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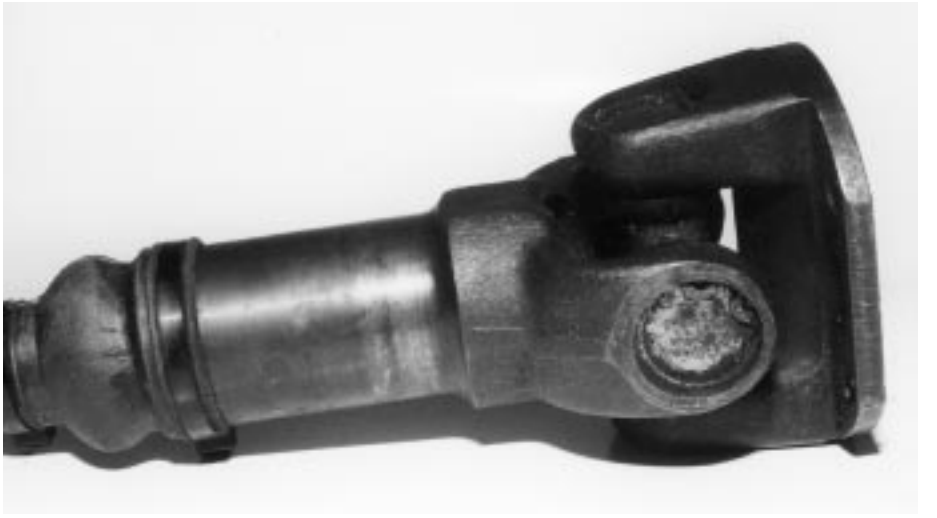
sidedraught Weber or Dellorto (with 38mm chokes and associated jetting), large bore extractor manifold and a modified ignition system is going to produce approximately 95 foot pounds of torque at about 5000rpm: torque it will hold until about 6500rpm. The maximum rpm capability of such an engine will be in the vicinity of 7200rpm to 8500rpm (consider 8500rpm to be the absolute maximum) and the horsepower will be approximately 100bhp at around 7200rpm. It is not all that difficult to get this much power, but it is relatively difficult to get a lot more than this, top engines giving approximately 120bhp at about 7200rpm, but with no major increase in torque (105 foot pounds). The difference between the 100 and 120bhp engines is a cylinder head with larger 37mm inlet valves and 31mm exhaust valves (offset guides).

Consider 7200rpm to be the everyday usable reliable maximum rpm capability from a well built example of this engine. If the rpm used is higher than this expect high main bearing journal wear; in fact, if revs over 7200 are consistently used, expect to carry out frequent engine rebuilds especially of the bottom end of the engine to maintain reliability. The crankshaft flexes over 7200rpm and, when this happens, it does not take long to wear the crankshaft/ bearings - often necessitating a crankshaft regrind to restore clearances, but a crankshaft can only be ground so many times. In the context of reliability, the crankshaft can be considered the Achille's heel of this engine when modified.

It is possible to use more than 7200rpm, but at a cost (frequent rebuilding). These engines can be revved to 8500rpm with standard bottom end parts (unbelievable as it may sound) - the cylinder head and related componentry can certainly take the strain and component wear is not abnormal. However, as with any high performance engine there are limits and good maintenance is **essential** if reliability and top performance are to be maintained. You can't just build one of these engines, rev the hell out of it all the time and expect it to last. It's just not like that with these engines, with the crankshaft and bearings being the 'problem' area. To illustrate the point, the standard MG Metro Turbo engine, for example, will usually knock its crankshaft bearings out before anything else goes wrong and this happens because the crankshaft rigidity and bearings are, in the overall scheme of things, marginal and the load the turbo puts on the engine is considerable.

When modifying the 1275cc engine for installation in a Mini/Metro, for instance, you need to be aware of the fact that there will be enough power/torque to BREAK JUST



Cooper S-type Hardy-Spicer universal joint and driveshaft.

Standard type of final drive with broken teeth.

Chapter 1
Cylinder Block

WHICH CYLINDER BLOCK?

There have been several different 1275cc A-series blocks made over the years, but the two best readily available blocks are the A+ 1275cc blocks. One for east/west engines and one for the north/south engines. They are both easily recognisable as A+ blocks and, except for the obvious differences to do with engine orientation, can be considered equal in strength. Note that all engines produced after 1980 are termed A+ engines because of the improvements made to them.

