IMPROVING YOUR STARTER SYSTEM

Pack the picnic, ignition on, press the starter... and nothing. Martin Thaddeus helps get your day off to a better start

Failure is not an option

Leaving the lights on is not good for your battery's life, but the single heaviest drain on your classic's electrical system is the starter motor. On a cold morning when the oil is thick, that little motor can draw enough power to flatten your battery in no time at all. So it pays to keep everything in top condition. Simply failing to keep the connections in good order is all it takes to ruin your chances of getting going.

TOP TIP

Wash your battery's case with a baking soda/water solution when deposits appear. These can drain your battery by conducting current from the + terminal.

Most classics' starter motors require the engine to be turning at between 50rpm and 100rpm in order to draw a usable mixture through the carburettor – and to most engines spinning at that sort of speed we need a fairly hefty electric motor.

This is designed to temporarily engage with a ring-gear on the flywheel, before falling out of mesh to prevent damage to the motor or drag on the engine. If the starter pinion sticks in mesh you can have real trouble starting.

Should this situation occur, the usual way to deal with it is to switch off the ignition, place the car in gear and shunt it back and forward, manually (ask an assistant to help).

Many traditional starter motors feature a square peg on the rear – this is the end of the rotor shaft and can be wiggled free with a spanner, if access allows.

However, it's best not to let things get to this state of affairs in the first place, so let's have a look at how things should be, and what can go wrong. This is about brushes, pinions, teeth and splines – so pay attention, please.

Having a childish tantrum won't persuade Martin's Rover to start.

DIFFICULTY

Basic stuff, but it will overcome those depressing non-starting blues.

ESSENTIAL KIT

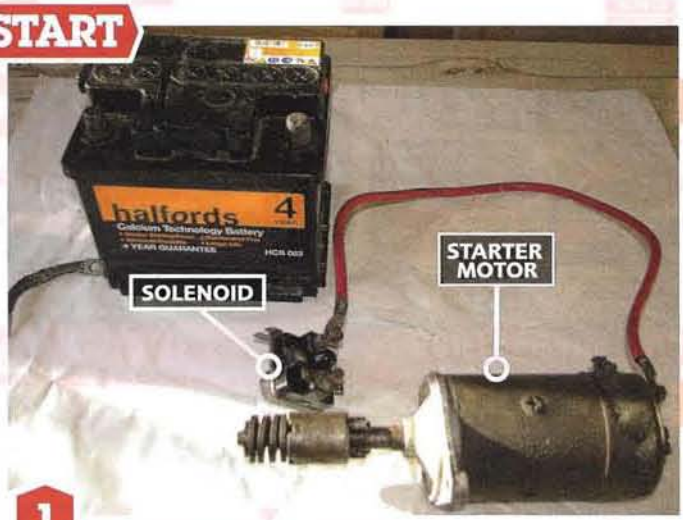
- ✔ Basic tool kit
- ✔ Axle stands
- ✔ Live- tester
- ✔ Paint brush
- ✔ Penetrating fluid (WD40 will do)
- ✔ A little petrol
- ✔ Emery paper

AFRAID TO ASK?

How long will it take?

Less than fixing it later by the roadside and better do it now, rather than later. It's a morning's work for the inexperienced home mechanic – follow our tips and you'll find it's all pretty straightforward.

START



1 THE STARTING SYSTEM

The ignition key switch activates the solenoid, which connects the battery to the starter motor. The solenoid control is earthed through the bodywork. The motor is earthed via the engine, so check the return cables from engine to bodywork and from bodywork to the battery.

2 PAY ATTENTION TO THE WIRING

Fractured, frayed or corroded wiring will impede the flow of power and hamper the starter's performance, as will loose, corroded or dirty connections. Check them regularly. Battery terminals and contacts can be weather-proofed with Vaseline or copper grease.

3 THE SOLENOID

The solenoid is a magnetic switch in which a low-powered wire from the key switch is used to control the high-power circuit to the motor. This avoids running the high-power line to the dashboard and, as the solenoid is sealed, reduces the risk of sparking. This unit is not serviceable, but do keep it clean and ensure good contacts and earth.

* On a Y-Type, you will also have to remove the exhaust header pipe to get sufficient clearance to remove the Starter.

4 REMOVAL OF STARTER MOTOR

First, disconnect the battery earth lead and set the car securely on axle stands. Next, from under the car, remove the starting lead from the motor. The motor itself will usually be held by two or sometimes three bolts. Please remember that the starter motor is not a light object – especially when held overhead.

5 BENDIX-TYPE HELICAL SPLINE

The Bendix or inertia starter employs a course thread or helical spline which, when spun, propels the cog into mesh with the ring gear. As the engine fires, it rotates faster than the motor and this causes the cog to be pulled back along the same helical spline and thus safely out of mesh with the ring gear.

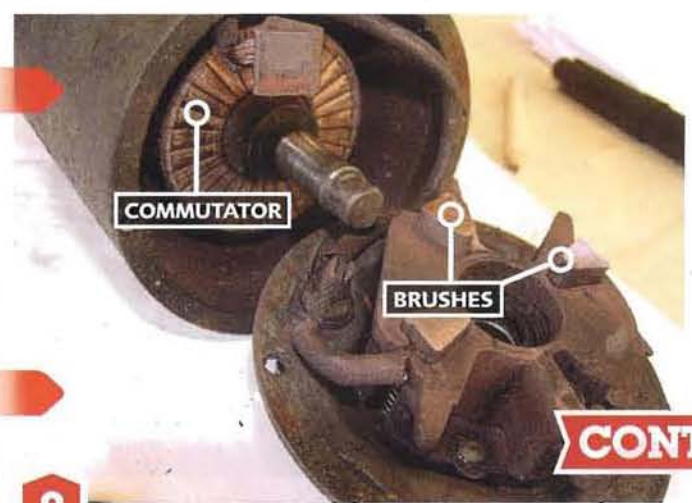
** A Y-Type does not have a pre-engaged starter, so this stage is irrelevant.

