Minor Mechanics

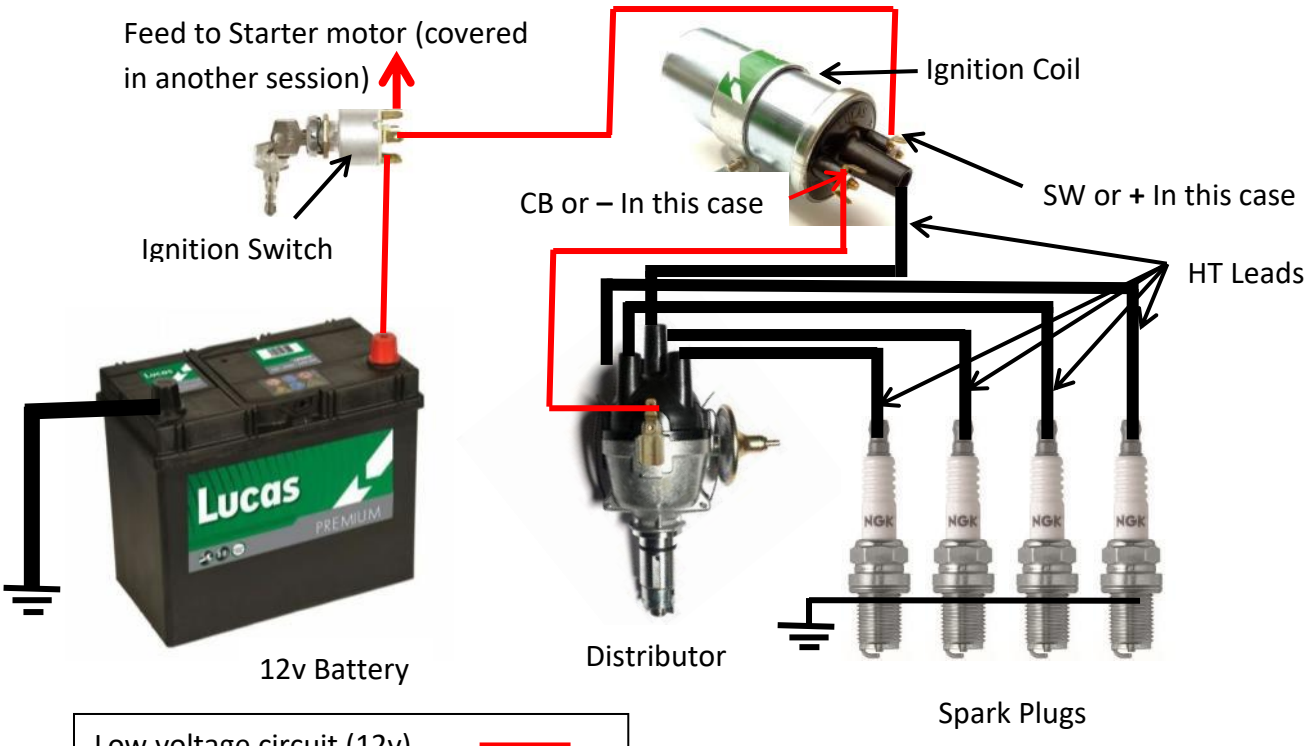
Technical Tip 2
Servicing the Distributor

For those with electronic ignition systems please start by reading the note at the end of this technical tip

Why is it important that the distributor is serviced regularly?

A Morris Minor travelling at 50 mph has an engine speed of between approximately 3,050 – 3,300rpm so for simplicity let's call it 3,000 rpm. At this speed your engine requires 6,000 sparks per minute. Driving for an hour at that speed equals 360,000 sparks that need to be handled by the contact point, condenser, rotor distributor cap, coil, main high tension lead (HT) with the plug HT leads and Spark Plugs handling 9,000 sparks. The ignition system and, in particular the distributor unit is the most used, abused and least understood part of the cars electrics. This is also why the service schedule instructs that we check the distributor, lubricate, and replace parts as required.

What makes up the ignition system? (Negative Earth)



What the ignition system does

It uses the 12 volt (v) battery supply and boosts it to between 20,000v - 30,000v to supply a spark to the spark plugs at the correct time to start combustion.

Tools and Equipment

Get the best you can.

- Ask people. There are lots of tools sitting around not being used. Some people have spares but only ever use one.
- Friends, relatives, auto jumbles, car boot sales etc.
- Make the simple tools yourself.
- Check for suitability, wear and damage.

If you must part with money buy the best you can afford.

For this task you will need

To remove the distributor you will need a spanner to loosen the clamp and another to remove the vacuum unit union if needed. A combination spanner is very versatile but whatever you have will do if it does the job.

To service the distributor you will need (see Fig 1):

- Pair of gloves to help keep your hands clean and offer some protection to your skin.
- Flat bladed screw driver with a blade tip close to ¼" (6mm) it needs to fit the points screw well to reduce the risk of slip out and reduce chewing up the screw slot.
- No 1 cross head screwdriver Philips or posidrive.
- Feeler gauge with a .015" feeler.