Unless racing class rules insist on original type block use, any engine being built up for racing purposes should use the later A+ block as found in any production vehicle fitted with this engine made after 1980. For example, the blocks out of a standard 1300 Metro, the MG Metro Turbo or a 1300 MG Metro, can all be considered identical. If it is an A+ block it is suitable for **any** high performance use. These blocks are quite easy to distinguish externally as they are quite different from all previous blocks as

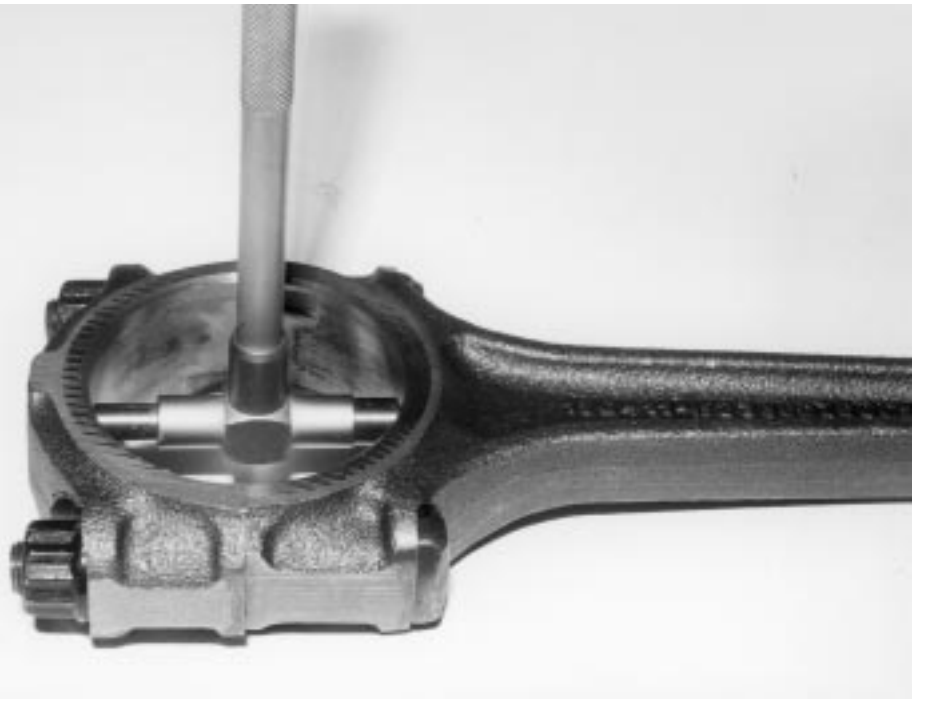
1275cc A+ cylinder block. Note the strengthening ribs.

If standard bolts have to be used in a high revving application, always fit new nuts and bolts and then replace them frequently (every 10 hours of full bore running). The engine use will have to be logged to keep track of the hours.

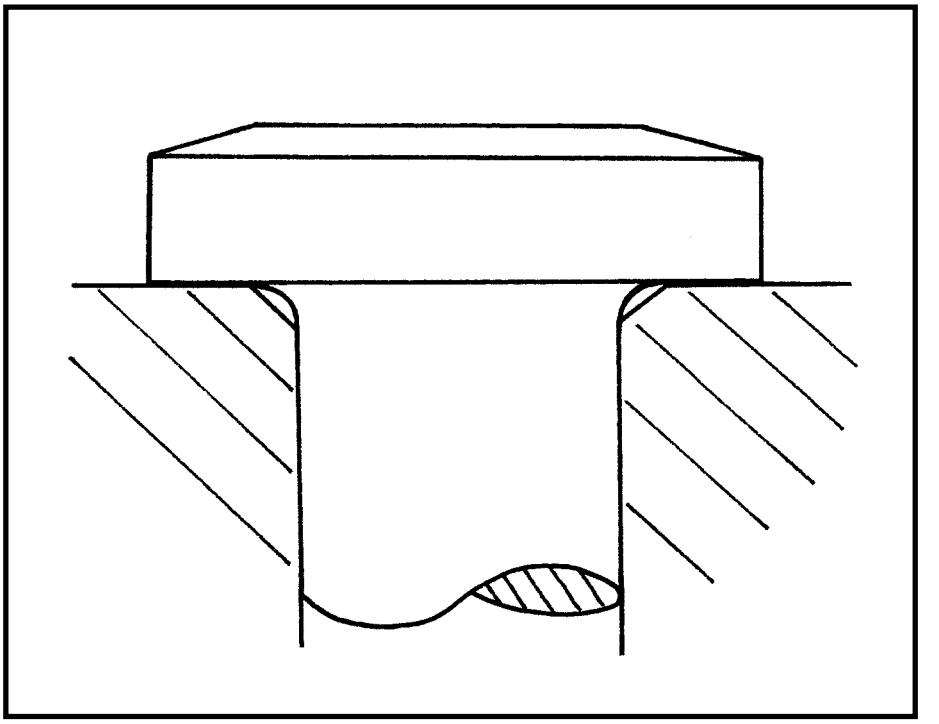
Caution! - Note that whenever the connecting rod bolts are replaced, the big end bore must be checked for roundness and, if the connecting rod tunnel is found to be out, the big end tunnel bore will have to be re-sized. Slight cap to connecting rod misalignment is possible when new bolts are fitted. Failure to restore the big end tunnel to perfectly round may well result in a bearing failure!

