

## The M30 Through The Ages

CAR	BORE	STROKE	CAPACITY	COMP	POWER	TORQUE
2500	86mm	71.6mm	2494cc	9:1	150bhp	165lb.ft
2800	86mm	80mm	2788cc	9:1	170bhp	174lb.ft
3.0S/CS	89mm	80mm	2985cc	9:1	180bhp	188lb.ft
3.3L	89mm	88.4mm	3295cc	9:1	190bhp	213lb.ft
3.0 CSL	89.2mm	80mm	3003cc	9.5:1	200bhp	199lb.ft
3.2 CSL	89.2mm	84mm	3153cc	9.5:1	206bhp	204lb.ft
633 CSI/3.3Li/733i	89mm	86mm	3210cc	9:1	197bhp	206lb.ft
635 CSI/735i (1979)	93.4mm	84mm	3453cc	9.3:1	218bhp	228lb.ft
E28 535i/735i (1983)	92mm	86mm	3430cc	10:1	218bhp	229lb.ft
E32 730i	89mm	80mm	2985cc	9:1	188bhp	188lb.ft
E34 535i	92mm	86mm	3430cc	9:1	211bhp	220lb.ft

# All About... The M30

After 25 years and nine model ranges, this fine old trooper surely deserves a long service award.

## FIND ONE IN: 745i Turbo



Two guises: the original 3.2 with a separate distributor and the 3430cc version with Motronic from 1983. For a reliable Turbo engine, forget the early unit. With high boost, a healthy 745i will do an easy 325-340bhp.

## History

The M30 started life in 1968 in the 2500 and 2800 saloons. It looks like a stretched M10 four-cylinder, yet is different. The distributor is at the front of the engine; the combustion chamber shape is different and the rocker shafts are further apart. The 150bhp 2500 and 170bhp 2800 differed in the stroke; 86mm bore with a 71.6mm stroke for the 2500 and 80mm for the 2800.

In 1971 the 180bhp 3-litre came in, using the 80mm stroke crank and 89mm bore. D Jetronic fuel injection and 200bhp appeared in 1972, along with the 3003cc CSL engine — a stock 3-litre injection engine with a first oversize rebore to 89.22mm and the same 200bhp. The 1971 examples used carburetors; 1972 cars were D Jetronic.

Next up was the oddball 3.3-litre unit used in the 1974 carburettor 3.3-litre saloon. With an 89mm bore, the stroke was increased to 88.4mm to give 3295cc and a lazy 190bhp. The 3.2 engine replaced it, combining the 89mm bore with a new 86mm crank to give 3210cc — it wasn't the engine used in the 3.2-litre CSL Batmobile; that would be too easy! The Bat's 3153cc motor used the overbored 89.25 bore of the 3003cc CSL, with a new 84mm stroke crank.

By 1976 the Batmobile was long finished, as the 633CSi had arrived. Along with a revised 3.3Li saloon, it used a Bosch L Jetronic version of the 3210cc engine and previous 2.5 and 2.8 carburettor units switched from twin Solexes to a

single four-barrel Solex 4A1 carb, with the 3.0Si also switching from Bosch D to Bosch L injection. The carb 2.8, a new carb 3-litre and the 633's injected 3.2 went into the new 7-Series in 1977; then for mid 1978 the famous 3.5 appeared. Using the 84mm crank from the late Batmobile engine, the 3.5 was massively overbored to 93.4mm, to create 3453cc of a real revver.

In 1979 the 732i replaced the 733i and was the first car to use Bosch Motronic. It had the 3210cc engine yet again. Motronic followed on the 3.5 engine in late 1980. Sadly the 3.5 engine suffered a lot of head gasket trouble, so for 1982 it was redesigned using the 86mm stroke of the 3210cc motor and a smaller 92mm bore to give 3430cc. By now all 2.5 and 2.8 engines were using the later type Bosch LE Jetronic injection, and all from the 2.5 to the 3.5 used the same 358 casting cylinder head.

