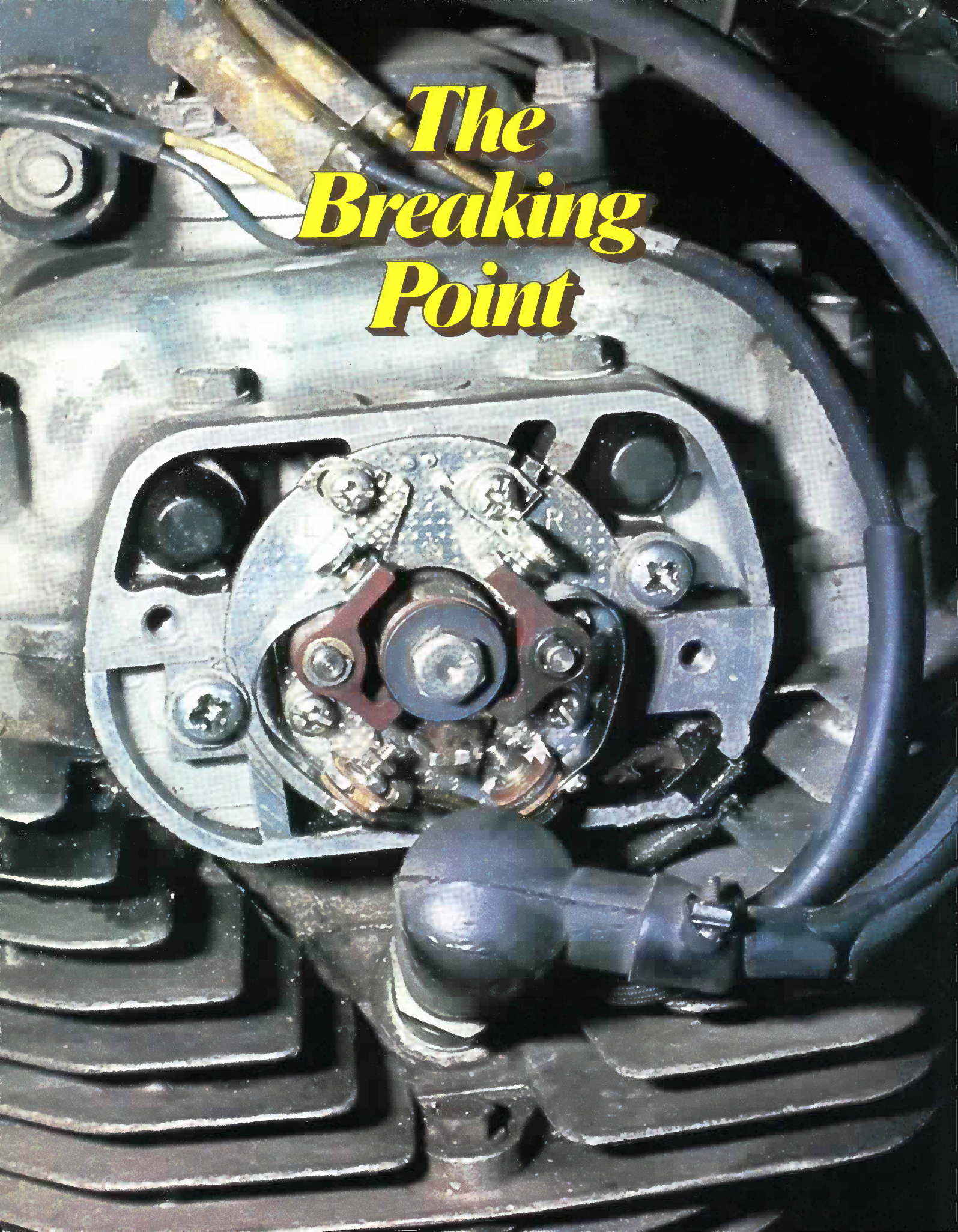

The
Breaking
Point

To ensure efficient running of any engine, it is essential that the spark at the plug, which ignites the fuel/air mixture, occurs at precisely the correct moment, lasts for the right length of time, and has a form compatible with the engine characteristics. Although electronically triggered systems – using photocells or magnetic detectors to initiate the spark – are available, their use is still rare and the simple mechanical contact breaker is the most common means of spark triggering.

Although the system is relatively simple, it demands a great deal of accuracy; a four-cylinder four stroke engine running at 8000rpm requires the contact breaker to open and close 16,000 times in a minute – or over 260 times per second – and this places a great strain on the component. Simple routine maintenance and adjustment of this small but vital part, and its timely replacement when necessary, will keep performance and fuel economy at a peak.

