



Getting into racing a Suzuki 500



The start of something big

TITAN RACING - POST CLASSIC ON A BUDGET

The Suzuki 500 twin in its various guises as a Cobra, Titan or GT500 serves as a useful basis for the construction of a very competitive post classic road racing machine.

The classic and post-classic racing scene has developed a degree of popularity that is becoming the envy of mainstream motorcycle road racing. The number and variety of machines racing, the sounds and sights on and off the track, the friendly nature of the sport, the good turnout of spectators and the growing interest of the trade are all evidence of the health of this form of racing.

One of the many machines racing is the Suzuki 500 two- stroke twin, either in its production racing motorcycle variant, the TR500, or as is more often the case, in the form of a modified T500 Titan road bike. The Suzuki has demonstrated its competitiveness in post-classic racing and this series of articles sets out not only to explain the pitfalls and hazards of building a T500 post-classic racer; but also to provide details of the basic modifications required to make the machine perform reasonably well on the track and at little cost.



The author production racing in 1973

The advantages of the Suzuki for this purpose are numerous: but first the objective reasons,

a. the Suzuki 500 is still fairly readily available on the second-hand market. A word of warning though, there are many signs that this fortuitous situation is about to change and as we know many "common" machines have disappeared from the market-place without anyone noticing at the time. BEEZAs, Trumpys, Benellis, Bultacos, quite a few Duke singles and the pre-Commando Nortons were once, to a varying degree, very common; but honestly, did you really notice them becoming scarce and how quickly it occurred? If you did notice, like most of us you probably thought there were still a lot around in back sheds and that the wreckers would be full of them. Well not so, least not out my way! The 60's and 70's British bikes are only re-appearing now because of the burgeoning second-hand classic bike import market and then they are available only at a premium price.



A great way to start classic racing

While the loss of the European bikes was gradually taking place the less noticable disappearance of early Japanese machines was already beginning to occur. A consumer- oriented market nurtured on new model releases each year and a horse-power war on the roads was quickly adapting to the disposable motorcycle life-style. A healthy dose of late 60's and 70's affluence helped as well while we should not forget the influx of baby-boomers looking for thrills and "hip" transport. Now we look, largely in vain, for late 60's Bridgestone twins, Kawasaki Samurai and Avenger twins, Suzuki T20, Hustler and Rebel twins. All had the advantage of being light, were of simple construction, had quite adequate brakes and were just screaming for the application of a bit of porting work and chambers. Even in their street legal form they set new standards for performance and reliability.

These and many other early models were written off as being out of fashion as newer, more complex and faster machines were churned out by the Japanese big four. The factories ensured their obsolescence by often stopping production of spare parts and exacerbating the problem with short model runs and lack of inter-changability of parts. Four strokes are not safe either, eligible CB750's in good condition are becoming harder to find as are CB450's, CB77's, CB72's etc. There are still some bargains around though if you are willing to look.

Secondhand Suzuki 500's are available in very, very good low milage condition for around A\$2,000, although some enterprising people are asking up to A\$2,500. Good condition higher mileage T500's can be found for A\$1,000 to A\$1,200, untidy road licensed ones can be had for A\$500 to A\$600, dogs for A\$400 and basket-cases from A\$150 to A\$300. One of the advantages of the Suzuki 500 being around for so long is that in my experience nearly everyone selling a T500 has a spare bike or engine to throw in as well.

b. the Suzuki 500 had a long, by Japanese standards, model run. The Suzuki was first produced in 1968 as the Cobra twin, in 1969 it had a carburettor change and a longer swingarm fitted, in 1970 it became the Titan with a change of tank, side-covers, instuments and some minor re-modelling, in 1974 it underwent some de-tuning with some changes to the porting and carburation and finally it came to rest in 1977 as the GT500 having gained in 1975, electronic ignition (PEI), the GT750 triple's tank and front forks, new instruments and seat and a single disk up front.

