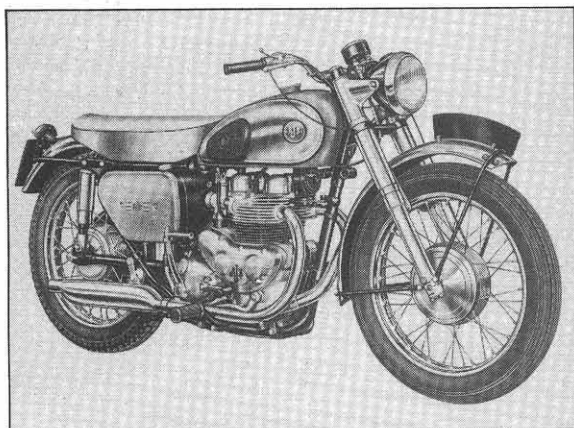


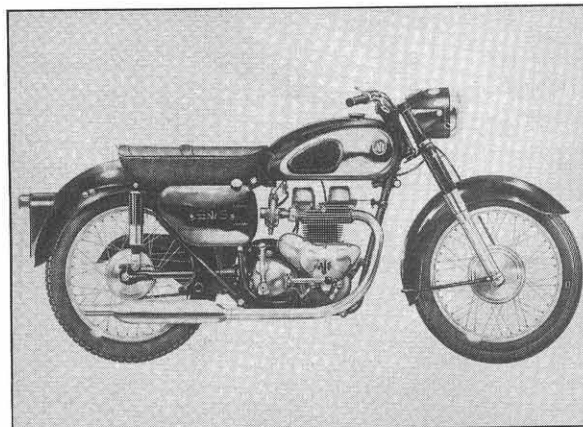
# AJS & MATCHLESS TWIN

## PART ONE

**ERNIE MERRYWEATHER HAS ESTABLISHED A REPUTATION SECOND-TO-NONE AS A DOCTOR OF THE AJS AND MATCHLESS TWINS. HERE HE SHARES SOME OF HIS ACCUMULATED WISDOM.**



*The 600cc 1958 AJS Model 30 CSR.*



*Less flashy 1959 500cc Model 20 Deluxe.*

### INTRODUCTION

The twin range started in 1949 with the 498cc tourer, designated Model 20 for the AJS badge and G9 for the Matchless. In 1956 the 592cc Model 30/G11 was introduced, but this was soon dropped when the 646cc Model 31/G12 took over in 1959. CS and CSR variants were introduced to capture the more sporting rider; the compression ratio was higher and the carburation slightly different, but the main appeal of these models probably lay in their cosmetic treatment.

### IGNITION

Up until 1959, all AJS and Matchless twins used the Lucas K2F magneto. Beyond the normal lubrication of the cam ring

with light grease every 3,000 miles and adjustment of the points to a gap of .012in-.015in, there is little maintenance which can be done by the average owner. After 6,000 miles, the contact breakers can be cleaned and levelled (or replaced if too pitted or worn), the HT pickups wiped and polished (the brush must be a sliding fit in its holder), and the slip ring and its flanges cleaned by holding a soft cloth onto the ring with a piece of wood while the engine is turned slowly.

In 1959 the standard model L was fitted with an alternator, and Lucas coil ignition. A single coil provided the spark, which was distributed by a Lucas 18D2 distributor. The points gap should be checked every 6,000 miles and set to .014in-.016in. At the same time the distributor cover should be checked and cleaned (pay particular attention to the central

carbon brush and the projecting electrodes). The automatic advance/retard mechanism can be lubricated by removing the rotor arm and the contact breaker base plate; light oil must be used. If there is evidence of excess oil inside the distributor, the oil sealing ring at the base of the unit should be checked.

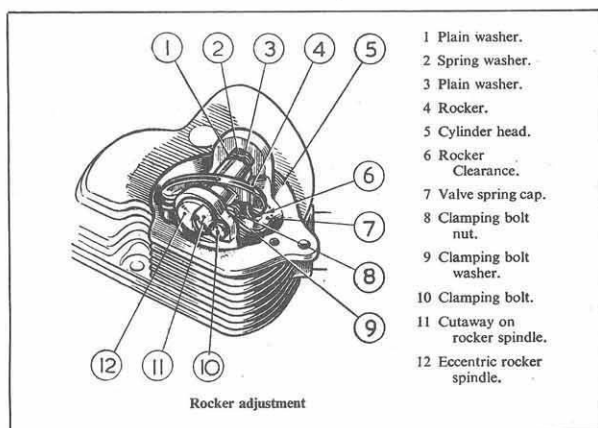
With both magneto and distributor, it is vital that no oil or grease reaches the contact breaker points. The HT leads, and their associated hardware, must also be in good order.

