

So you want to build a Historic racing Spridget.

You Fancy going racing, maybe after years of track days or hillclimbing, but first you need a car, so here's an overview of the basics based on my experience of racing a historic Sprite that I built from a part finished road car project. Its not a fully comprehensive overview (I would need a book for that) and if you need more advice head over to

<https://www.facebook.com/groups/csccmidgetspritechallenge>

and ask away. Its also always worth getting to races and ask lots of questions.

Why Historic?

Well its simple and massive fun is the first reason, the Dunlop tyres don't have a lot of grip and it makes it such good fun. You can see here on my Youtube channel

<https://www.youtube.com/watch?v=Wm6aaif9-hA&t=1s> (@markturner7168 is my ID)

Simple? Because the cars are in the spirit of the original 60s club racing cars which were a road car with a few safety additions (very few back then!!) and a more powerful engine.

There are also other reasons, the cars are good looking and are to a specification that can race at lots of different events and not only UK club meetings but over the last few years there were spridgets racing at Classic Lemans, Goodwood members meeting and the Silverstone festival. Spridgets have got to be the best value entry to any of these events. They also punch well above their weight with bigger heavier cars such as the MGBs in Equipe GTS. Think on the Historic class as an entry ticket, something other classes of cars cant do, and as a result the values are good. (but once you have raced one why would you ever want to sell one?



Paul Woolmer's PMO 200, (<http://www.sebringsprite.com/pmo200.html>) one of the many Sprinzel cars that carried that registration number next to my car at Gaydon. Photo © Mark Turner



Samuel Ashby showing the big engine cars the way in his Speedwell bodied sprite at the Donnington 2023 Equipe GTS round Photo © Dickon Siddall



Kim Dears Std bodied historic car pushing hard at Castle Coombe 2023 in the Midget and Sprite Challenge Photo© Dickon Siddall

Rules and regulations

Before you even start you need to know what series/championship you are building for and understand the Motorsport UK regulations. (see <https://www.motorsportuk.org/resource-centre/#yearbook>) For Circuit racing Part Q is most relevant although there are also other regulations you should read such as safety part K and general regulations Part J.

Now some series expect that you follow the FIA homologation to the letter (such as CSCC classic K which means you have to run a small bore engine) although Sebring mk1s have dispensation to allow alternative brake calipers as the Girling calipers are not available and a wider rear track as there was a mistake on the papers. Others are more open such as Midget and sprite Historic regs and (Equipe GTS which are effectively the same) HSCC on the other hand have certain regs and you can't run a fibreglass rear end.

Body Style

For a historic car you need to pick a style that was either Homologated in the FIA homologations, you can find them here <https://historicdb.fia.com/> and more specifically search on Sprite, Sebring, Midget, Speedwell. There are of course bodies such as Ashley which were not specifically homologated and its up to the competitor to prove that a certain bodystyle was used in Period, and here we are looking at pre 1968 ideally although round wheel arch shells may be allowed. A useful resource is Martin Ingals Sebring sprite website <http://www.sebringsprite.com/>



Me pushing hard at Cadwell Park 2023. The car takes it inspiration from Jack Wolchovers JAX12 hence the bootlid and later rear lights. (see <http://www.sebringsprite.com/jax12.html>) Photo © Dickon Siddall.



John Collinson Leading Ian Hodgkinson at Oulton Park 2023. Johns car is an early mk2 sprite with Ashley hardtop and Williams and Pritchard Sebring mk2 Bonnet, note the steel wheels. Ians car is based on the original Sebring Sprites (like PMO200). Again Midget and Sprite Challenge Photo © Dickon Siddall.



Andrew Giles trying hard at Snetterton 2023 In the Equipe series, This has the later Ashley hardtop and Williams and Pritchard Bonnet. Photo © Dickon Siddall



*Gary Bickerton in his SWA sprite, Ashley hardtops and Williams and Pritchard bonnets are popular!
Photo © Dickon Siddall*

So you know what spec you want to build

Here I will be primarily be dealing building a historic specification car although with some changes you can also apply this to class D road Modified.

