Toyota Supra Mk IV

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Photography: Tom Wood

High performance, brilliant handling and superb refinement are the key features that underlie the success of Toyota's flagship sports coupé

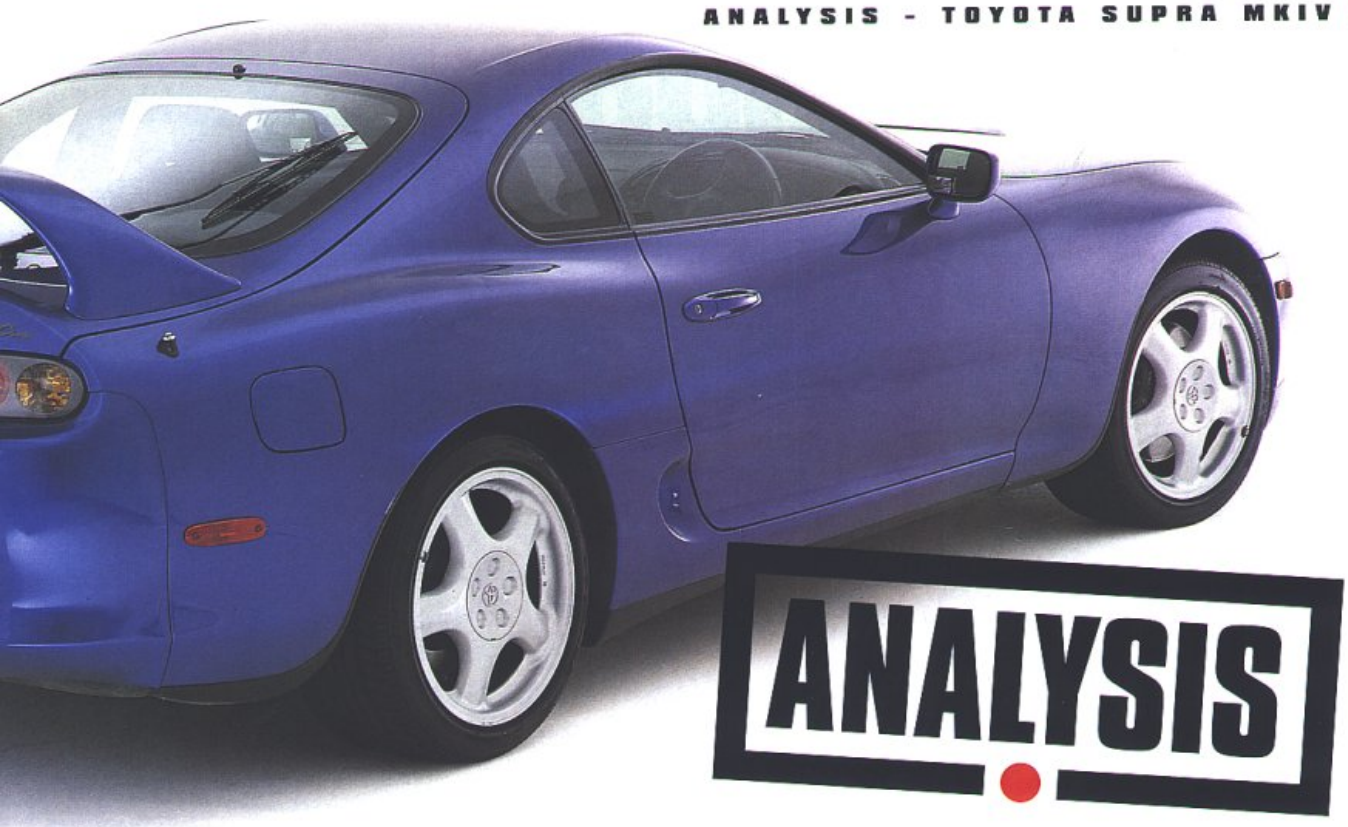
When the definitive version of the twin-turbo Supra was unleashed in May 1993, it was the most powerful production car Toyota had ever made. The 24-valve straight-six whirled easily to its 330bhp maximum at 5,600rpm, delivering a 4.9-second 0–60mph time along the way. The only reason the Supra wouldn't hit its potential 170mph is because the engine was electronically limited to 155mph to appease the authorities.

