

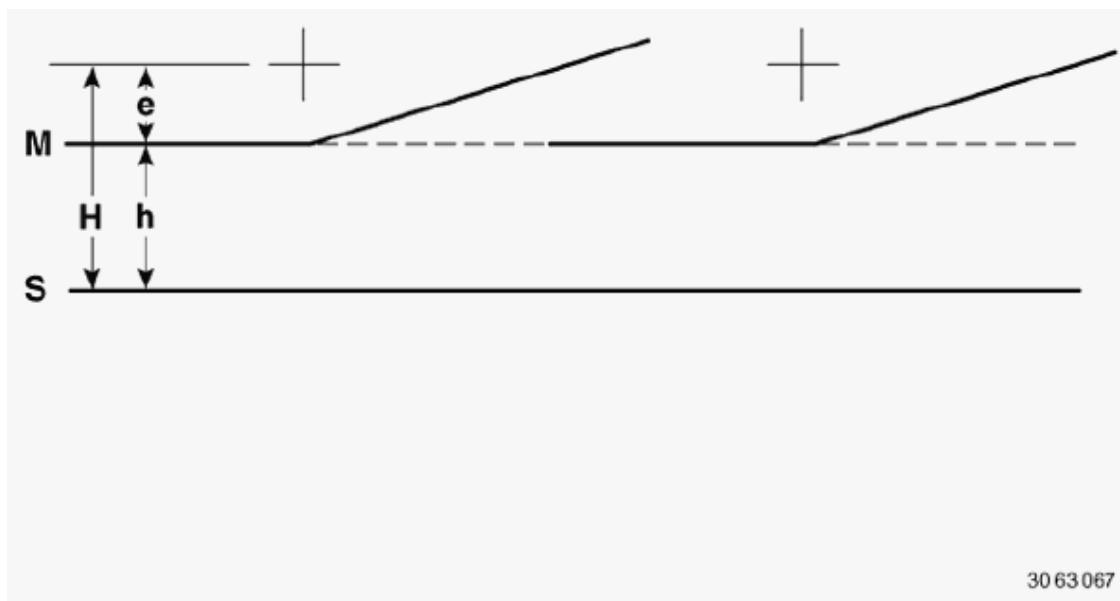
ACCESSORIES AND EQUIPMENT

Lighting - Repair Instructions - X3

10 LAMP SETTINGS

63 10 ... TEST REQUIREMENTS FOR HEADLIGHT VERTICAL AIM ADJUSTMENT

- Car parked on level ground.
- Replace faulty glass and mirrors and blackened light bulbs.
- Check tire pressure and correct if necessary.
- Apply load equivalent to one person on driver's seat (approx. 75 kg).
- Vehicle with full fuel tank or appropriate additional weight in luggage compartment.
- Correct adjustment of headlights in relation to engine hood (gap dimensions).
- Manual headlight vertical aim control: Turn handwheel to 0 position.
- Automatic headlight vertical aim control: Wait approx. 30 seconds after switching on lights.
- Version with xenon headlights: Wait 80 seconds after switching on lights. During this time, do not move the vehicle and avoid vibrations.
- Align headlight aimer with vehicle longitudinal axis and parallel to parking surface. Set marking line (M) on aimer to distance (e). Scale graduations on aimer are equal to a gradient in cm at a distance of 10 meters.

**Fig. 1: Headlight Aiming**

Courtesy of BMW OF NORTH AMERICA, INC.

Light/dark limit of headlights in headlight aimer

e Adjustment dimension, headlights:

- as per type plate on headlight housing in % (e.g.: 1.0 % = 10 cm / 10 m = 10 on headlight aimer).

Adjustment dimension, fog lights:

- all vehicles 2.0 % = 20 cm / 10 m = 20 on headlight aimer.

H Height of center of headlight above parking surface.

h H - e = height of marking line above parking surface

+ Central mark = center point of high-beam headlight.

M Marking line of headlamp aimer

S Parking surface of vehicle and headlight aimer

Adjustment dimension (e) is only valid for EUR. Observe differing national regulations.

63 10 004 ADJUSTING HEADLIGHTS

NOTE: Comply with test preconditions for headlight adjustment, see 63 10 ... Test requirements for headlight vertical aim adjustment.

Adjust headlights at adjusting screws (1) and (2).

A definite allocation of adjusting screws is not possible.

1. Adjustment screw primarily for vertical adjustment
2. Adjustment screw primarily for lateral adjustment

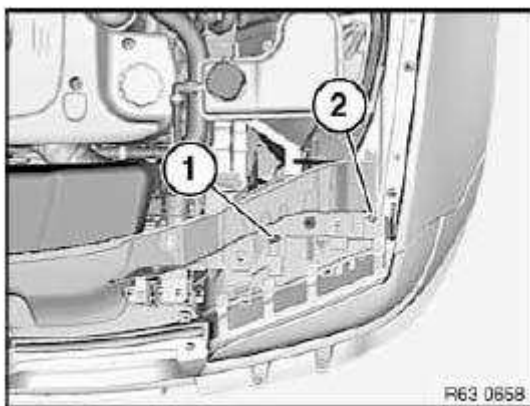


Fig. 2: Headlight Adjusting Screws

Courtesy of BMW OF NORTH AMERICA, INC.

63 10 014 ADJUSTING FOG LAMPS

Comply with test preconditions for headlight adjustment, see **63 10 ... Test requirements for headlight vertical aim adjustment.**

Unclip fog lamp trim (1) through opening (2) and remove from front bumper trim (3).

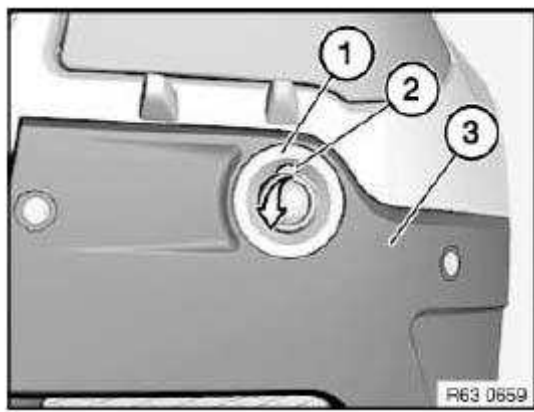


Fig. 3: Unclipping Fog Lamp Trim

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining hooks (1) of fog lamp trim (2) must not be damaged. Make sure fog lamp trim (2) is correctly seated in front bumper trim.

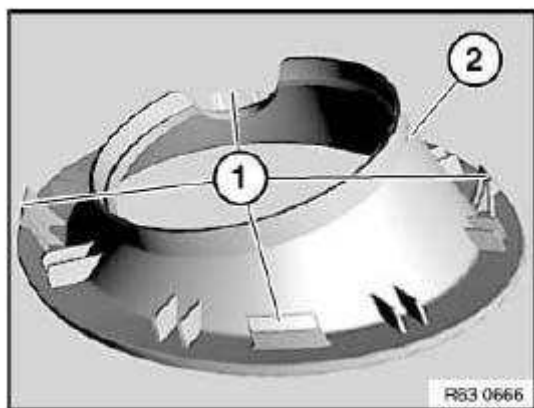


Fig. 4: Retaining Hooks Of Fog Lamp Trim

Courtesy of BMW OF NORTH AMERICA, INC.

Adjust fog lamp (1) by turning adjusting screw (2).

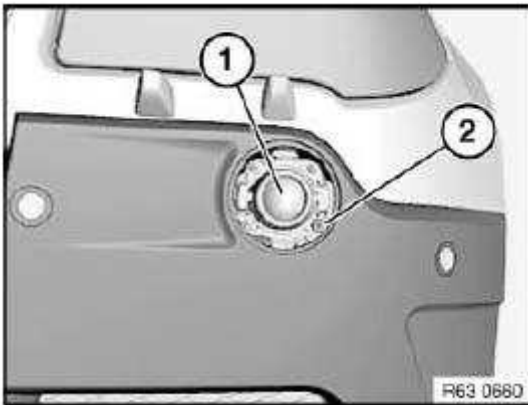


Fig. 5: Fog Lamp And Adjusting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

12 HEADLIGHTS

51 11 710 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT HEADLIGHT BRACKET (M TECHNIC AERODYNAMIC KIT)

Necessary preliminary tasks:

- Remove front bumper trim, see **51 11 156 REMOVING AND INSTALLING FRONT BUMPER TRIM (FROM 09/2006)** .

Version with headlight washer system:

- Remove high-pressure nozzle, see **61 67 083 REMOVING AND INSTALLING/REPLACING HIGH - PRESSURE NOZZLE OF LEFT OR RIGHT HEADLIGHT WASHER SYSTEM (M AERODYNAMIC KIT)** .

Release screws (1) and remove bracket (2).

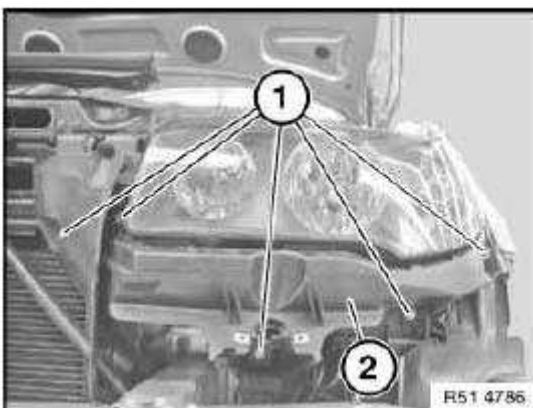


Fig. 6: Screws And Bracket

Courtesy of BMW OF NORTH AMERICA, INC.

63 12 001 REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT

Operation is described in:

Removing and installing left xenon headlight, see **63 12 010 Removing and installing/replacing left headlight (xenon headlight)**.

63 12 002 REMOVING AND INSTALLING/REPLACING RIGHT HEADLIGHT

Operation is described in:

Removing and installing left headlight, see **63 12 010 Removing and installing/replacing left headlight (xenon headlight)**.

63 12 010 REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT (XENON HEADLIGHT)

WARNING: Follow instructions for handling light bulbs (exterior lights), see **63 99 ... Instructions for handling light bulbs (exterior lights)**.

Necessary preliminary tasks:

- Remove front bumper trim, see **51 11 156 REMOVING AND INSTALLING FRONT BUMPER TRIM (FROM 09/2006)** .

Version with M Technic aerodynamic kit:

- Remove headlight bracket, see **51 11 710 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT HEADLIGHT BRACKET (M TECHNIC AERODYNAMIC KIT)** .

Unlock plug connections (1) and disconnect.

Release screws (2) and (3).

Installation:

- Observe gap dimensions, see **00 BODY** .
- Adjust headlight, see **63 10 004 Adjusting headlights**.

Pull out headlight (4) in direction of arrow and remove.

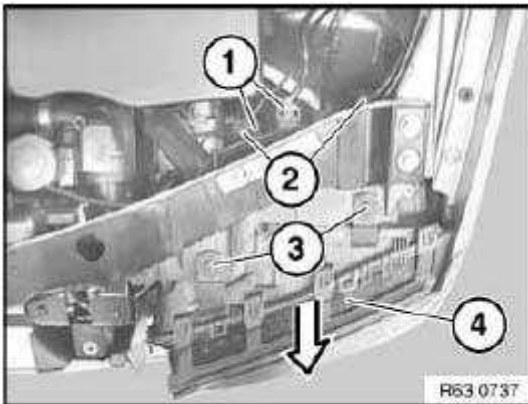


Fig. 7: Unlocking Plug Connections

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Install headlight (1) so that locators (2) fit exactly on guides (3).

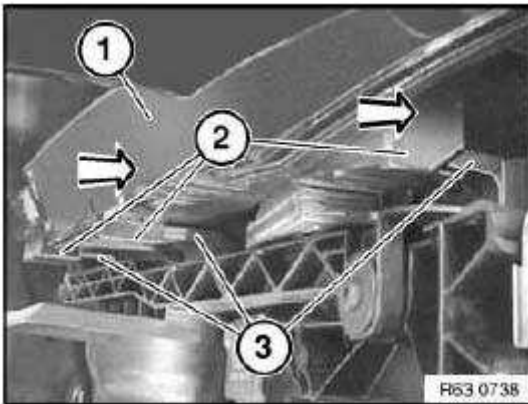


Fig. 8: Headlight Locators

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Remove ignition unit and bulb for xenon headlight, see **63 99 076 Replacing bulb for left xenon headlight.**
- Remove control unit for xenon headlights, see **63 12 860 REPLACING CONTROL UNIT FOR LEFT XENON HEADLIGHT .**

63 12 012 REMOVING AND INSTALLING RIGHT HEADLIGHT (XENON HEADLIGHT)

Operation is described in:

Removing and installing left headlight, see **63 12 010 Removing and installing/replacing left headlight**

(xenon headlight).

63 12 015 REMOVING AND INSTALLING LEFT HEADLIGHT (ADAPTIVE HEADLIGHT)

This operation is described in:

Removing and installing left xenon headlight, see **63 12 010 Removing and installing/replacing left headlight (xenon headlight).**

63 12 016 REPLACING LEFT HEADLIGHT (ADAPTIVE HEADLIGHT)

IMPORTANT: Read and comply with 61 35 ... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

WARNING: Follow instructions for handling light bulbs (exterior lights), see 63 99 ... Instructions for handling light bulbs (exterior lights).

Necessary preliminary tasks:

- Remove left headlight, see **63 12 010 Removing and installing/replacing left headlight (xenon headlight).**
- Remove drive unit for adaptive headlight, see **63 12 895 Replacing drive for left adaptive headlight.**
- Remove control unit for left xenon headlight, see **63 12 860 Replacing control unit for left xenon headlight.**
- Remove bulb for left xenon headlight (ignition unit), see **63 99 076 Replacing bulb for left xenon headlight.**

After installation:

- Carry out programming/coding using appropriate BMW service tool.
- Adjust headlight, see **63 10 004 Adjusting headlights.**

63 12 017 REMOVING AND INSTALLING/REPLACING RIGHT HEADLIGHT (ADAPTIVE HEADLIGHT)

Operation is described in:

Removing and installing left headlight, see **63 12 010 Removing and installing/replacing left headlight (xenon headlight).**

63 12 860 REPLACING CONTROL UNIT FOR LEFT XENON HEADLIGHT

WARNING: Version with xenon headlights: Danger to life due to high voltage! Therefore disconnect all components from voltage supply before removal. Work on the entire xenon lighting system (ignition unit, control unit and

lamp) may only be carried out by specialist personnel.

Necessary preliminary tasks:

- Remove left headlight, see **63 12 010 Removing and installing/replacing left headlight (xenon headlight)**.

Release screws (1).

Remove control unit for xenon headlight (2) from headlight (3).

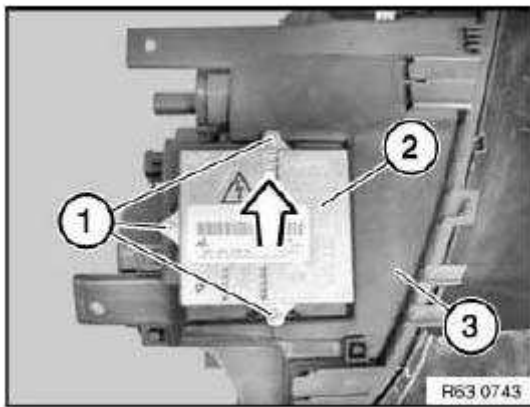


Fig. 9: Screws And Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit control unit for xenon headlight (3) exactly on headlight.

Make sure plug housing (1) is correctly seated on pin housing (2).

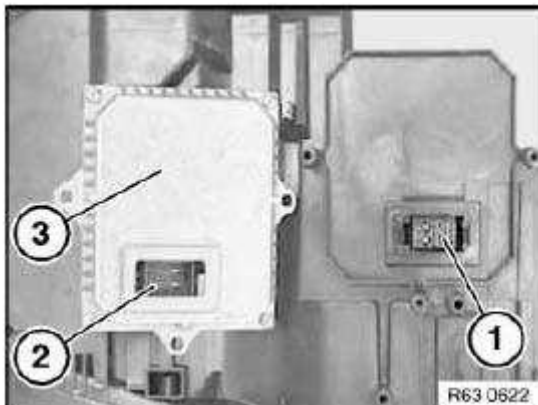


Fig. 10: Control Unit And Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

63 12 861 REPLACING CONTROL UNIT FOR RIGHT XENON HEADLIGHT

Operation is described in:

Remove control unit for left xenon headlight, see **63 12 860 Replacing control unit for left xenon headlight.**

63 12 870 REPLACING IGNITION UNIT FOR LEFT XENON HEADLIGHT

WARNING: Version with xenon headlights: Danger to life due to high voltage!
Therefore disconnect all components from voltage supply before removal.
Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

Unlock catch (1) in direction of arrow and fold down cover (2).

Remove cover (2) from headlight (3).

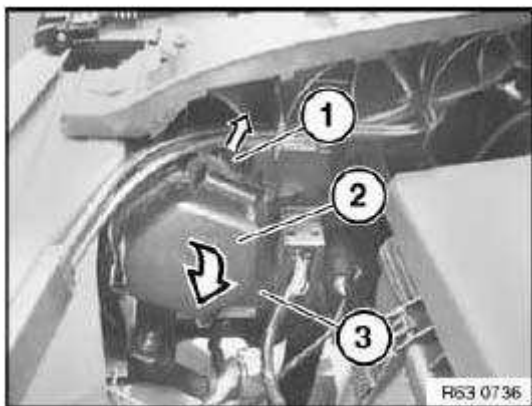


Fig. 11: Removing Cover From Headlight
Courtesy of BMW OF NORTH AMERICA, INC.

Turn ignition unit for xenon headlight (1) approx. 30° counterclockwise and detach from headlight (3).

NOTE: Plug connection (2) is automatically released by turning ignition unit for xenon headlight (1).

Feed out ignition unit for xenon headlight (1) through opening in headlight (4) and remove.

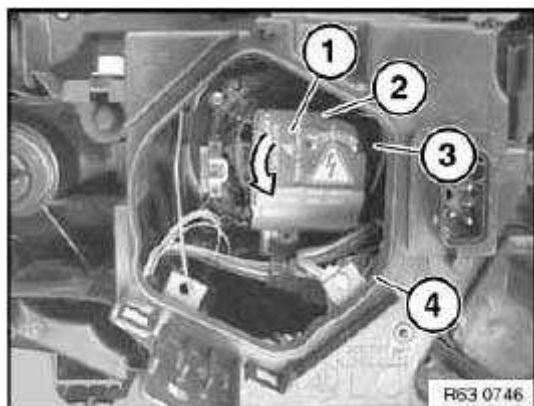


Fig. 12: Xenon Headlight

Courtesy of BMW OF NORTH AMERICA, INC.

63 12 871 REPLACING RIGHT IGNITION UNIT FOR RIGHT XENON HEADLIGHT

Operation is described in:

Remove control unit for left xenon headlight, see **63 12 860 Replacing control unit for left xenon headlight.**

63 12 895 REPLACING DRIVE FOR LEFT ADAPTIVE HEADLIGHT

IMPORTANT: Read and comply with **61 35 ... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE)** .

WARNING: Version with xenon headlights: Danger to life due to high voltage!
Therefore disconnect all components from voltage supply before removal.
Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

Necessary preliminary tasks:

- Remove left headlight, see **63 12 010 Removing and installing/replacing left headlight (xenon headlight).**

Release screws (1).

Remove drive for adaptive headlight (2) in direction of arrow from headlight (3).

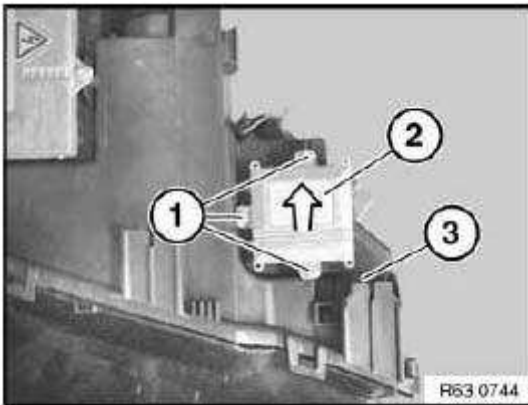


Fig. 13: Screws And Headlight

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit drive for adaptive headlight (1) exactly on headlight.

Make sure pin housing (2) is correctly seated in plug housing (3).

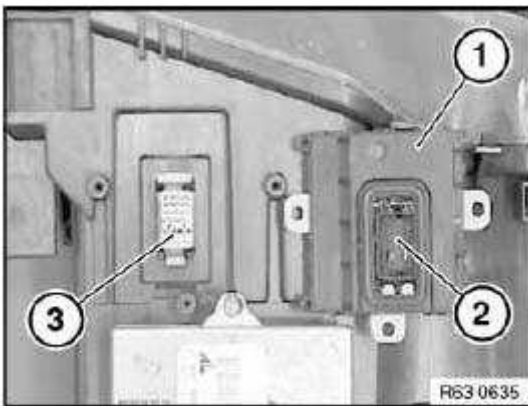


Fig. 14: Adaptive Headlight And Pin Housing

Courtesy of BMW OF NORTH AMERICA, INC.

Carry out coding/programming using appropriate BMW service tool.

63 12 896 REPLACING DRIVE FOR RIGHT ADAPTIVE HEADLIGHT

Operation is described in:

Replacing drive for left adaptive headlight, see **63 12 895 Replacing drive for left adaptive headlight.**

63 12 950 REPLACING A LOWER HOLDER FOR HEADLIGHT MOUNTING

Necessary preliminary tasks:

- Remove headlight, see **63 12 010 Removing and installing/replacing left headlight (xenon headlight).**

Release screws (1).

