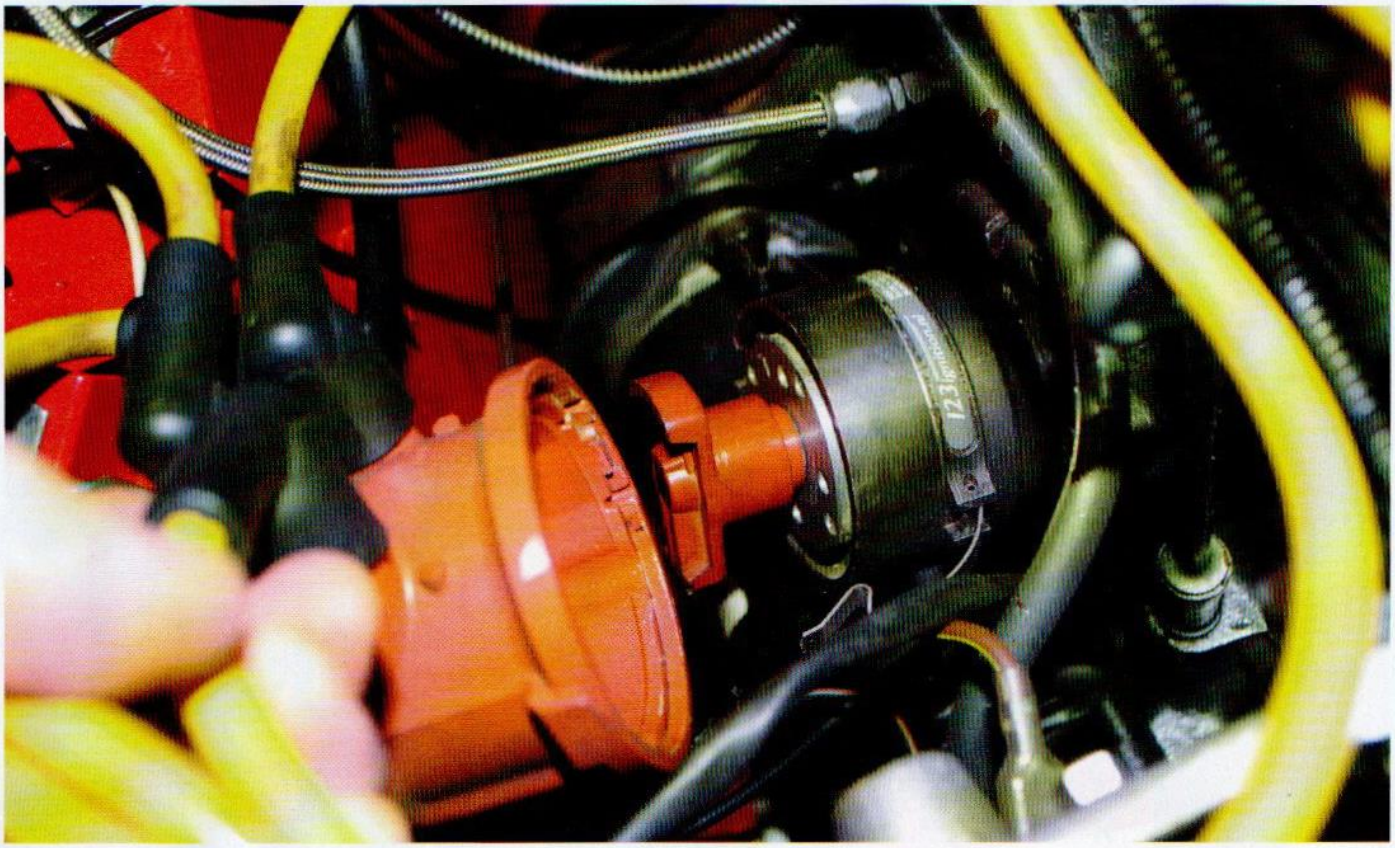
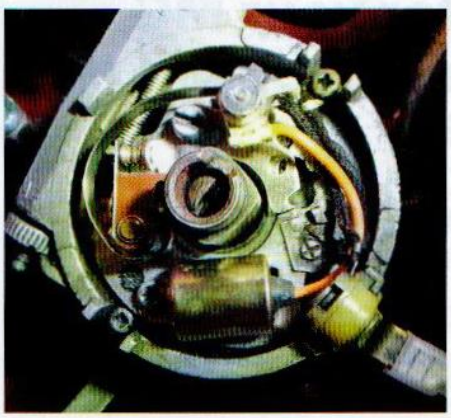


Electronic ignition

How much benefit will you get from a conversion to electronic ignition, and how much should you pay? **Roger Parker** explains the options.

