



SERVICE PARTNER

Technical Information

CODING LIGHTING FUNCTIONS





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CODING LIGHTING FUNCTIONS

The number of different vehicle types is increasing from year to year. The success of “niche models” is further softening the delineation between traditional classifications such as estate, saloon or van. In addition, new developments in the fields of driver assistance, communication and safety systems are creating further distinctive features to fulfil customer wishes.

Modifications and tuning of the exterior lighting are in the Top 10 of customer wishes – particularly since the introduction of daytime running lights. Conversion to Xenon headlights or LED combination rearlights are also in demand.

However, the challenges involved in the installation of such lighting systems increase with the complexity of the products.

CODING LIGHTING FUNCTIONS

For some years now, control units have been controlling, regulating and monitoring lighting functions. If different lights or headlights are installed in the vehicle, the control unit has to be "informed". This is where "coding" comes into the picture. During coding, parameters are changed in the respective control unit to guarantee perfect operation of the lighting functions.

Example HELLA Golf VI LED combination rearlight:

In addition to the HELLA combination rearlights, adapter leads are always required, since LED lights have different connections. These adapter leads are relatively easy to

make yourself. The following items are required for complete conversion:

- HELLA, exterior LED combination rearlights no. 2SD 010 408-091 left / -101 right
- HELLA, inner LED combination rearlights no. 2SA 010 409-131 left 2TZ 010 409-141 right
- Plug for connection to the LED lights VW no. 4x 7N0 972 703
- Socket for connection to the harness VW no. 4x 191 972 713
- Crimp contacts HELLA no. 8KW 863 931-003
- Individual wires with crimped contacts VW no. 6x 000 979 150 EA



Fig. 1

MAKING THE ADAPTER LEADS

1. Cut the 6 cables in the middle so that you have 12 cables: one end with a crimp contact, the other without contact. Then shorten the cables to approx. 10 cm.
2. Click the flat cables with the flat connectors into the plug (7N0 972 703) for the LED lights.
3. Strip the other cable ends by approx. 6 mm and crimp contacts 8KW 863 931-003 in place. You will need a tool for non-insulated crimp contacts for this (HELLA no. 8PE 002 007-011). During this working step, make sure that the LED plug with the red locking hoop is at the top and the crimp contacts are aligned evenly to one another. This prevents the cables twisting during subsequent plug assembly (see Fig. 2).
4. Click the cable ends with the flat connectors into the socket (191 972 713). Make sure the cables are in the right order! (Red locking hoop from plug and chamber numbers 1, 2, 3 from the socket must be visible from above (see Fig. 3)).
5. Now repeat these working steps for the other three adapters.

Fig. 2



Fig. 3



INSTALLING THE LIGHTS IN THE VEHICLE

1. Open the luggage compartment lid. Pull the side panel in the luggage compartment backwards and off so that the knurled screw is easy to reach (see Fig. 4).
2. Release the contact plug and remove it from the light.
3. Unscrew the knurled screw from the light.
4. Pull the light backwards and out of the body.
5. Insert the adapter into the LED light (exterior light). Then push the red locking hoop as far as it will go towards the light (see Fig. 5).
6. Insert the LED light into the body and tighten using the knurled screw.

Note! Heed the guides on the lamp during insertion.



Fig. 4

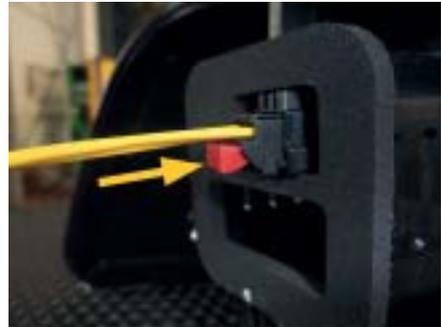


Fig. 5

INSTALLING THE LIGHTS IN THE VEHICLE

7. Connect the adapter socket with the plug from the vehicle harness.
8. Release and remove the flap from the luggage compartment lid (see Fig. 6).
9. Loosen the M8 screws on the light. Note! Unlatch the plastic strip on the side of the light and remove downwards (see Fig. 7).
10. Insert the inner LED light into the body and tighten using the M8 screws. Click the plastic strip back onto the light.
11. Connect the adapter with the light and the vehicle harness (see Fig. 8).
12. Install all the removed parts in reverse order.