All this power was certainly something to shout about, but Toyota was also concerned that the car's huge performance potential could land the unwary in big trouble. So, along with a host of passive safety features, the engineers chose to moderate the car's road behaviour electronically by introducing a lateral-G sensing anti-lock brake system. It works with the traction control to reduce the likelihood of skidding should the driver suffer a mid-corner panic-braking attack.

But, as well as a performance machine, this is also a refined sports car. Fluid-filled engine mounts isolate engine vibes, while sandwich-steel sheets form the front bulkhead and rear wheel arches (a technique first used in the luxurious Lexus LS400) to help keep the cockpit insulated against vibration and road-surface noise. Some felt that Toyota had gone too far with this obsession with noise control and refinement, fearing that it robbed the Supra driver of the traditional sensory thrills, leaving only the muted exhaust rumble and the swinging tacho needle to convey the sensation of speed. The sceptics needn't have worried; the superb smoothness hasn't prevented the Supra from becoming one of the world's favourite Japanese muscle cars.

The Supra Mk IV, as this version is known, owes some of its development to its origins as a sporty coupe version of the Celica. But, in truth, this is a far more highly developed and complete machine than anything that had gone before. By the time it reached this ultimate generation Supra, Toyota had brought a whole range of new technologies to bear to make this flagship road racer not only extremely fast and safe, but also environmentally friendly. It is ironic that ever-stricter environmental considerations eventually brought the Supra, along with other muscle cars of its type, to the end of the road.

Designers and engineers clashed with a vengeance during the creation of the Mk IV, or JZA80 as it's known within Supra circles. Of course the car had to be stylish, but the engineering faction insisted on an overriding functionality. The result is a stunning compromise, a body with a sporty two-seater look, bulging wheelarches and minimal front and rear overhangs, but also with superb aerodynamics.



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The big air intake blends perfectly with the front-end design, but it is also so effective in drawing cooling air to the radiator and intercooler that an additional electric cooling fan originally considered necessary was deleted from production cars, saving weight and power. The side vents cool not only the brakes but the differential housing and its oil cooler. The front airdam helps to reduce drag while the active front spoiler, which lowers at speeds over 56mph, assists in adding stabilising downforce. In the interests of aerodynamics, the Mk3 Supra's pop-up headlamps went in favour of faired-in glass, while airflowed side mirrors sprouted from the door panels, rather than from the window frames.

With a considerably enhanced equipment specification planned for this new model, engineers were faced with a formidable task in keeping the weight of the new Supra to a minimum. Supercomputer analysis determined the best structure for the body, and optimised the location of reinforcement to give the body exceptional rigidity without incurring extra weight.

Using aluminium for the bonnet panel helped, but this light metal found good use in structural areas, too, such as in reinforcement for the front bumper, suspension members and engine mountings and the engine oil pan. Brake calipers are also partially aluminium.

Plastics played a part, including high density polyethylene for the fuel tank, which is not only lighter than steel but moulded to fit into available space. One weight-saving casualty was the deletion of the telescopic steering column adjustment of the earlier Supra, but the switch to a single exhaust pipe had no deleterious effect on the car's performance. These weight-saving measures went into much finer detail, such as the use of recessed, shortened bolts wherever possible. When components could be sourced from different suppliers, the one weighing the least won the order.

For all this, the kerb weight of 1480kg doesn't exactly make this a featherweight, but for a big car with so much luxury equipment it is good going. Also to be commended is a front/rear weight distribution close to 50/50, a key point in achieving fine handling.

Putting this lightweight structure into action is a superbly engineered twin-cam multivalve straight-six engine, or rather two variants of the 2JZ-GE unit. In its normally-aspirated form this engine produces 224bhp at 5800rpm and 210lb.ft of torque at 4800rpm. Boosted by twin turbochargers in 2JZ-GTE form, however, the engine produces a hefty 330bhp, which gave the Supra the best power-to-weight ratio of any car in its class.

