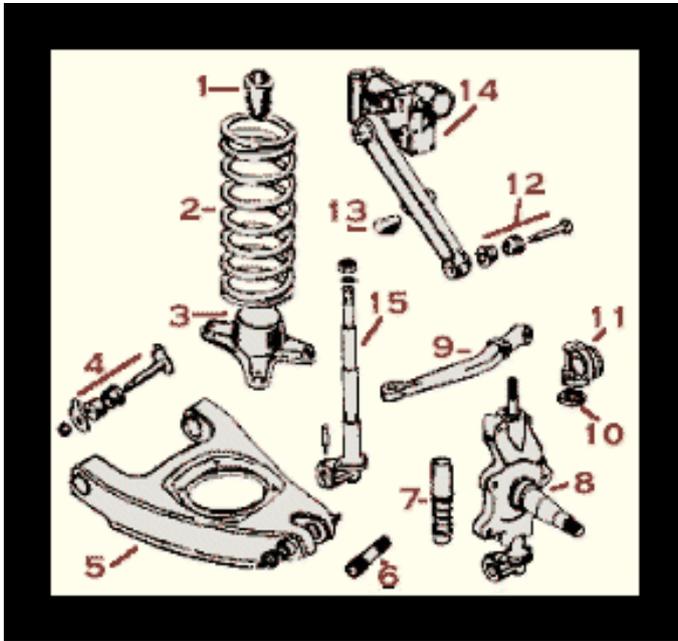


Components

This diagram shows the major components of the Sprite front suspension. The component naming varies between the different contemporary publications and so for clarity this diagram shows the names as used for each component in this text.



1. Spring pan Rebound Buffer
2. Spring
3. Spring Seat Pan
4. Inner Fulcrum Pin and Bushes
5. Wishbone
6. Bottom Trunnion
7. Dust Excluder Tubes
8. Stub Axle
9. Steering Arm
10. Thrust Washer
11. Top Trunnion Housing
12. Top Trunnion Pin and Bushes
13. Top Rebound Buffer
14. Shock Absorber
15. King Pin

General Comments and Maintenance

The front suspension of the Sprite was taken directly from the Austin A35 and whilst of technically good design for its time, (offering good performance at low cost) cannot be described as very durable. The BMC manuals recommend lubrication at 6000 mile (or six month), intervals; but in practice this frequency does not provide for longevity: To reduce wear to a minimum it is advisable to lubricate all front suspension grease points each month with a Lithium based grease such as Castrol LM.

Before applying the grease gun to any of the available nipples use a rag to remove any accumulations of dirt. Best results whilst greasing will be obtained if the car is raised right off the ground so taking the weight of the car off of the fulcrum points. This will allow the grease to penetrate right around the bearing surfaces. There is a useful tip to be found in the BMC manuals: When jacking the front of the car place a 3/4" block of wood between

the shock absorber arm and its rebound buffer. This helps to avoid splitting the top rebound buffer by compression from the weight of the suspension. The greasing of the king pin bearings is best carried out as a three stage operation: Firstly apply several strokes of grease to each nipple, then (using the steering wheel) apply full left and right lock to the steering, finally apply several more strokes of the grease gun to the same nipples. This method ensures the best possible lubricant penetration around the king pin / stub axle bearings.

Whilst lubricating the suspension it is worthwhile paying some attention to the king pin dust excluder tubes as these very quickly rust together and if at some point a suspension strip-down is necessary these fragile tubes will have usually seized solid. Whilst not irreplaceable, they are surprisingly expensive and the cost of replacement can be avoided by frequent cleaning and the application of firstly some light oil, followed by a smear of high melting point grease.

When lubricating the front suspension it is also a good idea to check the tightness of the three shock absorber mounting bolts (accessible from under the bonnet). These have a tendency to work loose in service with potentially disastrous consequences. They should be tightened to a torque figure of 25 - 30 lb. ft. (3 to 4 kg. m.) The tendency of these bolts to work loose can be counteracted by the use of a small amount of thread-locking compound such as that produced by Loctite when refitting.