Remove holder (2) from headlight (3).

Installation:

Screws (1) are also used for gap adjustment.

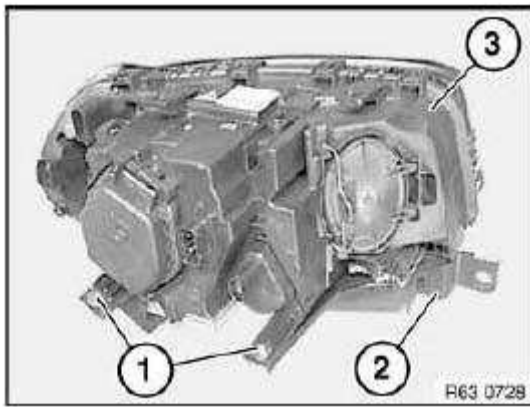


Fig. 15: Holder And Headlight
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure metal nuts (1) are correctly seated.

Guides (2) must slide exactly in locators (3).

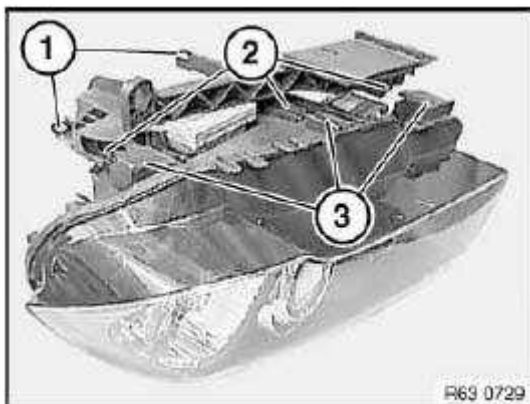


Fig. 16: Metal Nuts And Guides
Courtesy of BMW OF NORTH AMERICA, INC.

13 TURN SIGNAL INDICATOR LIGHTS

63 13 200 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT AUXILIARY TURN SIGNAL LAMP

Slide front auxiliary turn signal lamp (1) towards front and fold in direction of arrow out of front side wall (2).

Unlock associated plug connection and disconnect.

Remove front auxiliary turn signal lamp (1).

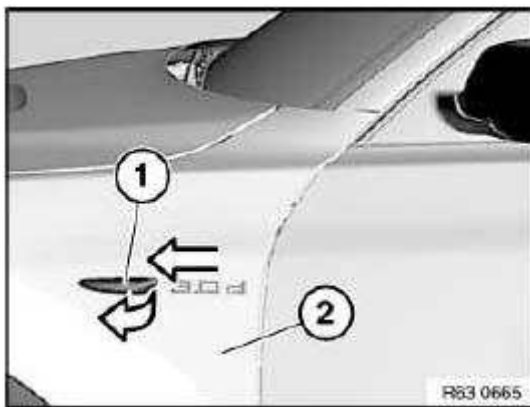


Fig. 17: Removing Front Auxiliary Turn Signal Lamp
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

If necessary, convert bulb.

WARNING: Follow instructions for handling light bulbs (exterior lights), see 63 99 ... Instructions for handling light bulbs (exterior lights).

Installation:

Note type of bulb, see 63 13 TURN SIGNALS E83 .

14 CLEARANCE AND SIDE MARKER LAMPS

63 14 120 REMOVING AND INSTALLING OR REPLACING REAR REFLECTOR

Unclip reflector (1) from bumper panel (2) in area (3).

Pull reflector (1) out of guide and detach towards rear from bumper panel.

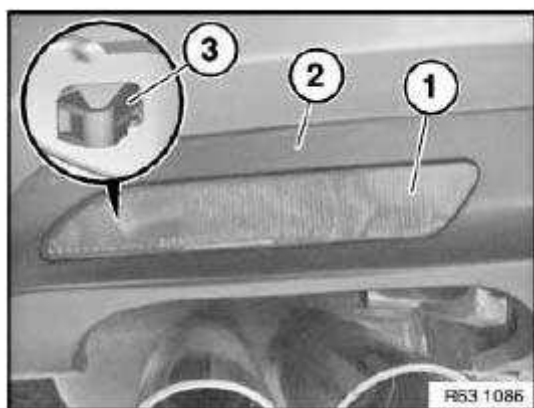


Fig. 18: Reflector And Bumper Panel

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Catches (1) on rear reflector must not be damaged.

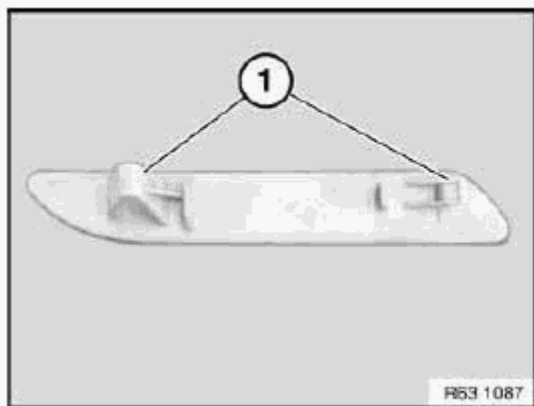


Fig. 19: Catches

Courtesy of BMW OF NORTH AMERICA, INC.

17 FOG LIGHTS, AUXILIARY LIGHTS

63 17 060 REMOVING AND INSTALLING (REPLACING) LEFT OR RIGHT FRONT FOG LAMP

WARNING: Follow instructions for handling light bulbs (exterior lights), see 63 99 ... Instructions for handling light bulbs (exterior lights).

Unclip fog lamp trim (1) through opening (2) and remove from front bumper trim (3).

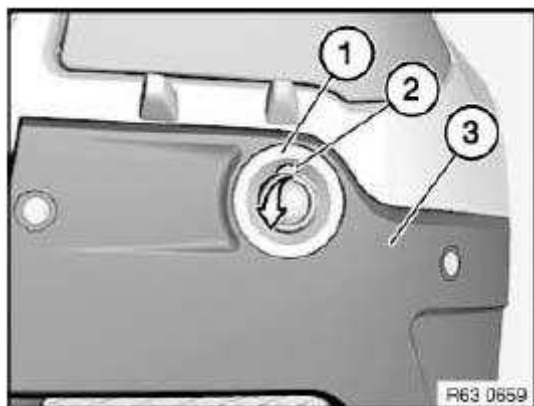


Fig. 20: Unclipping Fog Lamp Trim

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining hooks (1) of fog lamp trim (2) must not be damaged.

Make sure fog lamp trim (2) is correctly seated in front bumper trim (2).

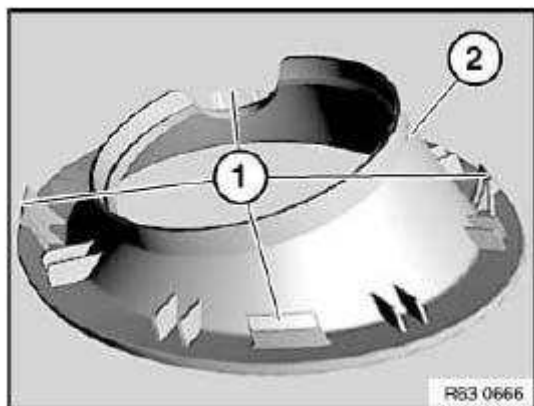


Fig. 21: Retaining Hooks Of Fog Lamp Trim

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Feed fog lamp (2) in direction of arrow out of front bumper trim (3).

Unlock associated plug connection and disconnect.

Remove fog lamp (2).

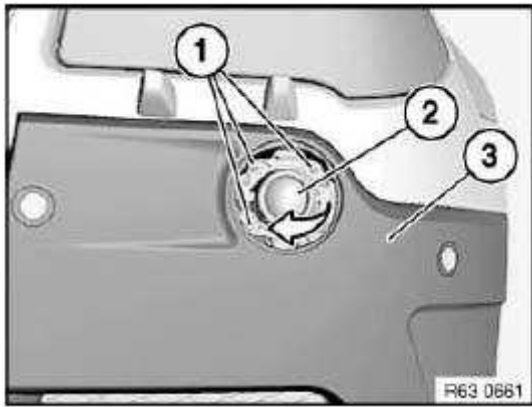


Fig. 22: Fog Lamp And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Adjust front fog lamps, see **63 10 014 Adjusting fog lamps**.

If necessary, convert bulb.

Installation:

Note bulb type, see **63 17 FRONT FOG LAMPS, ADDITIONAL LAMPS E83** .

63 17 060 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT FRONT FOG LAMP (M AERODYNAMIC KIT)

WARNING: Follow instructions for handling light bulbs (exterior lights), see **63 99 ... Instructions for handling light bulbs (exterior lights)**.

Necessary preliminary tasks:

- Remove front fog lamp trim

Release screws (1).

Feed fog lamp (2) in direction of arrow out of front bumper trim.

Unlock associated plug connection and disconnect.

Remove fog lamp (2).

**Fig. 23: Screws And Fog Lamp**

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Adjust front fog lamps, see **63 10 014 Adjusting fog lamps.**

If necessary, convert bulb.

Installation:

Note type of bulb, see **63 13 TURN SIGNALS E83 .**

21 REAR LIGHT CLUSTER**63 21 055 REPLACING A SOCKET HOUSING FOR LEFT OR RIGHT TAIL LIGHT**

WARNING: Follow instructions for handling light bulbs (exterior lights), see **63 99 ... Instructions for handling light bulbs (exterior lights).**

Side panel:

Unfasten plug connection (1) and disconnect.

Fold back side panel (2) in direction of arrow.

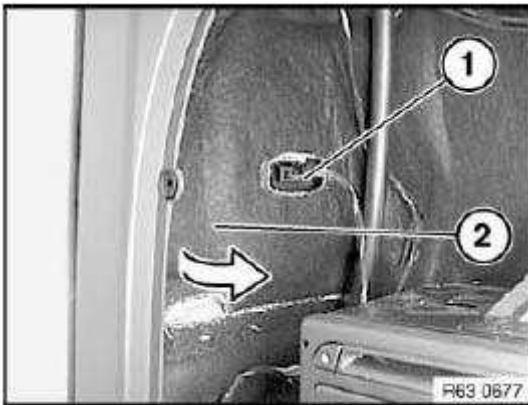


Fig. 24: Folding Back Side Panel

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock catch (1) and remove socket housing for rear light (2) in direction of arrow from rear light (3).

NOTE: If necessary, remove bulbs from socket housing for rear light (2).

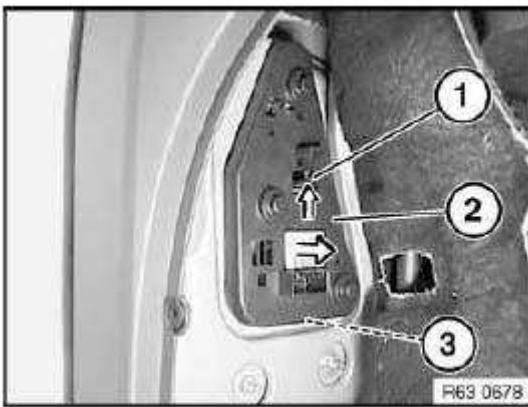


Fig. 25: Catch And Socket Housing

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert socket housing for rear light (1) in rear light (2) in such a way that retaining hook (3) engages associated locator (4).

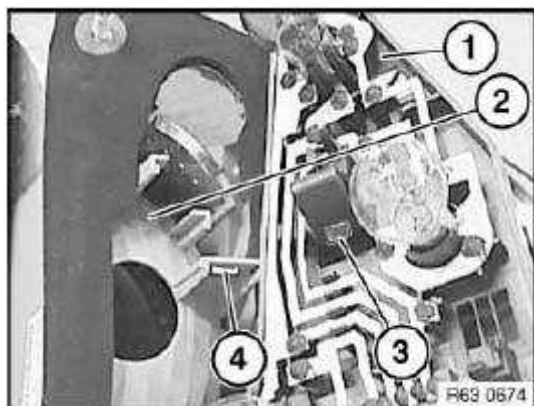


Fig. 26: Socket Housing And Rear Light
 Courtesy of BMW OF NORTH AMERICA, INC.

Rear lid:

Necessary preliminary tasks:

- Remove panel for rear lid, see **51 49 008 REMOVING AND INSTALLING/REPLACING PANEL FOR REAR LID** .

Turn socket housing for rear light to be replaced counterclockwise and remove.

NOTE:

1. Socket housing for fog warning lamp
2. Socket housing for reversing light

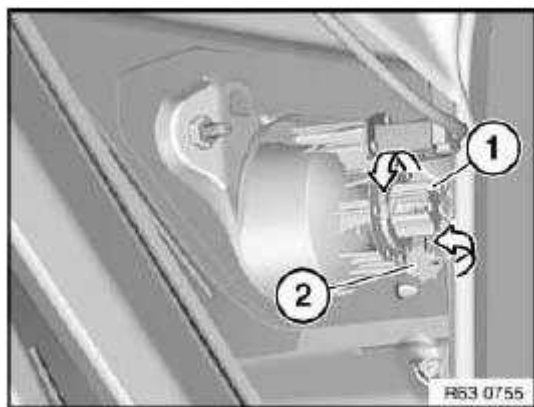


Fig. 27: Socket Housing For Fog Warning Lamp
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

Convert bulbs, replace if necessary, see **63 99 312 REPLACING BULB(S) FOR LEFT OR RIGHT REAR LIGHT (REAR LID)** .

63 21 101 REPLACING SEALING FRAME FOR LEFT OR RIGHT REAR LIGHT (ON SIDE PANEL)

Necessary preliminary tasks:

- Remove rear light, see **63 21 180 Removing and installing/replacing left or right rear light (on side panel)**.

Detach sealing frame for rear light (1) in upwards direction from rear light (2).

Installation:

Sealing frame for rear light (1) is centered via openings for threaded pins (3).

Make sure sealing frame for rear light (1) is correctly bonded all round on rear light (2).

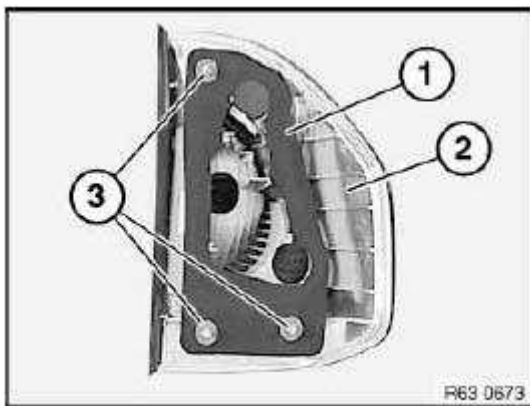


Fig. 28: Threaded Pins And Rear Light
Courtesy of BMW OF NORTH AMERICA, INC.

63 21 104 REPLACING SEALING FRAME FOR LEFT OR RIGHT REAR LIGHT (ON REAR LID)

Necessary preliminary tasks:

- Remove rear light, see **63 21 180 Removing and installing/replacing left or right rear light (on side panel)**.

Detach sealing frame for rear light (1) in direction of arrow from rear light (2).

Installation:

Make sure sealing frame for rear light (1) is correctly bonded all round on rear light (2).

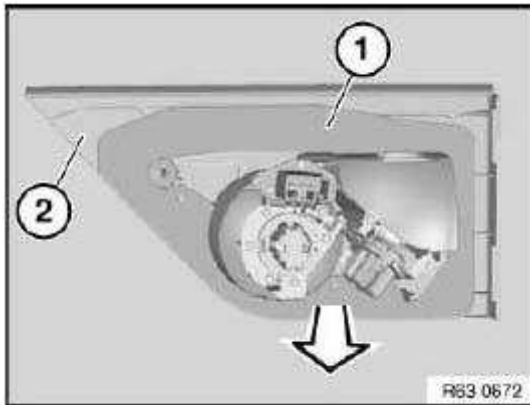


Fig. 29: Sealing Frame

Courtesy of BMW OF NORTH AMERICA, INC.

63 21 180 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT REAR LIGHT (ON SIDE PANEL)

IMPORTANT: Read and comply with 61 35 ... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary tasks:

- Remove socket housing for rear light, see **63 21 055 REPLACING A SOCKET HOUSING FOR LEFT OR RIGHT TAIL LIGHT** .

Unscrew nuts (1).

Tightening torque: 63 21 1AZ, see **63 21 REAR LIGHT UNIT** .

Remove rear light (2) in outwards direction from side panel (3).

Installation:

Make sure gap (outer) is uniform all round between rear light (2) and side panel (3).

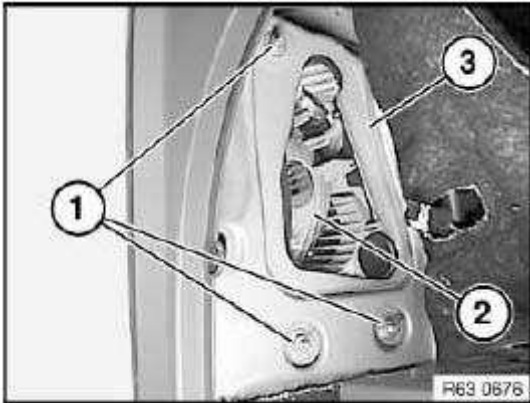


Fig. 30: Nuts And Side Panel

Courtesy of BMW OF NORTH AMERICA, INC.

63 21 183 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TAIL LIGHT (ON REAR LID)

IMPORTANT: Read and comply with 61 35 ... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary tasks:

- Remove panel for rear lid, see **51 49 008 REMOVING AND INSTALLING/REPLACING PANEL FOR REAR LID** .

Disconnect plug connection (1).

Slacken nut (2).

Tightening torque: 63 21 1AZ, see **63 21 REAR LIGHT UNIT** .

Feed out rear light (3) in direction of arrow and remove in outward direction from rear lid.

Installation:

Make sure guide (4) is correctly seated in cutout for rear lid (5).

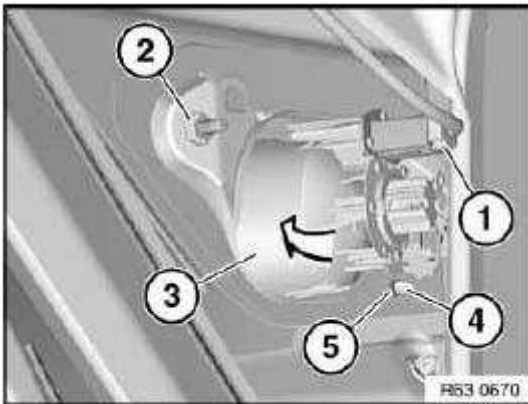


Fig. 31: Plug Connection And Rear Light
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Position lugs (1) of rear light (2) exactly over side edge of rear lid (3).

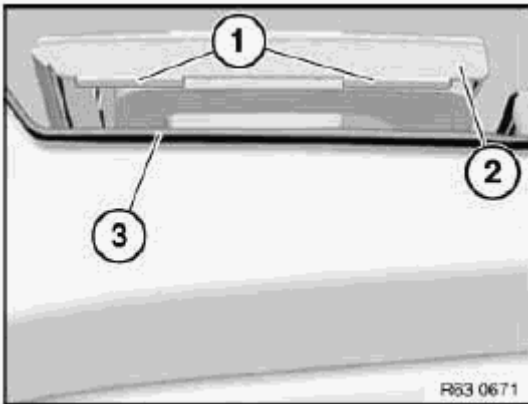


Fig. 32: Lugs Of Rear Light
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

If necessary, remove bulbs, see **63 99 312 Replacing bulb(s) for left or right rear light (rear lid)**.

25 BRAKE LIGHTS

63 25 000 REMOVING AND INSTALLING/REPLACING AUXILIARY BRAKE LIGHT

Necessary preliminary tasks:

- Remove rear spoiler, see **51 71 412 REMOVING AND INSTALLING REAR SPOILER** .

Release screws (1).

Installation:

Make sure hose (2) is correctly seated.

Slide additional stop light (3) slightly towards rear out of rear spoiler.

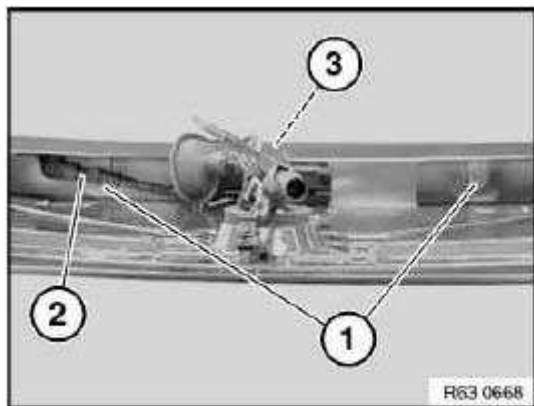


Fig. 33: Additional Stop Light And Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Pull additional stop light (2) in direction of arrow out of rear spoiler (3) and remove.

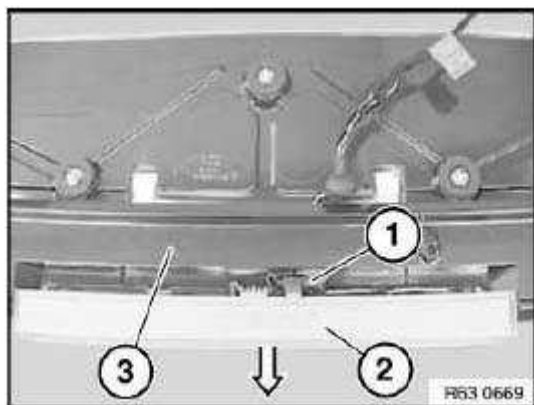


Fig. 34: Plug Connection And Additional Stop Light
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Guides (1) must be exactly seated in locators (2).

