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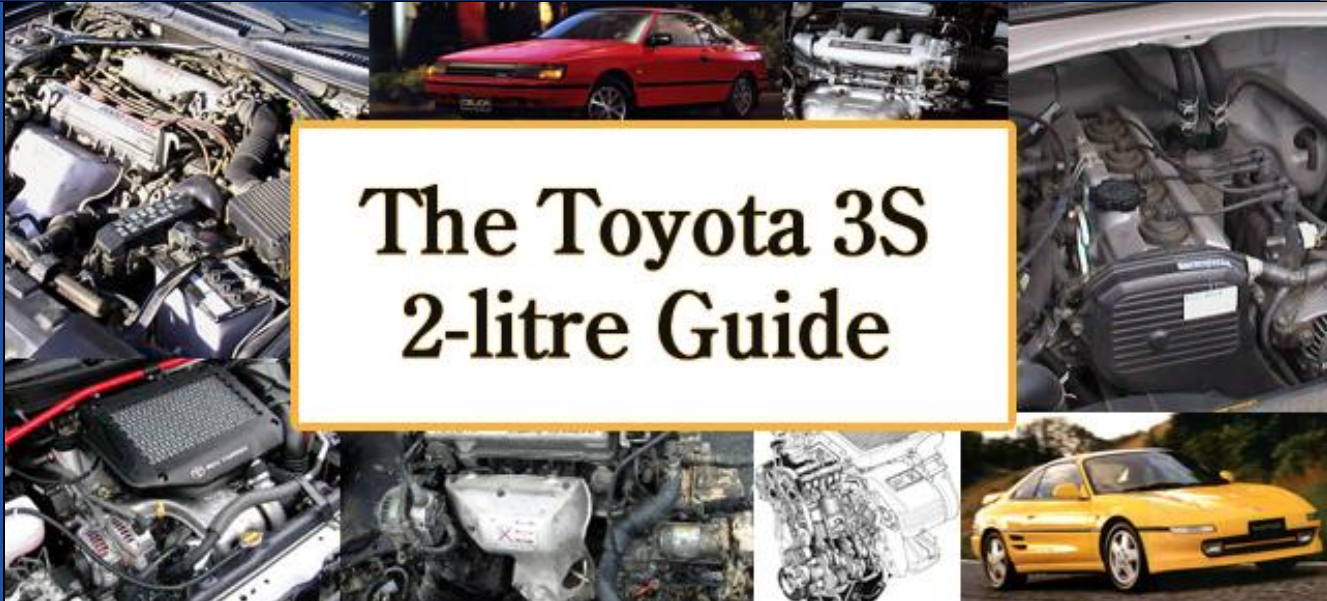
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# The Toyota 3S 2-litre Guide

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## The Toyota 3S 2-litre Guide

The detailed evolution of the Toyota 3S series engine

By Michael Knowling

### At a glance...

- Guide to Toyota 3S engines
- Mechanical specs
- Power and torque figures
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Here in Australia, one of the most overlooked 2-litre performance engines is the Toyota 3S. In factory form, the naturally aspirated versions are good for up to 154kW while the turbocharged models (which have proven their worth in world rallying) generate up to 191kW. These are sophisticated and durable engines that are close rivals for the popular Subaru EJ20 and Mitsubishi 4G63 – so let's check 'em out...

## Early 3S Engines



The first Toyota 3S-FE and 3S-GE engines were released for the 1986 model year and, fittingly enough, in the nose of the ST162 Celica (which was a monumental improvement over the previous model). Both 3S-FE and 3S-GE engines have iron blocks with a 86 x 86mm bore and stroke delivering a total swept capacity of 1998cc. But the cylinder heads of the FE and GE engines are quite different. The 3S-FE is regarded as the low output 'economy' version with its relatively narrow angle 16-valve DOHC head, while the 3S-GE has a wider angle head which is better for producing power. Toyota Variable Induction System (T-VIS) is also used in some models and the 3S-GE typically has a higher compression ratio than the FE.

In the '86 ST162 Celica the 3S-FE generates 86kW while the higher-spec 3S-GE puts out 96kW at 6000 rpm and 147Nm of torque at 5200 rpm. The ST162 was the first Celica to employ front-wheel-drive, so its 3S engine is arranged for transverse mounting and comes attached to a transaxle.



