Triumph 2000/2500/2.5 Tuning

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Engine

Typical Results

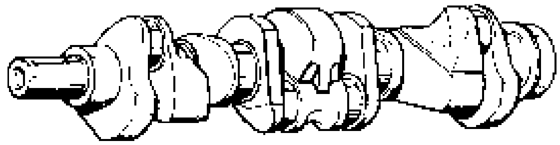
	Power:	*Power band:*	*Torque:*
2.5PI unmodified Mk2	**124bhp(DIN)** @5450rpm	**2000-5500rpm**	**152lb.ft** @2000rpm
2.5PI TR5 camshaft	**142bhp(DIN)**	**2500-6000rpm**	
2.5PI TR5 camshaft, 6-3-1 manifold	**165bhp(DIN)** @5500rpm	**2500-6000rpm**	
2.5PI TR5 camshaft, 6-3-1 manifold, modified head, exhaust	**180bhp(DIN)** @5800rpm	**2500-6500rpm**	**200lb.ft** @4000rpm

These figures are based on the Tuning Manual by G. Thomas.

Hints on engine tuning

Replace the mechanical fan with a thermostat controlled electric. This saves a few bhp at maximum RPM, and removes a source of crankshaft stress. At speed, sufficient cooling will be achieved without fan boost.

The standard cooling system is quite capable of handling an engine with increased power, as long as the radiator is in good shape.



 The bottom end must be sound. The crankshaft can be Tuftride hardened for longer life, in which case it is crucial that the bearing areas must be polished after the treatment. Ensure that the bearings are not too tight. Use Vandervell bearings. For a 2.5 litre with high output, cross-drilled oilways are highly recommended, plus pinning of bearings [Racetorations] [Witor].

 Ensure that the oil system is sufficiently good by installing a blue-printed oil pump, which will have tolerances machined down to a minimum. Do not modify the oil pressure relief valve: Excessive oil pressure does not contribute to anything except extra wear on the oil pump, and extra pumping losses [Racetorations] [TriumphTune] [Witor].

 The intake air should not be taken from the engine compartement itself, but instead from the cool air available at the front of the radiator. This is standard Triumph practice, but one often sees the inlet hoses beeing removed for *presumably* practical reasons. A free-flow air filter element is beneficial as well [Witor] [TriumphTune].

 Installing petrol injection on a carburetted engine is an efficient way of increasing the power significantly. Expect an increase of well over 20 bhp, with increased torque in both high and low bands. Match it with a TR5 camshaft, and the entire car will be transformed.

Triple twin Webers/Dellortos will also work well, and will require less maintenance than the PI system. With carburettors, there is always a compromise between top and bottom end power. Size 40 is generally recommended, with 45 suitable for cases where only top end power is a concern. Generally, carburettors will loose say 10 bhp, plus perhaps a bit of the instant PI response.

Forget the hype about Lucas PI *accurate metering*, though. The PI must usually be set up rich in the low band to run well.

Not that twin carburettors does not have possibilites, when such a setup is required or desired. Kastner reports 172 bhp at 6000 RPM with twin 175 Strombergs (the same engine with PI had 196 bhp, the camshaft was an S-4, the compression ratio 1:12.3).

 There has recently become available an electronic fuel injection conversion kit, which is an up-to-date alternative to the all mechanical Lucas PI. [Total]

 Lightening the flywheel makes the engine more responsive in low gears, and might decrease the stresses on the crankshaft. Special aluminum flywheels are available for all out competition use [Racetorations] [TriumphTune] [Paeco].

 The standard conrods are pretty strong, and might in fact be lightened somewhat. They **should** always be balanced.

To indicate just how important this is, consider that a total imbalance of, say, 30g will at 5000rpm create a force rocking the crankshaft up and down along its axis 83 times a second equivalent to a static weight of 40kg. (The formula is: Force = (RPM^2*stroke*imbalance) / (1.8*10^9), where stroke is in mm, the imbalance in g, and the force in kg-equivalents).

For high output engines, it is recommended to have the rods *shot-peened* and polished [Racetorations].

Special competition conrods are also available. These can be made in differing lengths, if required. [Paeco] [Cambridge]

 For longer life, the rocker shaft should be extra hardened as well as the rockers. Be sure to take out the adjusters before hardening the rockers.

 Have the engine carefully balanced. This is very important, especially with a long throw 4 bearing crank like the Triumph. Equalize piston weights within 1g, equalize conrods at both ends, and have crankshaft/flywheel/clutch balanced. This does much to extend life, smoothen the engine in a very favourable manner, and also gives a couple of extra horses. Do **not** remove significant material from the crankshaft counterweights; Kastner in fact found that he had to *add* weights to the crankshaft to dampen a resonance.

 Proper cylinder head work can add at least 5 to 10 bhp. Consult the Theory and practice of cylinder head modifcation by D. Vizard for further advice. Finished prepared heads are also available [TriumphTune] [Racetorations].

