown below). With that unsecured, the remainder of the wiper blade can be removed entirely just by pulling on it lightly, since none of the other clamps lock it in place.



<http://john1701a.com/prius/prius-wiperblades.htm> ...provides details (and more photos) of the replacement process for both the front & rear wiper blades.

Front Driver Wiper (Toyota Part: 85124 - 46010)

Front Passenger Wiper (Toyota Part: 85124 - 47010)

Rear Blade

To pivot the wiper arm upward, all you have to do is remove the clamp. It is the 2.5 inch (6 cm) piece of flexible plastic at the base, where it connects to the window. Just pull both sides out and slide it toward you. With that plastic off, the access to the blade is now possible. You can lift the arm up to get at the underside of it.

This photo shows that plastic clamp removed (the black object in the lower-right corner) and the arm of the rear wiper lifted up.



Rear Hatch Wiper (Toyota Part: 85124 - 44140)

Fuel Door

Lubricate

After a long enough duration, it will eventually become difficult to open. Exposure to sand, salt, moisture simply causes the existing lubrication to be less effective. Just a few squirts of WD-40 is all it takes to maintain/restore easy opening.

If you do discover that it is jammed shut, just recruit someone to help (since the distance between is too great for one person). Lifting the lever by the driver's seat and pushing on the back (left side) of the fuel door at the same time will dislodge it. There's no need for any type of tool; very little pressure is required.

Air-Conditioning

Filter Access

There is a Hepa filter for the Air-Conditioning system (Toyota Part: 87139 - 47010) directly behind the glove-box, which can be changed without any tools. Roughly every 30,000 miles or so (around 48,000 km) replacement will be needed.



Open the bottom glove-box, and then remove all the contents (since they will end up falling out all over the floor otherwise).

To the right of glove-box is an attached small plastic hydraulic arm (to add a resistance feel). Pull on that arm so it separates itself from the glove-box. Then hold onto the left and right sides of the glove-box while squeezing inwards. This will allow you to pull the glove-box downward, beyond the usual stopping point. Having accomplished that, you may let go. Just let it hang there, like this:



The air-flow assembling will then be completely visible and very easy to access. You'll see the filter at the top, lying horizontal along the entire width of that white plastic air-duct. Just pull on both sides to slide it out. Then you can easily inspect it and replace it (when needed).

For detail and more illustrations, refer to <http://john1701a.com/prius/prius-airconditioner-filter.htm>

OPTIONS

SKS: Smart-Entry

It is proximity detection system that automatically senses a wireless transmitter (called a "key-fob") in your pocket or purse, allowing you to **unlock the doors & hatch** without the need to use a physical key or push a button on a remote.

Touchless Unlock

Reaching into the handle area on the outside of the **Driver's door**, you'll trigger the sensor to unlock just that door.

Reaching into the handle area on the outside of the **Passenger's door**, you'll trigger the sensor to unlock all the doors.

Reaching into the handle area on the outside of the **Hatch door**, you'll trigger the sensor to unlock the all the doors as well as the hatch.

Automatic Disable

Leaving the key-fob inserted into the dashboard-slot for more than 10 minutes after power OFF will cause the SKS to be disabled. To enable it again, press the button under the steering-wheel.

Manual Disable

Look for a button labeled "SMART" on the dashboard directly underneath the steering-wheel. Pushing that will toggle between disable & enable. As the 12-volt auxiliary battery ages, constant trickle drains from it for extended durations (especially during the winter) should be avoided. So if you are going to leave your Prius sit for several weeks, the disable will help you get the longest life from the battery. Note that the battery-pack, not the auxiliary, is what supplies power for starting the engine.

Another use for that "SMART" button is to simply prevent the wireless functionality, should you have the need for direct-contact only operation.

Fob Battery

That small key inside the fob can be removed and used to open the driver's door manually, when the battery wears out due to excessive age. The battery isn't necessary to start the Prius when the key-fob is inserted into the dashboard slot; though, you will want to eventually replace the battery (CR-2032).

Outside Locking

On both front door handles and the hatch in back, there are small black buttons. Pushing one of them will trigger a beep and flash the lights to inform you the SKS (formally known as SE/SS) system has just locked the Prius. This ability prevents the need for you to *ever* touch the SKS device in your pocket or purse... unless you need to use the "panic" button on the back (which honks the horn and flashes the lights).

SKS: Smart-Start

It is proximity detection system that automatically senses a wireless transmitter (called a "key-fob") in your pocket or purse, allowing you to **start the hybrid system** without the need to use a physical key or push a button on a remote.

Fob Battery

When the fob battery wears out due to excessive age, you can still start the hybrid system without replacing the battery (CR-2032). Just insert the fob into the dashboard-slot manually. It will get sensed that way, even though the remote ability is not available.

Homelink

It is a set of buttons on the rear-view mirror available for custom programming, to supplement your other remotes.

Garage Door

To program a Homelink button on your mirror to open & close your garage-door, do the following:

- 1) If the mirror is off, turn it on. (The indicator light will be a steady green.)
- 2) Press the desired programmable-button (the left most three) on the mirror and continue holding it depressed throughout the entire programming process.
- 3) With the garage-door remote held close to the mirror, press the button on it repeatedly.
- 4) When the indicator light on the mirror changes to a rapid blinking red, stop pressing both the buttons on the mirror and the opener. Programming is complete.
- 5) Test the newly programmed Homelink button. Pressing it for 1 second will change the indicator light from a steady green to a steady red, which will instruct your garage door to open or close just like your garage-door remote.

* Note: this programming is only available for remotes with non-rolling security codes.

Electrochromic Mirror

Making it Darker

Some owners have discovered that the automatic dimming mirror doesn't get dark enough for them at night. The solution to this high-tech problem is a surprisingly low-tech modification. All you have to do is trick the mirror into thinking it is darker outside by just covering the optical-sensor on the back with a piece of transparent plastic. That way, less light is detected. The response is a deeper shade of green, which makes the headlights behind you appear less intense.

This photo shows how the optical-sensor has been covered by a piece of blue transparent plastic, attached to the mirror using a piece of clear adhesive tape.



