

APRA Car Fact Sheet Revision 1.9

Building your Pulsar for racing This document provides simple guidelines for people new to the category, it is intended for inexperienced people who need initial guidance (car enthusiasts and people with racing experience in other categories generally know how to prepare a car).

Safety Obviously you want to be as safe as possible in case an unfortunate incident happens (over our 5 year history of Pulsar racing we've had 2 cars roll over and no serious injuries).

There are various motorsport shops where you can purchase the following items (see vendors section):

- Helmet: \$500 to \$2,000
 - HANS compatible ○ Must have a rating accepted by CAMS as detailed in the "Schedule D – Apparel" document – the shop will give up to date advice ○ Note, Motorcycle helmets are not a good option as they are generally not fire resistant and can't be used with HANS devices
- HANS device: \$450 or \$1,000
 - Must have a rating accepted by CAMS as detailed in the "Frontal Head Restraint" document – the shop will give up to date advice ○ There is a lower cost composite version or a carbon version (less weight) at twice the price
- Suit: \$650 to \$2,000
 - Single layer with fireproof underwear ○ Multi-layer suits add ~20 seconds of safety buffer per layer and you don't need the fireproof underwear ○ Must have a rating accepted by CAMS as detailed in the "Schedule D – Apparel" document – the shop will give up to date advice
- Boots & Socks
- Motorsport safety belts (called "harness"): \$300 to \$650
 - Must be a 6 point harness ○ HANS compatible ○ Must have a rating accepted by CAMS as detailed in the "Schedule I – Safety Harness and Window Nets" document – the shop will give up to date advice

- A Window Net
- The car must be fitted with a roll cage: \$1,400 to \$3,000
 - Must be a “type 3” full safety cage
 - Both weld in and bolt in cages are compliant
 - Must be compliant with “Schedule J” (refer “General Requirements for Cars and Drivers” in the CAMS Manual of Motor Sport)
 - Dual side intrusion bars are currently (2019) needed in VIC (and may give you wider event eligibility outside APRA)
- The car must be fitted with a battery isolation switch: \$150 plus installation
 - This is to isolate the battery (between the battery and the starter motor) from the vehicle in the event of a crash and/or fire
 - Also needs to turn off the ignition or fuel in order to shutdown a running engine
 - Needs to have a pull wire operation to the driver’s side of the car in order for track safety personal to operate the isolate switch from outside the car

All car racing is headed towards mandatory usage of the HANS device - currently compulsory in all state, national and international events. It’s cheaper to buy HANS now rather than change later and you also get a significant safety benefit. Many people dislike HANS the first time they use it due to restricted movement (that’s the point of the device) but you quickly get used to it and most people change their opinion to “I would **NOT** got out on the track without HANS”.

Signage

Your APRA membership fee includes one series sponsor sticker set (which must be used to enter race meetings and gain series points). The set comes with sticker placement instructions. If you loose or damage stickers during the year you can purchase individual replacements from APRA at the track.

You will need to purchase numbers for the door panels (small CAMS size) and the yellow front/rear window numbers.

Licencing

AASA This is a cheaper and less complex option, refer to the AASA web site for licence and log book application details.

<https://aasa.com.au/>

CAMS You need a CAMS clubman (\$310) or national (\$490) circuit race license, refer to CAMS “License Forms” web page.

- Download the licence application form
- Fill out the form
- Have a medical (\$120) – attach results to CAMS form
- Send the form to CAMS
- CAMS send you an email telling you to do an online training course
- CAMS send you a form to take to the OLT (Observed Licence Test \$350)
- You do your OLT and get the form completed and signed by the testing authority
- Send OLT to CAMS
- You then receive a provisional CAMS race licence
 - You have to do 5 CAMS events in two years and 8 hours flag marshalling to convert the provisional licence into a full license
 - You need to use a P plate on the back of your car

Your car needs a CAMS log book (\$105), refer to the CAMS “log book forms” web page.

- Download the log book application form
- Fill out the form
- Contact a CAMS Scrutineer to get the car inspected, he/she will sign your application form
- Send the form to CAMS
- You then receive a log book

Reliability

Points to note:

- Your Pulsar will be 19 to 28 years old
- You are going to place extreme pressure on many components: brakes, suspension, engine, cooling

system

- Race days are expensive and rare (only 5 or 7 per year) – you don't want (avoidable) failures on race day

Here is a basic check list to work through to ensure your car is race ready and likely to be reliable:

- Replace the water pump with a new one (\$70)
- Purchasing a new radiator is a very good idea, get the radiator for the 2L automatic as it's much thicker (\$100)
- The clutch can get hot and slip during races longer than ~15 laps, we tend to use a puck clutch (the friction material is a ceramic/metal compound) but it's important to have a sprung centre to avoid chipping teeth off gears. The puck and pressure plate and release bearing will cost \$300 to \$450
- Check all wheel bearings (\$50 each) – replace as required
- Check all rubber suspension joints – replace as required
 - Whiteline front control arm bushes
 - Lower front bushing W51737 \$105
 - Lower rear bushing W51738 \$47.50 or KCA303 \$89 for +1 deg castor
- It's common for the rear engine mount to fail, solid poly engine mounts are available from Coastmodz \$150
- Ensure your radiator fan works (faulty sensors, relays, fans can all result in overheating)
- Check the condition of the water hoses to the radiator – replace as required
- Consider replacing the alternator and water + power steering belts
 - The water and power steering belt is a 4PK845 \$25
 - After removing the aircon use a 4PK845 \$25 or 6PK845 on the alternator
- Check the condition of the CV's and drive shaft boots
- Braided brake lines to the calipers are a good idea \$150
- Completely flush the old brake fluid, use a good quality brake fluid
 - "Super DOT 4" fluids from Penrite, Castrol, Shell, etc are suitable and cost effective \$36
 - Exotic racing brake fluids are good but very expensive, Motul etc \$70+
- If you have the older N14 Pulsar it is **highly** recommended to purchase the brake master cylinder and front calipers (AD22VF) from a N15 SSS (go to a wrecker or gumtree or "Pulsar Group of Australia" on