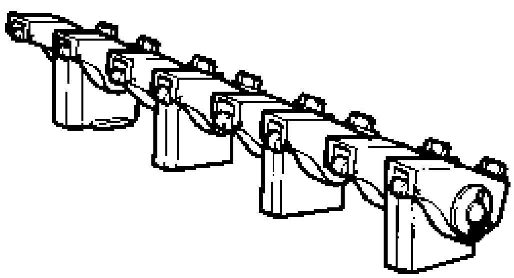
 It is important to equalize combustion chamber volumes. Experience shows that they are often not very well controlled in their original state, and later engine work have probably only made things worse. When calculating the resulting compression ratio, a gasket volume of 3.7 cm^2 may be used. For a 1:10 compression ratio on a 2.5, a chamber volume of 41.6 cm^2 should be aimed for, allowing for standard deck clearance.

 With a cam with limited overlap (e.g. TR5) and 98 octane (UK four star) fuel, avoid increasing the compression ratio above 10:1. Anything more will only cause problems with detonation, and will destroy pistons and rings. Higher compression ratios should **only** be used in connection with racing camshafts with very much overlap, and forged pistons [Racetorations] [Paeco]. [TSI] [Cambridge]

Replace the exhaust system. Especially the manifold is critical, and power increases of up to 30 bhp has been reported. This even applies for configurations where the standard carburettor sizes are retained. The fueling curve must be set up to suit, an increase of 30% at the maximum fuel point has been suggested as a starting point. There seems to be a strong consensus that the 6-3-1 interference design is the best solution [Witor]. The more traditional 6-2-1 design [TriumphTune] is still an improvement to the original item, of course.

The rest of the exhaust system should consist of a single 2½" outside diameter pipe, with one or perhaps two straight-through silencers. The single silencer system will be fairly **loud**.

With camshafts, a TR5 profile is a safe bet. With injection, low RPM torque is still surprisingly good, fuel consumption reasonable, and the engine is very well suited for every day driving. If going beyond that, the general advice seem to be to go for increased lift instead of increased duration.



In addition to changing the camshaft, one might install a roller rocker conversion which will give a ratio of 1.55:1 or 1.65:1 (depending on type) instead of the standard 1.42:1, increasing lift by 11 and 16%, repectively. Ensure that the total lift will give sufficient piston clearance. The roller rocker conversion usually requires adjustment of the rocker pedestal heights to achieve a satisfactory geometry. [Witor] [Cambridge] [TriumphTune] [TSI]

For any significant change to the original setup, a change in fuelling will be required.

For the injection system, this can usually be done by changing springs in the vacuum chamber (start with TR5 spec). [TriumphTune]. The fuel curve. must then be adjusted to suit the engine.

Carburettors need changes to needles and jets. The TriumphTune catalogue has more information.

For moderate degrees of tuning, the standard PI or TR5 ignition timing curve may be used. Further modification will require a curve with perhaps less low RPM advance, and more high RPM advance [Racetorations] [TriumphTune].

Hot climates or quick driving requires an oil cooler with thermostat. Fitting usually via a spin-on oil filter adaptor [Witor] [TriumphTune].

The spin-on oil filter adaptor is a good idea for any engine, by the way. It significantly decreases the oil pressure delay at startup, and also makes filter changes much quicker.

A baffle in the oil sump is worthwhile, and might be combined with an extension to the sump and oil pickup to increase the oil volume. A finned aluminum sump is the optimal solution [Racetorations].

Since RPM for moderately tuned engines is pretty low, these engines are not very critical with regards to the valve train. An external rocker feed kit will help the rockers last longer. Valve retainers and pushrods may remain as is. Bronze-alloy valve guides will improve reliability.

Extreme engines will benefit from light pushrods and valve spring retainers [Racetorations] [TriumphTune].

For high lift cams, ensure that suitable coil springs are used that avoid coil-binding and doesn't go soft too quickly [Racetorations] [TriumphTune].

A vernier cam timing wheel is available for very accurate cam adjustment. It is not essential [Witor] [TriumphTune].

Re-stroking a late 2.0 to 2.5 litres is easily done by replacing the crankshaft, pistons and harmonic balancer. Details are given in the TriumphTune catalogue. Keep in mind, however, that the 2.0 litre has probably as much potential for tuning as the 2.5 litre. It runs sweeter, and the crankshaft is better. The 2.0 litre can sustain much higher RPM, and might thus give more top end power if tuned for *full race*. For good low end torque and perhaps also every-day power, go for the 2.5 litre.

For increased reliability with high lift cams, ensure that a duplex timing chain is used (standard on 2.5 litre engines).

There is no point in aiming for very high RPM except for extreme engines. For the 2.5 litre, an absolute redline of 6000 RPM is suggested. Ensure the revolution counter is accurate. The standard 2.5 crankshaft has quite a severe resonance in the crankshaft at 6200 RPM, which is difficult to get rid of.

