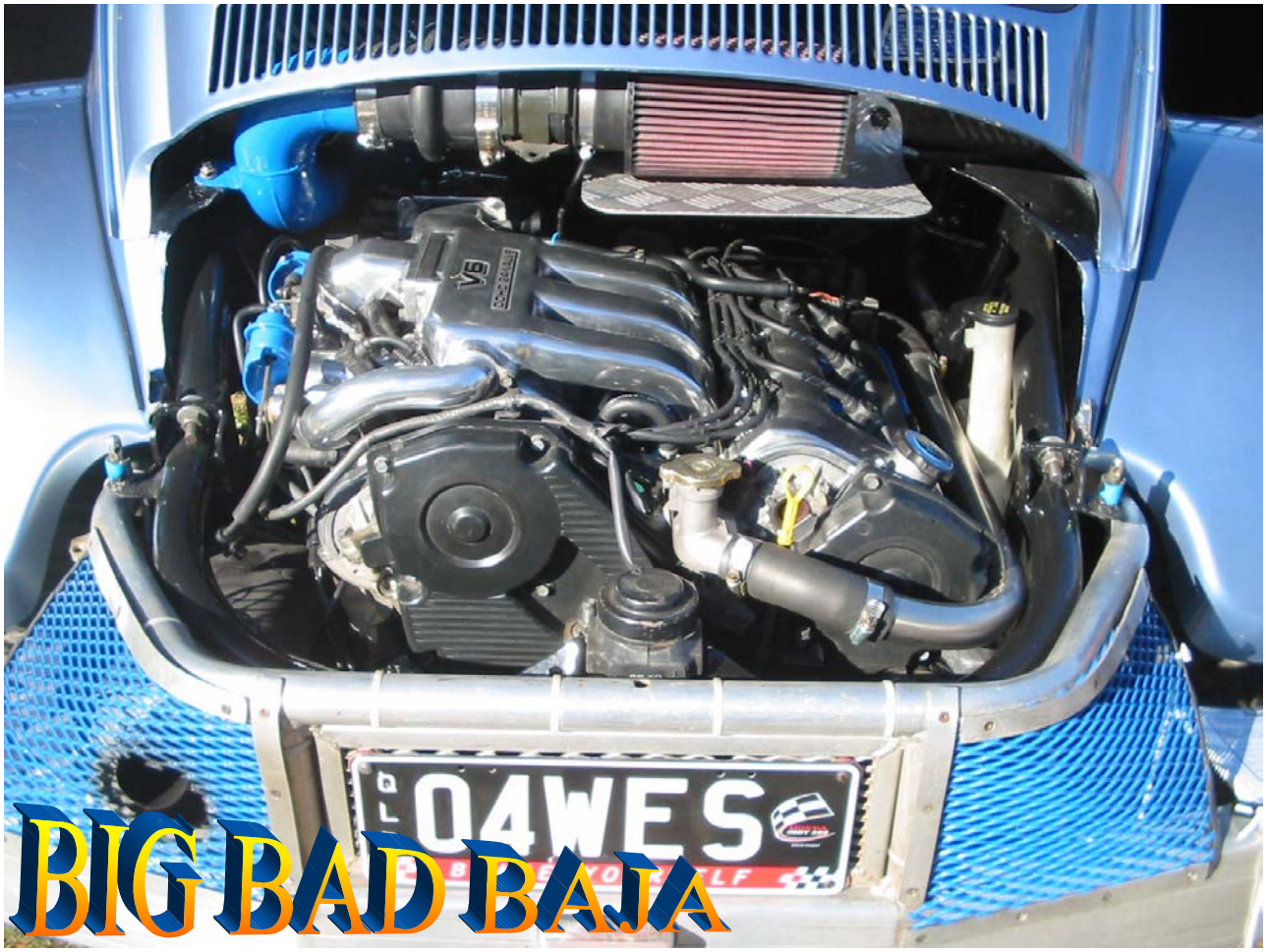


PART 2 – The V6 engine era *(all alloy, quad cam, 24 valve, VRIS, 200HP, 2.5 Liter, Sequential multipoint EFI V6 to be exact)*

Last edition I explained why I bought my Baja, what I like about it, and all about it's specs. The specs however, have changed.