I'm going to assume you have a solid car or shell to start with. You have the choice rear suspensions, either quarter elliptic suspension or semi elliptic, My own car uses quarter Elliptic as this was what my shell had (it was a part finished road car project). However I do know that one preparer has changed from quarter to semi as he thinks it is easier to drive and it certainly allows you to get the car lower and still get some bump travel, but to my eye does not control the axle as well from a traction perspective, but I digress.

First steps , Prepare the shell.

Assuming your shell is solid (this isn't about restoring a car) then you need to look at the shell. First of all your outer bodywork and this cant have extra wheel arches, If you are using a std shaped car I would stay with a steel rear end, I did this in Midget challenge class B years ago and it didn't give any weight disadvantage (I was still under the 580kg limit for the old class B). For others then of course lightweight fibreglass or aluminium bodywork is open to you. You can fit alloy doors and this can be full alloy or you can skin a steel frame with an alloy skin.

Onto the inner structure, which you need to maintain, I would suggest you keep the front inner wheel arches and maybe re-make in aluminium if you want the minimal weight save, but I would definitely keep them, and heres why, Ignition and Induction!! Ive run without wheel arches before and it's a real pain when it rains as the distributor gets jet washed by wheel spray (leads to misfires

and in some cases retiring from the race) and your air filter gets soaked and doesn't flow any air!!! We used to get round the distributor by taping a plastic bag around it, but it's a real pain. You may need to modify the LH inner wing to accommodate your inlet trumpets and air filter.

Next safety equipment, Cage mounting, seatbelt and seat mounts. A full cage is fairly standard here and can be a safety devices bolt in cage or a more bespoke one from the likes Peter May/MCR who will make a bespoke cage to the Motorsport UK regs with the correct structure and CDS tube as a minimum. (some body styles need a bespoke cage as the Safety Devices ones do not fit). You may also decide that you want the front cage pillars to be as close to the windscreen pillars for better visibility. Most importantly you will find the bodysheet mounting points have to be reinforced and the size is specified in the motorsport UK yearbook, and they have to be seam welded in place. You should also consider if you want the rear seatbelt/harness mounts to be included in the cage. The front harness mounts should be fitted to the floor with spreader plates to ensure they don't pull out. The harness should be a 6 point and needs to be in FIA date (although Motorsport UK has now given dispensation for a 5 year life extension)



John Collinsons bespoke roll cage to fit under his Early Ashley hardtop. Note the earlier screen is slightly lower than the later one on Andrew Giles car. © John Collinson



The Inside of my car showing cage, door bars, dash and full trim!! You can also see the Extinguisher and nozzles on the dash. © Mark Turner

Seat, Spridgets are not a big car and lots of race seats wont fit. You need to make sure that the seat will not only fit, but you will fit in it and can get in and out of the car over the door bars and your head is below the top of the cage. For the UK you don't need an in date FIA seat, (only if you want to race at Spa who run to Fia regulations). Suitable seats are Tillett B6 Screamer, Sparco Sprint, Caterham Tillett seats and some Kirkey aluminium seats, there may be others but I'm not aware of them. When you mount your seat again make sure it complies to the motorsport UK regs which state you need a doubler plate under the mounts.

You may also at this point decide the seam weld the shell, but actually this is more correctly stitch welding the seams with a series of 20-30mm long weld seams spaced apart. For a lot of us this isn't feasible, but if you are doing a fresh build may be worth considering.

For a quarter elliptic car there are some flanges close to the rear suspension trailing arms that you may wish to fold as they will hit the arm otherwise.

You have to run a standard front Antiroll bar and on some shells such as Heritage shells the mounts are not very secure and can tear out of the box/tophat section, seam weld the mount and also the

edge to the top hat section, if you are carrying out repairs here make the bottom of the top hat from thicker material.

For Tyre clearance at the back roll the wheel arch lip and if square arches you can push them out a little as the works mk2 sprites were done.

Make sure all of the bodywork fits and you also fit and at this point you can paint the shell or make good the reinforcements.

Putting it together.

So now you have a nice shell with all of the work done and you can start putting the car together.

Front Suspension.

This is as std using the later disk brake stub axles and swivel pins, but you can do the following

- a) Poly or Nylatron Bushes
- b) Negative camber trunions
- c) Uprated valves (fixed or adjustable) in the damper
- d) Uprated and lowered springs (500lb/in is about right)
- e) Lowering spacers under the spring pan
- f) Damper triangulation arm
- g) Standard Design Anti-Roll Bar but larger Diameter bar (but must use std links)
- h) Cut down rubber Bumpstops.

