

TUNE-UP PROCEDURES

Introduction

In order to extract the full measure of performance and economy from your engine, it is essential that it be properly tuned at regular intervals. A regular tune-up will keep your car's engine running smoothly and will prevent the annoying breakdowns and poor performance associated with an untuned engine.

A complete tune-up should be performed at least every 12,000 miles (19,200 km) or 12 months, whichever comes first. The interval should be halved if the vehicle is operated under severe conditions such as trailer towing, prolonged idling, start-and-stop driving, or if a driveability problem such as hard starting or poor running is noticed. It is assumed that the routine maintenance described in **Section 1** has been kept up, as this will have a decided effect on the results of a tune-up.

If the specifications on the underhood tune-up sticker (located in the engine compartment of your car) disagree with the tune-up specifications chart in this section, the figures on the sticker must be used. The sticker often reflects changes made during the production run or revised information that applies to the particular systems in that vehicle.

Spark Plugs

A typical spark plug consists of a metal shell surrounding a ceramic insulator. A metal electrode extends downward through the center of the insulator and protrudes a small distance. Located at the end of the plug and attached to the side of the outer metal shell is the side electrode. The side electrode bends in at a 90° angle so that its tip is even with, and parallel to, the tip of the center electrode. The distance between these two electrodes (measured in thousandths of an inch) is called the spark plug gap. The spark plug in no way produces a spark, but merely provides a gap across which the current can arc. The coil produces anywhere from 20,000-40,000 volts which travels to the distributor, where it is transmitted through the spark plug wires to the spark plugs. The current passes along the center electrode, and, in doing so, ignites the air/fuel mixture in the combustion chamber.





A variety of tools and gauges are needed for spark plug service

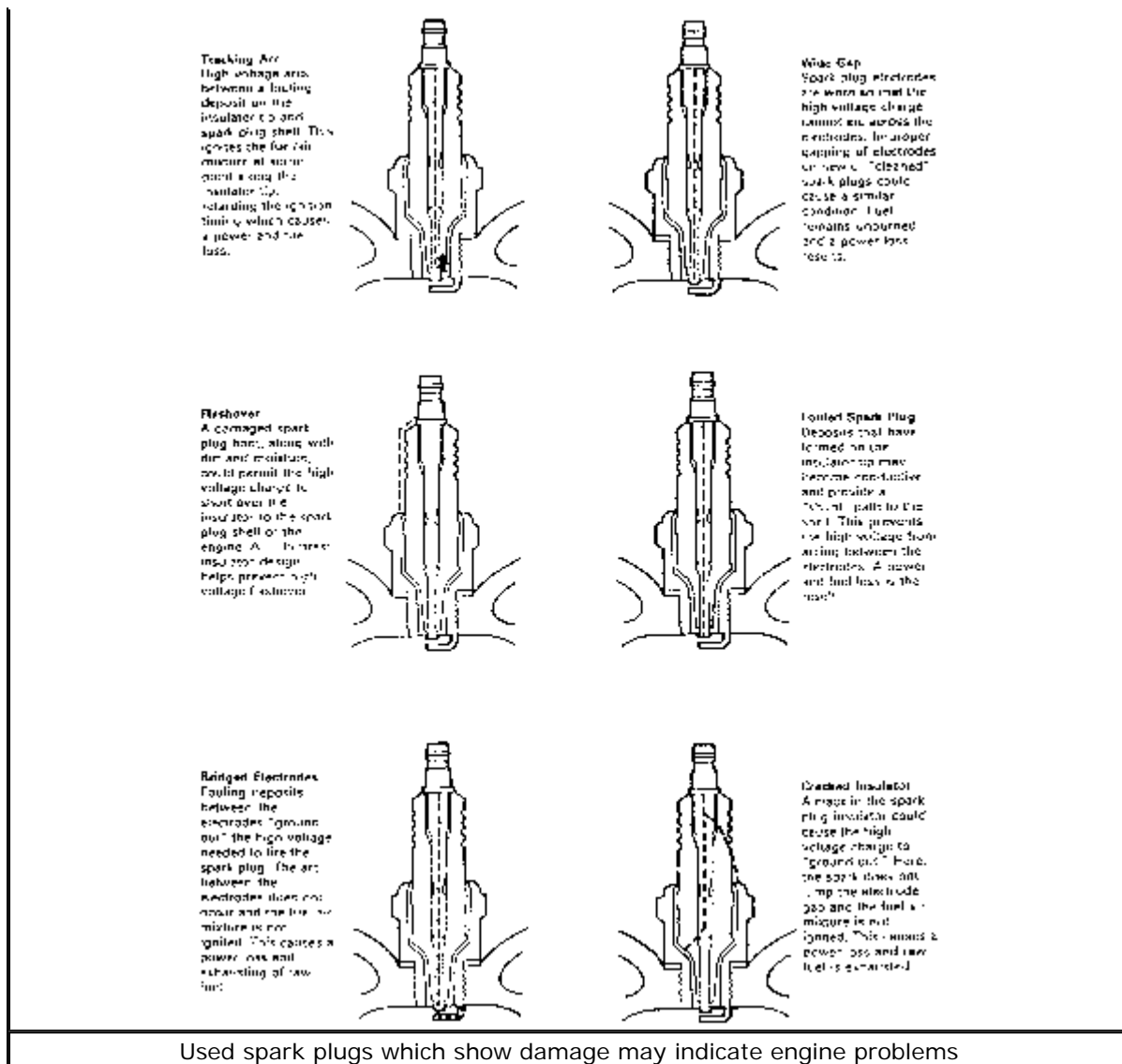
Spark plugs ignite the air and fuel mixture in the cylinder as the piston reaches the top of the compression stroke. The controlled explosion that results forces the piston down, turning the crankshaft and the rest of the drive train.