After quite a few years with the VW motor, I was getting bored with it. A twin Webered 1915 is nothing to be sneezed at, but it just wasn't as fun as it used to be. You see, the more power you have, the more power you want. And it doesn't take long to get used to what you have.

So the search was on, how should I achieve this illusive power I desire? Hmmm, turbo the current motor? No, turbo's kill air cooled motors. Supercharger? Now we're talking, nothing like the whine of a blower, and the instant throttle response. Maybe build a twin supercharged type 4 with a Porsche fan shroud…

I went as far as digging through superchargers at an importer, and even had two type 4 motors to build up. Then I did something sensible, I made a price list to see what it would cost. It was going to be a lot of money! Too much money in fact. It seemed I would need to spend at least $3000 to have 150 unreliable HP (and that's doing everything myself!).

I have some friends with some wild Jap cars, like old sprinters with 4AGZE's and CA18DET Jap motors in them. They were getting incredible performance for very little $$$. Why? They use Jap import half cut motors. They are fast, refined, reliable, and fantastic to drive.

I started talking to friends like Brad about how we would go about a Jap motor conversion in the Baja, where we would put parts, whether it was practical, etc. It didn't take long before Brad was encouraging me to go for it. Not that I needed much encouraging.

So I started my research, what motor to use? Subaru is the traditional choice, but they have never grabbed me. NA versions are low powered, turbo versions are very laggy, and it's all been done before. Not to mention the deep Subaru sump. Inline 4's would have really opened the options, but they wouldn't fill the Baja engine bay very well, and would have given bad offroad departure angles.

So I eventually decided I wanted a V6, more cylinders means a smoother and more torquey motor low in the rev range. Legally I was restricted

to either a 2.0lt turbo motor, or a 2.5lt naturally aspirated motor. I narrowed my list down to ;

Early Galant VR4 2.0 V6 twin turbo	Huge power, probably good sound, hard to find, $$$, bad part support
Early Camry 2.5 V6	Modest power, most parts available, heavy cast iron block
Mitsubishi FTO 2.0 V6	Great power (at about 8,500rpm), fantastic sound, no low end torque, hard to find, $$$, bad part support
Mazda/Ford 2.5 V6 KLZE	Great power and torque, apparently lightest V6 in class, not too hard to find, good part support, great sound, good price.
Alfa V6's, Audi V6's	way too expensive, because they're not a jap import.

So I went with the Mazda V6. The Australian version is a KL03 with 165HP which came in the (92+) Mazda MX6, 626, Ford Probe and Telstar Ghia so there is a good parts base in Australia. The Japanese version is the KLZE which has bigger ports, bigger cams, higher compression and has 200HP. It is an all alloy, quad cam, 24 valve V6 and has a variable resonance intake system (VRIS) which varies the intake length through-out the rev range to optimise torque. And it works, this engine pulls from 500rpm all the way to it's 7,900rpm rev limiter.

So after I decided what I wanted, I had to decided how I was going to make it fit. Preliminary measurements from drawings and a friends Telstar Ghia indicated that I should be able to squash it into the Baja's engine bay. Well providing I cut out the firewall to clear the intake and distributor anyway. A quick call to my approval engineer and I had the go ahead to modify the engine bay and firewall to suit the V6.

The next step was finding a front cut, and funnily enough my approval engineer told me where a well priced front cut was. I took my mates Brad and Rhys with me for the inspection for second and third opinions.

We turned up to the importers and were directed to the front cut. Oil looks ok, no visible blackening of the alloy or cams under the filler cap, water is very clean and a nice green colour, no stains in the overflow bottle, yep all looks good. Next check was to hear it run. So up on the forklift it went, they

hooked up a battery, hooked up some fuel, and turned the key.

Now this car had been cut in half, put on a ship, sent half way around the world, probably stored on it's side, roughly handled by lots of forklifts and generally neglected. But it still fired up instantly. I was impressed. A few big revs with no exhaust put a smile on our faces, you could tell it was a tough motor. There was no weird noises, even the climate control was working, so I bought it for $2500. Since then I have sold the gearbox, gearstick and steering wheel out of it for $600, so it only owes me $1900.