The engine has 'square' dimensions, with a bore and stroke of 86mm giving a total swept volume of 2,997cc. The crank is supported on seven main bearings, giving it excellent high-rev refinement. The turbo engine runs an 8.5:1 compression ratio, which is one reason why it is not possible to simply bolt a turbo onto the normally-aspirated engine, which runs a 10:1 compression. Distributorless direct ignition reduces voltage losses through high tension cables, with each cylinder being fired by its own individual plug-topping coil. Durability is enhanced by the use of a metal head gasket and an aramid-reinforced timing belt.

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The most striking feature of the turbo engine is the broad, strong torque band, with 90 per cent of its 325lb.ft delivered from as low as 1,300rpm and staying high to over 5,000rpm. This muscle is provided by the sequential action of the small, lightweight, low-inertia turbochargers. Though a single, larger turbo would have given the same power output, it would have taken longer to spin up to speed. A smaller, lighter turbo spools up much faster, but two are needed to give the same ultimate boost pressure and volume.

Although the turbos are mounted in parallel, the valving on the intake and exhaust ducts forces them to work sequentially, so at low speeds the full exhaust pressure is directed at the first turbo only, which quickly provides the necessary boost to deliver high torque at low revs. As the engine revs rise, a valve opens to allow the exhaust gases to drive both turbos. A similar effect is achieved in many modern turbocharged cars using a single turbo with variable vane geometry, but the twin-turbo concept not only works well dynamically for the Supra, it also has a charismatic ring to it.

It's interesting to note that, because British drivers were considered more likely to use the Supra's big performance, slightly larger turbos were fitted than those on Japanese-market models. In addition, the UK-spec engine had a different inlet cam, bigger injectors and a larger-bore exhaust downpipé. As such, Jap-spec grey-import twin-turbos claim a lower 280bhp and 318lb.ft of torque at 3600rpm. The actual bhp figure may be slightly more than this; Japanese car-makers are not permitted to claim figures greater than 280bhp for the home market. The normally-aspirated Supra is relatively rare in this country but could still give a good account of itself, with its straight-six developing 220bhp at 5800rpm and 210lb.ft of torque at 4800rpm.

Both normally aspirated and twin-turbo versions of the Supra could be specified with four-speed automatic or a choice of five-speed or six-speed manual transmissions, though on official imports to the UK only the twin-turbo came with the six-speeder. This was a Getrag box, built in Germany and shipped to Japan for assembly. It is a close-ratio box with a short shift that has proved ideal in this powerful sports coupé application.

The six-speeder was described as an over-drive box, which is only just true since in top gear the Supra hits its 155mph maximum some 200rpm below the engine's 5,600rpm peak power speed. De-limited, the Supra's true top speed is closer to 170mph, which would have

The Supra MkIV (JZA80) presented a striking form when it was first introduced in '93, yet it still turns heads today. Toyota's flagship coupé combined great looks with effortless performance, superb handling and a surprisingly high level of refinement. It was also tough, reliable and well built. The high price was the only real barrier to greater popularity in Britain

the engine revving at 6,000rpm, so it is actually closer to being an ideal sports ratio. In real-world situations, of course, the top-gear ratio is high enough to allow quiet cruising and contributes to potentially good fuel economy. This six-speed box is designed for smooth, slick shifts with triple-cone synchromesh on first and second, double-cone synchro on third and fourth and single cone on fifth and sixth. In practice, however, the box often proves slightly obstructive on that crucial first shift into second gear, which can hamper a racy acceleration attempt.

The four-speed ECTiS automatic transmission (Electronic Controlled Transmission Intelligent Sports) is not particularly out of place in this potent machine, because its electronic control allows it to switch between normal automatic action for relaxed driving and a manual mode when the driver feels more aggressive. With manual selection switched in, the transmission makes its shifts almost twice as fast as it does when in automatic mode, adding to the feeling of response and control. In 'normal' mode the shift pattern is deliberately a little slower and more controlled to make the gear-changes almost seamless.

OWNER'S VIEW

The owner of this late-model sapphire-blue Supra is Mike Lavery. He bought it after having owned ST185 and ST205 Celica GT-Fours, both of which he rates highly. This year-2000 model, with the latest VVTi twin-turbo engine, had covered just 500 miles when Mike bought it from the Japanese Import Centre in Surrey last April. He thought then that it was just too good to turn down and has never had cause to regret that decision.