The average life of a spark plug is dependent on a number of factors; the mechanical condition of the engine, the type of fuel, driving conditions and driving style.

Ford recommends that spark plugs be changed every 30,000 miles (48,000 km). Under severe driving conditions, those intervals should be halved. Severe driving conditions are:

- **Extended periods of idling or low speed operation, such as off-road or door-to-door delivery.**
- **Driving short distances (less than 10 miles/16 km) when the average temperature is below 10°F (12°C) for 60 days or more.**
- **Excessive dust or blowing dirt conditions.**

When you remove the spark plugs, check their condition. They are a good indicator of the condition of the engine. It is a good idea to remove the spark plugs at regular intervals, such as every 6,000 or so miles (9,600 km), just so you can keep an eye on the mechanical state of the engine.

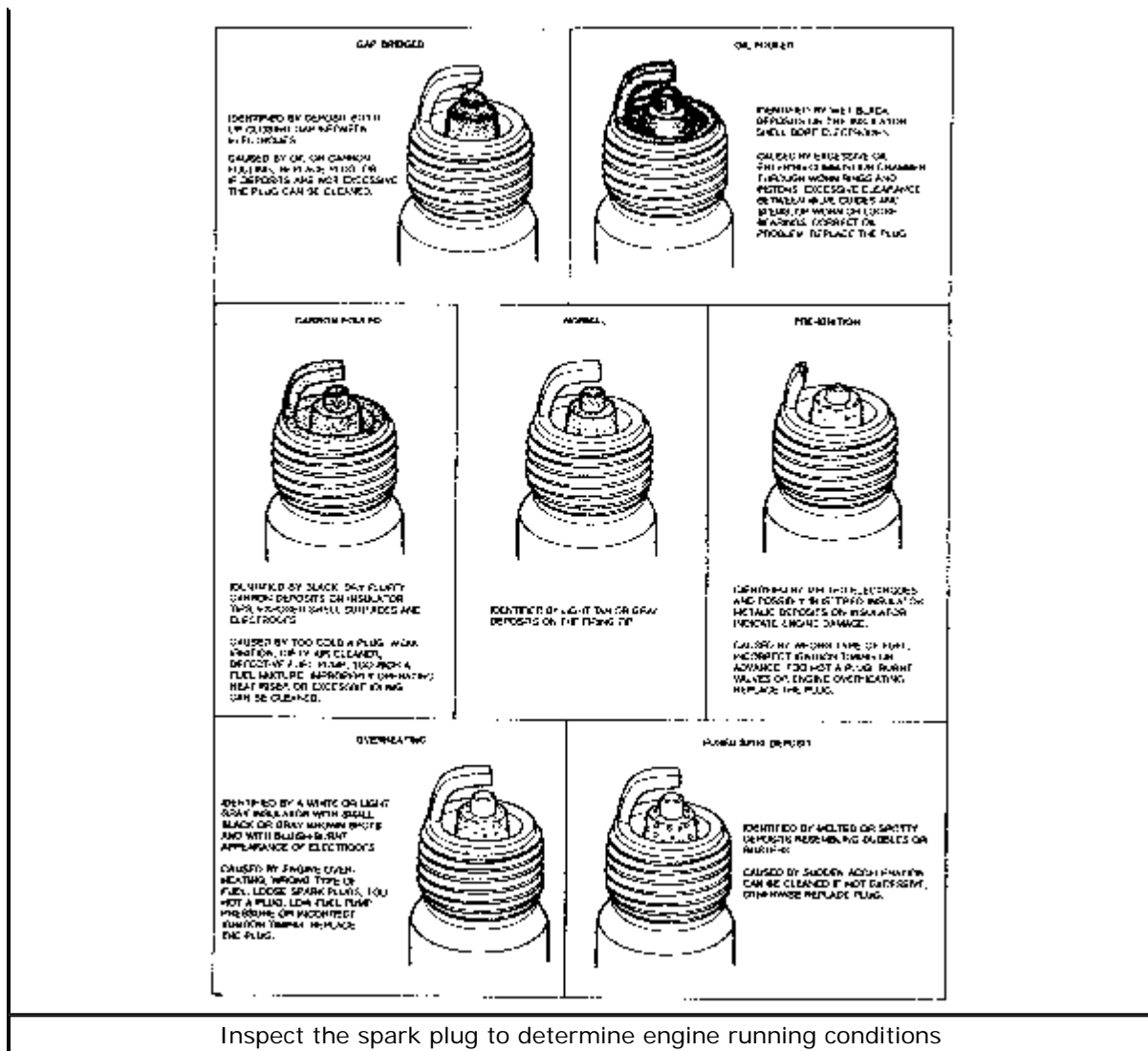


[Click to enlarge](#)

A small deposit of light tan or gray material on a spark plug that has been used for any period of time is considered normal. Any other color, or abnormal amounts of deposit, indicate that there is something amiss in the engine.

The gap between the center electrode and the side or ground electrode can be expected to increase not more than 0.001 in. (0.025mm) every 1,000 miles (1,600 km) under normal conditions. When, and if, a plug fouls and begins to misfire, you will have to investigate, correct the cause of the fouling and either clean or replace the plug.

There are several reasons why a spark plug will foul and you can learn which reason is at fault by just looking at the plug. A few of the most common reasons for plug fouling and a description of fouled plug appearance are shown in the corresponding chart.



