

Special Tuning

Issued by: THE BMC SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. LTD., ABINGDON-ON-THAMES, ENGLAND

Model MINI COOPER 'S'

Sheet Aa - 1 Issue 2

DESCRIPTIVE INDEX

Description	Part No.	Qty./Car	Sheet No.
<u>BODYWORK</u>			
Bonnet securing straps - Retainer	C-AHH 5517	2	A-4
- Buckle half	C-AHH 5518	1	A-4
- Tongue half	C-AHH 5519	1	A-4
Wing extension kit, for 4 $\frac{1}{2}$ " wheels	C-AJJ 3316	1	A-4
Pivotting single lamp bracket	C-AJJ 3318	1 or 2	A-9
Competition 4 lamp mounting bar complete	C-AJJ 3329	1	A-9
Rally padded seat covers	AKF 1650	2	A-9
B.M.C. reclining seat (See Body Parts List for Part Numbers)		2	A-9
<u>BRAKES</u>			
DS 11 brake pad set - Cooper 'S' only	C- 8G 8996	1	A-4
VG 95 rear brake shoes - Cooper 'S' only	C- 8G 8997	2	A-4
VG 95 linings and rivets - Cooper 'S' only	C- 8G 8998	1	A-4
<u>CAMSHAFT</u>			
Half race, 24 $^{\circ}$, 64 $^{\circ}$, 59 $^{\circ}$, 29 $^{\circ}$, Lift 0.252"	C-AEA 731	1	Z-2
Full race, 50 $^{\circ}$, 70 $^{\circ}$, 75 $^{\circ}$, 45 $^{\circ}$, Lift 0.315"	C-AEA 648	1	A-1, Z-2
<u>CARBURETTOR</u>			
1 $\frac{1}{2}$ " Twin S.U. - R.H.D. (CP4 needles)	C-AUD 178	1	A-2
Installation Kit for 1 $\frac{1}{2}$ " Carbs. - R.H.D.	C-AJJ 3301	1	A-2
1 $\frac{1}{2}$ " Twin S.U. - L.H.D. (CP4 needles)	C-AUD 176	1	A-2
Installation Kit for 1 $\frac{1}{2}$ " Carbs. - L.H.D.	C-AJJ 3302	1	A-2
1 $\frac{1}{2}$ " Twin S.U. fixed jet type (BG needles)	C-AUD 165	1	A-4
Flared intake pipes for 1 $\frac{1}{2}$ " carbs. (Steel)	C-AEA 485	2	A-2
" " " " " " (Glassfibre)	C-AHT 10	2	A-2
<u>CLUTCH</u>			
Competition diaphragm spring assembly (orange)	C-AEG 481	1	A-4
Clutch driven plate	C-22G 247	1	A-4
<u>DYNAMO, PULLEY AND FAN</u>			
Pulley for reduced speed	C-AEA 535	1	A-2
Fan belt to suit pulley C-AEA 535	C-AEA 756	1	A-2
Fan belt short	C-AEA 539	1	A-2
2 blade fan	C- 2A 997	2	Z-3
Alternator and installation kit complete	C-AJJ 3332	1	A-2

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Model MINI COOPER 'S'

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Issue 2

DESCRIPTIVE INDEX (Cont'd)

