Gillspeed Bulletin

Bulletins No. 14 **Reprinted . . April 1996**

How To Overcome Overheating Problems.

Engine overheating is one of the most common sportscar problems. Here are a few things to look out for. Some are obvious, others are less so.

Water: If the water in the radiator is dirty or rusty looking, it's worth flushing the cooling system. The best method is to reverse flush the system by removing the thermostat from the cylinder head and the radiator cap from the radiator. Push the garden hose into the cylinder head and run it flat out. Continue to flush the system until all the dirty water has left the top of the radiator via the filler neck. Replace any radiator hoses have gone gooey or hard and check the fan belt for cracks. Use a rust inhibitor or coolant additive when you refill the radiator.

To quickly check if the water pump is doing it's job, fill the radiator to the base of the filler neck, start the engine and let it idle. You should be able to see the water flowing past below the filler neck. (This flow is not so easy to see in early Sprites and Midgets because of the extended filler neck). If you see any air bubbles floating up into the filler neck at regular intervals you may have a cracked head or blown head gasket.

Radiator Caps: Radiator caps are used to maintain water pressure at either 4, 7, 10 or 13PSI. This pressure raises the boiling point of water and allows smaller radiators to be used. If the radiator cap fails to maintain pressure the engine may run hotter, because without pressure, the radiator is less efficient.

Radiator caps come with either 'short reach' or 'long reach' necks. If you fit a 'short reach' cap to a 'long reach' neck, the seal on the cap may not reach the base of the filler neck. As the radiator water heats up and expands, it will overflow past this gap. Also the lack of pressure will allow the water to boil more readily. If a 'long reach' cap is forced into a 'short reach' filler neck, the pressure release mechanism in the radiator cap may jamb solid, so preventing any pressure relief at all. If this happens, the water pressure may rise so high that the radiator hoses or tanks burst.

The factory workshop manual gives the correct pressure for each sportscar. Check that the neoprene seal on the radiator cap is in good condition.

Thermostats: If your car is still overheating, the next thing to do is remove the thermostat and check if it is the correct type and then boil it up in a tin of water on the kitchen stove. It should open before the water boils.

Note: Sprites, Midgets, MGA's and MGB's require a special blanking sleeve thermostat as explained below.

Whenever the engine is running below optimum operating temperature the thermostat remains shut. While the thermostat is shut the water pump still circulates water throughout the motor to prevent hot spots. All Sprite, Midget, MGA and MGB water pumps suck hot water from a small diameter 'by-pass' hole just underneath the thermostat and draw it back to the water pump inlet via water passages cast into the head and block or via an external rubber hose between the head and the pump. This constant flow of water also prevents water pump cavitation.

If a modern 'open/shut' thermostat is fitted or if the thermostat is removed for some reason, some of the hot water will miss the radiator and go straight back to the water pump via the by-pass passages. This reduces the efficiency of the cooling system. To prevent this happening, these motors were fitted with a special thermostat which has a built-in blanking sleeve to block of the 'by-pass' hole whenever the thermostat is open.

Since these old style 'blanking sleeve' thermostats are no longer used in modern cars, they are seldom readily available and so many sportscar engines have been fitted with the more modern open/shut type thermostat. These modern thermostats have no form of blanking sleeve, so they leave the by-pass hole open at all times thus reducing cooling efficiency.

Most older English sportscar cooling systems were barely adequate for Australian summer conditions when they were brand new, let alone after 20 or 30 use and neglect! They can't afford to lose any of their efficiency now.

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4 Ways To Put More Hot Water Through Your Radiator.

There are at least four ways to ensure 100% of the hot water goes through the radiator.

First: Fit the correct blanking sleeve type thermostat as described earlier. Gillspeed usually has stock available.

Second: Consider fitting a BMC Special Tuning thermostat blanking sleeve. These sleeves were designed for motor racing applications and permanently block off the by-pass hole. They direct 100% of the hot water through the radiator at all times. They offer maximum cooling potential in summer but tend to make the engine slow to warm up and run too cool in winter. They are available from Gillspeed.

Third: You can combine two separate components and make your own version of a blanking sleeve type thermostat. The end result is suitable for both summer and winter use. Start by fitting a Special Tuning blanking sleeve to block off the by-pass hole. Next install a modern open/shut type thermostat on top of the blanking sleeve to regulate the engine temperature. You will need to use a second modified thermostat housing gasket and also drill at least four 1/4" holes in the new open/shut thermostat to act as a by-pass to prevent hot spots and water pump cavitation. A drawing of how to carry out this modification is available free from Gillspeed.