Wheel bearings can be a problem, but the easiest solution are the taper bearings that Moss sells which are adjusted via shims.

Brakes

Std calipers and rear drums. Rear, use uprated Mintex shoes from Peter May. For Pads you have the choice of Mintex 1155, okish but cheap and good to start on, Mintex FR, Hawk Black (blue were a little to aggressive with the Dunlop tyres). Discs I try to get good quality Brembo std ones but they are not always available and I've used Quinton Hazel ones instead. They tend to get replaced at the same time as the brake pads.

I would also recommend a Bias Pedal box which allows for twin system hydraulics split front and rear for safety. It can be adjustable but only from inside the engine bay, ie not from the drivers seat. Peter May Engineering and Mamba Motorsport can supply suitable pedal boxes.

For those of you with the later type rear brakes (mini type) there are a couple of tricks for the wheel cylinders with the horrible spring clips, first one is AH spares can supply the original spring washer and circlip, second is the remove the roll pin, drill it a few mm deeper and tap m5, you can then secure the wheel cylinder with an m5 screw, much easier than the spring clips which can lead to the wheel cylinder moving and the pistons popping out leading to loss of brakes and an accident.

Steering

Use a later column which is collapsible, this has the added advantage that you can collapse it (hit it with a mallet) and then re fix it with either nylon bolts or hot melt glue to the length you want.

Rear Suspension

Once again as std apart from uprated bushes and lowered springs, and to get the correct ride height you may need wedges (quarter Elliptic) or spacers for Semi elliptic. Also cut your bump stops down. From this year (2024) you can also fit a Panhard rod which is very useful if you are running square wheel arches as clearance is tight. As with the front you will need re-valved dampers, either fixed or adjustable. You may need to adjust the ride height at the rear, I run approx. 130mm at the sills front and rear. On a quarter elliptic car I would start a little higher as it doesn't give much bump travel. You can delete/modify the wedges or add and remove spring leaves to do this.

Rear Axle

You will need uprated halfshafts from Peter May or Magic Midget (at a pinch the later 1275 half shafts can be used but should be inspected more often, they are marked with EN17 on the end). Differential will be either 4.2:1 or 3.9:1 and up to personal preference. I would suggest you start with a std open diff and then when you are used to the car upgrade to a LSD, either plate or ATB.

Make sure the axle threads are in good condition as well as the areas where the bearing runs, they can be reclaimed if needs be with a speedisleave (SKF part number CR99174) , A wheel bearing with extra seals also helps 6207-2RS. If the thread is really damaged a new axle end can be fitted by Peter May.

Now some people have had problems with knocking rear wheel bearings out. I know one occurrence of this was due to running the thinner uprated halfshafts which flex and are designed to be used with double rear bearing hubs.

Wheels and Tyres

Tyres for a historic the only option really is Dunlop L sections and in the 4.50L 13 size, there is not room for anything larger . Wheels will be depending what is allowed for your series, most allow 5" Minilight copies, but some such as Equipe Pre63 only allow steel or wire wheels. I mentioned about wheel to body clearance earlier and you may need to consider wheel spacers especially at the rear (usually 10-20mm thick). Don't use original steel wheels as they are too narrow and can crack, that means the best option if you need to run steel wheels are the Weller type wheels available from Peter May Engineering

Drivetrain

So that's the car on its wheels and ready for engine and gearbox. For historic this will most likely be a 1275 engine at +20 bore giving 1293, unless of course you are building an early FIA spec car with a 995 engine (or 1098). You can of course go to an engine builders such as Peter May, Mamba, Paul Inch, Skiptune etc or build your own. If you want to build your own you will need a good machine shop, the likes of which are getting harder to find. (I use Mark Priest at Absolute engines in Brierley Hill in the West Midlands).