Description	Part No.	Qty./Car	Sheet No.
<u>EXHAUST</u>			
Competition manifold for 970cc and 1071cc	C-AEG 432	1	A-2
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<u>FINAL DRIVE GEARS</u>			
3.938:1 ratio (Wheel	C-22G 340	1	A-3
(Pinion	C-22G 69	1	A-3
4.267:1 ratio Wheel	C-22G 370	1	A-3
4.35:1 ratio Wheel	C-22G 443	1	A-3
(See Sheet A-3 for other standard ratios)			
<u>FLYWHEEL</u>			
Lightened steel type	C-AEG 421	1	A-4
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Standard ratio gears (Straight cut)	(1st motion shaft C-22G 427	1	A-3
	(3rd speed gear C-22G 429	1	A-3
	(2nd speed gear C-22G 428	1	A-3
	(Laygear C-22G 335	1	A-3
Close ratio gears (Helical cut)	(1st motion shaft C-22A 985	1	A-3
	(3rd speed gear C-22A 987	1	A-3
	(2nd speed gear C-22A 986	1	A-3
	(Laygear C-22G 210	1	A-3
Close ratio gears (Straight cut)	(1st motion shaft C-22G 430	1	A-3
	(3rd speed gear C-22G 432	1	A-3
	(2nd speed gear C-22G 431	1	A-3
	(Laygear C-22G 306	1	A-3
<u>LITERATURE</u>			
Tuning Booklet - Cooper 'S'	C-AKD 5096		
Binder for Special Tuning Sheets	C-AKD 5061		
Divider set for Binder	C-AKD 5093		
B.M.C. Tuning Sheet Set (All models)	C-AJJ 3333		
B.M.C. Special Tuning Rosettes (1 pair)	C-AKD 5100	1	A-9
<u>LIMITED SLIP DIFFERENTIAL</u>			
Kit (For needle roller drive shafts only)	C-AJJ 3326	1	A-8
Kit (For rubber couplings only)	C-AJJ 3303	1	A-8
<u>OIL COOLER</u>			
Competition type complete kit	C-AJJ 3309	1	A-5
<u>PISTON</u>			
Competition 3 ring flat top Std. Grade 3	C-AEG 019003	4	A-1, A-5
High comp. 4 ring flat top +.040" Grade 3	C-AEG 043043	4	A-1

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Issue 2

DESCRIPTION INDEX (Cont'd)

Description	Part No.	Qty./Car	Sheet No.
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Scottish Rally type sumpguard. Complete kit	C-AJJ 3320	1	A-4
<u>SUSPENSION</u>			
Competition hydrolastic units			
Rally setting - yellow	C-21A 1705	4	A-6
Race setting - red front	C-21A 1819	2	A-6
- double red rear	C-21A 1821	2	A-6
Progressive rear bump stop kit	C-AJJ 3313	1	A-7
Rear anti-roll bar kit complete	C-AJJ 3317	1	A-7, A-9
<u>VALVE GEAR</u>			
Heavy 180 lb. valve springs			
{ outer	C-AEA 524	8	A-1
{ inner	C-AEA 652	8	A-1
{ locating collar	C-AEA 654	8	A-1
Strengthened rocker shaft	C-AEG 399	1	A-5
Valve rocker screws, lengthened	C-AEA 692	8	A-1
Valve rocker spacer	C-AEG 392	3	A-5
Lightened tappet	C-AEG 579	8	A-5
Lightened steel camshaft sprocket	C-AEG 578	1	A-5
<u>WHEELS</u>			
Magnesium Alloy 4 $\frac{1}{2}$ " (Cooper 'S' only)	C-21A 1968	5	A-4
Alloy wheel installation kit	C-AJJ 3327	1	A-4

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Special Tuning

Issued by: THE BMC SPECIAL TUNING DEPARTMENT
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Model AUSTIN & MORRIS COOPER 'S'
970cc, 1070cc, 1275cc.

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These engines are tuned to a fairly high degree in standard form, but further power can be obtained at the expense of some tractability at lower speeds. Full information on carrying out work on these cars is contained in Workshop Manual Part No. AKD 4935.

Copies of up-to-date R.A.C. Forms of Recognition are available ONLY from the R.A.C. Competitions Department, 31 Belgrave Square, London, S.W.1., who will also be able to answer any queries concerning eligibility of modified cars.

Cylinder Head

Remove all frazes from combustion chambers and ports, but leave the locating sleeves in place when matching the manifold ports. Raise the compression ratio either by fitting flat top pistons to 1071cc and 1275cc engines, or machining the cylinder head only on 970cc. Removing 0.012" (.305 mm) from the head face reduces the capacity by approximately 1cc. Fitting 3 ring pistons C-AEG 190 (4 off) or 4 ring pistons 8G 2432 (1 set) will make the compression ratio 11:1 on 1071cc and 12:1 on 1275cc engines.

Examine the waterways to ensure all sand and core wires have been removed. Use the standard head gasket AEG 226 and ensure that there are no burrs at the base of the head studs.

Bore

Engines may be up to +.040" (1.016 mm) but DO NOT RE-CHAMFER TOP EDGE OF BORE as gasket burning may result. Flat top 4 ring pistons are available for this size Part No. C-AEG 043043 or 6 (4 off). The 1275cc should not be bored more than +.020" (0.508 mm) to 1293cc otherwise the 1300cc class limit will be exceeded. Calculate appropriate combustion chamber capacity to give required compression ratio. 12:1 is the best maximum, but 100 octane fuel is required.