Four: This last option is really most suitable for motor racing applications. It is easy to fit to Sprites and Midgets with earlier vertical flow radiators and cylinder heads with a temperature gauge fitting in the front of the head under the thermostat housing.

You start by installing a Special Tuning thermostat blanking sleeve and a modern open/shut type thermostat as described in option three above. There is no need to drill the four 1/4" holes in the open/shut thermostat. Next you remove the capillary tube and bulb for the temperature gauge from the radiator and install them in the hole in the cylinder head under the thermostat housing. If the bulb is too long to fit in the hole you may need to install a 1275 Midget brass extension into the hole first. They are available from Gillspeed.

Next you run a length of 1/2" water hose from the heater outlet on the back of the head to the hole in the radiator that was previously used for the temperature gauge capillary tube and bulb. This hose remains open at all times and acts as the by pass to prevent hot spots and cavitation. If you have a heater fitted, you can fit a "T" piece into the 1/2" heater hose leaving the back of the head and run the hose from there.

In racing applications, this system has the advantage of allowing hot water to exit from both ends of the cylinder head simultaneously. This evens out the water temperature in the head and reduces the tendency to localised overheating and cracking.

If you have checked out the points mentioned so far and repaired any faults and still have overheating problems, then your radiator core may need attention. If your radiator is old and corroded or has blocked water tubes, you will need to have it re-cored. Gillspeed produces special 'Super Core' radiators. They are only slightly dearer than a standard re-core yet offer around a 30% increase in cooling capacity.

More Suggestions:

Two other less understood causes of overheating are worn distributors and worn SU carburettor needles and jets.

Worn Distributors

Spark Scatter: In order to achieve maximum performance, a distributor should deliver the spark to each of the four cylinders at exactly 90 degree intervals. When the distributor shaft bearings wear, the distributor shaft wobbles around and causes what's know as spark scatter. You can have a situation where No.1 cylinder fires at 90 degrees, No2 at 87 degrees, No3 at 92 degrees and so on. A 5 or 6 degree variation is not uncommon. When you remember how poorly your engine runs if the static ignition timing is 5 degrees off the optimum setting, it's not hard to see how spark scatter effects performance and temperature.

Advance Mechanisms:

The second job of the distributor is to boost performance and economy by varying the spark advance as the engine RPM or load changes. The theory is simple. The higher you raise the engine RPM the less time you have to burn the mixture in the cylinder, so you need to start the 'fire' in the cylinder earlier. This task is handled by the centrifugal advance mechanism. The rate of advance or 'advance curve' depends on the type and performance of the engine and the type of fuel being used.

On the other hand, when you are 'floating' along a country road or cruising down the freeway with your foot barely touching the accelerator, the carburettors are almost closed and so the charge in the cylinders is very weak. Under these conditions you need even more spark 'advance' to get this very weak 'fire' started. This task is handled by the vacuum advance unit. It advances the spark even further than the advance already being provided by the mechanical advance mechanism.

Centrifugal Advance:

Centrifugal advance mechanisms wear with age. They tend to 'over advance' the ignition timing at low RPM and cause 'pinging' on acceleration. The typical fix is to retard the static advance to eliminate the 'pinging', however this approach also retards the ignition timing at cruising and high speeds as well leading to poor performance and overheating.

The best way to check the mechanical advance mechanism is to take your distributor to a distributor specialist with a proper distributor testing machine. You will then be able to

How Distributors & Carburettors Cause Overheating.

compare your present advance curve against the original manufacturers 'curve' in the workshop manual.

Vacuum Advance:

The diaphragm in the vacuum advance unit is activated by the inlet manifold vacuum. Vacuum is very high under light throttle driving conditions. The neoprene diaphragm in the vacuum advance unit usually fatigues and springs a leak and so fails to operate at all. This leaves the engine with no additional advance for high speed light throttle situations. Retarded ignition timing in these circumstances leads to miss-firing and can easily push the combustion chamber temperature up and cause overheating.

You can quickly check if your vacuum advance mechanism is working by first pulling off the distributor cap and then by sucking on the vacuum hose connection. You should be able to see the breaker plate on which the ignition points are mounted rotating slightly. If nothing moves, ring Gillspeed for a replacement vacuum unit.