'I have always been a fan of Japanese cars as they are very reliable, built well and come as standard with many options. When you have a family it can be difficult to find a sports car with some sense of practicality,' he explains. 'Many of them require you to have another car for daily use, but the Supra does it all. It's also much faster than most other sports cars.

'The best points are its superb performance, individual styling, excellent build-quality and reliability, rarity, excellent interior layout, driving position and drivability. It's nice and composed for short journeys and popping to the shops, but being able to unleash it into a beast at anytime ... that's awesome!. However, it's quite a heavy car and the traction control could be better. It might benefit from four-wheel drive as it's easy to get the rear swapping ends with the front.

'My wife loves driving it, too, and the children fit nicely into the rear seats and have enough leg room for their small legs. Luggage space is minimal but this is not a problem for general shopping or going away for a weekend. It does meet my expectations of an all-round sports car. Try and find another affordable, practical sports car that performs like the Supra – I think not!'

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Sporty cabin has 2-plus-2 accommodation and is reasonably practical with its lift-up rear hatch. Twin turbo 330bhp engine in UK-spec cars would be good for 170mph if not speed limited. Grey-import Jap-spec cars are rated at 280bhp and have smaller turbos, smaller brakes, and a number of other detail changes

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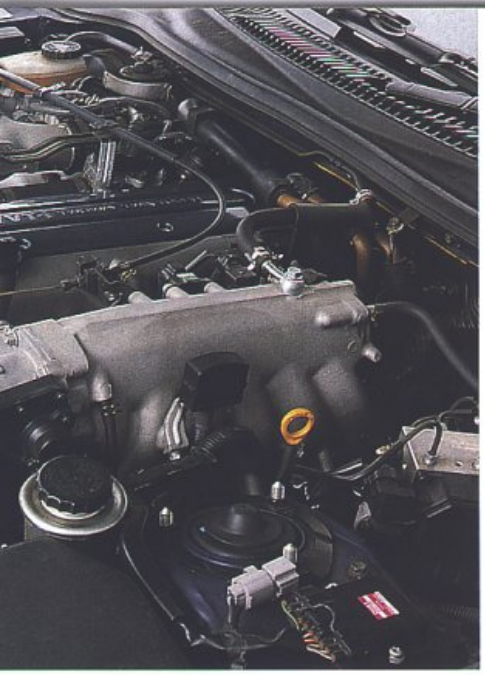
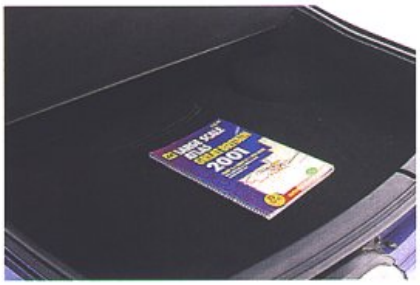
With so much power, it is important to control wheelspin. This is achieved by a variety of mechanisms, one being a Torsen limited-slip rear differential, a bias-gear design that constantly controls torque to each driveshaft, unlike more common clutched types which engage only after wheelspin begins. Because the engine is so responsive, the accelerator travel is designed so that it doesn't open in linear proportion to the pedal, but opens more slowly initially to help the driver feed power in progressively. If acceleration is brutal enough so that the a wheel begins to break traction, the electronic traction control comes into effect by applying the brake on each individual spinning wheel and by reducing engine power both by means of a sub-throttle valve and through retarding the ignition timing. Since there are times that this could spoil the driving experience, the traction control can be switched off.

JOIN THE CLUB

The specialist club for the Supra Mk IV owner (and earlier Supras too) is the **UK Supra Owners Group**, which runs a comprehensive website at www.supras.co.uk. The site contains a wealth of information about Supras, both official British imports and direct imports from Japan, with links to other Supra enthusiasts' websites around the world. For more information email club organiser Andy Stallwood at andy@supras.co.uk

The Toyota Enthusiasts Club also covers this model. For contact details see 'Clubs Directory' in the news section.