Inspection

Inspection of the front suspension should be carried out before any lubrication, as after greasing the effects of wear in the fulcrum points will be much less evident. The design of the front suspension is somewhat complex by modern standards and the scope for wear quite high. MOT (the U.K. yearly roadworthy-ness inspection) failure sheets cannot be relied upon to give the correct diagnosis of any wear present. Often the tester will simply attribute the wear to "worn trunnions" or "king pin play" when the wear is actually in more than one component. Recently the MOT failure sheet has become even more un-reliable as younger mechanics are now much less familiar with the Sprite front suspension: Occasionally a car in need of work will pass the test due to lack of experience in testing this suspension arrangement, or more frequently the description of the fault will be totally useless e.g. "excessive wear".

A proper inspection will require two people: one to rock the road wheel, and the other to watch carefully for play at the various fulcrum points. With the car jacked high off the ground and supported securely on axle stands, watch for play at the bottom trunnion, the bottom of the stub axle, the top trunnion, at the track rod end and at the inner wishbone fulcrum pins. If wear is felt by the person rocking the wheel ensure that the play is visible in the suspension before the strip down, as a worn front wheel bearing will be very likely to produce feel-able play. This is also an ideal time to inspect the steering rack for wear; watch out for play where the track rod joins the rack, wear here will often be accompanied by a knocking sound and "sloppiness" in the steering.

If play is found it is best to perform a partial strip-down in order to more closely inspect the play wear of the various components. Firstly remove the road wheel then, using a ball joint splitter free the track rod end from the steering arm. place a jack securely under the wishbone and remove the top trunnion. This will release the king pin / stub axle assembly for further inspection. If you can rock the king pin in the line of the car (as well as across the car) then this is evidence of wear in the bottom trunnion and wishbone bushes. With

the suspension stripped down this far, wear in the king pin / stub axle bushes will also be more obvious.

Generally the Sprite front suspension wears evenly, so if excessive play is found in the king pin / stub axle bushes then there will be wear evident in the wishbone / bottom trunnion bushes, (the reverse is also true). Unfortunately in the rare case where the bottom trunnion is not worn but the stub axle bushes are, generally the king pin will have rusted to the bottom trunnion anyway, making its removal impossible without cutting equipment. As a general "rule of thumb" if you spot wear, budget to replace the whole lot. It is easier and will avoid a further strip-down in the near future.

Strip-down

The value of a good quality penetrating oil cannot be over emphasized at this point: the Sprite is particularly prone to the front suspension bolts and nuts rusting solid. Whilst penetrating oil will not always shift the most stubborn of these it can save hours of struggling and bruised and cut hands. An angle grinder, if available, is useful if not a necessity, oxy-acetylene is an alternative but obviously, the dangers of using such equipment are much higher. If you don't have access to either of these don't despair as the job is not impossible; use that penetrating oil and if possible give it a good soak overnight or even longer.

The Sprite is one of the few cars which does not require the use of coil spring compressors in order to strip-down the front suspension. As hinted at above this is possible with the use of a hydraulic trolley jack: firstly jack the front of the car up as high as it will go and support it securely on axle stands. On cars equipped with disc brakes unbolt the brake caliper without disturbing the brake hose and secure it into the triangular cut-out in the chassis, this will avoid un-necessary bleeding of the brakes on re-assembly. On the early cars with drum brakes, either clamp the hydraulic hose or remove the reservoir filler cap, place a sheet of polythene over the opening and screw the cap back in place to avoid fluid loss. Then place a block of wood on top of the jack and use it to release the top trunnion and track rod end as described above. At this point on cars with an anti roll bar fitted it will be necessary to unbolt the roll bar drop link from the wishbone pan.

When the stub axle assembly is free, gently lower and remove the jack. This will release 90% of the coils spring tension. Next push the wishbone down to as near the vertical as possible; how hard this is will depend upon the state of the inner wishbone mounting bushes. The coil springs can now be pulled over the spring seats and removed with very little effort. If you don't like sound of this method then there is an alternative as described in the BMC workshop manuals, using slave bolts to remove and replace front springs. This method is described later.