A mild increase in engine capacity to 2.6 litres is possible by boring the cylinders to 0.060" oversize, i.e. a bore of 76.22mm. For this size, forged pistons are available, and the standard head gasket may be used. Note that engines with liners should not be overbored to 0.060", since the liner will become too thin. Also note that the piston clearances specified for forged pistons are much wider than for standard pistons, causing more engine noise and increased bore wear.

The *cold* clearance at the skirt for the Venolias forged pistons is specified as 0.18-0.22mm, something which causes quite a lot of audible piston slap on a cold engine. The ring gap is specified at 0.30-0.35mm. The piston slap reduces when hot, but is still audible. Although the common wisdom here is that it is *better to hear the pistons then to smell them*, one should on a a road engine probably try to stay at the tightest allowable tolerance. [Racetorations] [TSI].

 An engine capacity of 2.7 litres is possible by boring the cylinders to 77 or 78mm (standard is 74.7mm). The standard head gasket will not fit. Since the lands between the cylinders are getting pretty thin, a special steel or copper head gaskets, or alternatively O-ring sealing, will be required.

For these engine sizes, it should be possible to adapt Mazda 1300cc piston. Gudgeon bushes to fit the pistons must be machined. Note that the increased bore will increase the compression ratio, so this must be kept under control.

Even further increase is possible, although expensive, by increasing the stroke slightly by installing a stroked crankshaft. Piston heights must be correspondingly lower, of course [Racetorations].

Competition type pistons and copper head gaskets are available in any size [Paeco].

 With high lift camshaft, the toil on the camshaft, and wear on the camshaft bearings will increased. Since they run directly in the block originally, it is highly recommended to have the camshaft bearings line bored, and fit soft metal bearings from the 4 cylinder Spitfire 1500 engine.

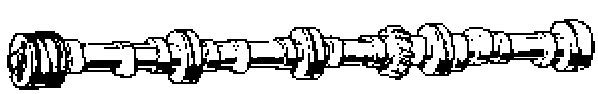
Wear in the camshaft bearings is more important that one might think. Since the camshaft bearings are supplied directly from the main gallery, low oil pressure will result from excessive camshaft bearing tolerances.

 For the territory above 150-180 bhp, especially with high compression ratios, forged pistons and special crankshaft treatment is definitely required. The ultimate solution is a EN40B cranshaft with reduced big end dimensions and reduced weight to allow better counter-balancing, thus extending the RPM limit to perhaps 7500. [Racetorations]

 Valves are available in a large range of sizes and materials. Stainless steel (214N) seems to be the favored material for uprated valves. Together with hard seat inserts, they should have no problem whatsoever with unleaded fuel. Valves with hard stellite faced seats are also suitable. Use of copper bronze alloy guides seems to be the norm.

For the stainless variants, inlet valves sizes are 36.81[Racetorations] and 38.08mm[Racetorations], exhaust valves 31.25mm[Witor] and 32.28mm[Racetorations]. Inlet valves with a narrower shaft to increase flow are also available. [Racetorations].

Camshaft Profiles



The tables shows various cam profiles, and results achieved when matched with suitable modification in other areas, e.g. valves, porting, exhaust system and fuel system.

2.5 litre

Standard installations:

Make	Lift	Timing	Ad Ol	Duration	Band	Bhp
2.5S	.330"	10/50 50/10	0 20	240	1500-4800	118
2.5PI Mk2/TR6	.340"	18/58 58/18	0 36	256	2000-5000	124
2.5PI 308778	.340"	25/65 65/25	0 50	270	2000-5500	126
TR5 307689	.360"	35/65 65/35	0 70	280	2500-5500	142

Non-standard engine installations, standard cams:

Make	Lift	Timing	Ad Ol	Duration	Band	Bhp
2.5PI 308778	.340"	25/65 65/25	0 50	270	2000-5500	145 [Witor]
TR5 307689	.360"	35/65 65/35	0 70	280	2500-6000	167*[Witor] [TriumphTune] [Racetorations]
TR5	.360"	35/65 65/35	0 70	280	3000-6500	175*
TR5 RR	.418"	35/65 65/35	0 70	280	N/A	N/A [Witor] [TriumphTune]

Non-standard cams:

