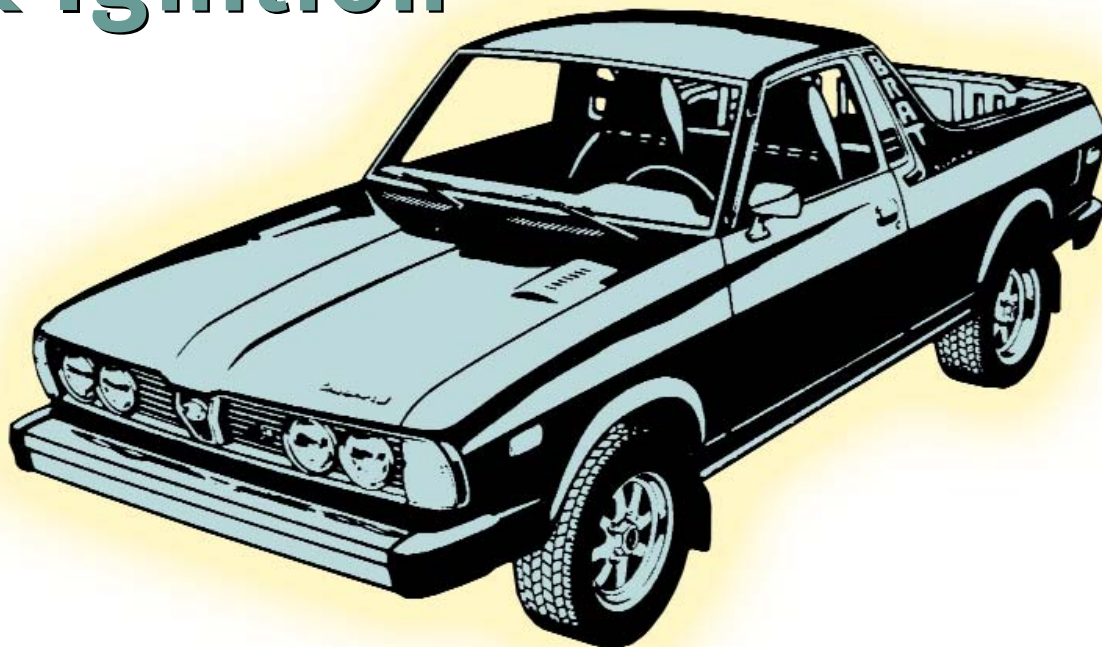


# The Way They Were: Pre-OBD II Diagnostics & Ignition



**W**here longevity is concerned, nothing beats a Subaru. Statistics? Well, 96 out of 100 sold in the last 10 years are still on the road.\* Then there are the real-world examples we've all seen, such as the '85 wagon that showed up at a New England press preview with an odometer reading of 325,000 — and there's no lack of salt on the roads up there. Or, this statement from a California specialist: "We see Subarus with 250,000 miles on them that have never had engine work." And, if you'll recall, the original Legacy in stock turbo trim held the World Speed Endurance record of 138 mph for 100,000 kilometers for years and years.

This kind of durability breeds rabid loyalty among owners. It also means that you're apt to be working on quite a few older models. Ergo, we figured we'd better refresh your memory about the electronic engine management diagnostics used in Subaru vehicles of yesteryear.

Until the advent of OBD II, Subaru self-diagnostics were different from anybody else's. There were four modes: U-Check, D-Check, Read Memory, and Clear Memory.

The U (for User)-Check is simply what turns on the MIL (Malfunction Indicator Lamp, also known as the Check Engine light) when any EFI components necessary for basic starting and driving functions are found wanting. The D (for Dealer)-Check is the most useful — it's where you'll find codes for the whole engine management system.

To enter this mode, get the engine up to normal operating temperature, shut it off, connect the two green test plugs (under the dash by the steering column, or on the engine side of the firewall by the master cylinder), turn on the ignition, and watch the Check Engine light (on pre-1990 models, look at the O2 monitor lamp, which is visible through a hole in the MPFI control box under the steering column).

\* Based on the Polk Company Retail Registration statistics for the period ending 6/30/03.

Mode	Engine	Read Memory Connector	Test Mode Connector
U-check	Ignition on	Disconnect	Disconnect
Read memory	Ignition on	Connect	Disconnect
D-check	Ignition on, engine on	Disconnect	Connect
Clear memory	Ignition on, engine on	Connect	Connect

*On pre-OBD II Subaru vehicles, follow this chart to access the four self-diagnostic modes of the electronic engine management system.*

If a fault is currently present, a code will be flashed out. Read it as follows: Each long flash (1.2 seconds) represents ten, and each short flash (0.2 second) one. So, Code 23 would appear as two long flashes, then three short flashes. After a pause of 1.8 seconds, the message is repeated.