Bosch Conversions:

If your car has been modified from standard, is 'pinging' on current 'low octane' Super petrol, or pulling 8000 PRM on 100 octane racing fuel or Avgas, you may need to consider a special advance curve or distributor to suit.

Gillspeed can supply brand new Bosch distributors tailored to your specific requirements. They meet modern European pollution control standards and use the same points and condensors as local cars. They can be supplied with Bosch Electronic Ignition Kits if required.

These distributors are far superior in design and construction to the original distributors fitted to most English sportscars. Spark scatter is eliminated and as a result, top end performance is particularly enhanced.

SU Carburettors

The second possibility for your overheating problems is worm SU carburettor needles and jets.

SU carburettors work on a very simple principle. As greater or lesser volumes of air pass through the carburettor the differences in air pressure cause the piston to rise or fall. The SU needle is attached to the piston and so moves in and out of a stationary jet fixed to the body of the carburettor. The hole in the jet is .090" diameter. The jet is always full of petrol. The needle is .089" diameter and tapers along it's length, reducing slightly in diameter every 1/8". At the 'idle' position, there is only .001" clearance between the diameter of the needle and diameter of the hole in the jet. When you consider the hundreds of gallons of fuel that pass through this tiny clearance and that the needle sometimes rubs on the side of the hole, it's easy to see how wear takes place. This wear allows extra fuel to flow into the carburettor at idle and makes the engine idle rough and pump black smoke out the exhaust. The typical fix for this problem is to 'lean' off the idle mixture to give a smooth idle.

(LEAN = less fuel. RICH = more fuel)

Unfortunately, because of the nature of the SU tapered needle fuel metering system this also 'leans off' the entire RPM range and leaves the engine running lean at highway cruising speeds as well. Just as with retarded ignition, a lean mixture can also push up combustion chamber temperatures and so cause overheating.

SU carburettors can be intimidating if you are not used to them, however they are straightforward to repair and tune if you follow every step in the workshop manual. Gillspeed carries a full range of SU parts and can rebuild your carburettors for you if you wish.

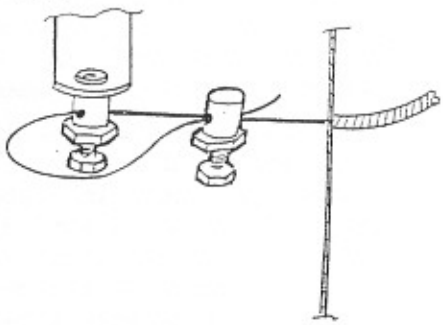
When you combine the effects of retarded ignition, lean mixtures and incorrect thermostats, you can easily end up with overheating problems.

Note: The latest 1996 reduced octane Super petrol is starting to cause a few problems for owners of road going sportscars that have had their compression ratios raised above the original makers specifications. Before you increase the compression ratio of your engine, ring Gillspeed for the latest fuel fact sheet. It could save you a lot of money.

Sprite Bonnet Cables.

Sprite and Midget bonnets have a nasty habit of flying up. They have the the potential to wrap themselves around the windscreen and the scuttle, not to mention the drivers head! The usual cause is a broken thimble on the bonnet locking pin which allows the lock to spring open. Gillspeed Bulletin No 6 shows you what to out look for.

Another common reason for bonnets to spring open is because the bonnet release cable is under tension after being routed through the wrong hole in the nose cone. The outer sheath of the bonnet release cable is supposed to terminate at a tiny 1/16" diameter hole in the nose cone assembly. The hole is about one inch from the top of the flange that bolts the nose cone assembly to the radiator iron and is directly in line with the bonnet lock.



The inner cable then continues through the 1/16" nose cone hole, passes through a floating ferrule and then through a second ferrule attached to the end of the lock lever. It is secured to the lever ferrule by a grub screw. The inner cable then loops back on itself and passes back through the first floating ferrule where it is again secured with a grub screw. It is important that the inner cable is not under any tension.

How To Avoid Breaking Your Brand New Windscreen.

Windscreen Replacement

Most Sprite's, Midget's and MGB's have similar windscreen to body mountings. All the windscreen assemblies are relatively easy to pull out but they are all a potential nightmare to refit.
The workshop manual tells you how to do the job, but here are a few more tips for beginners which have been learned the hard way.

Note: ***Old fashioned safety glass is flexible and forgiving. Laminated glass is not!***

The windscreen frames are held together with a selection of short and long 2BA metal thread screws. Don't mix them up or the long ones may protrude through glazing seal and break the glass.

