



# Lighting, the Way Forward

Lighting engineer **Gil Keane**, of the 4Sight Lighting Co, takes a look at upgrading to LED lighting

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## Why consider upgraded car lighting?

**S**adly, our eyesight does not improve as we age. Once we pass the age of 30, it's downhill all the way, with our eyes needing twice as much information (light) coming in at 50 for us to see as we did at age 25. Also, in recent years, car lights have become much brighter. This means that if we are driving a car with dim headlights, our eyes will be 'tuned' to that level, so that when a car with headlights three times as bright comes the other way, we are temporarily blinded, as our eyes simply cannot adjust instantly.

Fortunately, the development of LED bulbs and lighting upgrades offers a solution. Their greater efficiency, compared to incandescent bulbs, means that they can generate a lot of light while consuming far less energy. The low energy consumption means less heat is created, and that can help dashboard and light fittings to avoid the 'cooking' effect that so often afflicts certain components on older cars. Wiring does not get heated and cooled, so the insulation does not crack and deteriorate. Switches don't suffer burnt contacts, and the load on the alternator drivebelt is greatly reduced, reducing slippage and the chances of the belt deteriorating and breaking.



- Above: E-type lighting can easily be updated without any obvious outward signs of modifications (Photograph courtesy of Mike Cole)
- Left: fitting LED bulbs should not require any modifications to the original light housings



To a lighting designer like me, LEDs also offer completely new ways to approach old problems. For example, in a conventional filament-bulb, dual-headlight arrangement, twin-filament bulbs are used, with the smaller filament creating a dipped beam to allow us to see what is happening immediately in front of the car and to the sides. We lose this vital information when we select high beam, in order to see into the distance. We can't have both filaments on at the same time, as the heat generated would destroy the bulb in a short time. Using LED technology though, we can switch on the high beam alongside the low beam. Another problem with filament bulbs is that they

scatter light in all directions, necessitating some very clever lens and reflector designs over the years. Because surface-mounted LEDs emit their light in a very predictable way, we can design replacement bulbs to work with the lens and reflector combination to produce good results, with no scatter or glare. With a little extra work, we can also produce light in a shade of white that looks 'right' for the age of the car.

Using these advances will mean that those of us that love older cars, not as static museum pieces, but as living, usable wonders of engineering, can drive them in a way that is safer, both for us and for other road users.

- Top: for this particular installation, a new bulbholder was required to fit the new LED bulb to the original light housing
- Right: the bright, even light produced by LED headlight bulbs can significantly improve safety when driving at night



## Upgrading headlights

The obvious reason for upgrading headlights is to improve night-time vision, especially on unlit roads. There are other good reasons why you might consider an upgrade. If your car has a feeble charging system, it may only be generating around 25 amps. A pair of upgraded halogen headlight bulbs – generating a not very impressive 800 lumens per bulb – will each draw around 5 amps. Add all the other items that draw current from the electrical system and this can lead to problems. A good upgrade to LED headlamp bulbs will produce three times as much light, but use less than half as much power.

Generally, if you first identify the type of bulbs currently fitted, you should be able to locate suitable, more-efficient LED bulbs. Xenon HID (High-Intensity Discharge) bulbs are effective too, but expensive, more complicated and are being phased out in favour of LED bulbs. You will often find useful tutorials on the internet.

