EDITED 20th MARCH 2022

DON'T: Probably a bit late, but hopefully you read this before you buy a non running XJS. They come in various conditions.

a) Neat looking car, good body and interior, just one day the engine stopped and owner or mechanic cannot fix it. Could be a simple fix for a DIY or a mechanic with V12 experience and this forum to help.
b) Ditto, but this time it is serious. Overheated and dropped valve seat, engine bay fire and so on. Fixable for sure by DIY at moderate cost but expensive if you pay a mechanic.
c) Crappy looking car, not well cared for, strictly for a masochist. Just don't, even for a DIY can be a money pit.

NOTE WELL: There is a decision point about when to keep going with time and money, or when to give up. Firstly the general condition of the body and interior makes a big difference to that point.
If they are both good it is worth going further to fix up the engine. Worst case an engine can always be rebuilt or a second hand one found and you will end up with a car you will like.
If the body and interior are poor you might not want to sink a lot of time and money into it. Better to save that money plus some more and buy a better car.

V12 5.3L CHECK LIST: The idea is to get the engine ready for cranking and firing.

This is mostly intended for a new owner dealing with a non running V12 car. The idea is to check the known weak points before trying to start the car. This check list can avoid damage, frustration, wasted effort and buying unnecessary parts.
The check list follows with items to check marked by a ☐. Tick it off when checked.
Where there is more detailed information and photos at the end of the list it is noted as **(#1)** etc.
There is a 700 page downloadable "Book" created by Kirbert which has many pages of information on the XJS. Where it is helpful reference will be made to this BOOK for detailed information.
http://www.jag-lovers.org/xj-s/book/Jaguar.html
At a guess it will take 15+ hours of time to work through all items. You can choose to skip all or some of the items. Bear in mind even experienced DIY owners often spend more time than that tracking down a problem in a well maintained engine. Better to start by checking the obvious weak points.

☐ The engine bay is probably dirty. Cleaning it up so all the wiring and components are easily visible is time well spent. Especially clean out the V12 valley. **(#1)**

☐ Identify which version of 5.3L V12: Pre HE. HE Lucas ignition. HE Marelli ignition.
Later face lift cars are 6.0L. **(#2)**
Make a note of the car VIN number and also the engine number at the back of the valley if you can see it. Useful info when you start asking questions or buying parts.

☐ Get familiar with all the components needed to make the engine run. See diagrams **(#3)**

☐ There are a number of ground points in the wiring. Black wires are from the negative (ground) side of the battery and must be checked/cleaned where they ground to the chassis or engine.
There is a flexible ground strap from engine to chassis close to the oil filter, very important.

☐ There are lots of plugs and sockets in the engine bay wiring. Not essential right now but a good idea to pull them apart, spray with something like WD40 (there are better sprays for this) and reconnect. Note the white rubber bullet connectors favoured by Lucas can be very hard to pull apart but there are few reports of these being a problem. The black plugs on the injectors and other sensors are more likely a problem.

☐ Remove spark plugs and check condition. Pre HE should have 35thou gap, HE a 25thou gap. Some plugs are difficult to get at. Be careful not to try and extract them if the plug socket is not fair and square on the plug, and you will need swivel joints and patience to extract safely.
Before removing plugs in a dirty engine a good idea is to spray a lot of cleaner into the plug holes and then blow them out. Saves foreign objects getting into the engine.
Pray the last person to fit plugs used **anti-seize**, and you use it for sure on refitting.
See tips for removing plugs **(#4)**. **Do not replace plugs yet, cover the plug holes and check following ignition and fuel injection items first up to the "Lube engine" section.**

Lucas ignition section: (Skip if you have Marelli)
☐ Remove the dizzy cap. Check it for any damage and a functional carbon brush.
Later cars have a nipple in the cap for connecting a breather hose.
The spring loaded advance mechanism can be stuck, it should rotate freely. A bit of oil helps.
The springs in the mechanism may stretch, will not stop engine running but will affect timing.
Check the condition of the vacuum capsule.

☐ Pre HE has a bracket with 2 reed switches to initiate injector pulses, sometimes replaced with solid state switches. The pre HE ignition uses a plck up coil and a plastic wheel with 12 small metal bars. Check the gap between bars and the coil, should be 20 to 22 thou.

☐ The HE pick up uses a 12 lobe star wheel. Gap between lobe and coil, should be 20 -22 thou.