I am often asked what the best electronic ignition would be for a classic MG. For such a simple question there is no simple answer. Essentially what you need is a strong enough spark at the right time to burn the mixture inside the cylinder as well as it can to deliver the best efficiency from the mixture of petrol and oxygen. That efficiency means that the engine delivers its best torque from a wider open throttle when you want to accelerate, and also the best economy when you are cruising on a lighter throttle.



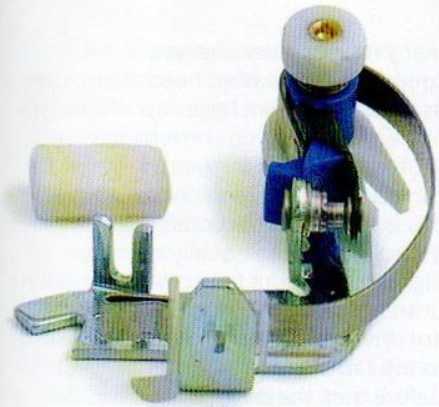
This is a typical Lucas 25D4 points distributor, with the arrow indicating the direction of rotation.

For decades cars relied on the simple and effective distributor that was driven off the camshaft to provide the timing, and used points to switch the coil on and off to generate that spark. The critical timing of this spark was controlled by the mechanical and vacuum advance aspects of the distributor. This system remains as efficient as it always has been, so long as there is no mechanical wear inside the distributor and the points do not become burnt or the heel worn.

Unfortunately all mechanical systems will, over time and use, suffer wear and this becomes a significant consideration when thinking about replacing the points and condenser in the distributor with an electronic switch. That's because fitting any form of electronic ignition which retains the original distributor is potentially flawed from the start if wear is present, so for any system that retains the original distributor it is often good policy to also buy a rebuilt distributor to eliminate as much of that inefficiency-inducing wear as possible.

A very late North American market MGB with a Lucas Constant Energy electronic distributor (the good one).

Let me add a few general words on the standard points systems, and start by saying they are as efficient as most of the electronic systems that replace just them and the condenser, at least when they are new and for a period of miles following. However, in normal operation they slowly degrade, so after several



Lucas points distributors in the 1980s gained a wiper mechanism to reduce wear and electrical erosion.

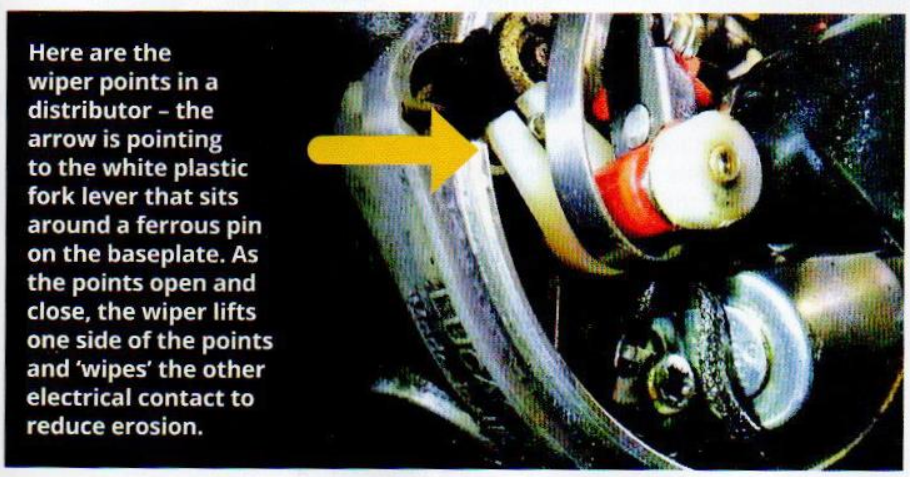
hundred miles they will not be quite as sharp in their switching, not that you should notice in the way the engine responds. However, over 1000 miles a gap recheck and careful surface cleaning of the two contacts can sharpen their switching performance. Another issue that is more common today is that the quality of some points isn't as good as it should be and the points gap can be eroded by the heel of the points actually wearing down. The most noticeable impact of this slow but inexorable decline in the points' efficiency will be in poorer fuel economy.