Make	Lift	Timing	Ad Ol	Duration	Band	Bhp
Kent TH6	.438"	42/68 78/32	intake center @103	290	3000-7500	N/A
Kent TH5	.400"	32/68 68/32	+5 64	280	N/A	150 [Witor]
Kent TH3	.400"	35/70 70/35	0 70	285	N/A	N/A [Witor]
TT Fast Road	.390"	30/70 70/30	0 60	280	3000-6000	143 [TriumphTune]
TT FRoad 89	.400"	34/76 58/34	0 68	290	N/A	N/A [TriumphTune]
RCT 777-6	N/A	N/A		N/A	1500-5500	150 [Racetorations]
RCT 111-6	N/A	N/A		N/A	N/A	N/A [Racetorations]
RCT 555-6	N/A	N/A		N/A	N/A	N/A [Racetorations]
RCT 888-6	N/A	N/A		N/A	N/A	N/A [Racetorations]
Isky Z19	.400"	29/69 69/29		268	2500-6500	N/A [Iskendrian]
Newman	.390"	30/70		280	3000-6000	145
SAH 357	.390"	36/71		287	3500-6500	170*
TT Sprint	.390"	38/70 70/38	0 76	288	3500-6500	163 [TriumphTune]
TT SSprint	.430"	36/72 72/36	0 72	288	3800-6500	175 [TriumphTune]
Piper	.416"	38/74		292	3800-6500	175 [Piper]
Kt/TT83	.420"	37/73 73/37	+5 76	290	4000-6800	193* [TriumphTune]
TT Race 86	.411"	54/86 86/54	0 108	320	4000-7000	N/A [TriumphTune]

BL S-2 V-532	.405"	31/71 71/31	62	282	3500-5500	158 [TSI]
BL S-4 V-579	.410"	42/71 71/42	84	293	3500-6000	165 [TSI]
BL S-5 V-688	.465"	37/73 73/37	74	290	3500-6500	185*
TSI275-6	.425"	N/A		275	3000-6500	N/A [TSI]
Cosworth A3	.392"	45/75 75/45	90	300	N/A	N/A Lobe c/l: 105
CraneCams F-244/310-10	.440"	47/87 77/37	intake center @105	310	N/A	N/A [TRF]

Lift given is lift of valve. The standard rocker ratio is 1.42:1.
Timing is related to crankshaft TDC and BDC, for inlet and exhaust.
Ad is for recommended advance, assume 0 if nothing stated. The corrected camshaft timing will be obtained by adding/subtracting the advance accordingly: `+Ad/-Ad +Ad/-Ad`.
Ol is overlap.
The **Band** and **Bhp** stated should be treated as just rough indications, and are not really comparable between brands. Other engine parameters will vary a great deal, and the figures are in many cases probably even subjective.
***** Indicates good results obtained according to G. Thomas.
RR stands for roller rocker conversion, with a higher rocker ratio.

2.0 litre

Standard installations

Make	**Lift**	**Timing**	**Ad Ol**	**Duration**	**Band**	**Bhp**
BL	.330"	18/58 58/18	0 36	256	1500-5000	90
BL 308778	.340"	25/65 65/25	0 50	270	2000-6000	98 [Witor]

Non-standard engine installations (depends on modifications done):

Make	**Lift**	**Timing**	**Ad Ol**	**Duration**	**Band**	**Bhp**
BL 308778	.340"	25/65 65/25	0 50	270	2000-6000	140* [Witor]
Piper Y	.370"	30/60		270	3500-6500	120 [Piper]
Newman	.390"	30/70		280	3000-6500	120
Kt/TT FR	.390"	30/70 70/30	0 60	280	3000-6500	120 [TriumphTune]
TR5	.360"	35/65 65/35	0 70	280	2500-6800	155* [Witor]
TT Sprint	.390"	38/70 70/38	0 76	288	3500-6300	150 [TriumphTune]
GT-ST 567	.420"	37/67		2R4	3000-6800	164*
Piper G	.380"	38/78		296	3800-6500	155 [Piper]
Newman	.370"	38/78		296	3500-6600	150
SAH 357	.390"	36/71		287	3800-6900	150
TT SSprnt	.430"	36/72 72/36	0 72	288	3800-6500	155 [TriumphTune]
Piper	.416"	38/74		292	3500-6500	160 [Piper]
Kt/TT R83	.420"	37/73 73/37	+5 74	290	4000-7000	162*

						[TriumphTune]
TT Race	.400"	45/77 77/45	+3 90	302	4500-7000	155 [TriumphTune]

Race profiles:

Make	Lift	Timing	Ad Ol	Duration	Band	Bhp
Newman	.400"	40/80		300	4000-7000	172*
Piper	.400"	45/85		310	4000-7000	158 [Piper]

Full-race profiles:

Make	Lift	Timing	Ad Ol	Duration	Band	Bhp
GT-ST/BL	.420"	52/76		308	4300-7500	168*
GT-ST 56	.435"	56/76		312	4800-7500	180*
GT-ST/BL	.410"	60/80		320	5000-7800	186*
GT-ST/BL	.420"	70/90		340	5500-8200	210*
GT-ST 68R	.450"	60/80		320	6000-8500	220

Inlet Areas

Total inlet area for various carburettor/injection configurations.

