Technical Tips No.7

Converting a standard Borgward Isabella rear light assembly to present day European practice.

This article arose from a enquiry from member, Alan Skerrett. Whilst about it, I decided to make it as comprehensive as I could. I have used the wiring diagram in the Borgward Operating Instructions as the basis, but realise that wire colours and even some connections may vary in practice. This modification is suitable for TS (small diamond) and Coupé models, both with operational Parking Lights. It can also be used for Isabella 60 models (small diamond), in which case, reference to the Parking Light switch is ignored. The modification converts a standard Borgward Isabella rear light assembly to present day European practice. The existing lens, which will be predominantly red with a clear lower section, will be replaced by a lens with a red top section, an amber middle section and a clear lower section.

1) Unscrew and remove the existing rear light lenses (Red with a clear lower section).

2) Before embarking on this conversion, obtain two 5w,6v bulbs (or 5w,12v if car has been converted to 12v), which will fit the socket of the existing 2w Parking Light bulb. Also, two standard 18w,6v (or 21w,12v) single filament bulbs will be required. Without suitable bulbs there is no point in carrying on.

3) Disconnect the +ve lead from the Coil (insulate against contact with any metalwork). This will safeguard against the possibility of the coil overheating if the ignition is left switched on for any length of time during the conversion.

4) Go to the Stoplight Switch on the end of the Brake Master Cylinder. It has two terminals.
   One has two wires connected to it – one Black/Red, the other Yellow (The Black/Red wire becomes live when the ignition is switched on).
   The other terminal has one wire connected – Black.
   Disconnect the Black wire and insulate its end.

5) Switch on the ignition and test the Indicator, Reversing and Stop lights. The Indicator and Reversing lights should be working correctly. The Stop lights should <u>not</u> be working. Switch off the ignition.

6) **Disconnect the battery earth connection**.

7) Unscrew and release the rear light Bulb Holder Assemblies.
   The existing wiring connections from top to bottom are:
   Grey/red or _____0.5²_____● 5w,6v (5w,12v)Tail Light
   grey/black
   Lt.blue/green or ____0.5²_____● 2w,6v (2w,12v)Parking Light
   lt.blue/yellow

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Black/red/green or ___0.75²_____● 18w,6v (21w,12v)Stop/Indicator Light
black/red/white
Yellow_____0.75²_____● 18w,6v (21w,12v)Reversing Light

8) On the Bulb Holder Assembly, on TS and Coupé models, disconnect the Parking Light wires (lt.blue/green or lt.blue/yellow).
On all models, disconnect the Tail Light wires (Grey/red or grey/black).
Connect the grey/red and grey/black wire to their respective Parking Light socket.

If the car is a TS or Coupé with a 12v electrical system, connect the lt.blue/green or lt.blue/yellow wire to the former Tail Light socket.

If the car is a TS or Coupé with a 6v electrical system, withdraw the lt.blue/green and lt.blue/yellow wires and insulate the ends. These wires are obsolete as their current rating is too low for an 18w, 6v circuit (i.e. 0.5² mm instead of 0.75² mm cross-section). These wires do not exist on 60 models.

9) On TS and Coupé models, go to the Parking Switch on the Dashboard. Identify the feed wire (grey/green or grey/white or mauve) to the switch (term 30) and trace it back to the Lighting Switch (term 54?). Disconnect the wire at the Lighting Switch and insulate its end. The Parking Switch is now non-functional.

a) If the car is a TS or Coupé model with a 12v electrical system, there are two choices. Either i) or ii).

i) Proceed as for case b) below. (i.e. 12v 60 model).

ii) Go to the Supplementary Fusebox. This contains three or four fuses. Fuses I and II protect the Parking Light circuits. Each fuse will have one wire coming in and two wires going out. All wires will be lt.blue/green or lt.blue/yellow. Disconnect the single wire into Fuse I. Take a suitable length of 1.0² mm wire and connect it between the vacated terminal on the Stop Switch (Para 4) to the vacated terminal on Fuse I.
Re-connect the battery earth terminal.
Disconnect the two outgoing wires from Fuse I. Using a test lead from the battery positive terminal, determine which of these outgoing wires from Fuse I connects to one of the front Parking Lights on top of the front wing. Leave this wire unconnected. Reconnect the other wire.
Similarly, test the two wires leaving Fuse II. This time, connect the wire feeding the rear Parking Light to the Fuse I outgoing terminal.
Connect the disconnected incoming wire from Fuse I to the incoming side of Fuse II. Connect the disconnected outgoing wire from Fuse I to the outgoing side of Fuse II. This is for tidy storage because Fuse II is no longer in circuit.
The fuse in the Fuse I holder may need to be uprated to 8A. However, the circuit is already fuse protected so it could be shorted across.
Insert the correct wattage bulbs in the appropriate sockets (see below) and replace the rear Bulb Holder Assemblies.