Camshaft

For rallying, use the latest standard camshaft AEG 510 to give reasonable low speed pick-up, but for racing and maximum power fit camshaft C-AEA 648. (See sheet Z-2 for camshaft details). This camshaft will require longer tappet adjusting screws C-AEA 692, or machine 0.050" from base of rocker shaft brackets if using standard screws.

Valve Springs

Standard valve springs will avoid undue load on the valve gear, but stronger ones are available to increase valve crash speed to 8,400 r.p.m. The new bottom locating collar must be used in place of the existing standard part.

Valve spring inner	-	C-AEA 652	8 off
Collar - locating	-	C-AEA 654	8 off
Valve spring outer	-	C-AEA 524	8 off

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Model AUSTIN & MORRIS COOPER 'S'
970cc, 1070cc, 1275cc.

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Carburettors

On right hand drive cars, fit $1\frac{1}{2}$ " carburetter pair C-AUD 178 using installation kit C-AJJ 3301, or for left hand drive cars use carburettors C-AUD 176 and kit C-AJJ 3302. These carburettors are fitted with blue piston springs AUC 4587 and CP4 needles. Use flare pipes C-AEA 485 (steel) or C-AHT 10 (glassfibre) to reduce turbulence at carburetter intake. Track testing may show the following needles and ignition settings to be best, but may be modified to suit the particular engine. The standard distributor is quite satisfactory.

	Static Ign. setting	Needle	Part No.
970cc	12° B.T.D.C.	CP4	AUD 1118
1071cc	7° B.T.D.C.	MME	AUD 1265
1275cc (cam C-AEA 648)	5° B.T.D.C.	BG	AUD 1067
1275cc (cam AEG 510)	2° B.T.D.C.	7	AUD 1006

Plugs

Champion N57R, N62R or N60Y are recommended for racing and N64Y for rally work. N60Y and N64Y are extended nose type and the ignition should be retarded 5° from the above setting.

Exhaust Manifolds

Fit the homologated competition exhaust manifold C-AEG 365 for 1275cc or C-AEG 432 for 970 and 1071 engines. The standard exhaust system is quite satisfactory, but may be strengthened and upswept at the rear for rallying.

Dynamo

To avoid damage to the dynamo at high speed, it is advisable to fit larger dynamo pulley C-AEA 535 together with longer fan belt C-AEA 756. The coil should be remounted upright on the wing panel at the rear of the engine to reduce the load on the dynamo brackets. Where regulations permit running without a dynamo, use standard water pump pulley 2A 601 and short fan belt Part No. C-AEA 539.

A spare fan belt of the correct type can be clipped around the water pump and timing cover for a quick changeover if one breaks during competition.

Alternator Fitting

An Alternator Kit C-AJJ 3332 is available with all necessary parts and wiring harness to enable the existing dynamo to be replaced by a high output alternator. This will then cope with extra lights, heated screens etc. for rallying, or can be used for continual stop-start motoring where the dynamo output may not be adequate.

The alternator mounting bracket is available separately, Part No. C-AHT 32.

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Model AUSTIN & MORRIS COOPER 'S'
970cc, 1070cc, 1275cc.

Sheet A - 3 Issue 5

ALTERNATIVE TRANSMISSION GEARS

Alternative gearbox and final drive gears are available for these vehicles. The gearbox ratios are as shown, top gear being direct in all cases.

GEARBOX RATIOS & GEARS

FOR COMPETITION USE

	Std. Ratio (helical)	Close Ratio (helical)	Std. Ratio (spur)	Close Ratio (spur)
<u>Ratios</u>				
1st & Rev.	3.200	2.568	3.077	2.573
2nd	1.916	1.780	1.875	1.722
3rd	1.357	1.242	1.307	1.255
<u>Part Numbers</u>				
1st Motion Shaft	See	C-22A 985	C-22G 427	C-22G 430
2nd Speed Gear	Parts	C-22A 986	C-22G 428	C-22G 431
3rd Speed Gear	List	C-22A 987	C-22G 429	C-22G 432
Laygear	AKD 3509	C-22G 210	C-22G 335	C-22G 306
<u>Numbers of teeth</u>				
1st Motion Shaft	20	23	20	22
2nd Speed Gear	28	29	27	28
3rd Speed Gear	24	25	23	24
Laygear	26,23,19,13	24,21,17,13	25,22,18,13	23,20,17,13

These gears must be fitted in sets, and can be used in all Mini Cooper 'S' gearboxes, Mini Cooper 998cc gearboxes, 848cc Mini gearboxes after Engine Number 815140, and 1100s fitted with 'B' type gears only (See Mechanical Parts List).