A major revision arrived in July 1986 for the E32 7-Series. The block was made thinner, with new shaped ports and bigger valves for the revised cylinder head and its reshaped combustion chambers. This engine was fitted to the 1988 E34 530i and 535i, plus the 635 CSi Highline. The M30 engine ran in this form until 1992, with the last 535is specially built for Alpina's B10 BiTurbo. The last M30 rolled off the line in autumn 1993 for the final six-cylinder 730i. After 25 years, the M30 ended up in similar shape as in 1968 — a legendary motor.

Words Andrew Everett  
Photography Alisdair Cusick

M30 was a very long-serving unit, spending a quarter of a century in production BMWs.

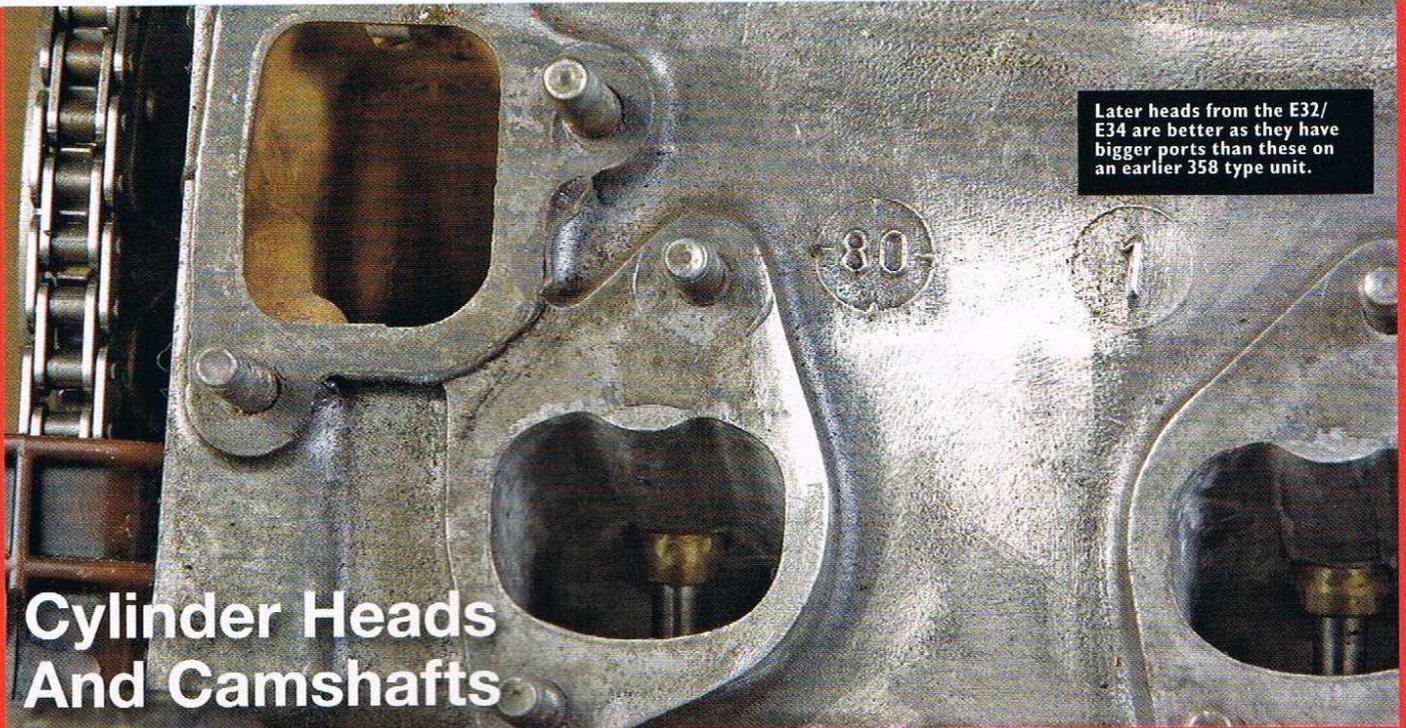
## Blocks

Most M30 blocks are similar but with different bore sizes, spacing and engine mounting points. Very early blocks from the 2500, 2800 and 3-litre E3, E9 and E12 can be identified by a boxy water channel running along the inlet side.