Fig1

- Small spanner for the contact breaker points terminal and (another for the distributor low tension wire if needed) terminal or pair of pliers.
- Oil can with engine oil
- Piece of card or thick paper
- Small amount of grease

Data

Contact breaker gap	.014 - .016 in (.36 - .40mm)
Dwell angle	60° ± 3°
Firing order (of spark plugs)	1 3 4 2 this can be seen on the exhaust manifold on many cars

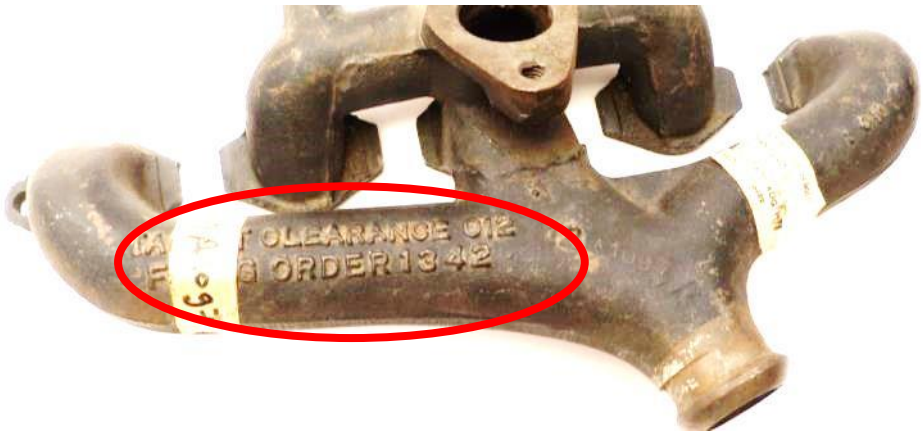


Fig 2

Distributor direction of rotation	Anti-clockwise (viewed from above).

Static timing 1098cc engine (always check details for your engine) but typically 3° Before Top Dead Centre (BTDC).

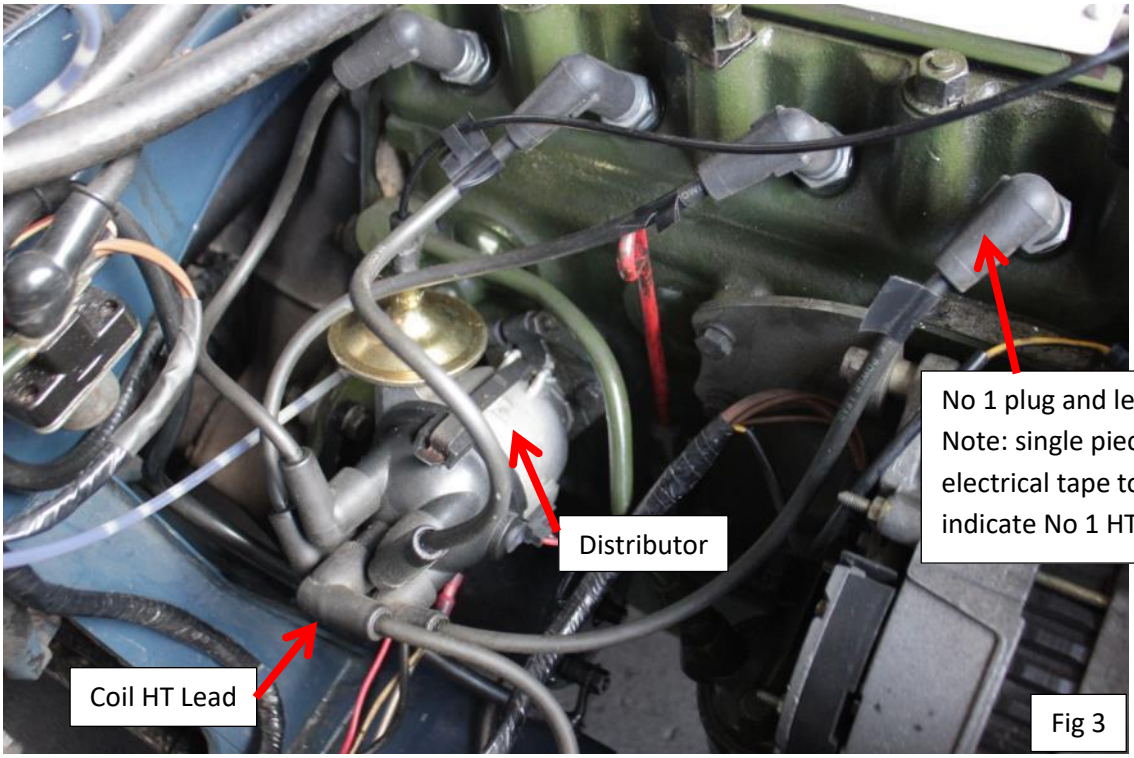
Stroboscopic timing 1098cc engine (always check details for your engine) but typically 6° BTDC at 600rpm with the vacuum unit pipe disconnected.

Removing the Distributor

The reasons we recommend removing the distributor are:

- It's easier to clean, check and work on.
- It's quick and easy to remove.
- If you drop a screw etc. it's easier to find and retrieve it.
- More effective way to lubricate the internals of the distributor.
- Easier to fit the replacement parts and adjust the point gap.

