XENON HEADLIGHTS

OVERVIEW

The automotive industry/press often identify xenon lighting systems as HID (high intensity discharge) systems. Xenon headlight technology was first introduced to the US market exclusively on the E32 750iL in 1993. BMW xenon headlight systems have evolved and their availability as optional equipment has spread throughout the model lineup.

Blue/White in color and using ellipsoidal technology Xenon headlights provide improved night time visibility in all driving conditions compared with traditional Halogen bulb headlights.

BENEFITS:

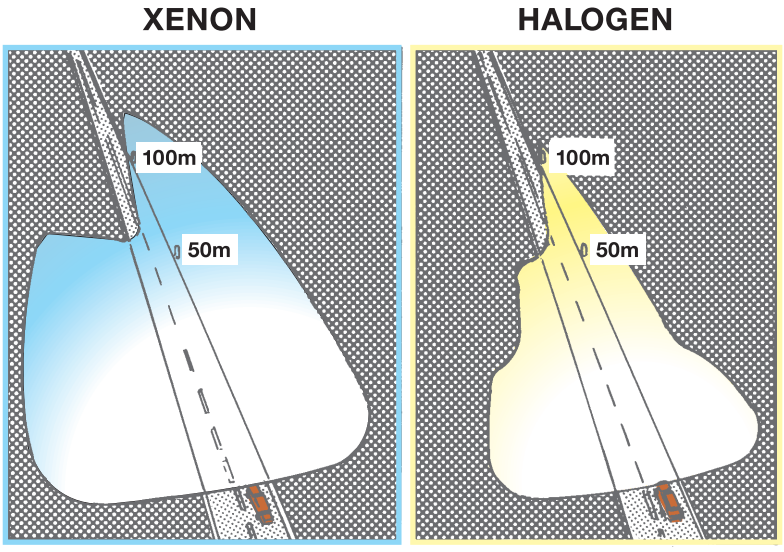
Xenon headlights provide the following benefits:

- **Longer bulb life**. Typically, xenon bulbs will last from 3 to 5 times longer than halogen.
- **More light output.** Xenon headlights produce from 2.5 to 3 times more lumens than halogen.
- **Blue/White light** *(simulates natural daylight)*. Xenon bulbs produce a blue/white light while halogen bulbs produce a yellow light. The light color of a light source is measured in color temperature (not to be confused with thermal temperature). Color temperature is measured in Kelvins (K). The higher the color temperature the whiter the light.

  Natural daylight = 4,500 to 5,000 K
  Xenon headlights = 4,000 to 4,500 K
  Halogen headlights = 3,200 K (yellow in color)

- **Better driving visibility.** The combination of higher lumens and higher color temperature provide a superior lighting source.

  The beam is wider and brighter in front of the vehicle than conventional halogen bulbs improving safety and driver comfort.



- **Lower operating temperature.**
- **Lower power consumption.**

VERSION IDENTIFICATION & SYSTEM SUMMARIES

Version identification is specific to vehicle model with the exception of the E38.

There are two E38 Xenon systems. The early system identified as **Generation 2.1** and equipped on 95-98 model year 750iL vehicles. The headlight design of this version has a flat bottom edge.

The **Generation 3** system has been introduced on 1999 model year E38 vehicles. This system can be visually identified by the rounded bottom edge as of the headlight assembly shown.

E38 Generation 3 Headlight

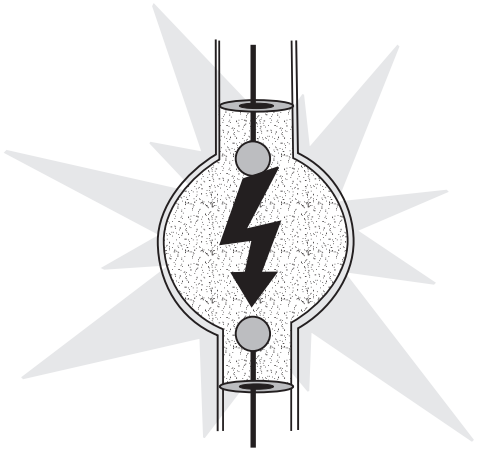
LWR: All 1999 model year systems are also equipped with LWR (Headlight Beam Throw Control). This system automatically adjusts the vertical position of the headlight beams to compensate for vehicle loads ensuring optimum beam throw. LWR components and function is described further on in this section.

Headlight Replacement Parts: In previous model years, individual replacement parts were not available for headlight assemblies. This was due to the Federal Motor Vehicle Safety Standards (FMVSS) relating to pitting or corrosion of the reflector components in non-sealed beam light assemblies.

BMW has recently submitted corrosion test data for headlight replacement components which have passed the FMVSS providing availability of headlight assembly spare parts. The approval has been given for **all Bosch** headlight assemblies (including halogen systems). Hella system components are currently being tested and in all likelihood be available in the near future.