The bushes used on the inner wishbones and top trunnion are of the metalastic type, consisting of a pair of rubber bushes with steel sleeves, (through which the fulcrum pins pass) bonded into the rubber. The steel sleeves are particularly prone to rusting to the fulcrum pins. This has the unfortunate effect of making the fulcrum pins extremely hard to remove, this is where the angle grinder comes in handy: It is often much easier to grind off the heads of the fulcrum pins rather than trying to remove them. If a grinder is not available a large chisel under the head of the pin will often pull it out, but you may have to resort to a wedge type ball joint splitter and some rather heavy blows. With the top trunnion and inner wishbone fulcrum pins removed, the suspension can be removed as a

complete unit. Further strip-down can now be carried out on the bench, so saving your back and knees from crawling around on the floor.

On drum brake cars slacken off the brake adjusters and remove the drums, then proceed with a complete brake strip-down, leaving just the wheel cylinders attached to the brake backplate. The front hub should now be removed: In order to do this the dust cap has to be removed from the center of the hub, and the split pin in the hub nut should be bent flat and pulled out. This procedure is straightforward on cars with plain steel wheels but can give problems on those fitted with wire wheels: The dust cap on wire wheeled cars can be troublesome to remove. It has a threaded stud protruding outwards which is supposed to accept a special removal tool, (BMC part no. 1B 4339). As an alternative to this removal tool a nut can be run down the threaded stud to provide a means of gripping the stud. Unfortunately this stud will often have been damaged by the use of pliers etc. in previous attempts at dust cap removal, in some cases it may have long since broken off. Often the easiest solution for removal is then to chop up the cap and remove it piece-meal with a sharp cold-chisel. Once the dust cap is removed the hub nut split pin on wire wheel models can also give problems: A hole is provided in the side on the splines to facilitate removal of this pin, unfortunately there is only one hole, (often blocked) so the pin cannot be pushed through from the other side. It is often easiest to chop up the split pin in situ and remove this piece-meal as well.

Ideally the hub should be removed sharply and firmly as then there is less likelihood of the inner wheel bearing breaking up. The best way to achieve this is by use of a hub puller, but if you don't have one the best way to proceed is to loosen the hub nut and give the center of the stub axle a sharp tap with a soft drift or piece of wood. Although the hub nut can be removed for this purpose it is best to leave it in place, but loosened as it will protect the threads on the stub axle end. Badly damaged threads on the stub axle will result in the unit being unsuitable for reconditioning / part exchange.

Once the front hub has been removed it should be possible to remove the brake backplate, the king-pin castellated nut, (if not removed earlier), and then the top trunnion housing. The stub axle can now be withdrawn from the king pin and the steering arm unbolted from it. The dust excluder tubes and retaining spring should be carefully removed from the stub axle at this point. Great care should be taken to lubricate these before removal as they are easily damaged. Bent or otherwise damaged dust excluder tubes should not be re-used as they will allow the ingress of water and dirt.

If replacing all components, you can stop the dismantling at this point: Most parts suppliers will accept wishbones for exchange with the king pin still attached and in most cases the removal of the king pin is extremely troublesome. You may wish to save money by removing small components such as the grease nipples but generally it is more worthwhile to replace them. Don't forget to ensure that you have removed the anti roll bar drop link mounting plate (from cars equipped with an anti roll bar). Keep the top trunnion housing and phosphor bronze thrust washer for re-use, unless you are buying a pre-assembled stub axle assembly, in which case you will have to hand these parts in for exchange.

Whilst it is possible to fit new bushes and a new king pin to your existing stub axle unit, it is only possible with the correct, stepped in-line reamer. Most parts suppliers will provide exchange sub axle units ready bushed, reamed and fitted with a king pin. Some will even offer the assembly ready shimmed up and fitted with a top trunnion housing. In which case you will need to hand in the top trunnion and thrust washer along with the other exchange parts. There is usually little or no money to be saved by obtaining the stub axle bearings

and king pin yourself and getting your local engineering workshop to fit them. Check on prices, but it is generally easier to obtain the finished item on an exchange basis.