Type	Area
2 x 1½" 150 CD / S.U. HS4	22.8 cm^2
2 x 1¾" 175 CD / S.U. HS6	31.0 cm^2
3 x 40 DCOE Weber, 33mm choke	51.3 cm^2
Lucas PI	95.2 cm^2

Lambda sensor

To set up the mixture (carburettor jetting or injection setpoints), one has to know the conditions under which the engine is running. Previously, this could only be done using pretty crude methods like *plug cutting*, or one had to have access to a a *rolling road*.

Now, enter the **lambda** oxygen sensor. It is a device to the size of a spark plug. It works by measuring the difference in oxygen content between the exhaust gases and the ambient air, which in its turn gives an indication of the air to fuel ratio. The lambda value is the excess air ratio, where 1.0 corresponds to a 14:1 air to fuel stoichiometric mixture.

The sensor is mounted so that the *business end* is exposed to the exhaust gases. It should be mounted fairly high up the exhaust system, partly because it relies on exhaust heat to operate, and partly because any exposure to ambient air will disturb the reading. It should also be placed at a point where it will be exposed to the exhaust gases from all cylinders, of course.

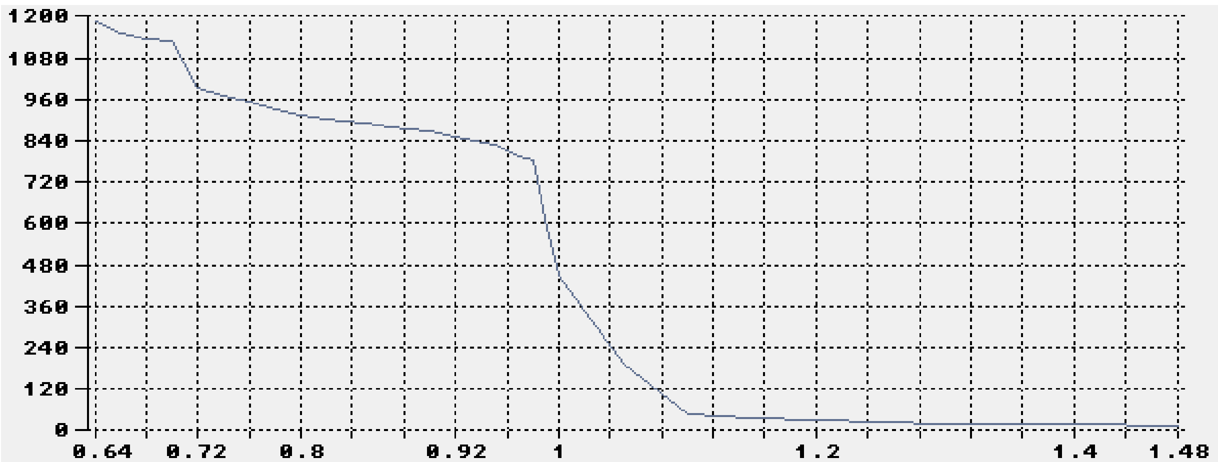
Bosch has a universal oxygen sensor which is suitable, and also quite inexpensive (approx. US$30). Number 11025, stock no. 0 258 001 025 009, available from SICP, for instance. There are also pre-heated 3-wire and 4-wire sensors, but their added complication and cost is probably not justified in this application. The unheated sensor reaches the operating temperature within a minute or so.

Beware that the oxygen sensor will be destroyed within a few hours of use if exposed to leaded fuel.

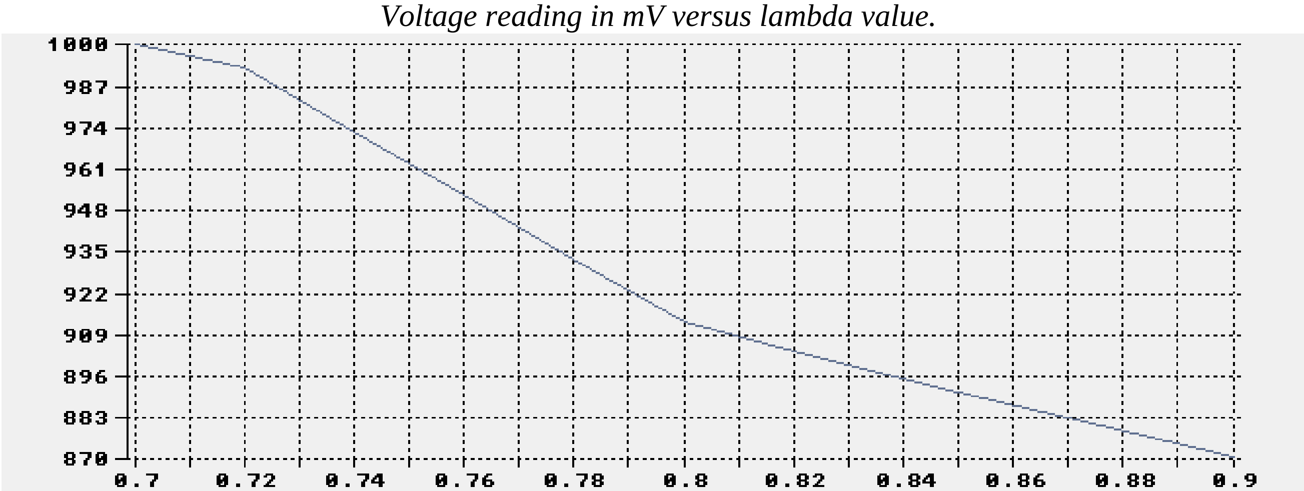
On a car equipped with a tuned manifold, the best place to mount the sensor is probably in the collector, where the tubes meet. The sensor must be installed so that it will not be exposed to physical damage. Drill an 18mm hole, and weld a M18x1.5 nut (metric fine pitch, as found on some spark plugs for Fords, for instance) on top of the hole. If you can't find one, it is easy to manufacture the nut yourself. One might for instance simply file or drill out a standard M16 nut. For making the threads, it has been reported that a plug thread chaser may work as a cheap substitute for the proper tool.

