

TECH TIPS

SERVICE TIPS FOR THE AUTOMOTIVE TECHNICIAN

TAKING THE MYSTERY OUT OF SUBARU TIMING BELT REPLACEMENT

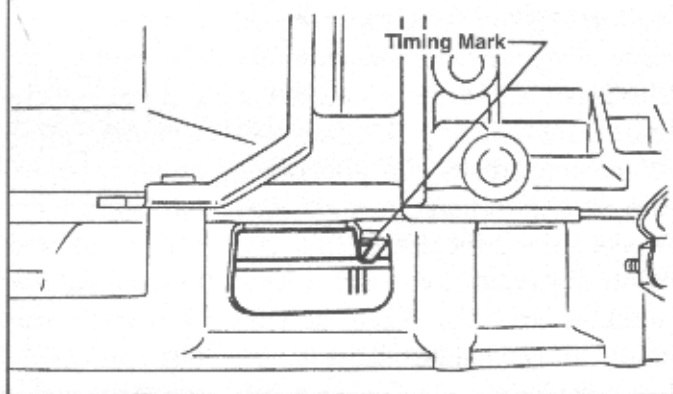
At the tech line we get a high volume of calls regarding how to replace the timing belt on those models equipped with dual belts. This setup first appeared around 1985 and since that time the service procedures have been a little vague. The most important item to remember on this setup is that this engine is NOT at top dead center when the cam and crankshaft marks are aligned.

At the flywheel end of the engine, there are two sets of timing marks. One set is used for the ignition timing and places the #1 cylinder at top dead center. The other set is the correct one to use for timing belt replacement. This consists of three lines closely spaced (refer to

diagram #1). In order to place the crankshaft in the proper position, the middle line of this set must be aligned with the timing pointer.

This places the cams in a position so that they won't be affected by spring pressure and rotate out of position. Set the right bank cam to the 12 o'clock position (refer to diagram #2). Install the right-hand timing belt and tension as required. Before you install the left bank timing belt, rotate the crankshaft one full turn. At this point, the right cam timing mark will now be in the 6 o'clock position. Now, set the left bank cam timing mark to the 12 o'clock position (refer to diagram #3). Install the left belt and complete the job.

Diagram #1



When the cams are correctly timed, one cam will be at the 12 o'clock position, and the other will be at the 6 o'clock position. Under no circumstances should the distributor require removal unless it is to be replaced. The distributor is gear driven by the left bank cam and if both cams are correctly aligned, the distributor will be properly aligned.

Pat Sugar

— Top Gun Technician

Diagram #2

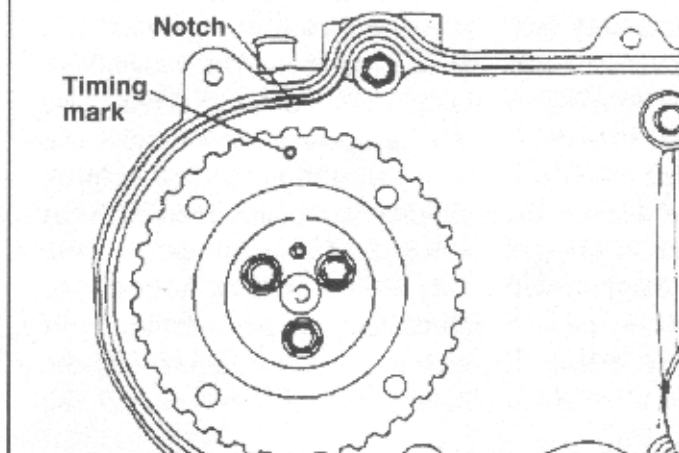
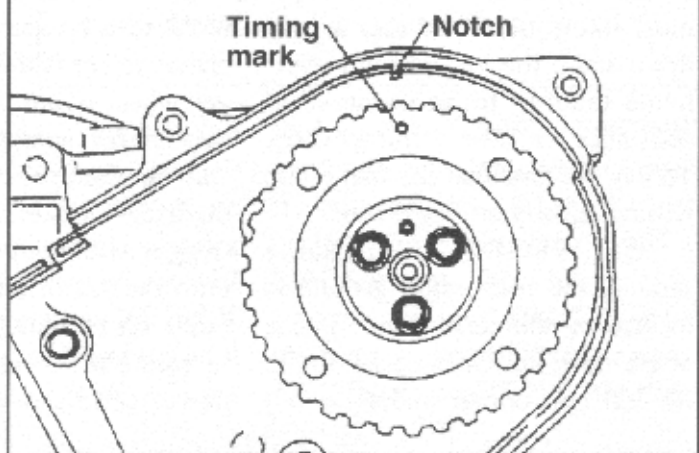