[Click to enlarge](#)

SPARK PLUG HEAT RANGE

Spark plug heat range is the ability of the plug to dissipate heat. The longer the insulator (or the farther it extends into the engine), the hotter the plug will operate; the shorter the insulator, the cooler it will operate. A plug that absorbs little heat and remains too cool will quickly accumulate deposits of oil and carbon since it is not hot enough to burn them off. This leads to plug fouling and consequently to misfiring. A plug that absorbs too much heat will have no deposits, but, due to the excessive heat, the electrodes will burn away quickly and in some instances, preignition may result. Preignition takes place when plug tips get so hot that they glow sufficiently to ignite the fuel/air mixture before the actual spark occurs. This early ignition will usually cause a pinging during low speeds and heavy loads.

The general rule of thumb for choosing the correct heat range when selecting a spark plug is: if most of your driving is long distance, high speed travel, use a cooler plug; if most of your driving is stop and go, use a hotter plug. Original equipment plugs are compromise plugs, but most people never have occasion to change their plugs from the factory recommended heat range.

REPLACING SPARK PLUGS

A set of spark plugs usually requires replacement every 30,000 miles (48,000 km), depending on your style of driving. In normal operation, plug gap increases about 0.001 in. (0.025mm) for every 1,000-2,500 miles (1,600-4,000 km). As the gap increases, the plug's voltage requirement also increases. It requires greater voltage to jump the wider gap and about two-to-three times as much voltage to fire a plug at higher speeds than at idle.