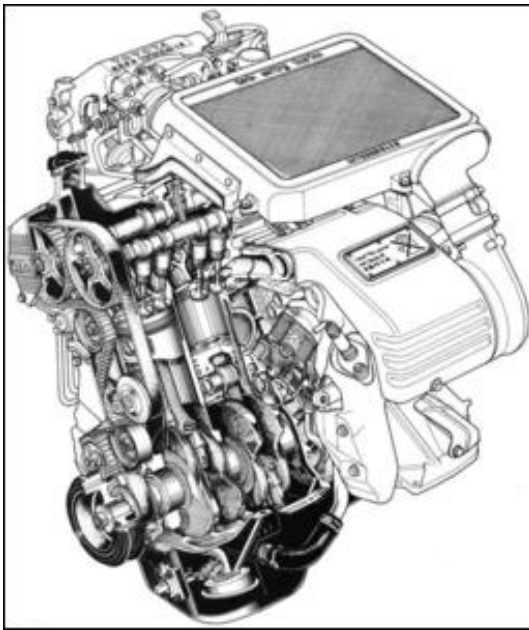
The turbocharged 3S-GTE version was released at the same time as the atmo 3S-FE/GE. Available in the ST165 Celica GT-4, this first generation 3S-GTE is equipped with fully floating pistons that deliver a boost friendly static compression ratio of 8.5:1. A Toyota CT26 turbocharger delivers around 9 psi boost through a compact water-to-air intercooler and output is 136kW/240Nm. Like its contemporary atmo cousins, a vane-type airflow meter is employed as part of the electronic management system.

In the next few years, the 3S engine series spread into a variety of vehicles.

In 1988 an 88kW version of the 3S-FE was released in the SV21/25 Vista and Camry. A high-performance of each model was also released using a 9.2:1 compression ratio version of the 3S-GE - output is 103kW at 6200 rpm and 172Nm at 4800 rpm (achieved on normal unleaded fuel).



Slightly smaller than the Vista/Camry is the Toyota Carina ED. In '89, the ST182/3 Carina ED was introduced with the ho-hum 3S-FE as well as an updated 3S-GE (with a 10.1:1 compression ratio) making 121kW and 191Nm. This engine is widely known as the second generation 3S-GE. At the same time, top-line models of the '89 Corona range swallowed the 121kW-spec 3S-GE.



Nineteen eighty-nine also saw the release of the Toyota SW20 MR-2 which was powered by a mid-mount version of the 3S engine. Base MR-2s come with a second generation 3S-GE generating 121kW but the go-fast MR-2 GT packs the second generation turbocharged 3S-GTE. This beast uses an 8.8:1 static compression ratio (up from 8.5:1), slightly altered CT26 turbocharger and an air-to-air intercooler. Outputs are 165kW and 304Nm.

The same second generation 3S-GTE was also fitted to the 1990 ST185 Celica GT-4 (the first GT-4 model seen in Australia). The naturally aspirated version of the '90 Celica (ST162) was also equipped with a 3S-FE or 121kW 3S-GE.



In 1990, the Vista/Camry range was updated to the SV32/33/35 series (which looks very similar to the first Australian

'wide body' Camry). The entry-level 3S-FE was tickled to deliver around 100kW but, as previously, hi-po versions scored an unchanged 121kW 3S-GE.

In 1992, the newly introduced Caldina wagon and Carina hardtop range were released with only a 3S-FE. The range was later reconfigured so only 4WD models used the 3S-FE. Nothing spectacular here.



The 3S series started to stir interest again when the so-called third generation 3S-GE appeared in the 1993 update SW20 MR-2 and ST202/203 Celica. The 3S-GE was given a 10.3:1 compression ratio and power increased to 132kW at 7000 rpm. But this applies to five-speed manual versions only – the autos are rated at 125kW.

At around the same time, the turbocharged 3S-GTE (fitted to the MR-2 GT and ST205 Celica ST205) was revised with a MAP sensor based management system, removal of T-VIS and other modifications. In MR-2 form these third generation 3S-GTEs push out 180kW while in GT-4 spec (using a large water-to-air intercooler), you're talking 188kW. Incidentally, the Australian delivered ST205 GT-4 is rated at just 178kW.

In addition to the base MR-2 and Celica models, the third generation 132kW 3S-GE was applied to the '93 ST202/203 Carina ED and Corona Exiv hardtop. The same engine was later added as an option in the ST195 Caldina.

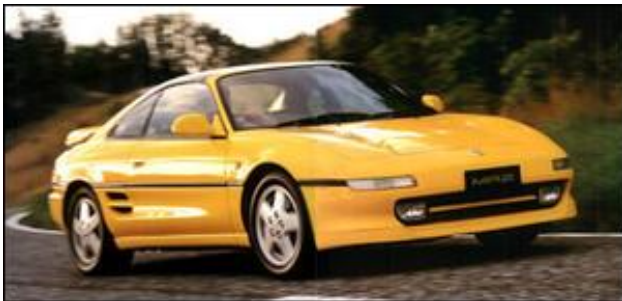


In 1994, the 3S-FE was slotted into base-spec ST206 Curren coupe (essentially a notchback Celica) while up-spec versions were sold with the 132kW 3S-GE. This year also saw the replacement of the SV32/33/35 Vista/Camry with the SV41/42/43 model. The new model retained the services of the 3S-FE in low-spec models and the go-fast option was eliminated.