With the E32 and E34 engines, the bolt points changed for the engine mounting brackets. If you want to fit an E32/34 engine into an older 6-Series or E28/E12/E3/E9, you should use Highline mounting

brackets, but if you're building an engine from scratch, then use the block from the era that the car came from.

For example, if you're building an engine for a CSL, then use the pre-E32/34 block as it's very strong and has no weak points — the early blocks have the casting number 1270006, while the rare 3453cc block used on all pre-1983 3.5s and the earlier Alpina B9s is numbered 1252 4460.



Later heads from the E32/E34 are better as they have bigger ports than these on an earlier 358 type unit.

## Cylinder Heads And Camshafts

At least four different early M30 heads exist, but they look similar. The most prolific original has casting number 1250019 and a mounting point for a cam-driven mechanical fuel pump. It also has 38mm exhaust valves and 46mm inlets, plus a propensity to crack. The 1262243 head replaced it, with a different chamber design, but the same sized valves. It was replaced in 1981 by the 358 cylinder head that was fitted to every M30 engine from mid 1981 until the E32/34, from 2.5 to 3.5 litres, and will fit an older engine. Last is the head fitted to the E32/E34 and Highline Six. The 3-litre version coded 1708497 has the same sized valves as the older heads and slightly

different ports, the 3.5 having the 1708843 part number, inlet valves 1mm bigger, and bigger ports again. It's so much better than the old 358 (compare port sizes!) and doesn't need much in the way of porting (use it with E32/34 3.5 pistons). The compression is slightly low at 9:1, but skimming 1mm from the head will raise the compression to around 9.7:1. Oddball heads — look for the 1304 473 used on 3-litre CSI and CSLs, and the 745i head with 'TURBO' cast into the side.

As for camshafts, earlier ones were good with profiles of about 272 degrees (the old 3.0Si, the E12 528i and M535i went like rockets). In the E28

era, the cam timing was softened for emissions and the 525i cam is far too tame to strangle power to 150bhp. Be aware that the Motronic cams changed in January 1984 with the type of rotor arm drive. Early Motronic cams up until January 1984 would accept the shaft for the Motronic rotor arm, but after that they had a different rotor arm arrangement, so when you are ordering a cam be aware of what you need. Motronic cams will not fit an older L or LE Jet engine. Piper's Fast Road cam is your best buy at £287. At 1500-6500rpm it gives about 12bhp to a standard engine and with an ECU chip, that's 245bhp from an otherwise stock E32/34 engine.