The advantage of this long model run and the fact that only minor changes were ever made to the motor is that all models can provide eligible engines for post-classic racing. The interchangeability of parts across the model range is also a great bonus.

c. the Suzuki 500 is blessed with a fairly straight- forward engine design which responds very well to the gentle application of a port file and a set of expansion chambers. The motor is also very robust, with an almost un-burstable crank and a strong gearbox (more on the gearbox later). As a result of this built-in strength the motor is rather heavy (56 kgs) and consequently can give my back curry when-ever I have to lift it onto the bench or into the car boot. Consumable parts are still readily available through Suzuki dealers. On rare occasions however a wait is necessary if the item needs to be sourced from Japan.

d. the Suzuki 500 is a stable road bike. It has a long, long, long wheelbase and tracks very well at most sane speeds. With the standard frame the T500 is a predictable and reasonably competitive road racer, particularly on fast sweepers and in straight lines. It doesn't like quick changes of direction; a good witness to that being how the dis-respectful among the historic racing crowd catch me through s-bends on the track! Nevertheless a few basic changes can be cheaply made to redress some of the drawbacks of the long open frame. Simply put, the frame is solid and readily usable. It responds well to mild doses of frame bracing and the odd bit of cutting and shutting. It is heavy, but then no-one said Suzuki 500's were lightweights!



Jim Howe from Pal and Panther Cycles and the author at the 1974 3 Hour Production Race at Wanneroo. It rained for the last 2 hours!

e. the Suzuki 500 is a time-proven motor which has a genuine race history and consequently there is a fund of tuning and race oriented information available to the enthusiast. In addition to the factory race bulletins and after-market service manuals there are several records of Suzuki "hop-up" hints from U.S. periodicals of the time and similar "hot-up" reports from British magazines where the Suzuki 500 was somewhat of a favourite. Due to the long model run of the Suzuki 500 and its popularity on the road-race track (not to forget its bastardisation on the speedway circuit in 500 speedcars) there is also no shortage of tuning and hotting up experience available to the budding post-classic road racer. Some of the old players are still in business and for example, John Woodley, in Geelong, has a particularly soft spot for the 500 Suzuki and a wealth of expertise and racing equipment. Pal and Panther Cycles in Perth have been Titan fans for the past 20 years and are both keen supporters of post-classic racing and capable of servicing and race-tuning the big twins.

As genuine production TR500 road-race machines were based on the original Suzuki 500 road bike the factory racing engine parts and frames are readily adaptable to the needs of the post-classic racing enthusiast. The only catch is finding original racing parts after the speedway boys have finished with them. The useful bits are factory heads, air-cooled barrels, magenetos, six speed gear- boxes, straight cut primary gears and light-weight cranks. Never fear though, for with some ingenuity and tuning nous the road motors can be made to do much the same as the race engines, after all that's all the factory did; take one T500 motor, add a pinch of horsepower, mix in some snazzy looks and go for it! Voila, one race bike!



This could be you!

There are some other more subjective reasons for racing a Suzuki 500. These include the fact that the Suzuki 500, despite being a two-stroke, was a firm favourite among many motorcyclists due to its traditional appearance, its low revving torquey power delivery, stable road-holding and its proven touring ability. As a big twin (for the time) it didn't make the screaming howl typical of two- strokes of the time; but had a less offensive rumbling exhaust accompanied by a deep induction note. Admittedly when the motor was worn and hot one could be forgiven for thinking that a few nuts and bolts had found their way into the combustion chamber, particularly on the overrun.

Getting into racing. Once you have bought your bike, before modifying it for racing, you should approach your local Historic Competition Motorcycle Club or Post-classic Racing Club and get to know a few people who share your interest. If you ride a Suzuki it may be hard to find anyone to talk to at first; but undoubtedly, the scruffy looking chap up the back whose job it is to clean the Club toilet block will be a Japanese bike rider. Whilst at first he will cringe in fear from you (due to his expecting you to hit and spit upon him) once he knows that you want to talk to him, about Japanese bikes and in particular, racing one, he will be your friend for life. Other handy allies can be the lonely souls who ride two-strokes be they Ariel Leader, CZ, Bantam, Yamaha, Ossa or even Bultaco owners. Always pretend that you know nothing about racing and anything mechanical (something that comes naturally to me) and be prepared to discard most of the advice you receive as being deliberately mis-leading or an attempt to "psych you" out of contention. Gain their trust with generous profferings of port (any brand will do), praise their choice of machinery and compliment profusely their on-track riding skills. Even if you have never heard of them, tell them how you still remember how they made that brilliant passing move, on the Lambretta, on Geoff Duke back in 1956 at the Moolabeenie Airstrip Grand Prix or there-abouts; drop a few names and mention how inspired you were when you saw their picture in this magazine only last month. Even if they know you're lying, most bike- racers will be too conceited to tell you.