Electronic ignitions benefit from a stable long-term level of switching efficiency, and this has been an attraction ever since electronic ignition started to creep into standard production car engines in the 1970s. As far as MG was concerned it was only the second half of the 1970s and only for North America (driven by the need to comply with ever tightening emission controls in the later half of the decade). At the same time the aftermarket quickly caught on to this new electronic fad, and a wide range of products appeared, with some talking about inductive discharge and others capacitive discharge systems.

For those interested in the difference between these two, very briefly the inductive systems are most commonly found on road cars as the system generates a reasonably strong HT spark that has a long duration which helps the fuel burn process, and it is ideal for the rev ranges in which our road engines operate. Capacitive systems have a capacitor that stores power that is fed to the coil, and this generates a much higher HT spark voltage, but of a much shorter duration. Generally capacitive systems are better for high revs, really above the range generally used on our classic road cars. Clearly combining the benefits of both systems (a very strong spark over a longer period) would be potentially best, and some readers may recall the MSD capacitive system (multiple spark discharge) that delivered three successive sparks to help overcome the short duration sparks and improve the burn process.

The systems MG used in the late 1970s started with the Lucas OPUS system (distributor code 45DE4). Note that the UK's exposure to OPUS at this period will have been more commonly on the Rover 3500 SD1 model with the 35DE8 distributor. This wasn't a particularly successful system as reliability issues tainted it, leading to my engineering friends within the Lucas proving labs calling it OPELESS as a result! At least it stung Lucas into ensuring the follow-on replacement system, the Constant Energy Ignition system 45DM4, was far more reliable. This was also mirrored in the Rover 3500 with the 35DM8 and 35DLM8 distributors, and in respect to the 35DM8 ones I have two still working well on my V8s after nearly 40 years' service!

Back with the MGB, all other markets soldiered on with points, although that is not a bad thing as points are easily replaced and set, and for many the fact this can be done at the side of the road in an emergency is a clear advantage. Certainly if you look at later Lucas points distributor developments, you see 'wiper points' where a peg was added to the baseplate and a fork added to the points that saw the two contacts of the points slide up and down (wipe) against each other as the points opened and closed to reduce spark erosion.



Here are the wiper points in a distributor – the arrow is pointing to the white plastic fork lever that sits around a ferrous pin on the baseplate. As the points open and close, the wiper lifts one side of the points and 'wipes' the other electrical contact to reduce erosion.

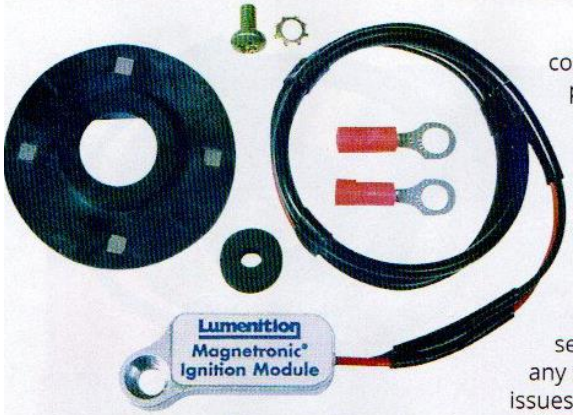
This is the Accuspark Stealth electronic ignition kit to replace points and condenser.