A typical engine spec could look like:-

- a) **Omega forged pistons** (flat top or dished depending on your cylinder head) std height (see comment about conrods). Most people set the pistons 0.010" down the bore to allow for a block skim if needed in the future.
- b) **Compression ratio** between 11.7 and 12.0:1 depending on your cam (and the cam supplier should be able to advise) and fuel available (more of that later)
- c) **Camshaft**, Mamba VP8C, Swiftune SW23, Piper 649+. Kent 296 or 310sp, use with 1.4 or 1.5:1 forged rockers (no roller rockers). Also don't use ultra light cam followers, they break (ive had that happen and it wasn't nice!!) Make sure your valve springs are compatible with the cam. The best I have come across so far are from Brett Simms motorsport. Drive will be with a chain with adjustable cam sprocket or offset keys
- d) **Flywheel and clutch**, there are some nice light flywheel and clutch packages available from Mamba and Peter May without the need to resort to a full on racing billet clutch. You will need the clutch release bearing to match them from those suppliers. Ive found flywheel assembly weight to be important to crankshaft longevity, otherwise they crack at number 4 main/big end. Don't use the original flywheel bolts, they shear, use ARP or good quality 12.9 grade cap heads.
- e) **Block**, centre main strap if midget block and if marina also use a rear main strap as well as the rear caps can break. Deck to suit pistons. You can also run a lip seal, but ive only had success with the type sold by Calver Special Tuning and Peter May. This had a blue seal, but you do need to machine the rear cap the suit.
- f) **Sump**, std sump but needs baffling, either a Peter may exchange sump or the kit from Mamba motorsport which works very well.
- g) **Crank and Rods**, you can of course go for a brand new crank, but make sure its not a multiweb crank as these are not allowed. Ive always used std En16 cranks, either as standard or wedged and lightened. Mamba can supply a crank to this spec (complete with heat treatment), I now use a cooper S front crank damper with a long retaining bolt and the tab that locates the bolt head and 6 damper bolts. I still use std rods with Arp rod bolts (don't forget to make a small countersink in the rod where the conrod bolt head fits to accommodate the larger root radius under the head of the rod bolt, approx. 0.5mm is fine.), but modified with little end bushes to suit the forged pistons which use 18mm pins, the biggest issue with std rods is getting ones that are straight! However you can get various "new" conrods, but some series don't allow longer ones and will insist you run a mandated rev limiter if you do!



Bare 1293 bottom end showing rear main seal and wedged crank © Mark Turner

- h) **Balancing**, The rotating assemblies, rods and pistons will need to be balanced. Your machine shop should be able to organise this, make sure you supply the crank, pulley, bolt, front sprocket, flywheel, clutch cover and rods with bolts and pistons.
- i) **Head**, between it and the cam is the source of power and you need to have a good one, the issue now is getting a good head as there are not so many head modifiers and the head castings are getting rather old now. For a 1293 engine you may not need to go for a full offset valve head (typically 37inlet 31 exhaust) and you may get away with a 35.7 inlet with 30mm exhaust. Head gasket choice is really only a multi layer such as Cometic as the old black Payen Bk460 gaskets are not as reliable as they used to be. Use ARP studs ideally and drilled for 11, although I do know of one builder that was happy with 9 studs and uses Minispares competition studs.
- j) **Inlet manifold**, ideally something like a manifold 5" or 7" with a 45 weber or Dellorto. Inlet trumpet lengths can be tuned in length to suit the engine characteristics you are looking for, the longer the more torque the engine. (which considering the Dunlops are not the grippiest tyres in the world is not a bad thing). To clear most bonnets you will need an under carburettor linkage or at least a very low one. (and don't forget a throttle spring directly onto the carb spindle for safety). Use a facet silver or red top pump with an external pressure regulator (filter king or sytec) set for approx. 3-3.5 psi.
- k) **Exhaust**, Manifold again Manifold from Peter May or Magic Midget. The exhaust itself either manifold or you can make your own, they only need a slight bend (either weld in a bend, cut a V and weld or pack the pipe with kiln dried sand and bend with heat). You will have to arrange a silencer to meet the noise limit of 105dbA at $\frac{3}{4}$ max revs. I used to make a repackable one with a body 5 $\frac{3}{4}$ " (146mm) in dia and 21" (533mm) long which worked, you may be able to get something similar from Demon Tweaks or Merlin Motorsport. If you