Double wishbone suspension was the natural choice for such a thoroughbred machine. This helps to minimise track and camber changes in cornering. Small offset and caster angles combine to give excellent control under braking and enhance cornering response, while a slight negative camber on the rear wheels aids cornering stability. The rear suspension also has a degree of built-in compliance that applies slight toe-in under braking. The brakes, big 323-mm ventilated discs on the front, were a Toyota first when this Supra model was launched, using spiral-shaped vent fins to increase the cooling area and reduce turbulence.

Although only two versions of the Supra were officially imported into the UK (the normally-aspirated model and the twin-turbo range-topper), both with leather upholstery and a comprehensive equipment spec, there were four distinct models (at least) available on the Japanese home market. The non-turbo car was a low-specification base model known as the SZ, while the twin-turbo came in RZ or slightly better-equipped RZ-S form with part-leather upholstery, electric seats and air conditioning. The range-topping GZ included the active front spoiler, uprated stereo and airbags for driver and passenger. There's also an Aerotop with removable glass roof panels, thought to be an option only with auto transmission. All Jap-market Supras are speed-limited to 112mph, unless de-restricted.

The huge rear wing fitted to virtually all officially-imported Supras was not an original fitment on the non-turbo car, but could be specified as an option – and equally it could be deleted from the specification of the twin-turbo model. Unique to the British market Supra is the big air scoop on the bonnet, which draws an extra flow of air to the intercooler.

This is only one of a number of mods for the British driver. The traction control was also very much a British-market feature. Japanese and American-market twin-turbo cars also used the same smaller-diameter brake discs as the non-turbo version, but these were upgraded for Britain. This is one reason why the wheels for UK-spec cars were 17-inch rather than the original-specification 16-inch. British-market tyres were Michelin Pilot 235/45R17 in front and 255/40 R17 at the rear, chosen because they gave the best combination of good adhesion with low noise.

More than eight years after it first delighted sports car enthusiasts, the Supra still looks fresh. In fact, the Supra is still in production in Japan and has enjoyed further development since it was withdrawn from the export market in around '96 (UK-spec cars were actually sold up to '98). Since then, it has had a mild facelift at the front-end and now has a revised cylinder head with variable valve timing (VVTi), and there's also the option of a push-button-type tiptronic-style auto/manual transmission.

The constant demand for greater efficiency and technological advance have brought newer and quicker sports cars to the fore, but the innovations that put the Supra ahead of all others at its launch still gives a competitive edge. The Supra's well balanced rear-drive chassis, allied to effortless power in a refined package with jaw-dropping looks, continues to provide a special appeal for the enthusiast driver. It remains a car that Toyota, and the many Supra owners around the world, can truly be proud of. ●

SPECIFICATION

	Toyota Supra Mk4 Twin Turbo (JZA80)
ENGINE TYPE	six-cylinder DOHC 24-valve, turbocharged and intercooled, longitudinal, front-mounted, rear-wheel drive
BORE AND STROKE	86x86mm
DISPLACEMENT	2997cc
COMPRESSION RATIO	8.5:1
MAX POWER	326bhp (330PS) at 5,600rpm
MAX TORQUE	325lb.ft at 4,600rpm
TRANSMISSION	Six-speed manual, limited-slip rear differential, traction control (auto optional)
SUSPENSION	*Front* Double wishbone, coil springs, anti-roll bar
	Rear Double wishbone, coil springs, anti-roll bar
BRAKES	*Front* 12.7in vented discs, four-pot calipers
	Rear 12in vented discs, two-pot calipers
STEERING	Rack and pinion, speed-proportional assistance
WHEELS AND TYRES	Wheels: 17in alloy
	Tyres: 235/45R17 (front), 255/40 R17 (rear)
DIMENSIONS AND WEIGHTS	Length: 4520mm
	Width: 1810mm
	Height: 1270mm
	Wheelbase: 2550mm
	Track front/rear: 1520mm/1525mm
	Fuel capacity (gal): 15.5
	Kerb weight: 1490kg
PERFORMANCE	0-60mph 4.9secs
MAX SPEED	155mph (limited)