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The modified wiring connections and bulb values are, from top to bottom:
Lt.blue/green or lt.blue/yellow_____0.5²_____● 21w Stop Light
Grey/red or grey/black _____0.5²_____● 5w Tail Light
Black/red/green or black/red/white___0.75²_____● 21w Indicator Light
Yellow_____0.75²_____● 21w Reversing Light

b) If the car is a 60 model with a 12v electrical system, Take a suitable long length of 1.0² mm new wire. From inside the car, pass one end of this wire through a grommet-protected hole in the bulkhead and connect to the Stop Switch terminal vacated in section 4. Run the rest of the wire along the path of the existing loom through to the boot area. There, connect the end of the 1.0² mm wire to two lengths of 0.75² mm wire. Feed the other end of each of these 0.75² mm wires through to the respective rear Bulb Holder Assembly. Connect each wire to the top bulb socket (formerly Tail Light), which becomes the Stop Light. The Bulb Holder connections will be as above in a)ii) except that the Stop Light will be fed by the new wire.

c) If the car is a 60, TS or Coupé model with a 6v electrical system, proceed as b) above but use 1.5² mm new wire instead of 1.0² mm.
Insert the correct wattage bulbs in the appropriate sockets (see below) and replace the rear Bulb Holder Assemblies.
The modified wiring connections and bulb values are, from top to bottom:
New wire_____to_____0.75²_____● 18w Stop Light
Grey/red or grey/black _____0.5²_____● 5w Tail Light
Black/red/green or black/red/white___0.75²_____● 18w Indicator Light
Yellow_____0.75²_____● 18w Reversing Light

10) If not already done, re-connect the battery earth connection.

11) Test that the Tail, Stop, Indicator and Reversing lights are working correctly.
If there are problems, first check that the earth connections in the boot and on the bulb holders are sound.

12) Replace the Rear Light Lenses. If necessary, seal the joints against the ingress of water.

13) Finally, re-connect the Coil +ve lead.

Note: Alan Skerrett used these instructions to convert his 6v Coupé. Apart from one wire colour difference and the necessity to clean up his existing earth points, he had no difficulty. He did point out that the trade no longer seems to recognise the metric wire specification, mm². Instead it uses amperage ratings.

Wire specification conversion.
I quote the mm² system because it is used in the Borgward electrical wiring diagram. This can be converted to modern metric wire sizes as follows:

mm² is the cross sectional area of the copper conductor. That is, the cross-sectional area of each strand multiplied by the number of strands. A metric wire size of 14/0.3 designates a wire of 14 strands, each strand 0.3mm diameter.

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The formula for the cross-sectional area is, $\pi d^2/4$ x no. of strands.
I.e. (3.142 x $(0.3)^2$)/4 x 14 = 0.9897mm² (say 1mm², rated as 8.75 amp. If inside a loom, reduce amperage rating by 60%).

Similarly, the cross sectional area of wire size 28/0.3 is:
(3.142 x $(0.3)^2$)/4 x 28 = 1.9795mm² (say 2mm², rated as 17.5 amp. If inside a loom, reduce amperage rating by 60%)

The mm² wire sizes in the Driver's Manual apply to a 6v system. In a 12v system the wire sizes need not be so big because in general they need to carry only half the current. However, allowance must be made if the total wattage of accessories, such as bulbs, is being raised.

Fuses.
On this subject I am vague and confused. I cannot find any Borgward literature which lists the fuse values. I calculate the current demand for the Coupé as follows:

Before conversion, Fuse 6 fed the Reversing Light, Stop Light and Flasher Unit circuits. Adding up the wattage of the bulbs we have, Flasher Unit operates 2 bulbs x 18w 6v. Stop Light = 1 bulb x 18w 6v. (The other Stop Light uses the rear indicator bulb). Reversing Lights = 2 bulbs x 18w 6v. This makes a total of 90w. On a 6v system this will draw a current of 90/6 = 15A. However, I have checked my 6v Coupé and it only has an 8A fuse.

After conversion: Fuse 6 will feed, Flasher Unit operates 2 bulbs x 18w 6v. Reversing Lights = 2 bulbs x 18w 6v. Stop Lights = 2 bulbs x 18w 6v. (Now separate from the indicators). This makes a total of 108w. On a 6v system this will draw a current of 108/6 = 18A.

I have read that the current values of conical ended, ceramic fuses, as used in Isabellas, represents the maximum continuous current they will carry. The fusing point is twice this value. On this basis, the 8A fuse will melt with a current of about 16A. This is confirmed by the fuse I have inspected. It has the marking, 15/8. Whether this is adequate for Fuse 6, I am not sure. Perhaps a member with electrical knowledge can throw light on the subject. All I can suggest is that you check the value of the said fuse. If it is 8A, operate the Flashers, Stop Lights and Reversing Lights all together for a few minutes. If the fuse stands up to this, it would seem to be adequate. If you have an ammeter to measure the current accurately, it would be even better.

Disclaimer: I do not know whether the new 5w tail light bulb, which is physically much smaller than a standard 5w tail light bulb is legal. There are one or two cars on the road with this conversion so, presumably, they have not had a problem passing the MOT test. I have written this article in good faith and have attempted to be as accurate and correct as possible, but cannot be held responsible for any errors which may inadvertently be contained therein.

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