Navigation

- Adaptive Volume** Increases the volume of the Navigation System's guidance information when going over 50 MPH (80 km/h).
- Mark Button** When you get to a common destination or one that was particularly difficult to find, take advantage of the "Mark" button on the Multi-Display (only visible when you have the extended menu shown). That will add it to the "Memory Points" menu. Up to 106 locations can be stored, so take advantage of this to make future navigation destination selection easier.

Bluetooth

Phone Type Here's a sampling of the some Bluetooth-enabled phones stated to work with Prius:

Motorola: V330, V505, V551, V600, V710, RAZR

Nokia: N-Gage, 3600, 3620, 3650, 3660, 6230, 6310i, 6600, 6620, 6820, 7610, N-GAGE QD

Sony Ericsson: T68i, T608, T610, T616, T637, Z600, SX1, S55, S56, W600i

Since the introduction of the HSD, many other cell-phones have been added to the Bluetooth list.

Check with your local provider for compatibility information. You may also find helpful facts on this webpage... http://toyota.letstalk.com/bluetooth/bt_userguides.htm

Adding a Phone Here's abbreviated instructions for setting up the RAZR:

- 1) On the Prius Multi-Display, select "Telephone", "Settings", "Add Phone"
- 2) On the phone, select "Settings", "Connectivity", "Bluetooth Link", "Handsfree", "Look For Devices", "HANDS FREE", "Yes"
- 3) Enter the password/passkey "1212" when prompted.
- 4) Setup should then be complete, confirmed by a connect message.

Handoff Some Bluetooth-enabled phones will allow you to transfer an active call from the connected device back to the phone itself, which is very convenient if you've arrived at your destination and do not wish to remain in the car. That handoff is surprisingly simple too. Just push the "Power" button on the Prius. The phone should then prompt you with a continuation question. Respond with a "Yes".

Volume While a call is active and the Multi-Display is showing the volume control, you can adjust the level by pressing the up & down buttons on the steering-wheel the very same way you'd adjust the radio.

More Info Refer to <http://john1701a.com/prius/prius-bluetooth.htm>

Voice-Recognition

No Training There is no training process for all the commands. The voice-recognition is remarkably adept the way it comes installed, so you can use it immediately.

VOICE-RECOGNITION

Help

Command Help
Command List
Help

Navigation - Commands

I'm Hungry	Add to Destination	Change to Arrow Guidance
POI Off	Cancel All Destinations	Change to Arrow Guide
Route Overview	Cancel Final Destination	Change to Compass Mode
Compass Mode	Cancel Next Destination	Change to Dual Map
Heading Up	Delete All Destinations	Change to Freeway Guidance
North Up	Delete Final Destination	Change to Freeway Guide
Louder	Delete Next Destination	Change to Heading Up
Softer	Enter Destination	Change to Intersection Guidance
Repeat	Previous Destination	Change to Intersection Guide
Repeat Voice	Replace Destination	Change to Lane Guidance
Cancel	Arrow Guidance	Change to Map Direction
No	Arrow Guide	Change to North Up
Yes	Freeway Guidance	Change to Single Map
Short	Freeway Guide	Change to Turn List Guidance
Mark	Guidance Screen on Freeway	Change to Turn List Guide
Mark This Point	Intersection Guidance	Go to Previous Destination
Zoom In	Intersection Guide	Go to Quick Access 1
Zoom Out	Lane Guidance	Go to Quick Access 2
Lexus Dealer	Repeat Guidance	Go to Quick Access 3
Lexus Dealership	Resume Guidance	Go to Quick Access 4
Toyota Dealer	Start Guidance	Go to Quick Access 5
Toyota Dealership	Stop Guidance	Go to Quick Access Number 1
Previous Start Point	Suspend Guidance	Go to Quick Access Number 2
Previous Starting Point	Turn List Guidance	Go to Quick Access Number 3
Right Map Direction	Turn List Guide	Go to Quick Access Number 4
Right Map Heading Up	Dual Map	Go to Quick Access Number 5
Right Map North Up	Entire Route	Go to Start Point
Right Map Zoom In	Entire Route Map	Go to Starting Point
Right Map Zoom Out	Fifth Destination Map	Quick
	Final Destination Map	Quick 1
	First Destination Map	Quick 2
	Fourth Destination Map	Quick Access 1
	Map	Quick Access 2
	Map Direction	Quick Access 3
	Next Destination Map	Quick Access 4
	Second Destination Map	Quick Access 5
	Single Map	Quick Access Number 1
	Third Destination Map	Quick Access Number 2
		Quick Access Number 3
		Quick Access Number 4
		Quick Access Number 5

Navigation - Locations

Airport	Fast Food	Other Retail
American Food	Ferry Terminal	Other Retail Stores
American Restaurant	Fitness Club	Park
Amusement Park	French Food	Park and Recreation
ATM	French Restaurant	Parking
Auto Club	Gas	Parking Garage
Auto Service	Gas Station	Parking Lot
Auto Service and Maintenance	Go Home	Performing Arts
Automobile Club	Golf	Pharmacy
Bank	Golf Course	Police Station
Barber Shops	Government Offices	Post Office
Beauty and Barber Shops	Grocery Store	Rental Car
Botanical Garden	Health and Fitness Club	Rental Car Agency
Bus Station	Higher Education	Rest Area
Business Facility	Historical Monument	Rest Stop
Campground	Home	Restaurant
Car Wash	Home and Garden	School
Casino	Horse Racing	Seafood
Chinese Food	Hospital	Seafood Restaurant
Chinese Restaurant	Hotel	Service and Maintenance
Cinema	Ice Cream Parlor	Shopping
City Center	Italian Food	Shopping Mall
City Hall	Italian Restaurant	Ski Resort
Civic Center	Japanese Food	Skiing
Coffee House	Japanese Restaurant	Specialty Food
College	Library	Specialty Food Store
Community Center	Marina	Speedway
Commuter Rail Station	Mexican Food	Sports Complex
Continental Food	Mexican Restaurant	Stadium
Continental Restaurant	Museum	Thai
Convenience Store	National and State Parks	Theater
Convention Center	National Parks	Tourist Attraction
Court House	Other Automotive	Tourist Information
Current Location	Other Automotive Stores	Train Station
Current Position	Other Business	Triple A
Department Store	Other Business Facilities	University
Detour	Other Financial	Video Rental
Detour Entire Route	Other Financial Services	Winery
Dry Cleaning	Other Food	Zoo
Exhibition Center	Other Restaurant	Zoological Garden