☐ Verify the firing order of the ignition leads.(#4). Check they have good connections to cap, plugs and coil. If in poor condition they should allow the engine to fire, but perhaps not on all cylinders.

☐ Pre HE used Lucas ignition amplifier mounted in the valley, later above the radiator.
Known to fail, often replaced with aftermarket types. One update was Crane Cams amplifier kit which included a 12 slot wheel and optical switch for the dizzy.

☐ The HE ignition amplifier is mounted on the B bank inlet manifold. They can fail but are easily fixed. There is a co-ax or shielded white wire from amplifier to ECU to initiate injector pulses. Nearly always shorts to the shield and needs fixing. Ground shield at one end only, usually the ECU end.

Marelli ignition section:
☐ This is essentially two 6 cylinder systems sharing a common dizzy. The dizzy has a twin rotor setup which means the cap has two outputs to two different coils, and each coil has its own ignition amplifier. This system is poison because it can fail on one output so the car runs on one bank of the V12 as a 6 cylinder quite smoothly with less power, while the other bank receives fuel but no sparks. Then raw fuel enters one exhaust system, burns nicely and can cause the catalytic convertor to melt and be very, very hot. Possible end of XJS.

☐ Take the cap off the dizzy. Check for any burning signs on the rotor. If burnt you need a new one. For an existing rotor or new rotor, **make sure you follow the silicone fix in the BOOK**
Be warned - burnt rotor - you may already have a melted cat in one exhaust.

☐ Verify the firing order of the ignition leads.(**#4**). Check they have good connections to cap, plugs and coil. If in poor condition they should allow the engine to fire, but perhaps not on all cylinders.

☐ Marelli cars have sensors (pick up coils) on the front of the crankshaft and the flywheel.
Check they have the specified gap 18 to 42thou. They are prone to fail. Check the resistance which should be around 700 ohm. Clean the connectors, can be a problem.

Fuel injection section:

☐ Injector wiring in the valley. Often in poor condition with broken insulation and exposed copper. Temporary fix is to cover the copper with insulation tape. Avoid shorts across wires or to engine. Later rebuild the harness or buy a new one.

☐ Injector fuel hoses are known to fail and cause engine fires. Check carefully for any leaks or damage. Once the engine is running replace them if the slightest doubt.

☐ Injectors may not be in good condition. A quick test is to apply a few brief 12V pulses to the injector coil and see if you hear a click. Chances are clicking injectors are functional if not perfect. One or two injectors not clicking may still let the engine fire, you can overhaul injectors later.

☐ Various items sending signals to the ECU that need checking.
A vacuum hose from the middle of the rear crossover tube to the ECU.
The coolant temperature sensor should be about 5.9kohm at 0deg C, 2.5kohm at 20C.
Critical to start the engine.
Air temperature sensor also same for HE, pre-HE about 10 times less ohms, but not so critical.
Throttle position switch(TPS). Can be a problem, see **(#5)**

☐ The throttle movement on both sides should be checked. The rubber bushes in the linkage often crumble, does not stop the engine but can cause rough running.

☐ In the trunk there is a small tank under the battery. This is almost sure to be full of crap and a plugged up filter. A constant source of trouble, remove and clean. Think of this while in there:
If the car has not been running for, say one year, the chances are the fuel can be compromised. Drain and refill with a few litres of high octane fuel.

Other things:

☐ Check the belts on the front of the engine. Will not prevent cranking but if slack or missing the engine gets overheated. The fan has a viscous clutch, rotate by hand and you should feel resistance.

☐ Check battery condition and connections to battery terminals.
Check ground cable from battery to bolt on chassis. Use trickle charger.

☐ Check the oil and coolant levels, they should be reasonable. If the oil looks dirty and suspect best change it before it can cause more damage. At this stage spend the minimum until it looks like the engine will crank and be worth persevering with. Use a cheap oil around 20-40 for now, change later.
Special care is needed to fill with coolant and avoid trapped air in the system.
Engines can have head corrosion problems because owners forget to change the corrosion inhibitor. You don't need inhibitor to crank but it is on the "follow up list".

☐ **Lube the engine:** Plugs are still out. Gold standard is to remove the oil gauge sender and rig up a small container and hose that plugs into the vacant hole. You can take out the 4 bolts and remove the throttle capstan tower for better access.
Fill container with oil and leave for a day. That will dribble oil into the important bearing surfaces. Better still if you can pressurise that container.
Spray something useful through the plug holes. Maybe fuel with 10% oil to lube the cylinder walls. Leave for a day. Replace oil gauge sender.
Remove all injector plugs so you don't spray fuel into the cylinders. Disconnect the low voltage wiring to the ignition coil or coils.