Electronic replacements for magneto and coil ignition systems are readily available and many owners who have done such a conversion reckon it one of the best moves possible. Unless new sources of contact breaker points come on stream, electronic conversion may prove necessary in the long run in any case.

Ignition timing (fully advanced) for magneto and coil 500/600 models is 39° btdc; for the 650s it is 35° btdc. If you prefer to use measuring sticks rather than degree plates, the fractions are 3/8in and 1/2in respectively.

### TAPPETS

Ernie Merryweather reckons that adjusting the rockers on AJS and Matchless twins is one of the easiest jobs around. Good access is guaranteed by the removable domed covers, and the clearance is made by turning the rocker spindles, which are eccentric: there are thus no screwed adjusters to wear and no gymnastics required of the feeler gauge. All engines prior to 1960 have .006in clearance at inlet and exhaust; engines after 1960 have .008in inlet and exhaust. As the cams have quietening ramps, it is essential that the valve not being adjusted is fully depressed in order to get an accurate measurement.



### CAMS

There are only three cams available for the twins – standard profiles pre- and post-1959, and the race kit cam, which is extremely rare. CSR models used the same profile as the others.

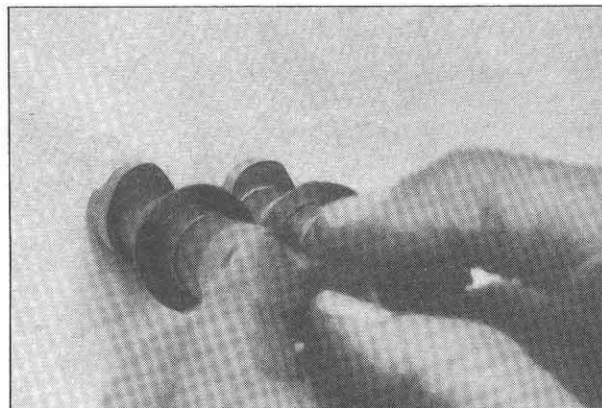
The later cams do not look radically different from the earlier ones, but Ernie Merryweather uses them wherever possible on the basis that the factory knew what it was doing; the timing figures demonstrate that they were substantially revised. Cams actually made in 1959, the changeover year, can be recognised because they are stamped S/S. A reprofiling service is available from Joe Francis; this reasonably priced operation gives your worn cam a new lease of life.

Timings are:

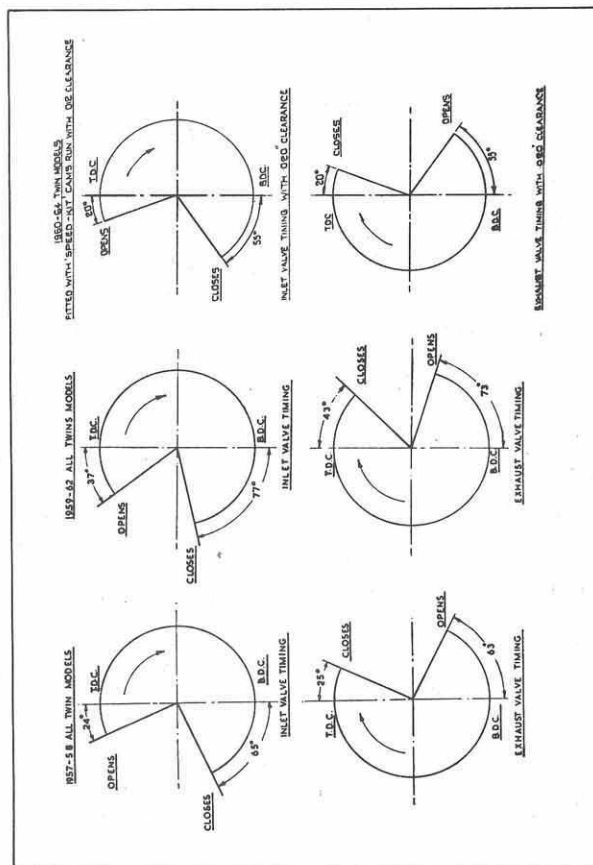
**Pre-59;** inlet opens 24° btdc; closes 65° abdc; exhaust opens 63° bbdc; closes 25° atdc.