Before refitting the glass, make sure all the channels are free of bends, twists and 'goop' of any sort.

Each model uses a different glazing seal. Corners are either moulded, cut and joined or relieved, sometimes a combination of all three. Make sure you use the correct one.

When you fit the glazing seal to the glass, use buckets of slimy kitchen detergent or soap on the windscreen frame, the glazing seal and the glass. Fit the top and bottom rails first, then slide in the end pillars. The detergent makes fitting the components a breeze and it washes off easily when you're finished.

When you fit the windscreen to body seal, make sure the ends of the seal extend slightly under the windscreen pillars. You may need to thin down the last inch or so of the seal to allow the windscreen assembly sit down properly on the scuttle. **Do not force anything!** If it won't go, stop, have a look for the problem and try again.

If there is a wire rod down the middle of the windscreen, don't overtighten it. Make sure it is installed the right way up and is well clear of the scuttle.

When you refit the windscreen frame to the car, there may be a gap between the chassis and the lugs on the bottom of the windscreen pillar. Fill the gaps with the shims you took out. If there is still a gap, use washers or cut up a jam tin and make shims to suit. **These shims are critical!** If there is a gap between the windscreen lug and the chassis, then either the lug or the windscreen glass may break as you tighten the bolts! Do not tighten the bolts fully until you check the windscreen pillar lines up with the 1/4 vent window frames on the door.

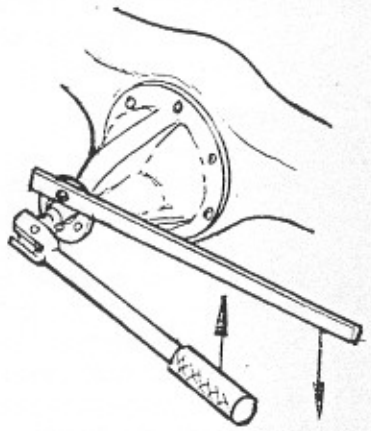
If you are not sure about anything, don't force it. Stop work. Try again or ring Gillspeed.

Differential Pinion Seals

Most differential pinion seals start to leak eventually. Here are a few things you can do to simplify the job of replacing them.

Once you have unbolted the propeller shaft you are faced with undoing the large nut that secures the drive flange to the pinion. Before you undo the nut, rotate the drive flange back and forward by hand and take a mental note of how stiff, smooth, rough or 'lumpy' it feels. You will need to remember this 'feeling' when you come to retighten the nut later. The next thing to do is scribe or centre punch two witness marks side by side. One on the nut and the other on the end of the pinion shaft. This will enable you to retighten the nut to the same position. This is important because some pinions have a collapsable spacer between the two pinion bearings which is used to maintain the correct bearing preload. If you now swing on the pinion nut with a socket and tommy bar you will find you exert so much torque that you start to turn the back wheels. Applying the hand brake or foot brake is usually not enough to stop the wheels turning.
One way over this problem is to bolt one end of a half meter length of steel bar to one of the 5/16" holes in the drive flange. You then pull this steel bar in the opposite direction to your socket and tommy bar to undo the nut.

Be careful you don't jamb your fingers!



Tap off the flange and prise out the seal with a sturdy screwdriver. Be careful not to damage the inside of the housing where the seal fits. If the seal has worn a groove in the drive flange, you can buy a stainless steel sleeve to press over the groove from Gillspeed. Clean the housing, apply a sealant to the outside of the seal and install it flush with the outside of the housing. Lubricate the lip of the seal with oil, reinstall the drive flange and retighten the pinion nut until the witness marks almost line up. Turn the drive flange backwards and forwards by hand, it should feel the same as when you first tested it. Continue to tighten the nut until the witness marks line up. If the bearings begin to feel 'lumpy', back off the nut a gnats whisker until it turns as before. Finally, replace any diff oil that leaked out, or better still, refill the rear axle with new oil.

Rear Axle Breather

On top of the rear axle housing is a breather valve which is supposed to release any air pressure that builds up. Often they are caked in mud and unable to vent. The build up of pressure can blow oil out the diff pinion and axle seals. The plastic breathers are easy to clean once you flick off the plastic top. Steel breathers can be easily unscrewed for cleaning.

That's all for this bulletin. If you would like any free copies of earlier bulletins, further information about any of the topics above, or overnight parts delivery, ring Gillspeed now on (03) 9568 0688.