Make sure electrical leads (3) are correctly routed.

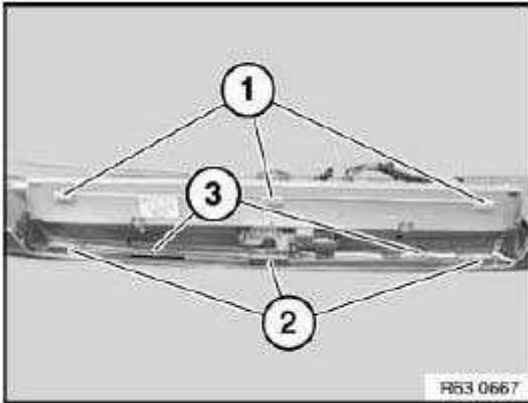


Fig. 35: Guides And Electrical Leads

Courtesy of BMW OF NORTH AMERICA, INC.

26 LICENCE PLATE LIGHTS

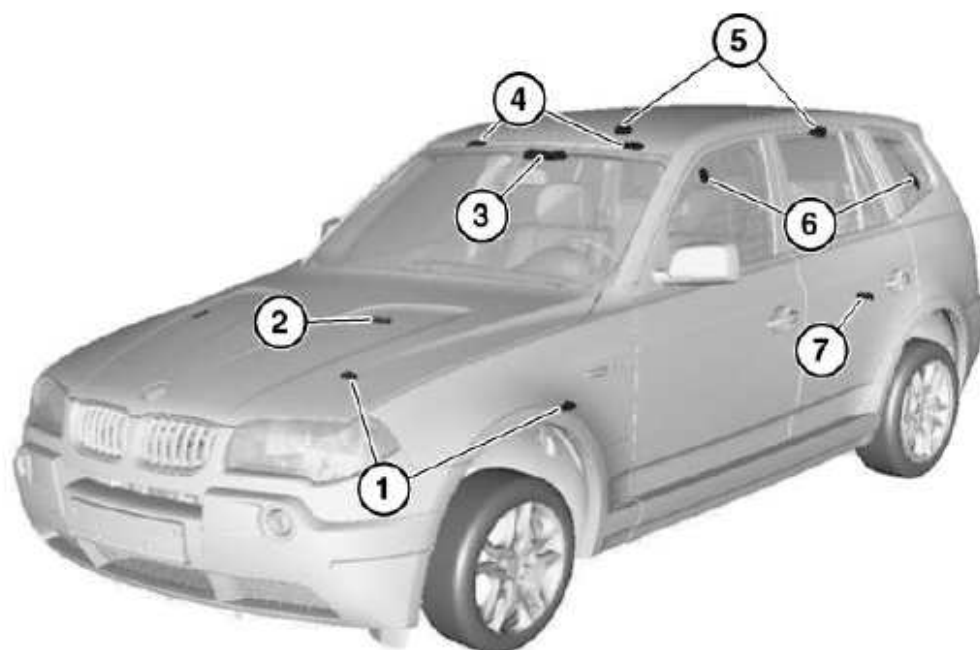
63 26 000 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT NUMBER/LICENSE PLATE LIGHT

Operation is described in:

Replacing handle strip (on rear lid), see **51 13 402 REMOVING AND INSTALLING/REPLACING HANDLE STRIP (ON REAR LID)** .

31 INTERIOR LIGHTS

63 31 .. OVERVIEW OF INTERIOR LIGHTS



R63 0943

- | | | | |
|---|---------------------------------------|---|--|
| 1 | Footwell light | 5 | Interior light |
| 2 | Glovebox light | 6 | Luggage compartment light (D-pillar) |
| 3 | Ceiling light (front) | 7 | Luggage compartment light (rear lid) |
| 4 | Mirror lights | | |

Fig. 36: Overview Of Interior Lights

Courtesy of BMW OF NORTH AMERICA, INC.

63 31 000 REMOVING AND INSTALLING/REPLACING COMPLETE CEILING LIGHT (FRONT)**Special tools required:**See **00 MAINTENANCE AND GENERAL INFORMATION**

- 00 9 317

IMPORTANT: Follow instructions for handling light bulbs (interior lights), see 63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Lever out ceiling light (1) with special tool 00 9 317 as illustrated.

Disconnect associated plug connection and remove ceiling light (1).

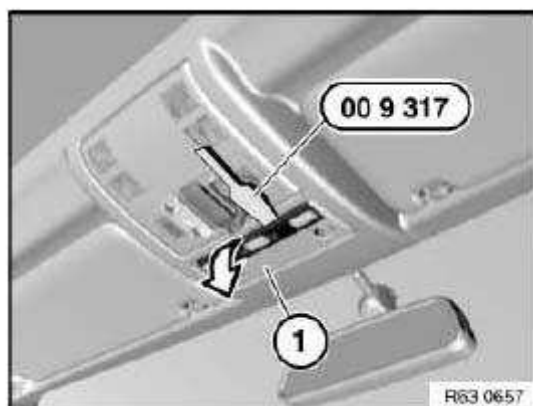


Fig. 37: Special Tool (00 9 317)

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- If necessary, convert bulbs.
- Note bulb type, see **63 31 INTERIOR LIGHTS E83** .

63 31 015 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT INTERIOR LIGHT (SIDE ROOFLINER)

Special tools required:

- **64 1 020 RELEASE HOOK**

IMPORTANT: Follow instructions for handling light bulbs (interior lights), see **63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS)** .

Lever out lens cover (1) with special tool 64 1 020 at retaining points (2).

Feed out lens cover (1) in direction of arrow and remove.

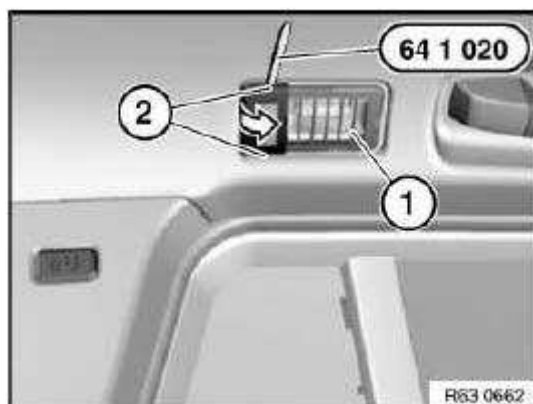


Fig. 38: Lens Cover With Special Tool (64 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out interior light (1) with special tool 64 1 020 as illustrated.

Disconnect associated plug connection and remove interior light (1).

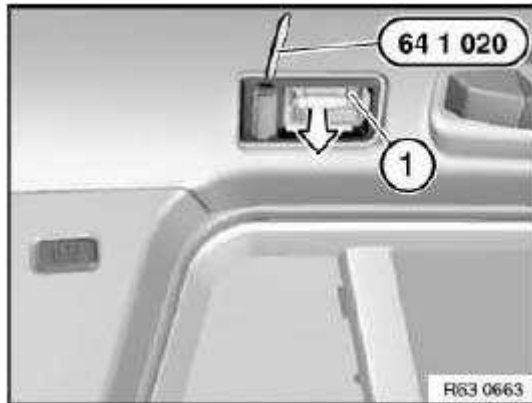


Fig. 39: Special Tool (64 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- If necessary, convert bulbs.
- Note bulb type, see **63 31 INTERIOR LIGHTS E83** .

63 31 020 REMOVING AND INSTALLING/REPLACING FOOTWELL LIGHT

Special tools required:

- **64 1 020 RELEASE HOOK**

IMPORTANT: Follow instructions for handling light bulbs (interior lights), see **63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS)** .

Replacement:

If necessary, remove bulb.

Lever footwell light (1) with special tool 64 1 020 out of trim for pedal assembly (2).

Disconnect associated plug connection and remove footwell light (1).

Replacement:

Note bulb type, see **63 31 INTERIOR LIGHTS E83** .

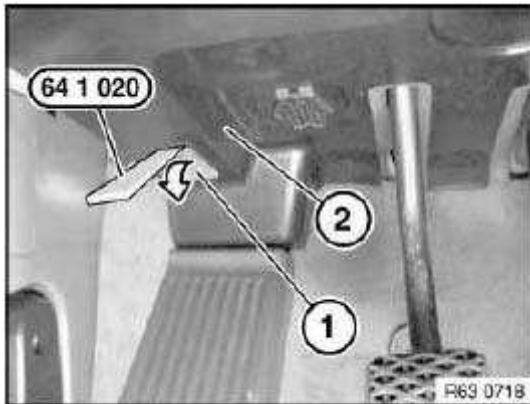


Fig. 40: Special Tool (64 1 020)

Courtesy of BMW OF NORTH AMERICA, INC.

63 31 050 REMOVING AND INSTALLING/REPLACING MIRROR LIGHT

IMPORTANT: Follow instructions for handling light bulbs (interior lights), see 63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Replacement:

If necessary, convert bulb.

Lever front mirror light (1) in direction of arrow.

Disconnect plug connection underneath and remove mirror plate light (1).

Replacement:

Note bulb type, see 63 31 INTERIOR LIGHTS E83 .

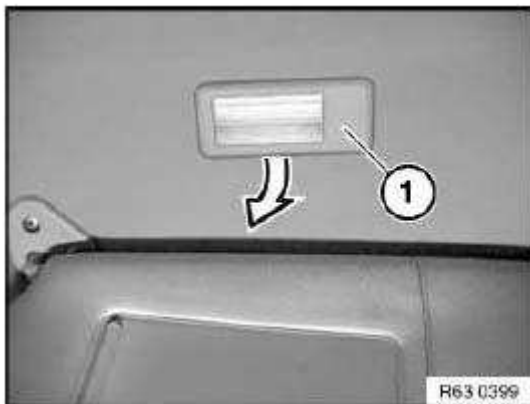


Fig. 41: Removing Front Mirror Light

Courtesy of BMW OF NORTH AMERICA, INC.

63 31 080 REMOVING AND INSTALLING/REPLACING LUGGAGE COMPARTMENT LIGHT (D-

PILLAR)**Special tools required:**

- **64 1 020 RELEASE HOOK**

IMPORTANT: Follow instructions for handling light bulbs (interior lights), see **63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS)** .

Lever out luggage compartment light (1) with special tool 64 1 020 as illustrated.

Disconnect associated plug connection and remove luggage compartment light (1).

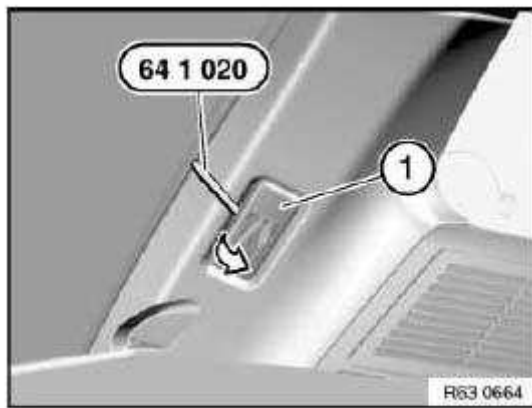


Fig. 42: Luggage Compartment Light With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- If necessary, convert bulbs.
- Note bulb type.

63 31 085 REMOVING AND INSTALLING/REPLACING LUGGAGE COMPARTMENT LAMP (ON REAR LID)

IMPORTANT: Follow instructions for handling light bulbs (interior lights), see **63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS)** .

Lever out luggage compartment lamp (1) at openings (2) in direction of arrow.

Disconnect plug connection underneath and remove luggage compartment lamp (1).

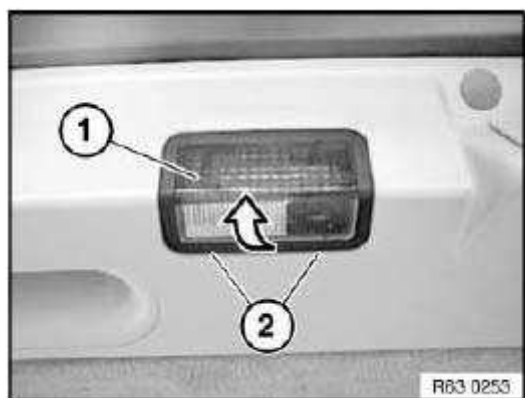


Fig. 43: Luggage Compartment Lamp
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- If necessary, convert bulbs.
- Note bulb type, see **63 31 INTERIOR LIGHTS E83** .

63 31 150 REMOVING AND INSTALLING/REPLACING GLOVEBOX LIGHT

IMPORTANT: Follow instructions for handling light bulbs (interior lights), see **63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS)** .

Lever out glovebox light (1) in direction of arrow.

Disconnect plug connection and remove glovebox light (1).

Replacement:

If necessary, remove bulb.

Note bulb type, see **63 31 INTERIOR LIGHTS E83** .

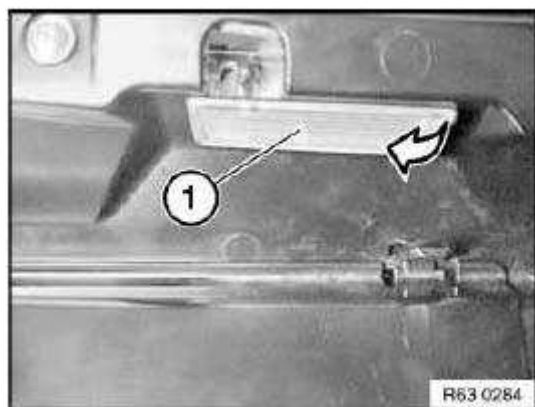


Fig. 44: Glovebox Light

Courtesy of BMW OF NORTH AMERICA, INC.

99 LIGHT BULBS

63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS)

WARNING: Xenon headlights: Danger to life due to high voltage!
Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

WARNING: Halogen lamps are under pressure:
To avoid injury, wear protective goggles and gloves.

IMPORTANT: To prevent short-circuiting, disconnect light bulbs from voltage supply prior to replacement.

Do not touch the glass bulbs in new lights bulbs as even the slightest contamination will burn in and reduce bulb service life.

Only touch light bulbs with clean gloves or a clean cloth.

Do not expose light bulbs to mechanical vibrations.

Use only recommended light bulbs.

Follow the light bulb manufacturer's instructions without fail.

63 99 ... INSTRUCTIONS FOR REPLACING LIGHT BULBS (INTERIOR LIGHTS)

CAUTION: To prevent short-circuiting, disconnect light bulbs from voltage supply prior to replacement.

Do not touch the glass bulbs in new lights bulbs as even the slightest contamination will burn in and reduce bulb service life.

Only touch light bulbs with clean gloves or a clean cloth.

Do not expose light bulbs to mechanical vibrations.

Use only recommended light bulbs.

Follow the light bulb manufacturer's instructions without fail.

63 99 002 REPLACING HALOGEN BULB FOR HIGH-BEAM HEADLIGHT ON LEFT

WARNING: Follow instructions for handling light bulbs (exterior lights), see 63 99 ... Instructions for handling light bulbs (exterior lights).

Necessary preliminary tasks:

- M54 only:

Remove suction filter housing

NOTE: Headlight (3) removed for purposes of clarity.
Unlock clip (1) in direction of arrow.
Remove cover (2) from headlight (3).

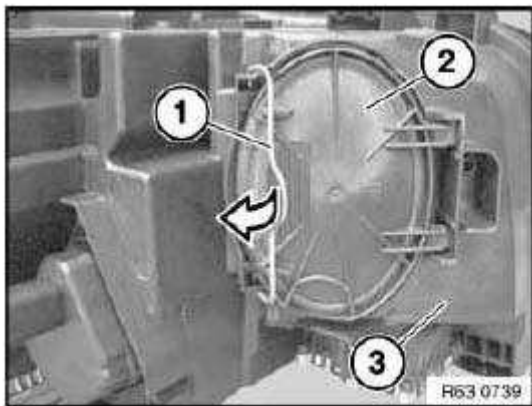


Fig. 45: Removing Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip bulb (1) by pressing on plug (2).

Remove bulb (1) from headlight (3) slightly, disconnect plug connection and remove bulb (1).

Installation:

Insert bulb (1) in headlight (3) at bottom at first and then tilt upwards until bulb (1) snaps audibly into place.

Make sure bulb (1) is correctly seated in catches (4).

Note type of bulb, see 63 12 HEADLIGHTS, HEADLIGHT ASSEMBLY E83 .

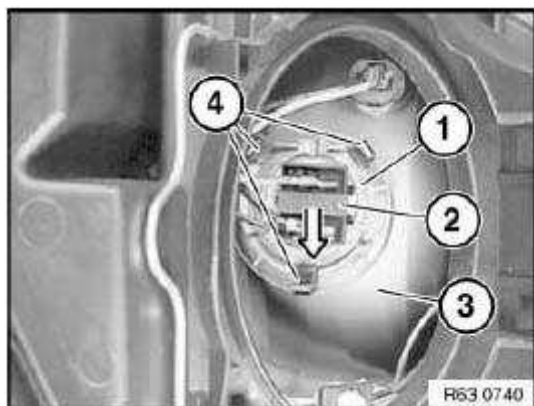


Fig. 46: Bulb And Catches

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 003 REPLACING HALOGEN BULB FOR HIGH-BEAM HEADLAMP ON RIGHT

Operation is described in:

Replacing halogen bulb for high-beam headlight on left, see **63 99 002 Replacing halogen bulb for high-beam headlight on left.**

63 99 072 REPLACING HALOGEN BULB FOR LEFT (OR RIGHT) HEADLIGHT

WARNING: Follow instructions for handling light bulbs (exterior lights), see **63 99 ... Instructions for handling light bulbs (exterior lights).**

NOTE: Headlight (2) removed for purposes of clarity.
Unlock cover (1) in direction of arrow.
Remove cover (1) from headlight (2).

Installation:

Make sure cover is correctly seated on headlight (2).

Guides must be exactly seated in associated mounts.

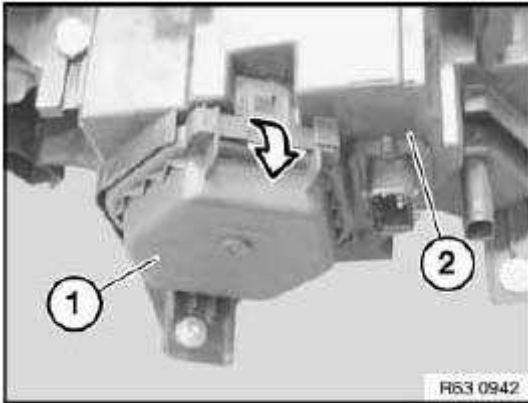


Fig. 47: Removing Cover From Headlight
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bulb (1) towards rear from headlight.

Disconnect plug connection (2).

Installation:

Make sure bulb (1) is exactly seated in headlight.

Note type of bulb, see **63 12 HEADLIGHTS, HEADLIGHT ASSEMBLY E83** .

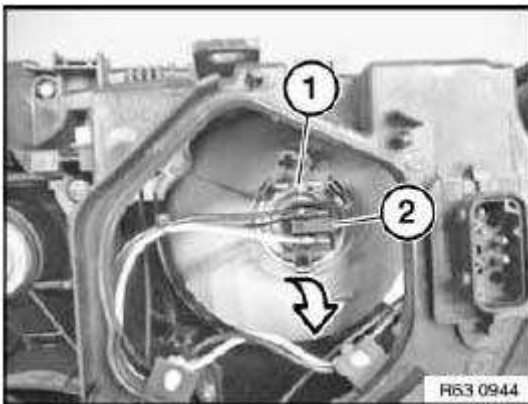


Fig. 48: Bulb And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 076 REPLACING BULB FOR LEFT XENON HEADLIGHT

WARNING: Follow instructions for handling light bulbs (exterior lights), see **63 99 ... Instructions for handling light bulbs (exterior lights)**.

Necessary preliminary tasks:

- Removing ignition unit for left xenon headlight, see **63 12 870 Replacing ignition unit for left xenon headlight.**

Unlock retaining ring (1) in counterclockwise direction and remove.

Remove bulb for xenon headlight (2) in direction of arrow from headlight (3).

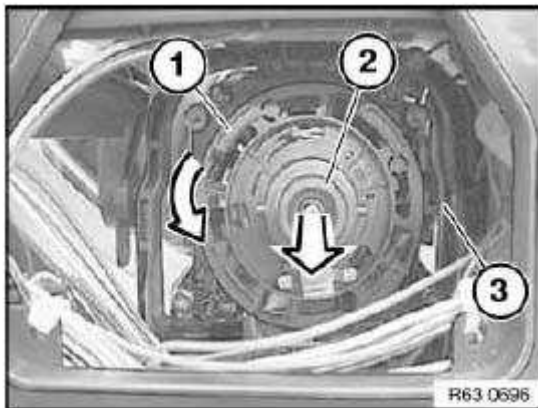


Fig. 49: Retaining Ring And Bulb

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert bulb for xenon headlight (1) exactly in headlight (2).

Observe "Top marking" (3).

Fit retaining ring (4) on headlight in such a way that apertures (5) slide over fixtures for ignition unit.