6 PRE-ENGAGED STARTER MOTOR

The later pre-engaged starter unit features a solenoid mounted on the motor, piggyback style. The construction is such that the solenoid thrusts the starting cog into mesh before it connects the power to the motor winding. This type of starter is more reliable, but we've found it more difficult to service.

7 STARTER MOTOR PINION TEETH

The traditional Bendix-type drive pinion hits the starting ring gear with some force after the motor has begun spinning. Worn teeth can lead to sticking and malfunction. A quick clean-up with a file might suffice. Replacement is always preferable in the long term.



CONT.

8 STARTER MOTOR BRUSHES

Your starter motor will be fitted with carbon brushes, which are designed to wear and slip down in their holders under spring action. Sticky brushes will not make good contact with the commutator, so if they are not too worn to need replacing, clean them with a fine abrasive or file.

CONT.

9 THE BENCH TEST

Set the motor firmly in vice and connect the motor to a 12-volt source. The motor should spin up with a whack, rather than simply rotate. Do this several times, as a single duff segment of commutator might not always show up first time. Listen for any grinding or imbalance.

10 THE STRIP-DOWN

Stripping the motor is not beyond the average classic motorist – 30 years ago most kitchen tables were used for this purpose. The long through-bolts tend to shear easily, so give them a good squirt of WD40 and take your time. A tap from a copper or hide mallet will also work wonders.

11 CLEAN PINION WITH PETROL

Dirt, grease, oil and dust will conspire to clog up and slow down the starter pinion. Use some petrol or thinners on a clean paintbrush to remove any grime. Avoid getting any harsh solvents into the winding as it is lacquered, and take care to thoroughly dry the motor before connecting it to any electrical supply.

12 NEVER OIL OR GREASE PINION – LUBE WITH A PENCIL

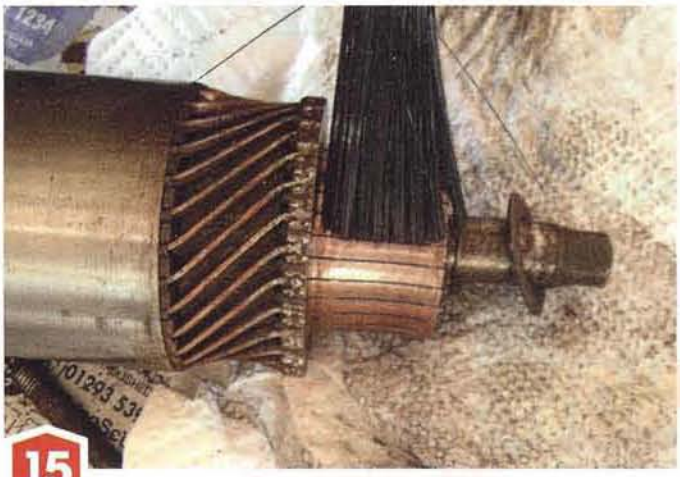
Oil and grease will only encourage the pinion to gunge up, so never use any lubricant other than perhaps a little pencil lead. This is optional and many mechanics will simply rely on the free movement of the pinion along the shaft to do its job.

13 INTERNALS – COILS AND BRUSHES

The rear end plate of the motor casing usually holds the terminals for the brushes and the field coils. As both the field and the brush circuits are fed from the same source, replacing the brushes demands that the wires are soldered securely and not simply joined by those convenient bullet-type or spade-type connectors.

14 INTERNALS – THE ROTOR

Worn bearings will lead to the rotor fouling. To replace the rear bearing – which is usually a phosphor bronze bush – pull the old one with a threaded tap and press the new one home with a G-clamp. Front bearings rarely fail, but if they do, you will need to remove the pinion set, which is not an easy job.



15 CLEAN THE COMMUTATOR

A dirty commutator will not help things, so spruce it up with petrol on a clean brush. Dry thoroughly. A badly or unevenly worn commutator can be trued up on a lathe. Surprisingly, an evenly worn unit like the one shown can work fine. Eccentric wear suggests bearing trouble.

16 RE-SURFACE WITH ABRASIVE

The commutator can be freshened up with a piece of fine emery or glass paper. Clean as above after resurfacing. Do not undercut between the segments of the commutator as you would with a dynamo and be certain to make a note of any shims or spacers.

17 ACCESS TO THE MOTOR BRUSHES THROUGH THE COVER BAND

Earlier starters have a cover band (not the type that churns out *Stairway to Heaven*) through which the motor brushes can be accessed for inspection and cleaning. Later models allow for access through the end plate. Brushes usually come in pairs – two or four, with two pigtail wires each.

18 LIFT THE MOTOR BRUSHES FOR CLEANING OR REPLACEMENT

Lift the carbon brushes and their coil springs with an old brake spring. Place the spring on the holder while working on the brush to stop it uncoiling. Minimum brush length is 8mm (ish). If you are struggling, bear in mind that these things are actually designed to be replaced.

19 TEST FIELD-COIL FOR CONTINUITY

If you place a 12-volt feed to the input terminal or to any winding, the live-tester will confirm continuity of the circuit. Connect the earth-wire of the test to earth and simply touch the probe to the other end of the winding. If it lights, the power has run through the wire. If it doesn't, you need a new motor.

20 TEST FIELD-COIL FOR EARTH LEAK

Just because the power has reached the end of the winding, that doesn't rule out the winding being earthed to the casing. The field wind is coated in lacquer as an insulator and this may be breached. The same test with the live-tester probe touched to the casing will show up a short circuit or confirm continuity. ■