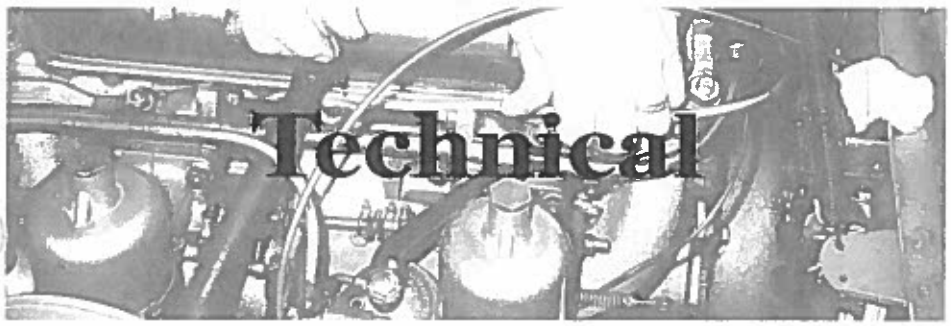
Polarizing a Generator

Polarization is a procedure to match the polarity of a generator and voltage regulator, also known as a "dynamo" and "control box," respectively. Modern electrical systems are negative ground (or "earth" in UK parlance), but any Jaguar with a generator (as opposed to an alternator) is configured positive ground. When installing a new generator, or when the battery has been disconnected, the polarization procedure must be performed.

To polarize a generator after the battery has been disconnected, or a new generator or voltage regulator has been installed, follow this procedure:

Do not turn on the ignition switch or start the vehicle. Make a small jumper wire from 14- or 16-gauge wire and attach alligator clips on either end. Find the terminal labeled "B" on the regulator and attach one of the alligator clips. Next, find the terminal labeled "D" and touch the terminal with the other alligator clip. You can do this several times; a soft spark should be produced each time. Never touch the terminal labeled "F" or any other part of the regulator or you'll risk damage to the regulator.

Start the car and gently rev the engine. The red generator light on the instrument panel should go off. Alternatively, the amp gauge (if your car is so equipped) should swing toward the "+" side.



Installing an Alternator in a BJ8

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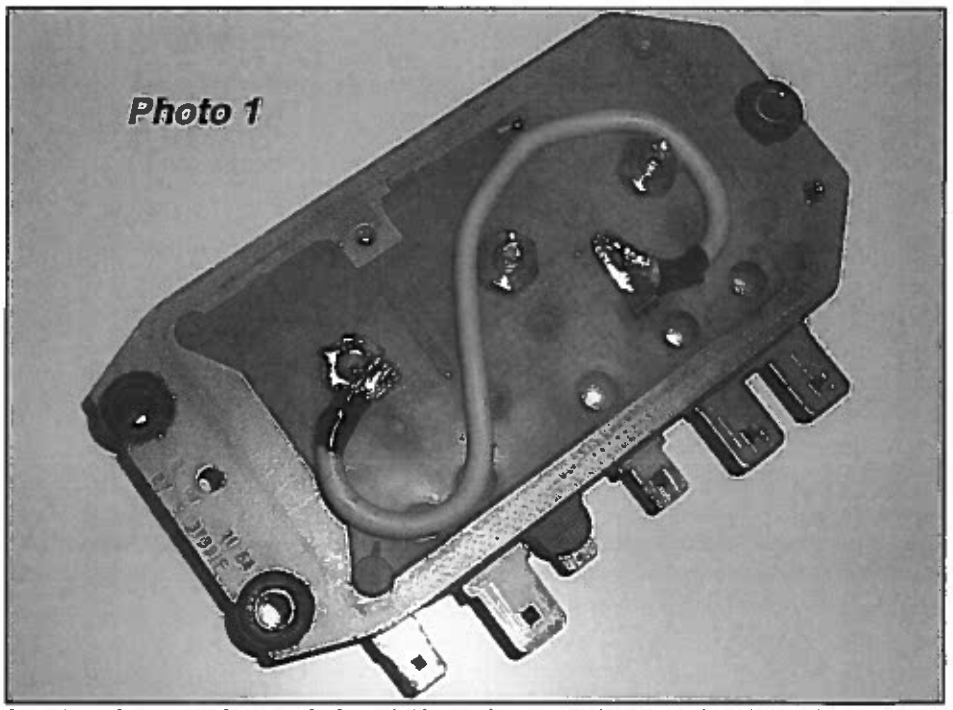
Several years ago I pulled the generator out of the BN1 and put in an alternator. The max output of a BN1 generator is about 22 amps, and if you add up the electrical requirements of the car – ignition, lighting, fuel pump, etc., you start getting close to the limit of the generator's output. If you add additional loads – like auxiliary driving lights or an auxiliary radiator fan – you can easily tax the generator's ability to keep the battery charged. BJ8 generators are better (28-30 amps), but the system can still drain if you put on extra lights and accessories. I wanted more power.