Installation:

Note type of bulb, see **63 12 HEADLIGHTS, HEADLIGHT ASSEMBLY E83 .**

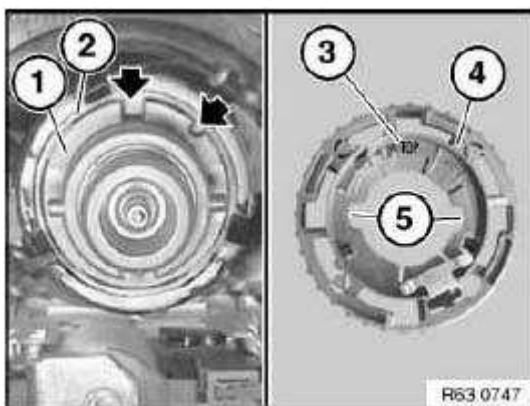


Fig. 50: Retaining Ring And Bulb

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 077 REPLACING BULB FOR RIGHT XENON HEADLIGHT

Operation is described in:

Remove bulb for left xenon headlight (ignition unit), see **63 99 076 Replacing bulb for left xenon headlight.**

63 99 140 REPLACING BULB FOR SIDE MARKER LAMP, FRONT LEFT

WARNING: Follow instructions for handling light bulbs (exterior lights), see **63 99 ... Instructions for handling light bulbs (exterior lights).**

Necessary preliminary tasks:

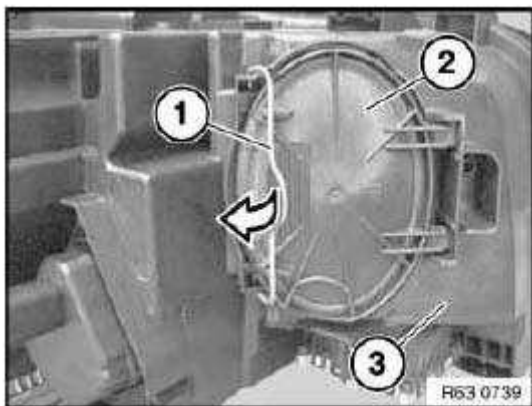
- M54 only:

Remove suction filter housing

NOTE: Headlight (3) removed for purposes of clarity.

Unlock clip (1) in direction of arrow.

Remove cover (2) from headlight (3).

**Fig. 51: Removing Clip**

Courtesy of BMW OF NORTH AMERICA, INC.

Grip bulb holder (1) on both sides and pull towards rear out of headlight (2).

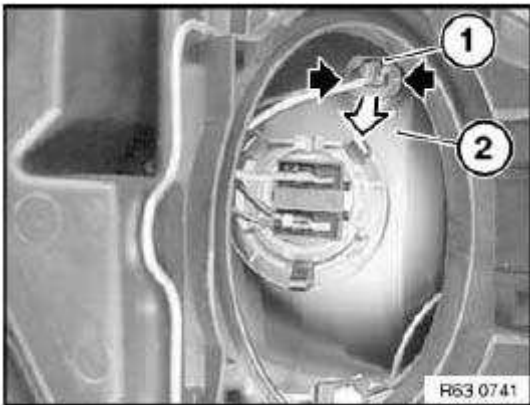


Fig. 52: Bulb Holder

Courtesy of BMW OF NORTH AMERICA, INC.

Pull bulb for side marker lamp (1) in direction of arrow out of bulb holder (2) and remove.

Installation:

Make sure guides (3) are exactly seated in mountings (4).

Note type of bulb, see **63 12 HEADLIGHTS, HEADLIGHT ASSEMBLY E83** .

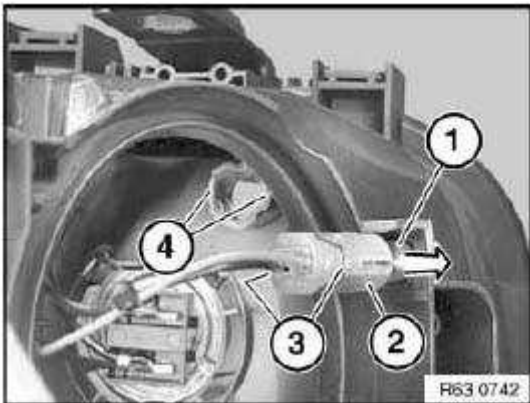


Fig. 53: Side Marker Lamp And Bulb Holder

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 141 REPLACING BULB FOR SIDE MARKER LAMP, FRONT RIGHT

Operation is described in:

Replacing bulb for side marker lamp, front left, see **63 99 140 Replacing bulb for side marker lamp, front left**.

63 99 201 REPLACING HALOGEN BULB FOR LEFT OR RIGHT FRONT FOG LAMP

WARNING: Follow instructions for handling light bulbs (exterior lights), see 63 99 ... Instructions for handling light bulbs (exterior lights).

Necessary preliminary tasks:

- Remove fog lamp, see 63 17 060 Removing and installing (replacing) left or right front fog lamp.

Turn bulb holder (1) in direction of arrow and remove from fog lamp (2).

Installation:

Note type of bulb, see 63 12 HEADLIGHTS, HEADLIGHT ASSEMBLY E83 .

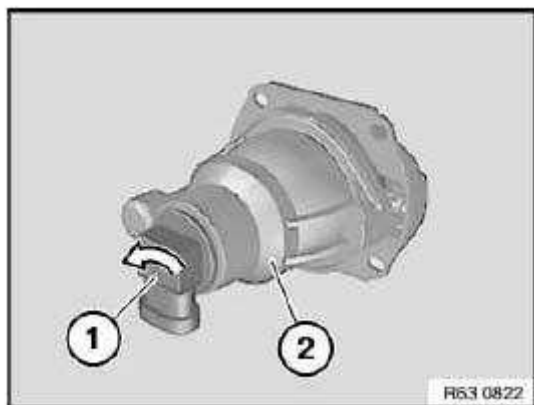


Fig. 54: Turning Bulb Holder
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 273 REPLACING BULB FOR TURN INDICATOR, FRONT LEFT

WARNING: Follow instructions for handling light bulbs (exterior lights), see 63 99 ... Instructions for handling light bulbs (exterior lights).

NOTE: Headlight removed for purposes of clarity.

Turn bulb holder (1) counterclockwise and pull towards rear out of headlight (2).

Remove bulb from bulb holder (1).

Installation:

Note type of bulb, see 63 12 HEADLIGHTS, HEADLIGHT ASSEMBLY E83 .

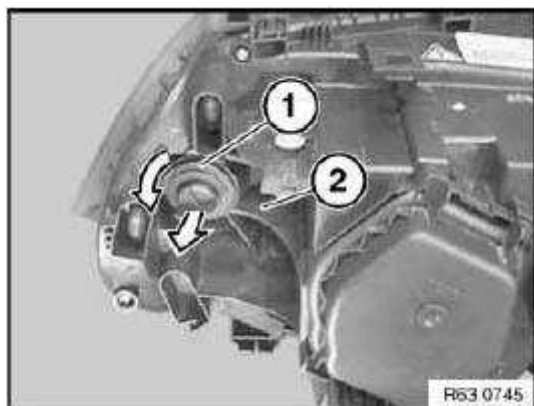


Fig. 55: Turning Bulb Holder

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 275 REPLACING BULB FOR TURN INDICATOR, FRONT RIGHT

Operation is described in:

Replacing bulb for turn indicator, front left, see **63 99 273 Replacing bulb for turn indicator, front left.**

63 99 295 REPLACING BULB FOR AUXILIARY TURN SIGNAL LIGHT, FRONT LEFT OR RIGHT

WARNING: Follow instructions for handling light bulbs (exterior lights), see 63 99 ... Instructions for handling light bulbs (exterior lights).

Necessary preliminary tasks:

- Remove front auxiliary turn signal light, see **63 13 200 Removing and installing/replacing front left or right auxiliary turn signal lamp.**

Turn bulb holder (1) approx. 45° and remove from front auxiliary turn signal light (2).

Pull bulb out of holder (1).

Installation:

Note type of bulb, see **63 12 HEADLIGHTS, HEADLIGHT ASSEMBLY E83 .**

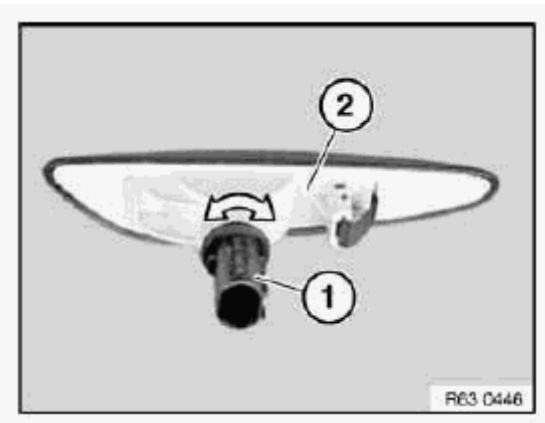


Fig. 56: Front Auxiliary Turn Signal Light
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 312 REPLACING BULB(S) FOR LEFT OR RIGHT REAR LIGHT (REAR LID)

This operation is described in:

"Replacing a socket housing for left or right rear light", see **63 21 055 Replacing a socket housing for left or right tail light**.

Installation:

Note type of bulb, see **63 12 HEADLIGHTS, HEADLIGHT ASSEMBLY E83**.

63 99 315 REPLACING LIGHT BULB(S) FOR LEFT OR RIGHT REAR LIGHT

WARNING: Follow instructions for handling light bulbs (exterior lights), see **63 99 ... Instructions for handling light bulbs (exterior lights)**.

Rear light in side panel:

Necessary preliminary tasks:

- Remove socket housing for rear light, see **63 21 055 REPLACING A SOCKET HOUSING FOR LEFT OR RIGHT TAIL LIGHT**.

Turn faulty bulb and pull out of socket housing for rear light.

NOTE:

1. Bulb, turn indicator light
2. Bulb, rear light/brake light
3. Bulb, rear light

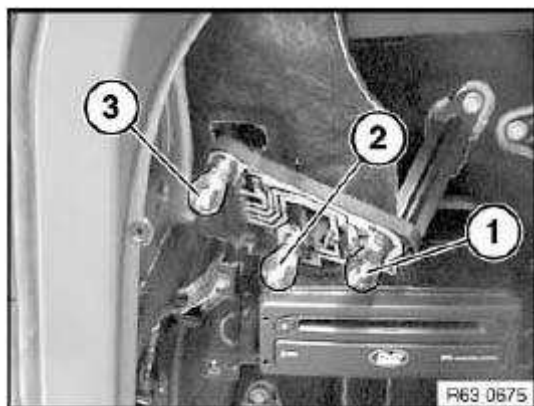


Fig. 57: Bulb, Turn Indicator Light

Courtesy of BMW OF NORTH AMERICA, INC.

Rear light in rear lid:

Necessary preliminary tasks:

- Remove socket housing for rear light, see **63 21 055 REPLACING A SOCKET HOUSING FOR LEFT OR RIGHT TAIL LIGHT** .

Remove faulty bulb (1) in direction of arrow from socket housing (2).

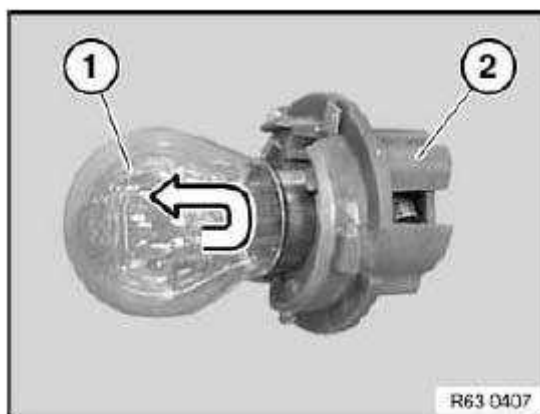


Fig. 58: Removing Bulb

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Note type of bulb, see **63 12 HEADLIGHTS, HEADLIGHT ASSEMBLY E83** .

63 99 401 REPLACING BULB FOR LEFT OR RIGHT LICENSE PLATE LIGHT

WARNING: Follow instructions for handling light bulbs (exterior lights), see **63 99 ...**

Instructions for handling light bulbs (exterior lights).

Lever out lens (1) on left or right from opening (2) and remove.

Lever out bulb (3).

NOTE: Note type of bulb, see **63 12 HEADLIGHTS, HEADLIGHT ASSEMBLY E83** .

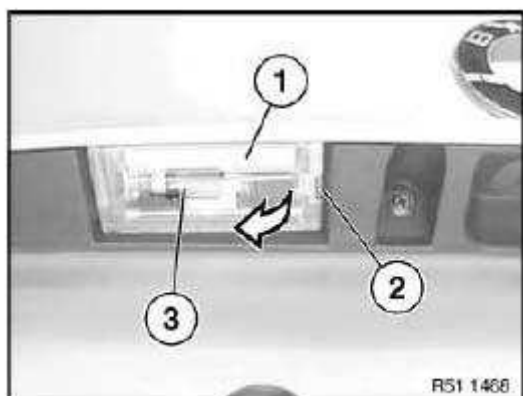


Fig. 59: Removing Lens

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 431 REPLACING BULB FOR FRONT CEILING LIGHT

WARNING: Follow instructions for handling light bulbs (interior lights), see **63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS)** .

Necessary preliminary tasks:

- Remove front ceiling light

Turn bulb holder in direction of arrow and remove.



Fig. 60: Turning Bulb Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Pull bulb (1) out of bulb holder (2).

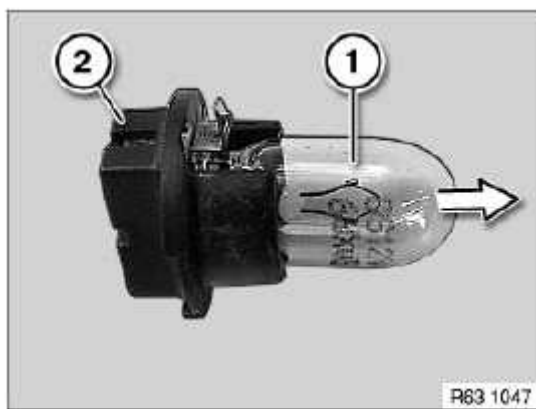


Fig. 61: Bulb Holder And Bulb
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Make sure bulb holder is correctly seated and engaged in ceiling light
- Note bulb type

63 99 431 REPLACING BULB FOR FRONT CEILING LIGHT

WARNING: Follow instructions for handling light bulbs (interior lights), see 63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Necessary preliminary tasks:

- Remove front ceiling light

Version without inside reading lamp:

Release screws (1) and remove lens.

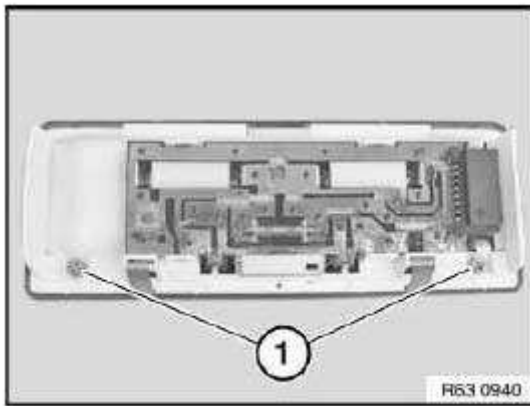


Fig. 62: Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Remove festoons (1) from lens (2).

Installation:

Note type of bulb, see **63 12 HEADLIGHTS, HEADLIGHT ASSEMBLY E83** .

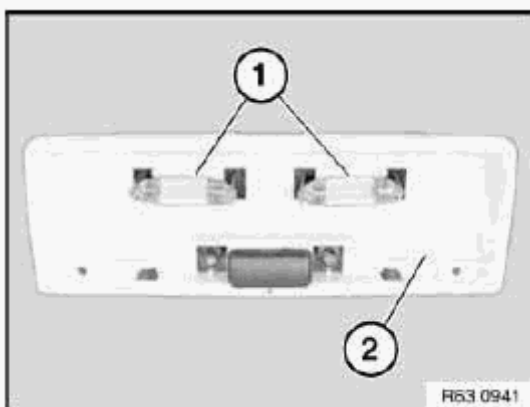


Fig. 63: Festoons And Lens

Courtesy of BMW OF NORTH AMERICA, INC.

Version with inside reading lamp:

Turn bulb in direction of arrow and remove.

Installation:

Note type of bulb, see **63 12 HEADLIGHTS, HEADLIGHT ASSEMBLY E83** .

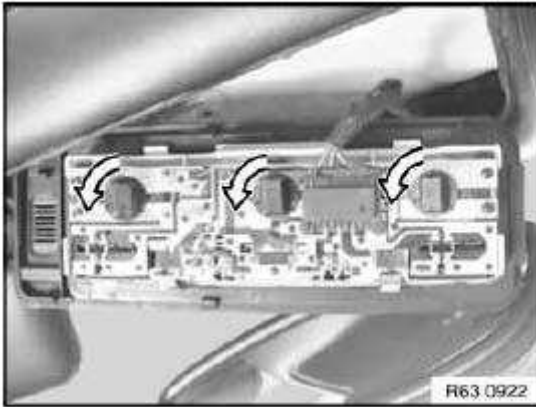


Fig. 64: Turning Bulb

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 435 REPLACING LIGHT BULB FOR LEFT OR RIGHT INTERIOR LIGHT

WARNING: Follow instructions for handling light bulbs (interior lights), see 63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Open lens (1) in direction of arrow and remove festoon (2).

Installation:

Note bulb type, see **63 31 INTERIOR LIGHTS E83** .

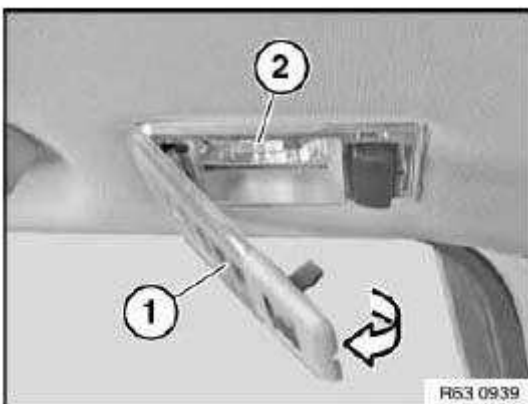


Fig. 65: Lens And Festoon

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 437 REPLACING LIGHT BULB FOR FOOTWELL LIGHT

WARNING: Follow instructions for handling light bulbs (interior lights), see 63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Necessary preliminary tasks:

- Remove footwell light, see 63 31 020 Removing and installing/replacing footwell light.

Unlock catch (1) on footwell light (2).

Open cover cap (3) in direction of arrow.

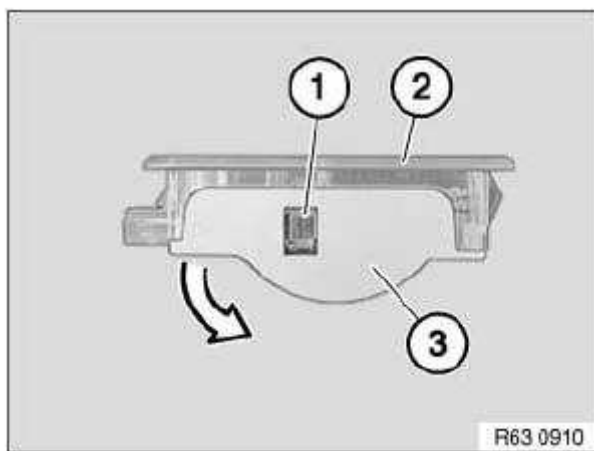


Fig. 66: Catch And Cover Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Pull bulb (1) in direction of arrow out of bulb holder (2).

Installation:

Note bulb type, see 63 31 INTERIOR LIGHTS E83 .

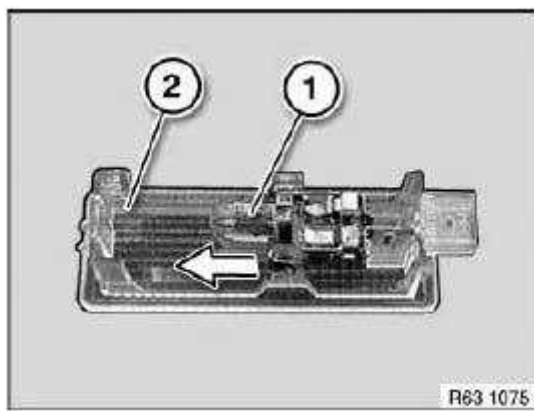


Fig. 67: Bulb Holder And Bulb

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 451 REPLACING LIGHT BULB FOR LUGGAGE COMPARTMENT LIGHTING

WARNING: Follow instructions for handling light bulbs (interior lights), see 63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Necessary preliminary tasks:

- Remove luggage compartment light, see 63 31 080 Removing and installing/replacing luggage compartment light (D-pillar).

Remove bulb (1) in direction of arrow.

Installation:

Note bulb type, see 63 31 INTERIOR LIGHTS E83 .

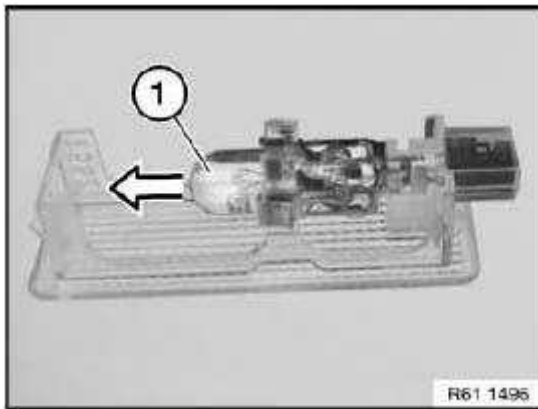


Fig. 68: Bulb

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 452 REPLACING LIGHT BULB FOR LUGGAGE COMPARTMENT LIGHT (ON REAR LID)

WARNING: Follow instructions for handling light bulbs (interior lights), see 63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Necessary preliminary tasks:

- Remove luggage compartment light, see 63 31 080 Removing and installing/replacing luggage compartment light (D-pillar).