ELECTRONICALLY ENHANCED POINTS SYSTEMS

In the 1970s one of the electronic products that arrived on the aftermarket was a system retaining points, but reducing most of the current load from them with the coil switching being done inside a box of tricks activated by a relay. Many may recall the Sparkrite SX1000 in a blue box, or the more complex SX2000 in a red box with distinctive clips to allow it to be simply clipped over the existing coil. They came with a three-way switch on the end: 1 for electronic operation, 2 switched off for security and 3 for conventional points operation. I specifically mention Sparkrite as today the SX4000, a new version following a similar format, has been introduced.

One of their main claims to fame was that the reduced electrical load through the points would allow those points to last indefinitely. For many at the time that claim wasn't universally accepted, but a few years ago I was asked to look at an MGB that wasn't starting. It had a Sparkrite 1000 fitted about 25 years previously, and I found that the heel of the points had worn down so much after all those years that the points no longer opened, but the actual points' contacts were quite serviceable. One of the attributes of these systems is that points gap is no longer a critical measurement, although clearly the points do still need to open, as that MGB proved.

That slight general suspicion surrounding the extended service life claimed for points was picked up by those selling electronic ignition conversions that replaced the points with an electronic trigger, and they made a big play on this. These electronically switched systems therefore became the more common fit, even though they were more expensive.



Lumenition Magnetronic electronic ignition kit to replace the points and condenser. Note the four ferrous segments to trigger the system embedded in the black plastic wheel.

SIMPLE POINTS AND CONDENSER ELECTRONIC CONVERSIONS

These systems are very simple, with just the points and condenser being removed and replaced usually with a Hall Effect magnetic switch, so providing a no contact/no wear switch with an infinite life. The major players in this field for many years were Lumenition Magnetronic and the American Pertronix, (also sold for an early period in the UK as the Aldon Ignitor). These work by having a small plastic moulding that fits under the rotor arm and over the cam section of the distributor mainshaft. In this there are four embedded ferrous segments for a four-cylinder engine, six for a six-cylinder engine and so on. When the distributor shaft turns, as a ferrous segment passes the Hall effect sensor it generates enough change in the magnetic field to trigger the system and cause the coil to generate a spark.

When first introduced, these were clearly more advanced than triggering by points and condenser, but after several decades that technology is no longer leading edge and component costs have reduced. Despite that, products continued to be sold at similar prices, so it was no surprise to see the market shaken up with similar new products from the likes of Accuspark, Powerspark and others, with similar functionality but a much lower price.

Importantly for owners, I have not seen these cheaper options show any significant difference in reported issues or poor reliability.

However, there remain a significant proportion of owners who still feel a little exposed to not being able to cope with any electronic ignition system if it fails on a Sunday afternoon drive. Here one unexpected benefit of these cheaper kits is that many owners buy a second kit and carry that in the glovebox as a spare to cater for the rare possibility of a module failure, just as they previously carried spare new points and condenser. To illustrate price differences, at the time of writing the Accuspark, Powerspark and similar kits were under £40 for an MGB with negative earth and slightly over £40 for positive earth kits. Lumenition Magnetronic was from around £115, and the US Pertronix systems from around £155. I am not delving any deeper into product details to compare functionality against cost as my simple observation of all systems over quite a few years now shows they all do the job intended.

The next step in the electronic ignition ladder would be the optically triggered systems that do exactly the same job as the magnetic type, but the triggering is said to be sharper – not that you would notice, except perhaps with the car on an engine dyno running at high engine revs where very small changes could be monitored. This comes very much into focus when you look at the average cost of just over £200 for the common Lumenition Optronic system. I certainly had good service with an Optronic system on my 1968 MGB when they first came out and before I converted it to V8, but would I have chosen the same route today? Possibly not.

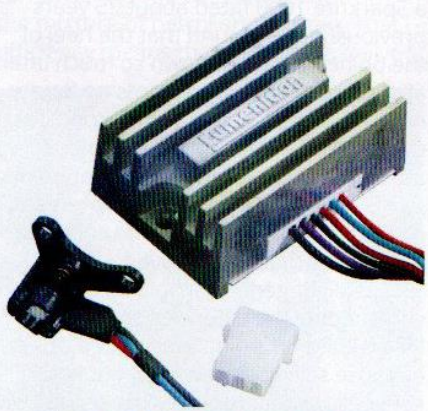
However, as important as correct and accurate switching of the coil is, the actual timing of this switching is still at the mercy of the mechanical condition and advance settings of the distributor, along with the vacuum advance as I previously mentioned. So if you are to get the full benefit of any type of electronic ignition conversion, you need to have the distributor rebuilt or replaced with new. So you may buy a £40 Accuspark, but replacing the distributor will add £70-£100 for many four-cylinder engines, and this combined cost is what needs to be seen as a true minimum base cost of this type of electronic ignition conversion.