The sensor has a pigtail lead, which should be connected to a shielded wire. Standard RG58 coaxial cable is fine. The coaxial shield should be connected to a suitable grounding point, preferrably on the lambda sensor itself. A stainless hose clip is suitable for this. The grounding and shielding is very important, otherwise you will pick up all sorts of noise, and the reading may become erratic.

The reading is made with a high impedance accurate voltmeter (most digital ones are suitable) between the centre wire and the ground shield. It should **not** be made against vehicle ground. The required range is 0 to 1000mV (1V). Note that the curbe is not linear, there is a significant difference in sensitivity for different lambda values.



Voltage reading in mV versus lambda value.



Expanded view around the max power point.

To summarize, these are the more important points on the curve:

Voltage [mV]	**Lambda**	**Ratio**	**Comment**
50	1.25	18:1	Lean misfire limit
100	1.07	15:1	Max. MPG point
400	1.0	14:1	Stoichiometric

870	0.9	12.6:1	Max. power point
920	0.8	11:1	Over-rich
1000	0.7	10:1	Rich misfire limit

As for the practical side of things, one should definitely stay away from readings below 100mV regardless of RPM and load, because the combustion temperatures will become very high with a risk of damage to pistons and valves. One should probably try to stay around stoichiometric (400mV) for medium loads.

For the wide-open-throttle situation, try to target a reading of somewhere around 800mV. A value of 750mV and below will make the engine more knock sensitive, and should be avoided. The point of max. power will depend on engine type and installation, figures between 760mV and 870mV has been reported.

There is definitely no point in going above that. A reading of 920mV will produce the same power as a stoichiometric mixture, but will consume **25%** more fuel. Not to mention that HC and CO emissions will increase dramatically. Any reading above 900mV means a considerable drop in power output, excessive fuel consumption, and danger of carbon deposits building up in the combustion chamber.

See also the O2 sensors FAQ, and BW hints on lambda sensor installation, maintenance and testing.

Drivetrain modifications


The standard clutch is quite capable, and will handle pretty powerful engines. A stronger (e.g. AP racing white or grey) spring and cover may be beneficial for hard use, and special competition type clutches are also available [TriumphTune] [Racetorations] [Paeco].

For the ultimate in clutch control, the traditional clutch slave and release arm can be replaced with a co-axial direct acting clutch release mechanism [Cambridge].


If not already installed, an overdrive unit is highly recommended. As well as for the usual reasons, a tuned car will increase the available top speed significantly due to the higher gearing.


If in good shape, the gearbox and final drive is capable of quite a lot of torque. Do not allow the overdrive to be used for 2nd gear, though, and perhaps not even 3rd with a powerful engine. If desired, 'A' type overdrives (early) will benefit from a TR6 accumulator spring, while 'J' type overdrives (late) can have Stag hydraulic units fitted [Racetorations].


For a highly tuned engine with a narrom power band, a close ratio gearbox can be worthwhile. Several gear sets are available, including ratios especially designed to work with the overdrive to create 6 equally spaced ratios. Be warned, however, that this is not always a straight bolt-on conversion [Racetorations] [TriumphTune] [Moss].

As an alternative to an overdrive unit and/or close-ratio gears, a 5-speed conversion based on the Toyota Supra gearbox is being made in New Zealand [CC].

Special strengthened racing gearboxes based on Volvo Turbo overdrive units, are also available. Leyland S/T gear sets for the Dolomite Sprint can be adapted. [ESP].

 To get all that power to the ground, also in tight curves, a Salisbury Pow-R-Lock LSD axle is recommended, although pretty expensive. [Racecraft].

A good alternative is the Quaife unit.

Chassis tuning

The 2000 is based on a very solid monocoque chassis, serving as a very suitable basis for a well handling car. A torque of around 6000-6500 lb.ft is required between front and rear axle lines for a 1° twist.

