DRIVING MILD CRAZY

Most cars with 1000bhp are undrivable drag monsters. Not so Ken Henderson's stunning Supra. Despite being one of the world's most powerful cars – it kicks out no less than 1300bhp – it remains a surprisingly usable everyday driver. Yes, seriously

Words by Iain Ayre Photography by Mark Chin

Toyota Supra Turbo

The irony that Ken Henderson faces is not lost on him. As Economic and Community Development Director of a city in the high desert country north of the Los Angeles basin, he has a good enough salary to build one of the most powerful Japanese road cars in the world (recently dyno-tested on the TO4R rolling road at 1110bhp at the rear wheels, or around 1300bhp at the flywheel). The irony is that he can't use it in anger very much on the street: the headline 'Senior City Official Busted at 200mph' wouldn't do much for his civic credibility, although the opposite might be true of his cred with the Supra community. (Incidentally, Ken has a GPS-certified top speed of 203mph, with more to come.)

More irony: the roads down which we blasted to take our photos used to be Ken's favourites for weekday drives, but because of people like Economic Development Directors, the once-empty valley is now being economically developed and will soon be covered in small, but extremely expensive houses and large industrial buildings. California is just as bad as the UK for traffic jams and unaffordable housing these days.

Ken's status in the Supra community is legendary, partly because he insists on keeping his car in road trim. With this much power, most people would have fitted a rollcage, at the very least – and most would also have stripped the car out in pursuit of serious dragstrip times. If they're not dragstrip monsters, most 1000bhp Supras are trailer queens: kept silent and unused under lock, key and chamois-soft covers, and occasionally trailered out to be kissed clean and buffed up for a car show. If they're lucky, they may even be started up a few times a year and driven off their trailers.

Leather-trimmed cabin is very far from being stripped-out drag style. Number of gauges hint at the extreme nature of what's under the bonnet

In contrast, Ken's car is genuinely used on the street. Apart from the evil quad-disc OS Giken clutch (Ken maintains it's fairly tractable once you get used to it), this car has been carefully kept drivable on a daily basis. Most seriously high-horsepower Supras are just plain nasty to drive. Their power bands are thinner than an Olsen sister, their solid-mounted engines transmit every vibration to the cabin, and they accelerate more like grenades than motor cars. Compared to most, Ken's car is a sweetie. The exhaust rumbles a little, but it manages to escape police attention. Most of the interior is standard, with just a few extra clocks and suitable seats. Cruising along suburban streets, the ride is admittedly stiff, but really just feels like a car with slightly dialled dampers and ultra-low-profile tyres.

Given an empty highway, Ken checks the mirrors and plants it. There's Racelogic adjustable traction control, but the engine dismisses that with a snigger and continues to decide for itself how much it will spin the tyres, as a huge wave of power throws the car down the road. This controlled explosion can only last a few seconds, as the speedo needle whips up towards a 200mph speeding ticket. Off the throttle, the roar and whine are replaced by the chittering of blow-off valves as the car resumes more dignified progress.

The concept behind the Supra is Ken's, but it's been built as a joint project with SP Engineering. Up to a point – probably around 600bhp – an amateur engineer can cherry-pick good performance parts for the Supra and combine them to good effect.

