Working class hero

Boat Anchor – that's what we used to call the Ford Pinto. We meant it was heavy enough to hold a sailing vessel stationary in a rough sea – the sea bed was the best place for it. Dave Walker explains himself

WITHOUT DOUBT, tuning the Pinto was a triumph of development over a basically flawed design. The cylinder head, where the power is always made, couldn't have been much worse. The valves were angled, but not enough to do much good – just enough to make life complicated. The cam bearings didn't give enough support for the stock cam, let alone a high lift one. The geometry of the rockers though wasn't bad – it was a nightmare! Throw in a marginal lubrication system and you have a good argument for buying a Crossflow engine.

But it works. You can get a reliable 200bhp from a 2-litre engine and the cost need not be unreasonable. I used to run a few cars with this engine, doing much of the early development with Arron Tucker and Roland Hayes of H.T. Racing. I learnt a lot from these guys, much of it from the shear volume of engines that they built. It's only by breaking things that you find out what's reliable! By the time this engine went out of fashion I don't think anyone knew more about them than we did at the time.

Digging deep into the memory banks we will start with engine choice. Forget the smaller capacity engines, you can tune the 1600cc Pinto but there are better 1600cc engines to start with. The 2-litre came in various guises, the low compression van engine; fuel injected 2.0 EFI Sierra and the ultimate variant: the Cosworth turbo. Of the true Pinto designs the one to look for is the 205 block Injection engine. This gives you the best head design (best of the bad) and a crankshaft pulley damper.

Bottom end

The crankshaft damper is important because the Pinto had a habit of throwing off its flywheel. This was a torsional vibration problem which the damper cancelled out. Some people used to dowel the flywheel in an attempt to keep it in place but that's tackling the result of the problem, not the origin of it. Trust me; you need the crank damper on a highly tuned engine.

You can lighten standard flywheels simply by machining off the outer weight. Leave some of the original thickness in place or the ring gear will fall off. I used to machine to within 2mm of the ring gear and never had a problem. On very high revving engines (7,500rpm to 8,500rpm) you need a steel flywheel.

The crankshaft of the Pinto is just about bullet-proof. I never broke a crank, even on my full race engines. You can use the Cosworth crankshaft as this is steel and uses a different flywheel but it weighs 33lbs against the standard crank's 28lbs – why are you adding all that weight? The stock crank, even at 10/10 regrind is not a problem. Stay away from tuftriding. Pinto cranks are fillet-rolled, which hardens the critical area of the pins. If you tuftride you lose this original hardening; plus the crank will almost certainly curl up. Bent cranks can't be straightened. The message is: don't spend money ruining a perfectly good crankshaft.

Lightweight steel flywheels lik this are only necessary on a full race Pinto engine.

The best conrods are without doubt the Cosworth ones. These interchange with the Pinto but they are not cheap. A good alternative is the Fiesta Diesel rod. This needs some machining to fit the Pinto

The 205 is the best all round block as Cosworth 4x4 blocks are much heavier.

Pinto cranks are super tough – Dave Walker never managed to break one.

engine, thinning down the big-end width then re-sizing the crankshaft big-end pins. You can use this to off-set grind the crank and gain some capacity on the stroke. The piston is no longer a press fit (circlips needed) but if you use diesel rods you will not be using the original piston. The conrods can be polished and shot-peened to good effect.

The original cast piston is okay up to a maximum of 7,500rpm. Go to 7,501rpm a few times and the piston ring lands will collapse. I was once told that you can run to 8,000rpm on KS cast pistons but you have to sell the engine quick after five short-oval races – before it self-destructs. Forged pistons are expensive but a good investment on an all-out race engine.

The 205 cylinder block is the one to have. The Cosworth 4x4 is a lot stronger

Cast pistons are OK to 7500rpm.

but also a lot heavier and not really viable for an aspirated Pinto. For a fast road engine the normal block is adequate up to about 165bhp. One tip is to change the core plugs in the block and fit the new ones with Loctite 648 Engineering Adhesive. The block distorts if you make good power and the core plugs gradually walk out of the block. I used to retain them by drilling and tapping the block to accept 4mm cap screws, using them in a triangle pattern to hold in the core plug.

The boys at H.T. had some problems with cracking through the tapped holes but I never did.

You can bore the blocks to 93mm and use the Ford V6 piston to make a 2.1. This is okay for moderate power outputs but on a proper engine the bore will eventually break down – usually on number one and the piston comes into contact with the water pump – it's a mess. The better route to a reliable 2.1 is to use Fiesta diesel rods with the stroked crank and a 92mm bore.

Steel rods are great for race engines but a cheaper option is Fiesta diesel rods.

Heads

All the Pinto heads are similar in design with three cam bearings and a spray bar lubrication system. Standard engines had a (well-deserved) reputation for camshaft wear. A Ford Cortina without a clattering engine was something to note. Once you fitted a bigger cam and stronger valve springs you were asking for trouble – and your request was often granted! These days the chilled casting has eliminated a lot of the wear problems. I used to have my chrome molybdenum blanks cross-drilled along their length and then little jet holes were drilled to exit just before the lifting ramp. This sprayed oil right onto the follower where it did some good, rather than just spraying in all directions and hoping for the best.

With only three cam bearings and marginal oil flow, top ends can suffer on Pintos.

For a fast road engine using up to 7,500rpm I only ever used single springs. I bought these from the local Ford main dealer since they are stock CVH singles. You'll have to pocket the spring seats on higher lift cams. I used a fitted length of 37mm. For race engine I used Iskendarian double springs from Paul Ivey at REC (01902 373770) on the same fitted length.