The spark plugs used in your car require a deep spark plug socket for removal and installation. A specially designed pair of wire removal pliers, Spark Plug Wire Remover T74P-6666-A or equivalent, is also a good tool to have for vehicles other than the 3.0L/3.2L SHO. The special pliers have cupped jaws that grip the plug wire boot and make the job of twisting and pulling the wire from the plug easier.

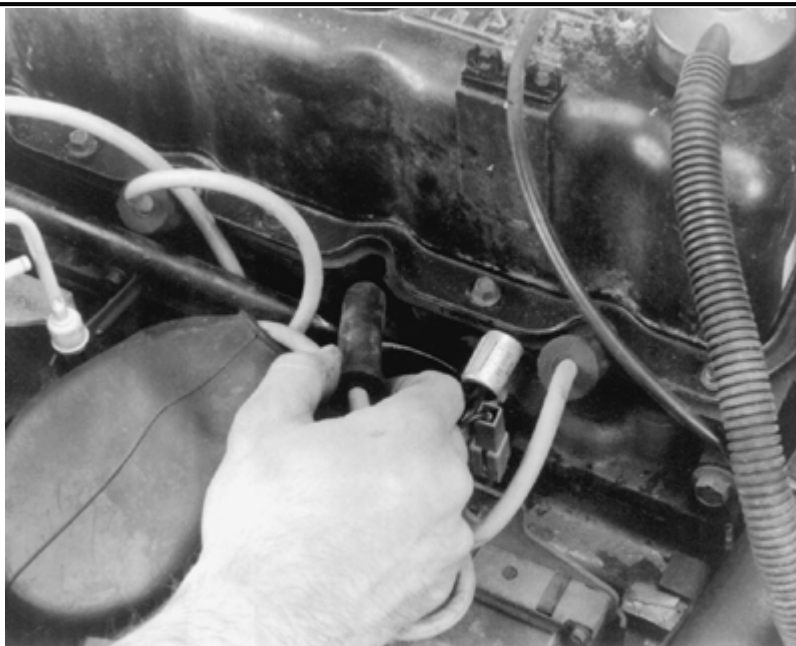
REMOVAL & INSTALLATION

When you are removing spark plugs, you should work on one at a time. Avoid removing the plug wires all at once because, unless you number them, they may get mixed up; if you must (or prefer to) do so, take a minute before removing the wires to number them with tape. The time you spend doing this will pay off later when it comes time to reconnect the wires to the plugs.

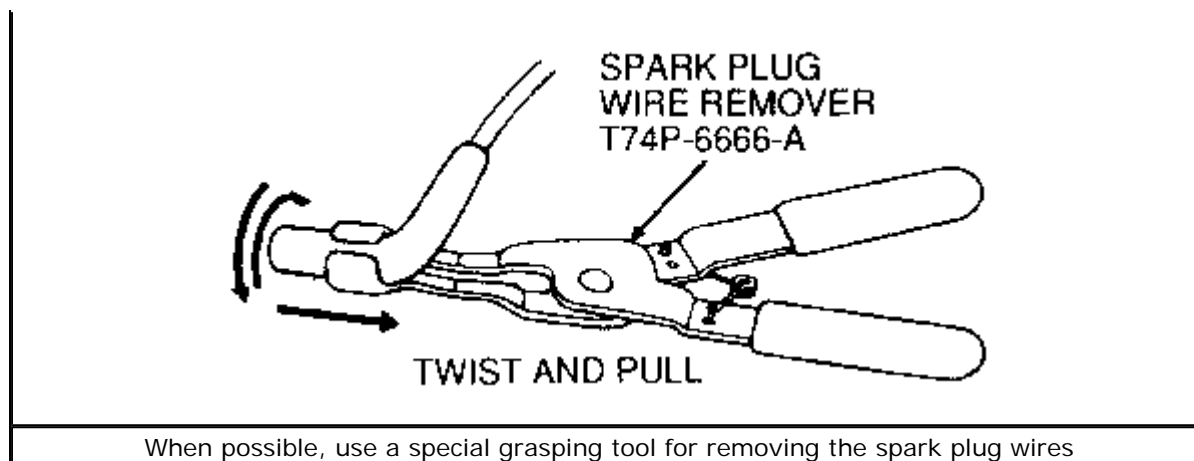
The original spark plug wires are marked for cylinder location. If replacement wires have been installed, be sure to tag them for proper location. It is a good idea to remove the wires one at a time, service the spark plug, reinstall the wire and move onto the next cylinder.