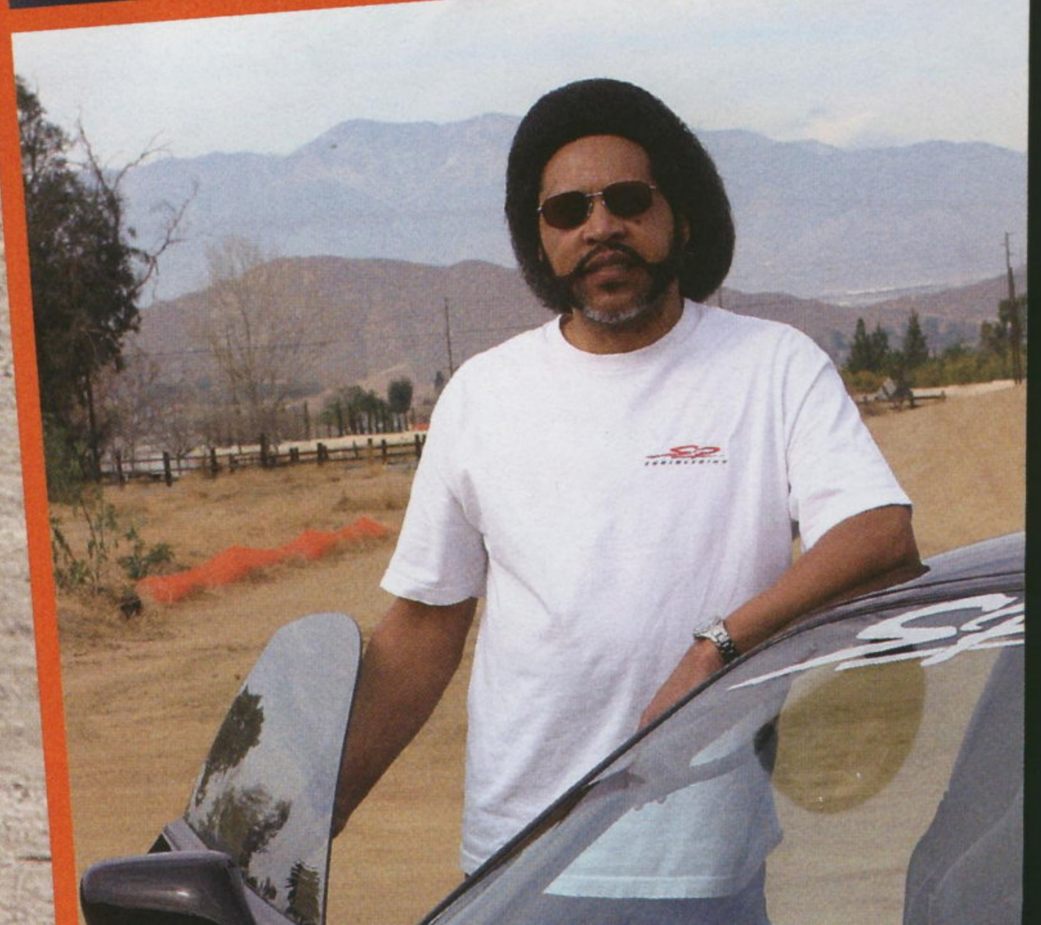
Toyota Supra Turbo

Despite its power, this Supra gets used regularly as a road car. That means it retains its air con, electric windows and other weighty luxuries

But at higher horsepower levels, things get very much more complicated – and engine builders need the experience to know how mods will interact with each other. For example, if you have a favourite primary pipe length for torque and have tried it with various different port sizes, the number of random variables is much smaller. For 1000-plus horsepower, you need to work with a tuner and engine builder – and you need to have absolute faith in that tuner and engine-building team. Ken has absolute faith in SP Engineering.

Three years ago, Ken thought his car was finished. It had even been repainted with the idea of doing a few shows for SP Engineering, a few American magazine challenge events and generally just being enjoyed. The engine had been taken about as far as a road-going standard-capacity 2JZ could reasonably go, which meant 801bhp at the wheels and 633lb ft of torque at 28.4psi of boost on 104-octane petrol.

The turbos were a pair of highly massaged GReddy TDO6L2 20Gs,



One of the world's most powerful cars: 1300bhp courtesy of HKS 3.4-litre stroker engine, two HKS ball-bearing turbos and zillions of carefully-honed mods

matched with six 720cc primary injectors and another six 310cc secondary injectors. That's right, staged fuel injection and dual fuel rails. The OEM crank was knife-edged, polished and balanced, the rods were Crower billet steel, the pistons were JE and the rings were Total Seal gapless.

The car was frisky and fun, and Ken was enjoying keeping his car going through the scenery rather than joining it, the injuries to his credit card were healing nicely and he was a happy bunny. Then SP Engineering took delivery of the first HKS 3.4-litre stroker kit to arrive in the USA. The goalposts had just moved: Ken's engine was suddenly… Ken's *old* engine.

You don't just pop in a stroker kit and go *large* on new turbos, though. First came a *newly*-built block, fortified by HKS and machined by Taylor Engines of Whittier, California, which has a major reputation in Top Fuel and Funny Car drag racing circles. The stroker kit comprises a balanced, forged, polished, nickel-plated long-throw crank, with forged HKS/Carrillo H-beam rods and nickel-plated pistons with ceramic-coated skirts and HKS low-friction rings.