On all earlier Minis and 997cc Mini Coopers it may be possible to fit a complete late type transmission assembly to accept the close ratio gears. For further information refer to the parts list.

ALTERNATIVE FINAL DRIVE GEARS

RATIO (teeth)	3.444 (18/62)	3.647 (17/62)	3.765 (17/64)	3.938 (16/63)	4.133 (15/62)	4.267 (15/64)	4.35 (15/65)
Wheel	22A 411	22G 940	22A 401	C-22G 340	22G 101	C-22G 370	C-22G 443
Pinion	22A 413	22A 399	22A 399	C-22G 69	22G 99	22G 99	22G 99

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Model MINI COOPER 'S'

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Issue 7

Flywheel and Clutch

After Engine No. 9F/SA/Y42730 an improved crankshaft AEG 479 was fitted, and this may be used on earlier 1275cc engines for competition use.

It is dangerous to lighten the standard cast iron flywheel but the lighter steel flywheel C-AEG 421 is safe at high revolutions. A competition diaphragm clutch spring assembly C-AEG 481 is available together with a bonded clutch driven plate C-22G 247. The whole crankshaft, flywheel, clutch and damper assembly should be fully balanced separately and as a unit.

Fixed Jet Carburettors

For racing where cold starting can be done by hand, carburettors with fixed jets are available Part No. C-AUD 165 for a pair. These are fitted with BG needles and should be used with installation kit C-AJJ 3301 for R.H.D. cars or C-AJJ 3302 for L.H.D. cars.

Valve Rocker and Pushrod

A lighter forged valve rocker AEG 425 was fitted as standard from Engine No. 9F/SA/Y 34540. Ensure that this is immediately above each valve stem if further lightening is carried out.

Check that the pushrods are straight and true, after which a small amount of material can be removed from the cup.

Brakes

Fit competition DS11 brake pad set C-8G 8996 (1 off) together with the harder VG95 rear brake shoes C-8G 8997 (2 off). Alternatively, the existing shoes may be relined using VG95 brake lining set C-8G 8998 (1 off).

Alloy Wheels

Magnesium alloy road wheels are available with $4\frac{1}{2}$ " (114 mm.) rims for the Mini Cooper 'S' only, Part Number C-21A 1968, 5 off required. These will need a wheel installation kit C-AJJ 3327 containing 18 special wheel nuts and self-adhesive balance weights.

Wing extension kit C-AJJ 3316 is necessary for certain events when using $4\frac{1}{2}$ " wheels to ensure bodywork covers the tyres.

Sumpguard

A very substantial sumpguard as used by the works is available as a complete kit Part No. C-AJJ 3320 including all necessary mounting plates and rubbers. This guard weighs 35 lbs and should not be confused with other guards already on the market of less robust construction.

Bonnet Straps

Competition leather securing straps are available. Order:- Retainer C-AHH 5517 (2 off), Strap - Buckle half C-AHH 5518 (1 off), and Strap - Tongue half C-AHH 5519 (1 off).

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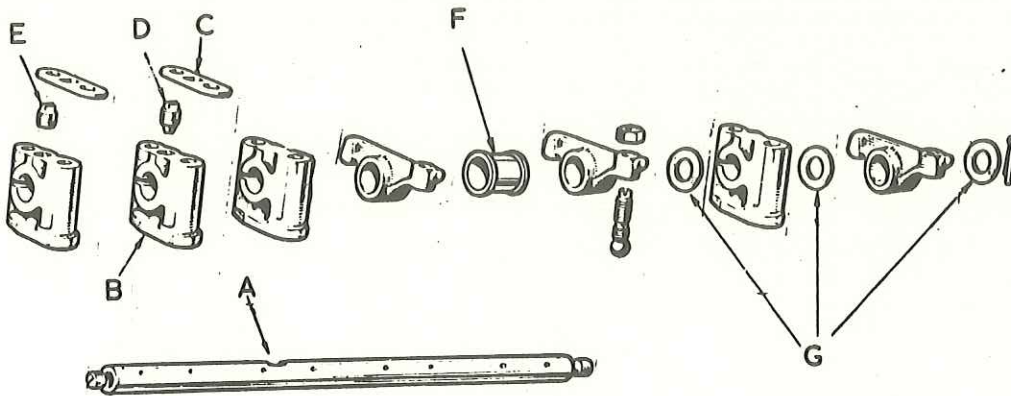
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Model MINI COOPER 'S'