I always used bigger valves in all my engines. The inlet port in the Pinto is just too big and larger valves make better use of the port size. The Group One sizes are 1.75 inch and inlet 1.5 inch exhaust. You can get a 1.8 inch inlet valve but this needs some trick re-drilling of the guide to fit with a 1.5 inch exhaust, otherwise the two valves clash with big overlap cams. Stick with 1.75 inch inlets and you have no such problems. For guides I always used bronze alloy guides and drilled the head to fit them. For a budget engine you can have the guide holes (part of the head casting) re-lined with a bronze insert.

Big valves are essential in a Pinto to make use of the ports, which are too big.

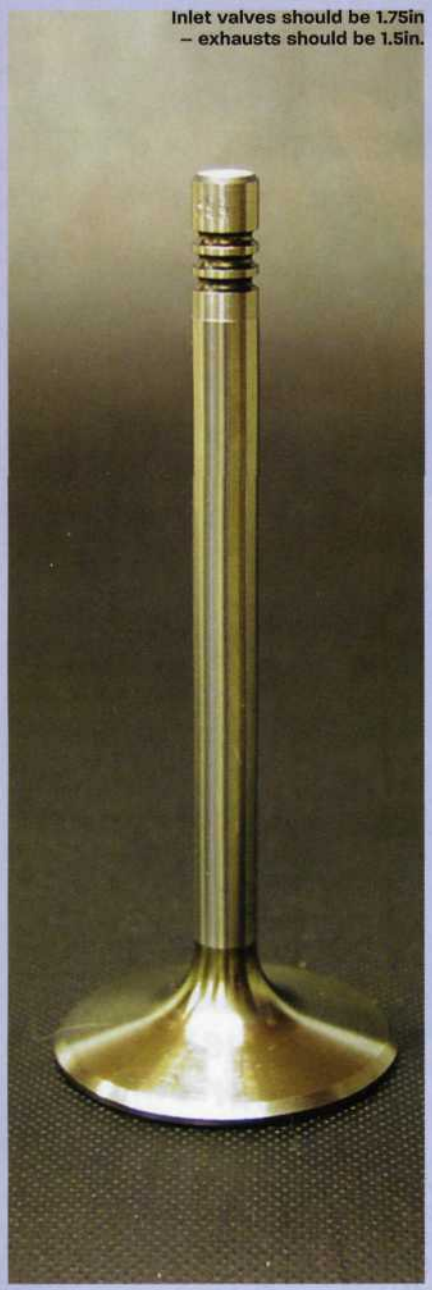
Porting

The best port shape is the 2-litre Injection casting. This has the inlet ports lifted up from standard and it gives you a better short side turn to work with onto the valve seat. The short side turn is the critical part of the Pinto port. Having the bigger valves fitted also gives you more metal to play with in this area. I used the 1600cc casting for this reason when I didn't have an Injection casting.

It's hard to describe the port shape required and it will change with the casting that you have. Basically the floor of the port is squared out slightly where it turns towards the seat. From a side profile the shape is not unlike the leading edge of an aerofoil. If you haven't the metal to work the port into this shape then go for a very flat slope with no short side turn at all (for example where a stock valve is retained). This looks more like a wedge of cheese than an aerofoil.

For heads with new guides you can

Careful porting is essential on the Pinto if you're to get any serious power from it.



Inlet valves should be 1.75in – exhausts should be 1.5in.

remove the entire guide boss – it makes it easier to shape the top of the port – but this has nothing to do with flow, it's just easier. If you are retaining the original guide do not remove the boss, there is no flow gain in doing so and the valve guide wear increases with the remaining shortened guide.

Unless you are experienced and have the right kit it's probably better to have the head done by someone who knows what they are doing. H.T Racing comes to mind or Charlie at CTM. Compression ratio wants to be 10.8:1 for fast road engines and 11.8:1 for a race engine. You can go higher but it's a trade off between piston-to-valve clearance and compression hike.

Camshafts

This is a nightmare area. When I made cams people always asked for a cam that would give a nice idle, pull from 1500rpm and rev to 9000. Wouldn't we all want that?

For a fast road engine on a down-draught carb I used to use the Emerald Phase 3 or Piper 285 Blueprint. For a softer option the Phase 2 or Piper 270 Blueprint. These are not the same cams. My camshafts were all made by David Newman Camshafts (016898 57109) and are still available from them. I mention the Piper cams for objectivity.

With side-draught carbs the Phase 3 was a favourite – although the Phase 4 gave more top end, the 3 had better mid-range. If the carbs are 45DCOE on 36mm chokes then I never used the full race Phase 5 (I don't know the Piper or Kent equivalents). With the full race cams I used 48DCOE carbs with 42mm chokes.

As a guide I used to see about 165bhp on the 45DCOE carbs and a maximum of 210bhp on the 48s with a full race engine. A lot of people thought that the 165bhp engine had at least 200bhp because the mid-range torque gave them very good performance. For a road car that's more important than a headline number.

That was all some years ago. I got into engine management when I first used mapped ignition on a race Pinto. This spread the torque and allowed the engine to make power way past the point where it fell over previously. I extended the useful rev range from 7,800rpm to 8,500rpm and this clinched a championship for us – snatched from the jaws of defeat, so-to-speak.

With engine management on fuel and ignition you could probably map a full race engine to run on the road without any problems but I can't see the point because a 16v Zetec will do a much nicer job and weigh a sight less too – which is where I came in.

Phosphor-bronze valve guides resist wear well.

Steel Vernier timing gear allows precise cam timing...

...as does even prettier alloy version of the same thing.

Don't go too wild with cams for road use. 160bhp is a good figure to aim for.