Fig. 6



Fig. 7



Fig. 8

CODING

Communication status
 C=1 TE=0 RE=0
 Protocol: CAN /

Steuergerät-Identifikation

Part number:	1K0 937 084 B	Component:	BCM PQ35 B 103 0537
Coding:	Long coding	Company no.:	Imp: 011 WSC 01357
Extra:	1K1955119E Wiper 19050 I 1K8951171 DWA sensor 00 I 1K0951605D LIN BACKUP H0		
Extra:			

Basic functions Extended functions

Reliable functions Heed repair guidelines!

Error memory - 02	Readiness - 15	Coding II - 11	Coding - 07
Measured value blocks - 08	Extended ID - 1A	Basic setting - 04	Adaptation - 10
Error paths - 18	Extended measured values	Actuator diagnosis - 03	Access authorisation - 16

Close control unit, back - 06

Fig. 9

On account of the different characteristics of lights with filament bulbs and lights with LEDs, the control unit – known as “Body Control Module” (BCM) at VW, has to be “coded”. Parameters are changed in the control unit in such a way that the LED combination rearlights work perfectly. If this does not happen, fault messages will appear on the display and lights will only have limited functionality. (The stoplight in the tailgate can shine more brightly than the stoplight in the exterior light clusters).

Note! Conversion is not possible with every BCM. There are different specifications for the Golf VI concerning the production date

(vehicle) from which perfect functionality of the lighting functions is guaranteed. Before a vehicle is converted to LED lights, we recommend reading out the BCM software status (see Fig. 9).

Generally speaking, there are two different BCMS: the old one with software status 03XX. Proper conversion is not possible with this BCM. If a customer would still like to equip his vehicle with LED lights, a new BCM will have to be installed as well. The old BCM cannot be updated to a newer software status.

CODING

Conversion is generally possible with the new BCM with the software statuses 05XX (0537, 0541). In vehicles with these software statuses and standard Xenon headlights there is still a special factor that has to be taken into account: after the combination rearlights have been coded, the option “permanent driving light” (low beam is always activated when the engine is switched on) is no longer available. If this option is to remain active, the BMC must be updated to a newer status (SW status 0575 or later).

Once the software status has been checked, coding takes place. For this purpose, the “long coding” is requested via the menu items Central electrics – Coding. For LED combination rearlights, only byte 18 is changed. The BCM lists the possible changes for this byte in a sub-menu (see Fig. 10).

In this case, the bit must be changed to “04”. Once coding has been completed, faults will no longer be indicated.

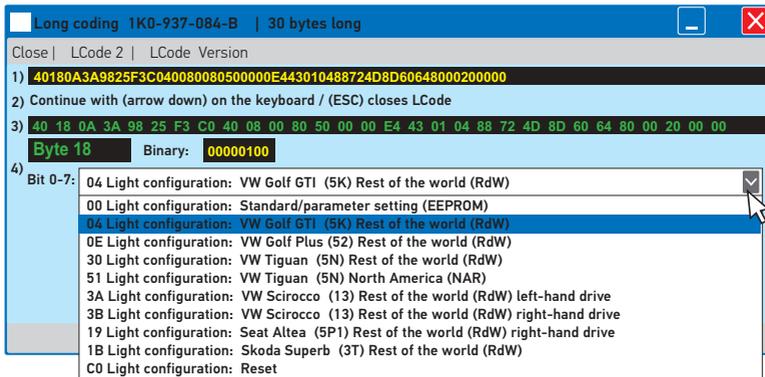


Fig. 10

CODING FOR INSTALLATION OF DAYTIME RUNNING LIGHTS

Daytime running lights are often already fitted as standard in many newer vehicles. Depending on the vehicle model, however, customers have different wishes concerning the optical design of this lighting functions. If customers do not like the optical design, something can be done about it. In many cases, daytime running light can be switched off by coding. Again, the Golf VI shall be used as an example for this.

For this purpose, the “long coding” is requested via the menu items Central electrics – Coding. When byte 15 is selected, a list of bits and their functions appears. If the tick is removed from bit 6, the DRL function is deactivated (see Fig. 11). This allows customer wishes related to design and installation location to be implemented.