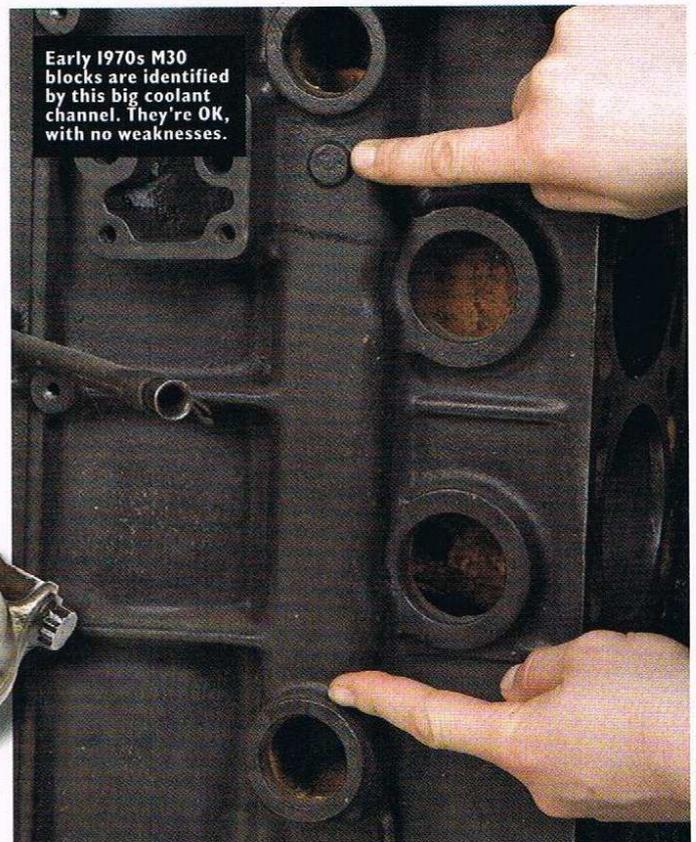
## Pistons

Pre-1976 engines used the 'raised grand piano' pistons, named after the shape of the raised crown. For the late 1976 and the single-carb engines, the head and piston design was changed. By 1981 and the introduction of the E28, it changed again.

The E32/34 is different again and the golden rule is to keep the pistons and head matched, because it is purpose designed. We've seen E28 type heads fitted to E32/34 engines that seem to run OK and when BMW ran out of pre-1976 heads for their reconditioned engines, they started to use the E28 type head on the old pre-E28 engines.



Connecting rods were all the same from '68-'93. Right hand rod is lighter M5/M635 item.



Early 1970s M30 blocks are identified by this big coolant channel. They're OK, with no weaknesses.

## Crankshafts And Con Rods

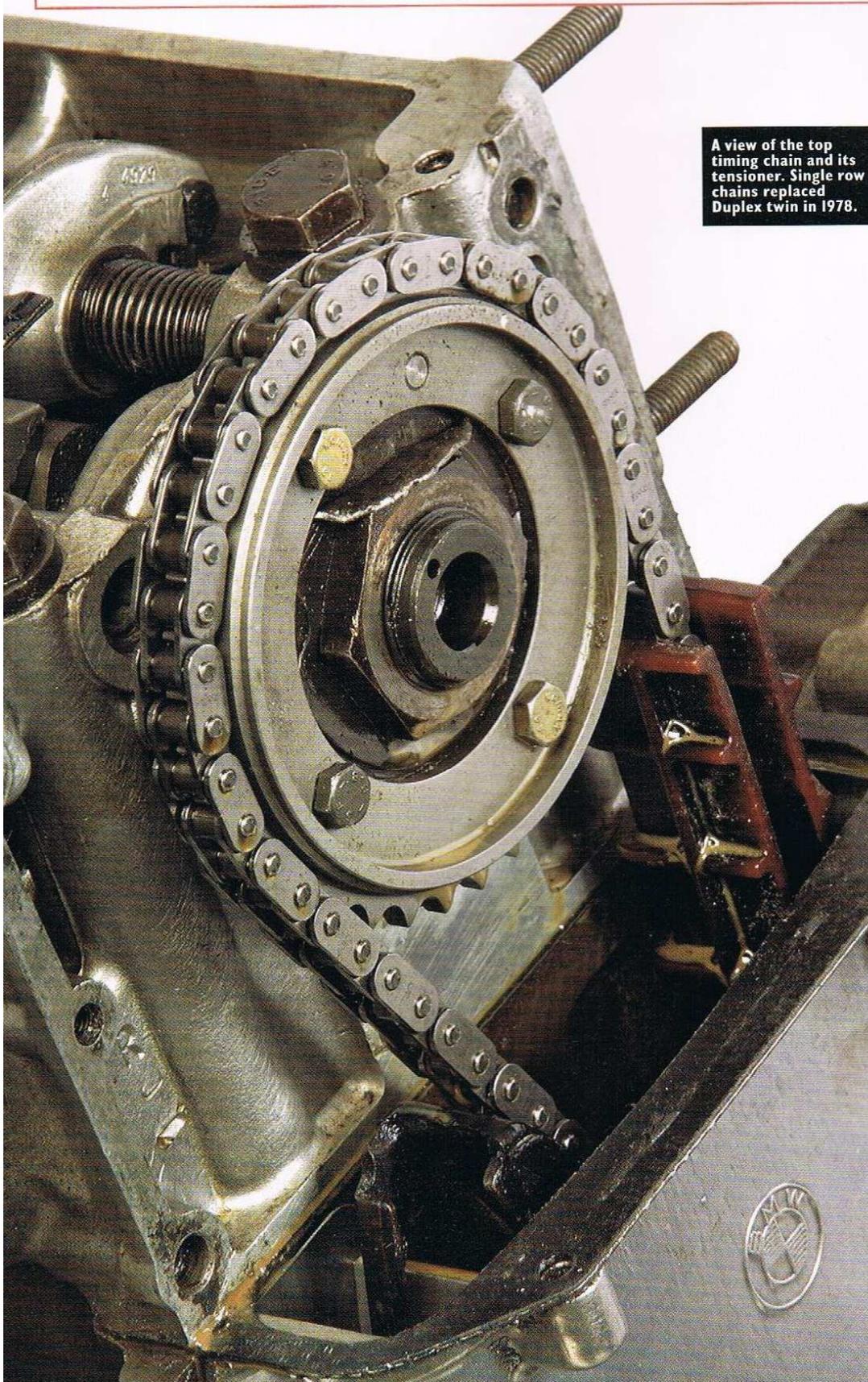
The M30 cranks are very tough and as they're all forged steel, there's really no crank to be avoided. All the connecting rods are the same from the first ever 2500 to the final 735i.