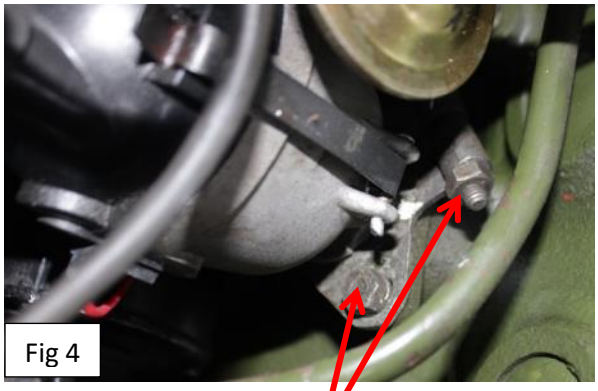
1. Open the bonnet and working from the offside (driver side) of the engine compartment, locate and mark the plugs High tension (HT) leads with No 1 being the plug lead nearest the radiator (see Fig 3)



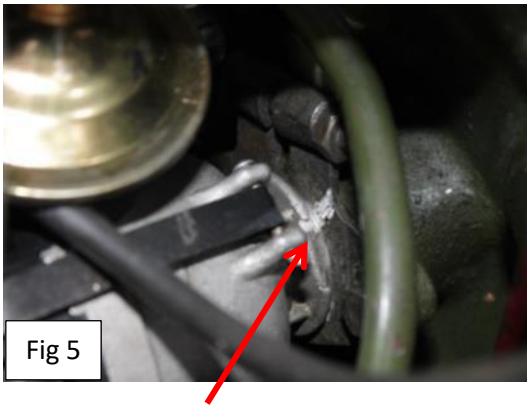
You can mark the leads in any way you like, The method I have used in this case was to put a piece of electrical tape around the leads on No's 1 2 and 3 (you don't need to mark No 4 because it's the only one not marked) on No 1 lead I have left the tape intact. On No 2 I have a single cut making 2 tags. On No 3 I have made 2 cuts l making 3 tags (see below). If the leads are not marked I tie a knot into No 1 lead or pull it out of the distributor cap (this works because if you know which is No 1's location, the firing order is 1342 and the distributor rotation is anti-clock wise you can work it out).



2. Remove the plug HT leads from the spark plugs and coil HT lead from the Coil or Distributor cap and tuck them out of the way so you can access the distributor clamp bolt, nut and paint a line on the distributor and clamp to mark its location (Fig 4 and 5).

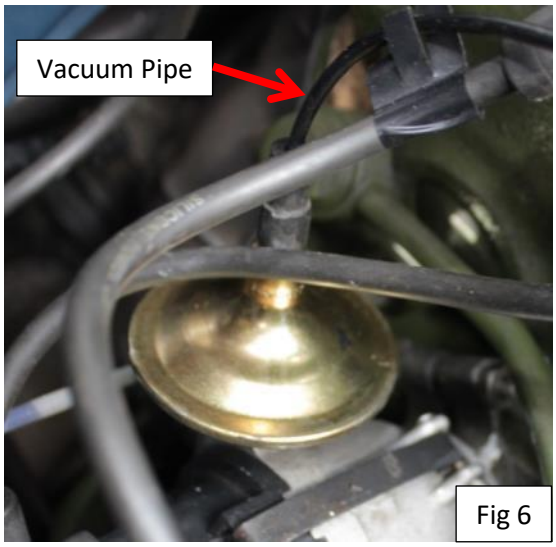


Clamp bolt and clamp nut

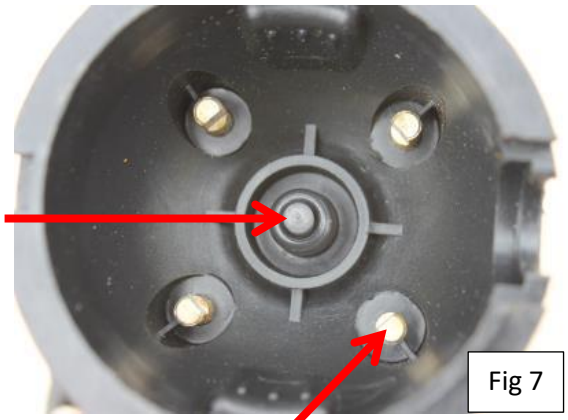


Paint a mark on the distributor and clamp for realignment

3. Remove the vacuum pipe from the vacuum unit. (Fig 6)
4. Remove the low tension wire (black and white wire) from the side of the distributor. (It may be pull off connector or have a nut)
5. Loosen the clamp bolt one full turn and the clamp nut until the distributor can be pulled out
6. Place the distributor in a vice, holder or hold onto it somehow. **Note:** take care not to damage the "O" ring on the shaft.



7. Flick off the clips that hold the distributor cap in place and remove the cap. Remove the rotor arm by pulling it off.
8. Clean the cap, rotor arm and HT Leads with a soft cloth.
9. Examine them for faults
    a. Fine black lines showing signs of electrical tracking inside and outside of the distributor cap and rotor arm
    b. Push the carbon electrode in the inside centre of the cap to check for free movement and wear between the electrode and the hole.