Vehicle/ Model	Model Year	Manufacturer(s)/ Version ID	LWR- Head Light Beam Throw Cont.	Individual Replacement Parts Available
E32/ 750iL	93-94	**Hella** (Light & CM "control module") Generation 1	No	No
E38/ 750iL	95-98	**Bosch** (Light & CM) Generation 2.1	No	Yes
E38/ All	99-	**Bosch** (light) **Hella** (CM) Generation 3	Yes	Yes
E39 All	99-	**Hella** Generation 3	Yes	No (possible in future)
E46	99-	**Bosch (Light & CM)**	Yes	Yes

XENON HIGH INTENSITY DISCHARGE BULBS



Xenon bulbs are identified as D-2S (D=Discharge). Xenon bulbs illuminate when an arc of electrical current is established between two electrodes in the bulb.

The xenon gas sealed in the bulb reacts to the electrical excitation and heat generated by the current flow. The distinct bluish/white brilliant light is the result of the xenon gas reacting to the controlled current flow.

Phases of Bulb Operation:

Starting Phase: The bulb requires an initial high voltage starting pulse of 18-25kV to establish the arc.

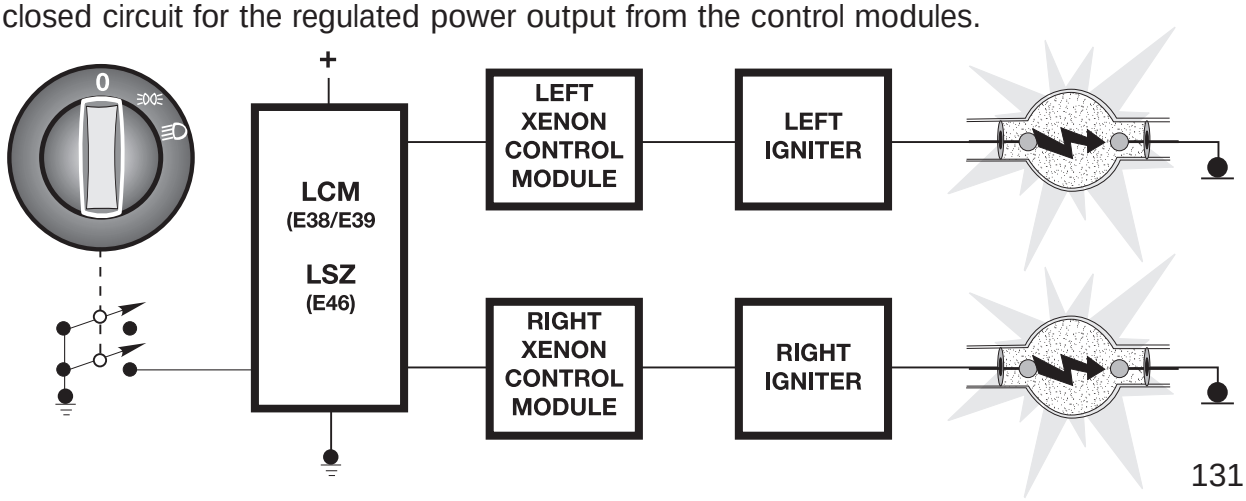
Warm Up Phase: Once the arc is established the power supply to the bulb is regulated to 2.6A generating a lamp output of 75 watts. This is the period of operation where the xenon gas begins to brightly illuminate. The warm up phase stabilizes the environment in the bulb ensuring continual current flow across the electrodes.

Continuous Phase: Once the warm up phase is completed, the system switches to a continuous mode of operation. The supply voltage for the bulb is reduced and the operating power required for continual bulb illumination is reduced to 35 watts which is less than a conventional halogen bulb.

FUNCTIONAL DESCRIPTION

To regulate the power supply to the bulbs, additional components are required. The xenon control modules (1 per light) receive operating power from the lighting control module (LCM E38/E39 -- LSZ E46) when the headlights are switched on. The xenon control modules provide the regulated power supply to illuminate the bulbs through their phases of operation.

The igniters establish the electric arcs. Integral coils generate the initial high voltage starting pulses from the control module provided starting voltage. Thereafter they provide a closed circuit for the regulated power output from the control modules.