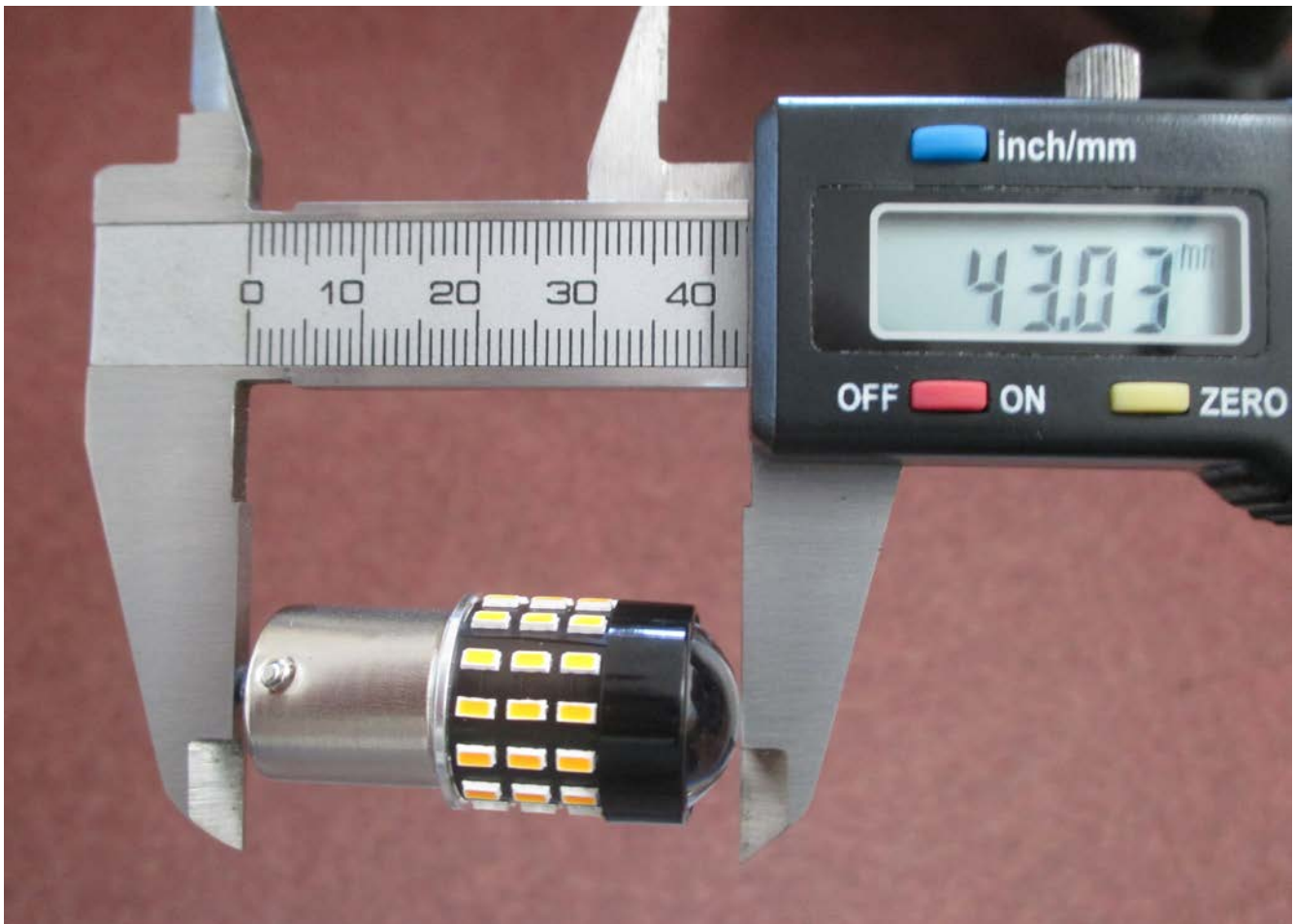
Do not take any notice of people telling you that you will ruin the originality of your car, or that you will burn out wiring or switches, or that you have to fit relays or face doom. Upgrades are easily reversible. Having accidents due to poor headlights will undoubtedly spoil the originality of your car even more, and changing to components which use a lot less power will reduce the stress on switches and wiring, so you won't need relays.

Anything electrical that uses very small amounts of current will need all of the contacts and connections to be clean and sound. 'Heavy-draw' components will 'pull' current across dirty connections, but LEDs will not. Always read instructions, as they are provided for a reason. For example, if you leave the power on when you are fitting LED bulbs, you are very likely to destroy them. If your new bulb does not work first time, double check. Remove it from the car and try it on a car battery or charger. If it then works fine, the problem is not the bulb. Another



- Top: these LED indicator bulbs are the same size as conventional filament bulbs. Note the LEDs at the side of the bulb, as well as the front, to ensure that even light is visible from all angles
- Right: this complete kit for upgrading indicators to LED bulbs includes a suitable flasher relay and an audible-warning unit
- Above: an alternative upgrade kit for LED indicator bulbs





useful check is to swap bulbs from side to side. If a problem transfers across, it is likely to be a problem bulb. Finally, check the condition of your headlights before buying better and brighter bulbs. If the headlights are in poor condition, new bulbs are unlikely to fix the problem, plus you may also be about to throw powerful extra light in all sorts of unwanted directions.