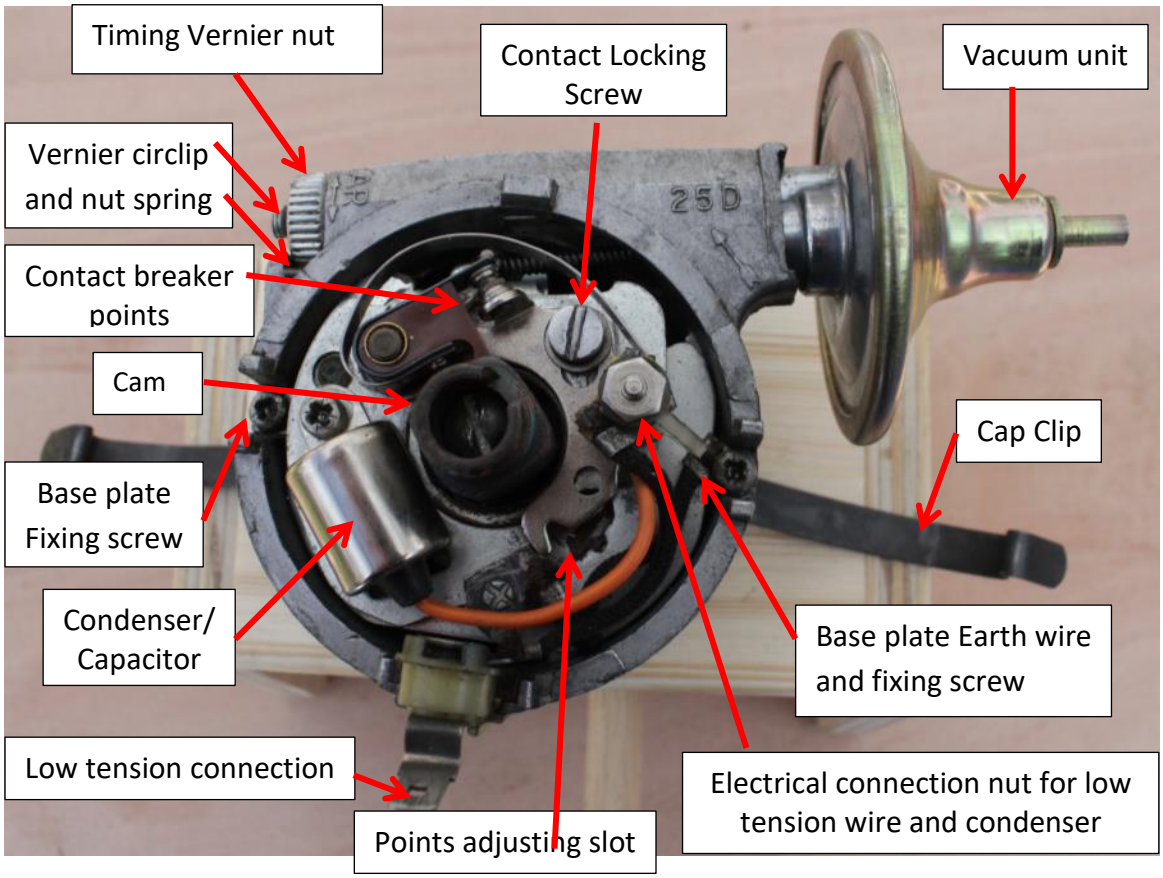


    c. Corrosion and marking of the 4 contacts inside the cap.
    d. Heat damage, cracking and brittle HT leads and Plug Caps

Replace parts as required.

Fig 8

Parts of a distributor (Fig 9)



10. Use a small spanner or pliers to unscrew the points wiring nut, pull off the plastic top hat washer (Fig 13), cloth covered low tension wire and condenser wire. Remove the plastic low tension connection block in the side of the distributor noting how it fits into its slot (Fig 10).
11. Using a small cross head screw driver remove the condenser by removing the screw and spring washer (Fig 12)