Barry Sheene on his ex-works 125 - he soon moved up to a 500 twin

Having gained a modicum of respect through this means and having proved that you can exaggerate with the best of them you will probably be asked to prove your commitment to the sport by putting your money where your mouth is! If you are like me and carry your wallet in your back pocket comfortably nestling against your right cheek, then this is a far better proposition than putting your mouth where your money is!

If, so far, you have escaped having to buy a lottery ticket for \$500 of woman's underwear sourced from the Club President's Lingerie Shop or a raffle ticket for a Club T-shirt two sizes too small, then do not despair for the Club Treasurer has the happy knack of never forgetting a face and will pin you down for ever more.

First expense for most is the Club fees, these are generally modest (as the best is yet to come) and may include a joining fee to cover the cost of writing your name in the address book. Club fees normally are no more than A\$40 for the year and this entitles you to call yourself a Clubman in public and to a Club newsletter every month. As a Clubman you are entitled to apply for a competition license. A concessional license allows you to enter Club events and tuning days. The license fee includes compulsory accident insurance. If you wish to ride at Open events with other Clubs then you will need a full Competition license. Your application must be accompanied by a significant donation, a pair of passport photos and have the imprimatur of the Club Secretary. Normally a concessional or a full license will not be approved by the Club Secretary until you have proven on at least two tuning days that you have a degree of riding skill, understand the flags and have a modicum of on-track courtesy.

If you haven't already done so you will need to buy an ACCA approved helmet (\$450 should do, gloves and boots and a set of approved racing leathers. Leathers can be either one piece or two-piece; but if they are two piece they must zip together and zip close at the wrist and ankle plus have a velcro fastener at the neck. Fancy leathers with suitable padding and elbow and knee protection can be bought new for between \$800 to \$1000+; however secondhand leathers with the odd battle scar can be found in the classifieds for \$200 to \$600 depending on condition and the amount of flashy leatherwork on them.

I think I've run out of time and I still haven't told you what to do with that old Titan you've got rusting in the shed! Well get out the General Competition Rules and and study them and next time I'll tell you what chopping and changing you need to do. Until the next time, get the bike out, pull the engine out of the frame and give it all a good clean. The frame could do with a bit of painting as well while your at it.



Race preparation for a Suzuki 500

"HOW TO FRIGHTEN YOURSELF ON A TITAN"

Firstly, some background. Suzuki realised the strengths of its Cobra motor way back in 1968. They called their racing 500 the XR-05. Sounds like something built to break the sound barrier and it nearly did. When they brought the XR-05 over to Daytona it was good for 152 mph, the sort of performance that made the American and British manufacturers sit up and take notice. Despite their performance the XR-05's were little more than souped-up T500 motors and that bodes well for interested Post-Classic racers of today. The T500 Suzuki is built solid, is reliable and as a result of its popularity as an economical and long-lasting commuter come tourer is still in plentiful supply second hand.

The best way to go is to find someone with a race-prepared bike and be prepared to pay their price, believe me, if they've done the work, then it is the cheapest way to go. Failing that and their aren't that many people who want to part with their hot T500s, look for a couple of old duffers and start the long path to a fabulous race bike. Once you've found a bike, strip it down, check the motor and have a close look at the wheels, brakes and frame.



The Exo-skeleton.

Check to see that the frame is neither bent nor damaged, clean off the rust and get rid of everything extraneous except the engine mounts. You don't need the standard seat mounts, side cover mounts, centre stand or side stand mounts or the battery/oil tank mounts, get rid of them all. Grind or cut them off, soon you will have a lovely pristine frame which will look custom-made when finished. Don't forget to cut the lifting grab-handle off as well. No macho self-respecting racing motorcyclist would have such a practical device on their machine.

Serious attention to the handling can now commence. The suggestions I make are for backyard mechanics only so I don't go to the extent of bending tubes and re-aligning steering-head angles. Firstly, the Titan frame is open and spacious, wide-open in fact! Some consideration to triangulation can be given by welding one inch (or so) pipe from just above the swing-arm plate on each side to meet the top frame rails about the point where the single steering head support bar meets the top rails. If you are going to mount a shorter swingarm then you will need to relocate the rear mudguard mounting point which is on a cross bar between the two rear frame tubes. A super little touch, that looks so right that people will think the factory did it, is to cut the rear mudguard mounting cross bar off the rear frame tubes and weld them to your new triangulating frame tubes, both to brace them and to more effectively mount the rear mudguard. The mudguard mounting has to move otherwise the shorter swingarm will bring the rear tyre into contact with the mudguard.