☐ Check everything is safe to go and now crank the engine. With luck you get an oil pressure reading in the instrument cluster. This proves the starter electrics are O.K.
Oil pump failure is very rare, if it cranks you will have oil pressure and the engine is lubed.

☐ Replace the spark plugs and injector plugs. Replace ignition coil wires. Replace the spark plug leads. **Check you have not forgotten something.**

☐ **Ready to crank and fire up:** Do not overdo it, if it is going to fire up it should happen with no more than 8 cranks, say 4 seconds each spread over 2 minutes. Be kind to starter and battery.
DO NOT run the engine for long once it fires until you check the BOOK all about proper filling of coolant to avoid air locks. Just because you see coolant does not mean it is safe.

☐ **Will not fire up:** Quick check, is it ignition or fuel ? Spray some starting fluid into the intakes while somebody hits the starter. If it fires we have a fuelling problem.
If it does not fire use an old spark plug connected to the high voltage side of the ignition coil. Check for a blue spark on the plug while cranking. No spark = ignition problem.
Ask the forum for advice.

ADDITIONAL INFORMATION

#1 What follows is easier if you remove all the spark plug leads, then you can see things !
For a dirty engine ideally you squirt a lot of degreaser all over the engine and engine bay, avoiding the ignition and dizzy, and hose down gently with water. Having the front of the car raised so the water drains down out of the valley helps. Finish by blowing all the water out of the spark plug holes.
This can make for a really clean engine, and I have done it a few times but usually with an engine that I warm up first. A cold non running engine will not dry nearly as quick.
There are forum members who have done this hose down and spent a lot of time trying to get their engine running again. You need be very careful how you do it.
If water gets under the spark plug boots or in the dizzy that will be a headache. It is not too difficult to pull apart all the electrical connectors and squirt some WD40 or similar into them, that should take care of water ingress.
You can get the worst of the grime off the engine using a brush and solvent such as kerosene or degreaser, once again blowing solvent out of the spark plug holes.
Dirty engines are not nice to work on. More possibility small items like screws and washers can get lost and fall into cylinders. Harder to identify parts, wire colours and hidden damage. Less likely you can get somebody happy to give you a hand.
See **(#4)** to replace the spark plug leads, but don't do that yet.