Legalities vary widely from country to country and also sometimes according to the age of the car, and even then rules can change at specific date points. For instance, in the UK, upgrading to LED headlights was fine until March 2021, then suddenly it wasn't. After loud protests, cars registered for use in the UK before 1 April 1986 were exempted. Later cars, at the time of writing, are not exempt, and theoretically would fail an MoT test if fitted with LED headlights. It is also wise to check with your insurance company before considering an upgrade. Simply contact your insurer, and tell them that you are thinking of upgrading some of the lighting on your car to brighter and safer LED systems, asking if they have any objection. It is worth asking for a response in writing, or an e-mail, that you can save.



### Upgrading indicators

LED flasher bulbs, even ones that are much brighter than the original filament bulbs, draw only around 10 per cent of the power, which is good, right? BUT, that means that the original flasher relay will not work with them. In most cases, electronic 'LED-friendly' versions of the flasher relay will be available, but being electronic, these will have no moving parts and will be silent, so the required audible warning will need to be supplied by a separate unit. You can get a small sounder to make the original 'tick-tock' noise. Where there is no appropriate matching electronic version of the flasher relay, there are special LED bulbs designed to work with the original relay, and this can be a good solution where you also have hazard warning lights, which have their own relay.

- Top: always check LED bulb sizes to make sure that they are compatible with the space provided for the original filament bulbs
- Above right: LED bulbs can provide clear and even dashboard lighting, enabling instruments to be read more easily

## Upgrading dash lighting

There are several reasons why making instrument-panel lighting and warning lights brighter is a good idea. It can make your car look like it is in rude good health, rather than being below par, but safety is another consideration – the time you will need to take your eyes away from the road to check on fuel levels etc. will be greatly reduced. Heat is another consideration. Original dash-lighting bulbs can produce more heat than light, and many of the electrical problems on older cars can be traced to this with cracking insulation, brittle plastics or ceramics, and discoloured dials. The new and bright LED bulbs will run cool and cause none of these problems.

Experience gained with long-range aircraft during the war showed that coloured instrument illumination not only avoided night blindness, but also reduced fatigue, which is why post-war cars tend to use coloured instrument illumination. Until LEDs came along, the only colour of light that could be produced was white, of various shades, so a coloured lens was used. This is wasteful, and the trapped light, if there is enough of it, can turn the coloured lens to a pastel shade. If you match the colour of the light to the colour of the lens, you will get a better result every time. Also, the heat from the conventional bulbs is often enough to 'cook' coloured filters, which then become opaque. When you can produce light of the right colour, damaged filters can be discarded, and better and more even illumination can be achieved.



If your instrument panel has a rotary dimmer, more correctly called a rheostat, it won't work with conventional LED bulbs. Also, trying to dim LED bulbs with the original dimmer can damage the new bulbs by supplying them with the wrong voltage. The answer is to either use an alternative dimmer designed to work with LED bulbs, or to use the fully dimmable LED bulbs which have just become available. For cars with a two-position brightness switch, a simple mod can be made which will make it work correctly with LED bulbs.

You can now get self-flashing LED warning-light bulbs for all fittings. These are ideal for the most critical warnings, as it is hard to avoid noticing them instantly, even on a very sunny day. Paying a few pounds extra for one or two of these could save thousands of pounds.

## Finally

If you are to enjoy driving an older car, it is important that you feel relaxed and safe. Conditions on our roads have changed over the years, and inexpensive upgrades such as LED lighting can make your car safer to drive. Of course, preserving originality may be the overriding factor in your decision, but making a compromise, which can be returned to 'as original' at a later date, might just increase your enjoyment, as well as improving safety.

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- Left LED bulbs are available in compatible sizes to replace most types of filament bulbs. The bulbs shown here are screw-fit instrument panel bulbs
- Below: it is important to ensure that suitable connectors are used to connect to existing wiring, and that all connections are secure