Return to the car and unbolt and remove the front shock absorbers. The three mounting bolts are accessible from under the bonnet. Inspect the rubber rebound buffers, there are two; a large one which sits inside the spring, and a smaller one which sits under the shock absorber arm. Any signs of splits or bad perishing and these will require replacement. Also inspect the condition of the rubber mountings for the anti roll bar (when fitted), any play or splits in these will warrant replacement. Finally inspect the rubber bushes in the roll bar drop links, if there is any play evident, or the rubber is starting to part company with the steel then again, replacements will be necessary.

Take a careful look at the shock absorbers, any signs of oil leakage will warrant replacement units. Bolt the shock absorber into a vice and work the lever arm up and down, any tight or weak spots in the travel will also denote that the shock absorber requires replacement; the action should offer a good, even resistance across its full range. Shock absorbers are available either new or reconditioned. Whilst there is a considerable price difference between these it is worth considering new as opposed to reconditioned units: Because of the side-loads that the Sprite shock absorbers are subjected to the bearing and seal of the main spindle are very prone to wear and subsequent leaks. Because of the relatively short lifespan of these units they may have been reconditioned many times, with the reliability of the main seal declining each time. For this reason if you can afford the extra cost it may be worth considering new units.

Re-assembly

starting with clean, new parts the assembly of the front suspension is much more straightforward and enjoyable than the strip-down. There are however some traps to catch the inexperienced or unwary.

Before commencing assembly the bottom trunnion should be bedded into the wishbone bearings; it is a tight fit and is usually impossible to fit if the following procedure is not carried out: Hold the wishbone pan in a bench vice so that the bottom trunnion access hole is uppermost, (vertically so the trunnion can be screwed down into the wishbone). Thoroughly lubricate the trunnion pin with grease and insert it into the hole. The next job is to screw the trunnion into the wishbone using the same action as used when tapping i.e. 1/2 turn forwards then back off by 1/4 turn. **DO NOT USE A SCREWDRIVER FOR THIS;** the trunnion pin is case hardened and the use of a screwdriver in its slotted end can result in the trunnion shattering, so rendering it useless. Instead of a screwdriver use a piece of mild steel bar which is a good fit in the slotted end of the trunnion. This way you can provide more torque evenly, without the risk of shattering the trunnion, the bar may bend whilst in use and require straightening several times, but this is much better than scrapping the new trunnion. Once the cotter pin slot is visible through the first bush you can use a 1/2" spanner on the flat of the trunnion, which will allow the safe application of even greater torque.

Once the trunnion is screwed fully home, remove it again and thoroughly clean it and the wishbone to remove any residual swarf from the bedding in process. Take particular care to clear the grease-way which runs through the center of the trunnion and the grease distribution slot which runs along the outside. The trunnion should now be much more easy to fit, but remember to use the steel bar on assembly rather than a screwdriver as it may still be tight.

Re-assemble the wishbone and stub axle on the bench liberally greasing all components as you re-fit them, but don't mount the front hub or brake backplate yet, this is better left off until the wishbone / stub axle assembly is bolted onto the car as the extra weight of the hub etc will make the unit less manageable on fitting. Fit the top trunnion housing and thrust washer to the top of the king pin along with an 0.008" shim, tighten the king pin castellated nut and check the endfloat on the stub axle assembly; there should be slight resistance felt when moving from lock to lock and no vertical movement. If the assembly is too tight increase the number of shims on the top of the king pin, and if there is vertical movement reduce the number of shims; you can obtain a pack of various size shims from the parts specialists, generally they will come with the exchange axles. Because of variations in the top trunnion housing castings it is possible for there to be vertical movement when no shims are present. If this is the case insert a larger diameter shim above the thrust washer, (inside the top trunnion housing) and use the smaller shims for fine adjustment. Attach the shock absorbers to the car and replace any rebound buffers as necessary. Next attach the inner fulcrum end of the wishbones to the car, but do not tighten the securing nuts. When fitting the new metalastic bushes, lubricate them with rubber grease or Vaseline as this helps them to bed in and avoids suspension squeak.

Now the coil springs can be refitted. Again, push the wishbones down to a near vertical position and then you should be able, (with a bit of effort) to push the springs into place over the dome in the wishbone spring pan. This is the reason for not tightening the inner fulcrum nuts, as it is much harder to push the wishbone to a near vertical position if they have been tightened. Then the jack and block of wood can be used to compress the spring against the weight of the car until the top trunnion can be connected.