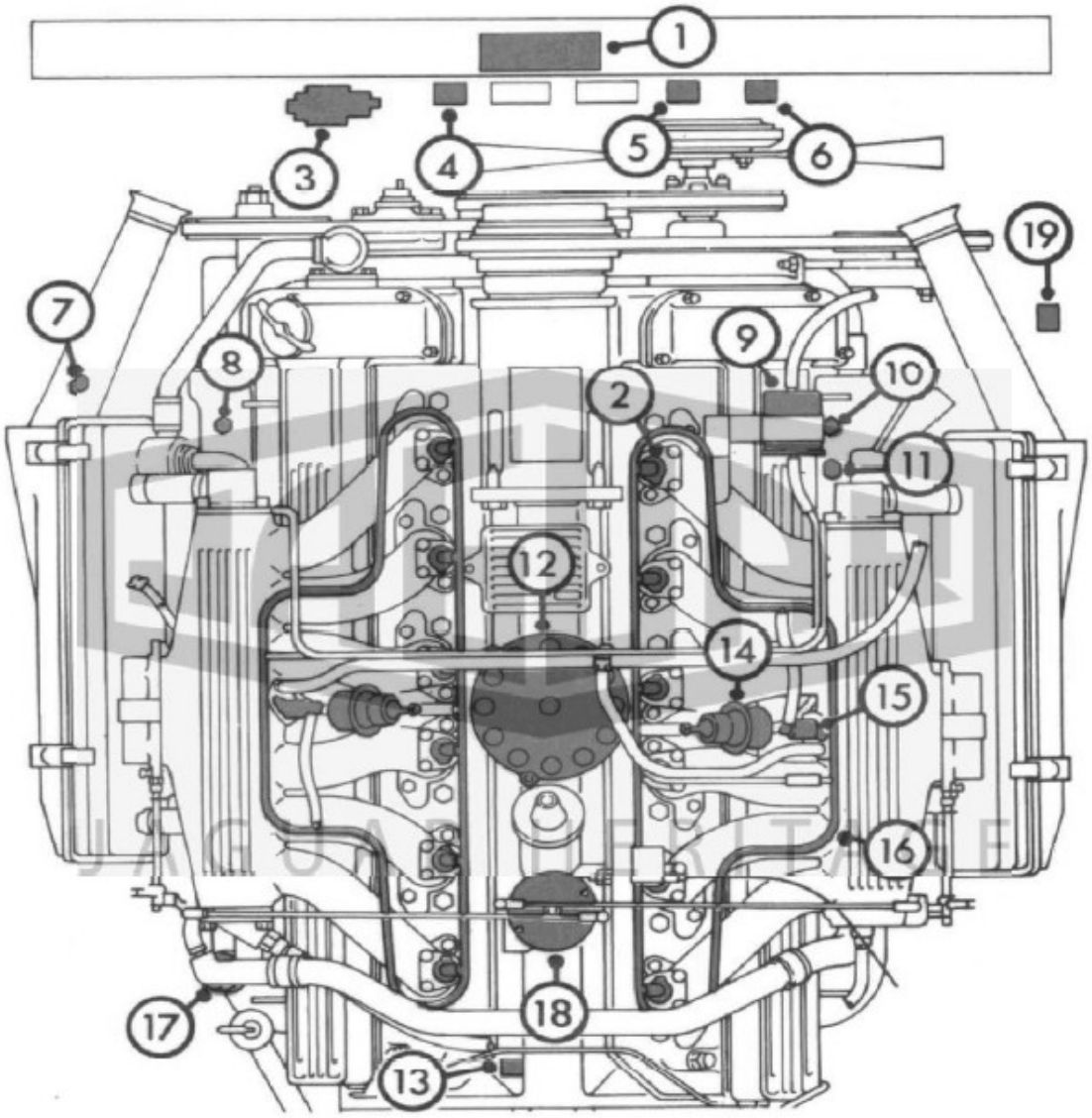
#2. IDENTIFY THE ENGINE.
This is my 1988 convertible Lucas ignition engine. Standard except cruise control removed.
On a V12 the A bank is on the right looking through the windscreen, B bank on left.

Below is a Lucas dizzy on the left, a Marelli dizzy on the right. Marelli engines look very much the same as my