 The standard saloon brakes are pretty good in standard form, but a highly tuned PI engine really would require an improvement in this area. The Stag front brake discs and calipers will provide a significant improvement in braking power, and are a bolt-on fitting. They are 5/8" thick, compared to the standard 1/2". They are also significantly larger in diameter, and will only fit 14" or larger wheels. The Stag stone shields are larger, but there are probably no serious problems using the standard 2000 part.

Stag type calipers with 36mm pistons were also used on some Ford Transit vans, so they should be easy to find. The models are Transit 90 1.6, 1.7D and 1.8D, years 1970-1976. Double check the Locheed part numbers, they are 4265-026 (lefthand) and 4265-025 (righthand). [RB]

For even further improvement, a ventilated disc conversion with 4 pot calipers might become available in the future. At least 14" wheels will be required. There are also rumors of a rear disc conversion coming up. [Witor] [ESP]

A Leyland Princess or Rover SD1 larger diameter brake booster can be fitted if the clutch master cylinder is moved inwards by adding 20mm to the pedal box. To suit 4 pot calipers, a mid-80's Ford Transit tandem master cylinder with increased piston diameter fits this booster. [ESP]

A Leyland Princess or Rover SD1 larger diameter brake booster can be

 The 2000 has a very long suspension travel, especially at the front. This means that violently hard springs may not be required to obtain satisfactory performance.

 Replacing all suspension rubber items, front and rear, with harder material gives a significant improvement in roadholding and accuracy. [Witor]

 Do not skimp on damping, it improves control and roadholding. Harder damping is usually always for the better, up to a point, naturally. Rear Koni or Spax dampers allows experiments with damping factors. For increased damping, Konis could be set to 3 or 4 half-turns instead of the standard 2.

Front dampers are fixed. Konis are reputed to be on the soft side, harder Monroes are available.

Very hard and short rear springs will require shortened dampers to ensure that the springs remain properly located on full rebound. Especially adapted Monroe units are available. [Witor]

 Do fit a front roll bar. As well as reducing body roll, this will decrease inner wheel spin when accelerating through turns, and improve handling in general terms. An increase in diameter over the standard S/Stag item seems to be favored. Bars are available in sizes up to 35 mm. [Witor] [ESP].

Keep in mind that a **too** stiff front roll bar will make the car understeer. The car will roll less, make the *impression* of greater stability, but will in fact be slower (more drift).

 Further roll compensation may be added in form of a rear roll bar. This reduces understeer. No bolt-on kit is available, but roll bars from Humber Sceptres are reputed to be suitable for adaptation, for instance. Rear bars meant for the TR6 may perhaps also be suitable, although the track is narrower. Extra adapter brackets will be required. [TriumphTune].

 Use plenty of Molykote grease to decrease spline lock up up the rear axles (the infamous Triumph rear end twitch). Harder bushes in the rear subframe mounts also help, as do harder springing. The twitch gets more noticable when more torque is available from a stronger engine. A linear bearing drive shaft conversion, based on Datsun 180B linear bearing halfshafts, is available to eliminate spline lock-up completely by disposing of the splines altogether [Witor]. These use larger metric U/Js, and hence require machining of the yoke ends.

At the top of the range, technically and costwise, there is also available a free floating axle conversion with constant velocity joints made by Hardy Spicer [SNGB].

 The steering response may be improved by fitting harder, or even solid, mounts. A quicker rack (3¼ turns lock to lock) is also available. [Witor]

 A full set of uprated polyurethane suspension bushes are available, highly praised in that they increase the precision of the suspension. [Witor]

 Decreasing the ride height lowers the roll centre, which is beneficial. Increased spring rates are obviously required. If decreasing the ride height **too** much, the car might become unpractical for road use. Remember also to correct excessive negative rear wheel camber when lowering the car. Special inner trailing arm shackles for de-cambering are available, in 1.5 and 3 degress versions. A little negative camber is good, too much is silly. [Witor]

Polyurethane spring insulators of 7 to 15 mm thickness are available for fine tuning of the rear ride height. [Witor]


Decreasing front positive camber will reduce understeer. Do not go beyond say ½° negative, though. Excessive negative camber does not work with wide tyres, and may also causes wander at high speed.


Increase wheel diameter, and consider using wider tyres on suitable rims.

Modern low profile tyres of the correct rolling radius are not suitable for a 13" wheel, so 14" is very worthwhile. 5½" wide 14" aluminum wheels were standard on the 'S', and are of course quite suitable. Obviously, 15" or even 16" is even better if low apect ratio performance tyres are required. On practical terms, very low apect tyres will not protect the rim from kerb damage. .LP The wheel arches will allow reasonable wide tyres without modification. Wide wheels may need a decrease in the steering lock.