Audio

Audio
Audio On
Audio Off

Radio
AM
AM Radio
FM
FM Radio
FM1
FM2
Program
Seek Down
Seek Up

CD
CD Changer
Disc Down
Disc Up
Next Disc
Next Track
Previous Disc
Previous Track
Skip Backward
Track Down
Track Up

SAT
SAT1
SAT2
SAT3
Satellite Radio
Satellite Radio 1
Satellite Radio 2
Satellite Radio 3
Type Down
Type Up

Cassette
Tape
Fast Forward
Play
Reverse
Rewind

Climate

Automatic Air-Conditioning
Automatic Air-Conditioning Off
Automatic Air-Conditioning On

Cooler
Warmer

Lower Temperature
Raise Temperature

Temperature 65 Degrees
Temperature 66 Degrees
Temperature 67 Degrees
Temperature 68 Degrees
Temperature 69 Degrees
Temperature 70 Degrees
Temperature 71 Degrees
Temperature 72 Degrees
Temperature 73 Degrees
Temperature 74 Degrees
Temperature 75 Degrees
Temperature 76 Degrees
Temperature 77 Degrees
Temperature 78 Degrees
Temperature 79 Degrees
Temperature 80 Degrees
Temperature 81 Degrees
Temperature 82 Degrees
Temperature 83 Degrees
Temperature 84 Degrees
Temperature 85 Degrees

65 Degrees
66 Degrees
67 Degrees
68 Degrees
69 Degrees
70 Degrees
71 Degrees
72 Degrees
73 Degrees
74 Degrees
75 Degrees
76 Degrees
77 Degrees
78 Degrees
79 Degrees
80 Degrees
81 Degrees
82 Degrees
83 Degrees
84 Degrees
85 Degrees

Screen

Screen Off

OTHER

Battery-Pack

Replacement

The power management system was designed to maximize battery life. It rigorously works to always keep the charge-level at optimum, by never fully draining or fully recharging it. And you can clearly see that by watching the indicator on the Multi-Display. Lab testing has demonstrated that the battery-pack will last an equivalent of 180,000 miles (290,000 km) of driving without any deterioration. And the preliminary real-world data now available is confirming those findings. The battery-pack is expected to last the lifetime of the vehicle. With normal wear & tear, Prius owners should not expect to ever have to replacement it. (The US distance record as of July 2006 from a Classic model Prius was an amazing 243,000 miles!)

Recycling

Toyota has had a recycling program in place for NiMH batteries ever since the electric version of the RAV4 was introduced back in 1998. Every part of the battery, from the environmentally safe precious metals to the plastic, plates, steel-case, and the wiring, can all be recycled. To ensure that the battery-packs come back to Toyota, each battery has a phone number on it to call for recycling information and dealers are paid a "bounty" of \$200 for each pack collected.

Rear Hatch

Slam It!

The hatch door is designed to be slammed shut. So if you find you are not getting it to shut tight, don't feel afraid to use some muscle on it. Holding back isn't necessary. Grab the hand-hole (that cavity within the plastic, on the right as you face it) then... Slam It! Damn It!

Unlock

SKS (formally known as SE/SS) won't unlock the hatch while the Prius is running. So to unlock the hatch, you need to press the unlock button on the inside either of the front doors.

Extra Height

Temporarily remove the false floor to reveal the hidden storage area. Doing that provides an extra 6 inches of height from the glass, for carrying unusually tall cargo.

Cargo Cover

The rollout "shade" that is used to cover the hatch (to conceal the contents, if any) uses plastic grips that lock into place with the body of the car. Each grip attaches to the cover using 2 screws. It is possible, after plenty of use, for a screw to come loose and eventually fall out. Don't let the inconvenience occur. Be proactive by either tightening them annually (like during routine spring cleaning) or take the time to make the connection permanent by sealing over the screw with a heat-resistant adhesive (like "Super Goo").

Securing Cargo

There are 4 metal-rings, bolted to the frame of the vehicle, available for securing cargo. Each is located in a corner of the hatch area. Use them in conjunction with bungee-cords or rope to keep large or loose items from shifting while you drive. If you need addition locations when the back seats are up, simply raising a headrest to reveal metal rods that can be used. When the back seats are folded down, you may use the latch-loop that is normally used to secure the seat in place.

Cargo Nets

There are two types available. One mounted flat (horizontal) across the floor, connecting to each of the metal-rings. You just slip cargo underneath it to prevent movement while you drive. The other is mounted upright (vertical), connecting to the 2 metal-rings closest to the hatch door and 2 connector-points which you add by drilling a simple hole in a location close to the window. This type works well for cargo such as grocery bags.

Hidden Release

From inside the hidden storage area underneath the floorboard, remove the tiny black panel on the side closest to the hatch, and then poke your finger through that hole into the metal casing. There's a smooth tiny metal latch there. (Toyota definitely wanted to make that inaccessible from outside.) Pulling it up pops the hatch open.

With the hidden storage area removed, the photo below shows the exact location of that metal latch, as indicated by the yellow “V” mark.



The following close-up of the photo above makes that metal latch (brass colored) easier to see, again as indicated by the yellow “V” mark.



Height Reduction

For those of you that don't want to reach so high to close the hatch, try this alteration:



Connect a piece of string on each end the pressure-arm with hooks.

Just a simple restrictive device like this is all it takes. Preventing that pressure-arm from extending all the way reduces the height of the hatch when open. And when you shut it, the string simply folds into the slot for drainage.

The string (or light-weight rope) should be about 12 inches when stretched.

The hooks must only be 1/8 inch thick to fit properly. They can be any length.

To the left is a photo of the string attached. Below is a photo of it below installation.



External Cargo

Roof-Rack

Removable & Lockable roof-racks can be used for kayaks, canoes, bikes, and cargo carriers. Yakima is the brand shown in the photo below. Thule & Saris brands are also available.



That particular configuration above uses the following rack components:

- Q-Towers (# 0124) \$130
- Q-124 Clips (# 0724) \$60
- 66" Round Bars (# 0410) \$55
- Mako Saddles (# 4019) \$60
- Hully Rollers (# 4028) \$70
- Lock Cores (# 7204) \$35

It's about \$375 retail to carry one kayak, and an additional \$130 for a second (as shown to the right). The rack can be used without the optional \$35 lock cores.