Lucas one, except for the Marelli dizzy and the lack of an ignition amp on the B bank manifold.

#3 Pre HE V12 shown below. Note: It has circular section fuel rail, HE has square.

ELECTRONIC FUEL INJECTION SYSTEM DIAGNOSTIC AID

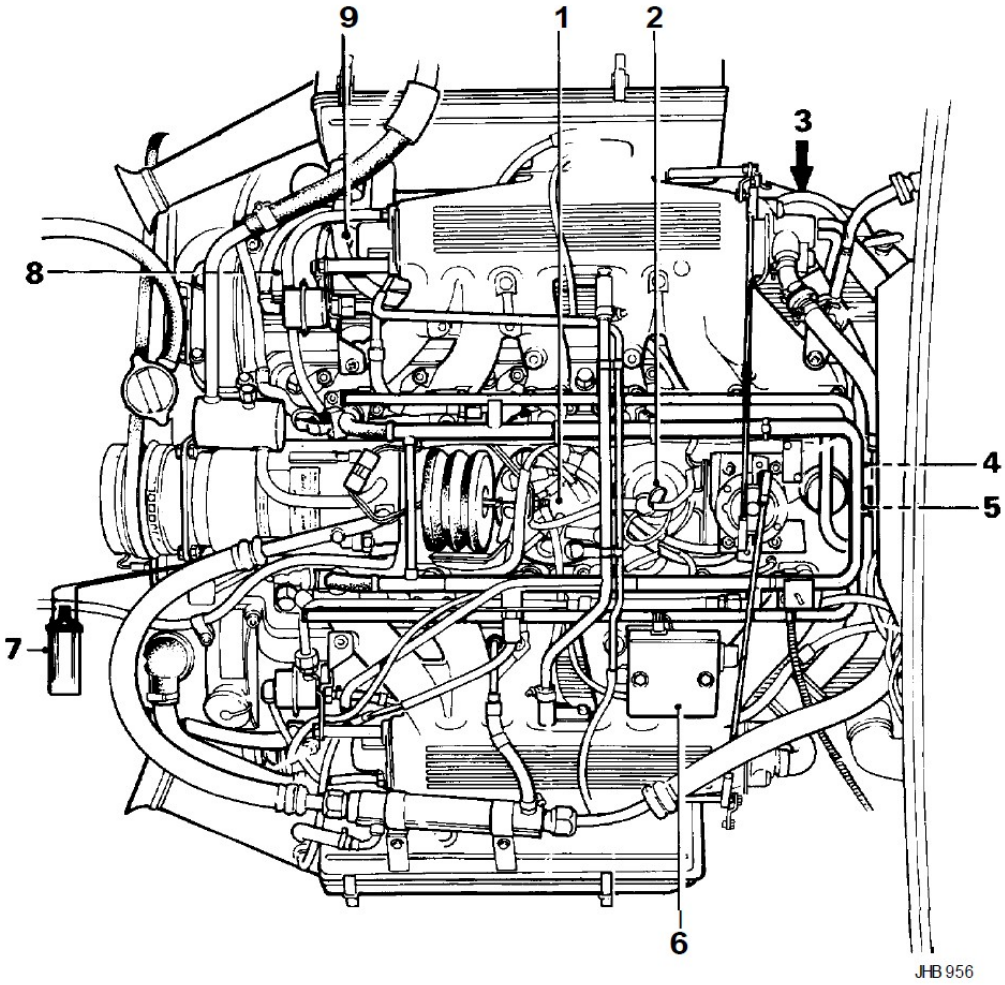
This aid should be kept in the car to assist in the rectification of simple faults.