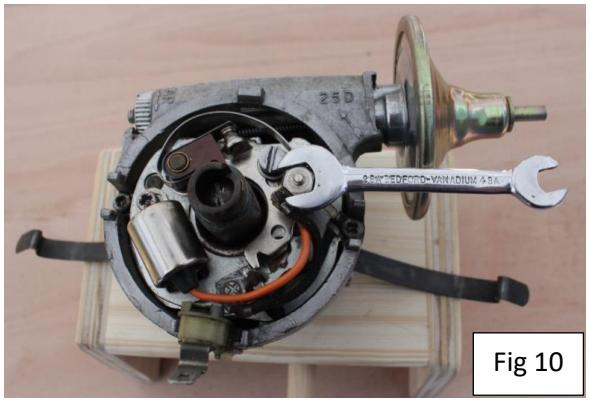


Fig 10

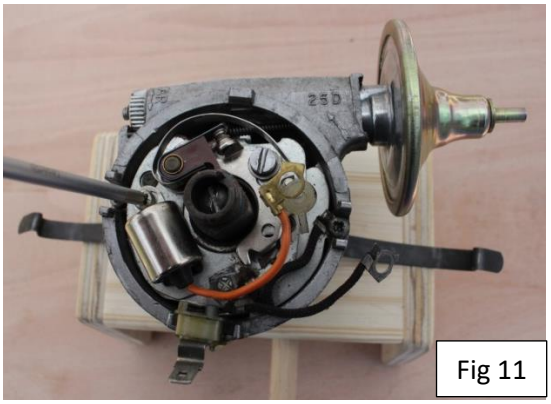


Fig 11


Fig 12

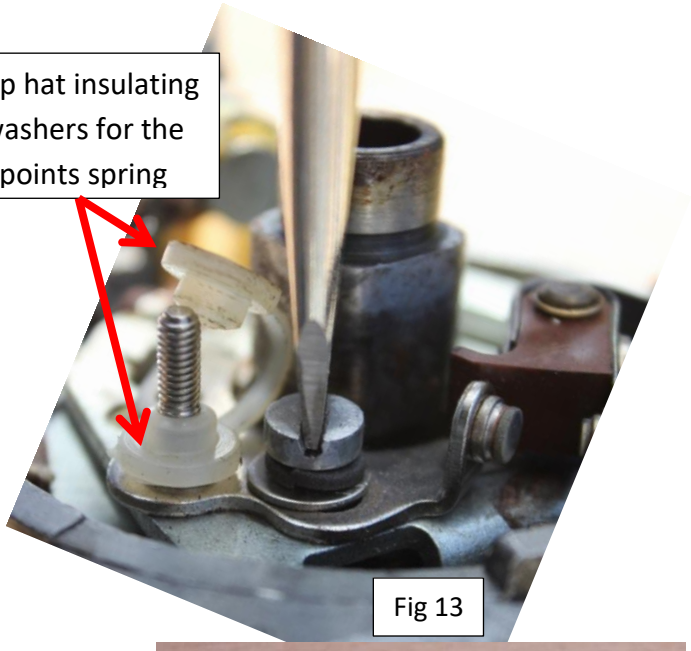


Fig 13

12. Using the flat blade screw driver remove the points screw, spring and flat washer **Note:** the snug fit of the screw driver blade in the screw (Fig13).
13. You can now remove the quick fit points. (Fig 14).
14. Remove the two cross head screw from the base plate Note: the position of the cloth covered earth wire (Fig 15)


Fig 14

15. Using a small screw driver lift off the spring vacuum unit connection from the base plate pin (Fig 16)

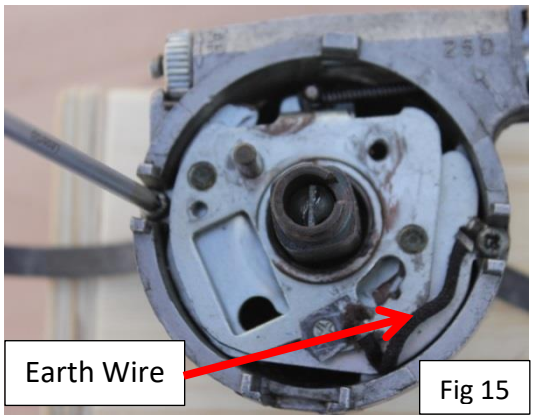


Fig 15

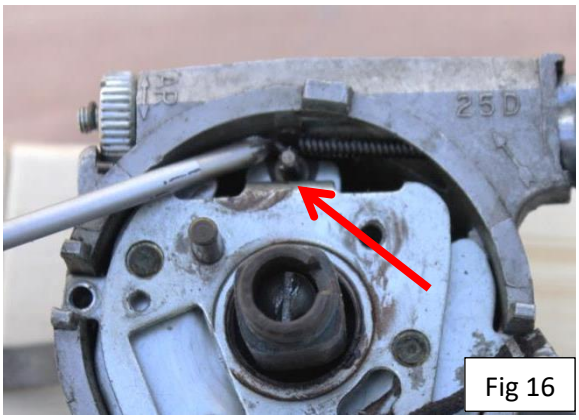


Fig 16

16. Hold one part of the base plate and rotate the other part so the pin rotates in the curved keyhole slot so that the pin is in the round hole, lift the two plates apart. (Fig 17 -18)
17. Clean off the base plate parts and distributor inside and out.
18. Apply a smear of grease onto the base plate parts as indicated, coating the plastic stubs, inside the centre hole, keyhole slot and spring contact face (Fig 18 – 19).
19. Reassemble base plates (Fig 17)

