

XJ Headlight Improvement



The XJ series 1, 2 & 3 cars all have four headlights, two 7" in the wings, and two 5 $\frac{3}{4}$ " in the bonnet beside the grille. These have the potential to be an excellent set of headlights, with the right equipment and techniques. If you're not satisfied with your XJ headlights, there are a number of improvements that can be made. Just be thankful you're not in the USA. Their cars were regulated to use four 5 $\frac{3}{4}$ " low wattage sealed beams, which must have given abysmal light output, and incidentally, made the front of the car look silly.



USA car with 5 $\frac{3}{4}$ " sealed beams – not pretty, just pretty useless.

Problems? - No problem!

There are six main areas where your lighting can have problems:

1. Headlight Dip Switch & relay.
2. Headlight Fuse Box (on LH wing)
3. Wiring from the fuse box to the lights.
4. Headlight inserts
5. Bulbs
6. Mountings and adjustments

1. Headlamp Dip Function

The first task is to ensure that the headlights are working correctly. The dip switch on the steering column operates the changeover relay on the left inner guard to dip and flash the headlights. Does the dip switch work correctly every time? Does the headlamp flash switch work? The problem can be with the dip switch, the wiring, or the change-over relay. Checking the wiring and repairing the dip switch will be covered in a forthcoming article. The wiring can also be checked with a meter after determining what the symptoms of failure are. If there are problems with the relay, it can easily be removed from its case. It works by flipping a rocking contact each time it is activated and there is a separate headlight flash relay in there too. Look for loose wires and contacts, but the relay is usually reliable. If any of the female spade connectors to this are at all loose, a light squeeze with a pair of pliers will tighten them up. A smear of silicone grease or Vaseline on the connector will also improve the contact and prevent corrosion.

2. Headlight Fuse Box

The headlight fuse box, also on the left inner guard, has been known to give problems, like the other two inside. Lucas decided that it wasn't necessary to connect power to both of the contact blades that hold each end of the fuse. This was probably adequate for the first twenty years, but on older cars, the fuses tend to loosen. With only one side of the fuse holder contacts conducting, the current to the lights can be reduced, or intermittent. The quick solution is to take the fuses out, and push the fuse contacts together, so that they grip the fuse more securely, but as the contacts are not very springy, they tend to loosen again. The permanent solution is to connect both side contacts with a wire soldered under the fuse box. The procedure for this will be discussed in a forthcoming article.



Headlight Fuse Box

3. Headlight Wiring

The wiring from the fuse box to the lights has several bullet connectors in line. If any of these are corroded or loose, the light output will suffer. The bulbs in the outer headlights are connected only through the three-pin connector, without separate ground wires to the headlight insert. For the inner headlights there are separate earth wires that are connected to the headlamp insert and to grounds on the panels beside the radiator. These commonly fail, as the wires are flexed every time the bonnet is opened. Repair or replace the earth wires as needed, and clean up the earth connections to the body. The Lucas in-line bullet connectors tend to corrode and get loose. Remove all the male connectors, and gently squeeze the female connector parts with a pair of pliers. Apply some silicone grease inside and refit the male connectors, which should be firmly pressed in until they click. Replacement bullet connectors are available, but a.) the bullets are slightly smaller than the Lucas ones, so the squeeze is definitely needed, and b.) they have a ridge of insulation where they are crimped so they must be pushed firmly into the Lucas female connectors. Note that the right hand inner headlight bucket is cut away. This is to give clearance to the air conditioning piping on cars so fitted.

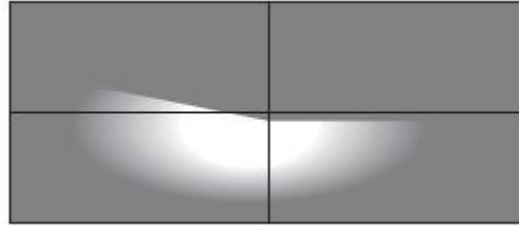


RH inner headlight bucket

4. Headlight Inserts

The right headlight inserts are vital to get the light where you want it. Unless you are a concours enthusiast, and require the absolutely original non-halogen bulb-type inserts, modern headlamps are the most efficient. There are three types of headlight you might find. Early cars may have inserts with non-halogen bulbs, though this is fairly unlikely in the XJ range. The next type were sealed beam units. These don't have separate bulbs, but have the filament permanently mounted in the one piece lens / reflector unit. When it burns out, you replace the whole thing. These used to be common in the 7" size, with 75/50 Watt units. These aren't bad, but they're not halogen, so the light is more yellow than white, and the beam pattern is symmetrical, which is less efficient.

The best type are the semi-sealed modern inserts. These are made for halogen bulbs and have an asymmetric low beam pattern. This gives extra light to the left side of the road, very little to the right, and a sharp cut-off of light at the top to prevent oncoming drivers from being dazzled. The high beam part is also shaped. They tend to have a fairly flat glass, which is important for those cars with headlamp wash/wipe.



Asymmetric Dip Beam Pattern

Hella make a good range of these inserts, and they are available from Auto Electric City. The outer 7" insert (#1056) and with supplied park bulb and holder (#1058) are both around \$80 each. There is a kit with two inserts (#5604) but at \$170 it seems cheaper to buy them individually. The inner 5³/₄" insert (#1053) and long-range version (#1040) are also just under \$80 each. If you are upgrading a Series 1 or 2 with separate park lights, then the park bulb aperture can be taped over. Ideally, remove the rubber grommet and seal the aperture with some aluminium tape.