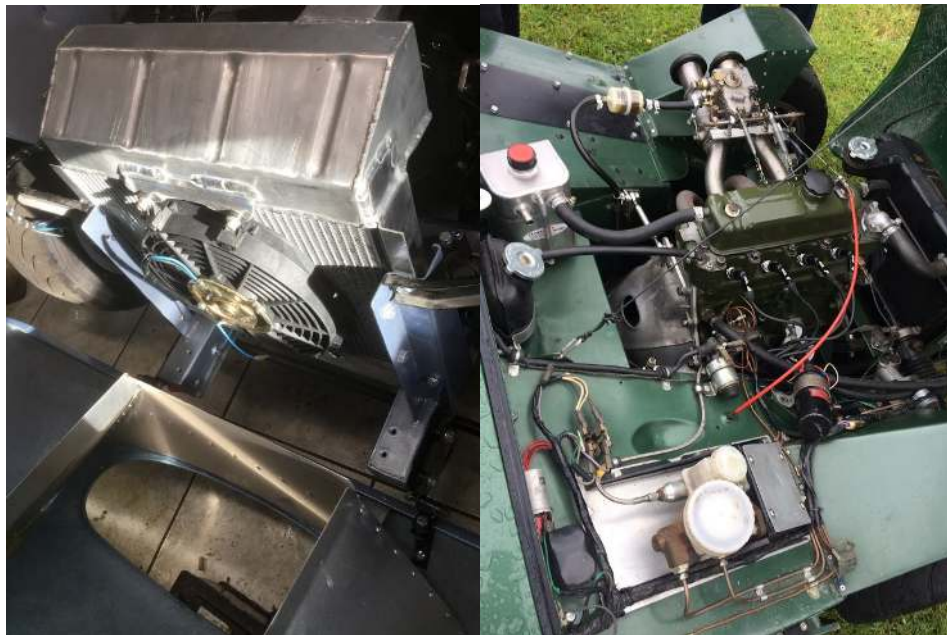
want to use a longer one then add a 90 degree bend and route it over the back of the car where the fuel tank would be.

- l) **Ignition**, Use a Bosch blue coil or a Viper Coil. Distributor to Aldon red spec with an internal trigger (its historic and some series don't allow an external module such as lumination, some even insist on points!!) Timing typically 28-30 degrees at 5000rpm, but set it when its on the rolling road, if its wrong you will melt your pistons!! Plugs usually NGK B8ECS.

Catch Tank, you need a catch tank on the engine and this is minimum 2ltrs.

Gearbox, ideally a Straight Cut Close Ratio gearbox although some have run a std 1275 box in the past when they have needed to. They can be built by the likes of Peter May engineering, Mamba or even your local gearbox specialist. Use gears from Peter May or Minisparts with their uprated competition syncros. Bearings and layshafts from Moss or the like (old good condition parts are perfectly acceptable and if you are like me you have a box of gearbox bearings etc There are some guides on Youtube and this link is useful, even though its based on the earlier gearbox (you need a 1275 box with the needle bearing mainshaft) https://www.dorsetmmoc.co.uk/wordpress/tech_articles/gearboxrebuild.pdf

Cooling, A std design radiator is needed. The choice is a Chinese cheapy alloy one at your risk or a bespoke one. I made my own vertical flow using a core from BMR in Leicester. Others such as Radtec and Peter May can also supply radiators. Make sure you use a large pulley on the water pump, these used to come off 998 A+ metros from the scrapyard but alloy ones are also available.



My Self made radiator (Left) and the engine bay of James Thackers TZA238 Historic sprite (Right) © Mark Turner



Overview of my engine bay showing the inner wing cut out, Pedal box, catch tank and extinguisher nozzles @Mark Turner

Wiring, With the main part of the car together time to get the electrics sorted out. You can either use a std loom or make your own (in which case you know what you are doing!) I chose to use a loom I had which was for the correct age of car but had been supplied by Autosparks converted for alternator. The car is fully road legal with all lights, horn wipers etc, and the reason for that is its very useful for running in and also checking if that misfire is still there (otherwise expensive and time consuming rolling road is needed). Talking of alternators I have used a lucas alternator with a large pulley, but it didn't like the vibration very much. I had the same problem with a powerlight unit and have now got a std Kubota Nippon Denso unit which works very well, you can modify your wiring loom to suit this and its easier if you get a unit with two lucar connectors in a T configuration. You will need a pre-engaged starter motor to go with your steel flywheel from the likes on Wosp, or in my case a modified Rover 400 unit which is the same basic starter motor. I use a std car battery (063) in an alloy box set into the rear deck as per the original sebring sprites. Some use racing batteries and then you don't need a battery box. My instruments are as per the std car but with an Elliot rev counter. Some have had bad experience with the Smiths copies available now. Also advisable is a oil pressure light set to minimum 25lb, and make it big and easy to see!!!