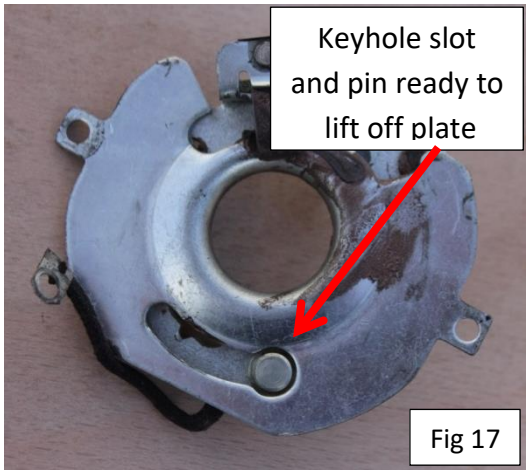


Fig 17

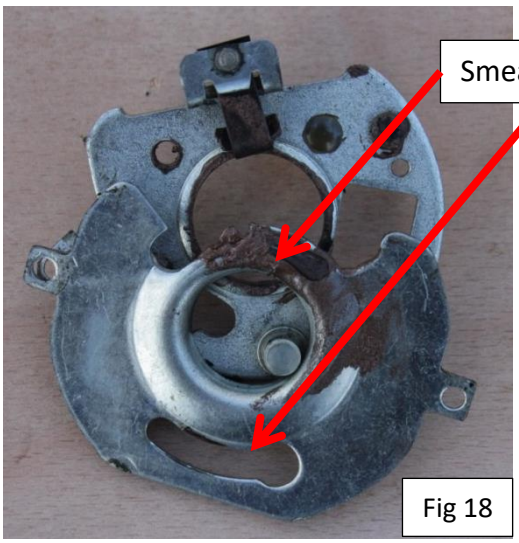


Fig 18

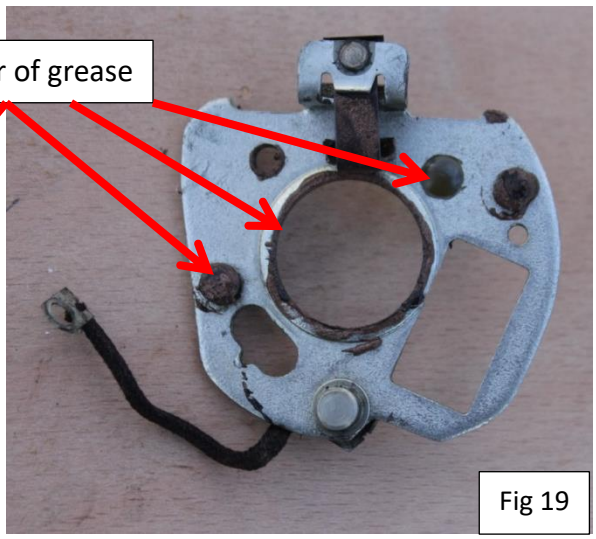


Fig 19

20. Oil the pivots and balance weights inside the distributor and one drop of oil onto the screw in the centre of the cam. Apply a thin smear of grease on the cam contact faces (Fig 20 -21).

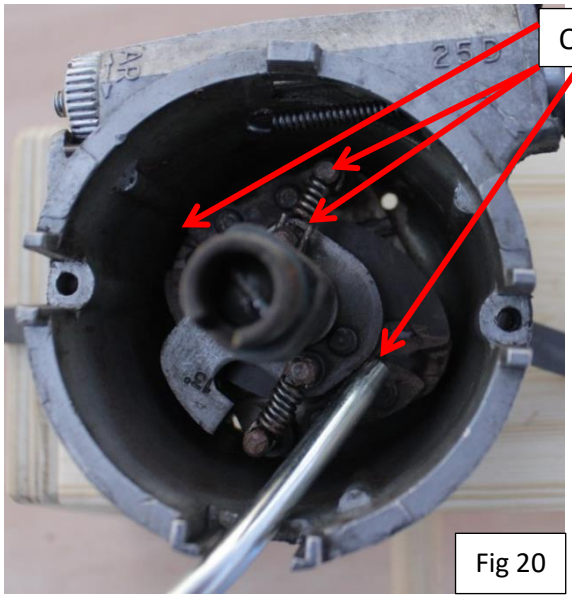


Fig 20

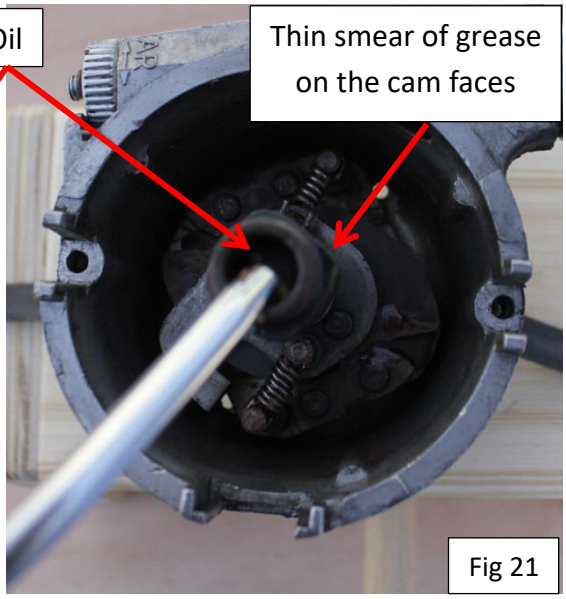


Fig 21

21. Put a piece of hose (screen washer hose) onto the pipe fitting of the vacuum unit and suck the hose while watching the vacuum spring which should pull back into the unit and then return when you stop sucking (Fig 6). **Note:** Be careful if you are planning to suck directly on the vacuum unit as you might get a mouth full of petrol.