The next stage was working out how I was going to make everything fit. I decided the best plan of attack was to trial fit everything into a test car before cutting up my much loved Baja. To do this I made what was essentially a beetle rear cut. Put a 2inch wooden lift kit in it, and an old kombi gearbox. So dimensionally it was very similar to the Baja.

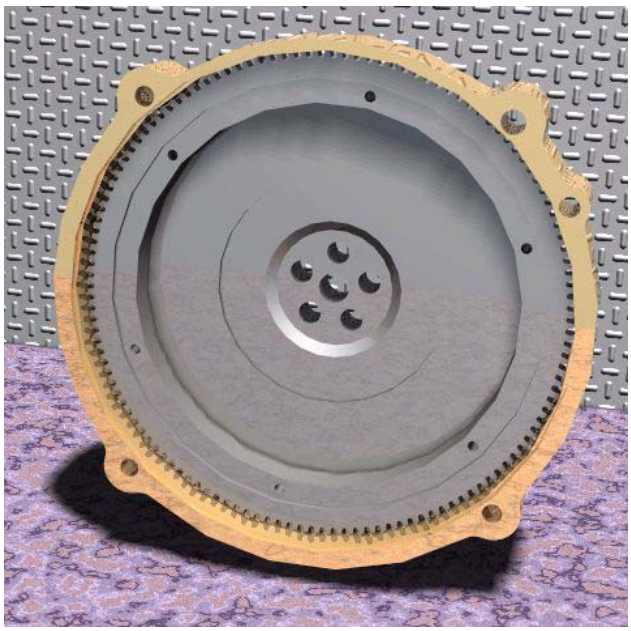
The big decision was where to put the radiator. Most people put one up the front because that's where the most air flow is, well when the car is moving anyway. I think the radiator up the front usually doesn't look right, is prone to damage, heats up the

fuel in the tank, and makes life hard for the water pump. Surely there must be a better way.

I figured since I have to cut my firewall and lose most of the area behind the rear seat. I might as well cut away a little more of the body and put my radiator there too. It's protected, it compact and neat, it's close to the motor, and by my reasoning the low pressure behind the car at highway speeds should help suck air through it. A quick bit of cutting and trial fitting into the beetle rear cut and I found the radiator could be mounted above the gearbox.

The adaptor plate was the next item on the list of things to figure out. A good quality adaptor from the US would have been US$550, too expensive for me. Even an adaptor made in Australia was going to be about $650, then I would need to buy a heavy duty pressure plate as well. I decided the best option would be to make my own adaptor, and set-up the flywheel to use the Mazda pressure plate, since it is designed for the torque of the V6.

So I started drawing everything in AutoCad. Drew 3 different styles of VW flywheels, the VW bellhousing, the Mazda flywheel, and the V6 engine bolt pattern. Then it was a simple matter of moving things around in Cad until I figured out how to make it fit.



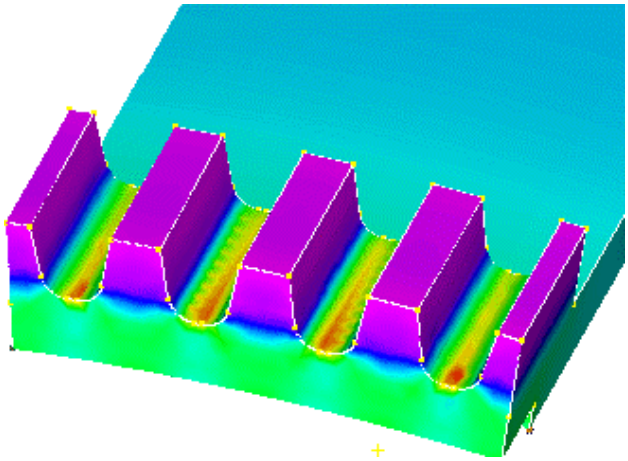
The adaptor plate was the easier part. It was a simple case of laying the VW bellhousing over top of the Mazda engine bolt pattern. I decided the cheapest way to make it was to get it water / plasma cut out of aluminium plate. This means no expensive milling. The problem it creates is there is no locating spigot like on the VW motor. I solved this problem by simply drilling and dowelling the adaptor plate to the VW bellhousing. After all, the Mazda engine was only located with dowels to it's gearbox.