Fold back trim (1) on luggage compartment light (2).

Remove festoon (3).

Installation:

Note bulb type, see **63 31 INTERIOR LIGHTS E83** .

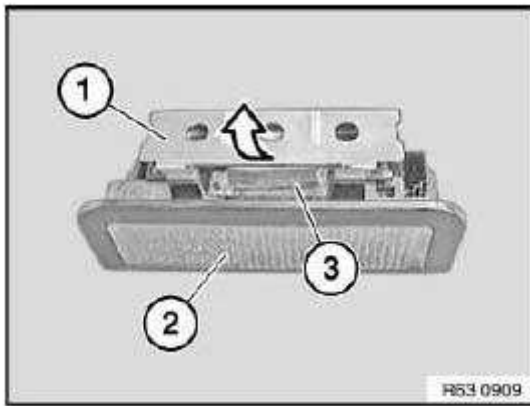


Fig. 69: Trim On Luggage Compartment Light
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 461 REPLACING BULB FOR GLOVEBOX LIGHT

WARNING: Follow instructions for handling light bulbs (interior lights), see **63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS)** .

Necessary preliminary tasks:

- Remove glovebox light, see **63 31 150 Removing and installing/replacing glovebox light.**

Spread bow contacts (1) and remove bulb.

Installation:

Note bulb type, see **63 31 INTERIOR LIGHTS E83** .

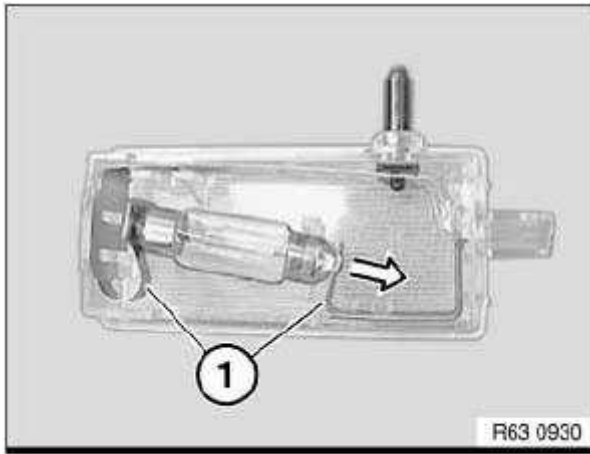


Fig. 70: Bow Contacts Of Bulb
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND EQUIPMENT

Lights - SI Techniques - X3

GLOSSARY OF ELECTRICAL COMPONENTS

All models from E38 and MINI



Fig. 1: Glossary Of Electrical Components
Courtesy of BMW OF NORTH AMERICA, INC.

INTRODUCTION

This glossary contains electrical components from the circuit diagrams found in diagnosis, together with the respective abbreviated designations for the components.

Abbreviated designations are the descriptions of the components found in the circuit diagrams. Example: "A210" for the control unit "door module, rear passenger side".

This glossary contains approx. 2,000 abbreviated designations.

This glossary contains the following information:

- Abbreviated designation (alphanumerically sorted)
- Component
- Information: Reference to a component description in an SI Technology bulletin (SBT).

If there is not a more detailed description of the component available, a short description of the component will be given in column headed "Information".

- KoGr.: Main group for the component

Each abbreviated designation with component is assigned to a main group.

An overview of the main groups can be found in the SI Technology bulletin (SBT) "Abbreviations".

- Model series: Overview of model series in whose circuit diagrams the abbreviated designation is found.

This glossary contains the abbreviated designations for the following circuit diagrams:

- Circuit diagram-DVD "BMW V 5.0", status 03/2005 (WDS: Wiring Diagram System):

This DVD contains the circuit diagrams needed for diagnosis on BMW vehicles.

- Circuit diagram-DVD "MINI V 3.0", status 03/2005 (WDS: Wiring Diagram System):

This DVD contains the circuit diagrams needed for diagnosis on MINI vehicles.

This glossary contains the abbreviated designations used in both these DVDs. Abbreviated designations that are **only** found in the overviews "Component- and signal information" are **not** contained in this glossary.

NOTE: Assignment of abbreviated designation to model series

For technical reasons associated with the system, some model series are listed together, as follows:

- E60 and E61
- E63 and E64
- E65 and E66
- E83 and E85
- E87 and E90
- R50, R52 and R53

For this reason, it is possible that an abbreviated designation is assigned to a model series even though the component concerned is not found in that model series.

ALPHANUMERICAL OVERVIEW OF ABBREVIATED DESIGNATIONS

The WDS-DVD (Wiring Diagram System) alphanumerically lists the abbreviated designations from the

overview "Component- and signal information".

Abbreviated designations are alphabetically sorted in the following groups:

- A Control units, modules
- B Sensors, electric converters
- D Diagnosis interfaces
- E Lights, electric heating equipment
- F Fuses
- G Power supply, gas generators
- H Acoustic and visual warning systems
- I Components from BMW suppliers
- K Relays
- L Coils
- M Electric motors, drives
- N Amplifiers, regulators, control units
- P Display instruments
- R Resistors, potentiometers
- S Switches, buttons
- T Ignition coils
- U Radio systems, suppressor filters
- V Semiconductors, diodes
- W Aerials, screening
- X Connectors

Connectors are **not** listed in this glossary.

Y Electromechanical components

Z Blocking circuits, suppressor filters

ADAPTIVE HEADLIGHTS

E46/2, E46/C, E53, E83

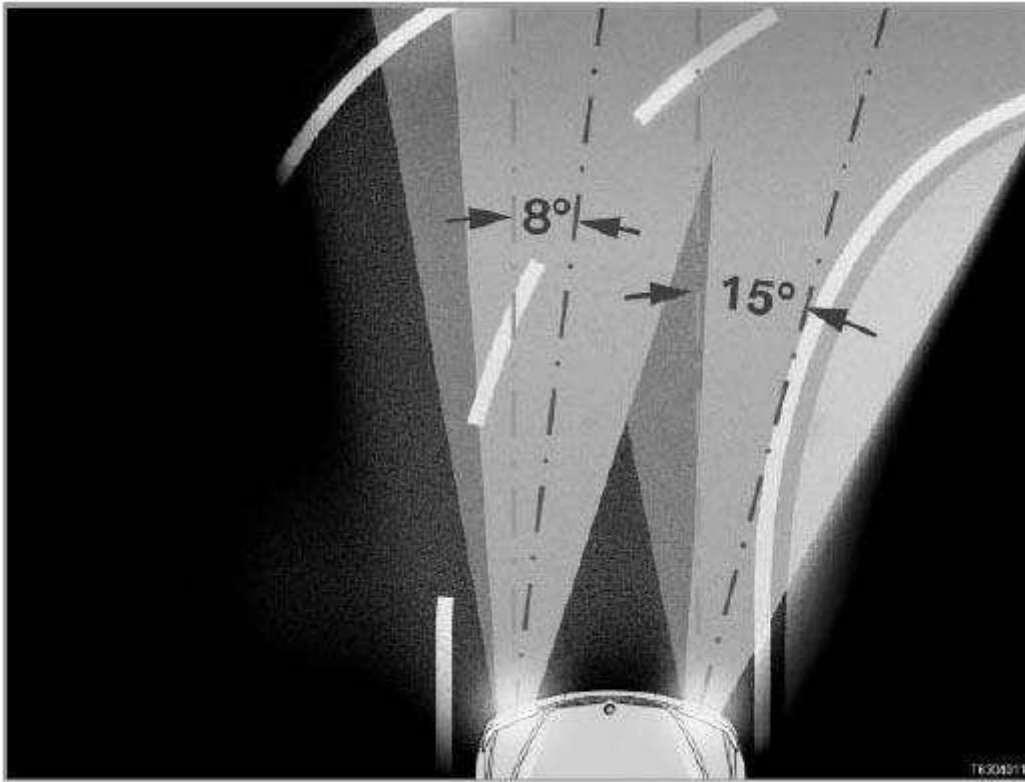


Fig. 2: Adaptive Headlights Aiming Angle
Courtesy of BMW OF NORTH AMERICA, INC.

Launch dates for option 524 "Adaptive headlights":

- E46 Coupe (E46/2) and E46 Convertible (E46/C) model revision: 03/2003
- E53: 04/2004 onwards
- E83: From 10/2003

NOTE: Option 524 is only available in conjunction with option 522.

Option 524 "Adaptive headlights" is only available in conjunction with option 522 "Xenon dipped and main - beam headlights".

NOTE: ALC = AHL
The development code for the adaptive headlights was "ALC".
ALC stood for "Adaptive Light Control".
The marketing and sales designation for option 524 in English-language markets is "adaptive headlights", abbreviated to "AHL".
This is why the abbreviation "AHL" is used even in diagnosis and technical vehicle documentation.
However, some control units may still bear the abbreviation "ALC", which may also be the abbreviation used in the EPC (Electronic Parts Catalogue).

INTRODUCTION

The adaptive headlights turn the bi-xenon headlights towards the inside of a bend when cornering. This improves illumination of the curve of the road.

Visibility is therefore improved.

When cornering, the driver is not looking into a "black hole" - instead, the adaptive headlights allow the driver to see the curve of the road.

- > E46/2, E46/C, E53 and
E83 until 09/2006
- > E83 from 09/2006

NOTE: AHL control unit discontinued from 09/2006.

On the E83 from 09/2006, the software for the AHL control unit is integrated into the light module (LM). The AHL control unit is no longer fitted.

The turning lights function is new on the E83 from 09/2006.

The turning lights give the area next to the carriageway additional illumination when you are turning or cornering (driving in tight bends). The function is also active when you are parking.

The turning lights are realized using the front foglights. The front foglights have a specially shaped reflector to illuminate the areas to the sides better.

**NOTE: Turning lights only in conjunction with option 524.
Turning lights are a subfunction of option 524 "Adaptive headlights".**

BRIEF DESCRIPTION OF COMPONENTS

The following components and control units provide input signals for the adaptive headlights system:

○ **Light switch**

The rotary switch for the side lights and dipped headlights differs depending on the vehicle equipment level (adaptive headlights, automatic driving lights control, automatic or manual headlight-range adjustment). For the adaptive headlights function to operate, the light switch must be set to position "A" ("A" = "automatic driving lights control" or "adaptive headlights").

○ **Turn-signal/main-beam switch**

The main-beam headlights are switched on and off with the direction indicator / main-beam switch (by pressing or pulling the switch). The adaptive headlights function operates with both dipped and main-

beam headlights.

- **Ride-height sensors**

If the special equipment "Adaptive headlights" is fitted, the adaptive headlights control unit evaluates the signals from the ride-height sensors.

This is because: the adaptive headlights control unit also controls the automatic headlight-range adjustment.

The automatic headlight-range adjustment feature adjusts the vertical aim of the headlights to compensate for variations in the vehicle tilt angle (e.g. when the vehicle is laden, and under braking and acceleration in dynamic driving situations).

- **Brake light switch**

If the vehicle is equipped with the "adaptive headlights" option, the signals from the brake light switch are read by the control unit for the adaptive headlights.

The signal sent by the brake light switch is an input signal for the automatic headlight-range adjustment; see above: Ride-height sensors.

- **Zero-position sensor**

- > E46/2, E46/C
- > E83

The zero-position sensor in the AHL headlight sends a signal for calculating the zero position of the AHL headlight. This regulates the horizontal movement of the AHL headlight.

- **Position sensor**

- > E53

The position sensor in the positioner module for the bi-xenon headlights supplies a signal for the horizontal movement of the headlights.

- **General module**

The basic module supplies input signals with regard to the terminal management (terminal 15 ON).

The adaptive headlights control unit is activated when terminal 15 is switched ON.

- **EGS control unit or reversing light switch**

When reverse gear is engaged, the headlights are moved to the straight-ahead position.

On vehicles with automatic transmission, the EGS control unit (electronic transmission control) provides the "Reverse gear engaged" signal.

On vehicles with manual transmission, the signal is supplied by the reversing light switch.

○ **KOMBI: Instrument cluster**

The instrument cluster is the gateway, i.e. the data interface) between the PT-CAN data bus and the K-bus.

○ **RLS: Rain-light sensor for automatic driving lights control**

The rain-light sensor measures the ambient brightness outside the vehicle.

- In twilight conditions, the rain-light sensor transmits the message "Twilight" so that the automatic headlight-range adjustment can activate dipped headlights. The headlights are tilted up and down as required, but they are not swivelled towards the bend in the road.
- In darkness, the rain-light sensor sends the message "Darkness". The adaptive headlights are then activated when the vehicle is cornering. The headlights are moved to the left or the right:

○ **Steering-angle sensor and DSC sensor**

The steering angle sensor and DSC sensor (DSC = Dynamic Stability Control) supply signals for the adaptive headlights to the adaptive headlights control unit. These signals are evaluated as follows, depending on the vehicle's speed:

- Vehicle speeds up to **30 km/h**:

The adaptive headlights function is controlled using the information from the **steering angle sensor** (in the steering column switch cluster).

- Vehicle speeds between **30 km/h and 50 km/h**:

In the 30 to 50 km/h speed range, there is a **continuous transition** in signal evaluation: from the evaluation of signals sent by the steering angle sensor to evaluation of the signals sent by the yaw-rate sensor (in the DSC sensor).

- **In extreme dynamic driving situations**, e.g. if the vehicle starts to skid or fishtail, even at speeds less than **50 km/h**, the signals from the yaw-rate-sensor are considered.

If the vehicle starts to skid or fishtail, the headlights will move to the straight-ahead position. The headlights are not moved until the vehicle has stabilized.

- Vehicle speeds over **50 km/h**:

At speeds upwards of 50 km/h, the signals from the **yaw-rate sensor** (in the DSC sensor) form the primary basis for control of the adaptive headlights function.

Reason: For a constant cornering radius, the steering angle required increases disproportionately with speed. In addition, the steering angle required also depends on the coefficient of friction of the road surface.

The yaw rate is directly proportional to speed. For this reason, the yaw rate is always the most suitable measure for controlling the adaptive headlights at high speeds.

Even at high speeds, however, the steering angle sensor signal is used to detect (predict) the driver's commands **in advance**. This prediction is important: The yaw rate signal is not supplied until the vehicle has **responded** to the steering wheel movement.

The steering-angle sensor signal is disabled so that rapid, momentary steering adjustments do not affect the adaptive headlights function.

A number of control units are involved in the adaptive headlights system.

Depending on the series and model concerned, the adaptive headlights are actuated by the following control units:

- **AHL control unit**

- > E46/2, E46/C, E53 and E83 until 09/2006

The AHL control unit controls the adaptive headlights.

For safety reasons, the AHL control unit is also responsible for the automatic headlight-range adjustment. This is because: Oncoming traffic must not be dazzled by the adaptive headlights. If a headlight sticks in an unfavorable position, the AHL control unit will attempt to move this headlight down (using the stepper motors in the automatic headlight-range adjustment).

The AHL control unit is connected to the K-bus and the PT-CAN.

- **LM: Light module**

- > E83 from 09/2006

The AHL control unit is integrated in the light module.

The light module controls and monitors all vehicle lights. Information is received and transmitted over the data buses PT-CAN, LIN bus and K-bus.

- **Stepper motor controllers**

The stepper motor controllers (SMC) control the stepper motors in the headlights (for the automatic headlight-range adjustment and for the adaptive headlights).

- **LSZ: Light switch cluster**

- > E46/2, E46/C, E53 and E83 until 09/2006 (E53: light module)

The light switch cluster forwards the prompts from the light switch and from the turn-signal/main-beam switch to the AHL control unit (via the K-bus).

- **Xenon-headlight control unit**

The xenon-headlight control unit actuates the bulb in the bi-xenon headlights.

The following components are controlled:

- **Stepper motors for the adaptive headlights**

The stepper motors turn the positioner modules in the bi-xenon headlights.

The stepper motors swivel the headlights along the vertical and horizontal axes. (vertical = up and down for the automatic headlight-range adjustment;

horizontal = to the left and right for the adaptive headlights).

The positioner modules execute the movement.

- **Indicator light on the light switch**

The indicator light (green LED) next to the "A" (= "automatic driving lights control") is actuated by the adaptive headlights and has 2 display functions:

- The indicator light **lights up permanently** when the automatic driving lights control or adaptive headlights function is switched on (= light switch in position "A").
- The indicator light **flashes** if a fault develops in the adaptive headlight system.

The indicator light thus supports diagnosis of the adaptive headlights.

The indicator light is actuated by the light switch cluster or by the light module.

SYSTEM FUNCTIONS

The adaptive headlights system moves headlights horizontal (i.e. from left to right) in order to illuminate the inside of a bend when cornering.

The following functions of the adaptive headlights system are described below:

- System activation and automatic calibration
- Activation of stepper motor controllers
- Speed-dependent analysis of signals
- Adjustment of headlight horizontal aim
- Deactivation of adaptive headlights function under extreme handling conditions
- Deactivation of adaptive headlights function in response to system faults
- Setting headlights to parked position
- Automatic headlight-range adjustment
- Adaptive headlights for automatic driving lights control
- Turning light

NOTE: Different control units for adaptive headlights.

- > E46/2, E46/C, E53 and E83 until 09/2006: AHL control unit
- > E83 from 09/2006: The adaptive headlights are actuated by the light module.

For this reason, the following text refers to the general "control unit for adaptive headlights".

System activation and automatic calibration

When terminal 15 is switched ON, the headlights always perform a calibration sequence, even if the dipped headlights are not switched on. The control unit for adaptive headlights (AHL control unit or light module) sends the "perform calibration sequence" prompt to the stepper motor controllers (SMCs, control unit for the headlight stepper motors). The stepper motor controllers actuate the stepper motors in the headlights. The calibration sequence is performed.

In the calibration sequence, the headlights move as follows:

- The headlights move to the right and the left (= calibration sequence for adaptive headlights).
- The headlights move up and down (= calibration sequence for automatic headlight-range adjustment).
- At the end of the calibration sequence, the headlights are in the straight-ahead position.

Following the calibration sequence, the system is ready for operation.

When reverse gear is engaged, the headlights are moved to the straight-ahead position.

NOTE: The calibration sequence is performed only after terminal 15 has been switched OFF for at least 15 seconds.

If terminal 15 is repeatedly switched on and off (e.g. for demonstration purposes), the calibration sequence will not be executed every time terminal 15 is switched on. Terminal 15 must have been switched off for at least 15 seconds before it is switched on again. Only then is a calibration sequence performed when terminal 15 is switched on.

Activation of stepper motor controllers

The control unit for adaptive headlights (AHL control unit or light module) sends the stepper motor controllers (SMC) the nominal values for the positioner modules (position of positioner modules and speed of movement).

The control unit for adaptive headlights calculates the nominal values using the following signals:

- Vehicle road speed
- Steering angle (at speeds up to 50 km/h, dependent on encoding)
- Yaw rate (50 km/h upwards, see Steering-angle sensor and DSC sensor above)

Speed-dependent analysis of signals

The adaptive headlights are controlled by the following signals depending on the road speed: signals from the steering angle sensor or signals from yaw-rate sensor (in the DSC sensor). The encoding (at the end of the production line) determines the priority assigned to sensor signals above which speed threshold (see above).

Adjustment of headlight horizontal aim

The stepper motor controllers move the headlights to the right or left when the vehicle corners.

Horizontal range of movement of headlights:

- Inwards, i.e. towards center of vehicle: up to max. 8 °
 - > E46/2, E46/C, E83:7 °
 - > E53:8°
- Outwards: up to max. 15°

Example: Right-hand bend:

The right-hand headlight turns by up to 15° (the right-hand headlight is the "inside" headlight on a right-hand bend).

It therefore swivels outwards away from the vehicle center.

The left-hand headlight swivels through a maximum of 8 ° (the left-hand headlight swivels towards the vehicle center, i.e. inwards).

The headlight on the outside of the bend reaches its end position at the same time as the headlight on the inside of the bend, ensuring that the road is evenly illuminated.

On a right-hand bend, the left-hand headlight is on the outside of the bend. The right-hand headlight is on the inside of the bend.

Deactivation of adaptive headlights function under extreme handling conditions

If the vehicle drifts, skids and loses sideways grip, the adaptive headlights function is deactivated as follows:

- The headlights are returned to the straight-ahead position. The headlights are no longer turned.
- The dipped headlights remain on.

Deactivation of adaptive headlights function in response to system faults

In the event of a system error, the indicator light on the light switch will flash.

Dazzling of oncoming traffic must be prevented in the event of a system fault.

For this reason, the adaptive headlights function is deactivated as follows:

- If the stepper motors are still functional, the headlights are returned to the straight-ahead position. The

headlights are no longer moved towards bends in the road.

- If it is no longer possible for a headlight to be moved back to the straight-ahead position, the headlight is tilted downwards (by the stepped motors for automatic headlight-range adjustment). This prevents dazzling of oncoming traffic.
- If the headlight cannot be tilted downwards, the bi-xenon bulb in this headlight is disabled as follows:

When the vehicle is parked up, the control unit registers sleep mode for the adaptive headlights, as follows: Standstill and terminal R OFF for several minutes.

The next time the vehicle is restarted, the bi-xenon light of the defective headlight is not switched on.

The front foglights are switched on in order to ensure a minimum level of illumination.

The dipped headlight is **not** switched off while the vehicle is in motion.