COMPONENT LOCATION

1. Power Amplifier
2. No. 1A Cylinder, Injector and Spark plug
3. Manifold Pressure Sensor
4. Cold Start Relay
5. Pump Relay
6. Main Relay
7. Air Temperature Sensor
8. Coolant Temperature Sensor
9. Fuel Filter Unit
10. Thermo Time Switch
11. Coolant Temperature Transmitter
12. Trigger Unit (in Distributor)
13. Trigger Unit Connector
14. Pressure Regulators Right and Left
15. Cold Start Injector(s) Right & Left
16. Fuel Rail(s) Right and Left
17. Auxiliary Air Valve
18. Throttle Switch
19. Power Amplifier Harness Connector

HE V12 SHOWN BELOW: 2 versions, one has good drawing but lacks detail.



Shown above is V12 HE LUCAS component location, not comprehensive.

1 Distributor 2 Main HT coil 3 Starter motor 4 Oil pressure transmitter

5 Oil pressure warning switch 6 Amplifier 7 Auxiliary HT coil 8 Alternator

9 Coolant temperature transmitter (for temp gauge)

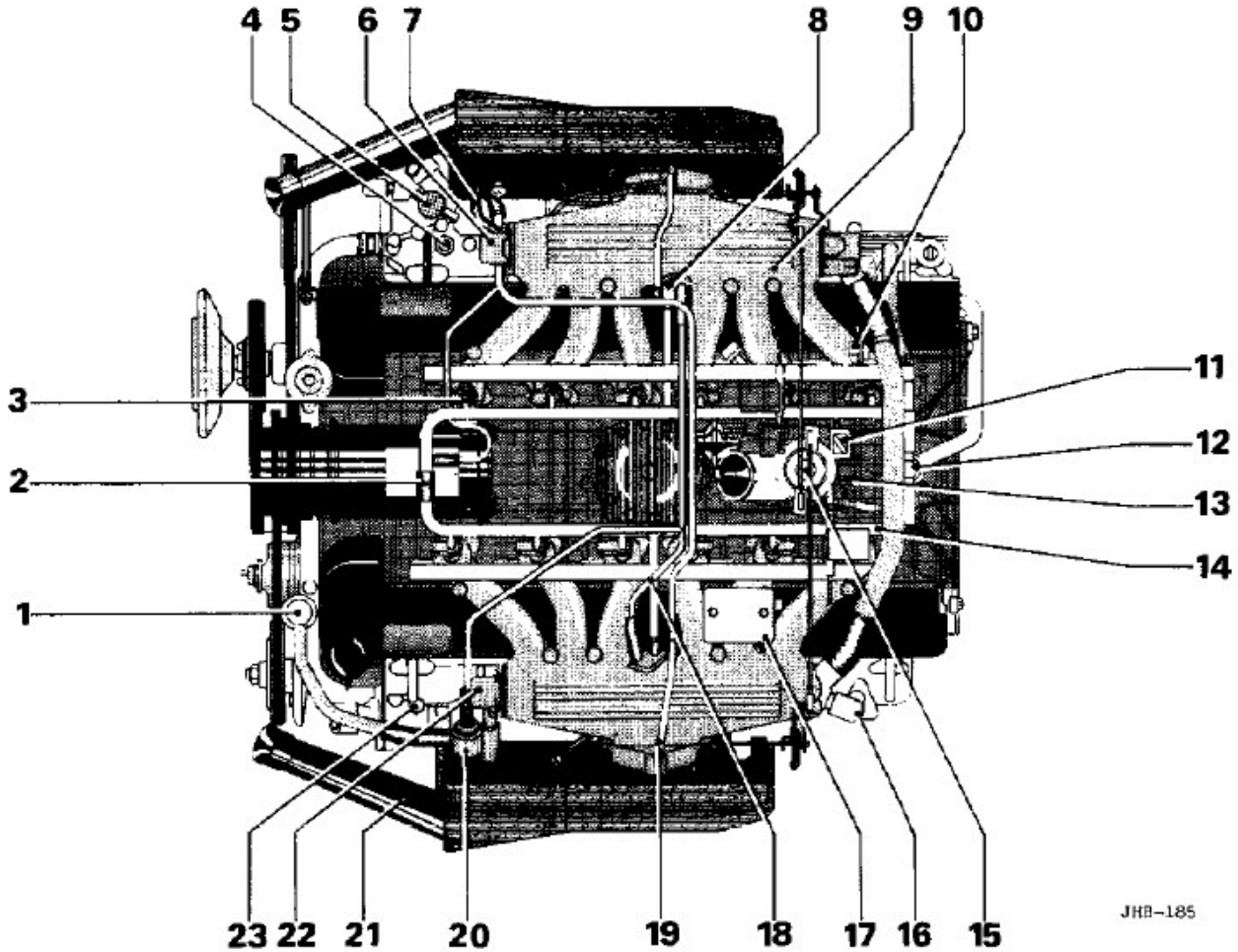


Fig. 4

Key to Fig. 4

1. Crankcase breather
2. Fuel rail
3. Fuel injector
4. Thermo-time switch
5. Over-run valve
6. Vacuum dump valve
7. Supplementary air valve
8. Cold start injectors
9. Solenoid vacuum valve
10. Vacuum switch
11. Throttle position switch
12. Check valve (NAS cars only)
13. Fuel pressure regulator
14. Air injection distributor rail (NAS cars only)
15. Throttle potentiometer (below throttle pulley)
16. Extra air valve
17. Ignition system amplifier
18. Crankcase vent
19. Canister purge (NAS cars only)
20. PCV valve
21. Air temperature sensor
22. Over-run valve
23. Coolant temperature sensor

#4 Removing spark plugs: Plugs are numbered 1A, 1B at front of engine etc.
On a V12 the A bank is on the right looking through the windscreen, B bank on left.
The front ones are hard to get at and many owners find it best to move the cruise control and aircon compressor out of the way first. Some of the others are hard to get at too. Small hands, lots of swivel joints, crow foot wrenches, rubber hose to fit plug insulator, and tons of patience are useful.
The original Jaguar tool kit from an XJS might have a swivel plug socket.
Many good ideas in the BOOK from page 117 onwards.
To replace the spark plug leads on a Lucas engine note the 1A lead is marked on the dizzy cap with a "1" which is not too easy to see. Make sure you get it right. The firing order follows:

1A 6B 5A 2B 3A 4B 6A 1B 2A 5B 4A 3B and it goes anti-clockwise on the dizzy.

The Marelli ignition system is covered in the BOOK from page 158 onwards.
That has the same firing order, all the A plugs from the centre terminal of the dizzy cap and all the B plugs from the offset terminal.
On the Marelli dizzy cap the spark plug leads are moulded into the cap, see below.

(#5) The TPS is below the throttle capstan. It has 3 wires to the ECU. The ECU supplies +5V and 0V to the TPS which is a resistor. The third wire is a wiper that moves along the resistor as the throttle capstan rotates, giving about +0.4V at closed throttle to about +5V at max throttle.
It tells the ECU at +0.4V the throttle is closed, at +5V the throttle is at max. At any throttle setting, a sudden opening of the throttle makes the wiper move rapidly and tells the ECU to give extra fuel.
The engine works with the TPS disconnected, but not 100% correctly.