The question of block and crank swapping arises, but there's little point in doing this. If you fitted a long stroke crank from a late 3430cc engine (or a 3210cc unit) into an early 3.5 block, you would end up with the same 3535cc as the E34 M5. But you would need to use 3.6 M5 rods and pistons, as the

early 3.5 pistons would poke out of the top of the bore and there are no shorter rods available from the BMW range. The M5/M6 pistons have a very short pin-to-crown height and the M5/M6 rods are 6mm longer.

If you are planning to rebuilding a genuine 3.2 Batmobile engine, the early 3.5 crank is the one that you will need when replacing your Bat crank if it's knackered and BMW steel cranks don't like being reground more than 10 thou.

A view of the top timing chain and its tensioner. Single row chains replaced Duplex twin in 1978.



## Other items

Up until November 1978 the cam was driven by a duplex timing chain and the oil pump gear was held on with three 10mm bolts, while the later pumps used a single nut.

Motronic is mappable but if you are starting from scratch, use the E32/34 type system. Fritz's Bitz is in the process of rebuilding an original 1972 CSL and is using this later system. The ECU is easily mappable and is just so much nicer than the early system, with less to go wrong.

None of the old injection systems such as D, L and LE Jetronic can be remapped and that four-barrel Solex 4A1 needs binning — the old twin Solex 35/40 INAT carbs are much better, but you will find that most of them need overhauling.

All engines from 1981 onwards with LE Jetronic or Motronic used the 745i one-piece inlet manifold which supposedly is not quite as efficient as that earlier 'bunch of bananas' type shared with both D and L Jetronic, but it is not really worth changing it. It's true that the older L Jet motors were livelier, but that was because of the cam rather than the manifold.

Speaking of manifolds; the BMW exhaust manifold is a pretty gruesome thing and a tubular manifold is what you need, if only for the sound! You can get one from Fritz's Bitz which makes various types of tubular stainless-steel manifolds and systems.

When you overhaul an M30 head, you should take time to carefully mark each of the four rocker shafts. You certainly won't regret doing this as each one is different and if you should get them mixed up, it's a recipe for disaster!

### THANKS

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