Yes indeed, a shorter swingarm. The Titan has a monstrous wheel-base of 57.2 inches so the loss of 3 or 4 inches at the swingarm can only serve to quicken steering and reduce flex. You can make your own or modify the existing one, there is plenty to play with. I toyed with fitting a 350 Suzuki swingarm, it is the right length and takes the same wheel. I never got around to it. Once you take a few inches out of the arm weld some angle iron on to it to strengthen it. It weighs a ton but then so does the whole frame. It must be made of stovepipe. The T500 frame is heaps heavier than the Honda 750 frame I'm fiddling with at present.

Once you've moved the back wheel forward then you will have to re-locate the rear shock mounts as they will be too far back. Cut the rear frame extensions, take out an inch or two and weld them back on to regain the appropriate angle for the shocks to work properly.



Rolling along....

Unless you are keen to run a front drum brake then I suggest that you go for discs. Disc brakes are so much easier to maintain, are lighter, work better in all conditions and are plentiful. That is of course unless you follow the adage, "what do need brakes for, they only slow you down"?

The Titan comes with a handsome twin leading shoe front drum. If anyone wants one I've got a shed full of them. Try and find a traditionalist who wants a good looking front drum brake and sell it to him. I set my fastest laps on a drum braked Titan many years ago. Of course then I didn't know the meaning of "slow down" and didn't really notice that I didn't have any brakes after the first corner. Really serious work with the Titan drum brake led to cracks in the hub apparently, though it never happened to me. Of course the true aficionado can go for the GT750 Suzuki 4 leading shoe drum brake; but has anyone noticed how much they weigh, how long they take to set up and how quickly the shoes wear?

Or you can go the Grimeca 4 leading shoe drum brake way if you have lots of money. None of them look anything remotely like the TR500 Ceriani racing drum brake anyway (which is unobtainably expensive) while the Suzuki front disc brake setup looks just like the 1972 Suzuki factory Daytona setup and is heaps more practical.

The first disc-braked GT750 Suzuki had a twin disc brake front end which works very well on the Titan racer, even if two discs make for a lot of weight. They look good! The first disc-braked model GT750 had big, heavy disks with smaller cutouts in the centre. They look authentic; but they are hard to find and are heavy! From then on all the GT model Suzukis had slightly lighter disks which only pedants could distinguish from the first batch.

If you don't want twin disks then the GT500 Suzuki and the GT550 Suzuki shared single disk setups and similar forks. All the GT750's, GT500's and GT550's ran 35mm diameter fork legs on their disk- braked models and the triple clamps are interchangeable. The disc-braked model front triple clamps slot straight into the T500's headstock. Take the opportunity to replace the steering head ball- bearings with tapered roller bearings while you are at it.



The author gets his Titan based racer over

The 750 forks are a bit long and so they need to be run though the top triple clamp a way. They are also a little stiff for the 500 so change the oil and look for softer springs. Either way they will work for you with little effort. Silkolene RSF fork oil comes in a range from 2.5W to 15W. I go for 10W. AtA \$18 a litre don't spill any. The best all round ride comes from the GT500 forks, they are softer running than the 750's. The advantage of the GT550's forks is that even though they normally come with only a single disc they often have the twin disk fork sliders allowing you to upgrade if so desired.

The standard Titan forks are 34mm jobs that are somewhat soft and spindly. They look quaint though with their external spring, though I recommend that you keep the dustcover on. Later forks, discs and callipers from the GS Suzuki range are not eligible for the Post-Classic class.

Feel, with the disc brake front end is vastly improved by the addition of braided steel hydraulic lines and joints. I've one set with braided lines and another with standard rubber hydraulic lines. Each time I ride with the standard lines I come in off the track complaining of sponginess. There is nothing wrong with them, the braided lines are just so much better. I get mine setup through Pal and Panther Cycles in North Perth, I'm sure there will be a place near you in other cities to do the job, it is worth it. Pal and Panther supply the brake pads and hydraulic fluid as well. Ferodo pads are the go at A\$30+ a pair and Silkolene hydraulic fluid is the recommended oil.

