Tech Tip

LIGHTING 154

HID HEADLIGHTS

They Can Light Up More than the Highway!

Does the subject of headlights sound boring or unrelated to your business interest? Even if you are not interested in servicing headlamps or other lighting on the vehicle, there are a few facts that you and your technicians should know about the high intensity discharge (HID) lighting. The information may prevent you from having to replace some expensive components at the shop's expense, and the technician from smelling like burnt bacon.

How up-to-date is your headlamp knowledge? Joe's wasn't up to par. While diagnosing an engine performance condition on a 2008 Corvette, involving a misfire and multiple trouble codes stored, he torched a headlamp at a cost of $973.52 plus two hours labor to install the new headlamp assembly. A lot of parts must be removed to make the headlight replacement. For example:

a) Secure the vehicle on jack-stands.

b) Remove the front bumper fascia (urethane bumper).

c) Remove the forward inner-fender panels.

d) Six screws positioned along the top of the fender must be removed.

e) Remove the three nuts which secure the headlight module assembly.

f) Disconnect the electrical connectors from the headlight assembly.

g) Carefully, lift the upper corner of the fender and remove the headlight module assembly.

This is not a condition or encounter that is confined to a Corvette, as the damage incurred can happen to any foreign or domestic vehicle equipped with HID lighting, sometimes referred to as the white lights. Read on to get a better understanding of the system and how negligence can generate a financial catastrophic event. It is very easy for this to happen to any technician working under the hood while trying to protect the customer's vehicle from damage. The information contained will illustrate conditions that can lead to permanent damage to some expensive headlamps or inflict personal injury to the technician, due to improper service procedures.

HID HEADLIGHTS

The high intensity discharge (HID) lights function via a series of relays, ballasts, starters and high voltage transformers that produce high operating voltages necessary to create an arc between two electrodes. Instead of a normal filament found in a conventional bulb, the HID lamp produces a light when high voltage current is passed between two electrodes in the bulb through a mixture of inert gas and certain metal halides. This method of lighting produces a lot of heat in the headlight assembly.

Caution: The HID system produces high voltage and current. To prevent the risk of severe shocks or burns, it is advisable to remove the negative battery cable prior to performing any service work that involves or is performed around the HID system.

a) Never open the HID system ballast or the arc tube assembly starter.

b) Never probe between the HID system ballast output connector and the arc tube assembly.

The diagnostic procedures required to diagnose a failure with the HID system are not the same procedures required for a conventional low voltage lighting system. ***Failure to follow the vehicle manufacturer's diagnostic procedures can result in a severe burn or electrical shock***. Do not secure a test lamp and start probing electrical connectors for a lamp failure condition. Doing so will almost guarantee that you will be the one to light up.

HID LIGHTING ADVANTAGES

Following are some of the system's unique features:

a) The lighting output of the HID system is nearly double that of halogen headlamps.

b) The lighting of the HID lamps is a white color that is comparable to sunlight and is easier on the eyes.

c) The light features a high relative spectral distribution at wavelengths to which the human eye is most sensitive. This means that even in the rain, more light is reflected back from the road surface toward the vehicle for added visibility.

d) Power consumption is approximately 25% less than halogen headlamps.

BULB FAILURE

Some noticeable symptoms which indicate bulb failure include:

a) Color changes in the bulb. The white light may take on a dim pink glow.

b) Lights intermittently go out. This may occur when the ballast detects excessive or repetitive bulb strikes.

c) Flickering of the lights may occur during the early stages of bulb failure.

The life cycle of the bulb usually ends when the bulb gets old and unstable. Initially, the bulb may start shutting off intermittently, such as once during a 24 hour period. The ballast will automatically re-light the bulb within 0.5 seconds. This occurs so quickly that the vehicle operator may never realize that the light momentarily shut off. Eventually, the frequency in which the bulb shuts off will increase to several times per minute. When this occurs, the ballast will become damaged due to the repetitive re-strikes and overheating of the ballast. Eventually, the ballast will shut down and not attempt to re-strike the lamp. When the repetitive re-strikes occur, the starter/arc tube assembly must be replaced. Turning the lights off and back on again resets the fault circuit within the ballast until the next sequence of repetitive bulb re-strikes. Repeatedly re-setting the input power can result in overheating and permanent damage to the ballast. Sufficient cool-down time between re-set attempts should be allowed.

Some variation in the coloring when comparing the right and left headlights should be considered normal.

CHEMICAL DAMAGE

Most late model vehicle headlight lenses are constructed of polycarbonate. The main reason is due to its ability to withstand heat and its resistance to impact.

The polycarbonate lens is subject to crazing or cracking when exposed to certain chemicals. Special care should be taken when cleaning the vehicle with any type of chemical. Polishing and rubbing compounds, tar and grease cleaning agents, wheel and tire cleaners and even some detergents or car wash soaps that are too highly concentrated can contribute to cracking or crazing of the lens. Exposing the headlamp to those chemicals may require a complete headlight module replacement and that can be very expensive.

HEAT DAMAGE

Crazing or deformation of the headlight lens may occur if a fender cover or any type of covering is placed over the fender and covers all of, or a portion of the lens. ***The heat generated from the headlights or daytime running lamps cannot dissipate when the lens is covered, resulting in permanent damage to the lens.*** The damage may be immediately recognizable, or unnoticed at first and then result in hairline cracks or spider-webbing in the polycarbonate lens. In extreme cases of heat, the lens may become distorted, blister, or melt.

The Rest of the Story... Now you know what Joe encountered with the Corvette. Joe had wrapped the entire front end of the Corvette in protective covers to protect the customer's vehicle from chips, scratches or chemicals. His intentions were good. Imagine his horror when he removed the protective covers and observed the damaged headlight lens. It was an honest, but very expensive mistake that the shop was liable for.

HEADLIGHT CONDENSATION

It is not uncommon to see headlamps that have accumulated moisture and display fog or condensation on the lens. GM and Nissan both advise that a fine mist or white fog on the inside surface of the lens during periods of high humidity should be considered a normal occurrence. Condensation occurs when the air inside the light assembly reaches the dew point level. When these normal atmospheric changes occur, the moisture in the air within the light assembly condenses, resulting in a fine mist or fog on the inside surface of the lens.

Both GM and Nissan headlamps are vented assemblies, which allows for moisture to be removed by expelling it through the vent system. The vent system is most effective when the lights are illuminated or the vehicle is in motion. Do not be surprised if it requires 2–6 hours of vehicle operation to expel the moisture from the headlights, especially during certain atmospheric conditions, such as high humidity.

If water is collecting in the headlights, or large droplets cover more than half of the surface of the lens, it may be an indication of a water leak, instead of condensation. This condition would require a headlight assembly replacement. Other conditions that may indicate a water leak could include one light that will not clear itself of condensation, when compared to its companion headlight.

The vehicle manufacturers will not replace headlight assemblies under warranty for moisture accumulated during normal atmospheric conditions. A search on the Internet will identify many unhappy Corvette owners who have encountered this condition, only to be told that this is a normal characteristic. It is also explained in the vehicle owner's manual.

Be familiar with the HID lighting and make certain your technicians take special precautions to keep the headlights free of obstruction, which can cause overheating and permanent damage. Always think safety when working with the system, as a severe electrical shock or burn can be incurred.

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