For easy access when servicing the spark plugs, remove the air cleaner assembly and air intake tube.

1. **Disconnect the negative battery cable.**
2. **Twist the spark plug boot and gently pull it from the spark plug. For all vehicles except the 3.0L and the 3.2L SHO, using the special plug wire pliers will aid in ease of removal and prevent damage to the wire and inside connector.**



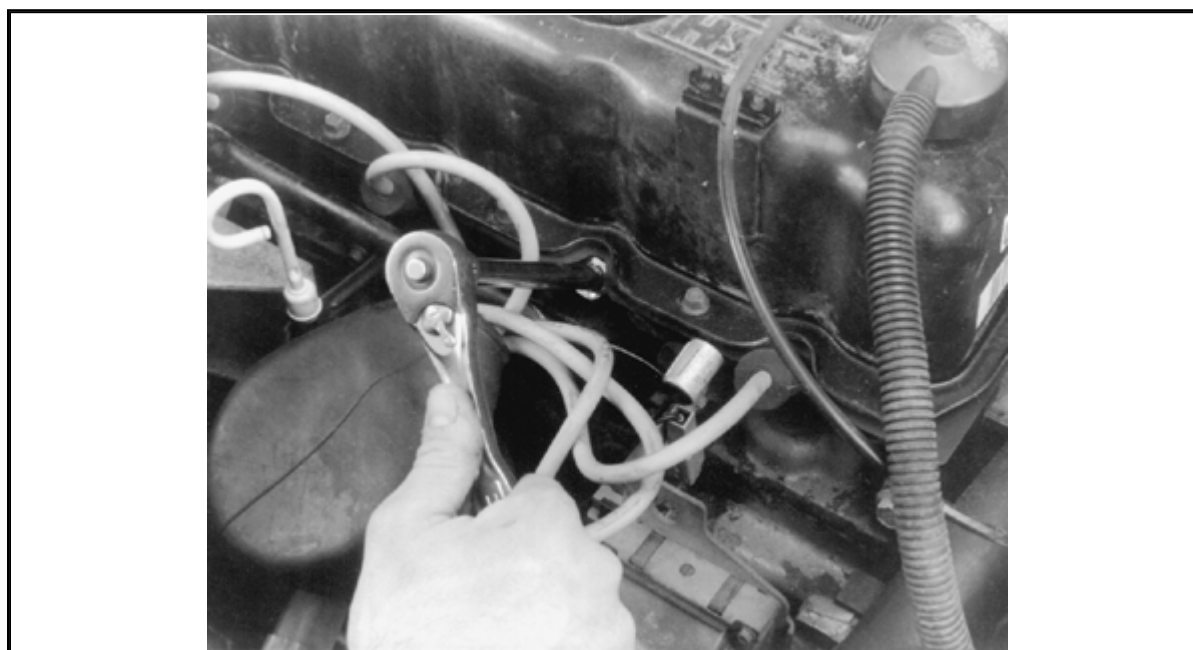
Gently twist and pull the boot to remove the spark plug wire; NEVER pull on the wire itself