Sheet A - 5 Issue 4

Rocker Shaft

A strengthened rocker shaft (A) Part No. C-AEG 399 is now available, which requires an additional tapped pedestal (B) AEG 165, locking plate (C) 2A 515 and locating screw (D) 2A 258. The locating screw (E) in the rear pedestal should be cut off flush with the end of the thread, so that the oil feed to this pedestal is still maintained. The location is now maintained by the adjacent pedestal (B) which should line up with the repositioned hole in the new rocker shaft.



To reduce friction, the coil spring rocker spacers can be replaced by solid distance tubes (F) Part No. C-AEG 392 (3 off) and washers (G) AEG 168 (6 off). These should normally be either side of the end pedestals, but may be moved to ensure each rocker is immediately above the valve stem. The latest standard valve rockers AEG 425 can be further lightened by careful grinding and polishing.

Lightened Tappets and Sprocket

Specially machined tappets C-AEG 579 are now available which are considerably lighter than the standard version, thus reducing the loading on the camshaft and raising valve bounce r.p.m.

A lightened steel camshaft sprocket C-AEG 578 is also available but this is NOT suitable for any 'B' series engines as the timing would then be incorrect. This also applies to the standard steel sprocket AEA 696.

Primary gears

Primary gears are now available with special steel-backed bushes to prevent breakage during competition use. This Primary Gear C-AEG 3134 must be used with special Thrust Washer C-AEG 3137, and should be assembled with just a smear of engine oil.

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Model MINI COOPER 'S'

Sheet A - 6 Issue 2

SUSPENSION MODIFICATIONS

Cone Rubber Type

A maximum of 0.312" (7.9 mm) may be removed from both the front and the rear struts, but modified shock absorbers must be fitted, to ensure that the shock absorber and its mounting brackets are not strained. Armstrong Patents Ltd., Beverley, Yorkshire manufacture various competition shock absorbers modified to suit lowered suspension and different travel. It is essential to move the brake pipe away from the top of the rear suspension arm, to prevent this being damaged by contact with the rear bump stops.

Hydrolastic Type Suspension

There have been changes in production specifications affecting parts fitted to cars with Hydrolastic suspension, and it is advisable to use the correctly matched parts, unless ample facilities are available for carrying out scientific experiments.

Early cars had normal Hydrolastic units which had no colour identification bands. * After the changes, the Mini Cooper 'S' only was fitted with Competition units identified by Blue and Double Blue bands, and at the same time the rear helper spring was changed to Part No. 21A 1806 and the rear strut changed to Part No. 21A 1805. All other Mini and Mini Cooper models were also fitted with these different helper springs and struts, but modified standard Hydrolastic units were fitted and identified by one Orange band.

Alternative Hydrolastic Units

		EARLY CARS		LATE CARS	
		Marking	Part No.	Marking	Part No.
Normal setting	- front	NIL	21A 1477	1 orange band	21A 1804
	- rear	NIL	21A 1703	1 orange band	21A 1804
Stiff setting	- f. & r.	1 yellow band	C-21A 1705	2 orange bands	21A 1811
Hard setting	- front	1 red band	C-21A 1819	1 blue band	21A 1872
	- rear	2 red bands	C-21A 1821	2 blue bands	21A 1874

After fitting new displacer units, ensure that the ball sockets do not become displaced at the start of pressurising. Take the pressure up to 400 lb./sq. in. (28.1 kg./cm²) and wait at least 20 minutes for vehicle to settle, before reducing to the correct running pressure of 263 lb./sq. in. (18.41 kg./cm²) for early cars or 282 lb./sq. in. (19.74 kg./cm²) for late cars.

Hydrolastic units incorporate internal dampers, and the fitting of any additional shock absorbers is not recommended or approved by B.M.C.

* See Mechanical Parts List for change-points

(See also Sheet A-7)

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Model MINI COOPER 'S' (Hydrolastic Only) Sheet A-7 Issue 3

Rear Bump Buffers

If the front end of the car has a tendency to rise on fierce acceleration, this may be remedied by fitting progressive rear bump stops, which are available as a car set in Rear Bump Buffer Kit, Part No. C-AJJ 3313.