Diagram #3



FORD TAURUS, MERCURY SABLE- 1986 TO 1995- CUTS OUT, STALLS INTERMITTENTLY

The following problem could be a straight forward diagnosis, or it can be a nightmare for you, depending on how the vehicle arrives at your shop. The customer complaint is that the car cuts out or stalls intermittently. The car may restart immediately, or after waiting several minutes, it may start without any difficulty. In fact, this problem may occur every few weeks or months. When the customer brings you the car, it is running flawlessly. This is what can make the diagnosis of this problem difficult. If you are lucky, the customer may have noticed that some accessories such as the power windows, door locks, mirrors, and courtesy lights worked poorly or not at all when the car cut out and was difficult to restart. This problem is most likely caused by a poor fuel pump ground which is characteristic of this model. The reason we added the fact that the accessories worked poorly or not at all is because they all share this common ground. This problem is most likely to occur after a long drive since the bad ground overheats leading to an increase of resistance, creating a voltage drop. This is the time that the fuel pump will run slowly or shut down.

On 1986-89 Taurus/Sable sedans, the fuel pump ground is located on the center brace inside of the deck lid. On wagons it is in the left rear corner under the tail

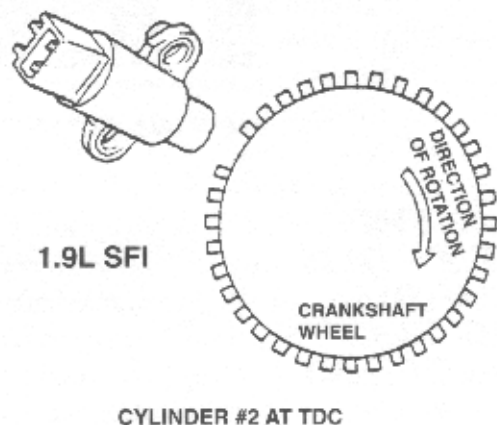
light. On 1990-95 vehicles, the ground is located on the driver's side rocker panel, under the trim plate, approximately in the center of the driver's door opening. Usually this problem develops because the self tapping screw was insufficiently tightened from the factory. The fix is to thoroughly clean the surface of paint and/or rust and firmly tighten the attaching screw.

Peter Mc Ardle
— Domestic Specialist

FORD ESCORT/ MERCURY TRACER- 1.9L. ENG- 1991 & LATER- NO START AFTER BROKEN ACCESSORY BELT

If you get one of these vehicles that experiences a no start or a lack of power condition after someone replaced a broken accessory belt, check to see if the crankshaft trigger wheel is out of sync. When a belt breaks, sometimes it finds its way between the crank sensor and the trigger wheel. As a result, the trigger wheel, which is pressed onto the crankshaft damper, will rotate on the damper, just enough to create a no start or a lack of power condition due to retarded

Diagram #4



base ignition timing. A quick way of verifying this is to bring the #2 cylinder to top dead center of the compression stroke. Now, check to see if the crankshaft position sensor is lined up with the missing tooth space of the trigger wheel (refer to diagram #4). If it is not, then you have found your problem. At this point do not attempt to repair the damper. It must be replaced.

James D'Anna
— Top Gun Technician

BUDGET DIAGNOSTICS

Most of us may remember that we have an old carburetor fuel pressure gauge sitting someplace in our tool box. You remember? Only reading up to 15 psi and also measuring vacuum. This tool can be an invaluable aid in helping diagnose problems even with the newer fuel systems that we see today. One use can help if you think you may have an intake air leak in a V type engine, and the intake valley is sealed to the

crankcase and the heads. Please, **DO NOT** add propane into the crankcase. This method has been known to cause explosions within the crankcase from unexpected combustion, sending valve covers into orbit. Instead, disable any crankcase breathing or ventilation systems, then block all of the breather ports leading to the crankcase. Next, install your vacuum/pressure gauge onto the oil dipstick tube. After starting the engine, observe the gauge. Your gauge should never indicate that vacuum is present. If your gauge does, then you have found your intake leak, which is in the valley area. Even a tight engine has some blowby, and since you have closed the crankcase, the gas has nowhere to go. This creates some pressure that should be indicated by your gauge.