Setting headlights to parked position

When terminal R is switched off, the headlights move to the parked position. The parked position is important for the headlights' next calibration sequence. From the parked position, the headlights are run through a calibration sequence in the pre-drive-check. During the calibration sequence, the control unit for adaptive headlights relearns the straight-ahead position for the headlights.

When the headlights have reached the parked position, the stepper motor controllers SMCs inform the control unit for adaptive headlights ("verification").

The control unit for adaptive headlights deactivates the stepper motor controllers. The run-down period lasts approx. 10 seconds.

Automatic headlight-range adjustment

If the special equipment "Adaptive headlights" is fitted, the control unit for adaptive headlights also controls the automatic headlight-range adjustment.

The automatic headlight-range adjustment adapts the headlight range for different operating conditions.

Variations in the vehicle tilt angle are produced by vehicle loads and braking or acceleration in extreme driving situations. The automatic headlight-range adjustment moves the headlights up and down as required.

The control unit for adaptive headlights also controls the automatic headlight-range adjustment as follows.

1. The ride-height sensors and the brake light switch supply the signals for the automatic headlight-range adjustment.
2. The control unit for adaptive headlights computes the vehicle inclination (longitudinally to the roadway) from the signals.
3. The stepper motors for the automatic headlight-range adjustment automatically and dynamically control the headlight range.

The headlight range is adjusted so that the actual headlight range conforms to the legally required headlight range as follows:

- If vehicle rear is lower than front:

The actual headlight range will be longer than the legally stipulated range. The headlight beam height is lowered to reduce the headlight range to match the legal requirement.

- If the vehicle is horizontal:

The actual headlight range will be the same as the legally stipulated range.

- If vehicle front is lower than rear:

The actual headlight range will be shorter than the legally stipulated range. The headlight beam height is raised to increase the headlight range to match the legal requirement.

Adaptive headlights for automatic driving lights control

The automatic driving lights control feature (option in conjunction with the rain-light sensor) switches the side lights and dipped headlights on and off automatically.

Switch-on conditions:

- The automatic driving lights control must be encoded in the light switch cluster or light module.
- The light switch must be in position "A" ("A" stands for automatic driving lights control and for adaptive headlights).
- The rain-light sensor must be installed and operational.

The rain-light sensor detects the brightness of the ambient light.

The rain-light sensor sends the following prompts to the light switch cluster or the light module:

- Ambient brightness low: In twilight, darkness, in an underground garage or tunnel.

"Switch on dipped headlights" request

- Ambient brightness sufficient.

"Switch off dipped headlights" request

If only the side lights are to be switched on, the light switch must be set to side lights (switch position 1).

When the light switch is set to position "A", the control unit for adaptive headlights is also activated:

- When the automatic driving lights control function switches on the dipped headlights (e.g. at twilight), the adaptive headlights function is notified at the same time.

The control unit for adaptive headlights then assumes control of the automatic headlight-range adjustment.

- In addition, the signals from the rain-light sensor are also evaluated. The headlights are not turned when the vehicle is cornering until total darkness sets in.

The message "dipped headlights on" is given individually for each headlight.

If a headlight fails, the adaptive headlights are switched off.

The front foglights are switched on in order to ensure a minimum level of illumination.

Turning lights

- > E83 from 09/2006

The turning lights are coupled to the adaptive headlights (option 524).

Depending on actuation, the right-hand and/or left-hand front foglight is switched on. The turning lights are actuated by the light module (LM). The turning light are not switched on suddenly but rather faded according to special time parameters.

Depending on the country concerned, the turning lights are switched on when cornering.

The following conditions must be satisfied for the turning lights to be **switched on**:

- Terminal 15 ON
- Light switch in position "A" ("A" stands for automatic driving lights control)
- Rain-light sensor detects twilight or darkness (threshold exceeded)

and

- Turn signal indicator ON (not one-touch turn signal)
- Speed range (forward):
 - Europe and Japan version from 0 km/h to 35 km/h
 - US version from 0 km/h to 65 km/h
- Swivel angle (theoretical):
 - when stationary < or = 77°
 - when driving < or = 10°

Alternatively

- Speed range (reverse):
 - 0 km/h to 35 km/h
- Swivel angle (theoretical):

- when stationary or driving $> \text{ or } = 70^\circ$

If the vehicle is stationary, the turning lights will automatically be deactivated after a certain time, e.g. when waiting at traffic lights. However, the turning lights can be activated again with the turn-signal/main-beam switch.

The light module (LM) uses the following signals to actuate the turning lights:

- Steering angle
- Yaw rate
- Status of reverse gear

The following conditions must be satisfied for the turning lights to be **switched off**:

- Light switch not in position "A" ("A" stands for automatic driving lights control)
- Rain-light sensor does not detect twilight or darkness (lower threshold exceeded)

Alternatively

- Turn signal indicator OFF
- Speed range (forward):
 - Europe and Japan versions $> \text{ or } = 40 \text{ km/h}$
 - US version $> \text{ or } = 70 \text{ km/h}$
- Swivel angle (theoretical):
 - when stationary 77°
 - when driving 10°

Alternatively

- Speed range (reverse): $> \text{ or } = 40 \text{ km/h}$
- Swivel angle (theoretical): when stationary and when driving below a certain value

Alternatively

- Vehicle skids and swings out.

Alternatively

- Front foglights are switched on with the front foglights switch.

PRECONDITIONS FOR ACTIVATION

The control unit for adaptive headlights is "awake" from terminal 15 ON.

The movement of the lights is subject to the following conditions:

- Reverse gear must **not** be engaged.
- No system faults must be present. The indicator light must **not** be flashing.
- The bulbs for the bi-xenon lights are OK in both headlights.
- The vehicle must not be skidding or fishtailing.
- The rain-light sensor must detect darkness.
- Additional precondition for activation: automatic driving lights control is active (light switch in position "A", see above).

National versions

The options "Daytime driving lights" and "Manual headlight-range adjustment" are available in certain countries.

Vehicles with manual headlight-range adjustment do not have adaptive headlights.

This is because vehicles with manual headlight-range adjustment have halogen dipped headlights; adaptive headlights are only available in conjunction with option 522 "Xenon dipped and main-beam headlights".

Switching on adaptive headlights in conjunction with daytime driving lights function

The "Daytime lights" option (Northern Europe and Canada) means that

The dipped headlights and the side lights are **always** switched on under the following conditions:

- Light switch in position "2"
- Terminal 15 ON

The automatic headlight-range adjustment is active (actuated by the control unit for adaptive headlights).

If terminal 15 is switched off, the dipped headlights and the side lights are automatically switched off as well.

The light switch must also be set to position "A" with the "Daytime driving lights" option. The control unit for adaptive headlights is then in standby.

System functions for "Daytime lights" option when the light switch is set to position "A":

- If the vehicle is encoded with the "Daytime driving lights" option (end of production line), the light switch can remain in position "A" at all times.

When terminal R is switched on, side lights, parking lights and licence plate lights are switched on.

As soon as terminal 15 is switched on, the dipped headlights are also switched on.

- When the dipped headlights are switched on, the adaptive headlights control unit is activated (for automatic headlight-range adjustment).

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- The indicator lamp on the light switch lights up and indicates that the system is functional.
- The adaptive headlights turn when the vehicle is stationary if the steering wheel is turned (to the right only).
- The headlights are moved when the vehicle corners if the rain-light sensor registers darkness.

The switch-on conditions for the adaptive headlights in conjunction with special equipment "Daytime driving lights" are as follows:

- The vehicle must be encoded with the "Daytime driving lights" option (end of production line)
- The light switch must be in position "A"
- Terminal 15 must be switched on and reverse gear must not be engaged
- Rain-light sensor must detect darkness

Subject to change.

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10 LAMP SETTINGS

63 10 ADJUSTMENT OF LIGHTS E30 / E32 / E34 / E36 / E38 / E39 / E46 / E52 / E60 / E61 / E63 / E64 / E65 / E66 / E67 / E70 / E81 / E83 / E85 / E86 / E87 / E90 / E91 / E92 / E93 WITH HEADLIGHT VERTICAL AIM ADJUSTMENT

TECHNICAL DATA - ADJUSTMENT OF LIGHTS

Low-beam dip unit	e = 10
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12 HEADLIGHTS

63 12 HEADLIGHTS, HEADLIGHT ASSEMBLY E83

TECHNICAL DATA - HEADLIGHTS, HEADLIGHT ASSEMBLY E83

Light bulb - driving light (halogen)	Type	H7 12 V 55 W
Light bulb - driving light (xenon)	Type	D2-S
Light bulb - high beam	Type	H7 12 V 55 W
Light bulb - side marker lamp EUR	Type	12 V 5 W
Bulb - side marker lamp US	Type	12 V 21 W

13 TURN SIGNAL INDICATOR

63 13 TURN SIGNALS E83

TECHNICAL DATA - TURN SIGNALS E83

Light bulb - turn signal, front EUR	Type	12 V 21 W
Light bulb - turn signal, front US	Type	12 V 21 W
Light bulb - turn signal, rear EUR	Type	12 V 21 W
Light bulb - turn signal, rear US	Type	12 V 21 W
Light bulb - auxiliary turn signal	Type	12 V 5 W

17 FOG LIGHTS, AUXILIARY LIGHTS

63 17 FRONT FOG LAMPS, ADDITIONAL LAMPS E83

TECHNICAL DATA - FRONT FOG LAMPS, ADDITIONAL LAMPS E83

Bulb, fog lamp	Type	H11 12V 55 W
Bulb, fog lamp, M-aerodynamic kit	Type	H11 12V 55 W
Bulb - rear fog lamp EUR	Type	12 V 21 W

21 REAR LIGHT CLUSTER

61 61 WINDSCREEN WIPERS E83 /

TECHNICAL DATA - WINDSCREEN WIPERS E83

Adjustment dimension - right windscreen wiper arm	Millimetres	66.0 ±3 mm
Adjustment dimension - left windscreen wiper arm	Millimetres	61.0 ±3 mm
Contact angle - right windscreen wiper blade	Degrees	85.2° ± 1
Contact angle - left windscreen wiper blade	Degrees	85.4° ±1
Adjustment dimension - rear window wiper arm	Millimetres	29.0 ± 3 mm

63 21 REAR LIGHT UNIT E83

TECHNICAL DATA - REAR LIGHT UNIT E83

Bulb - rear light	Type	12 V 21 W
Light bulb - brake/rear light	Type	12 V 21 W
Light bulb - fog warning lamp	Type	12 V 21 W
Light bulb - backup light	Type	12 V 21 W
Light bulb - turn signal	Type	12 V 21 W
Light bulb - 3rd brake light	Type	LED

26 LICENCE PLATE LIGHTS

63 26 LICENSE PLATE LIGHTS E53 / E83

TECHNICAL DATA - LICENSE PLATE LIGHTS E53 / E83

Bulb, license plate light	Type	Festoon 12 V 5 W
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31 INTERIOR LIGHTS

61 61 WINDSCREEN WIPERS E83 /

TECHNICAL DATA - WINDSCREEN WIPERS E83

Adjustment dimension - right windscreen wiper arm	Millimetres	66.0 ±3 mm
Adjustment dimension - left windscreen wiper arm	Millimetres	61.0 ±3 mm
Contact angle - right windscreen wiper blade	Degrees	85.2° ± 1
Contact angle - left windscreen wiper blade	Degrees	85.4° ±1
Adjustment dimension - rear window wiper arm	Millimetres	29.0 ± 3 mm

63 31 INTERIOR LIGHTS E83

TECHNICAL DATA - INTERIOR LIGHTS E83

Reading light, front	Type	12 V 6 W
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2007 BMW X3

ACCESSORIES AND EQUIPMENT Lights - Technical Data - X3

Interior light, front	Type	12 V 6 W
Interior light, rear	Type	Festoon 12 V 6 W
Trunk light	Type	Festoon 12 V 10 W
Glovebox light	Type	Festoon 12 V 5 W
Footwell light trim	Type	12 V 5 W
Make-up mirror light, front	Type	Festoon 12 V 10 W

2007 BMW X3**ACCESSORIES AND BODY, CAB Lights - Tightening Torques - X3****ACCESSORIES AND BODY, CAB****Lights - Tightening Torques - X3****21 REAR LIGHT CLUSTER****63 21 REAR LIGHT UNIT****REAR LIGHT UNIT - TIGHTENING TORQUES**

	Type	Thread	Tightening specification	Measure
1AZ Retaining nuts, rear light	E60 / E61 / E92 / E93		Observe tightening sequence	2.5 Nm
	E63 / E64 / E70 / E85 / E86 / E90 / E91 / E93			2.5 Nm
	E83			4.0 Nm
	E81 / E82 / E87			2.8 Nm
2AZ Retaining screws, rear light	E63 / E64			1.5 Nm
3AZ Retaining clip (clamping claw), rear light	E92 / E93			4.0 Nm
	E70			2.5 Nm
4AZ Auxiliary brake light to carrier	E81 / E87			2.3 Nm

ACCESSORIES & EQUIPMENT

Vehicle Lighting - Product Information

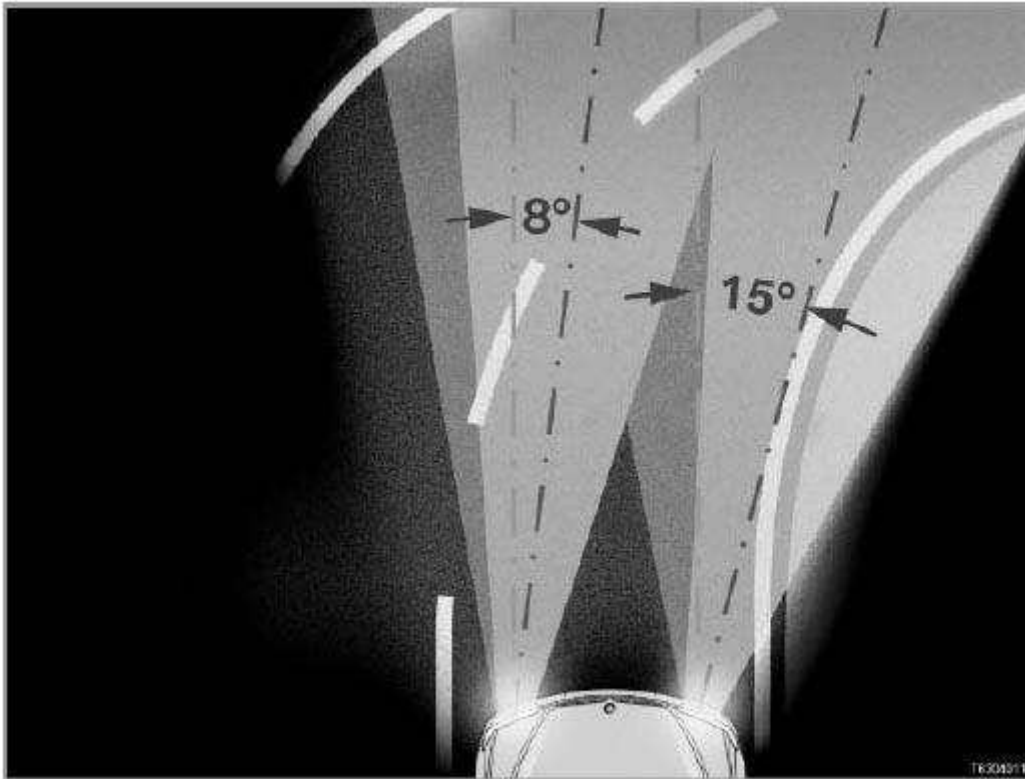
ADAPTIVE HEADLIGHTS E60, E61, E63, E64, E65, E66, E70, E81, E87, E90, E91, E92, E93

Fig. 1: Identifying Headlights Focusing Angle
Courtesy of BMW OF NORTH AMERICA, INC.

INTRODUCTION

Adaptive headlights turn the bi-xenon headlights towards the inside of a bend when cornering. This improves illumination of the curve of the road. Visibility is therefore improved.

When cornering, the driver is not looking into a "black hole" - instead, the adaptive headlights allow the driver to see the curve of the road.

This service information describes the adaptive headlights for the following model series:

> E60, E61, E63, E64 up to 03/2005:

See **SYSTEM OVERVIEW OF ADAPTIVE HEADLIGHTS (E60, E61, E63, E64, E65, E66 UP TO 03/2005)**

The system overview applies accordingly for the E65 and E66 up to 03/2005.

> E60, E61, E63, E64 from 03/2005 until 09/2005

See **SYSTEM OVERVIEW OF ADAPTIVE HEADLIGHTS (E60, E61, E63, E64, E65, E66 FROM 03/2005)**

The system overview applies accordingly for the E65 and E66 from 03/2005.

NOTE: ***AHL control unit discontinued from 03/2005.***

From 03/2005, the AHL control unit software is integrated into the light module on the E60, E61, E63, E64, E65 and E66. The AHL control unit is no longer fitted.

> E60, E61, E63, E64 from 09/2005

The vehicle electrical system was changed from 09/2005.

As a result of the change, several control units were discontinued and some control unit functions were integrated into new control units.

> E70

The turning lights function is new on the E70 from the start of series production.

The turning lights give the area next to the carriage way additional illumination when you are turning or cornering (driving in tight bends). They are also active when you park the vehicle.

Depending on the country concerned, the turning lights are activated when cornering.

> E81, E87, E90, E91, E92, E93

For the E81, E92, E93 from start of series production and for the E87 from 03/2007, the turning light function is new.

NOTE: ***Turning lights on E70, E81, E87, E92, E93 only in conjunction with option 524***

Turning lights are a subfunction of option 524 "Adaptive headlights".

Bi-xenon headlights are standard equipment on the E92, E93.

Option 524 is standard on the US version.

NOTE: ***AHL components on E46, E53 and E83***

There is a separate system description for the adaptive headlights on the E46,

E53, E83.

NOTE: *AHL components on the E63, E64*

- The E63, E64 has a zero-position sensor.
- Otherwise, the E63 and E64 are the same as the other 5-Series models.

NOTE: *Components for adaptive headlight on E70, E81, E87, E90, E91, E92, E93*

On the E81, E87, E90, E91, E92, E93, the adaptive headlights largely correspond to those on the E60, E61, E63, E64, E65 and E66:

- E70, E81, E87, E90, E91, E92, E93 vehicles are equipped with a zero-position sensor.
- On the E70, E81, E87, E90, E91, E92, E93, the FRM (footwell module) acts as control unit for exterior lighting. The footwell module contains the functions of the light module, AHL control unit and the general module (or body general module).

BRIEF DESCRIPTION OF COMPONENTS

The following components and control units provide signals for the adaptive headlight system:

CAS: Car Access System

The Car Access System supplies signals for the terminal management (e.g. terminal 15 ON).

The adaptive headlights control unit is activated when terminal 15 is switched ON.

Light Switch

The rotary switch for the side lights and dipped headlights differs depending on the vehicle equipment level (adaptive headlights, automatic driving lights control, automatic or manual headlight-range adjustment). For the adaptive headlights function to operate, the light switch must be set to position "A" ("A" = "automatic driving lights control" and "adaptive headlights").

See **LIGHT SWITCH**

Turn-Signal/Main-Beam Switch

The main-beam headlights are switched on and off with the turn-signal/main-beam switch (by pressing or pulling the switch). The adaptive headlights function operates with both dipped and main-beam headlights.

See **DIRECTION INDICATOR/MAIN-BEAM SWITCH**

SZL: Steering Column Switch

The SZL control unit forwards the signals from the turn-signal/main-beam switch to the adaptive headlights control unit.

E60, E61, E63, E64, E65 and E66

See **SZL: STEERING COLUMN SWITCH CLUSTER**

E70, E81, E87, E90, E91, E92, E93

The steering column switch cluster forwards the signals from the turn-signal/main-beam switch to the footwell module (FRM).

Ride-Height Sensors

If the special equipment "Adaptive headlights" is fitted, the adaptive headlights control unit evaluates the signals from the ride-height sensors. This is because: the adaptive headlights control unit also controls the automatic headlight-range adjustment.

The automatic headlight - range adjustment feature adjusts the vertical aim of the headlights to compensate for variations in the vehicle tilt angle (e.g. when the vehicle is laden, and under braking and acceleration in dynamic driving situations).

See **E60, E61, E63, E64, E65, E66, E90 - RIDE-HEIGHT SENSORS**

Brake Light Switch

If the special equipment "Adaptive headlights" is fitted, the signals from the brake light switch are read by the adaptive headlights control unit.

In addition, the brake light switch signal is also a signal for automatic headlight-range adjustment, see **RIDE-HEIGHT SENSORS** above.

Position Sensor

E60, E61

E65, E66

Hella headlights have a position sensor.

The position sensor in the positioner module for the bi-xenon headlights supplies a signal for the horizontal movement of the headlights.

See **POSITION SENSOR**

Zero-Position Sensor

> E63, E64

> E70, E81, E87, E90, E91, E92, E93

Automotive Lighting headlights, previously Bosch, have a zero-position sensor.

The zero-position sensor registers the horizontal movement of the headlight.

See **ZERO-POSITION SENSOR**

EGS Control Unit or Reversing Light Switch

When reverse gear is engaged, the headlights are moved to the straight - ahead position.

- On vehicles with automatic transmission, the EGS control unit provides the "Reverse gear engaged" signal. (EGS: electronic transmission control).
- On vehicles with manual transmission, the signal is supplied by the reversing light switch.

Rain-Light Sensor For Automatic Driving Lights Control

The rain - light sensor measures the ambient brightness outside the vehicle.