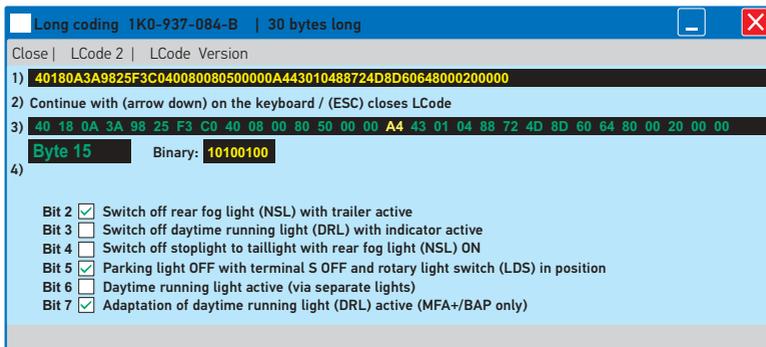


Fig. 11



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CODING FOR INSTALLATION OF DAYTIME RUNNING LIGHTS

When daytime running lights are retrofitted, the ventilation slots in the front apron often offer the ideal location. This spot is often already “occupied” by standard fog lights though. But there are daytime running lights available that have almost the same dimensions as fog lights. Often, customers think one can simply be replaced by the other. But fog lights are used less often. Daytime running lights using LEDs also have the problem of bulb failure check. Coding can be used to remedy the situation here, too. The Golf VI shall be used as an example again.

For this purpose, the “long coding” is requested via the menu items Central electrics – Coding. When byte 14 is selected, a list of bits and their functions appears. If the tick is removed from bit 0, the fog light function is deactivated (see Fig. 12).

If the customer would like cornering light, this is no problem if fog lights are installed. Simple check the box next to bit 7 and the fog lights will switch on accordingly in the respective situation.

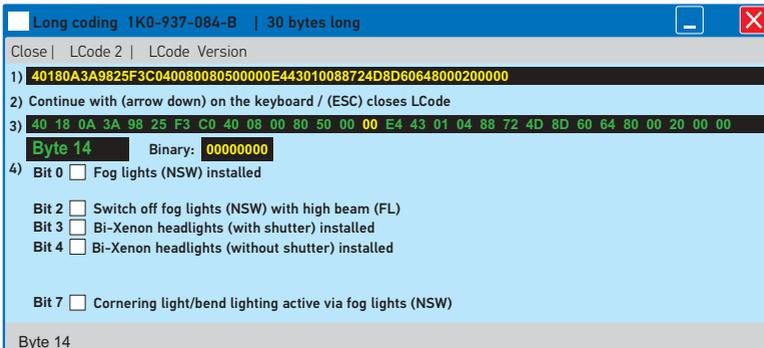


Fig. 12



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CONCLUSION

Professional modification of the lighting technology can even be carried out on modern vehicles through coding. The possibilities always depend on what the manufacturer allows on coding level, of course, and whether suitable diagnostics

testers are available. Experience shows, however, that more and more garages are discovering this possibility for themselves, and can thus fulfil their customers' wishes.



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HUMIDITY IN LIGHTING SYSTEMS

Influence of humidity on photometric systems

Protecting lights from humidity is one of the greatest challenges during the development of photometric systems. This subject is always of particular interest during the cold and damp days in autumn and spring. **Increasing numbers of customers bring their vehicle into the garage to complain about fogging and water drops in headlights and lights.** The impairment to light distribution or light performance perceived by the customer only represents the obvious effect, however. The corrosion caused by humidity is a much more serious problem in many cases. Whereas excessive fogging in headlights and lights can be seen quickly, corrosion works in hidden spots. The whole extent of the "decay" only comes to light when diagnosis takes place, e.g. when one of the lighting functions fails.

Corroded plug connections, crimp contacts that have been oxidised away and completely dilapidated bulb holders are only a few examples of what can be found. Compared with trucks and passenger cars, this subject is even more of an issue with motorhomes and caravans. Here, penetrating humidity can not only damage the light and its wiring, it can also spread into the insulation of the bodywork which can result in mould forming.

The most important points related to proper repairs will be explained using the example of various lights on a motorhome.

First, let us explain a few physical laws related to humidity in lighting systems. These can be used as basic information when talking to customers.