Generators in cars went the way of steam engines along ago for a variety of reasons – the power issue perhaps being first and foremost – and were replaced by far more efficient and far more powerful alternators. Where a generator has an armature of copper windings spinning inside a magnetic field, an alternator has a magnetic field that spins within a fixed array of windings. The design of a generator limits how fast it can spin – hence its power output. The design of an alternator allows it to spin faster, and as a result, not only do they produce more power (you can easily get alternators with 100-amp outputs), they have the added advantage of being able to charge the battery at lower engine speeds.

Alternators have a few other advantages: They're lighter, smaller, and less expensive than generators, and they contain their own regulators, eliminating the need for the electro-mechanical control box found on the firewalls of generator-driven Healeys. Another positive is the fact that most auto electric shops can repair them. On the downside, they're all negative ground. So before you begin, you'll have to convert the car over.

I replaced the generator in the BN1 with a late-model Lucas alternator off an MGB and now I can run almost anything I want without fear of running down the battery. This turned out to be a fairly extensive project, however. I had to have the mounting bracket handmade and I had to have a special pulley made to accommodate the smaller-diameter alternator shaft and the BN1's wide fan belt. Installation of an alternator into the BJ8 is far more straightforward, since for starters, the pulleys take a "standard" belt and an existing alternator pulley can be used. Moreover, the mounting bracket was also available. Some drilling, cutting, soldering and struggling was required though.

Before starting anything, it's a good idea to familiarize yourself with the charging circuit in a generator-equipped BJ8. Power from the battery comes up from the starter solenoid to dual-terminal B of the regulator (control box) mounted on the firewall, and is distributed back to the ignition, to the light switch, and to the hot fuse (A1). Two lines run off the generator. The charging line runs from the generator to terminal D (for Dynamo) on

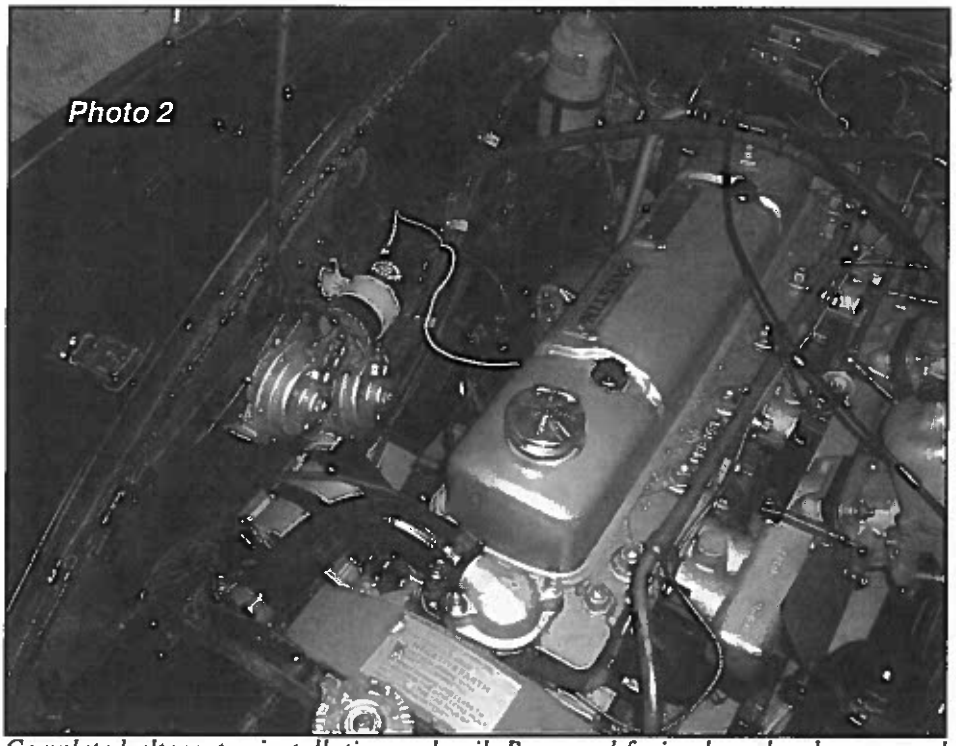


Interior of junction box made from BJ8 regulator. Dual-terminal B (far right) connects battery to light switch, ignition and fuse A1. Terminal D (second from left) is for power from alternator. Jumper connects terminals B and D, connecting alternator to battery line. Three ½-inch screws with nuts pass through holes used by rivets to hold in the three armatures of the former regulator. Jumper is soldered to nut on left-most screw, which passes through backside of terminal D, and to copper tab attached to terminal B. Terminal E (far left) grounds windshield wipers and overdrive.

