THE STANDARD SPECIAL ENGINE

By John Merton (04/2008)

Introduction.

In 1937, Leonard P Lee, head of Coventry Climax Engines Ltd, and the son of that company's founder, took a decision which was to lead directly to the adoption of the Standard Special engine by the Morgan Motor Company.

Coventry Climax were a long-standing manufacturer and supplier of engines to the car and commercial vehicle industry, and built and supplied the 1122cc inlet-over-exhaust engine which had powered most production Morgan 4/4's since that car's introduction in late 1935. However, the car engine trade had become increasingly problematical for Coventry Climax. Several of its smaller customers, including Swift (1931) and Vale and Marendaz (1936) had gone out of business, and Crossley ceased car production in 1937. Triumph, which had made its own 4 and 6 cylinder engines to Coventry Climax designs under a licensing arrangement, ceased this when it completed the move to its own in-house OHV designs from 1936. Faced with the vagaries of the car trade, Lee decided, in 1937, to cease the manufacture of engines for the car trade, concentrating instead on a government contract for the manufacture and supply of fire pump trailers, using two existing old engine designs, the smaller the side-valve unit from the defunct Swift.

Faced with the fact that its existing contract with Coventry Climax would not be renewed, Morgan was forced to look for another engine supplier. The Standard Special engine was the result.

Incidentally, there is no truth whatever in the claims that surface from time to time that Triumph rather than Coventry Climax itself, supplied the Coventry Climax engines to Morgan. Nor is there any substance to the parallel stories that Triumph either owned or had some management control of Coventry Climax in the pre-war period.

Design Features.

The Standard Special engine is a reasonably conventional in-line 4 cylinder engine of 1267cc, with a bore of 63.5mm and a stroke of 100mm. The crankshaft is De-Saxed, the offset being to the left, or camshaft side of the engine. Consequently, there is a small cut-out at the right-hand bottom of each bore to allow clearance for the connecting rods.

One and two, and three and four cylinders are siamised (more later). The crankshaft runs in three main bearings, and both these and the big-end bearings are of the shell type. The thrust is taken by washers on each side of the rear main bearing. The big ends of the connecting rods will not pass down through the bore and the pistons have to be inserted from underneath. There is a lead at the bottom of each bore to assist this. There are alloy sealing blocks and filling pieces covering the two end main bearing caps to ensure a flat surface for the sump to bolt onto. These are held to the block with two 5/16” BSF set-screws. At the rear there are also two horizontal set-screws through this block into the alloy rear oil retainer. The bolts attaching the sump at these two points are Whitworth thread rather than the BSF used for the other sump attachment bolts, and the threads into the alloy blocks are all too easy to strip if these are overtightened. The lowest attachment bolt for the timing case also screws into the front block and similar care should be taken to avoid overtightening, likewise the two bolts into the rear oil retainer.

The camshaft is on the left side of the motor and generally runs direct in the block (the author has seen one engine with one-piece shell bearings).There are four journals that bear on the block; these are 1 11/16”, 1 15/32”, 1 7/16” and 1 13/32” going from front to rear. Supposedly the camshaft has been ground to a greater degree of overlap than those in either the Flying 8 or 10hp side-valve engines, but on measurement I have found no discernable difference between the Morgan camshaft and that from an 8hp engine. There is a single row timing chain, and a spring steel tensioner blade which is attached to the inside of the timing cover, not to the block. Timing gear alignment is via shims under the timing gear on the crankshaft. Distributor drive is via a

vertical shaft from a cogwheel at the centre of the camshaft, this shaft continuing downward to activate the oil pump. Camshaft location, and end float, is via a steel plate (the camshaft locating plate) at the front which has a half moon cutout, and is fastened to the block with two bolts.

The pistons can be of either the three or four ring variety, although most replacements these days seem to be the latter. The top ring has a tendency to break on the former. The pistons and connecting rods are as for the Standard 10hp engine. The connecting rods from the 8hp engine are similar, but have a smaller gudgeon pin diameter.

There is a steel plate bolted to the front of the engine which incorporates the feet for the engine mounts. At the rear there is another steel plate, or engine cover, which provides the mounting base for the bellhousing and also the starter motor, which is at the bottom right hand rear of the engine block. The starter motor has month and year of manufacture stamped on it.

There is an alloy rocker cover, incorporating a raised “Morgan” on the top in running script.