We (Brad and I) bought some 20mm aluminium plate from a scrap metal merchant for the low price of $50. We had enough to make 3 adaptor plates, so we did. The adaptor plate drawing was taken to an abrasive water jet cutting workshop along with the aluminium. The fee to cut the plate was $66 per adaptor. Not too bad at all. The 2nd adaptor plate is going to be used by Brad who is putting a KLZE in his Mega Manx, but that's a different story.

The flywheel was a little more difficult. I found the stock Mazda V6 clutch was the same diameter as the stock 2lt type 4 VW clutch. The easy option was then to use the VW clutch with the Mazda flywheel and pressure plate. This has worked very well and is giving me excellent clutch performance with normal pedal pressure.

The hard part was the starter motor. The ring gear on the Mazda engine was too big to even fit in the VW bellhousing. So the plan was to put a VW ring gear on the Mazda flywheel. This was going to be the expensive part, but still only ended up costing about $264 which wasn't too bad. The workshop pulled the ring gear off the Mazda flywheel, then pressed and welded on a ring gear that I had machined off an old 1800 flywheel. The welding could have been better, but it's still holding together.

The problem with pressing the ring gear on the Mazda flywheel was that the ring gear had to hang out over the front of the flywheel, and was only attached at the pressure plate mounting posts (a strange property of the modern flywheels. There was a danger the ring gear would fly apart at high RPM. Luckily I am an engineer and have access to some very expensive FEA software that allows me to calculate the stress in the ring gear at high rpm's. A quick analysis of the flywheel showed the stresses to be high, but within the limits of a high grade casting.



The tricky parts were figured out, and now I was ready to jam it in the Baja. I was sent to Townsville from October to May the next year, so that so down my progress. Talking with Brad we thought we should try to get it in and running when I come back for 3 weeks of Christmas holidays. He said we could christen his new shed. I thought what the hell, and the plan was set. Before I knew it my car was sitting in Brad's shed with the VW engine removed.

I had also organised a stronger gearbox. The 5-rib I had was still in excellent condition, but I figured I needed the strength of the 6-rib gearbox to handle the V6 power and torque. I struck a few deals with a friend and soon had a 6-rib box being built. I opted for a late Vanagon factory 4-spider diff as the only strength modification to the gearbox. A 6-rib would've put my revs at 100kph at about 2800rpm at 100kph. I didn't see much point having the V6 revving that high, so ordered a custom Albins 0.70:1 gear set. I now do about 2,200rpm @ 100kph, and 2,500rpm @ 110kph. 1st, 2nd, and 3rd are for acceleration (3rd revs out to about 200kph!) and 4th is just for cruising along.

After the initial shock (or fun for Brad) of cutting a huge hole in the back of my car had worn off, the fabrication begun. The V6 weighs in at 176kg with absolutely everything on it, as opposed to maybe 120kg for a fully dressed type 1 motor. So to handle the extra weight we fabricated a support frame / hoop in the rear of the car. It extends from the torsion tube, along the frame horns, to the back of the hoop where it picks up the rear engine mount of the V6. This is to take the stress off the bellhousing. It then flows up to the top of the firewall (or where it was), and then angles down behind the rear seat to the torsion tubes again. It also supports the radiator, and gave me something to bolt a new firewall / engine cover plate to.

As described earlier, the radiator is mounted above the gearbox, just in front of the motor. Most people don't know where I put it until I point it out to them at shows. It is the stock radiator from the front cut and has two thermo fans mounted on it. The fans are both dual speed (low / hi) fans which are controlled by the factory computer to keep the engine at the optimum temperature.

As part of getting the V6 approved and legal, the approval engineer wanted to see rear disc brakes fitted, I didn't think it was such a bad idea. I basically fitted an off the shelf XF falcon rear disc kit. The XF

falcon caliper size matches the VW front caliper size very well, and did not require the use of a bias proportioning valve. Dispite popular myth, you do not need a brake booster to run disc brakes. The pedal pressure on my car is not heavy, and the braking is excellent.