The increased capacity and hotter, more powerful exhaust pulses allowed the effective use of bigger turbos, which are HKS GT3240s with dual ball-bearings. This is the first time in the US that these have been used as a pair.

The cylinder head was already capable of handling the gasflow of the previous engine and more, partly because it was designed for high gasflow speeds rather than high volumes.

The porting work (by Port Flow Design of Harbor City, California) was more a matter of shaping, surfacing and matching the ports than simply boring them out as big as they would go. It can be a mistake to enlarge ports to the max: big port bores can slow gasflow – and if it gets too slow, some of the fuel can stick to the port walls rather than make the car go faster. In Ken's case, the current port design and standard-sized Ferrea valves with HKS 272 cams for exhaust and intake have not restricted power or torque, but if there is any more potential power lurking in this engine, that's probably where it is.

When you increase the performance of a motor from 320bhp to 1300bhp, you are definitely pushing your luck, so Ken has done all he can to help the engine stay in one piece. The standard oil cooler is assisted by an additional Trust 16-row cooler, the standard radiator has been replaced by a big ARC aluminium number, and ARP studs hold the head on and keep the metal HKS head gasket from squirting out of the side of the engine.

Apart from big capacity and big turbos, electronics play a big part in maxing the power. The HKS F-CON V-Pro system is used, as it works well with Ken's requirements. It's a stand-alone system, but is piggybacked on to the factory ECU, so that Ken can still keep all the luxury features of an upmarket road car as well as all his optional brute power – the air conditioning, power windows and so on are all still fully functional. In fact, the only factory amenity not still on the car, cruise control, was eliminated by the VeilSide surge tank intake manifold. Engine function sensors are mostly by HKS, as well, which avoids complications with electronic mismatches.

The HKS system offers 32 x 32 bits for fuel and timing maps, and can very usefully run eight injectors any way you want – so the six 1000cc injectors for the six cylinders are complemented by two extra injectors, which allow more fuel into the whole engine for more power and give richer-mixture safety at the top end. A lean patch in the fuel map at 7000rpm will melt a nickel-plated, ceramic-coated piston nearly as quickly as an ordinary aluminium one. According to Ken, the eight 1000cc Denso injectors idle better than the six 1200cc or 1600cc injectors often seen in Supras making big power, and offer up significantly better fuel mileage, as well.

As for the red car (below), it's Ken's other Supra, with 'just a few tweaks'. But I reckon he won't be able to resist brewing up another Jekyll and Hyde job. Don't you? ●

'Ken has a GPS-certified top speed of 203mph and a dyno print-out of 1110bhp at the wheels, yet it's still got air con and no rollcage'

THANKS/CONTACT

Thanks to Alex Shen, owner of **SP Engineering**, ('an amazing mechanical engineer, engine builder and tuner, certified HKS F-CON V-Pro tuner and like a brother to me'); Jason Reinholdt, SP Engineering chief engine builder and certified HKS F-CON V-Pro tuner; and Hiro Kondo, SP Engineering chief, HKS F-CON V-Pro tuner and fabricator
Tel: 001 626 333 5398, website: www.sp-power.com

Specification

Ken Henderson's Toyota Supra Turbo

Engine: Toyota 2JZ-GTE 2997cc 24-valve, in-line six-cylinder engine, HKS-fortified block with HKS 94x87mm stroker kit making 3352cc, forged, balanced, polished and nickel-plated HKS long-throw crankshaft with forged HKS/Carrillo H-beam conrods, forged pistons with nickel-plated tops, ceramic-coated skirts, HKS low-friction piston rings and gudgeon pins (+1mm bore, +8mm stroke), HKS 1.6mm 'Stopper' metal head gasket, 2JZ-GTE cylinder head, ported and polished by Port Flow Design, HKS 272 camshafts, JUN/Toyota adjustable cam gear, Ferrea stainless valves and valve train kit with double springs, titanium retainers, stainless guides, locators and locks, reprofiled ports, TRD engine mounts, GReddy underdrive pulley kit, GReddy Extreme timing belt with Sound Performance billet timing belt tensioner, ATI SFI-approved crankshaft dampener/pulley, ARP studs, Earl's dual-layer steel braided oil/water lines and fittings

