Instructions

Fitting Spark Plugs

Problems

The nature of the ignition system on an A Series means that the spark plugs lead a pretty hard life. This is because each plug fires twice during the normal 4 stroke cycle as opposed to the normal once. During the service life of the plug the operation of the ignition system erodes the plugs electrode and effectively widens the gap between this and the ground electrode.

The widening of the gap reduces the ability of the plug to provide a suitable spark and starting, performance and fuel economy suffer as a result. The plugs can be removed and the gap re-set, but the low price of spark plugs means this is probably not worth it – they should last till the 3,000 mile service, so just replace them when you do the service.

The plugs are often blamed for bad starting and poor running but the truth is it is probably something else that is causing the problem. Change them every 3,000 miles and you can basically ignore them, unless another problem on the vehicle reduces their operating life. Carefully inspect the condition of the plugs when you remove them from the engine, they can tell you much about the general condition of the engine.

Fitting Notes

Make sure your engine is cool prior to removing the old plugs or inserting new ones. Removing or inserting plugs into a hot engine greatly increases the chance of damaging the cylinder head threads.

Remove the plug caps from the plugs. You should grab the boot of the cap as opposed to the lead itself as you can pull the lead off its connector if you use a lot of force.

If you have access to an airline blow around the plug head prior to removal to blow out any debris.

Take your 3/8 inch drive ratchet with a short extension bar and your plug socket and loosen and remove the old plugs. If the wings are on the car this is more difficult than when the wings are removed because you cannot generally apply force directly along the vertical axis of the plug. Try not to 'waggle' the plug as it is coming out as this can cause the thread to go oval. As soon as the plug feels loose try to take them out by hand rather than using the wrench – it can be difficult, but you should use the wrench as little as possible.

Check the condition of each plug as you remove it – this gives a good indication of the general condition of the engine. A guide to what to look for is given at the end.

Install the small shaped ends over the threaded part at the top of your new plugs if they are not already attached. Make sure they are on tight, pliers do a good job.

Blow off any paper particles from the thread of the plug, these come from the little cardboard protectors that are in the box.

Check that the plugs are gapped to 0.7mm.

There is no need to lubricate the threads of the plug prior to fitting as they have a special nickel plating on them to stop them seizing in the threads. Lubricating won't do any damage though if you wish to apply it though.

Carefully install the plug into the plug hole being careful not to stick it in any debris that may be lying around. Have a look at the plug hole prior to starting and get a feel for the angle it should go in at. The plan is to get it into the head as far as possible by hand to minimise the risk of damaging the threads. You should be able to get it on quite a few turns before you need to resort to using the wrench. If you feel a lot of resistance in the first few turns it could be cross threaded – don't be tempted to continue, take it out and try again.

NGK list the torque for installing 14mm sparking plugs into an aluminium head as 18-21 ft/lb or 2.5-3kg/m. The lower setting is plenty, if they won't hold in at this level then the threads are probably damaged and you should consider installing some thread inserts. If you don't have a torque wrench the conventional setting is tight + _ turn.

Replace the plug leads making sure that the socket in the lead boot clips nicely onto the terminal on top of the plug.

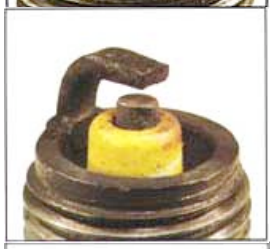
Reading Spark Plugs

Normal Condition
An engine's condition can be judged by the appearance of the spark plug's firing end. If the firing end of a spark plug is brown or light gray, the condition can be judged to be good and the spark plug is functioning optimally.

Dry and Wet Fouling
Although there are many different cases, if the insulation resistance between the center electrode and the shell is over 10 ohms, the engine can be started normally. If the insulation resistance drops to 0 ohms, the firing end is fouled by either wet or dry carbon.

Overheating
When a spark plug overheats, deposits that have Accumulated on the insulator tip melt and give the insulator tip a glazed or glossy appearance.

Deposits
The accumulation of deposits on the firing end is influenced by oil leakage, fuel quality and the engine's operating duration.



Lead Fouling
Lead fouling usually appears as yellowish brown deposits on the insulator nose. This can not be detected by a resitsance tester at room temperature. Lead compounds combine at different temperatures. Those formed at 370-470°C (700-790°F) having the greatest influence on lead resistance.

Breakage
Breakage is usually caused by thermal expansion and thermal shock due to sudden heating or cooling.

Normal Life
A worn spark plug not only wastes fuel but also strains the whole ignition system because the expanded gap (due to erosion) requires higher voltages. Normal rates of gap growth are as follows:
Four Stroke Engines: 0.01~0.02 mm/1,000 km (0.00063~0.000126 inches/1,000 miles)

Abnormal Erosion
Abnormal electrode erosion is caused by the effects of corrosion, oxidation and reaction with lead - all resulting in abnormal gap growth.

Melting
Melting is caused by overheating. Mostly, the electrode surface is rather lustrous and uneven. The melting point of nickel alloy is 1,200~1,300°C (2,200~2,400°F).

Erosion, Corrosion and Oxidation
The material of the electrodes has oxidized, and when the oxidation is heavy it will be green on the surface. The surface of the electrodes are also fretted and rough.

Lead Erosion
Lead erosion is caused by lead compounds in the gasoline which react chemically with the material of the electrodes (nickel alloy) as high temperatures; crystal of nickel alloy fall off because of the lead compounds permeating and seperating the grain boundary of the nickel alloy. Typical lead erosion causes the surface of the ground electrode to become thinner, and the tip of the electrode looks as if it has been chipped.