WARNING

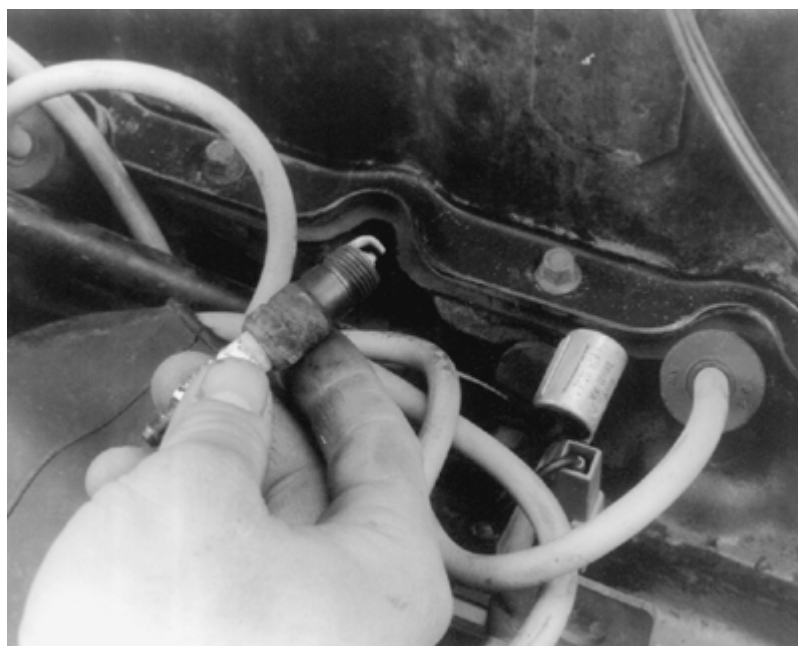
NEVER pull on the wire itself, as damage to the inside conductor could occur! If available, use Spark Plug Remover Tool Y74P-6666-A or equivalent to prevent the wire separating from its connector inside the boot.

3. The plug wire boot has a cover which shields the plug cavity (in the cylinder head) against dirt. After removing the wire, blow out the cavity with compressed air or clean it out with a small brush, so no foreign material enters the cylinder when the spark plug is removed.
4. Remove the spark plug with a plug socket. Turn the socket counterclockwise to remove the plug. Be sure to hold the socket straight on the plug to avoid breaking the insulator. A deep socket designed for spark plugs has a rubber cushion built-in to help prevent plug breakage.



It will be easier to remove the spark plug using a socket with an extension

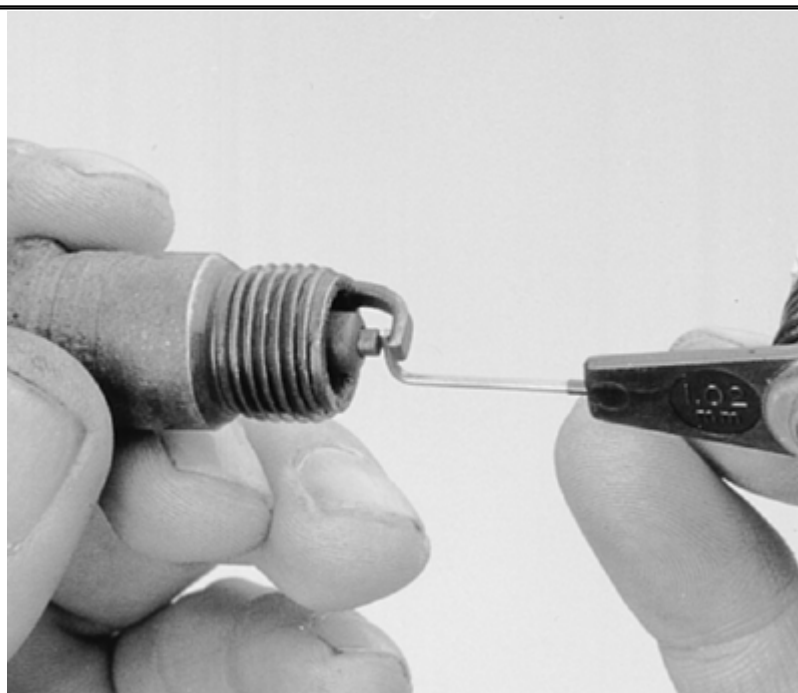
5. Once the plug is out, compare it with the spark plug illustrations to determine the engine condition. This is crucial since spark plug readings are vital signs of engine condition and pending problems.



