

DEDICATION

To Rick Moses, aka 'Mr Sprite', for publishing my early work in the 'Sprite' newsletter, which was an encouragement and inspiration to me and led to my writing the first and subsequent Sprite & Midget books. Thanks too for his work in the five yearly Sprite meets, which have been a rich source of information, friendship and modified cars. Also, to my wife Isobel and my daughters Faye and Miranda, who are future Sprite/Midget owners.

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SPEEDPRO SERIES

series. But there are cams for the 1500 engine, and Kent Cams has four cams to choose from (plus a race cam), of which its TH5 looks to be the best, having a power range of 2200-7000rpm. This cam is available as part of kit which includes suitable cam followers and valve springs. APT in the USA also has a range of cams worth considering.

VALVE GEAR (ROCKERS) A SERIES AND 1500



Hi-lift rockers come in many forms; these are Titan roller-tip rockers.

Whichever cam you go for, if you can, use hi-lift rockers (1.5 ratio on A and A+ series and 1.65 ratio for the 1500), which will increase lift at the valve, independent of any camshaft change, and therefore, increase power for any engine other than perhaps 948 and 1098cc A series. Most, but not all hi-lift rockers are of a roller type, which is better than conventional contact pad rockers for reducing valve stem wear. Although they are usually quite expensive, they represent good tuning value for money – cost to power increase. However, not all engine

specifications, especially with regard to cam(s), will produce more power on high lift rockers so consult your cam manufacturer before purchase.

CAMSHAFT AND CAMSHAFT DRIVE – A AND A+ SERIES

When building your engine, or having it built, consider a couple of things with respect to the cam drive: On a standard engine the cam is driven via chain and sprockets from the crankshaft, and enclosed by the timing chain cover. On 948 and 1048cc engines a single tooth chain and sprockets are used, but they can be replaced by the duplex chain and sprockets used on the 1275cc engine. On the in-line A and A+ series engines, used in the Morris Marina and Ital respectively (as well as transverse A+ engines), the timing gear is equipped with a tensioner which can be fitted to the Sprite/Midget engines. You'll need the timing gear back plate and front cover as well as the tensioner itself to make the swap, which will work with a duplex timing gear as well as a single row timing gear. Some adaptation is required for the timing gear plate and cover to clear the reinforcing section of the Sprite/Midget front engine plate. The cover also puts the timing mark indicator in a different position, so either the Marina/Ital engine pulley needs to be used or the Sprite/Midget pulley, marked to suit the new position. However, unless your car already has the Marina or Ital engine, it might be a lot less trouble, and ultimately a neater solution, to buy a better alternative off the shelf as follows.

Camshaft drive – vernier adjustment sprocket – A series

For some years, if chain drive was used for the camshaft, it was highly recommended that a vernier cam drive sprocket be fitted for any cam, and especially so for a high-performance



Here is a Vernier-type adjustment timing gear using a Speedwell timing gear cover that has been modified for easy access. Bolt slots allow precise valve timing to be achieved. (Courtesy Tom Colby, Speedwell Engineering)



And here is the cover fitted in place. (Courtesy Tom Colby, Speedwell Engineering)

cam. In more recent years, Kent cams introduced a new type of vernier adjustment, high-performance chain and sprocket kit. The kit has all the advantages of the older vernier adjustable sprocket, but uses specially machined gears, and a claimed ultra-strong chain that is said to virtually eliminate chain rattle. The cost is not high, and the kit is worthwhile and preferable to standard gear. This conversion may prove better than the belt drive conversion, not least because the standard timing cover will allow superior engine ventilation, but it is unlikely to be as quiet. It's also possible to fit the Marina/Ital/transverse A+ engine timing chain tensioner.

SPEEDPRO SERIES

Single Weber basic settings for 1275cc engine			
	Standard 45 DCOE	Road modified 45 DCOE	Race modified 45 DCOE
Aux vent	3.5	3.5	3.5
Choke	34	36	38
Main jet	145	165	175
Air corr	175	175	175
Em tube	F2	F2	F2
Pump jet	45	50	55
Idle	50F9	55F9	55F2

Twin Weber basic settings for 1500cc engine			
	Standard 40 DCOE	Road modified 40 DCOE	Race modified 40 DCOE
Aux vent	3.5	3.5	3.5
Choke	28	31	33
Main jet	115	125	130
Air corr	170	170	170
Em tube	F16	F16	F16
Pump jet	35	35	40
Idle	45F9	45F9	50F9

Single Weber basic settings for 1500cc engine			
	Standard 45 DCOE	Road modified 45 DCOE	Race modified 45 DCOE
Aux vent	4.5	4.5	4.5
Choke	34	36	38
Main jet	155	175	185
Air corr	175	175	175
Em tube	F9	F9	F9
Pump jet	45	50	55
Idle	45F9	50F9	55F9

confuse the DCOE with the DGV(DGAV) progressive downdraught carb because, on the DCOE, both barrels are the same size with a synchronised action and both throttle plates opening equally at once.