FOGGING IN LIGHTS

If complaints are received about the above, this does not necessarily mean there is a fault in the lighting. When condensation forms on the cover lens, the photometric output area should dry within a certain period after the light bulb has been switched on. This process can happen more or less quickly depending on the ambient temperature and relative humidity. This process is completely in line with normal physical laws and completely harmless from a technical point of view, since the reflector is protected against the influence of fogging.

When the light bulb is switched on, the air inside the light heats up. The expanded, heated and dry air is displaced out of the housing of the combination rearlight through the ventilation slits. After the light bulb has been switched off, the air in the combination rearlight slowly cools down again. This causes saturated humid air from outside to be “sucked” into the light interior. This can lead to condensation on the inside of the cover lens on account of high air humidity and greater temperature differences inside the light. This condition occurs more frequently in the cold months and in humid weather. If there is so much fogging that

water drops form on the cover lens (see Fig. 13) or water even accumulates in the lower area of the light (see Fig. 14), the seal should be checked for damage and replaced if necessary.



Fig. 13

FOGGING IN LIGHTS

Equally, any “blockage” of the light ventilation openings should be checked. The light can be blasted with oil-free compressed air to dry it out. If water still accumulates in the light after this process, the light has to be replaced.



Fig. 14

CAPILLARY EFFECT

The capillary effect in lights is a less well-known subject. This phenomenon is often responsible for water penetrating into a light and accumulating in it. Capillary effect describes the property of liquids to spread to different extents in narrow pipes or cracks.

In the case of an electric cable, the capillary effect is that water molecules and molecules of the cable sheathing gravitate towards one another. The tighter a capillary is (capillary = tight cavity), the greater this gravitational

effect. For the capillary effect to have any effect at all, water has to get into the cable. This is often due to a plug connection not being watertight. Simple blade connectors, incision-type connectors (current thieves) etc. do not offer the cable sufficient protection against humidity. This means that water can penetrate the cable through poorly or non-insulated cable areas under the cable sheathing (insulation) (see Fig. 15).

CAPILLARY EFFECT

Through the capillary effect in the cable, humidity penetrates between the copper wires and cable sheathing into the light.

For this reason, watertight plug and cable connections such as Superseal plugs (see Fig. 16) should always be used.