Safety, You need an extinguisher. Check the motorsport uk regs, I used a plumbed in one and you need nozzles in the cockpit and engine bay. Put one pull cable in the bulkhead in front of the screen on the left next to the batter cut off and another in the dash. Make sure you carry spare pull cables as they seem to seize!! See above for seat and Harness. The other items you will need are a label showing your door handle if its inside, towing eye

arrows/labels and towing eyes. Most common are the straps you can buy (or make from an old seatbelt crutch strap!!). These are needed front and rear.

You will most importantly need a battery cut off, I mount mine in the dash with a pull cable which is fitted on the bulkhead externally. As you will be running an alternator you will need a cut off switch with external switching for the ignition and resistor otherwise the car will keep on running when the cut off is turned off.

Don't forget on your roll cage the soft padding, it still hurts if you hit your head with a crash helmet on!!

Fuel Tank, You can use a std tank but the filler should be ideally flush mounted in the bodywork (its not allowed to project) . I have a boot lid and run an alloy foam filled tank in the boot (you can do this without a lid either again with a flush cap, a recessed monza type cap or with a simple body flap.) All tanks need to have a breather with a one way valve and if its in the boot a splash bowl with an external drain. Consider the races you want to do and the capacity, for fuel consumption I work on 0.5 ltrs per minute and an extra 5-10ltrs for safety. Assuming max race time of 40 minutes then a 30 or 35ltr tank would be fine. Its also worth making a calibrated stick so you can dip the tank (another good reason for a tank in the boot as its much easier to dip it). A piece of wooden dowel with grooves every 5 litres works well



My Fuel tank Installation showing splash bowl (left) © Mark Turner and John Collinson's Weber carburettor installation showing with short trumpets and inlet manifold you can get away without inner arch modifications. (right) © John Collinson

Fuel

This is specified by Motorsport Uk and quite often in the regulations for the race series. You can buy specific race fuel with higher octane, either from the circuit or delivered to you or forecourt super unleaded and use an octane booster. I use Tesco 99 or Esso super unleaded (lower amount of ethanol, in some cases zero) and use VP Madditive booster with leaded additive to protect the seats of my race head (valves are too large for seat inserts)

Windscreens

Must be either laminated glass or plastic, if plastic section J 5.20.8 of the yearbook gives more detail.

General comment about fixings.

First of all it's a race car and there are sources of vibration, make sure that all fixings have some kind of locking method, so nylock, lock washer, Loctite 243 or lock wire. The only items that don't are engine rod bolts and main bolts etc. Also make sure that they are of the correct quality (normally S quality) and you don't use any unmarked unknown bolts. Sprites were built with UNF and UNC fixings on the whole.

Hopefully this will help in your quest to build a historic (or other) racing Spridget, don't hesitate to ask any questions via the facebook page. My contact details are also on the CSCC Lackford Engineering Midget and Sprite regulations.

Places to race

<https://www.classicsportscarclub.co.uk/post/cscclackford-engineering-midget-sprite-challenge>

<https://hsc.org.uk/championships/historic-road-sports/>

<https://equipeclassicracing.com/>

<http://www.hrdc.eu/hrdcuk/>

Useful Suppliers

<https://www.magicmidget.co.uk/>

<https://www.mambamotorsport.co.uk/>

<https://www.petermayengineering.com/>

<https://www.swiftune.com/>

<https://skiptune.com/>

<https://www.autosparks.co.uk/>

Absolute Engines

Unit 4A, Moor Street Industrial Estate, Moor St, Brierley Hill, DY5 3ST [01384 77479](tel:0138477479)

Lackford Engineering (Championship sponsor) <https://www.robinlackford.co.uk/>

Useful Resources

<http://www.sebringsprite.com>

<https://www.motorsportuk.org/resource-centre/#yearbook>

<https://dsdigital.co.uk/> More wonderful photos from Dickon Siddall.