FIRING END ANALYSIS

NORMAL
Insulator nose has slight deposits. Colour ranges from brown to greyish-white. Spark plug is functioning correctly under good engine conditions.

INSULATOR BREAKAGE
The insulator nose is cracked or split. Breakage not resulting from mechanical impact is caused by sudden heating or cooling (thermal shock). Severe detonation will often produced the type of breakage shown in the picture. Causes of detonation are similar to what is described in "Overheated"

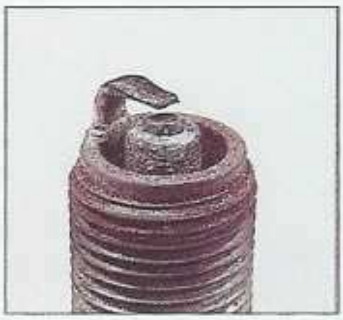
CARBON FOULED
Dry, soft, black carbon deposits form in large quantities on the insulator nose and electrodes. As carbon accumulates the insulation between the centre and the ground electrodes deteriorates, an electrical leakage path is formed by the carbon and misfire results.
Causes of carbon fouling include; rich fuel mixture, clogged air filter, faulty choke system, prolonged low speed driving or idling, faulty ignition system, over-retarded ignition timing and spark plug heat rating is too cold.

MELTED
The centre and/or ground electrode surface is uneven and cauliflower like in appearance. The insulator is blistered and possibly contains metallic deposits. Melted firing end results from overheating. Refer to "Overheated" for causes.

OIL FOULED
Wet, black, oily, carbon deposits form on the insulator nose and electrodes. As described in "Carbon Fouled", misfire results due to the reduction in insulation resistance between centre and ground electrodes.
Causes of oil fouling include; excessive oil entering into combustion chamber, oil level is too high, worn piston rings, cylinders and valve guides.

ABNORMAL EROSION
The centre and/or ground electrodes badly worn relative to the length of operation. Misfire will eventually result due to to the high ignition voltage needed for the large gap. Abnormal erosion is often caused by harsh lead and oil additives combined with severe operating conditions such as high speed driving.

DEPOSITS (Ash Formation)
Heavy ash deposits build-up on the firing end and eventually cause misfire. In some circumstances these deposits can reach temperatures which might lead to pre-ignition. Ash formation is mainly produced from the burning of oil, type of oil, fuel additives and engine condition.



RAPID ABNORMAL EROSION
The centre and/or ground electrodes are very badly worn. Their surfaces are fretted and rough. The electrodes have oxidised and sometimes turn green when the oxidation is heavy. Rapid abnormal erosion is produced by a more aggressive operating environment than :Abnormal Erosion". Refer "Abnormal Erosion" for causes.

LEAD FOULED
Lead fouling usually appears as yellowish brown deposits on the insulator nose. The lead deposits have no adverse effect on starting, idling or low speed driving but do cause misfire during rapid acceleration or under heavy engine load. Misfire results when the lead deposits become electrically conductive at high temperatures creating a reduction in the insulating resistance between centre and ground electrodes. The lead additives used to enhance the fuel octane rating are the source of the lead deposits. Lead fouling will not occur with unleaded fuel.

LEAD EROSION
The ground electrode is badly worn and appears to be chipped. Lead erosion is caused by the harsh lead additives in the fuel. At high temperatures these additives chemically react with the nickel alloy electrodes and separate the grain boundary of the nickel alloy.

OVERHEATED
Overheated spark plugs have a white glazed or glossy insulator. Small black deposits accumulate on the insulator nose and the electrodes are prematurely worn.
Causes of overheating include; over-advanced ignition timing, lean fuel mixture, insufficient fuel octane rating, excessive deposits accumulated in combustion chamber, manifold air leak, insufficient cooling and lubricating, spark plug heat rating is too hot.

NORMAL WEAR
The centre and/or ground electrodes are worn. Deposits cover the insulator nose and ground electrode. This plug has operated under normal conditions for a considerable period and reached the end of its life. Further usage will cause misfire, bad fuel economy and poor engine performance.