1053



1040



1056



5604

The only problem with the Hella inserts is that they are slightly thinner than the original Lucas units where the mountings fit into the headlight socket. This means that they aren't firmly clamped when the inner mounting ring is screwed on. The difference is only about 1mm, but the resulting vibration will probably make the bulbs fail early. The solution to this problem is to add a bead of silicone RTV sealant around the inside front edge of the mounting rings. Create a wedge of sealant at a 45° angle across the front corner about 5mm wide. We don't want to seal the headlight in place, just create a resilient gasket for it, so after applying the sealant, allow it to cure for 24 hours. Clean up the edges of the cured sealant with a razor or new scraper blade (nothing else is sharp enough to cut the sealant without dragging it.) There should now be enough sealant to firmly hold the insert when fitting it to the headlight mounting. The photos show black sealant, but any colour, or clear is good, as it is invisible once mounted.



RTV in mounting ring



Close up

5. Bulbs

The other advantage of the modern semi-sealed units is that they have glass lenses, not polycarbonate, so more powerful bulbs are no problem. The heat from higher wattage bulbs can distort or discolour headlights with plastic or polycarbonate lenses.

The standard bulb for the 7" insert is a 60/55W H4 which has a 60W high beam and a 55W dip beam. The H4 refers to the shape of the bulb holder. Other wattages available are 100/90W and 130/90W, both of which give a definite improvement, especially on dip beam. It is important to give the best performance on dip beam when switching from a high beam of up to 460W. The 90W bulbs and the asymmetric pattern help prevent the 'black hole' effect when dipping the lights. For the 5¾" inner units, the standard bulb is a 55W H1. You can replace these with 100W H1 bulbs.

In some countries the headlight wattage is regulated to 55W, so higher power bulbs there are marked 'not for highway use'. The Warrant of Fitness examination requirements do not mention bulb wattage; so higher wattage bulbs are legal. Lights can be failed if the inspector thinks they are likely to dazzle other motorists, so correct adjustment is important.

Some owners in other countries have fitted 5¾" high/dip inserts in the inner sockets, linked to the outer headlights, but only two lights on dip beam are allowed in NZ. Note that you are also only allowed four lights on high beam, so extra driving lights aren't legal if they can be on with the four existing high beam lights.

There are bulbs that claim to give a whiter light or even a blue tinge to the beam, but most do so by filtering out the yellow light that the human eye is more sensitive to. France mandated for some years that all headlights were to have a yellow tinge for this reason. Take your lead from the major

manufacturers like Bosch, Hella and Narva, who don't usually make the extreme blue colour bulbs.

The Series 3 cars have the parking lights using a small (5W) bulb inserted into the outer headlights. Narva make a 5W Halogen park bulb (#17830) which has the same colour light as the main beams. These are available from Repco and Appco.



H1 Bulb



H4 Bulb

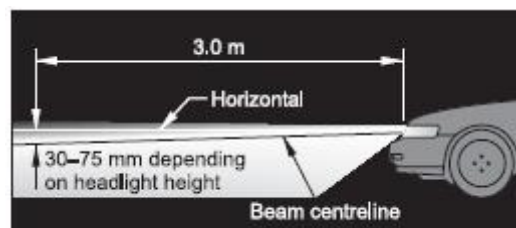


Halogen Park Bulb

6. Headlamp Aim Adjustments

Even the best high power headlights are ineffective if they are not adjusted correctly. The high beams are adjusted so the light output is essentially horizontal. The nominal setting can sometimes be improved by finding a straight, flat country road with no traffic and adjusting for the best 'real world' effect. When the lights are correctly adjusted, reflective marker posts are usually visible several hundred yards away. To isolate the effect of each headlight, lift fuses from the headlight fuse box so that only the headlight being adjusted is lit. This also reduces the load on the battery, which will only last for a certain time on full beam with the engine stopped.

Dip headlights produce a beam angled downwards with respect to the main beam by a calibrated amount. The modern H4 headlight assemblies produce very good beam patterns and angles. If the relative angles between the main and dip beams appear wrong, check that the bulb is of the correct type, and is properly installed in the reflector assembly. As the bulbs are only retained by wire springs, it is possible to misalign the bulb slightly and still secure the springs. The dip beam should be 1% to 1.5% lower than the main beam, which gives between 30mm and 45mm drop over a distance of 3m for the XJ headlights. To adjust the beam aiming, first remove the headlight rim finishers, which are held in place with a screw mounted at the top, up into the car body. On the outer 7" headlights, the 12-o'clock screw adjusts the beam vertically, and the 9-o'clock screw adjusts the beam horizontally. On the inner 5³/₄" lights, the screws are at 2-o'clock (vertical) and 8-o'clock (horizontal).



Dip Beam Adjustment

While you're in there...

Take the time during your headlight improvement program to thoroughly clean and polish all the chromed parts. The inner mounting rings that received the RTV tend to rust at the bottom, so now is your chance to remove that rust and put some protective paint on. The rust is on the inside, invisible, so a bit of paint won't show but will help preserve the ring. The thick outer trim rings are cast in Mazac or pot metal, which doesn't rust, but tends to show pimples or pits as it ages. A good polish with metal polish and a coat of wax will help them stay in good condition. Have a good look at the metal inside the headlight recesses, as this is a known trouble spot for rust on XJs. Brush out any gravel or leaves and consider applying some corrosion preventative product like Fisholene.

Final Thoughts

Now that you have improved your headlight performance, you will be able to drive at night with confidence. As the human eye ages, it gets progressively less transparent, so that at 60 we need twice as much light to see as we did at 20. Being able to see clearly makes a real difference to the driving experience. Now get out there and light up the place!



The End Result