- In twilight conditions, the rain - light sensor transmits the message "Twilight" so that the automatic headlight - range adjustment can activate dipped headlights. The headlights are tilted up and down as required, but they are not yet moved towards the bend in the road.
- In darkness, the rain-light sensor sends the message "Darkness". The adaptive headlights are then activated when the vehicle is cornering. The headlights are moved to the left or right:

See **RAIN-LIGHT SENSOR FOR AUTOMATIC DRIVING LIGHTS CONTROL**

Steering-Angle Sensor and DSC Sensor

The steering angle sensor and DSC sensor (DSC = Dynamic Stability Control) supply signals for the adaptive headlights to the adaptive headlights control unit. These signals are evaluated as follows, depending on the vehicle's speed:

- Vehicle speeds up to **30 km/h**:

The adaptive headlights function is controlled using the information from the steering angle sensor (in the steering column switch cluster).

- Vehicle speeds between **30 km/h and 50 km/h**:

In the 30 to 50 km/h speed range, there is a continuous transition in signal evaluation: from the evaluation of signals sent by the steering angle sensor to evaluation of the signals sent by the yaw-rate sensor (in the DSC sensor).

- **In extreme dynamic driving situations** , e.g. if the vehicle starts to skid or fishtail, even at speeds less than **50 km/h** , the signals from the yaw-rate-sensor are considered.

If the vehicle starts to skid or fishtail, the headlights will move to the straight - ahead position. The headlights are not moved until the vehicle has stabilized.

- Vehicle speeds over **50 km/h**:

At speeds upwards of 50 km/h, the signals from the **yaw-rate sensor** (in the DSC sensor) form the primary basis for control of the adaptive headlights function.

Reason: For a constant cornering radius, the steering angle required increases disproportionately with speed. In addition, the steering angle required also depends on the coefficient of friction of the road surface.

Yaw rate is directly proportional to speed. For this reason, the yaw rate is always the most suitable measure for controlling the adaptive headlights at high speeds.

Even at high speeds, however, the steering angle sensor signal is used to detect (predict) the driver's commands **in advance**. This prediction is important: The yaw rate signal is not supplied until the vehicle has **responded** to the steering wheel movement.

The steering-angle sensor signal is disabled so that rapid, momentary steering adjustments do not affect the adaptive headlights function.

A number of control units are involved in the adaptive headlights system (see above: **CAS: CAR ACCESS SYSTEM**, **EGS CONTROL UNIT OR REVERSING LIGHT SWITCH** and **SZL: STEERING COLUMN SWITCH**). Depending on the model series and model version concerned, the adaptive headlights are actuated by the following control units:

AHL: Adaptive Headlights

> E60, E61, E63, E64, E65, E66 up to 03/2005

The AHL control unit actuates the adaptive headlights.

For safety reasons, the AHL control unit is also responsible for the automatic headlight-range adjustment. This is because: Oncoming traffic must not be dazzled by the adaptive headlights. If a headlight sticks in an unfavorable position, the AHL control unit will attempt to move this headlight down (using the stepper motors in the automatic headlight-range adjustment).

The AHL control unit is connected to the PT-CAN.

See **AHL: ADAPTIVE HEADLIGHTS**

LM: Light Module

E60, E61, E63, E64, E65, E66 from 03/2005

From 03/2005, the AHL control unit is integrated in the light module.

The light module (LM) controls and monitors all vehicle lights. Information is transmitted and received via the K-CAN data bus.

The light module actuates the indicator light for the adaptive headlights (on the light switch).

See **E60, E61, E63, E64 FROM 03/2005** and/or **E65, E66 (FROM 03/2005)**

FRM: Footwell Module

> E70, E81, E87, E90, E91, E92, E93

The footwell module controls the exterior lighting and the adaptive headlights.

The footwell module thus takes the place of the light module and the AHL control unit.

The footwell module actuates the indicator light for the adaptive headlights (on the light switch).

See **FRM: FOOTWELL MODULE**

The footwell module has its own system description.

SMC: Stepper Motor Controllers

The stepper motor controllers control the stepper motors in the headlights (for the automatic headlight - range adjustment and for the adaptive headlights). The stepper motor controllers are not capable of self - diagnosis. The stepper motor controllers are diagnosed and encoded via the control unit for adaptive headlights.

See **SMC: STEPPER MOTOR CONTROLLERS**

SGM: Safety and Gateway Module

E60, E61, E63, E64 until 09/2005 and E65, E66

The safety and gateway module (SGM) is the interface between the two data buses K-CAN and PT-CAN. Thus, all information exchanged between the light module and the AHL control unit passes through the SGM. Information from the yaw-rate sensor (in the DSC sensor) is also fed through the SGM to the AHL control unit.

KGM: Body Gateway Module

E60, E61, E63, E64 from 09/2005

The vehicle electrical system was changed from 09/2005.

As a result of the change, several control units were discontinued and some control unit functions were integrated into new control units.

The new body gateway module (KGM) supersedes the safety and gateway module (SGM) previously fitted, the door modules and the micro - power module.

Xenon-Headlight Control Unit

The xenon-headlight control unit actuates the bulb in the bi-xenon headlights.

The xenon-headlight control unit is not capable of self-diagnosis. The xenon control unit is monitored by the light module (E70, E81, E87, E90, E91, E92, E93: footwell module).

See **E60, E61, E63, E64, E65, E66, E90 - BI-XENON HEADLIGHTS**

Headlights

Option 524 "Adaptive headlights" is only available in conjunction with option 522 "Xenon dipped and main-beam headlights". This means that bi-xenon headlights are employed.

See **E60, E61, E63, E64, E65, E66, E90 - BI-XENON HEADLIGHTS**

Stepper Motors For the Adaptive Headlights

The stepper motors turn the positioner modules in the bi-xenon headlights.

The stepper motors move the headlights vertically and horizontally (vertically = up and down for automatic headlight range adjustment;

horizontally = left and right for the adaptive headlights function).

The positioner modules execute the movement.

See **POSITIONER MODULES**

Indicator Light On the Light Switch

The indicator light (green LED) next to the "A" (= "automatic driving lights control" and "adaptive headlights") has 2 display functions:

- The indicator light **lights up permanently** when the automatic driving lights control or adaptive headlights function is switched on (= light switch in position "A").
- The indicator light **flashes** if a fault develops in the adaptive headlight system.

E60, E61, E63, E64, E65 and E66:

The indicator light is actuated by the light module.

E70, E81, E87, E90, E91, E92, E93:

The indicator light is actuated by the footwell module.

SYSTEM FUNCTIONS

The adaptive headlights system moves headlights horizontal (i.e. from left to right) in order to illuminate the inside of a bend when cornering.

The following functions of the adaptive headlights system are described below:

- System activation and automatic calibration
- Activation of stepper motor controllers
- Speed-dependent analysis of signals
- Adjustment of headlight horizontal aim
- Deactivation of adaptive headlights function under extreme handling conditions
- Deactivation of adaptive headlights function in response to system faults
- Setting headlights to parked position
- Automatic headlight-range adjustment
- Adaptive headlights for automatic driving lights control
- Turning light

NOTE: ***Different control units for adaptive headlights.***

E60, E61, E63, E64, E65, E66 up to 03/2005: The adaptive headlights are actuated by the AHL control unit.

E60, E61, E63, E64, E65, E66 from 03/2005: The adaptive headlights are actuated by the light module (LM).

E70, E81, E87, E90, E91, E92, E93: The adaptive headlights are actuated by the footwell module (FRM).

System Activation and Automatic Calibration

When terminal 15 is switched ON, the headlights always perform a calibration sequence, even if the dipped headlights are not switched on. The control unit for adaptive headlights sends the "perform calibration sequence" request to the stepper motor controllers (SMCs, control units for the headlight stepper motors). The stepper motor controllers actuate the stepper motors in the headlights. The calibration sequence is performed. In the calibration sequence, the headlights move as follows:

1. The headlights move to the right and left (= calibration sequence for adaptive headlights).
2. The headlights move up and down (= calibration sequence for automatic headlight - range adjustment).
3. At the end of the calibration sequence, the headlights are in the straight-ahead position.

Following the calibration sequence, the system is ready for operation.

When reverse gear is engaged, the headlights are moved to the straight-ahead position.

NOTE: ***The calibration sequence is performed only after terminal 15 has been switched OFF for at least 15 seconds.***

- > E66, E61, E63, E64, E65, E66 until 09/2006
- > E87, E90, E91, E92, E93 until 03/2007

If terminal 15 is repeatedly switched on and off (e.g. for demonstration purposes), the calibration sequence will not be executed every time terminal 15 is switched on.

Terminal 15 must have been switched off for at least 15 seconds before it is switched on again. Only then is a calibration sequence performed when terminal 15 is switched on.

NOTE: *Calibration sequence always after terminal 15 ON and dipped - beam headlights ON.*

- > E66, E61, E63, E64, E65, E66 from 09/2006
- > E70 from start of series production
- > E81, E87, E90, E91, E92, E93 from 03/2007

If terminal 15 is repeatedly switched on and off (e.g. for demonstration purposes), the calibration sequence will not be executed every time terminal 15 and the dipped-beam headlights are switched ON.

NOTE: *Calibration sequence with enlarged range of movement.*

- > not E65, E66

From 09/2007, starting with the E60, E61, E63, E64, a calibration sequence with larger range of movement will be introduced.

The calibration sequence with larger range of movement will then gradually be introduced on other model series.

Activation of Stepper Motor Controllers

The control unit for adaptive headlights sends the stepper motor controllers (SMC) the nominal values for the positioner modules (position of positioner modules and speed of movement).

The control unit for adaptive headlights calculates the nominal values using the following signals:

- Vehicle road speed
- Steering angle (at speeds up to 50 km/h, dependent on encoding)
- Yaw rate (50 km/h upwards, see **STEERING-ANGLE SENSOR AND DSC SENSOR** above)

Speed-Dependent Analysis of Signals

Depending on the road speed, the adaptive headlights are controlled using the following signals: Signals from the steering angle sensor and signals from yaw - rate sensor (in the DSC sensor).

The encoding (at the end of the production line) determines the priority assigned to sensor signals above which speed threshold.

Adjustment of Headlight Horizontal Aim

The stepper motor controllers move the headlights to the right or left when the vehicle corners.

Horizontal range of movement of headlights:

- Inwards, i.e. towards center of vehicle: up to max. 8°
- Outwards: up to max. 15°

Example: Right - hand bend:

The right-hand headlight turns by up to 15° (the right-hand headlight is the "inside" headlight on a right-hand bend).

Viewed from the vehicle, the right-hand headlight moves "outwards".

The left-hand headlight moves up to 8° (the left-hand headlight moves towards the middle of the vehicle, i.e. "inwards" as viewed from the vehicle).

The headlight on the outside of the bend has to reach its end position at the same time as the headlight on the inside of the bend so that the carriage way remains smoothly and evenly illuminated.

On a right-hand bend, the left-hand headlight is on the outside of the bend. The right-hand headlight is on the inside of the bend.

Deactivation of Adaptive Headlights Function Under Extreme Handling Conditions

If the vehicle drifts, skids and loses sideways grip, the adaptive headlights function is deactivated as follows:

- The headlights are returned to the straight-ahead position. The headlights are no longer turned.
- The dipped headlights remain on.

Deactivation of Adaptive Headlights Function In Response To System Faults

Until 09/2007, a system fault will be indicated by the indicator lamp on the light switch flashing.

From 09/2007 system fault will be indicated by a Check-Control message in the instrument cluster.

Dazzling of oncoming traffic must be prevented in the event of a system fault.

For this reason, the adaptive headlights function is deactivated as follows:

- If the stepper motors are still functional, the headlights are returned to the straight-ahead position. The headlights are no longer moved towards bends in the road.
- If it is no longer possible for a headlight to be moved back to the straight-ahead position, the headlight is tilted downwards (by the stepped motors for automatic headlight-range adjustment). This prevents dazzling of oncoming traffic.
- Vehicles **up to 09/2007**

If the headlight cannot be tilted downwards, the bi-xenon bulb in this headlight is disabled as follows:

When the vehicle is parked up, the control unit registers sleep mode for the adaptive headlights, as follows: Vehicle standstill and terminal R OFF for several minutes.

The next time the vehicle is restarted, the bi-xenon light of the defective headlight is not switched on.

The front foglights are switched on in order to ensure a minimum level of illumination.

The dipped beam headlights are **not** switched off while the vehicle is in motion.

NOTE: *From 09/2007, the dipped - beam headlights will not be switched off in the event of a system fault.*

If a system fault develops in the adaptive headlights, the dipped-beam headlights for the affected headlight will *not* be switched off.

Setting Headlights To Parked Position

When terminal R is switched off, the headlights move to the parked position. The parked position is important for the headlights' next calibration sequence: From the parked position, the headlights are run through a calibration sequence in the pre-drive-check. During each calibration sequence, the control unit for adaptive headlights relearns the straight - ahead position for the headlights.

When the headlights have reached the parked position, the stepper motor controllers SMCs inform the control unit for adaptive headlights ("verification").

The control unit for adaptive headlights deactivates the stepper motor controllers.

The run-down period lasts approx. 10 seconds.

Automatic Headlight-Range Adjustment

If the special equipment "Adaptive headlights" is fitted, the control unit for adaptive headlights also controls the automatic headlight-range adjustment.

The automatic headlight - range adjustment adapts the headlight range for different operating conditions. Variations in the vehicle tilt angle are produced by vehicle loads and braking or acceleration in extreme driving situations. The automatic headlight-range adjustment moves the headlights up and down as required.

The control unit for adaptive headlights also controls the automatic headlight-range adjustment as follows:

1. The ride-height sensors and the brake light switch supply the signals for the automatic headlight-range adjustment.
2. The control unit for adaptive headlights computes the vehicle inclination (longitudinally to the roadway) from the signals.
3. The stepper motors for the automatic headlight-range adjustment automatically and dynamically control the headlight range.

The headlight range is adjusted so that the actual headlight range conforms to the legally required headlight range as follows:

- If vehicle rear is lower than front:

The actual headlight range will be longer than the legally stipulated range. The headlight beam height is lowered to reduce the headlight range to match the legal requirement.

- If the vehicle is horizontal:

The actual headlight range will be the same as the legally stipulated range.

- If vehicle front is lower than rear:

The actual headlight range will be shorter than the legally stipulated range. The headlight beam height is raised to increase the headlight range to match the legal requirement.

Adaptive Headlights For Automatic Driving Lights Control

The automatic driving lights control feature (option in conjunction with the rain-light sensor) automatically switches the side lights and dipped headlights on or off.

Switch-on conditions:

- The automatic driving lights control must be encoded (in the light module on the E60, E61, E63, E64, E65, E66, in the footwell module on the E70, E81, E87, E90, E91, E92, E93).
- The light switch must be in position "A" ("A" for automatic driving lights control and adaptive headlights).
- The rain-light sensor must be installed and operational.

The rain-light sensor detects the brightness of the ambient light.

The rain-light sensor sends the following prompts to the light module (on the E70, E81, E87, E90, E91, E92, E93: footwell module):

- Ambient brightness low: In twilight, darkness, in an underground garage or tunnel.

"Switch on dipped headlights" request

- Ambient brightness sufficient.

"Switch off dipped headlights" request

If only the side lights are to be switched on, the light switch must be set to side lights (switch position 1).

When the light switch is set to position "A", the control unit for adaptive headlights is also activated:

- When the automatic driving lights control function switches on the dipped headlights (e.g. at dawn/dusk), the adaptive headlights function is notified at the same time.

The control unit for adaptive headlights thus assumes control of the automatic headlight - range adjustment.

- In addition, signals from the rain - light sensor are evaluated (E60, E61, E63, E64, E65, E66: by the light module; E90, E91, E92, E93: by the footwell module).

The headlights are not turned when the vehicle is cornering until total darkness sets in.

The message "dipped headlights on" is given individually for each headlight.

If a headlight fails, the adaptive headlights are switched off.

The front foglights are switched on in order to ensure a minimum level of illumination.

Turning Lights

The turning lights are coupled to the adaptive headlights (option 524).

The footwell module (FRM) uses the following signals to adjust the turning lights:

- Steering angle
- Yaw rate
- Status of reverse gear

> E81, E92, E93 with start of series production and E87 from 03/2007

Instead of the main-beam headlight (H7), the main headlight with turning light has a fixed additional reflector with an H3 bulb. The special shape of the lens prevents dazzle to the front.

The **Fig. 2** shows the main headlight with turning light on the E81, E87, E92, E93

1. Bi-xenon light
2. H8 bulb for side lights and daytime driving lights

3. H3 bulb for turning lights
4. Reflector for turning lights

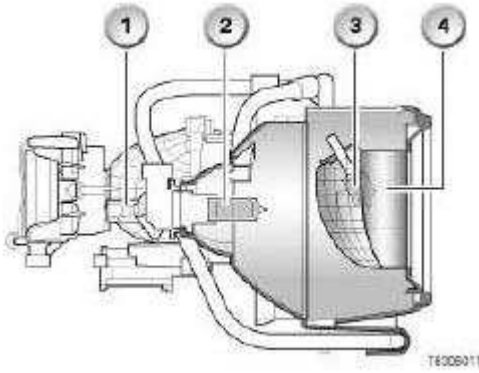


Fig. 2: Identifying Headlight Reflector For Turning Lights
Courtesy of BMW OF NORTH AMERICA, INC.

The **Fig. 3** shows the turning light on the E81, E87, E92, E93

1. Left turn
2. Right turn

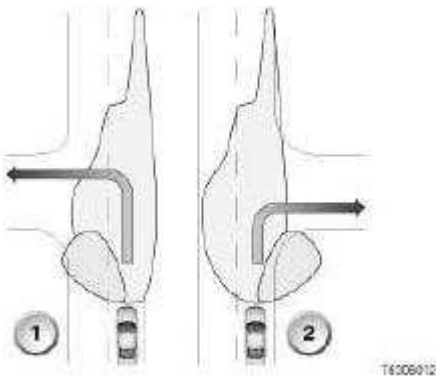


Fig. 3: Identifying Turning Light Turn
Courtesy of BMW OF NORTH AMERICA, INC.

The following conditions must be satisfied for the turning lights to be switched on:

- Terminal 15 ON
- Light switch in position "A" ("A" stands for automatic driving lights control)
- Rain-light sensor detects twilight or darkness (threshold exceeded)

The turning lights are not activated at speeds greater than 70 km/h.

> Europe version:

For legal reasons, the turning lights on the Europe version can only be activated via the turn signal indicator at speeds up to 40 km/h.

When reversing, the footwell module (FRM) activates the turning lights as follows in the speed range 0 km/h to 35 km/h:

- US version: both sides
- Other countries: outside of turn only

When the turn signal indicator is switched on:

If the vehicle is stationary, the turning lights will automatically be deactivated after approx. 4 seconds, e.g. when waiting at traffic lights. However, the turning lights can be activated again with the turn-signal/mainbeam switch (up to 3 times) until the reflector has reached a certain temperature.

A temperature model protects the headlights from excessive thermal stress.

The switching-off conditions for the turning light depend on the country concerned.

NOTE: *Temperature monitoring by temperature model*

A temperature model in the footwell module calculates the temperature of the reflector. The temperature of the reflector must not exceed a certain value. If a critical temperature is reached, the footwell module (FRM) will deactivate the turning lights. The turning lights can be activated again after a cooling-off phase.

> E70 with start of series production

The turning lights are realized using the front foglights. (Reason: The installation location of the headlights is too high for the turning lights. This prevents legal stipulations from being adhered to.)

Depending on actuation, the right - hand and/or left-hand front foglight is switched on. The turning lights are actuated by the light module (LM).

The front foglights have an additional reflector to illuminate the areas to the sides better.

When turning, the front foglight on the inside of the turn is automatically activated. The additional reflector for the turning light reflects the light beam towards the turning area.

The turning light are not switched on suddenly but rather faded according to special time parameters.

Depending on the country concerned, the turning lights are switched on when cornering.

The **Fig. 4** shows the front foglight on the E70

1. Additional reflector for the turning light

2. Reflector for the front foglights
3. Bulb

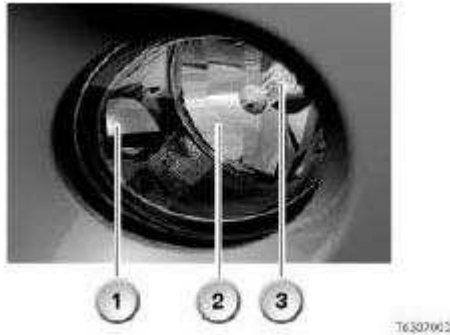


Fig. 4: Identifying Turning Light Reflector
Courtesy of BMW OF NORTH AMERICA, INC.

The following conditions must be satisfied for the turning lights to be **switched on**:

- Terminal 15 ON
- Light switch in position "A" ("A" stands for automatic driving lights control)
- Rain-light sensor detects twilight or darkness (threshold exceeded)

and

- Turn signal indicator ON (not one-touch turn signal)
- Speed range (forwards):
 - Europe and Japan version from 0 km/h to 35 km/h
 - US version from 0 km/h to 65 km/h
- Swivel angle (theoretical):
 - when stationary $\geq 77^\circ$
 - when driving $\geq 10^\circ$

Alternatively

- Speed range (reverse):
 - 0 km/h to 35 km/h
- Swivel angle (theoretical):
 - when stationary or driving $\geq 70^\circ$

If the vehicle is stationary, the turning lights will automatically be deactivated after a certain time, e.g. when waiting at traffic lights. However, the turning lights can be activated again with the turn-signal/main-beam switch.