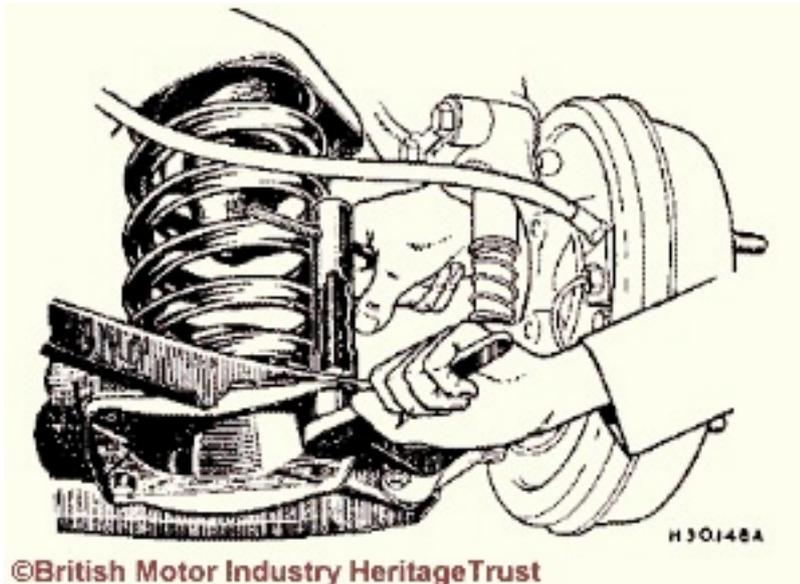
Once the Spring is in place and the top trunnion re-connected reassemble the brakes and hub, and reconnect the steering arm as per the manual. Do use new tab washers on the brake caliper and steering arm and don't forget to tighten the inner fulcrum pin nuts. Before refitting the road wheels grease the front suspension as described in the first section and bleed the brakes if the hydraulic hoses were disturbed.

Torque Wrench Settings		
	lb.ft.	kg.m.
Track Rod End Balljoint nut	28 to 32	3.87 to 4.42
Shock Absorber Mounting Bolts	25 to 30	3.5 to 4.1
Front Hub Nut (Drum)	55 to 65	7.6 to 8.98
Front Hub Nut (Disc)	46	6.4
Steering Arm bolts	39	5.4
King Pin Castellated Nut	40	5.5
Road Wheel Nuts	44 to 46	6.0 to 6.4

Using Slave Bolts for Removing and Replacing Coil Springs

As an alternative to the method of coils spring removal / replacement described above it is possible to use a slave-bolt method. The BMC manual text describes the use of the official BMC service tool (part no. 18G 153), but suggests the alternative of using a pair of slave

bolts. This technique is particularly useful for replacing springs when a complete suspension strip-down is not required. For this you need a pair of set screws (like bolts but they have the thread along the entire length) about 8" long and the same (or slightly smaller), diameter as the spring pan mounting bolts, with nuts to suit.



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Using a pair of slave bolts to remove or replace a front coil spring

Jack the front of the car up as high as possible, and support securely on axle stands. remove two diagonally opposite spring seat mounting bolts and replace them with the slave bolts and nuts. Then remove the other two spring seat bolts. The slave bolts will now be taking the full force of the spring. Slowly and evenly undo the slave bolts, the spring pressure will be gradually released until the spring seat and spring will drop away. The slave bolts can now be removed along with the spring and spring seat.

Replacement is reversal of the removal procedure, but be careful upon compressing the spring that the bolt holes for the spring pan line up with those in the wishbone.

(c) Mick. S. Maguire M.I.E.E.E

Additional info

paul@pwiley.fsnet.co.uk Your Request=I read your tech tips on renewing front suspension (very useful). One tip I would pass on which is to leave the spring pan bolts loose when refitting spring-makes life very easy. I have found that using a new wishbone and poly bushes it is very difficult to fit the inner wishbone links. Any suggestions to make life easier would be welcome. Thanks