The generator is attached to two brackets off the top left of the engine block, and will also have month and year of manufacture stamped on it. The three 5/16” BSF attachment studs for the front mounting bracket incorporate a spacer so this bracket stands a fraction over half an inch proud of the front of the block. The rear mounting bracket bolts direct to the block and straddles the tappet cover plate.

An AC mechanical petrol pump drives off the rear of the camshaft. The rear bolt on this is difficult to access, and one approach is to use a longer bolt with a nut welded 3/4” or so up the thread. There is a quarter inch thick spacer between the pump and the block.

The four spark plugs screw horizontally into the cylinder head on the right hand side of the motor. They are underneath the inlet and exhaust ports, and numbers one and four angle outwards slightly.

Lubrication. The oil pump transmits oil to a horizontal gallery on the left hand side of the motor which feeds the crankshaft, the camshaft, and the tappets. The tappets (cam followers) are held in place by two blocks, each fastened to the engine block by two bolts tapped right through into the bores themselves. It is of course critical in reassembly to ensure these bolts do not intrude into the bores. There is a small horizontal channel behind each block for oil transmission. A piece of copper wire suitably “half-mooned” where the oil holes go through to the tappets, sits in these grooves to control flow, and there is a thin paper gasket between these assemblies and the engine block.

There is also, or should be, a short casting attached between the two inner bolts holding on the tappet blocks with a semi-circular cut-out in its middle which acts as a collar on the distributor driveshaft to stop the drive gear jumping out of mesh with the camshaft gear (more later). A side-mounted tappet cover plate with rounded ends covers this area of the engine. It is held on by two domed brass bolts which also secure the two engine breather pipes. This cover plate has a crescent of five small holes drilled under each retaining bolt hole. The plate is mounted with these facing the bottom, as they have the joint function of breather and allowing any oil carried with the blowby gases to flow back to the sump.

The horizontal oil gallery has takeoffs for a pipe to the rear of the cylinder head to lubricate the rocker gear, for the oil pressure gauge, and for the feed to a by-pass oil filter. Each end of this gallery is sealed by a half inch aluminium plug, which is screwed in then cut off flush. The return from the oil filter is direct to the sump. These oil filter pipes were originally Bundy. There has been a tendency to replace these pipes with copper ones, a huge mistake as they will work harden and that to the sump in particular will fracture just where it enters the sump. Not a case of if but when and I have heard of several engines being ruined because of this. The fittings are common BSP ones and it is best to have an hydraulic hose specialist make up new flexible pipes.

There is a ball and spring type oil pressure relief valve.

Oil return at the ends of the crankshaft is by scroll thread arrangements. At the front the thread is machined onto the alloy fan pulley, assisted by a dished thrower just inside the timing case. At the rear both the crankshaft and the one piece alloy covering plate, (the rear oil retainer) have scrolls machined on them. It is critical that both the rear oil retainer and the front pulley be centred correctly on reassembling one of these engines, otherwise some awfully funny noises may result and also the thread on the pulley and rear oil retainer plate ground off! The front crank pulley nut is 3/4" BSF. It is sometimes difficult to feed this over the end of the crankshaft until it engages the full thread. There is a locking tab washer underneath it with three tabs to lock the nut and another smaller tab on the inside which engages in the Woodruff key slot in the pulley itself.

Lubrication of the bores and gudgeon pins is assisted by a small hole drilled through the big end of each connecting rod, offset to the right hand side. Although superficially the connecting rods look identical, they are in fact matched pairs, the more pronounced big end flange on No 1 connecting rod facing that on No 2 and similarly for 3 and 4. Likewise, the big end bearing shells do not have the centre oil hole common to most these days but two holes offset either side of centre. If using modern replacements, a suitable hole may need to be drilled in each top shell.

The sump is alloy. It has heavy internal baffling, and there is a flat horizontal steel plate bolted to the top of these baffles to help control oil surge. This plate has a cut-out at left centre to allow oil pump access. There is a much smaller cut-out opposite this for the dipstick. The oil pump is a compact design (more later) with a fixed gauze filter. It does not have a floating filter and pick up, as claimed in several publications and as was used in the Standard 8 and 10hp engines. This error appears to have originated in an article in "The Light Car", May 26 1939. The same report (which probably originated from a factory handout) was incorporated in the Dowdeswell workshop manual, which was itself copied into the Morgan Autobook One manual, although both, in then talking of the need to take care not to remove the gauze surrounding the oil pump, fail to pick up the error.