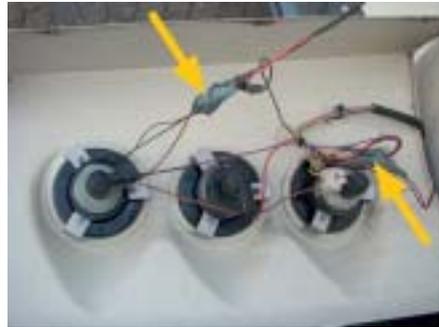


Fig. 15



Fig. 16

TROUBLESHOOTING ON FOGGED LIGHTING SYSTEMS

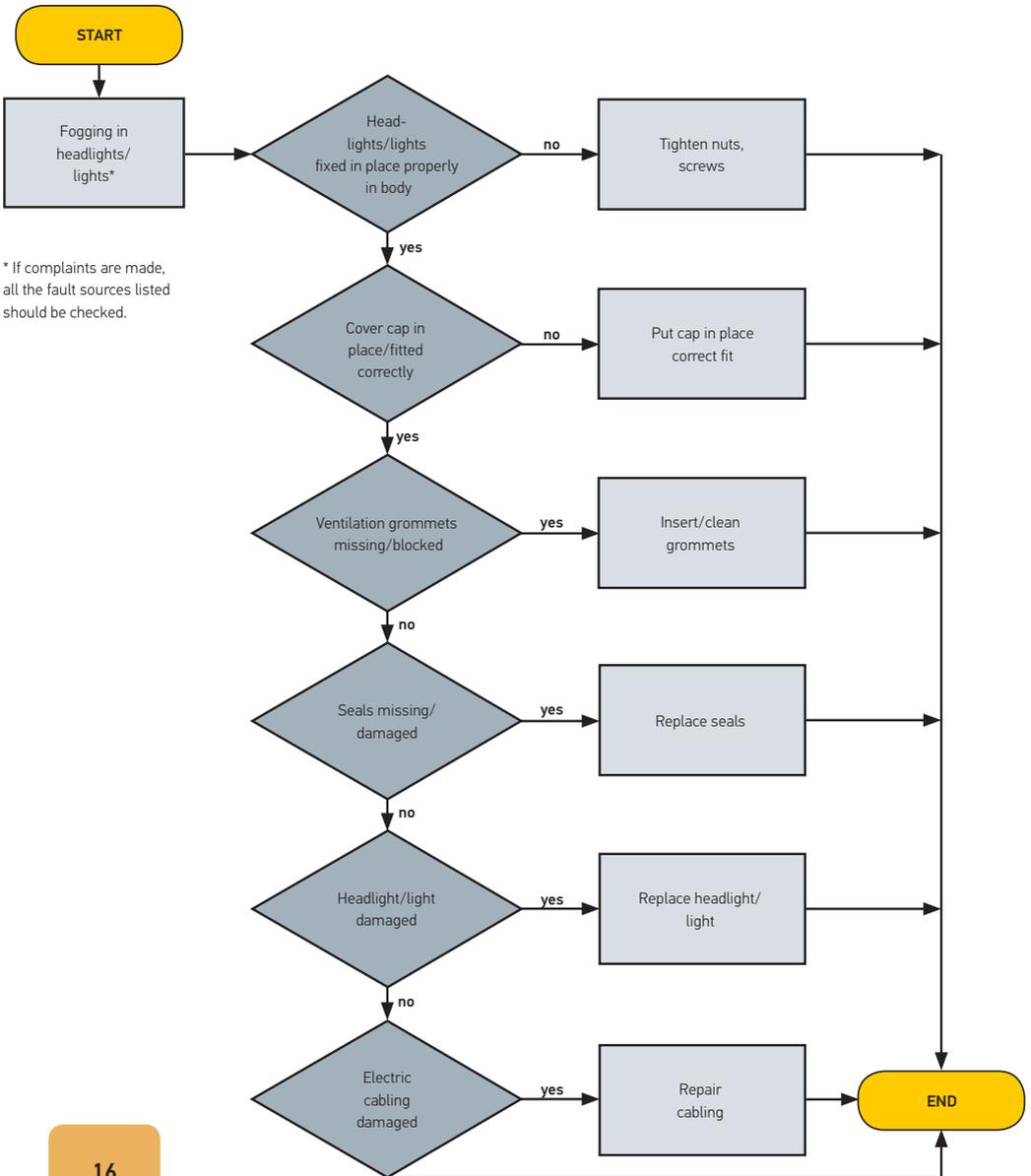
If a customer complains about heavy fogging on his vehicle's lighting equipment, this can have several causes. A systematic procedure is thus essential to fast and

reliable troubleshooting. The troubleshooting tree (see diagram) illustrates the main testing steps.



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TROUBLESHOOTING ON FOGGED LIGHTING SYSTEMS



REPAIRING LIGHTING SYSTEMS

Failure of a lighting function is often the reason for a visit to the garage. In the case described here, the left stoplight and one side marker light have failed. The reason becomes obvious during dismantling of the lights. The combination rearlight is not sealed against the plastic body, so that there is nothing stopping dirt and water penetrating the light (see Fig. 17 and 18).

The bulb holder, the bulb sockets and the crimp contacts are corroded so heavily that they have to be replaced completely. In addition, the cable duct into the body is not sealed, so that water penetration has left clear traces here, too. For these reasons, a certain assortment of installation material is required for professional repairs. You can see a selection in Fig. 19.



Fig. 17



Fig. 18



Fig. 19

REPAIRING LIGHTING SYSTEMS

In the case shown, proceed as follows:

1. Pinch the corroded crimp contacts off the cables and dismantle the bulb holder from the light.

2. Lay the cables together. Pull a suitable shrink hose (heed diameter) over the cable near the cable duct and heat it using a hot air gun until it is tight to the cables.

3. Various caravan and motorhome manufacturers create a cable duct using a bore hole. If these are not sealed, rubber stoppers can be used. These are offered in different sizes in assortment boxes and are suitable for versatile use. Select a matching stopper and put a hole through the centre. The diameter of the hole should be a little smaller than the diameter of the cable with shrink hose. This guarantees that no water can penetrate the interior between shrink hose and stopper after the stopper has been fitted.