A steering damper is a useful aid to help dampen out those bumps, especially on country round the houses circuits. I've used both the hydraulic type, which start working when the front end starts slapping around, and the friction type, fully adjustable, which works all the time, and presumably stops the front end from slapping around from the beginning. I haven't noticed a great deal of difference; but I do like the friction damper, made by Sebac, and sold to me by the late Ted Stolarski from Moto Guzzi Australia in Victoria Park, W.A. for around ninety bucks. Cheaper than the hydraulic units and if it good enough for the 4 valve Magni Guzzi at Daytona then it is good enough for me.

Fit a front mudguard, it makes a world of difference. Not only does it stop mud and sand from getting all over the motor but it also braces the spindly fork legs just a smidgen.

Rear shocks always need replacing and the standard Post-Classic racing replacement part seems to be Konis. These Koni shocks are normally very stiff, come with some damping adjustment, take a long time to bed in and they come in a bewildering range of spring strengths and lengths. The recommended rear shock varies on the weight of bike and rider. The stripped down Titan is around 165kg and I am pushing 80kg and my Konis are too stiff. I am using 7610 - 1307 with a 214 spring which is the standard GT500 setup. Other suggestions are the Koni 7610 - 1282 with a 240 spring for a much softer ride or the 7610 - 1514 with 70/100 springs. I have ridden the Titan with good condition standard Suzuki shocks and springs, they work okay as long as you don't expect miracles.



Rims, well if you want to look flash then alloy rims are mandatory; but for my money steel rims are cheap and durable. I use two different types of rim, DID and Akront WM2. Both weigh a bit less and look more pukka, Akront more so. The Titan has a 19" front wheel so re-spoeking to 18" is the way to go for quicker steering, good looks and a better range of tyres. Craig Howe from Pal and Panther is the man to see locally for both rims and tyres for Suzuki 500's. If you haven't got a wheel, he can build one up from the new twin disk front hubs he has in stock. DID alloy rims cost around A\$130+ each and the flash Akronts about \$180. Add in wheel building and spokes when you do your costing.

Tyres are a toss up as most brands these days are pretty good. Dunlop K591's provide good grip in the dry; but maybe not so good in the wet. Dunlop K124's and K164's are pretty well the best you can get if you can get them and can afford them. No-one seems to bring them in anymore. I found them excellent to start with; but they wore real quick and went off real quick. Good for a few sprint races then they should be discarded. I think it is too hot in Australia for Pommy sprint tyres. Too expensive anyway.

Avon AM22 front and AM23 rear are a good pair. These Avons have a very good profile, they grip well and they are long-lasting. I have been very impressed with these tyres which have given me my best times at Wanneroo. I still have them on after two seasons and they are the tyre I recommend to other riders.

Despite this Craig Howe is fitting some Bridgestone BT37 Battleaxe's, from his famed Wall of Tyres, to the bike at the moment; the Avons will stay on the spare bike, so I will let you know how the Bridges go in due course.



Darryl Beattie started small as well

Clothes maketh the man....

Clipons are de rigueur, though even after the above mods the T500 will wallow in bends and flex in the esses. Long ones give more leverage, forget the Jarno Saarinen replicas you'll will need all the help you can get to go fast and hold the beast on line. Alloy clipons are very smart and expensive. Don't buy second hand if they have been down the road. Steel clipons are readily available, repairable and heavy. They are also getting quite expensive. Expect to pay \$80 for a set from a shop and not everybody carries them these days as modern bikes usually come with their own unique setups. Early Ducati Pantahs wore 35mm forks and clipons and they seem to be frequent sellers at swapmeets or wreckers.

Rearsets are the mark of the real racing machine. The Suzuki T500 is readily adaptable to a rearset gear linkage and the recent trend to sporty roadbikes has made the job easier. Any wrecker will carry a range of old Suzuki rearset gear levers and linkages from Katanas or even boring old farts such as the GSX250. These linkages sell for A\$10-20 and are ideal. The gearshaft size and fitting is the same on these newer Suzukis as it is on the T500. Thank goodness for some standardisation over time. The rose-joints work wonderfully and often the only change needed is to extend the connecting rod. The brake is more difficult to fit as you will need to handcraft a foot-brake to suit. It isn't important as the back brake works so poorly anyway despite skimming and fitting new linings.

