

## Check list for difficult starting, by Chris Kingsford-Curram.

### IGNITION

Is the ignition switched on?	Note: This checklist was made for a car with S.U. carburettor & petrol pump, and with standard 6V ignition system. <b>*ASSUME NOTHING - CHECK WITH YOUR OWN EYES*</b>
Is there a spark at the plugs?	Remove #1 plug, reconnect lead, with ignition on hold plug against a head stud and turn engine over. (Insulate your hands from the plug with gloves or a thick rag).
If no, is there a spark from the coil?	With ignition on, disconnect HT lead from distributor, hold 3/8" from a head stud and open the points manually, should be a strong spark. (Again, hold the lead with gloves or a thick rag).
If no, is there power to the coil?	In my case S.U. fuel pump is connected from the coil terminal, so if pump is definitely working then yes. Otherwise use a multimeter between terminal and earth.
Coil continuity check with multimeter:	Resistance across + / - contacts should be around 0.4 - 2 Ohms
Coil continuity check with multimeter:	Resistance from either contact to HT terminal should be around 6,000 - 15,000 Ohms (8570 in my case)
Is the coil correctly connected?	Battery positive - ignition switch - coil 'plus' ; coil 'minus' - distributor (LT lead) for neg earth system. Battery negative - ignition switch - coil 'minus' ; coil 'plus' - distributor (LT lead) for pos earth system. (Should not prevent car from starting, but worth checking).
Are points gapped correctly?	12 to 14 thou when on cam lobe. Check on more than one lobe. (18 thou for a Bosch)
Are contact breaker points clean?	Remove, inspect, clean by dragging a strip of fine sandpaper or clean card/paper (not emery) between the points. (Emery embeds carbon in the surface which leads to further trouble). May be better to replace with new (but note new points are sometimes coated and need a pre-clean with petrol and rag). Automatically replace points if more than 30% of surface won't clean up.
Is the insulating washer present?	Should be a thin fibre washer between points base and sprung section.
Is there about 6V at distributor end of LT lead?	Check with voltmeter
Is the LT terminal of distributor sound?	The terminal often breaks loose from the strap inside the distributor - remove and re-solder if loose.
Is the carbon brush in distributor cap	Check for free movement, look for breakage or fouling
Is the inside of the distributor fouled?	Clean or replace cap if wet or dirty (risk of tracking). Wipe away any general dirt, oil or
Are the terminals in the distributor cap clean?	Clean by careful scraping or replace cap
Is the rotor arm actually turning?	Should turn with engine rotation, if not shear pin has failed
Check/ replace condenser	Replace with a known OK condenser. Possible to test with analogue ohmmeter set on highest scale. Disconnect condenser then discharge it by grounding the terminal to which LT lead attaches. Touch red lead to terminal, black to casing, should see a small jump of needle then decay towards infinity. Hold leads in place for 20 secs. Reverse the leads and there should be a bigger jump this time, again decaying to infinity. Less than infinite resistance indicates a short.
Check/ replace rotor arm	It can break down under load even though it looks alright; if in doubt replace.
Are the HT leads good?	They can break down under load even though they look alright; if in doubt replace.
Is the engine properly earthed?	Head and block will normally earth through their fixing studs. Best practice is to connect the battery earth lead to mounting bolt of starter motor. Otherwise a strap from starter fix bolt to chassis frame.

Is the ignition timing correct?	Check points open on COMPRESSION stroke (n.b. not 180 deg out - easily done) just before TDC - about 1.25" on the flywheel or 2 ~ 3mm of piston travel. Rotor arm should be aligned with appropriate terminal in distributor cap. You can check which is compression stroke either with a thumb over the plug hole while turning engine, or remove valve chest cover and feel the tappets - they will rattle slightly when valves are closed, and go tight when valves are open (both should be closed during compression stroke).
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## FUEL

Is there petrol in the tank?	
Is the fuel tap open?	
Is the petrol fresh?	If in doubt go and get some brand new fuel fresh from the pump.
Is the petrol clean?	Put a filter in the line (unlikely to prevent a start but you may have blocked a jet).
Is the fuel filter blocked?	Replace filter
Is the fuel pump working?	Remove lid of carburettor float bowl, hold supply line over a pot and check.
Is the choke out?	Check
Is the choke actually operating?	Check physical operation of the choke at the carb visually
Is the throttle closed?	Again, check physical operation at the carb visually, linkage could be stuck etc.
Is there fuel reaching the cylinders?	Remove spark plug and take a look/ sniff. Turn the engine on starter with plugs out and a mist of fuel should be visible.
Is the engine flooded with fuel?	Remove plugs and leave for an hour or so for excess fuel to evaporate. Don't drop anything down the open plug holes...
Are spark plugs fouled?	If plugs wet with petrol, remove all plugs and ventilate a while before trying again. If fouled with oil a problem with piston rings is indicated.
Is the carburettor piston free?	Check movement
Is the (S.U.) carburettor damper containing any oil?	Top up (3 in 1)
Is the fuel tank ventilated?	Check vent isn't blocked
Is there water in the cylinders?	Head gasket isn't sealing; dry out, fix leak. Change oil if water may have gone into sump, otherwise your bearings will suffer. Tip: First start after rebuild fill the coolant immediately <i>after</i> the engine fires and drain down when you switch off. Re-torque head when cold.
Is there an air leak at inlet manifold?	Check for a dribble of petrol around top of valve chest cover. Make sure manifold nuts/ bolts are tight. Remake the joint with sealant. Only a very small leak is needed to kill air/fuel ratio then it won't fire.

## COMPRESSION

Can you feel compression?	Remove plug, turn engine with thumb over plug hole
Check valve clearances	Should be 6 - 8 thou
Do a compression test	A newly rebuilt engine needs some running to reach optimal compression. Otherwise use a compression tester and follow instructions. If you can reach 80 psi without large variation between cylinders the engine should run OK. Best level is about 115 psi. Note you need a running engine to do a proper compression test.
Blown or leaking head gasket	Replace; if new make sure it is greased on both sides, head and block are flat and nuts evenly torqued down to 20lbf in correct sequence. After initial running re-torque to 22lbf when

	engine is COLD (especially important with alloy head).
Check valve timing	Possible to assemble timing gears wrongly, then valves will open in wrong position (1 tooth out may be enough to prevent engine start). Rough check by observing tappets while turning engine. Timing gears have been known to be incorrectly marked. When assembling an engine it's a good idea to photograph the matching marks after assembling the camshaft then this question can be put to bed without dis-assembly later. Better still plot the curve of valve lift vs flywheel rotation then you have some interesting data.

## STARTER

Is the starter motor turning quickly and freely?	If not check battery health and that it is fully charged. Connect the battery directly across the starter (one lead to terminal, one to mounting bolt).
Is the starter robbing current from the ignition circuit?	Check with a multimeter. Try using the starting handle. Try push or tow start.

## DESPERATE MEASURES

Empty the float bowl and fill with FRESH petrol straight from the pump.	Modern petrols are prone to 'freshness' issues, especially after switch to summer formulation (April - May) which is less volatile
Tow start or apply 12V across the starter (only)	More revs may help get started but probably only if the engine is firing.
Warm spark plugs in the oven	Helps to vapourise the fuel
Squirt 'Easystart' in the inlet manifold	Basically ether will fire when petrol won't, however prone to pre-ignite which is not good for the engine, especially risky if the fault is not known... It's bottom of the list for a reason.