sheet metal screw. The coil mounts horizontally facing the rear. As a side benefit, there was no need to cut or replace any of the coil wires.

Disconnect the generator wires, and loosen the nuts on the four mounting bolts. Remove the 9/16" nut on the lower mounting link, then the two bolts securing the generator to the engine-cover bracket. Slip off the fan belt and pull the generator out.

two nuts on the mounting link and the two nuts on the lower link. The alternator is now in place. Push the three-prong plug connector into the alternator. Note here that the sense terminal is at the bottom of the connector. To keep things secure, I looped the new harness over the back of the alternator and secured it with a cable loop using one of the screws used to secure the black plastic cover on the alternator.



Completed alternator installation and coil. Rearward facing horn has been moved 180 degrees and now is mounted below forward horn and secured through original mounting hole. Coil bracket uses same bolt at the lower end and is screwed down to shroud support thought the upper end. Alternator is visible to left of radiator hose. New harness is mounted alongside existing harness on right hand frame rail.

(One other advantage of alternators – they weigh less.) Now you have something to sell at the next swap meet. Take off the lower mounting link and reattach it to the alternator. Remove the five bolts holding down the engine cover mounting bracket for the generator, pull the bracket clear, scrape off the gasket and clean up the area where the gasket had been.

Mount the alternator bracket (with new gasket) to the block. Position the alternator near the bracket and slip on the fan belt, making sure that the belt is seated properly on the other pulleys. Now loosely secure the alternator via the two mounting bolts. Attach the link to the block and bolt down lightly. Make sure there's about ¾-inch play in the belt. Tighten up the

Finally, remount the coil and reconnect the wires leading to the ignition, distributor, and accessory fuses. If you want you can trim away the loose 10-gauge brown with yellow wire where it came out of the harness and connected to the generator and at the firewall where it connected to the D terminal of the regulator. You can do the same with the old brown/green sense wire. Or you can just tie them back out of the way. I do not anticipate reinstalling the generator, so I cut them off. Photo 2 shows the completed setup. Reconnect the battery and crank over the car. If the warning light does not go out right away, or if the battery does not seem to be charging, punch the gas.

Some final thoughts:

1. You will be dealing with hot wires when working around the regulator. Before removing the regulator and/or any wires attached to it, make sure the battery is disconnected. Verify that the battery is off by trying to switch the lights on and off.

2. Before installing the alternator bracket make sure that the alternator and the bracket fit correctly. For some reason the bracket I had was 1/32" too tight and I had to file down the rear alternator-mounting stud before the two pieces would mate properly.

3. Make sure that the internal jumpers stay away from the E terminal. You have battery current flowing through the jumper. The E terminal is ground.

4. In a BJ8 with a regulator and generator, the sense line and the warning light are connected internally by the regulator using terminals F and WL. With a junction box, however, the sense line and the warning light line must be connected directly not through the junction box. If you attach the warning light circuit to terminal WL, you will end up creating a circuit that will allow the battery to discharge through the warning light when the ignition is off.

Parts list

1. Alternator. I used a Denis Welch CELG 169, a Lucas unit – it comes with fan and pulley. Price when purchased £59. Other alternators can be used.

2. Bracket. Denis Welch CENG 775. Price when purchased £49.50. Bracket comes with alternator mounting bolts. You must reuse the five generator mounting bolts, and one is longer than the others. Note the position of this bolt when removing the generator bracket.

3. 1 Engine Cover gasket.

4. Three-prong plug connector. British Wiring part #801. Plug comes with two 3/8-inch and one ¼-inch 90-degree female spade connectors.

5. One 3/8-inch straight female spade connector. (BW Part #241).

6. Two bullet connectors, one single sleeve connector.

7. One 3/8-inch cover (BW part #241).

8. Two 48-inch segments of 10-gauge wire; 1 48-inch segment of 14-gauge wire. 40-inches of 3/8-inch shrink tubing. Various cable loops and cable ties.