In fact the design of the sump is such that it would not be possible to fit a pump with a floating gauze uptake.

The actual pump used is the higher capacity one from the Standard 12/14hp engines, not that from the 8/10hp engines.

Valve gear lubrication is via the pipe from the gallery to the left rear of the cylinder head, up through the rear rocker support pillar into the centre of the rocker shaft and hence to each rocker. The bushes in the rockers are two piece, straddling and forming a central channel which conveys oil down a shaft drilled down the rocker to the pads bearing on the valve stems. These shafts have a felt wick or a piece of twisted wire in them to control oil feed, and would almost certainly have clogged up over time and need to be cleaned out.

The pushrods have a spring at their bottoms where they bear on the tappets, with a nominal .015" clearance (nominal because the machining of the camshaft lobes was hardly precision). This clearance is as well as the return springs on the valves themselves, where the specified clearance is .022". While there have been cases where the valve clearance has been reduced, this practice is fraught – in a number of cases it has led to the springs binding (ie being forced beyond their limits of compressibility) with rocker breakage and/or impacting of the pushrods resulting (more on this later). The bottom springs on the pushrods are held in place with horseshoe collets, unlike the split collets on the valves themselves.

The valve heads were originally cut to a 30 degree angle. Nowadays most seem to have been recut to 45 degrees.

Manifolding. There is a one piece cast iron manifold for both inlet and exhaust. It has a hotspot. The exhaust section runs over the top of the inlet, towards the front of the car, whence it curves downward and joins a pipe which exits through a hole in the chassis. The manifold is on the right hand side of the engine, unlike those on its side-valve Standard contemporaries which are on the

left. The inlet ports in the cylinder head are siamised, with one inlet hole each for one and two, and three and four cylinders respectively. There is a separate port for each of the exhausts.

Carburetion A single Solex downdraft model 30 FAI was used.

Cooling. Water cooling on all engines was by the thermosyphon principle, assisted by a two-blade fan. The triangular boss and shaft on which this fan and its associated pulley are mounted is bolted (with three 5/16" BSF bolts) to the right-hand front of the block and covers a 3/4" diameter access hole to the water jacketing. These bolts will work loose over time, leading to coolant loss, and should be checked for tightness periodically, say at 5,000 mile intervals.

These engines were never fitted with a water pump. This is an error in a number of books and articles which appears to have originated in an "Autocar" article of July 5 1946 which incorrectly referred to a "water impeller unit".

Timing. The engine is designed to fire at top dead centre at rest. There is a timing arrow on the flywheel, and another at the top of the rear engine cover plate. Timing is 1 3 4 2 from the rear cylinder. With the engine in the car it is easier to centre the timing arrow on the flywheel in the bottom hole in the bellhousing and to time off number 2 cylinder.

The distributor is of a type common to many British light cars of the time. A sleeve is pinned to its shaft, this engaging with the end of the vertical driveshaft from the cam. This can have a tendency to wear the base of the distributor over time, causing the shaft to ride up and the rotor button to grind into the distributor cap. The only spark advance provided is by bobweights – vacuum advance and retard was not fitted. For hawkeye originality freaks, the flat side of the distributor body will have month and year of manufacture stamped on it (eg 2 49). An arrow will point to this. The spark plug leads are routed through two locating brackets, one mounted as a horizontal rearward extension just below the distributor (attached via the bolt that also holds the coil bracket at its rear attachment point) the other as a vertical extension off one of the bellhousing attachment bolts at the rear right hand side of the engine. There are rectangular caged sections at the end of each of these brackets to carry the spark plug leads, and the leads are shielded further from contact with the sides of these cages by a rubber moulding.

Another issue to watch is that on a number of engines the cast bracket acting as a retaining collar to prevent the distributor drive gear jumping out of mesh has been missing. Consequently, this gear can can sometimes ride up (for example if the engine backfires) and jump out of mesh with the camshaft gear. This can be remedied with a snug-fitting thinwall brass tube over the driveshaft to bridge the distance between the driven gear and the distributor's drive sleeve. Otherwise, a new bracket with collar can be made up.

There is a brass water cock on the rear lower right of the block. The engine number (starting with "Q", ending in "E" and generally with two or three numbers in between) is stamped on a raised boss about halfway along the right of the block towards the top.