Another use for your old gauge is to check fuel system operation. Many vehicles use dual fuel pump systems. Others use three pumps as well as more than one fuel tank. Most of the dual pump systems use a lift or supply pump in the fuel tank together with an external high-pressure pump. When the pressure at the fuel rail is low, here is a way to determine which pump is not working properly. Using a "t" fitting, install your gauge between the high and low pressure pumps. With the pumps running, check your pressure reading. If the low-pressure pump is OK, you will read low pressure. If the low-pressure pump is not working correctly, or, if the fuel inlet is restricted, you will read vacuum

on your gauge. This is the result of the high pressure pump doing all of the work.

Jeff Auerbach
— Domestic Specialist

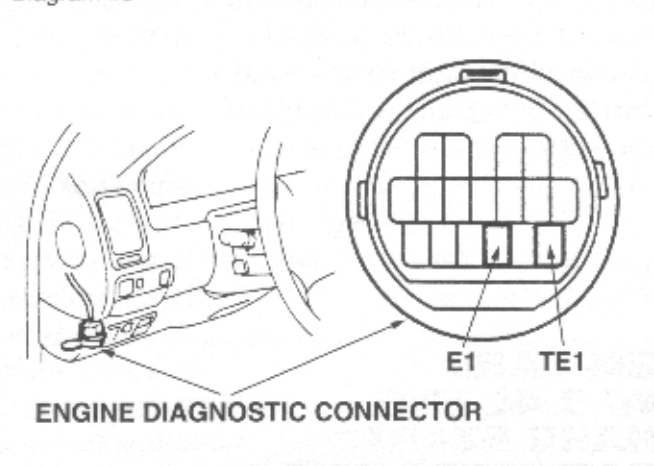
1990-94 LEXUS 400S - "CHECK ENGINE" AND TRACTION ("TRAC") LIGHTS ILLUMINATED

If you or someone just replaced a timing belt, or, performed a repair which required removal of the timing belt, and now both warning lights are illuminated, this tip is for you.

This engine is equipped with dual distributors. Each distributor has a cam sensor. The ECM uses these camshaft sensors for fuel injection synchronization. This engine also uses a crankshaft sensor to determine engine speed as well as determining when cylinder #1 is at top dead center. If the ECM sees cylinder #1 on the crank sensor, but does not see the proper sequence of camshaft timing through the cam sensors, it will then illuminate the "CHECK ENGINE" lamp and store a hard fault code. Most of these vehicles

are equipped with a traction control system. Lexus refers to this system as "TRAC". There is an indicator light on the dash board which shows whether the system is engaged. One of the inputs the "TRAC" system relies upon is the engine speed signal which is supplied from the ECM. If the engine speed signal is not there, or does not look correct, the "TRAC" light will stay illuminated no matter which position the button is in. At this point, the first step is to check for trouble codes in both systems. To check for codes in the engine ECM, place a jumper wire from terminal "TE1" to terminal "E1" of the diagnostic connector under the left side of the dashboard (refer to diagram # 5). Now, turn the ignition key to the "ON" position. At this point, just count the