To reduce noise and improve aerodynamics, this shield can be added: 44" Fairing (# 7048) \$50



Tie-Down Eyelets

Prius is equipped with remarkably handy tie-down eyelets. Their original purpose was for ocean transport from Japan, to provide a convenient & reliable method of securing the car to the boat. Owners have found the very opposite to be true as well, securing a boat to the car. Located in each of the 4 corners under the bumpers, you'll find those handy metal eyelets for tying down large roof cargo like a canoe.

Receiver-Hitch

Custom aftermarket receiver-hitches have been built for Prius. That is another option available for carrying bikes on the back of the vehicle.

Strap-On Rack

Inside is the ideal method of transporting bikes. But if you require that room for carrying people or cargo instead, a strap-on rack can be used.



The photo on the left shows the 3 bike model of the Saris Bones rack.

It straps on very securely with only a minimal amount of pressure on the glass. Most of the bike weight is supported legs on the bumper.

The photo above shows how even an odd shaped recumbent bike can be carried along with a traditional 12-speed bike.

If you desire an extremely secure connection, for extra support of very heavy loads, there is a little known option available. The metal anchors for the hatch itself are outside of the water-seal, which makes them the ideal location for tying a rope to. Just open the hatch, the hinges are part of those anchors. Extend a rope from there to the strap-on rack or the bikes themselves.

Side Mirrors

Blind-Spot

As with most all vehicles, Prius has a blind-spot immediately to the left-rear of the driver. The solution to that is carefully aiming the mirror on the side. You can also add a blind-spot mirror to it, the very same way as with other vehicles.



The photo above shows a blind-spot mirror installed, outside the driver-side door. (There's just an adhesive sticker on the back of it. So installation only takes a moment.) The upper-right corner is the least intrusive location, since you won't normally see a vehicle positioned there anyway.

It is recommended that you purchase two (one for each side of the car) made from high-quality hard plastic. The cost is around \$6 for a set of that nicer type. That makes it easier to see fine detail and more resistant to water spots. In fact, you'll find that the plastic stays cleaner in the winter than the glass of the big mirror.

Internal Storage

Hidden Drawer

This drawer often takes a very long time for owners to discover, since it is located underneath the cupholders between the front seats near the floor.



It is ideally for storing tissue. By removing them from the standard cardboard box, a surprisingly large stack can be neatly placed inside.

Transmission

Type

"Planetary" is the type of CVT that Prius utilizes.

It has nothing in common with the other type of CVT currently available, called "**Cone & Belt**".

Design

Technically, Prius really doesn't have a transmission since nothing ever shifts. There are no gears. There are only power-carriers. All they do is rotate, and they are permanently engaged.

Operation

The physical components within the "Planetary" CVT bare a striking resemblance to those within a differential (the power-transfer mechanism found on all vehicles). In fact, they even serve the same purpose.

Lifetime

Due to the fact that the "Planetary" CVT is nearly identical to that of a differential, the expectation is that it will last just as long. So you can confidently predict it will operate without worry for the entire lifetime of the vehicle.

Information Sources

- Recent News** <http://news.google.com/news?hl=en&lr=&ie=ISO-8859-1&q=Prius&sa=N&tab=wn>
- Toyota's Website** Information directly from Toyota itself is available here... <http://www.toyota.com/prius>
- Toyota Online** Repair Manual access & downloading for \$10 per day at... <http://techinfo.toyota.com>
- Toyota Manuals** Available via credit-card from 1-800-622-2033
- 2004 Prius Repair Manual, volume 1: RM1075U1
 - 2004 Prius Repair Manual, volume 2: RM1075U2
 - 2004 Prius Repair Manual, volume 3: RM1075U3
 - 2004 Prius Electrical Wiring Diagram: WED555U
 - Prius New Car Features, 2004: NCF255U
- Toyota Tech-Info** Technical Information System free downloads:
- Emergency Response Guide (HSD)... <http://techinfo.toyota.com/public/main/2ndprius.pdf>
 - Emergency Response Guide (Classic)... <http://techinfo.toyota.com/public/main/1stprius.pdf>
 - Dismantling Manual... <http://techinfo.toyota.com/public/main/priusdisman.pdf>
- Enthusiast Forum** <http://priuschat.com>
- A very informative forum where you can participate in online discussions related to Prius.
- Owner Webpages** <http://john1701a.com/prius/owners/owner-index.htm>
- Where find a variety of hosted Prius owner webpages with many photos.
- Graham's website** <http://www.ecrostech.com/prius/original/PriusFrames.htm>
- An owner's website that thoroughly documents many aspects of the Prius.
- john1701a's website** <http://john1701a.com>
- This is a very large Prius owner website. As of 6/01/2007 the combined Classic & HSD Prius content (142,977 miles combined) available consisting of: 515 webpages, 1569 digital photos, 1521 offline pages of personal logs, 83 animations, 54 wallpapers, 15 spreadsheets with graphs, 33 documents, 6 screen-savers, and 4 printable calendars, along with a few other Prius related items. There is also nature gallery with 151 photos.

ScanGaugeII



This is a scan-tool that provides live data via the standard OBD-II connector found in virtually every car now in use. That port which you connect it to is the same one the mechanics use to attach their very expensive diagnostic equipment. When Prius was new, there were no affordable offerings for a device of this sort. Things have changed. Owners wanting information beyond what the Multi-Display provides have a very realistic option now. It's an empowerment device you'll grow to really enjoy.

The following photo is an example of where the scan-tool could be mounted (using the included adhesive Velcro strips) in a Prius. That wire used to connect it is exposed only at the point shown; the remaining neatly tucks behind the water-seal of the door and underneath the steering-wheel up to the data-port. The setup is simple plug & play that takes only a few minutes without any tools.



RPM, MPG, MPH, and Coolant-Temperature are the data that Prius owners are typically drawn to. There are 8 other gauge options to choose from. There are also 11 values which can be setup for automatic tracking for 4 sets of trip data.

“**Check Engine**” codes can also be both read and cleared. That's very informative, allowing you to easily distinguish the difference between a simple error (like not tightening the fuel-cap enough) to a genuine part failure.

The color of the backlighting for the display itself can be changed too, by just selecting a different one from the extensive menu of options.

<http://www.scangauge.com> for more information and to purchase (\$169.95 including shipping).