4. Strip cable ends to approx. 10 mm and fit crimp contacts e.g. HELLA no. 8KW 732 567-003. Then heat the shrink sleeves of the crimp contacts using a hot air gun until they are tight to the cable.

5. Insert the rubber stopper in the bore hole (see Fig. 20).



Fig. 20

6. To prevent water and dirt penetrating the light as before, we recommend the use of thin strips of cellular rubber. These are available in a wide range of versions in terms of thickness and width. It is important that they have an adhesive coating on one side. Glue the cellular rubber strips all the way round the contact face of the light. A small section approx. 1 cm long should remain free at the lower edge to allow condensation etc. to flow away (see Fig. 21).



Fig. 21

7. Fit light bulbs in the bulb holders and insert the crimp contacts.

8. Blast soiling out of the light using oil-free compressed air.

9. Mount the bulb holder on the light and then screw this to the body tightly again.

REPAIRING LIGHTING SYSTEMS

The same problems can be seen after dismantling of the side marker lights. Here, sealing compound has been used generously in the past to prevent humidity penetration (see Fig. 22). Unfortunately, this measure was not successful.

The crimp contacts are completely oxidised, which in the end led to the light failing. Generally speaking, flush-mounted lights with fitted light bulbs should never be fitted or sealed using sealing compound or adhesive. If one of the bulbs were faulty, the light would be extremely difficult to disassemble, if at all possible. In such cases, the only solution is “complete reconstruction”!

To carry out repairs, proceed as follows:

1. Use a suitable cleaning agent to clean the contact face of sealing compound.
2. Pinch off old crimp contacts. Strip the cable ends to approx. 10 mm and fit crimp contacts e.g. HELLA no. 8KW 732 567-003. Then heat the shrink sleeves of the crimp contacts using a hot air gun until they are tight to the cable.

3. Clean the contacts on the lamp base or replace the lamp base if necessary.

This side marker light does not have a rubber seal to the plastic body. This means water can find a way between the body and the light housing in this case, too. This process is enhanced by the airstream. For this reason, O-rings should be used as seals for flush-mounted lights with a round light base. If there are no suitable O-rings available, have a look in your O-ring box for air-conditioning systems. Push the O-ring up to the light base plate (see Fig. 23).



Fig. 22

Note! The O-ring must not be too thick. After assembly, the light should be flush to the body.

4. Fix the light base in the light.

5. Insert crimp contacts on the light base and screw the light tightly to the body again (see Fig. 24).

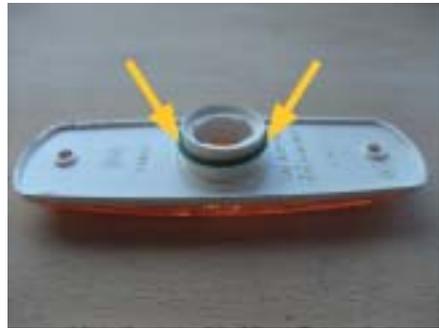


Fig. 23



Fig. 24

CONCLUSION

When lighting systems are installed or repaired with the right know-how and material, the effects of humidity can be reduced to the minimum possible under

the physical conditions. This applies for most LED lights, as well as for lights with conventional bulbs fitted.



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“TERMINAL 15” FOR INSTALLATION OF DAYTIME RUNNING LIGHTS

Daytime running lights make a great contribution to safety in road traffic. Law makers are also convinced that this is the case. For this reason, this lighting function is obligatory for all new vehicles entering the market from February 2011 onwards. The market offers a wealth of retrofit solutions for vehicles which do not have daytime running light fitted as standard.

There are few alternatives for electrical connection, despite the differences in terms of design, light sources and attachment. With many manufacturers, the lights are connected with terminal 15 (switched plus, often also known as ignition plus), terminal 58 (position light) and terminal 31 (ground). While the connection of terminals 58 and 31 is unproblematic in most cases, the situation is different for terminal 15.

In modern vehicles, there is a lack of connection possibilities under the bonnet e.g. fuses of other consumers connected to

switched plus. In such cases, a cable has to be routed to the vehicle interior. There is usually a suitable connection possibility in the fuse box. In many vehicles of the brands Audi, Seat, Skoda and VW daytime running lights can be triggered via the light switch.