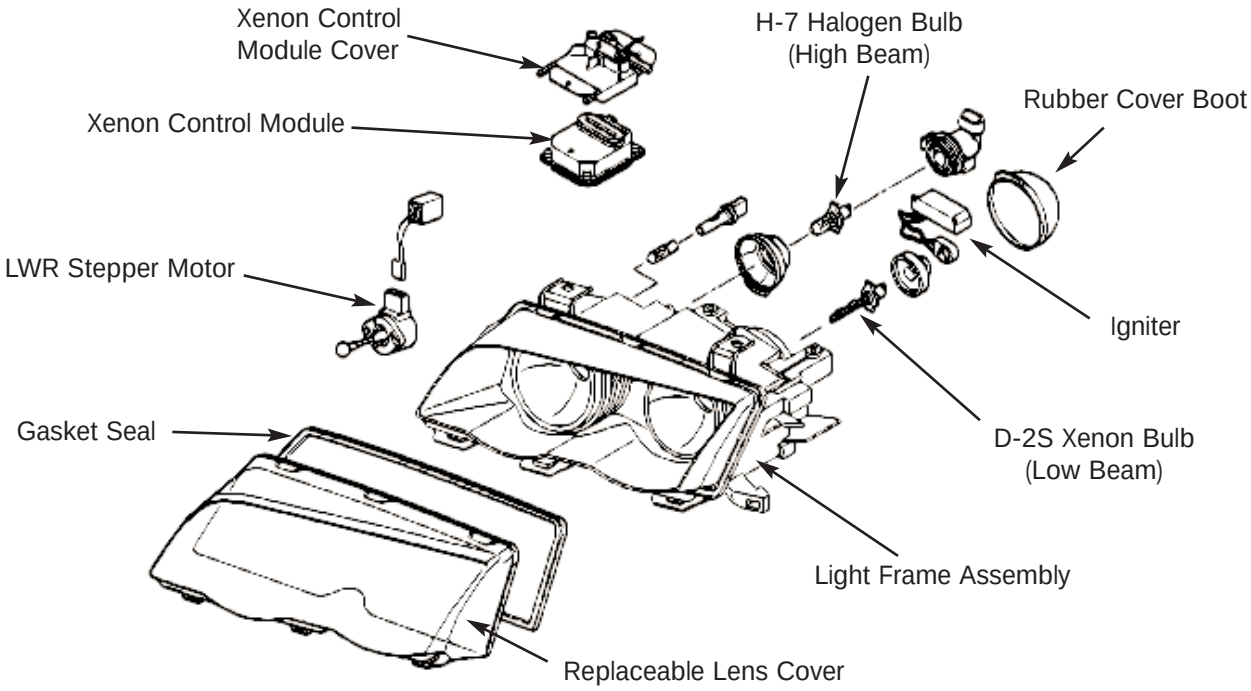


XENON BULB MONITORING

Xenon bulb function is monitored by the Lighting Control Module (LCM E38/E39 -- LSZ E46). The bulbs are only “hot” monitored. Cold monitoring is not possible since the lighting control module is not in direct control of the xenon bulb. For this reason cold monitoring for low beam headlights is encoded off in the lighting control module for Xenon headlight equipped vehicle.

The lighting control module detects xenon bulb failure via a reduction in current flow to the xenon control module. When a bulb fails, the xenon control module’s current consumption drops to 60mA indicating unsuccessful xenon bulb illumination. The lighting control module then posts the appropriate matrix display message or LED illumination in the Check Control Pictogram display of the E46 and E39 Low Instrument Clusters.

XENON HEADLIGHT ASSEMBLY COMPONENTS (Example - E46)



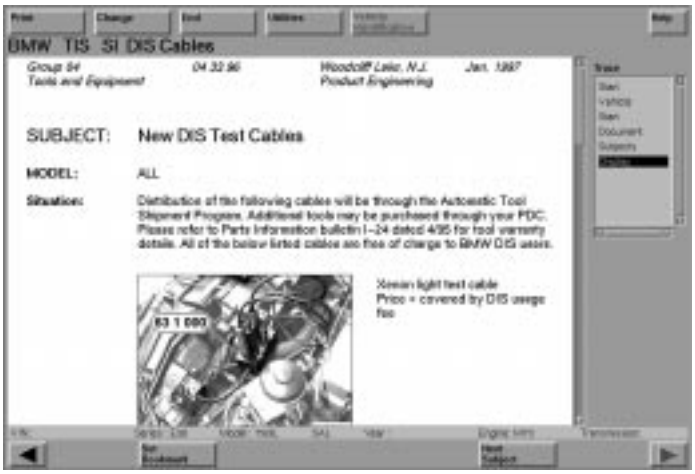
DIAGNOSIS

Xenon control modules are not connected to the diagnostic link. However, the vehicle specific Lighting Control Module (E38/E39 - LCM or E46 - LSZ) does incorporate xenon headlight specific diagnosis up to the xenon control module.

XENON HEADLIGHT TESTING

Warning: *Xenon headlight control systems generate high output voltage. Prior to headlight removal or testing observe the vehicle warning labels and be cautious by following safeguards to prevent accidental injury.*

All xenon headlight systems (control module, igniter and bulb) can be tested with Special Test Adapter (P/N 90 88 6 631 000) in conjunction with the **DIS** Measurement System only.



Refer to SI 04 33 96 for detailed adapter introductory information.

The DIS Measuring System includes all of the cable connection information and test procedures in the “Xenon Preset Measurement”.

The test provides an automatic oscilloscope setup and provides conclusive “defective/not defective” test results.

XENON HEADLIGHT SI/TRI BULLETINS

- **SI 6308 98:** Xenon Headlamp Reduced Service Life - 1999 740iL. This bulletin address a small group of possibly defective xenon control modules. This bulletin uses the special test adapter and specific oscilloscope setup procedures to check the xenon control module output.

- **SI 63 02 98**: E39 Headlight Alignment Procedure

- **SI 63 02 93:** Xenon Headlights - Color, Fuses, Warranty

- **TRI 63 01 92:** Gas Discharge Xenon Low Beam Headlights.