Informational Materials

Info-Sheet



This info-sheet provides a comprehensive overview of the Toyota Prius. It features a large image of the car at the top left, followed by a detailed 'Specifications' table. Below the table are sections for 'Features', 'Performance', 'Fuel Economy', 'Safety', and 'Options'. At the bottom, there are small images of various Prius models and their corresponding colors.

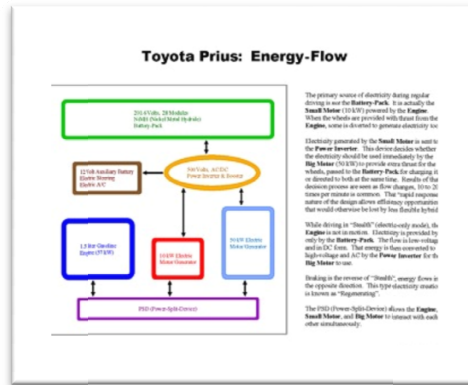


This info-sheet focuses on the 'Self-Charging' feature of the Toyota Prius. It includes a large image of the car's interior dashboard and steering wheel. The text explains how the car's battery is recharged while driving and provides information on how to use the 'EV Mode' and 'EV Range' settings. It also includes a section on 'EV Mode' and 'EV Range' settings.

For an illustrated summary, refer to this document. It serves as a convenient means of introduction to all aspects of Prius.

<http://john1701a.com/prius/prius-infosheet.htm>

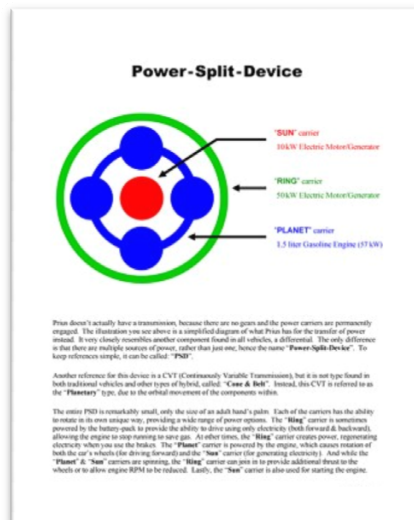
Energy Flow



For a basic understanding of the energy flow within the Prius hybrid system, download a copy of this document. Each of the major components are identified and the connection of each is explained in an easy to read format.

<http://john1701a.com/prius/prius-energy.htm>

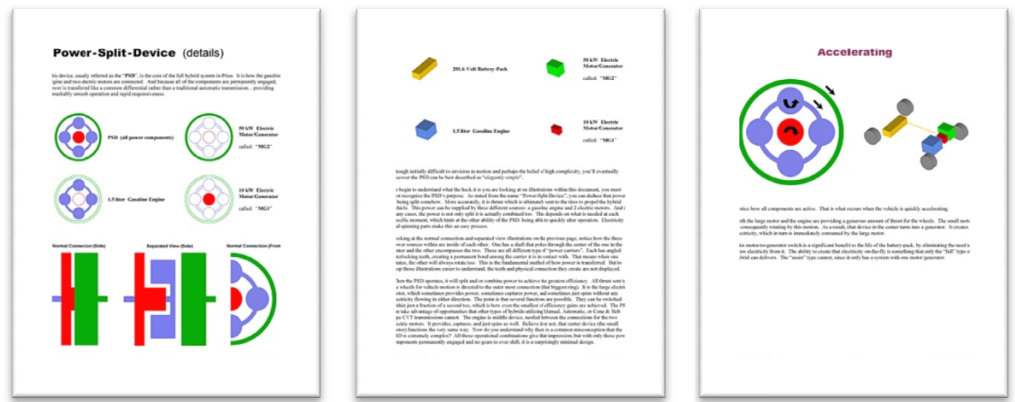
Power-Split-Device



For information about the heart of the hybrid system, read this document. This special device within Prius entirely eliminates the need for a traditional transmission. It is how the 2 electric motors and gasoline engine are able to seamlessly interact with each other.

<http://john1701a.com/prius/prius-psd.htm>

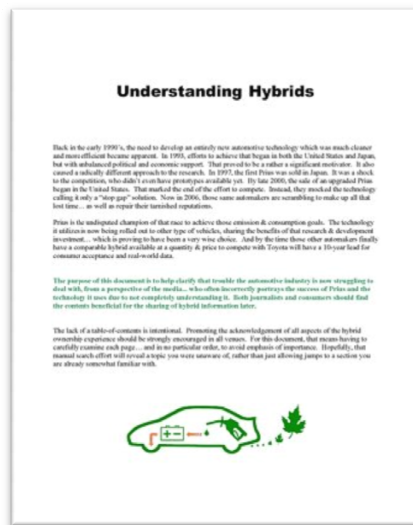
PSD (details)



This document provides a more in-depth look at the PSD. Without being overly technical, the illustrations describe how the wide variety of movements within the device relate to the operation of the hybrid vehicle.

http://john1701a.com/prius/prius-psd_details.htm

Understanding Hybrids

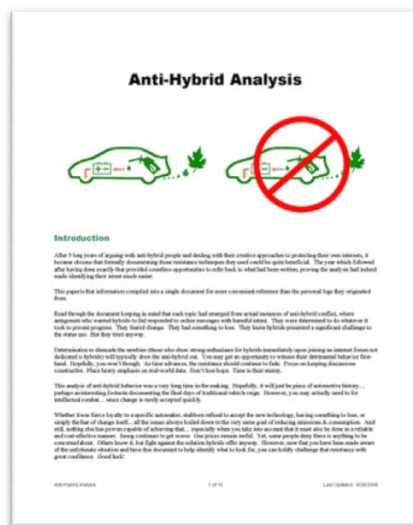


The understanding of hybrids requires much more than just awareness of the efficiency values listed on the window-sticker and the fact that you don't have to plug them in.

This document spells out the what you need to know.