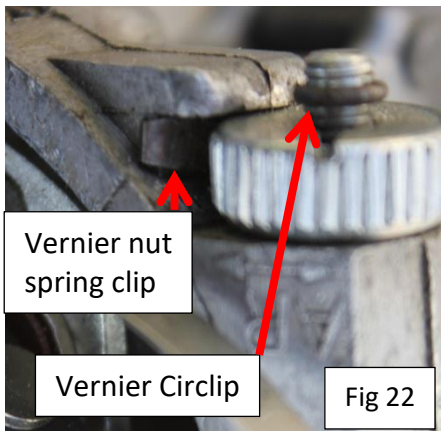


Fig 22

22. To replace the vacuum unit if it's faulty, pry off the circlip of the threaded end of the Vernier nut and unscrew the nut (making sure not to lose the spring clip that pushes onto the nut), pull the vacuum unit out and insert a good replacement. Refit Vernier nut and push the threaded end of the vacuum unit into it, tightening the nut to a allow the circlip to be refitted and approx. ¼ " of the thread protruding (Fig 9 -22).
23. Place the base plate back into the distributor and hook the vacuum spring onto the base plate pin, locate the two base plate screws **not forgetting to fit the earth lead** on the correct screw (Fig 15) and tighten the screws.
24. Fit the condenser (as Fig 9) using the screw and spring washer (condensers have always been subject to failure so fit a new one unless you know it's not very old (fitted in the last 3,000 miles).

25. Check the condition of the Contact breaker points. If they are blue or badly burnt this usually means the condenser has failed (gone open circuit allowing arcing at the points). If the points are grey in colour and you have a small pit on one contact and a small lump on the other contact you could clean them to allow the gap to be set accurately, using an oil stone, fine file or wet and dry paper. It's important to remove the lump and ideal if you can remove the pit but the finished job should have a polished set of points that fit perfectly flat together. If you have nothing better to do go for it.
26. Place a piece of card or strong paper between the contact point faces and move it up and down to wipe away any oil or grease from the contact faces (Fig 23)

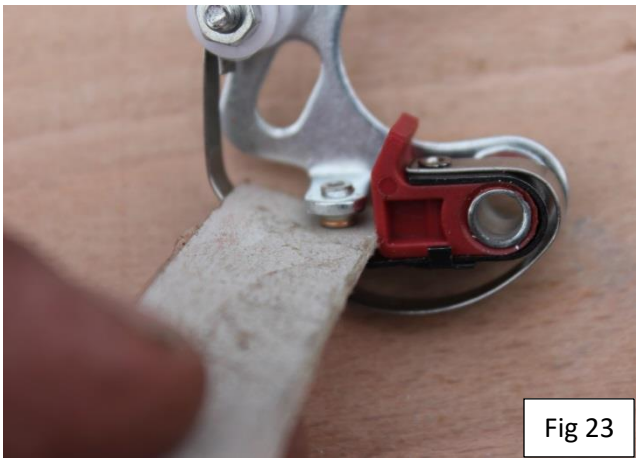


Fig 23

27. Place the quick fit points over the pivot pin, place the spring washer onto the screw first followed by the flat washer then refit the screw assembly through the point slot into the base plate and at this point tighten the screw lightly (fig 11-13).
28. With the terminal nut and the upper top hat washer removed from the points first fit the condenser wire followed by the cloth covered low tension wire, top hat washer and tighten the nut to hold them (as shown in Fig 9).
29. Rotate the distributor shaft so that the heels of the points are on the high part of the cam (to open the open point position).
30. Using Fig 23 as a guide. Insert your flat blade screwdriver into the adjusting slots between distributor base plate and points base plate. Open the points to give a gap to what you think is about .015" by turning the screw driver clockwise will close the gap anti clockwise will open the gap**. Note:** Remember you should only have lightly tightened the point locking screw. If you can't open the gap slightly loosen it. If the gap keeps closing slightly tighten it.
31. Take a .015" feeler and wipe it to remove any oil or grease. Place the feeler into the point gap and holding the feeler between one finger and thumb, slowly pulling it through the points you should feel only slight resistance and putting the feeler in and out of the point should not open or close the points noticeably. Use the screw driver to open and close the gap as required. Tighten the locking screw when you are happy with the gap setting and recheck the gap and readjust if required. **Note: this is best demonstrated when we can do a practical session.**