**Post-59;** inlet opens 37° btdc; closes 77° abdc; exhaust opens 73° btdc; closes 43° atdc;

**Race cam;** inlet opens 20° btdc; closes 55° bbdc; exhaust opens 55° bbdc; closes 20° atdc. The race cam takes .020in clearance.



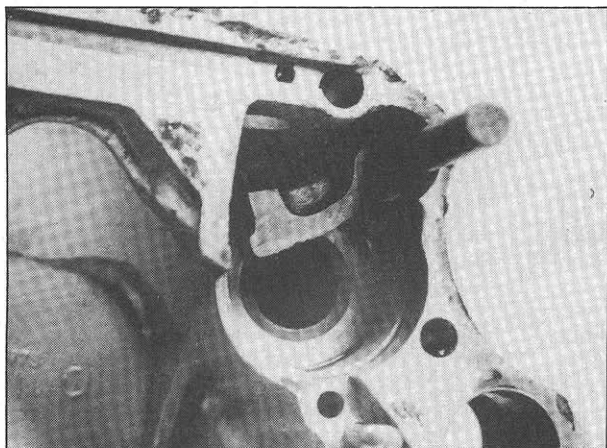
Pre-1959 (left) and post-1959 cam profiles compared.



Timing diagrams for the three types of camshaft.

### CAM FOLLOWERS

New cam followers, which are of the pivoting type, are readily available. However, it is advisable, before fitting a new one, to radius the arm to prevent it snagging on the crankcase mouth. It has been known for a new, unradiused follower to go up and stay up, necessitating an inconvenient engine strip down!



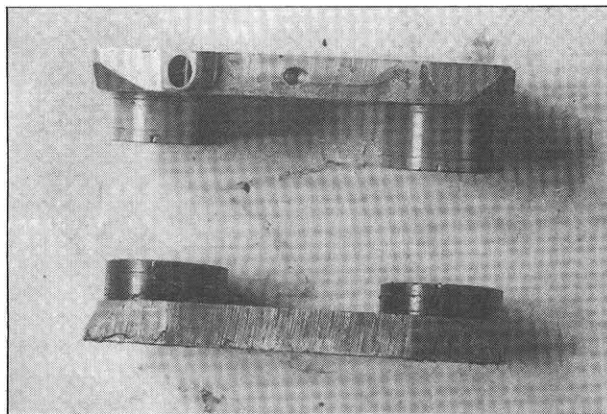
*New cam follower arms should be radiused before use.*

### OIL PUMP

The general design of the gear-type oil pump was laid down in 1949, and did not alter until 1963 when the flow capacity was doubled, from 26 gallons per hour to 52 gallons per hour at 6,500rpm. This was achieved by the simple and usual expedient of increasing the width of the pinions. Ernie Merryweather does not feel it necessary to update the pump as a matter of course, but if you decide to fit the later unit, you will also have to use the later timing side cover (and its longer screws) to accommodate it.

It is not unknown for people to confuse the pump bodies on a unit, and it is important to remember that the larger body is the scavenge side; fitting the bodies the wrong way round will result in massive over-oiling, lubricant in the sump and an oily mess.

The AJS and Matchless Owners Club and Hamrax offer an exchange service for oil pumps.



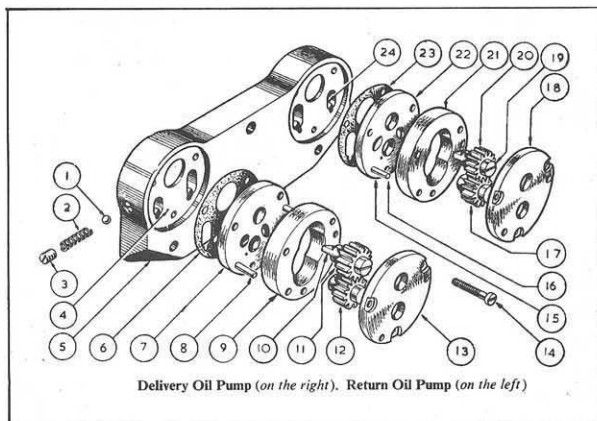
*Pre-1963 (below) and post-1963 oil pump assemblies.*

### OILS

Ernie takes the view that a good quality 20/50 multigrade oil is perfectly good enough for this engine. He also takes the view that changing it every 1,000 miles is a good idea! The primary chaincase also takes engine oil. AMC/Norton gearboxes should be filled with monograde SAE 50.