<http://john1701a.com/prius/prius-understanding.htm>

Anti-Hybrid Analysis

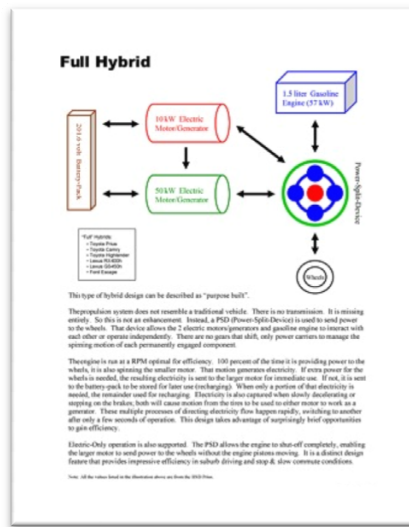


Sadly, there are people that intentionally fight against hybrids, doing all they can to prevent their success.

Reading this will provide some insight. It is a summary of behaviors observed within online forums, based on several years of discussion messages posted about hybrids.

http://john1701a.com/prius/anti-hybrid_analysis.htm

Type: FULL

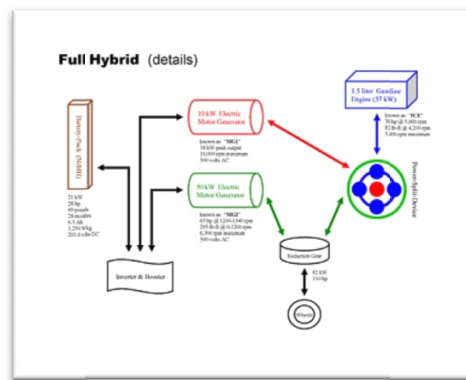


The most dynamic of the hybrid types is known as "Full", since it includes a second electric motor to provide some abilities not available from lesser designs.

Prius is this type of hybrid.

http://john1701a.com/prius/hybrid-type_full.htm

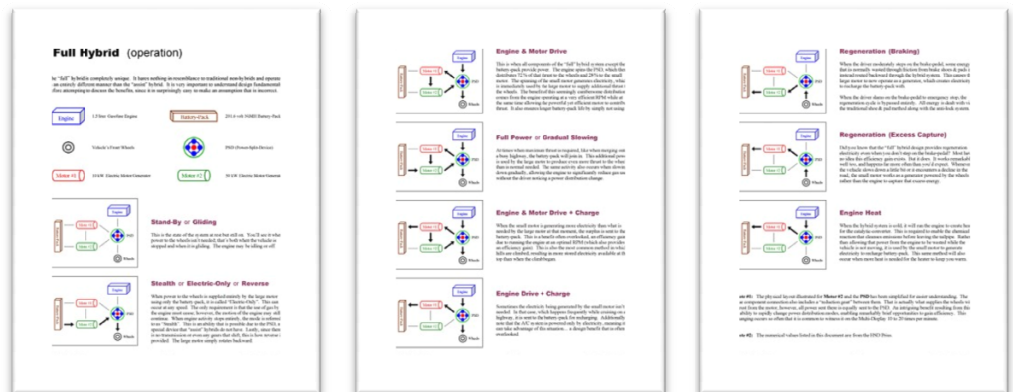
FULL (details)



For a more detailed illustration of the "Full" hybrid type, refer to this document.

http://john1701a.com/prius/hybrid-type_full_details.htm

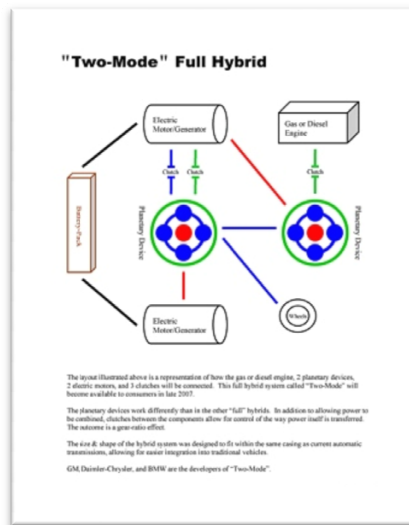
FULL (operation)



For an in-depth breakdown of how "Full" hybrids operate, download a copy of this document.

http://john1701a.com/prius/hybrid-type_full_operation.htm

Type: TWO-MODE

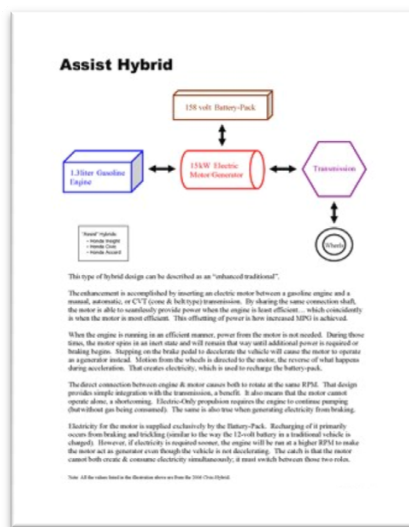


This alternate variety of the "Full" hybrid is a configuration known as "Two-Mode". It adds another power-split-device for electric motor and engine interaction, plus multiple clutches.

This document highlights the differences you should be aware of.

http://john1701a.com/prius/hybrid-type_two-mode.htm

Type: ASSIST

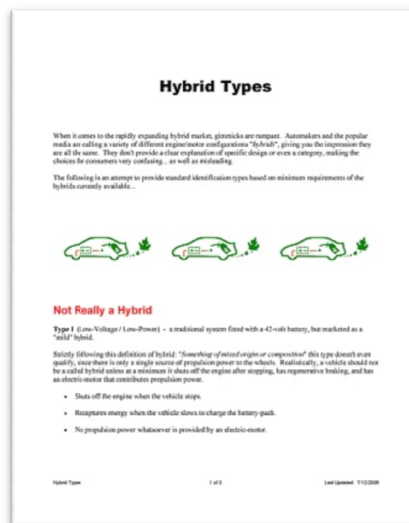


The type of hybrid with only one electric motor that is directly integrated with an engine is known as "Assist".

There are benefits and limitations that those contemplating the purchase of this hybrid type should carefully consider.

http://john1701a.com/prius/hybrid-type_assist.htm

Hybrid Types




There is a more diverse collection of hybrid system designs than most people realize.

This document helps by identifying and explaining the different types available.

http://john1701a.com/prius/hybrid-types_print.htm

Misconceptions: HIGHWAY

Highway Misconceptions



The basic design elements of a hybrid are easy to understand. For example, a combustion engine is inefficient when accelerating. Having an electric motor, which is more efficient, contribute power during those times will result in less fuel being used overall. That, combined with the knowledge that electricity is generated from energy normally lost from braking and the engine shuts off at stoplights, the design benefit becomes obvious for city driving. People readily recognize how those factors result in a MPG improvement.