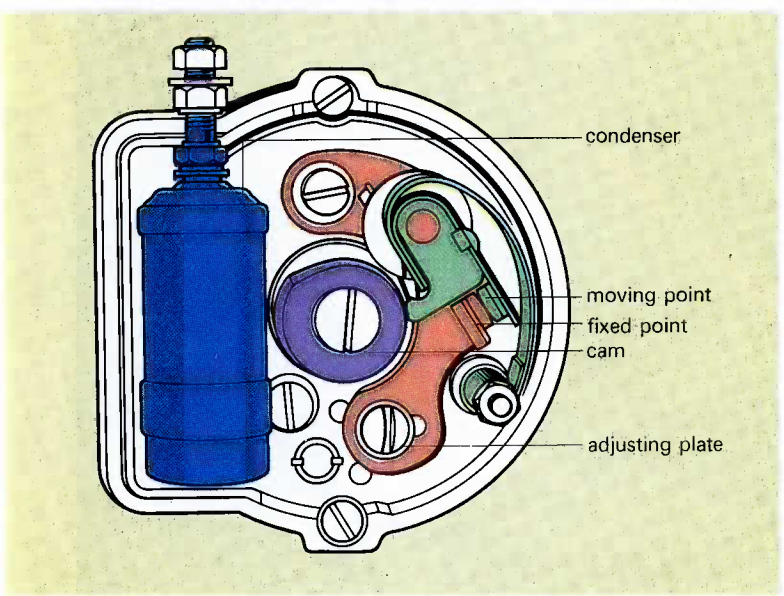
The contact breaker – or points – consists of two adjacent contacts, electrically insulated from each other but joined by a spring. One contact is fixed and the other is pivoted, so that relative movement between the two causes them to act as a switch. The pivoted contact has a heel attached and the heel is kept, by spring pressure, in contact with an engine-driven cam. The fixed contact is connected to earth and the moveable one through the primary winding of the coil to the battery, or other current supply. For a magneto ignition system, the moveable contact is connected to the primary winding of the magneto. As the engine turns, the cam causes the two contacts to move apart, causing a voltage surge as the switching occurs. The surge is damped to some extent by the condenser which is connected between the contacts. The surge travels through the primary circuit and induces a large secondary voltage which is distributed at the correct time to the appropriate spark plug.

So long as the parts are in good condition and the engine revs are not excessive, the system is highly efficient. Unfortunately, deterioration can be rapid. There are three main factors which cause this deterioration, wear of the heel which bears on the cam, loss of tension of the spring and erosion of the actual contacts. The first of these causes the spark to be generated progressively later as the cam takes up the larger gap caused by the wear, the second can allow the points to bounce at high speeds, which completely negates any timing, and the third reduces the intensity and duration of the spark. Heel wear is of course inevitable, although modern fibre or nylon heels have quite a long life expectancy. Wear is minimised by occasional lubrication, which should be sparing so as not to cover the electrical contacts. Loss of spring tension cannot be avoided and should be borne in mind when deciding when to change the points – a high speed random misfire is a fair indication of points bounce. The points themselves are usually of tungsten or platinum to withstand the enormous heat generated by the rapid sparking but even so they have a tendency to melt on their surfaces and develop a pip on one contact and a corresponding crater in the other. Up to a point, this damage can be repaired by carefully rubbing the faces of the contacts on a stone to grind them flat, taking care to keep the faces parallel. Once the points begin to be eroded in this way, however, their life is very limited as the loss of metal reduces heat conduction.

Other than these routine checks, the most important part of points maintenance is setting the fully opened gap to the correct value. Having gained access to the points – whether by removing a distributor cap or cover, or by aligning an inspection hole in the flywheel – the procedure is simple.

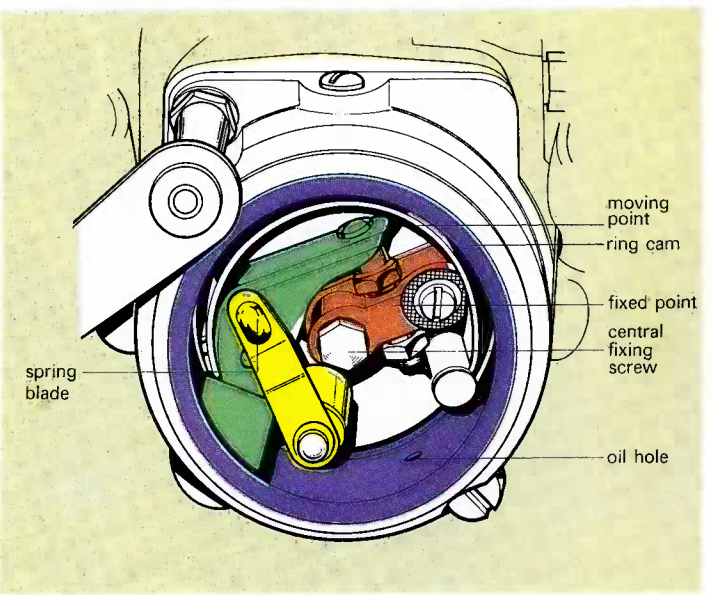
Although some systems have used ring cams, or even face cams and rockers, the most commonly used is the eccentric cam type. Adjustment begins with turning the engine until the points are fully opened by the peak on the cam, the gap can then be measured using a feeler gauge of the thickness specified by the manufacturer for the gap. The screw which secures the base plate – on which the fixed point is mounted – is loosened and the base plate moved to adjust the distance between the points. A slot is usually provided in the base plate in which a screwdriver blade can be inserted and twisted to move the plate. The adjustment is correct when the feeler gauge is just

Left: on twin, or multi-cylinder engines it is common practice to use two contact breakers and an appropriate number of peaks on the actuating cam. This is the system used on the twin-cylinder Honda 125, with two contact breakers and a single peak on the cam. A four-cylinder engine would require a cam with two peaks



Below left: the relative positions of the major components of a cam-actuated contact breaker system. Rotation of the eccentric cam causes the points to open at the right time

Below: a variation of the cam-driven contact breaker is this use of a ring cam which rotates around the points



held by the points. The securing screw is tightened and the operation is complete. For any other type of actuation, the adjustment principle is the same; the gap is measured with the points in their fully open position, using a feeler gauge, and moving the normally fixed contact. Dual points should be adjusted individually and the adjustment of one unit should not affect the setting of the other.

With regular attention, the life of the points will be extended, and both performance and fuel economy will benefit – an excellent return for the expenditure of a few minutes work.

Right: the compact electrical system of the BMW R100RS; the contact breaker assembly is at the bottom of the diagram

Below: a one-piece contact breaker set

Bottom: a contact breaker in situ; the cam is also shown