The T500 tank is quite handsome and will do if you can't find anything else. It is a bit short though if you go in for rearsets. A racing seat is essential to look the part and anyway you will need it to stop sliding off the back. If you can weld or know someone who can aluminium then a standard trick is to knock up an alloy box for a petrol tank and put a fibreglass dummy tank over it. Ok if you like that sort of thing. I don't like fibreglass tanks so I always look around for suitable metal ones. Old racing Yamaha ones look good; but my favourite is the early Ducati 750SS or 900SS tank. It is light, metallic, racy looking and fits straight onto the T500 frame. It is also the right length to suit a rearwards seating position. To fit it all that is needed is to weld a strap in place to locate the Ducati mounting bolts. You can still get to the plugs and head-bolts with the tank in place.

Of course if you put a Ducati tank on then a Ducati sports single seat really sets off the tank and the recess under the seat makes for a handy place to locate the oil tank for the oil injection system. I use old lawn mower petrol tanks. They are metal, hold just the right amount of oil, can take the vibration and of course they fit under the seat.



Race preparation for a Suzuki 500 - Part 2

TITANING UP



By now keen readers of this esteemed page would be well aware of the potential of the trusty old Titan Suzuki 500 to make a cheap and viable Post-Classic racer. The heart of a Titan is solid gold, it is built to last and will take a heap of abuse. The combination of heaps of torque and big heavy flywheels makes it one of the fastest bikes off the line in its class. Do nothing to the motor except add chambers and the Titan will rocket away into the first corner like no other. So my advice is unless you really need heaps of power leave it stock until you crave more. So you do want heaps of power? Oh well, lets start with the porting charts.

Porting.....

This is a tricky bit and slow as you go here will pay off. Don't jump in hacking heaps of metal off with porting tools. The real techo can probably almost double the standard 47 bhp but I bet the motor will lose rideability, reliability and enjoyment. Be warned go one step at a time, cutting away little by little, each time being sure what you are aiming at with every modification.

The August 1969 Daytona Suzuki factory specs say take 5mm from the top of the exhaust port and take 5mm from the bottom of the inlet port, taking care not to break through between the 3rd and 4th fin above the exhaust port. Similar amounts are taken off each side of the ports. The result, reportedly, is a peaky motor which is not very useable on tight tracks.

Cycle World in April 1970 suggested that the way to go was widen the exhaust port from 44mm to 57mm, raise the port from 40mm to 34mm, raise the transfer port 2.5mm and lower the inlet from 105mm to 110mm while increasing the width by 4.4mm. A good deal more radical than the quoted factory specs and probably peakier as a result.

I've had a lot of success by widening the exhaust port by 10mm, from 44mm to 54mm, raising the exhaust port 3mm, from 40mm to 37mm, leaving the transfer port alone, lowering the inlet from 105mm to 108.5mm while increasing the width by 15mm. The motor is tractable, fast and eminently reliable as a result.

One of the problem areas is access to the transfer ports. If you are really clever you can cut through the cylinder casting, open up the transfer ports and reweld the cylinder again. If you are like me, you can't get to them and have to leave well enough alone. The factory recommends raising the transfers by up to 2.5mm. Clearly if you can't increase the volumetric efficiency of the transfer ports then there is little point fiddling with the inlet ports greatly. The safest part of the transfer port to modify is the bottom of the port where it joins the crankcase. Cut the base gasket to match the cut-outs and then match the transfers to the base gasket. Then carefully smooth the transfers and dress up the piston cut-out to make sure everything is a good match. Clean up and match the rear edge of the transfer inlet windows in the cylinder lining. Some tuners choose to cut out the lower edge of the inlet window to assist transfer flow, I'm not so sure that is such a good idea. Any tuners out there got an opinion?

When opening up the exhaust port aim to keep it as oval as possible. This port shape is fairly gentle on the rings provided it doesn't get excessively wide. Increasing the width of the exhaust port will normally result in a power increase from the upper mid-range to peak rpm with no noticeable loss of power elsewhere. Raising the port will always knock off some bottom end power. Below is a chart of different recommendations for port sizes. Suffice to say that the mild exhaust port height I use, combined with a wide exhaust port has proven to be a tractable beast. The latter Suzuki TR500 specs have a higher exhaust port and the motors are renowned for their peakiness.