On the highway though, many people believe the motor & battery in a hybrid become worthless, since speed remains relatively constant for long distances. They are quite incorrect. Few discover that one. Even fewer figure out why. The operation of a hybrid is unlike any other type of vehicle they have ever encountered. Among the types of hybrids themselves, there is quite a bit of variation too. So it is not wise to make assumptions.

This document points out what you need to know about the "full" hybrid system while driving on a highway. There are some subtle aspects of design & operation that account for significant efficiency improvements. Hopefully, you'll gain a heightened sense of awareness to help bring an end to these misconceptions.

Also, keep in mind the unfortunate need for this document. There are some who intend to impede the progress of hybrids. They intentionally spread false information to feed misconceptions.

Specific details about hybrid misconceptions related to operation while on the highway.

http://john1701a.com/prius/prius-misconceptions_highway.htm

Misconceptions: WINTER

Winter Misconceptions



Fortunately, the misconceptions about "full" hybrid operation during the winter primarily come from those that simply don't understand the technology or how it is used. Unfortunately, there are quite a few misconceptions. Spreading of incorrect & misleading information does occur. So, read the contents of this document carefully to help dispel those occurrences as you later encounter them online and in person. Awareness is a surprisingly overlooked.

Prius has been available in North America since the second half of 2000 and in Japan since late 1997. None of those winters that followed proved to be a problem. The cold weather and slippery driving conditions present challenges, as do for all other vehicle types, but the hybrid system is well equipped to deal with them.

Differences between traditional vehicles and "full" hybrids are abundant during the winter, though most are subtle - which is the very reason misconceptions come about. Many small influencing factors lead to drawing conclusions inaccurately. Knowledge of what they are and how they contribute to the resulting outcomes & efficiency is very helpful.

Specific details about hybrid misconceptions related to conditions during the winter.

http://john1701a.com/prius/prius-misconceptions_winter.htm

GLOSSARY

ABS	Anti-Lock Braking System, the feature which allows you to retain the ability to directionally control your vehicle during emergency deceleration.
AC	All modes of conditioning air inside the passenger area of the vehicle: Heating, Cooling, Venting
A/C	Condensing of air to cool it and to remove humidity.
Assist	Hybrid system with a small battery-pack and a single small electric-motor that provides peak power for the gasoline-engine during periods of acceleration.
AT-PZEV	Advanced Technology - Partial Zero Emission Vehicle
"B" Mode	Engine Braking, (it isn't actually a gear) when you shift the transmission to this setting the engine will be used to slow down the car, it works similar to an exhaust brake used on the large semi-trucks (except the one on Prius is totally silent).
C	Celsius, a measure of temperature, $(C * 1.8) + 32 = F$, $-25^{\circ}C = -13^{\circ}F$, $-15^{\circ}C = 5^{\circ}F$, $-5^{\circ}C = 23^{\circ}F$, $0^{\circ}C = 32^{\circ}F$, $5^{\circ}C = 41^{\circ}F$, $20^{\circ}C = 68^{\circ}F$, $25^{\circ}C = 77^{\circ}F$, $30^{\circ}C = 86^{\circ}F$
CAFE	Corporate Average Fuel Economy, the US system used to measure overall fleet efficiency
CARB	California Air Resources Board, an agency dictating emissions requirements for cars sold in California. (These are often more strict than Federal standards.)
CAT	Catalytic Converter, a vital component in the emissions system, typically utilizing a self-renewing metal
CC	Cruise Control
Cd	Coefficient of drag (0.29 for the Original & Classic Prius, 0.26 for the HSD Prius)
CEL	Check Engine Light
Classic	The term used to identify the 2001, 2002, 2003 model years of Prius.
CNG	Compressed Natural Gas
CO2	Carbon-Dioxide, the type of vehicle emission that contributes to global warming.
CVT	Continuously Variable Transmission, Prius uses the "Planetary" design which functions as a power-split device to manage multiple sources of thrust; other CVT vehicles use a "Cone & Belt" design to adjust power ratios.
Dinosaur	A very large, gas-guzzling, high-emission vehicle based on 20th century technology... doomed to extinction.
DRL	Daytime Running Lights
DVD	Digital Versatile Disc, used for the Navigational system in Prius
E10	Blended engine fuel, 10% ethanol and 90% gasoline
E85	Blended engine fuel, 85% ethanol and 15% gasoline
ECU	Electronics Control Unit, the amazing computer that monitors and controls the two motor-generators, the gas engine, the motion of the planetary gear set, the battery pack power levels etc. to provide the Prius' smooth acceleration and speed control.
Engine	The term used to refer to the device which runs on gasoline, utilizing combustion to push pistons to deliver power.
EPA	Environmental Protection Agency, the group responsible for rating the emissions & efficiency of vehicles sold in the United States.