Facebook)

- RDA brake rotors are a cheap option but often suffer warping, we've had no problems with DBA rotors
- N15 Front Brake Rotors (avoid drilled rotors) ○
DBA 901S - T2 Slotted \$150 pair ○ DBA
4901S - T3 Slotted \$300 pair
- N14 Rear Brake Rotors
 - DBA 917 \$90 pair ○ DBA 917S
T2 Slotted \$250 pair
- N15 Rear Brake Rotors
 - DBA 902 \$100 pair ○ DBA 902S -
T2 Slotted \$250 pair ○ DBA 4902S -
T3 Slotted \$325 pair
- Front Brake Pads
 - QFM A1RM work very well and are cheap \$120 front pair ○ Winmax pads are twice the price but do last longer \$300 front pair ○ ProjectMu Club Racer are very high friction, very responsive, last well, eat rotors \$390 front pair
- Rear Brake Pads
 - Anything that can handle higher heat than street usage ○ Low friction is best – the rear brakes don't help much and want to avoid locking the rear brakes ○ Some people have even used Bendix GC
- Consider installing an oil cooler (it's a fairly expensive exercise \$250+ but a good safety measure)
- Use a good quality fully synthetic engine oil (with zinc friction additives): \$80 each oil change
 - If the car has not been actively used, has a poor service history or the oil on the dipstick looks bad,
consider using an engine flush product prior to changing the oil for your first track day
 - Fill the engine right up to maximum on the dip stick ○ 5W30 and 10W40 are common choices
- Use a good quality gearbox oil
- Consider flushing the cooling system

Other points:

- Use steel wheel nuts (not alloy!)

- Must have metal tyre valve caps (scrutineering requirement)

Wheel Setup These are basic settings to start with and fine tune to the driver's preference.

- Obviously you need the series control coil over shock/spring package from MX5 Mania – make sure you purchase the correct set as N14 and N15 are different due to the N15 rear axle
- Tyre Pressures
 - Recommend 34 to 36 PSI hot
 - Pressures will build up from cold to hot over 6 laps
 - Front +7 PSI
 - Rear +4 PSI
- Ride height
 - ~25mm lower than stock
 - The front lower control arms should be level or ideally pointing down (if they point upwards you are too low)
 - Going very low will wear out CV joints, risk hitting the sump on curbs, create handling issues due to the roll center moving too far away from the CG (common problem for all FWD cars with Macpherson strut suspension)
- Front
 - -4 to -5 degrees of camber
 - 0 to +3mm of total toe out
- Rear N14
 - -1 to -3 degrees of camber
 - 0~1mm total toe in
- Rear N15
 - The solid rear axle does not have camber and toe adjustments

Performance

- CAI
 - Does not appear to be much advantage especially if this results in higher air temperatures going into the engine
- Exhaust
 - Remove the CAT and resonator, use a straight through sports rear muffler
 - From the exhaust manifold backwards, competitors using many different configurations
 - 2 & 1/4" pipe is popular

- Differential

- In hard cornering you won't be able to get on the throttle early enough because the inside wheel will spin with a stock differential. This can be overcome by installing a locked diff. From Round 1 2020 the only form of differential that will be allowed is a locked diff. This can be achieved by welding the diff centre or installing a mechanical locking device specifically designed for this purpose ie: spool or mini spool.

- Don't use too much steering lock at low speed (pits and workshop) as it can destroy a CV

- Sway bars

- This is a somewhat complex setup topic – everybody has different preferences
 - Whiteline make after-market front \$300 and rear \$350 sway bars

The “Do and Don't” List

Do

- Change engine oil frequently

- Bleed the brakes before each event (high brake temperatures give the fluid a hard time)

- Check brake pad thickness before each event

- Clean the air box and filter before each event (there will be tyre rubber in the air box)

- On race day, when engine is cold, prior to first session on track

- Check radiator water level when cold

- Check the wheel nuts are torqued

- Check the cold tyre pressure
 - Check the bonnet pins

- Work the tyres and brakes on the out lap to get heat into them

Don't

- Overheat the engine

- Over rev the engine (missing a gear change or changing down to a low gear at high road speed)

- If you have a locked diff don't use too much (over 70%) steering lock in the pits and workshop – it will destroy a CV

- Pull the hand brake on after a track session as this can warp the brake rotor, turn the engine off and leave the car in 1st gear

Motorsport Vendors

These are just a few common vendors, there are many more throughout Australia

- Raceaway
 - Race packages
 - OLT
- Zero Tolerance Motorsport
 - Motorsport fittings and lubricants
 - Roll cages (Wildridge fabrications)
 - Pulsar remote oil filter kit & brake booster delete kit
- Coastmodz
 - Pulsar parts
 - Solid engine mounts
- Bond bars
 - Roll cages
- AGI
 - Roll cages
- Revolution Raceware
 - Seats, Suits and motorsport components
 - Race numbers – small CAMS size
- Racer Industries
 - Wide range of motorsport components
- MX5 Mania
 - Yellowspeed coil overs (at time of writing \$1,100 pickup)
 - General motorsport components