When lowering the floor of the inlet port it is important to rework the inlet all the way back to the carburettor. Otherwise the port will not flow any better than the original port. To encourage air flow the port must be smooth and free of any obstructions. Polish the port as much as possible by hand or use a flap stick mounted on an electric drill piece.



You too could be a Barry Sheene on the race track with this porting!

Comparison chart :

the following list of recommended porting arrangements will give an idea of the different approaches tried by various sources. You will note that the porting I use is not all that radical which indicates that when I want to I can still extract some more power from my machine.

H = height, measured from top lip of exhaust port to top of the cylinder lining, in mm. W = width of port, in mm. D= depth of inlet port, measured from bottom lip of exhaust port to top of the cylinder lining, in mm.

Ports	Standard barrels	1969 factory specs	Cycle World 1970	Clymer 1973	Factory specs
Exhaust :H	40	36	34	35	35
W	44	51.5	57	46	51.5
Inlet: D	105	110	110	109	108.5
W	44	48	48.4	44	48
Ports	Ron Grant	Pal & Panther	My race motor	old reliable	
exhaust: H	35	34	37	37	
W	55	48	55	54	
inlet : D	105	107	108.5	108.5	
W	47.5	57	60	59	



Kevin Schwantz was a nobody until he followed the advice on this page!

An Exhausting Topic

The exhausts are probably the most critical element when it comes to power tuning a two-stroke. Many shortfalls of porting can be compensated by tuning the pipes to suit. There are a number of sources of expansion chamber for the T500. Swarbrick Racing in London does a nice set (for you) at a very nice price (for them). Kiwi John Woodley is happy to supply you with a set of impressive looking chambers for a TR500 for \$800. They look good and go well so if you are interested you can order them through Powerflow in Geelong. If you are desperate you can use ex-road chambers, such as J&R, but expect only minor improvements in performance with a race-porting motor.

The basic TR500 design looks archaic and is archaic; but it works well, sounds good and accommodates a vast range of tuning stuff-ups. As I am not after absolute power; but seek reliability, tractability and improved performance all in the one package, I am happy with a set of pipes which not only look appropriate to the time but do the job well. The only drawback is the length of the pipes which makes the fitting of an after market silencer difficult.

69 factory specs			My spare pipes			70 factory specs			Ron Grant 69			My race pipes		
length	diameter	length	diameter	length	diameter	length	diameter	length	diameter	length	diameter	length	diameter	
150	45	170	45	100	47.5	286	43.5	190	45					
275	49	200	50	250	47.5	220	43.5	230	50					
320	65	260	62	70	58	280	58	400	60					
32	100	90	95	320	65.5	40	100	30	100					
150	100	120	110	30	100	110	100	150	100					
237	86	270	110	147	100	220	86	260	90					
220	23	310	30	253	87	320	34	240	25					
				230	23									

Note: all measurements in mm. Diameters shown are as at the beginning of each taper. The final length of each pipe is for a straight pipe, or stinger.



Whee, Eric's got a Suzi 500 racer! (pic courtesy US T500 web page)

My race bikes are ported for a theoretical 8500 rpm; however one of the main factors which restrict my machines to a much lower rev limit are the expansion chambers. My current race bike has chambers fitted with dimensions which imply a tuned rev limit of 6750 rpm. This chamber design has a very long header and a long shallow taper diffuser. A long header has the effect of increasing mid- range power at the expense of a drop in maximum rpm. My spare bike fares little better, the pipe is designed for an implied limit of 7270 rpm. The header is a little bit shorter and the diffuser is also slightly steeper. This allows some more revs without taking away too much from the mid-range. Clearly the potential of the motor is not being reached with these chambers. Despite this the motor delivers an impressive turn of speed, rapid acceleration and excellent tractability. When ready I will be able to extract additional power should I feel the need. Taking the spare bike's chamber dimensions and merely shortening the parallel mid-section dimensions from 120 mm to 60 mm will give the motor an implied rev limit of 7700 rpm. Taking it down to 30 mm will lift it to 8000 rpm (based on an exhaust duration of 182 degrees). Compare this to the standard motor which was generally good for 7500 rpm and that was with standard mufflers! Fiddle with two strokes at your own risk.