EV	Electric Vehicle, powered exclusively by a battery-pack charged before use
F	Fahrenheit, a measure of temperature, $(F - 32) / 1.8 = C$, -15°F = -26.11°C, 0°F = -17.78°C, 15°F = -9.44°C, 32°F = 0°C, 40°F = 4.44°C, 60°F = 15.56°C, 70°F = 21.11°C, 80°F = 26.67°C
FCHV	Fuel Cell Hybrid Vehicle, a fuel-cell vehicle that takes advantage of hybrid technology including the use of a battery-pack
Fob	The device (introduced in 2004) used to unlock doors and start the hybrid system. By default, it works as a wireless remote for unlocking and is inserted into a slot in the dashboard for starting. As an option, it can be upgraded to control the SKS (formally known as SE/SS) feature. And note that there is actually a traditional key within which can be used for unlocking the driver's door manually.
FUD	Fear, Uncertainty, Doubt
Full	Hybrid system with a large battery-pack, a small electric-motor, at least one large electric-motor, and a gasoline-engine that combined provide a wide variety of combustion & electric propulsion abilities.
GPS	Global Positioning System, this is the part of the Prius Navigation System that identifies your exact location on Earth.
Greenwash	To intentionally mislead with respect to environmental benefits.
HEV	Hybrid Electric Vehicle
HID	High Intensity Discharge, bulbs used for headlights; illumination is created using an arch electricity instead of a traditional filament
HSD	Hybrid Synergy Drive - Toyota's modular hybrid design, currently implemented in the 2004-2007 Prius with many more vehicles planned to also use it.
HOV	High Occupancy Vehicle - used to describe the restricted "diamond" lanes on highways
HP	Horsepower, indicating a unit of power, a measurement different from torque
ICE	Internal Combustion Engine
IMA	Integrated Motor Assist - Honda's hybrid technology
km	Kilometer, a measure of distance, 1 kilometer is equal to 0.6214 mile
kW	Kilowatt, an electrical measurement unit used when describing Prius power consumption & storage
LEV	Low Emission Vehicle, once the cleanest designation, but no surpassed by several levels of reduced emissions
L/100km	Liters per 100 kilometers, the more common unit of efficiency measurement outside of the US and UK
LMPG	Lifetime Miles Per Gallon
LRR	Low Rolling Resistant - used to describe minimum friction tires
MD	Multi-Display - the touch-sensitive liquid-crystal screen on the dashboard of Prius
Mi	Mile, a measure of distance, 1 mile = 1.6093 kilometers
MG	Motor Generator, an electric motor which can either provide motive power when electrically driven or generate electricity when mechanically driven.
MG1	The smaller Prius electric motor. It is three-phase AC permanent-magnet synchronous motor/generator starts the ICE, controls the CVT, and generates the electricity (by using thrust from the ICE and deceleration power from slowing before the brake-pedal is pushed) to charge the battery-pack and/or feed the larger motor.
MG2	The larger Prius electric motor. It is three-phase AC permanent-magnet synchronous motor/generator drives the wheels and generates electricity (from regenerative braking) to recharge the battery-pack.

Motor	The common term used to refer to the power device which operates using electricity.
MPG	Miles Per Gallon
MSRP	Manufacturer's Suggested Retail Price
MY2001	Model Year 2001 (which became available in the United States the summer of 2000)
NAV	DVD-based GPS Navigation System, used in Prius
NiMH	Nickel-Metal Hydride, the type of modules used in the Prius battery-pack
NO_x	Nitrogen Oxides, that type of vehicle emission that contributes to smog
NVH	Noise, Vibration, Harshness
OEM	Original Equipment Manufacturer, components directly from the automaker
OPEC	Organization of the Petroleum Exporting Countries
Original	The term used to identify the 1998, 1999, 2000 model years of Prius (which were only available in Japan).
Priustoric	All that transpired before the Prius
PHEV	Plug-In Hybrid Electric Vehicle
PPM	Parts Per Million, the scale at which emissions are common measured, literally a count of matter within a unit
PSD	Power-Split Device, the planetary gear set which divides power between the ICE and the two electric motor-generators, also functions as the continuously-variable transmission.
PZEV	Partial Zero Emission Vehicle. (A manufacturer must eliminate evaporative emissions and ensure that the vehicle will run cleanly for its entire projected life. Even if the vehicle is just sitting in the driveway, it is still polluting. The source of this pollution is hydrocarbons emitted from the gas tank as gasoline slowly evaporates. To achieve PZEV certification, all evaporative emissions must be eliminated.)
R&D	Research & Development
SE	SKS: Smart-Entry. It is a proximity detection system that automatically senses a wireless transmitter (called a "fob") in your pocket or purse, allowing you to <i>unlock the doors & hatch</i> without the need to use a physical key or push a button on a remote.
SKS	Smart-Key-System (formally known as SE/SS: Smart-Entry & Smart-Start) It is the collective term used to describe all features of the wireless system available with some models of Prius.
SOC	State Of Charge, indicating the amount of stored electricity available in the battery-pack
SS	SKS: Smart-Start. It is proximity detection system that automatically senses a wireless transmitter (called a "fob") in your pocket or purse, allowing you to <i>start the hybrid system</i> without the need to use a physical key or push a button on a remote.
Stealth	Electric-Only driving (up to 42 MPH for Classic & HSD Prius) without the engine in motion.
SRS	Supplemental Restraint System, better known as Airbags
SULEV	Super Ultra Low Emission Vehicle (only a few vehicles qualify for this clean rating category, Prius is among them)
THS	Toyota Hybrid System - Toyota's hybrid design for the Classic Prius
Torque	Measurement value indicating wheel turning force, a strength value different from horsepower
TRAC	Toyota Rent-A-Car, a program by which some have shortened the waiting time: when the demo/rental units reach a time/mileage it permits the dealer to sell them.

Turtle	Driving a Prius with the battery-pack extremely drained of electricity, in conditions too hot (typically above 105 F degrees), or conditions too cold (typically below -10 F degrees), so that an orange "turtle" icon displays near the speedometer. This warns the driver to avoid forceful acceleration.
ULEV	Ultra Low Emission Vehicle (as of the 2003 model-year there were 90 vehicle models in the United States that met the rating criteria)
V	Volt or Voltage, an electrical measurement unit used when describing attributes of Prius propulsion components.
VIN	Vehicle Identification Number, the worldwide identifier unique to each vehicle ever built
Vaporware	A term from the computer industry used to describe claims made by a company about a product that was never delivered. It sounded great in concept, but for whatever reason was impractical in the end. In other words, don't believe it until you actually see the product available for consumers to purchase.
VSC	Vehicle Stability Control, a safety feature that automatically engages side-specific braking for you when it detects the vehicle wheels slip; stepping on the brake is not necessary for the feature to work
ZEV	Zero Emission Vehicle

Prius Generations:

	<i>Original</i>	<i>Classic</i>	<i>HSD</i>
Engine HP	58	70	76
Engine kW	43	52	57
Engine RPM Redline	4000	4500	5000
Motor HP	40	44	67
Motor kW	30	33	50
Motor Torque	225	258	295
0-60 MPH (seconds)	14.1	12.5	10.1
Tire Width	165	175	185
Tire Diameter	15	14	15
Battery-Pack Energy (W/kg)	600	900	1250
Battery-Pack Voltage	288	273.6	201.6
Battery-Pack Weight (lbs)	125	110	99
Battery-Pack Section Type	D-Cell	Module	Module
Battery-Pack Section Count	40	38	28
Hybrid-System Voltage	288	273.6	500

CLASSIC: Touch-Sensitive version of the Multi-Display was introduced.

HSD: Electric A/C was introduced. Multi-Display size was increased.