Electronics: HKS F-CON V-Pro standalone ECU piggybacked on standard ECU, 32 x 32 bit resolution for fuel and timing maps, HKS Type DLI ignition amplifier, HKS Super-Wide range pressure sensor, HKS vein pressure converter air temperature sensor, HKS knock amplifier, HKS wideband O2 sensor, HKS EVC-Pro boost controller, HKS turbo timer and harness

Air: Two Blitz SUS Racing stainless steel air filters, VeilSide intake manifold system (surge tank with internal velocity stacks, 100mm throttle body, lower intake manifold with ceramic-coated intake runners), twin HKS GT3240 580-PS dual ball-bearing turbos, Blitz Racing dual-drive blow-off valves with uprated springs, GReddy JDM four-row front-mounted intercooler, SP Engineering custom aluminium intercooler pipe kit, SP Engineering/ADF custom aluminium intercooler cover, SP Engineering custom aluminium intake piping

Fuel: SP Engineering custom fuel system with dual Denso fuel pumps, Earl's stainless steel lines and fittings, VeilSide billet high-flow fuel rail, TRD fuel pressure regulator, six-plus-two Denso fuel injectors (1000cc top feed, low impedance)

Exhaust: HKS SUS304 ceramic-coated two-piece tubular stainless exhaust manifold with matched primaries, two HKS 50mm GT wastegates, 1.6bar wastegate springs, HKS/SP Engineering dual downpipes and custom midpipes (JetHot 2000 ceramic-coated), HKS 102mm racing titanium exhaust

Cooling: Factory oil cooler plus Trust 16-row thermostatically-controlled oil cooler with remote filter, ARC aluminium high-performance radiator, SP Engineering custom power-steering cooler

Transmission: SP Engineering custom flywheel bolts, OS Giken quad-disc multi-plate clutch, OEM V160 Getrag gearbox with TRD heavy-duty mounts, ACPT 3.25in 11,000rpm carbon-fibre driveshaft, OEM Torsen limited-slip diff, 3.13:1 final drive, Racelogic adjustable traction control

Suspension: OEM double-wishbone suspension system, custom Tein RA aluminium 16-way adjustable coilover system with pillow mounts, independently adjustable height, rebound and bounce, TRD 'Big-Ass' front and rear anti-roll bars, Do-Luck aluminium floor assist bars, Do-Luck aluminium rear cross-brace, TRD front tower brace, Cusco carbon-fibre rear tower brace

Brakes: Brembo four-piston callipers, Brembo 14inx1.3in vented cross-drilled cast-iron discs, Ferodo DS2500 pads, Wilwood brake proportioning valve, Earl's steel braided brake lines, factory ABS system

Wheels & tyres: Front: 18x9in custom forged split-rim Work Meister S2R alloys with 245/40x18 Bridgestone S-02A Potenza tyres; alternatively, 19x10in custom three-piece Work VS-TX alloys with 275/30x19 Michelin PS2 tyres. Rear: 18x10in custom, forged split-rim Work Meister alloys with 295/35x18 Bridgestone S-02A Potenza tyre; alternatively, 19x12in custom three-piece Work VS-TX alloys with 315/25x19 Michelin PS2 tyres

Exterior: Do-Luck Type II bodykit with front bumper cover/under diffuser, bonnet, wide-arch wings, side skirts, rear spoiler, rear under diffuser and Type I rear over-wings, Do-Luck aluminium grille mesh inserts, 1997/1998 OEM front lighting with Philips HID 6000K bulbs, BMW Jet Black paint

Interior: Black leather Sparco Milano seats, matching leatherseats.com rears, Momo Race steering wheel with Top Secret quick-release hub, OEM gear lever with C's short-shift kit, Creative Car Audio and Motorsports custom gauge pod and controls for custom HKS turbo timer, EVC-Pro boost controller, SP Engineering intercooler temperature meter, SP Engineering A-pillar gauge holder with GReddy gauges (boost meter, EGT meter, peak/hold oil temperature and oil pressure, peak/hold fuel pressure, peak/hold water temperature), TRD 10,000rpm tachometer, SP Engineering intercooler temperature meter, SP Engineering/ADF custom aluminium glovebox plate, Valentine One radar/laser detector with concealed display unit, Custom SP battery relocation kit