Like any carburettor, the DCOE mixes fuel with air to form a mixture which is drawn in by the descending piston, and burnt in the closed combustion chamber. However, unlike most original equipment carburettors, the DCOE can be calibrated in very small increments in order to achieve the optimum fuel/air mixture for your engine.

Once air has flowed through the ram pipe, it enters the two venturi in the carb main body, starting with the auxiliary venturi, where the airflow draws fuel mixture from the main jet passages. The auxiliary venturi acts like a signal amplifier because the end is positioned at the point of greatest depression in the main venturi. (Sometimes the auxiliary venturi is known as the booster venturi). The air (and now fuel mix) having passed through the auxiliary venturi, passes through the main venturi.

Because fuel is drawn into the airstream by partial vacuum in the venturi, once the fuel flow starts it is difficult to control the flow precisely, and this

Weber DCOE operating principles & calibration

Once you've fitted the carburettor it will need to be provisionally calibrated. I say 'provisionally,' as the optimum settings can only be ascertained by running the engine on a dynamometer (more later). The accompanying tables show basic Weber calibration for the 1275 A series and the 1500cc engines and should be sufficient to get the car running.

Despite its complexity, the DCOE is not difficult to calibrate, though on first impression it can seem daunting. However, before you work on the DCOE you might find the following rudimentary explanation of its workings helpful.

The DCOE is two identical carburettors in one body. Don't



DGAV (left) and DCOE – as can be seen they bear no resemblance to each other.



Close-up of Lumenition Optronic kit installed in a 45 series.

black box to be mounted without having to drill any holes in your car. A similar system that hasn't been seen as much in recent years, but is still available, is the Piranha optical switch system which is now produced by Newtronics Systems Ltd which likewise also works in conjunction with an external black box. The advantage of optical triggering systems – which incidentally use infrared light – over the magnet (Hall effect) types is hard to pinpoint, but expect a longer-life system and slightly more spark energy. The disadvantage is the amplifier module might spoil an otherwise standard car, unless you can hide it away discretely somewhere.

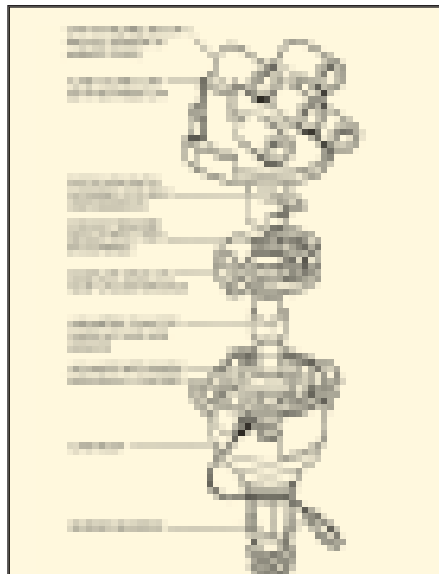
DISTRIBUTORLESS IGNITION

It is possible with all the Sprite/Midgets to fit a distributorless ignition system that is controlled by a triggering device on the crankshaft. However, the A and A+ series engine lends itself much more readily to conversion to distributorless ignition, as propriety kits are available. The advantages to conversion to distributorless ignition are small in comparison to the cost and work involved, so are not recommended other

than if you're particularly interested in the technology or perhaps as part of a K-series engine conversion.

DISTRIBUTORS

If your Sprite/Midget has a performance-



Components of a high-performance distributor. Such distributors have their advance curves tailored to your engine's particular requirements. (Courtesy Microdynamics)

tuned engine, it may be necessary to modify the distributor so that its characteristics match that of the engine. Also, it's possible to fit an OE electronic ignition system which requires the whole distributor to be swapped. If your Sprite/Midget is using the A+ block from the Morris Ital you will need a different distributor anyway. The aim of this section is to explain the differences between one distributor and another which on the face of it appear identical, except perhaps the A+ distributors.

The function of the distributor

The distributor emits sparks at regular intervals for each revolution of the engine to each sparkplug. A revolution of the engine requires 360 degrees of rotation, but the piston's 4 strokes require 720 degrees of crankshaft revolution. Therefore the firing intervals need to be 180 degrees apart to occur 4 times in a 720 degree cycle. This is achieved by gearing down the distributor so that it runs at half engine speed and produces sparks 90 degrees apart. The distributor produces, in conjunction with the coil, a spark every 90 degrees of its rotation but to a different cylinder each time until it has provided a spark for each of the 4 cylinders. Once the engine has rotated 720 degrees, the distributor has rotated 360 degrees, and the cycle is repeated.