Nothing more than engine shuffling occurred during 1996. The newly introduced Ipsum, Town Ace Noah and Lite Ace Noah people movers were powered by the 3S-FE. The increasingly popular RAV4 was also made available with the third generation 3S-GE, however output was a surprisingly low 121kW.

## Late 3S Engines

In 1997, Toyota started throwing some major enhancements at the 3S engine range.



The naturally aspirated versions of the AW20 MR-2 and ST202 Celica were treated to VVTi (variable valve timing) and an 11:1 compression ratio for a substantial increase in output. Known as the fourth generation BEAMS 3S-GE, this engine makes an impressive 147kW at 7000 rpm and 206Nm at 6000 rpm. Interestingly, there were no major changes to the turbocharged MR-2 GT or ST205 GT-4 except, by this time, a CT20B turbocharger had been

adopted.



The '97 ST215 Caldina also benefited from VVTi and 11:1 comp. The AWD GT version kicks out 140kW and 206Nm and, later, the ST210 front-drive scored the same engine. And, to make the Caldina even more appealing, a GT-T version was released with turbocharged 3S-GTE grunt. Curiously, the Caldina GT-T's 3S-GTE puts out slightly more power than the MR-2 or GT-4 - 191kW and 324Nm.

And the action kept coming during 1998.



The most potent version of the atmo 3S-GE – the fifth generation 'BEAMS' Dual VVTi – was introduced in the Altezza RS200. With its infinitely variable inlet and exhaust cam timing, 11.5:1 compression ratio, electronic throttle control and low restriction exhaust, you're talking a huge 154kW and 216Nm (at a high 7600 and 6400 rpm

respectively). Auto versions are detuned slightly to 147kW at 7000 rpm and 216Nm at 4800 rpm. Note that these are longitudinally mounted engines configured for rear-wheel-drive.

Interestingly, the 1998 Nadia people mover, SV50 Vista and ST210 Corona Previo were made available with a newly devised 3S-FSE. The FSE engine features a 10:1 compression ratio and direct injection to achieve 107kW and 196Nm on normal unleaded – a good middle ground between the conventional 3S-FE and 3S-GE. These direct injection engines come tied to a front-wheel-drive automatic transaxle only.

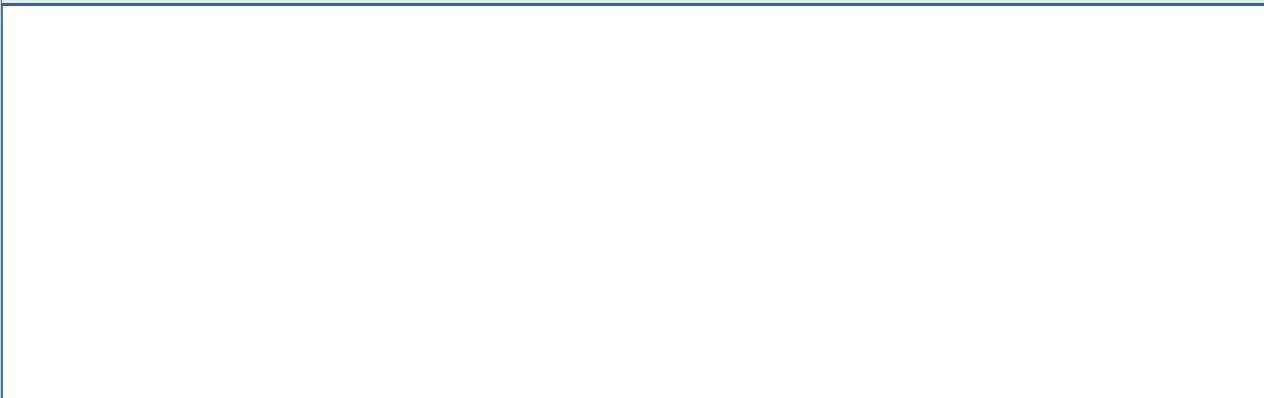


But Toyota saved the best 'till last.

In the late '02 Caldina GT-T (ST256) you'll find a fourth generation 3S-GTE boasting direct-fire ignition, a new intake manifold, revised engine internals and an integrated exhaust manifold/turbine housing. Curiously, you won't find the VVTi system as fitted to atmo models. Power? A range-topping 191kW and 324Nm.

Sure, 191kW is slightly shy of 206kW output of the top-line Subaru EJ20 and Mitsubishi 4G63 Turbo engines – but minor breathing mods will soon even-out the balance of power...

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