Design Antecedents

The Morgan Company claimed that the Standard Special engine was based on the earlier Standard 9 side-valve unit. Given that engine's stroke of 100mm, this is more feasible than tracing its origins to the earlier 10hp engine, which had a stroke of 106mm. However others have claimed it is an OHV version of the Standard Flying 10 engine or even an OHV conversion of that engine.

None of these claims is strictly correct. Laban claims that this engine was first offered to Morgan in 1937. If so, its development appears to have parallelled the development by Standard of its new range of side valve engines for its "Flying" series of cars. The offer also appears to coincide with Coventry Climax's decision to exit the car engine trade. Why Standard decided to develop this engine is unclear, although they were producing OHV engines in larger sizes for SS Jaguar. Incidentally, although Weslake has a claimed involvement in the development of the OHV

(crossflow) cylinder heads for the Jaguar engines, it seems unlikely he was so involved in the Standard Special arrangement.

As far as I can determine, the engine was never used in any production vehicle other than Morgan. However, apparently it did power the first Triumph Mayflower prototype after the War, and it is tempting on this basis that it may have been tested earlier also in some of the Flying Standard prototypes. Perhaps we will never know.

The cylinder block casting is unique and is narrower than that used in either the Standard 8 or 10 hp engines. There are 10 head studs, each in two rows of five, unlike the side valve engines which had three rows of studs. As well as using the oil pump from the 12/14hp engines, the Standard Special engine uses the crankshaft from the contemporary Standard 8 with its oilight spigot bush rather than that from the 10hp cars which had a roller bearing. The reason for this is that both the 8hp engine and, I am advised, the 10hp engine had full water jacketing around the cylinder bores, whereas the Standard Special's are siamised. This means that the cylinder centres on the Standard Special engine are to the same spacings as the 8hp engine rather than the 10hp one, whose centre two cylinders are at different spacings. The 10hp crankshaft can be fitted to the Standard Special engine, but the two centre connecting rods will require modification. Note that the flywheels for the 10hp and 8hp Flying Standard engines are the same, except the clutch pressure plate and driven plate are smaller in the 8hp engine hence their attachment holes are at a smaller diameter.

Pricing and Quality Issues.

According to Laban's research, the price of the Standard Special engine in November 1937 was around 25 pounds, compared with Climax engines which had risen to 36 pounds from 29 pounds. When compared further, HRG were paying 34 pounds for the Meadows 4ED engine in 1935 (Dussek).

This makes the Standard Special engine seem a comparative bargain (more so when contemporary reports indicate it was available as an option for an extra 5 pounds), but “there is no such thing as a free lunch”.

While it is quite a strong little engine (main bearing journals of 2” in diameter compared with the 1.75” in the Austin A40, for example: their big end dimensions were the same at 1.75”) it is a shoddy piece of work, and the block, head and manifold castings in particular are rough examples indeed of foundry practice. Expect to find left over casting ridges and dags in the porting and jacketing also left over bits of core wire in the water jackets. The cylinder head casting is so rough that I doubt whether Weslake would have wished association with it in any way. We have found considerable weight variations between connecting rods, and some crankshafts have been well-nigh impossible to get in balance without the removal of almost alarming amounts of metal. In the case of the connecting rods, balance has finally been achieved several times by juggling big-end bolts and nuts with those from the Armstrong Siddeley 16/18 hp engines, which are waisted, and a much superior design each weighing about 8 grams less than the Morgan ones. The starter ring gear is cut into the circumference of the flywheel. The two centre studs on the water exit manifold are drilled through into the two centre exhaust ports. All of the head studs are tapped through into the water jacketing. The problem with rocker breakage when valve clearances are tightened appears to be as much due to shoddy finishing of the head, as anything else. The single row timing chain and the camshaft running direct in the block have been mentioned earlier.

Mind you, many of these comments also apply to the small Standard engines.

So, HFS may have been a shrewd businessman, but so was John Black, the head of Standards!

Specifications

Capacity 1267cc, 63.5mm bore by 100mm stroke.

Power(contemporary quotes) Prewar 38.8 BHP at 4,500 rpm, compression 6.8 to 1

Postwar 40 BHP at 4,300 rpm compression 7 to 1

Torque (quoted postwar) 61.6 lb ft at 2,500 rpm

Spark Plugs Champion N8, **Points** L10/GL10

.