For the electrics and computer side of the conversion I simply used everything that was in the half cut. I am running the factory ECU, loom, I'm even running the factory Mazda instrument cluster. Since the half cut was running when I bought it, I just kept pulling non-essential electrics (abs, headlights) out of the loom, and then restarting the engine to ensure I hadn't ruined anything. I ended up putting the ECU behind one of the rear side interior panels, so it is safe from the weather.

The exhaust is still in a somewhat temporary state, and consists of a 2inch exhaust with a turbo muffler and catalytic converter in a tight S shape at the rear. I plan to build a 2.5 or 3in exhaust for the car, and also eventually replace the factory cast iron exhaust manifolds to reduce the weight a little.

So that's a basic description of how the conversion was performed. Once everything was in place I made a checkerplate aluminium rear internal engine cover. This completely seals out the engine and any possible fumes, and is an obvious legal requirement. I have made it removable to allow easy access to the engine. I have even retained the rear seat and seat belts, although the rear seat did need to be shortened by 50mm because of where we put some of the bar work. I had to remake the rear Subwoofer box / speaker panel too.

Since the initial conversion I have had very few problems, and made a couple of small changes. One problem was the radiator fluid level in the overflow tank kept going up and down constantly, sometimes overflowing (on the Nanango run). I knew it wasn't overheating and eventually traced it to a faulty radiator cap (the rubber goes hard when it gets dried out, re-wet, then dried out again, etc).

The other problem was a weird engine cut out for about 3 seconds when the car had been running for longer than 1 hour. I eventually traced this problem to the way I had my surge tank set-up. When you install a fuel injected motor you need to set-up a surge tank and high pressure pump for the EFI. I was recirculating the hot fuel from the EFI fuel rail straight back to the surge tank. After a long time the fuel in the surge tank started to get very hot and caused the high pressure EFI pump to cavitate. I fixed this problem by installing a low pressure pump to circulate the hot fuel back to the main tank. I haven't had any problems since.

The mods have been mainly aesthetic, such as polishing the alloy intake and valve covers. This took a long time and made my neck very sore. The factory parts have quite rough casting marks which took a lot of sanding before I could even start polishing. I then painted the polished parts with POR Glisten PC, a specially formulated clear coat for such use. It means the polished pieces will stay shiny and not oxidise when I go on the beach. I also fabricated a cold air intake out of 3inch exhaust pipe to feed the engine cool air and get the air filter far away from sand, mud or water. It works well!

My first proper offroad trip with the V6 was around my parent's acreage with the Manxclub. Unfortunately the shop that built my gearbox set-up first gear wrong, and it would jump out of gear if I used full throttle. This was a bit of problem for climbing hills, so it meant I couldn't try the big hill in my yard. This has given a certain buggy owner the false sense that his buggy beat my baja (despite the fact I have been up the hill twice before), but not having a usable 1st gear is a bit of a handy cap.

But the other sections of yard were more fun. The torque of the V6 is fantastic. It makes more torque at 1,000rpm than my 1915cc VW motor did anywhere in the rev range. And you really notice that offroading. I can climb up hills at 600rpm without worrying the motor at all. Then when you flatten it from those low revs it actually accelerates. This makes general offroading so much easier. I no longer need to keep up my speed, or slip the clutch anywhere. I just leave the clutch engaged in first and crawl through everything.

The extra weight of the motor has given the car a lot more traction, I have been very surprised. And this makes offroading even easier. www.offroadvw.net

Vehicle specs at a glance…	
Car / Body	1968 Baja
Interior	Velour Trim, Prelude seats, custom stereo install with custom pods. 4x50W Xplode head unit, 800W sub, 6" fronts, 6x9" rears, RF Fosgate amp
Engine	200HP, all alloy, quad cam, VRIS, 2.5lt V6, Mazda MX6 – KLZE V6
Gearbox	2lt 6-rib Kombi-Box, albins 0.70:1 4th gear set, 4-spider diff
Susp' Front	Ball joint, raised, soon to be thing type 181 front end.
Susp' Rear	Beetle IRS, raised / modified, kombi CV's inner and outer
Wheels & Tyres	Dragway Centerlines with Goodyear MTR mud tyres.
Misc.	Custom bar work, bash plates, side bars, electric windows, 2inch body lift, 4wheel discs