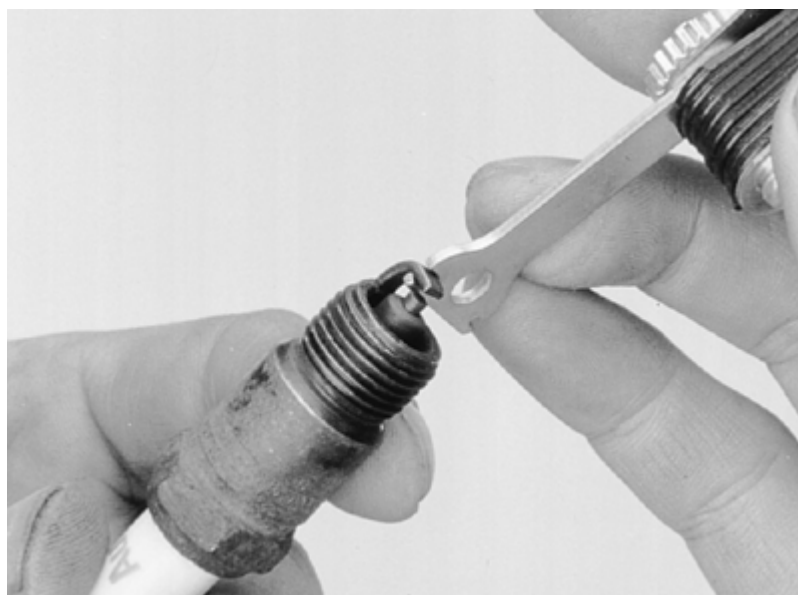
Inspect the plug for signs of fouling or deposits

To install:

- 6. If the old plugs are to be reused, clean and regap them. If new spark plugs are to be installed, always check the gap. Use a round wire feeler gauge to check plug gap. The correct size gauge should pass through the electrode gap with a slight drag. If you're in doubt, try the next smaller and larger sizes. The smaller gauge should go through easily and the larger should not go through at all. If adjustment is necessary, use the bending tool on the end of the gauge. When adjusting the gap, always bend the side electrode. The center electrode is non-adjustable.**



Always use a wire gauge to check the electrode gap on used plugs



Adjust the gap by bending the side electrode very slightly towards or away from the center electrode

7. **Squirt a drop of penetrating oil on the threads of the spark plug and install it. Don't oil the threads heavily. Turn the plug in clockwise by hand until it is snug.**

CAUTION

Do NOT use the spark plug socket to thread the plugs. Always thread the plug by hand to prevent the possibility of cross-threading and damaging the cylinderhead.

8. **After the the plug is finger-tight, torque it to 17-22 ft. lbs. (23-30 Nm). DO NOT OVERTIGHTEN!**
9. **Thinly coat the inside of the boot and terminal with silicone dielectric compound (Motorcraft D7AZ-19A331-A or equivalent).**
10. **Install the plug wire boot firmly over the spark plug. Push the boot until it clicks into place. The click may be felt or heard, then gently pull back on the boot to assure proper contact.**
11. **Connect the negative battery cable.**