Unfortunately a further wear aspect can also affect ignition timing, and this is a more deep-rooted engine aspect and so can equally affect the digital distributors I will cover later. The distributors on classic MG OHV engines are driven by a shaft that connects down to the camshaft through a skew gear. Before that, the drive to the camshaft comes through the timing chain from the crankshaft, and the chain is often subject to wear and stretch that adds a small degree of floating movement, especially the single row (Simplex) timing chains but less on the twin row (Duplex) chains. Overall you can get an idea of how much wear is present by using a timing light to monitor the degree of timing float you see with the timing marks basically just jumping about, an aspect called timing scatter.

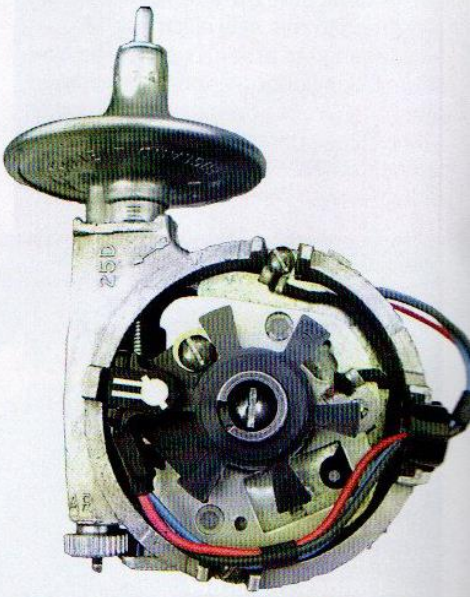
Testing to assess scatter may see the engine not running smooth enough at a normal idle speed, so raise it to a fast idle if that helps. Then the degree of timing scatter can be noted and anything more than plus or minus two degrees from the set position isn't very good. Obviously doing this test with a worn distributor will add to the scatter, but if a new or rebuilt distributor shows continuing scatter, then this suggests probable timing chain slackness.

DIGITAL ELECTRONIC IGNITION CONVERSIONS REPLACING MECHANICAL DISTRIBUTOR TIMING

The next step in the electronic ignition ladder is for the full digital conversions



Lumenition Optronic kit to replace points and condenser showing the optical trigger that fits in the distributor and the control module that fits externally.



And this is the Lumenition Optronic fitted into a Lucas 25D6 distributor for the six-cylinder MGC.

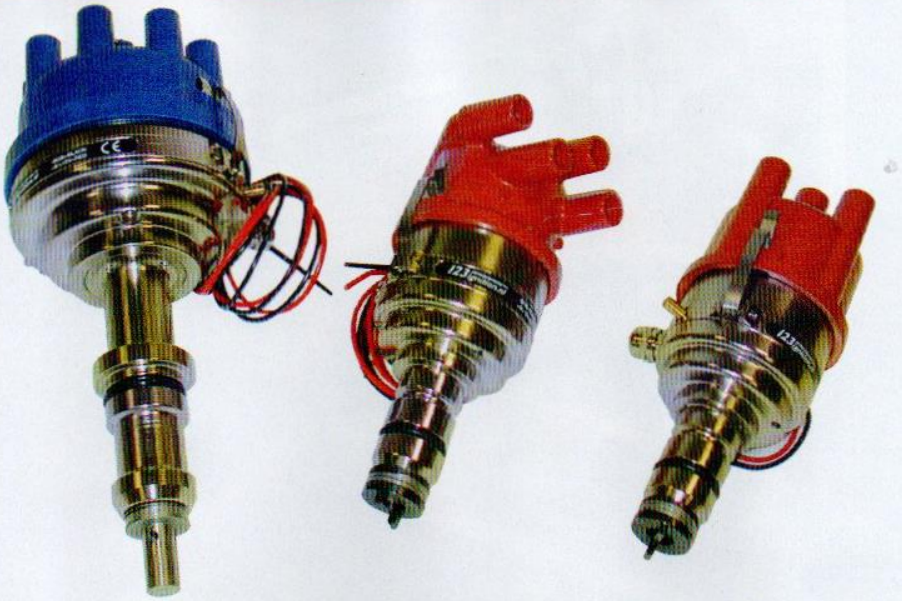
contained in a distributor body, and here the common candidates are the 123 and CSI fully digital distributors. These have all the timing functions mapped and come with the option of 16 different on-board maps for different engine specs, plus options with some to add custom maps via a USB port on the distributor body using a laptop.