Proceed as follows for electrical connection:

- 1.** Connect the cable for terminal 31 (ground) to a suitable spot on the body or directly to the battery.
- 2.** The cable for terminal 58 does not have to be connected to the position light cable on the headlight. This function is taken over later by the light switch.
- 3.** Route the cable for terminal 15 to a suitable spot on the interior.
- 4.** Release the light switch (see Fig. 25) and pull it out of the cockpit trim. To do this, push the rotary switch in first, and then turn it clockwise slightly.

5. In some vehicles (e.g. VW Sharan or Seat Alhambra) the switch cannot be pulled completely out of the cockpit together with the cable connection. In this case, the side cockpit panel has to be dismantled first, so that the plug connection is accessible from there.

6. Loosen the plug connection from the switch.

7. There is a contact for daytime running light on the switch (see Fig. 26).

8. The matching contact socket in the plug is not usually fitted with a crimp contact (see Fig. 27).



Fig. 25



Fig. 26

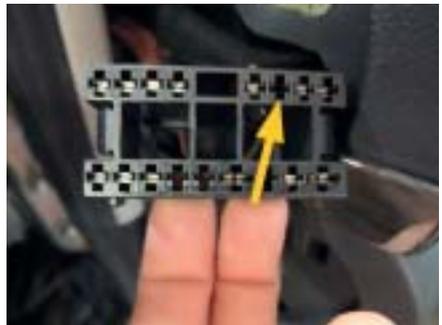


Fig. 27

“TERMINAL 15” FOR INSTALLATION OF DAYTIME RUNNING LIGHTS

9. With the aid of a crimp contact (HELLA no. 8KW 863 934-003) the cable can thus be connected to terminal 15 there. A fuse holder (8JD 743 557-021) with a 3 amp fuse should be fitted upstream, however (see Fig. 28).

10. Install the removed parts in reverse order.

11. When the ignition is switched on, the daytime running lights are switched on automatically. When the light switch is actuated (position light or low beam), the lights go off automatically.



Fig. 28

Here is a list of the vehicles in which this type of connection is possible.
The list does not claim to be complete.

Audi A3	(8L)	Model year 09.96 – 05.03
Audi A	(8P1)	Model year 05.03 –
Audi A3 Sportsback	(8PA)	Model year 09.04 –
Audi A4 saloon	(8E2, B6)	Model year 11.00 – 12.04
Audi A4 Avant	(8E5, B6)	Model year 04.01 – 12.04
Audi A4 Cabrio	(8H7, 8HE)	Model year 04.02 –
Audi A4 Limousine	(8K2)	Model year 11.07 –
Audi A4 Avant	(8K5)	Model year 04.08 –
Audi A6 Limousine	(4B, C5)	Model year 01.95 – 01.05
Audi A6 Avant	(4B, C5)	Model year 11.97 – 01.05
Audi A6 Limousine	(C7)	Model year 05-04 – 04.11
Seat Alhambra	(7V8, 7V9)	Model year 10.97 – 06.10
Skoda Fabia	(7V8, 7V9)	Model year 08.98 – 03.08
Skoda Octavia	(1U2)	Model year 09.96 –
Skoda Octavia estate	(1U5)	Model year 07.98 –
Skoda Octavia	(1Z3)	Model year 02.04 –
Skoda Octavia estate	(1Z5)	Model year 02.04 –
VW Bora	(1J2)	Model year 09.98 – 05.05
VW Golf IV	(1J1)	Model year 08.97 – 06.05
VW Golf IV Variant	(1J1)	Model year 05.99 – 06.06
VW Lupo	(6X1, 6E1)	Model year 10.98 – 07.05
VW Passat	(3B2)	Model year 10.96 – 11.00
VW Passat Variant	(3B5)	Model year 06.97 – 11.00
VW Passat	(3B3)	Model year 11.00 – 05.05
VW Passat Variant	(3B6)	Model year 11.00 – 05.05
VW Polo	(9N1,2,3)	Model year 10.01 – 03.10
VW New Beetle	(9C1, 1C1)	Model year 01.98 –
VW Sharan	(7M6-7M9)	Model year 09.97 – 10.10
VW Transporter 5	(7HA-7EH)	Model year 04.03 –



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9Z2 999 131-106 SCH/08.11/0.1

Printed in Germany