Caution! - The connecting rod bolts are a press fit into the connecting rod: they must **not** be a loose fit. If the bolts are loose, the connecting rod is definitely a write-off. The problem is that the cap is not accurately located onto the connecting rod and, depending on how loose the bolts are, the bearing clearance will not be consistent at all and a bearing failure is very likely.

Caution! - Aftermarket connecting rod bolts are not necessarily a 'drop-in' fit. The radius between the shank and the head of such bolts can prevent the full contact seating which is **essential** (the standard bolts have virtually no radius and, as a consequence, there is considerable variation in the factory chamfering where the head of the connecting rod bolt sits). Aftermarket bolts feature the radius for extra strength, so it **must not** be removed. The solution to this problem is to chamfer the tops of the bolt holes **just** sufficiently to accommodate the bolt stem to head radius; this will ensure that the underside of the bolt head makes full contact with its seat (see diagram).



Big end bore being measured using a telescopic gauge. An outside micrometer is then used to obtain a size reading from the gauge. Bottom size is 1,8955in/48.10mm.



Underside of bolt head must clear connecting rod chamfer.

Connecting rod nut used on extra stud. Note that because this head has been planed by 0.120in/3.0mm, thick washers are placed under the nuts to compensate.

and is made of a good grade of high tensile steel.

These nuts can also be used when an alloy roller rocker type shaft is fitted; the standard nuts are too large and will foul the rockers.

SECURING HEAD STUDS

It's a good idea to secure head studs with a locking agent.

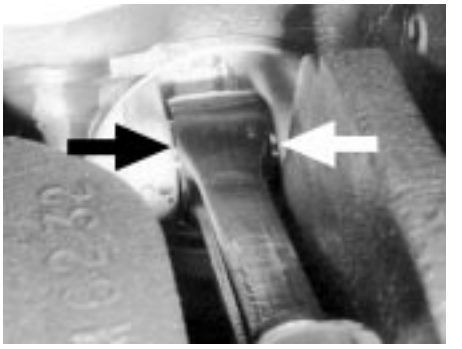
Make sure the threads within the block and on the head studs are completely clean and free of damage. Coat the threads of each stud with a thread locking compound such as Loctite. Wind the studs into the block, being 'clean' they'll run in easily until they bottom out. Wind each stud out a quarter turn and mark its position relative to the block with a marker pen line or dot (so that you'll be able to tell if they move).

Fit the cylinder head immediately and wind on the retaining nuts until each stud is under some tension (not full torque). The idea is that the studs will be in a true vertical plane as the locking agent sets and the threads of the studs will be in metal to metal contact with the threads in the block in the direction of the clamping force.

The locking agent will set the studs in the correct position and the studs will not rotate when the cylinder head is being removed.

CONNECTING ROD LITTLE END SIDE CLEARANCE

Once the engine is assebled far enough, look up through the crankcase at each little end and note whether or not there is any clearance between the connecting rod and piston little end bosses. Move the rod by hand at the big end to check that there is small end clearance at both extremes of the rod's sideways movement. **Caution!** - The bosses of piston and connecting rod little end **must not** be in contact - if they are, the engine will need to be dismantled and the piston bosses relieved. This is a rare problem.



Check that there is side clearance between the little end bosses of the connecting rod and the piston bosses.

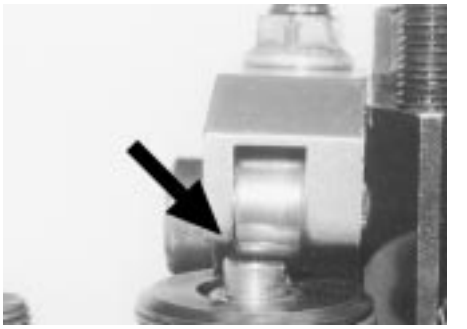
CAMSHAFT ROTATIONAL FREEDOM

When new camshaft bearings and a new camshaft are fitted to an engine, the freedom of rotation must be checked to ensure that there is no binding (or certainly no major binding) between the camshaft and the bearings. Possible problems are a bent camshaft or tight bearings (insufficient clearance). To check the camshaft for rotational freedom the camshaft is fitted along with its thrust plate, then the sprocket is added and the securing nut fitted and tightened. The camshaft must be able to be turned easily by hand without binding. Camshaft bearings are virtually always fitted by a machine shop/engine reconditioner as they have special equipment just for doing this particular job. This means that the block will be at their premises and the time to check the camshaft fit is there and then, before the block is taken away. If there is a problem with the camshaft fit, the machine shop/engine reconditioner can attend to it before the block is taken away. The solution to the problem may mean removal of a bearing/s and replacement with another or the bearing/s may have to be 'eased' using a scraper.

SETTING UP ALLOY ROCKERS FOR OFFSET VALVE GUIDE HEADS

When valve guides are offset to accommodate 37mm and 31mm valves, the roller tips of alloy rockers will not line up with the exhaust valve stems.

The two outer rockers need to be moved out with spacers by 0.060in/1.5mm and the two inner rockers moved in by 0.120in/3mm; the two end spacers will need to have 0.060in/



End rocker's roller not in line with valve stem.