Twins have two oil filters – a metal gauze one in the oil tank and a felt one in the crankcase (for some years these were very fine wire, but felt ones are all that is available now). The filters should be cleaned or replaced whenever the oil is changed. A magnetic sump plug also attracts metallic debris, and this will need cleaning at the same time; if a suspiciously

large amount of metal is clinging to it, you would be well advised to seek the source!

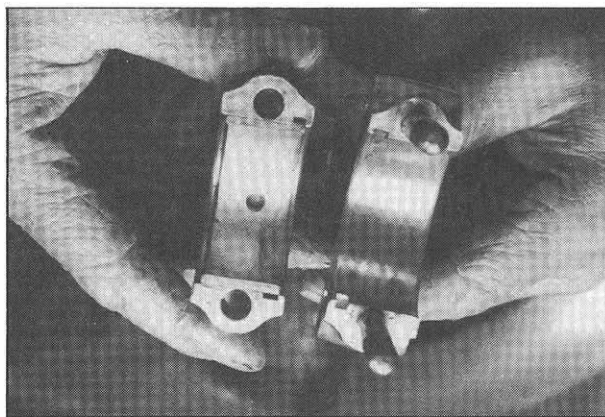


### BEARINGS

The AJS and Matchless twins are renowned for having a three-bearing crankshaft, the centre bearing being a split shell, similar to a big end. At present, centre crank bearings are in extremely short supply, but the club spares scheme is actively sourcing a new supply.

The outer main bearings did not change throughout the engine's production life: 500s, 600s and 650s all use RLS 12½ roller bearings (the dimensions of which are 1⅞×3×⅞). These are available through the club spares scheme or any bearing factor.

Big end bearings are generally available, and the shells from the BMC Mini engine can be used if machined narrower; the conrod caps also require a new "nick" to be machined as the Mini shells have their locating tang on the opposite side to genuine AMC ones. If desired, the BMC shells can be used to take a crank down to .080in undersize, but this is not generally advisable.



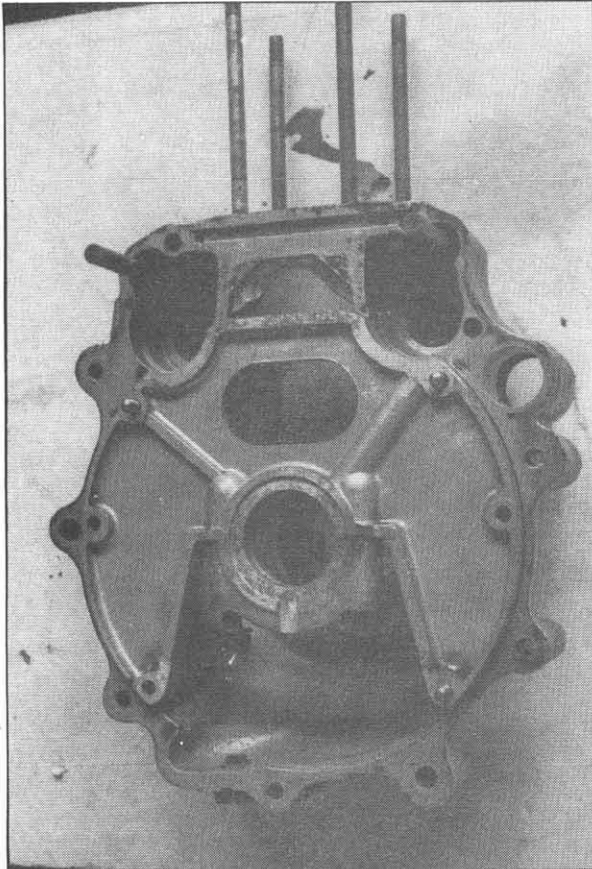
*Conrods can be adapted to take machined down Mini shells.*

### CENTRE MAIN FITTING

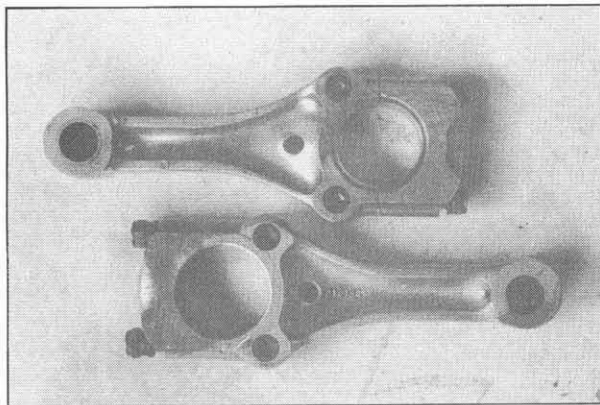
When reassembling the crankshaft, the centre main bearing and its web (ie the alloy plate which supports it) are fitted first. The web has an "O" stamped on it, and this should face you when putting it together, and should be on the drive side. When the web is assembled, and the bearing nuts tightened to 20ft/lb, the crankshaft assembly (which includes the conrods and main bearing inner races) can be lowered into the drive side crankcase.