Diagram #5

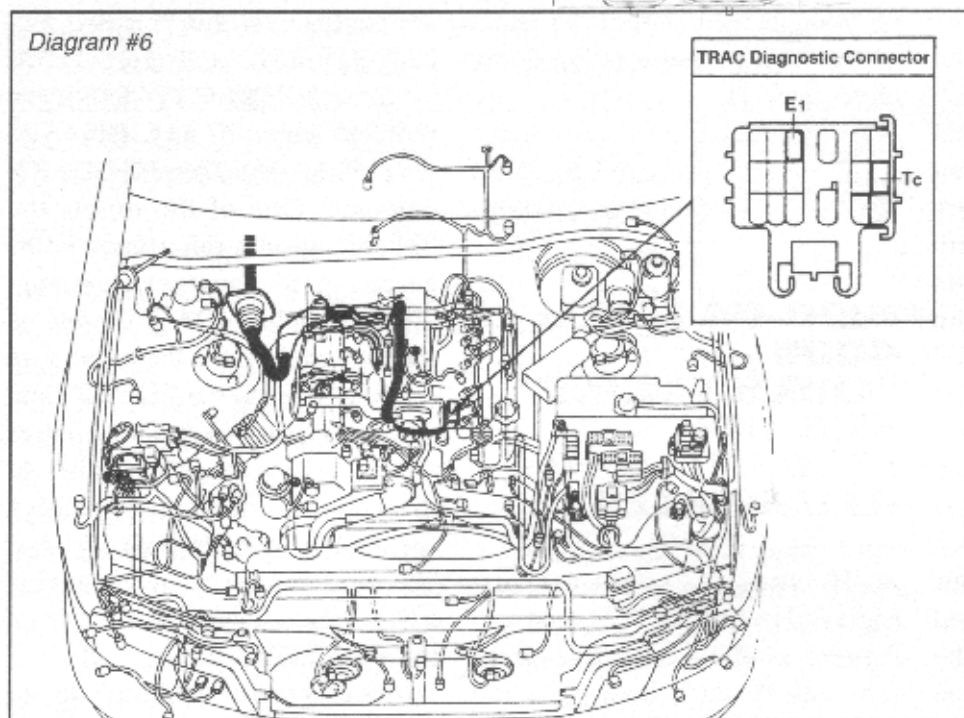


flashes of the "CHECK ENGINE" light, and record the trouble codes. If you see codes : 12,13,14,15,17, or 18, your timing belt is off at least one tooth. To check for trouble codes in the "TRAC" system, place a jumper wire from terminal "TC" to terminal "E1" of the diag-

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Diagram #6



nostic connector under the hood (refer to diagram # 6). As before, turn the ignition key to the "ON" position and count the flashes of the "TRAC" light. If you discover that any codes are present: 44 or 51 (singularly or in combination), then the timing belt is off at least one tooth.

Vincent Walsh
— Top Gun Technician

GM CARS W/ 3.4L ENG.- HARD START, BACKFIRES WHILE CRANKING, STALLS

This tip applies to the 3.4l "S", and "X" engines with a manual transmission. Specifically: 1993-91 Lumina, Grand Prix, and Cutlass Supreme with

the 3.4L dual overhead cam engine; and 93 and up-Camaro, Firebird with the 3.4L OHV engine.

These vehicles may be hard to start, backfire through the intake on cranking, or may stall upon deceleration or at any low speed when the clutch pedal is depressed.

Both of these engines use an inductive or permanent magnet type crankshaft position sensor. With this type of sensor, the distance the sensor is situated from the triggering wheel or crankshaft will influence sensor output. What we have seen in some cases is that the crankshaft thrust bearing is worn enough so as to position the trigger wheel on the crankshaft far away enough to limit the crank sensor's output, creating the symptoms we have described. The correct specification for crankshaft end play for both engines is .0024"

to .0083". By the time the vehicle is in your shop exhibiting these symptoms, the end play is usually much greater than the specs will allow. The fix is to check the crank thrust surfaces, and if you're lucky, only the thrust bearing will have to be replaced.

Peter Mc Ardle
— Domestic Specialist

GM "G" SERIES VANS- 1986-92 - ELECTRICAL PROBLEMS

If you do any type of electrical trouble shooting on these vans, we have experienced that the bulk-head connector on the firewall of these vehicles has been more than a major contributor to the electrical problems that these vans experience. It seems that this connector is not immune to corrosion problems from the elements. Compound that with the fact that the battery is not too far away. Any type of overcharging problems as well as a leaking battery will add some sulfuric acid to that connector, resulting in more corrosion. We have seen many cases of: no start, hard start, intermittent trouble codes, inoperative speedometer, inoperative gauges, intermittent light operation, and false ABS codes just to name a few!

Julio Oyola
— Domestic Specialist