Of course there are a multitude of factors involved in speed tuning a two stroke motor and I cannot cover any of them in any depth in a short article. Nor am I qualified to do so. Those wanting to calculate the optimum for their machine should consult a reference of the calibre of "Performance Tuning in Theory and Practice - Two Strokes" by A. Graham Bell, a Foulis book published by Haynes (ISBN 0 85429 329 9). This is a wonderful book by an Australian engineer and is a must for any two-stroke tuner.

Head-aches

The Suzuki 500 heads are fairly ordinary in design and the factory brought out some Daytona heads which incorporated a squish chamber and central spark plug to try and improve on combustion. There are some of these heads around; but, they seem to be jealously guarded. Some adventurous souls weld up the standard heads and cut a squish chamber out of them, at great expense I imagine. Certainly a decent squish chamber and fine tolerances will result in a power increase; however, the trade-off is in maintenance and careful assembly of engine components. The most accessible head modification to most Titan racers is to follow the factory advice and take up to 1.5mm off the head in order to increase compression. The heads I use have 1mm skimmed off them. I have another set with 1.5mm taken off; but I haven't used them yet. A higher compression ratio can increase mid-range power and widen the power-band marginally; but, there is little advantage in out-right power terms. I run octane boost to promote a cleaner burn. Pal and Panther supply me with two types which work well, Silkolene's Pro-boost (A\$28/litre) or P-J-1 (A\$12 a can). The Silkolene pro-boost can be used in proportions as small as 1.5% and helps prevent pre-ignition as well as give the motor a crisper feel. Do remember to tension the heads properly. Rub them down on a sheet of glass with some wet & dry to make sure they are flat. Titan heads have a propensity to crack if not progressively tightened so make sure you don't over tension them, they warp easily.



Next page - the factory racers

Sparks

I try to avoid running the old Titan motor. The GT500 model has a modified crankshaft which runs Suzuki's own electronic ignition which is maintenance free and can run without a battery. This "pointless electronic ignition" (PEI) system is quite adequate, uses a single coil and requires no adjustment for racing conditions. The absence of a battery is a godsend. The vibration of the motor at racing speeds combined with the weight of the rotor is claimed to sometimes result in fractured crankshaft noses. I know of only one machine that this happened on. It was not raced and is now in Darwin. In several years racing it has not happened to me (so far). For the average historic racer PEI is the way to go.

Some keen individuals have mounted modified GSX ignitions on Titans; but I am not familiar with this modification. Similarly, Krober Ignitions can be fitted if you have the money. I have a Fems electronic ignition for the T500 which is rather temperamental but provides a healthy spark. Too healthy, the only time I ran the Fems it put a big hole in a piston. The result of wrong ignition timing I suspect.

If you can't find a suitable electronic ignition then points ignition can be accurately used by ditching the alternator and running total loss with a battery. You just need to keep the battery charged between meetings.

Spark plugs are critical. Never run on anything hotter than a NGK 9HS or its equivalent. Pal and Panther Cycles are good enough to supply NGK B10HV plugs which retail for A\$12 each. These plugs are ideal for racing with their recessed electrode and long lasting reliability.

Whilst on ignitions, do yourself a favour and buy an electronic tachometer which clips to the spark plug lead. I use a digital tachometer favoured by go-cart drivers . It is small, light reliable and accurate unlike the cable operated tachometer which lags behind the motor to the point where it is useless. The digital tachometers are not cheap though! Plan on spending \$150 on a good one.

Cranks

The Titan crank is heavy. Bloody heavy! The trade-off is that for normal use (read: Post-classic racing) they are trouble-free. They had better be, the huge main bearings are expensive and only available from Suzuki warehouses. Suzuki practise is to use injection oil-fed to the main bearings. So don't take the oil-pump off and rely on pre-mix in the petrol tank. If you must take the pump off to a. look like a real racer and b. because you think you need that little tiny fraction of horse-power that will be saved, then don't forget to drill some passages to feed the bearings.

One mod that is popular is to machine the flywheels down to lighten the crank. If you do this it is essential to put stuffers in the crankcase to maintain primary compression. It is a big, expensive job to lighten the crank and stuffers don't just sit around on the shelves. One alternative, if you desire a free spinning motor, is to lighten the flywheels by cross-drilling and then stuffing them with cork and epoxy resin to maintain the primary compression. Opinions vary on whether to lighten the crank or not. Some say the light crank helps with acceleration while others maintain that it makes stuff-all difference

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