The web is located on six studs, and it is at this stage that

Ernie Merryweather's experience of these engines provides an extremely useful tip. Instead of simply bolting the web into place, do up the nuts until they are just tight enough to hold the assembly in place (finger tight will probably suffice), then offer up the other crankcase half. When this is in place, try turning the crankshaft; if there is the slightest trace of binding, take the timing side off, undo the web nuts and move the web, then try again. Although the amount of movement is minimal, eliminating any bind here can make the difference between a smooth engine and a rough one. You might have to try three or four times before a satisfactory rotation occurs, but Ernie is adamant that it is worth the extra trouble. When the web is located correctly, carefully tighten the nuts to 6ft/lb.



Centre bearing web sits on six studs (only three fitted here); micro-adjustment before final tightening can make all the difference to a motor.



500, 600, 650 conrods are the same; 650's must be chamfered.

## CONRODS

Like the main bearings, the conrods were the same throughout the AMC twin's life. The only modification occurs on 650cc engines, where the "knuckle" on the end cap and just above the eye has to be chamfered for it to clear the crankcase, because of the extra throw on the crankshaft. An unchamfered rod can be filed down to suit, but the chamfer must face outwards. Torque setting for the big end nuts is 22ft/lb.

## CRANKSHAFTS

Apart from the centre main bearing, the AMC twin is also famous for having nodular and non-nodular crankshafts; this refers to the quality of metal used for the forgings. When the motor was 500cc or 600cc, the non-nodular crank proved strong enough, but the introduction of the 650 model was the final straw, and crankshafts began to break. The change of specification cured the problem, and ever since the nodular crank has been sought after. The simplest way to tell the difference is to tap the crank with a light hammer – a nodular crank emits a clear ringing tone, while the non-nodular one utters a dull, muffled clonk. However, unless this has been demonstrated to you (or in cases of tone deafness) it is a fairly useless piece of information. Some nodular cranks are stamped with an "N", others are not.

If that is not confusing enough, both 600cc and 650cc cranks are stamped "6", and the only way to tell them apart is to measure the throw (72.8mm or 79.35mm), although if you find an alternator crank stamped with a 6, it is not a 600!

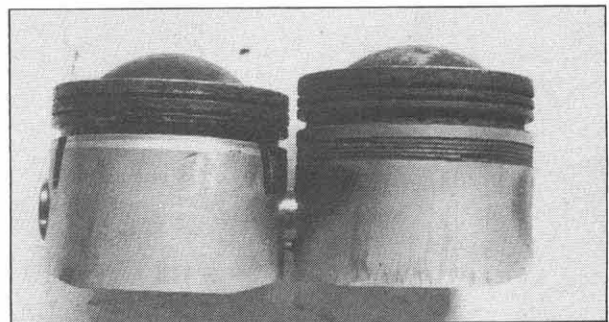
When the crankshaft is out, you must clear out the sludge trap. An impact driver is needed to shift the plug, then some fine wire to pick out the rubbish. Finally, flush it all through with clean oil, until only uncontaminated lubricant emerges from all journals.

## PISTONS

Generally speaking, each of the three capacities had standard and high compression pistons available: 500cc – 7 or 8 to 1; 600cc – 7.4 or 8 to 1; 650cc – 7.5 or 8.5 to 1. There were also some 10 to 1 racing pistons made, but like the cams they are very rare. None of the pistons is very domed, but the higher compression ones can be identified by the larger valve cutaways.

Pistons for the 1959 650 can present something of a problem, as they are domed and look very similar to the 600 pistons (both are 72mm diameter). If a 600 piston is fitted to a 650 by mistake, the compression ratio will be extremely low, and the balance will be upset. Side by side they can be told apart as the 650 component is taller from the gudgeon pin to the top of the dome.

After 1959 the pistons changed completely, and had much flatter tops, to suit the new combustion chambers (see Barrels and Cylinder Heads).



600 (left) and 1959 650 pistons compared; confusion can arise!