Spark Plug Wires

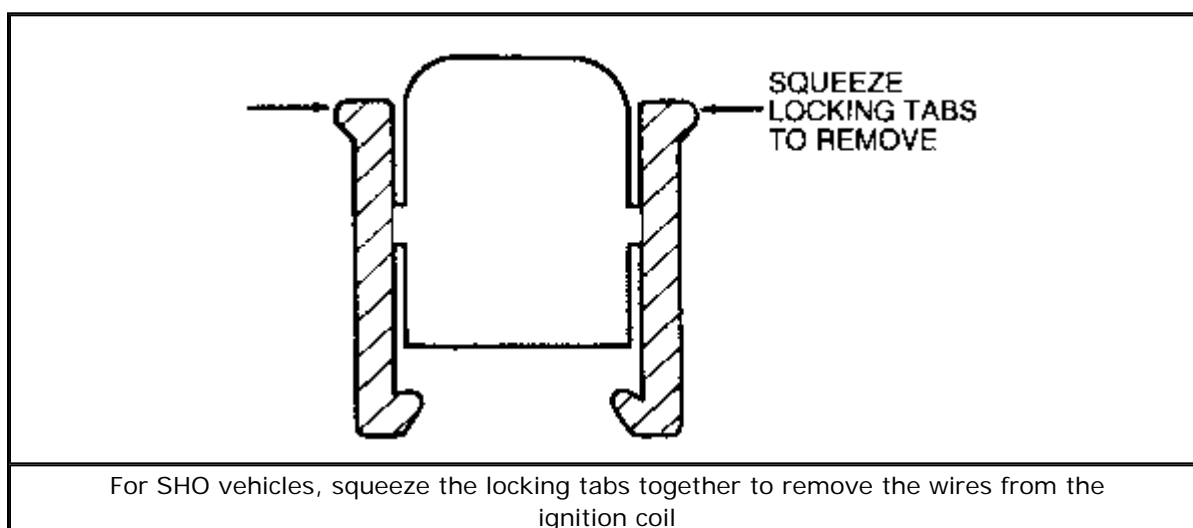
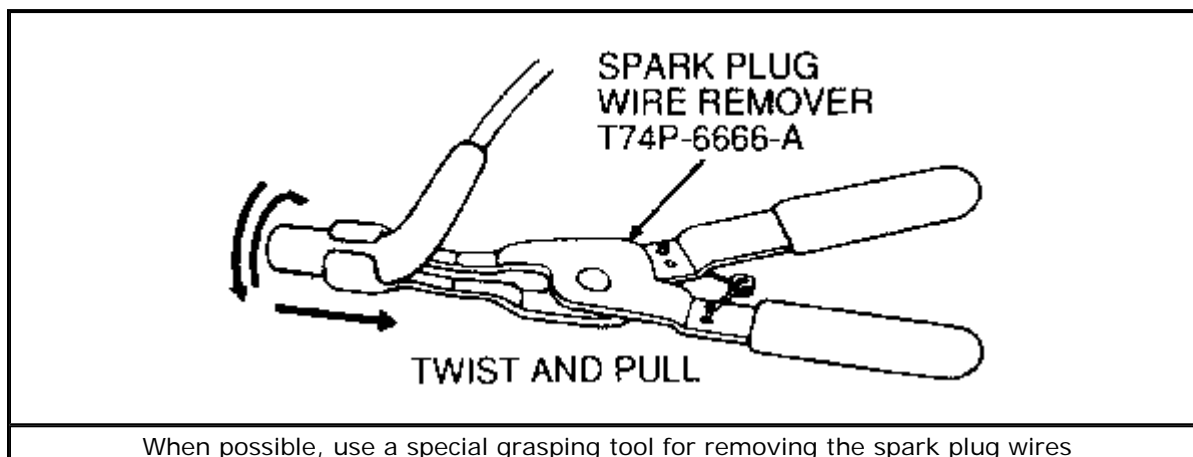
CHECKING AND REPLACING SPARK PLUG WIRES

Your car is equipped with an electronic ignition system which utilizes 8mm wires to conduct the hotter spark produced. The boots on these wires are designed to cover the spark plug cavities on the cylinder head.

Inspect the wires without removing them from the spark plugs, distributor cap or coil. Look for visible damage such as cuts, pinches, cracks or torn boots. Replace any wires that show damage. If the boot is damaged, it may be replaced by itself. It is not necessary to replace the complete wire just for the boot.

To remove the wire, grasp and twist the boot back and forth while pulling away from the spark plug. Use the specialized pliers mentioned earlier in this section, if

available. For 3.0L and 3.2L SHO vehicles, in order to remove the wires from the ignition coil, squeeze the locking tabs of the ignition wire retainer and use a gentle twisting/pulling motion.



Always coat the terminals of any wire that is removed or replaced with a thin layer of silicone dielectric compound (D7AZ-19A331-A or equivalent).

When installing a wire, be sure it is firmly mounted over or on the plug, distributor cap connector or coil terminal.

Every 30,000-45,000 miles (48,000-72,000 km), the resistance of the wires should be checked using an ohmmeter. Wires with excessive resistance will cause misfiring and may make the engine difficult to start in damp weather.

To check resistance, remove the distributor cap, leaving the wires in place. Connect one lead of an ohmmeter to an electrode within the cap; connect the other lead to the corresponding spark plug terminal (remove it from the spark plug for this test). Any wire with a resistance over 7,000 ohms per foot of wire should be replaced.