The following conditions must be satisfied for the turning lights to be **switched off**:

- Light switch not in position "A" ("A" stands for automatic driving lights control)
- Rain-light sensor does not detect twilight or darkness (lower threshold exceeded)

Alternatively

- Turn signal indicator OFF
- Speed range (forwards):
 - Europe and Japan versions > or = 40 km/h
 - US version > or = 70 km/h
- Swivel angle (theoretical):
 - when stationary 77°
 - when driving 10°

Alternatively

- Speed range (reverse): > or = 40 km/h
- Swivel angle (theoretical): when stationary and when driving below a certain value

Alternatively

- Vehicle skids and swings out.

Alternatively

- Front foglights are switched on with the front foglights switch.

PRECONDITIONS FOR ACTIVATION

The control unit for adaptive headlights is "awake" from terminal 15 ON.

The movement of the lights is subject to the following conditions:

- Reverse gear must **not** be engaged.
- The system is free of faults (indicator lamp **not** flashing and no Check-Control message)
- The bulbs for the bi-xenon lights are OK in both headlights.
- The vehicle must not be skidding or fishtailing.
- The rain - light sensor must detect darkness.
- Additional precondition for activation: automatic driving lights control is active (light switch in position "A", see above).

Notes for service staff

CAUTION: Exercise caution when working on bi-xenon headlights

Whenever inspecting or working on the headlights, always observe the safety precautions and accident prevention rules. The headlight system has dangerously high voltage.

- General note: See **E60, E61, E63, E64, E65, E66, E90 - ADAPTIVE HEADLIGHTS, GENERAL INFORMATION FOR SERVICE STAFF**
- Diagnosis: See **E60, E61, E63, E64, E65, E66, E90 - ADAPTIVE HEADLIGHTS DIAGNOSIS**
- Encoding/programming: See **E60, E61, E63, E64, E65, E66, E90 - ENCODING/PROGRAMMING ADAPTIVE HEADLIGHTS**
- Car and Key Memory:
 - > E60, E61, E63, E64, E65, E66

The sensitivity of the driving light sensor can be set to one of 2 settings with the Car and Key Memory.

> E70, E81, E87, E90, E91, E92, E93

All Car and Key Memory functions are programmed inside the vehicle itself.

(Please refer to the "Personal profile" section of the Owner's Handbook: Personal settings for a maximum of 3 remote control units via the display in the instrument cluster or via the Central Information Display.)

NATIONAL VERSIONS

The options "Daytime driving lights" and "Manual headlight - range adjustment" are available in certain countries. Vehicles with manual headlight-range adjustment do not have adaptive headlights. This is because vehicles with manual headlight - range adjustment have halogen dipped headlights. Adaptive headlights (option 524) are only available in conjunction with option 522 "Xenon dipped and main - beam headlights".

Switching on adaptive headlights in conjunction with daytime driving lights function

The "Daytime lights" option (Northern Europe and Canada) means that dipped-beam headlights and side lights (E70, E92, E93: daytime driving lights) are always switched on:

- Light switch in position "2"
- Terminal 15 ON

The automatic headlight - range adjustment is active (actuated by the control unit for adaptive headlights).

If terminal 15 is switched off, the dipped headlights and the side lights are automatically switched off as well.

The light switch must also be set to position "A" with the "Daytime driving lights" option. The control unit for adaptive headlights is then in standby.

System functions for "Daytime lights" option when the light switch is set to position "A":

- If the vehicle is encoded with the "Daytime driving lights" option (end of production line), the light switch can remain in position "A" at all times.

When terminal R is switched on, the side lights, parking lights and licence plate lighting are switched on.

As soon as terminal 15 is switched on, the dipped headlights are also switched on.

- When the dipped headlights are switched on, the control unit for adaptive headlights is activated (for automatic headlight-range adjustment).
- The indicator lamp on the light switch lights up and indicates that the system is functional.
- The adaptive headlights turn when the vehicle is stationary if the steering wheel is turned (to the right only).
- The headlights are moved when the vehicle corners if the rain - light sensor registers darkness.

The switch-on conditions for the adaptive headlights in conjunction with special equipment "Daytime driving lights" are as follows:

- The vehicle must be encoded with the "Daytime driving lights" option (end of production line)
- The light switch must be in position "A"
- Terminal 15 must be switched on and reverse gear must not be engaged
- Rain-light sensor must detect darkness

Subject to change.

MAIN-BEAM ASSISTANT E60, E61, E63, E64, E65, E66, E70, E90, E91, E92, E93

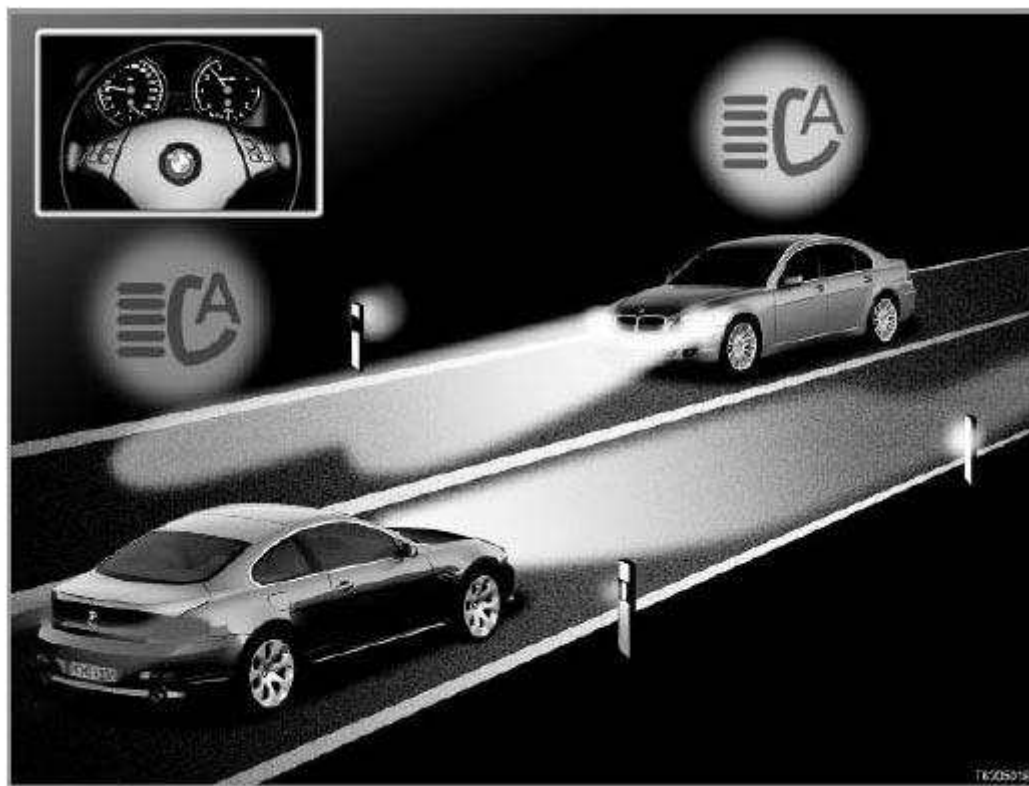


Fig. 5: Identifying Main-Beam Assistant
Courtesy of BMW OF NORTH AMERICA, INC.

INTRODUCTION

The main-beam assistant assists the driver to operate the main-beam headlights. The main-beam assistant automatically switches the main-beam headlights on and off as the traffic situation changes.

The main-beam assistant detects vehicles travelling ahead of the car and oncoming traffic, and it also detects lighted stretches of roadway. By automatically switching off the main-beam headlights in good time, the main-beam assistant ensures that the occupants of oncoming vehicles, for example, are not dazzled by the headlights.

Advantages:

Drivers do not have to concern themselves with the job of operating the main - beam headlights. This enhances the level of convenience for drivers. The main - beam headlights are switched on more frequently by the main-beam assistant than is the case with manually operated main-beam headlights. The driver's field of vision is optimally illuminated. Driving in the dark, therefore, is rendered safer.

IMPORTANT: *The driver retains full responsibility for all his/her actions, despite the assistance of the main - beam assistant.*

The main-beam assistant merely assists the driver in the task of operating the main-beam headlights.

Responsibility for switching the main-beam headlights on and off in accordance with the dictates of the traffic situation rests with the drivers.

The main-beam assistant can be deactivated at any time with the turn-signal/main-beam switch.

Option 5AC "Main-beam assistant" is available for the BMW 3, 5, 6 and 7-Series.

> E60, E61, E63, E64, E65, E66 - See **SYSTEM OVERVIEW FOR THE MAIN-BEAM ASSISTANT: E60, E61, E63, E64, E65, E66**

NOTE: *Only the main beam of the bi-xenon headlights are switched on.*

If a main-beam assistant is fitted, only the main beam of the bi-xenon headlights are switched on.

The halogen headlights are switched on only when the headlight flasher is actuated. In countries in which daytime driving lights are required by law, the halogen headlights are used for the daytime driving lights.

BRIEF DESCRIPTION OF COMPONENTS

The following components and control units provide input signals for the main - beam assistant:

- **Light switch**

The main-beam assistant can be activated only when the light switch is in position "A".

"A" stands for "automatic headlight control".

- **Turn-signal/main-beam switch**

The main-beam assistant is activated and deactivated by means of the turn-signal/main-beam switch.

See the section entitled **OPERATION** below.

- **Rain-light sensor**

The rain - light sensor measures the brightness of the ambient light. The light module switches the dipped headlights on when daylight fails.

The main-beam assistant can be activated only when the dipped headlights are on. The precondition is that the light switch must be in the "A" position.

- **Wheel-speed sensors**

Each of the wheel-speed sensors measures the circumferential speed of an individual wheel. The DSC control unit (DSC: Dynamic Stability Control) uses these input signals to calculate the car's road speed.

The main-beam headlights are switched on when the car's road speed is above 50 km/h.

The main-beam headlights are switched off when the car's road speed is below 38 km/h.

- **DSC sensor**

The DSC sensor registers lateral acceleration and calculates the yaw rate.

("Yaw" is the movement of the vehicle about the vertical axis, e.g. when the car is cornering).

The main-beam assistant uses the yaw rate to improve evaluation when the car corners. The DSC sensor is underneath the driver's seat. For safety reasons, cars with active front steering have a second DSC sensor underneath the front passenger's seat.

- **Image sensor**

The image sensor is a special camera for detecting light sources.

The image sensor transmits images to the control unit for the main - beam assistant.

The images are carried by an LVDS data line (LVDS: Low Voltage Differential Signalling).

The control unit for the main-beam assistant analyses the images.

The image sensor and the control unit are installed in a **common** housing and can only be supplied as a unit.

See **IMAGE SENSOR FOR THE MAIN-BEAM ASSISTANT: E60, E61, E63, E64, E65, E66**

- **Reverse gear switch**

The main-beam headlights are **not** switched on if reverse gear is engaged.

In a manual-shift car, the reverse gear switch supplies the "reverse gear engaged" information.

The reverse gear switch sends this information to the light module.

- **Selector lever position switch**

The main-beam headlights are **not** switched on if reverse gear is engaged.

In a car fitted with electronic transmission control (EGS), the selector lever position switch supplies the "reverse gear engaged" information. The selector lever position switch sends this information to the EGS control unit.

The EGS control unit sends this information to the light module or footwell module.

- **Selector angle sensor and shift travel sensor**

> E60, E61, E63, E64, E65, E66

The main-beam headlights are **not** switched on if reverse gear is engaged.

In a car fitted with sequential manual transmission (SMG), the selector angle sensor and the shift travel sensor supply the "reverse gear engaged" information. The selector angle sensor and the shift travel sensor send the information to the SMG control unit. The SMG control unit sends the information to the light module.

The following control units are involved in the main-beam assistant system:

- **FLA: Main-beam assistant**

The FLA control unit analyses the images from the image sensor. The FLA control unit receives information on road speed and yaw rate from the DSC control unit.

The FLA control unit sends a switch-on recommendation or a switch-off recommendation for the main-beam headlights to the light module. The recommendation depends on the traffic situation, the ambient light, and the car's road speed.

The FLA control unit is connected to the K-CAN.

See **FLA CONTROL UNIT FOR THE MAIN-BEAM ASSISTANT: E60, E61, E63, E64, E65, E66**

- **LM: Light module**

> E60, E61, E63, E64, E65, E66

The light module receives various input variables for the main-beam headlights:

- Switch-on or switch-off recommendation from the FLA control unit
- Switch position of the light switch
- Switch position of the direction indicator/mean - beam switch
- Information from the reverse gear switch or the selector lever position switch or the selection angle and shift travel sensor
- Information from the rain-light sensor, as to whether the dipped headlights have to be switched on

On the basis of the input variables, the light module decides whether the main-beam headlights should be switched on or off.

- The light module actuates the bi-xenon headlights.
- The light module actuates the FLA indicator light in the instrument cluster.

A Check-Control symbol appears if the main - beam assistant fails.

The light module is connected to the K-CAN.

○ **FRM: Footwell module**

> E90, E91, E92, E93, E70

The footwell module receives various input variables for the main - beam headlights:

- Switch-on or switch-off recommendation from the FLA control unit
- Switch position of the light switch
- Switch position of the direction indicator/mean-beam switch
- Information from the reverse gear switch or selector lever position switch
- Information from the rain-light sensor, as to whether the dipped headlights have to be switched on

On the basis of the input variables, the footwell module decides whether the main-beam headlights should be switched on or off.

- The footwell module actuates the bi-xenon headlights.
- The footwell module actuates the FLA indicator light in the instrument cluster.

A Check-Control symbol appears if the main-beam assistant fails.

The footwell module is connected to the K-CAN.

○ **DSC: Dynamic Stability Control**

The DSC control unit calculates the car's road speed using the signals from the wheel-speed sensors. The DSC control unit sends the information on road speed to the main - beam assistant.

The DSC control unit also sends the information from the yaw-rate sensor in the DSC sensor to the main-beam assistant.

○ **EGS or SMG: Electronic gearbox control or sequential manual transmission**

The EGS control unit receives the "Reverse gear engaged" information from the selector lever position switch.

The EGS control unit is connected to the PT-CAN.

The SMG control unit receives the "Reverse gear engaged" information from the selector angle sensor and the shift travel sensor. The SMG control unit is connected to the PT-CAN.

○ **SZL: Steering Column Switch**

The switch signals from the turn - signal/main-beam switch are picked up and evaluated by the SZL

control unit.

The SZL control unit sends the position of the turn-signal/main-beam switch to the light module (E60, E61, E63, E64, E65, E66) or footwell module (E90, E91, E92, E93, E70)

The following components are controlled:

- **Bi-xenon headlights**

The bi-xenon headlights are actuated by the light module.

NOTE: *Only the main beam of the bi-xenon headlights are switched on.*

If a main-beam assistant is fitted, only the main beam of the bi-xenon headlights are switched on. The halogen headlights are switched on only when the headlight flasher is actuated. In countries in which daytime driving lights are required by law, the halogen headlights are used for the daytime driving lights.

- **Instrument cluster**

The indicators in the instrument cluster are as follows:

- Main-beam indicator lamp (legally stipulated, blue)
- FLA indicator light
 - Orange on BMW 3, 5 and 6-Series and on X5
 - Blue on BMW 7-Series
- Check-Control symbol for failure of the main-beam assistant (yellow)

See the section entitled **SYSTEM FUNCTIONS** below.

The following components provide the power supply for the main - beam assistant:

- **PM: Power module**

> E65, E66

In the BMW 7-Series, the power module supplies power to the main - beam assistant.

- **Rear power distributor**

> E60, E61, E63, E64

In the BMW 5-Series and 6-Series, the rear power distributor supplies power to the main-beam assistant.

- **Power distributor in junction box**

> E90, E91, E92, E93

On the BMW 3-Series, the power distributor in the junction box supplies voltage to the main - beam assistant.

- **Rear power distributor**
 > E70

On the BMW X5, the rear power distributor provides power to the main - beam assistant.

SYSTEM FUNCTIONS

In accordance with the traffic situation, the FLA control unit sends a switch - on recommendation or a switch - off recommendation for the main - beam headlights to the light module or footwell module. On the basis of this recommendation and various other the input variables, the light module or footwell module decides whether the main-beam headlights should be switched on or off.

The following system functions of the main - beam assistant are described:

- Automatic main-beam headlight switch - off when oncoming traffic is detected
- Automatic main-beam headlight switch - off when vehicle detected ahead of the car
- Automatic main-beam headlight switch - off when adequate ambient lighting is detected
- Automatic main-beam headlight switch - on
- Indicators in the instrument cluster
- Function limitations of the main - beam assistant
- Automatic alignment of the main - beam assistant

Automatic Main - Beam Headlight Switch-Off When Oncoming Traffic Is Detected

The light cone of the main - beam headlights has a range of about 400 m. The image sensor can detect other light sources within a range of about 1000 m. This ensures that the image sensor detects oncoming vehicles before their drivers can be dazzled by the light cone of the main - beam headlights.

When the image sensor detects an oncoming vehicle, the FLA control unit sends a switch - off recommendation to the light module or footwell module. The light module or footwell module switches the main - beam headlights off.

Automatic Main - Beam Headlight Switch-Off When Vehicle Detected Ahead Of The Car

When the image sensor detects a vehicle ahead, the FLA control unit sends a switch - off recommendation to the light module or footwell module. The light module or footwell module switches the main - beam headlights off.

Automatic Main - Beam Headlight Switch-Off When Adequate Ambient Lighting Is Detected

When the image sensor detects an environment in which ambient lighting is adequate, the FLA control unit sends a switch-off recommendation to the light module or footwell module. The light module or footwell module switches the main-beam headlights off.

Adequate ambient lighting means:

- Daylight
- Twilight
- Street lighting (e. g. in illuminated towns)

Automatic Main-Beam Headlight Switch-On

If there is no reason for the lights to be dipped, the light module or footwell module switches the main-beam headlights on. The bi-xenon headlights are switched to full beam.

Displays In The Instrument Cluster

The FLA indicator light lights up in the instrument cluster as soon as the main-beam assistant is activated (blue on the BMW 7-Series, orange on the BMW 3, 5, and 6-Series and on the X5).

The main-beam indicator light also lights up (blue) in the usual way as soon as the main-beam headlights are switched on.

A Check-Control symbol appears (yellow) if the FLA control unit detects a system failure.

See **INDICATORS FOR THE MAIN-BEAM ASSISTANT AND THE MAIN-BEAM HEADLIGHTS: E60, E61, E63, E64, E65, E66**

Function Limitations Of The Main-Beam Assistant

The main-beam assistant can be subject to function limitations under the following circumstances:

- Inclement weather conditions (e.g. fog)
- Poorly lighted road users (e.g. cyclists, pedestrians)
- Certain road signs (e.g. the warning sign for a tight bend): Reflections from traffic signs may be incorrectly interpreted by the main - beam assistant as a vehicle driving ahead or as oncoming traffic.

See **FUNCTION LIMITATIONS OF THE MAIN-BEAM ASSISTANT**

- Driving over crests and through dips

See **FUNCTION LIMITATIONS OF THE MAIN-BEAM ASSISTANT**

- Certain traffic situations (e.g. tight bends, vehicles approaching from the side)
- Image sensor's field of view obstructed (e.g. by snow)

Automatic Alignment Of The Main-Beam Assistant

In order to operate correctly, the image sensor must be aligned parallel with the vehicle's centerline. When the car is driven at night, the main - beam assistant can automatically correct alignment up to 3° to the left or 3° to

the right. This correction compensates for minor deviations from the centerline.

Driving conditions for automatic directional orientation of the main - beam assistant are:

- Straight ahead for a distance of approx. 50 km: A relatively straight stretch accelerates the directional orientation.
- Road marking must be clearly visible.

See **IMAGE SENSOR FOR THE MAIN-BEAM ASSISTANT: E60, E61, E63, E64, E65, E66**

OPERATION

Operation of the main-beam assistant is described in a separate section.

The following controls of the main - beam assistant are described:

- Switching on automatic headlight control
- Activating the main - beam assistant
- Deactivating the main-beam assistant
- Reactivating the main-beam assistant
- Switching on the headlight flasher

See **OPERATION**

PRECONDITIONS FOR ACTIVATION

For technical reasons, distinctions are drawn between the following conditions required for switch - on:

- Conditions required for switch-on for the FLA control unit
- Conditions required for switch-on for the main-beam assistant
- Conditions required for switch-on for the main-beam headlights

Conditions Required For Switch - On For The FLA Control Unit

The FLA control unit is active as of terminal 15 ON.

Conditions Required For Switch - On For The Main-Beam Assistant

- Light switch set to position "A"
- Dipped headlights switched on.

When the switch is in position "A", the dipped headlights are switched on by the automatic headlight control.

- Turn-signal/main-beam switch pressed forward (in forward direction of travel).

Conditions Required For Switch - On For The Main-Beam Headlights

- Road speed greater than 50 km/h.
- Reverse gear must **not** be engaged.
- Image sensor does **not** detect an oncoming vehicle or a vehicle ahead.
- Image sensor detects adequate darkness.

Notes for service staff

The following information is available for service staff:

- General note: See **MAIN-BEAM ASSISTANT, GENERAL INFORMATION FOR SERVICE STAFF: E60, E61, E63, E64, E65, E66**
- Diagnosis: See **MAIN-BEAM ASSISTANT DIAGNOSIS: E60, E61, E63, E64, E65, E66**
- Encoding/programming: -