The spark is supplied just before the piston in the cylinder has reached top dead centre (TDC), after it has first travelled down the cylinder inducting air and fuel and travelled back up the cylinder to compress it. How much earlier in degrees of crankshaft revolution the spark is produced before the piston is at TDC is called advance, and is expressed as the number of degrees of advance before TDC (BTDC). The engine does not require the spark to occur at the same number of degrees of advance throughout its rev range, and needs the spark to arrive earlier in the cycle, more advanced,

Chapter 6

Flywheel and clutch

FLYWHEELS – INTRODUCTION

Each engine size used in the Sprite/Midget employed its own flywheel, as did the two versions of the 1098cc engine.

Regardless of which engine your car is using, there is an advantage to be had in lightening and balancing the standard flywheel. Lightening the flywheel is beneficial to engine performance because a light flywheel requires less energy to accelerate it. Balancing is beneficial because it reduces vibration and thus stresses on the rest of the engine. There is an old myth that any engine with a lightened flywheel will have a lumpy tickover, but, in the author's experience of four different engine specifications, this is unlikely to be the case.

For the 1500cc engine, flywheel balancing is crucial if the engine is going to be worked hard, as it has been known for unbalanced flywheels to disintegrate.

Any specialist engineering company can lighten and balance a flywheel for you though it's recommended you use a Sprite/Midget engine specialist such as

APT in the USA or Peter May Engineering in the UK. However, before you despatch your engine's flywheel for lightening, consider whether, at some point, you might want to use the AP Racing 7.5in clutch (more of which later). If you do, ensure that when the flywheel is lightened a chamfer is not machined on the clutch face of the flywheel, but that the full width is retained. The standard weight for a 1275cc engine flywheel with ring gear is 16lb, while a typical weight for a lightened flywheel which can be used with the 7.5in clutch is 11lb (5kg). Lightened flywheels for engines using the standard 6.5in clutch may be slightly lighter.

STEEL FLYWHEELS

Steel flywheels are readily available for both 1275cc and 1500cc engines. If you do have trouble finding a flywheel to purchase, or require a steel flywheel for a 948cc or 1089cc engine, contact one of the specialists such as Peter May Engineering or Farndon Engineering to see if they can make you one.



The reverse side of Peter May Engineering's lightened steel flywheel, drilled for the 7.5in AP competition clutch. Note the detailed machining to ensure as much weight as possible has been removed from the outermost edge.



And here's a closer look.



Note the grille treatment and cut-down aeroshield-type windscreens of Eric Grundy's beautifully prepared racer. (Courtesy Eric Grundy)

this book, you have to bear in mind that this car is not only pretty light (a third of the weight of a normal Midget), it's also used on road rallies rather than circuits.

Fuel is held by a very neat bag tank in the boot.

The boot has been reskinned in alloy, as have the doors. Elsewhere the body features race weight fibreglass and has been seam welded for extra rigidity.

The car was first run in the 1992 season, during which development bugs were ironed out. Eric's car can be seen in action on his native Isle of Man.



Extension of the rear 'deck' of Eric Grundy's Midget goes well beyond the rear roll-bar mountings. Other racers have adopted this approach, but none as tidily as this – not a rivet in sight. (Courtesy Eric Grundy)

RACE SERIES BRITISH & EUROPEAN

There are several race series open to the Sprite/Midget as well as classes in hillclimbing, sprinting and rallying.

Each type of event will have general and safety regulations for cars and specific regulations for classes (classes are divided into categories of near standard, modified classes and in-betweens). Separate race series for the Sprite/Midget are run by the Austin Healey Club, MG Car Club and MG Owners Club, and rallying comes under the umbrella of the Historic Rally Register. Hillclimbing



A look at the rear of the Autocross cars.

and sprinting events are covered by the Hillclimb and Sprint Association.

The Austin Healey Club has two main classes for circuit racing – standard and modified. Both classes are fairly free but becoming less so and, like any class, are subject to yearly change. Standard class cars are more relaxed than the MGCC standard class. Modified cars are very free, although, in recent years, have reverted from slicks to a control tyre which may be more to do with letting the big Healeys catch up than an attempt to limit the expenses of modified racing.

The MG Car Club has three classes: A, B and C, which are fully modified, race modified and road-going cars respectively. General modifications for all classes allow removal of bumpers and interior trim and for a racing seat to be fitted. The extent of bodywork modifications varies from class to class, with limits for all classes on air dams and spoilers and the number



Lining up for Autocross in the USA. As with sprinting in the UK it's possible to use either a standard road car or fully modified car.