The benefits I found from fitting this type of digital distributor compared with a new distributor with a Hall Effect electronic switch conversion are subtle rather than significant. The idle and lower rpm operation was noticeably smoother, but there was less difference from the other systems above 3000rpm. The lower rpm smoothness did also show a slightly improved response, but again this was small, so whether these improvements justify the extra cost is going to be a personal decision – some people will always want the best, irrespective of cost.

However, all engines are individuals and that is why there are often measurable differences in performance between standard production engines all operating with the same fuelling and ignition settings. Going digital replaces the rigidly-set mechanically controlled timing settings and allows for virtually any setting, and so the opportunity now arises with the mappable versions of these systems to create the best ignition settings for that specific engine using a rolling road. That sort of work is usually confined to race cars where the benefit of an extra couple of bhp and a few more lbs/ft of torque can make a difference on track, but for a road car the smaller benefits mean the owner would have to be quite focussed to see this as value for money.

Costs of these distributor-based systems are still within reach of most owners, varying either side of £300 depending on detail spec. On the face of things many would expect this to be the end of considerations with the ignition system, but it isn't. Firstly, remember that these distributors are still being mechanically driven via a camshaft and timing chain to the crank, so the previously mentioned advice to check timing scatter and address any significant wear before spending a lot more money on any kind of improved system is perhaps even more pertinent when you are fitting a system with much more accuracy than a base electronic ignition conversion.

Note though that there is always a potential for some scatter, even with new chains and sprockets plus good condition skew gears that allow only the bare minimum of mechanical slop. That is why we see the next level of digital ignition conversions adopt a toothed wheel, usually fitted to the crank pulley, and a fixed sensor on a new bracket on the engine to read the crank position. This completely eliminates any timing error, but usually this level of modification is associated with a separate ECU in the format of a modern engine management system, along with additional sensors to measure manifold vacuum, throttle position and coolant temperature to provide for full three dimensional monitoring of the engine and more accurate timing as a result. Cost of course takes another step upwards, this time to £650 and beyond. At this point, with many of the sensors used being common to the needs of fuel injection, then the possibilities of adding fuel injection may be attractive, but expect the costs to triple. That, though, is outside the scope of this feature!



The 123 fully digital distributor conversions: V8 to the left, and two four-cylinder applications right showing two different types of distributor cap.

Lumenition coils and their required ballast resistor (except on rubber bumper cars that have a ballasted ignition as standard) are recommended for use with Lumenition electronic ignitions. Most systems can use the original standard MG coils, though.

IN CONCLUSION

After all this, my very basic conclusion is that for almost all road cars, retaining the standard or near standard spec still works very well, but changing from points and condenser to one of the cheaper electronic ignition conversions offers a consistency that removes the need for frequent points checking whilst maintaining maximum efficiency. Fitting one of these will satisfy most owners' needs in the road environment, and going to the more expensive options offers only small further gains at a much higher cost. However, it is important to add in all the costs involved with any conversion, and that includes the cost of a new distributor if yours is worn, whereas more expensive options may have a new digital distributor included. At the end of the day, be realistic about the gains you hope to achieve and the money you have to spend, because ultimately engine tuning always ends up as something of a compromise.

Red rotor arms were introduced to overcome weaknesses in some original black rotors and are a good cheap addition for most distributors.