“On pre-1990 models, it’s easy to tell if the oxygen sensor is working,” says a former SOA training manager. “Get it up to normal operating temperature, then look at the LED on the computer. If it’s flashing, the sensor’s working.”

### Glitches

Driveability and emissions items specific to Subarus lend themselves to a list, to wit:

- The fuel cut control unit on ‘89-’93 Loyales provides the ground for the fuel pump. So, if you get one that won’t start and has no fuel pressure, check out the unit, which is mounted near the hood release.



*A customer who's fond of fording streams may show up at your door with the Check Engine lamp on. If you get a code 32, the oxygen sensor was probably flooded with water. Simply clear the code and the car will be good to go.*

- On '85 and later Loyale MPFI cars, cutting out and dramatic surging over 2,000, mostly while cold, could be caused by excessive charging system voltage. Anything over 15V makes the computer lose its mind.
- A Legacy with a strange whistling noise may have a bend in the catalytic converter's inlet shield ring. Pull it apart and blow compressed air around the ring to see if you get the sound.
- Another source of whistling is a carboned-up ISC valve.
- Stalling or idle surge may also be caused by the ISC valve — you can't adjust it, so get a new one.
- '95 Legacy vehicles have a speed limiter that kills injection at 113 mph. So, a malfunctioning vehicle speed sensor that sends a signal indicating that number or higher will shut down the engine. A customer who complains because he can't go faster than that should be ejected from your place of business.
- A Legacy's idle quality can actually degrade from corrosion in the connection between the spark plug terminal and the wire.
- If the oxygen sensor of a Legacy gets flooded with water, it could illuminate the MIL and set a code 32. The sensor will be fine, so just clear the memory.
- Make sure that Impreza is fully warmed up and at normal idle speed before you even think about making a throttle position switch adjustment.
- Stalling or even an instantaneous backwards crank can set a false code 11 or 13.
- If you're ever fortunate enough to get a tune-up on an SVX (the test drive will be a blast — that flat six is one great motor), you should be aware that there are two frame rail access holes for R&R of #5 and #6 spark plugs. The holes are only big enough in diameter for your 3/8th extension, which you stick through then attach to the socket.
- You can run an emissions test on any '87-1/2 and up four-speed automatic AWD Subaru using a two-wheel dyno. Just install a fuse in the receptacle you'll find under the hood near the driver's side shock tower that's labeled "FWD." This completes the ground path of a circuit that controls power flow to the rear wheels.

- Again on emissions checking with a dyno, TCS-equipped Subarus should have the switch on the dash turned off AFTER starting the engine, but before any testing begins.
- Reduced performance, a glowing MIL, and a code 22 (or 28 on the SVX) may mean that the knock sensor has a broken internal lead wire.
- By causing a lean mix, a clogged fuel filter can set a code 41 in a Legacy.
- A code 42 in a '90 Legacy, possibly accompanied by hard shifting of the 4EAT, may be due to corrosion in the three-pin connector F23/F24 (clear, and located near the battery and main harness connectors).
- F.Y.I., in '97s the charcoal canister uses manifold vacuum instead of ported vacuum, and in '96 and up models a loose fuel cap will illuminate the MIL as part of the OBD II strategy.

## Old Sparky

On all older models except Legacy and Impreza, variable spark lead is used to stabilize idle speed, so you should be aware of the checking/setting procedure for ignition timing. First, you'll have to remove the spare tire, which resides in the engine compartment (the timing marks are on the flywheel, and the viewing port has a rubber cover — that is, except on the Justy, which has a more conventional three and regular marks on the crank pulley), then plug the two green test connectors together as you do to get trouble codes. Make sure you're at curb idle speed with the idle contacts closed, then shine the light.

A variation on this is the '85-'86 turbo, for which you unplug the five pin knock sensor connector, then set the timing.

Another ignition-related point is that '86-'94 SPI (Single Port Injection — the old two-belt 1.8L) engines have distributors with a photo-sensitive diode and a shutter wheel with 360 tiny slits. Make sure the slits aren't blocked with dirt or grease. Subaru models with MPFI have a magnetic pickup/reluctor ignition. Cylinder #1, by the way, is at the front of the passenger's side, and the firing order is 1-3-2-4. ■