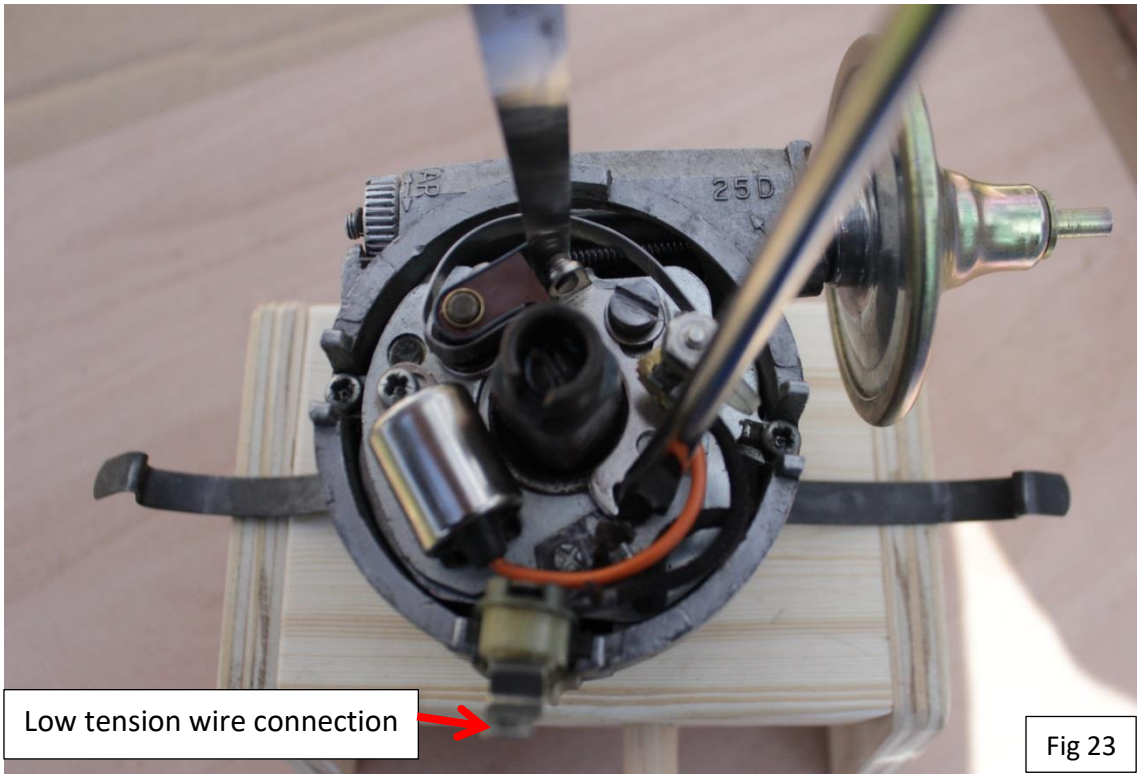


Fig 23

32. Refit the rotor arm by pushing down and rotating lightly until it locks into place and pushes fully down onto the cam shaft of the distributor. (Don't forget to fit the rotor arm as it's a common mistake causing the engine not to start after doing this job)
33. Looking at the bottom of the distributor you will see that the drive dog is off set (see fig 24)

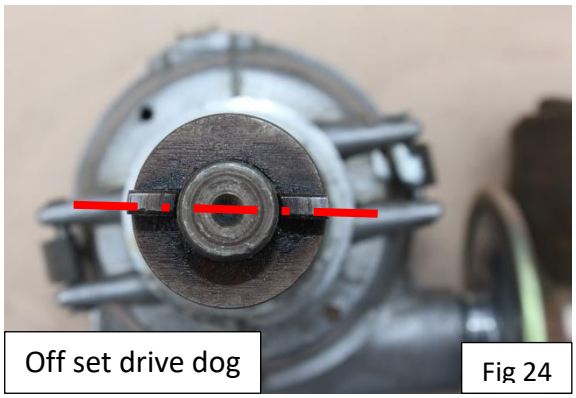


Fig 24

34. Take the distributor to the engine and refit it into the side of the engine using the paint mark to roughly align it. The drive shaft dog on the distributor will only locate in one position so you will need to push in lightly on the distributor and rotate the rotor arm **until the distributor fully enters into the clamp plate.** Turn the distributor to line up the paint marks and hold it in position while at the same time pushing the distributor, into the clamp plate, lightly tighten the clamp nut.
35. Connect the low tension wire onto the connection on the side of the distributor (Fig 23)
36. If you are planning to carry out static timing leave the distributor cap off as it makes it easier to time the engine. **Note:** to be covered in an ignition timing session
37. If you are planning to carry out stroboscopic Timing (**Note:** again covered in an ignition timing session) you will need to fit the distributor cap and plug leads onto the correct plug.

38. Whenever you adjust the point gap etc. it's important to check the ignition timing (to be covered in the session mentioned above).
39. When you are happy with the ignition timing, tighten up the clamp nut and then the clamp bolt.
40. If your paint markings and refitting were accurate the engine should start to allow you to carry out stroboscopic timing.
41. Clear away all tools, remove timing light and check that everything is in place and you haven't disturbed something while working on the engine and it's safe to drive the car.
42. Close the bonnet. Job Done

This job is a bit involved but with practice it becomes easier and is a very good skill to have.

It will certainly make your car more reliable.

Electronic Ignition?

Note: For those of you that have an electronic ignition kit (electronic switching) unit fitted you will still need to carry out everything except the section relating to the points and condenser but you will need to use heat sink paste under the base plate unit if you clean it off (see the fitting instructions that came with the unit).

Happy Motoring