14" wheels are available up to 6" widths, 15" and 16" wheels up to 7½" widths. [Witor]

To retain the rolling radius of the standard 2.5PI tyres, the following sizes may be used (the sizes shown in *italics* are not widely available, if at all):

13"	**185 - 13** Rim: 5..7			*215/70 - 13*	*225/65 - 13*	*245/60 - 13*	
14"		**185/70 - 14** Rim: 5..7	**195/70 - 14** Rim: (5),5½..7	**205/65 - 14** Rim: 5½..7		**225/60 - 14** Rim: (5½),6..8	*245/55 - 14*
15"	**185/65 - 15** Rim: 5..7	**195/65 - 15** Rim: 5½..7	**205/60 - 15** Rim: 5½..7		*225/55 - 15*	*245/50 - 15*	
16"				**215/50 - 16** Rim: (5½),6..7		**245/45 - 16** Rim: (6),6½..8	
17"				**215/45 - 17**		**245/40 - 17**	

The rim sizes in parenthesis will fit as such, but are not recommended. In general, the wider the rim, the more stable the tyre will be.

Other cars sharing the 4 on 4½" circle bolt pattern are listed here, in part based on Scott Fishers wheelsize chart. A mention here definitely does not necessarily imply that any given wheel will fit or will be suitable. The offset/inset may be different, and there may be interference with the wings, the steering mechanism, or the brakes.

- Acura - Legend '86-'89
- Buick - Special '61-'63
- Chevrolet - Corvair and Chevy II all 4-bolt, Sprint '85-'87, Nova '61-'70
- Datsun/Nissan - most models to '89
- Dodge - Colt '79-'88
- Ford Mustang '65-'86 4-bolt, Falcon, Maverick, Granada all 4-bolt
- Mazda - 626, RX7 '83-'87
- MG - MGA, MGB
- Plymouth - Arrow, Sapporo '79-'88
- SAAB - most models up to '87
- Toyota - most models up to '89, excluding MR2 and Pick Up
- Triumph - TR2 to TR6, Stag

 Relocating the battery to the boot will improve the forward/rear weight balance. For safety reasons, do not mount it close to any PI fuel pump. The battery fits nicely in the well behind the righthand inner wing. A plastic battery box for boats is a good way of ensuring that acid spills are kept under control, as well as preventing electrical shorts from tools and such that might be floating around. Ensure that the ground connections at both the battery and engine ends are faultless, that the lead between the starter terminal to the battery is of sufficient gauge, and that it is routed in a safe manner.

 Another weight saving option (who those that will spend GBP50.00 for every kg saved) is the geared, lightweight starter motor. [Cambridge]

 A camber adjustable strut top for the front suspension is available. A polyurethane unit suits the standard strut, whereas a special rubber unit is available for modified Bilstein struts. [ESP]

Cross bracing of the MacPherson strut mounting points is not really considered necessary. The big Triumph chassis is very strong in this area.

Other resources

Automotive programs WWW page, a large selection of useful programs for automative related calculations by Bruce Bowling.

Tyre Size Comparison Calculator, and Simple Horsepower Calculator.

Further reading

 The Tuning Manual by G. Thomas is highly recommended. All aspects of tuning is included, and the saloon is well covered.

 The TriumphTune Performance Manual contains lots of useful, detailed information on engine tuning. For instance, complete jet and choke tables are given for Weber or Dellorto carburettor conversions of various configurations.

 The Kastner Competition Preparation Manual is perhaps slightly dated, focused on the TR6, but still contains much useful information relevant for saloon engine tuning.

The Theory and practice of cylinder head modifcation by D. Vizard focuses on cylinder head modification, with detailled description about how to modify a Triumph.

Parts suppliers

- [Cambridge] Cambridge Motorsport *Engine and drivetrain tuning parts.*
- [ESP] English Spare Parts *Suspension tuning, and racing gearboxes.*
- [Iskendrian] Iskenderian Racing Cams *Performance camshafts.*
- [Moss] Moss International *Engine and drivetrain tuning parts.*
- [Paeco] PAECO Industries *Manufacturer of tuning camshafts, copper head gaskets, pistons, Al flywheels, clutches, conrods.*
- [Piper] Piper Cams *Camshafts.*
- [Racecraft] Classic Racecraft *Salisbury LSD differentials.*
- [Racetorations] Racetorations *Engine tuning parts.*
- [Total] Total Advance *Electronic Fuel Injection.*
- [TriumphTune] TriumphTune *Engine and drivetrain tuning parts.*
- [TSI] TSI Imports *Engine tuning parts.*
- [Witor] Chris Witor *Chassis and engine tuning parts.*

Thanks to:

- Mark Bilston for information about the 2.7 litre conversion.
- Randy Wilson for hints regarding the lambda sensor.
- Chris Witor for lost of tips about all sorts of things.
- Derryl Uprichard (Racetorations) for lots of information about engine tuning.
- Roddy Pratt for information about racing a 2000.
- Terry O'Bierne for tips on suspension and brake tuning.

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Latest update: *July 12th 2000*