These bump buffers will also tend to improve the handling of the car when the rear is heavily laden, but are only suitable for Hydrolastic cars.

Raising Ride Height

Excessive packing of the displacer struts can be dangerous and under no circumstances should a washer thicker than 0.150" (3.81mm) be fitted. Spacers as shown 'A' are available as follows:

- 0.050" (1.27mm) thick - Part No. 21A 356
- 0.080" (2.03mm) thick - Part No. 21A 363
- 0.1" (2.54mm) thick - Part No. AJH 5322
- 0.150" (3.81mm) thick - Part No. 21A 1845

Cars should not normally be run with pressure exceeding 300 lb./sq.in. (21 kg./cm²) but to compensate for extra weight on the front i.e. sump guard and extra lamps, it is satisfactory to fit stronger rear helper springs 21A 1806 to early cars. As well as affecting the handling, damage will result if the car is driven whilst making continual contact with the rebound stops.

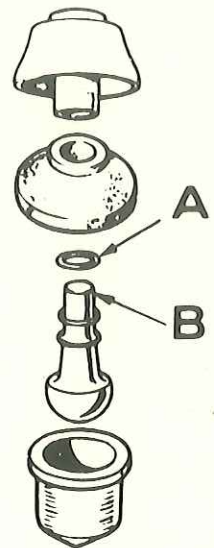
Ensure the Hydrolastic pump pressure gauge is occasionally checked against a steam gauge or similar accurate equipment.

Lowering Ride Height

For circuit racing on relatively smooth tracks, the suspension may be lowered by machining accurately 0.2" (5.1mm) from the front displacer pistons, and 0.3" (7.6mm) from the rear displacer strut. Before refitting these parts, it is ESSENTIAL to see that the ball sockets 'B' still seat properly, if necessary by filing or drilling to clear any ridges. Do not use the standard rear bump buffers, but if the parts in kit Part No. C-AJJ 3313 are considered to provide too much resistance, bump stops 21A 1728 R.H. and 21A 1729 L.H. may be used with the same special securing screws and washers. It is essential to pack the rebound stops to compensate for the lowering of the car to ensure suspension movement is controlled. Fit anti-roll bar kit C-AJJ 3317 and the Red and Double Red displacers to early cars, or Blue and Double Blue displacers to late cars. *

After allowing the new displacer units to settle as explained on sheet A6, the pressure can be lowered until the car is just clear of the bump stops. Note that the car will settle lower when the fluid is cold, and DO NOT use pressures less than 220 lb./sq.in (15.5 kg./cm²). It does not matter if the pressures are uneven from side to side.

* See also Sheet A-6, and Mini Cooper Mechanical Parts List for Changepoints.



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Model MINI COOPER 'S'

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Limited Slip Differentials are available for these cars as follows:

	<u>Part No.</u>	<u>Qty.</u>
LIMITED SLIP DIFFERENTIAL KIT (For cars with rubber drive couplings only including Mini, Cooper, 1100 and Moke)	C-AJJ 3303	1
LIMITED SLIP DIFFERENTIAL KIT (For Cooper 'S' cars with needle roller drive shafts only)	C-AJJ 3326	1

N.B. On early Mini Cooper 'S' cars only, the rubber drive shaft couplings can be replaced to take the latest drive-shafts and limited slip differential by using the following standard parts.

End cover	22G 419	2
Seal - for end cover	22G 423	2
Collet - for driving flange	22G 424	4
Seal - rubber, for flange	22A 1202	2
Washer - plain	22A 1201	2
Washer - spring	LWZ 510	2
Setscrew - for driving flange	22A 1104	2
Nut - for bolt	LNZ 205	8
Driveshaft R.H.	21A 1857	1
Driveshaft L.H.	21A 1858	1

If a conventional differential is required after converting to needle-roller couplings, differential gears 22A 1151 (2 off) and driving flange 22A 1152 (2 off) will be required.

Replacement pawls C-22G 417 (8 off) are available for both limited slip differential units.

N.B. These units are not desirable for use on the road, and such use will also cause excessive wear.

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Model MINI COOPER 'S'

Sheet A - 9 Issue 2

Fog and Spot Lamp Mounting

Additional driving lamps can be mounted in front of the grille without restricting the accessibility of the distributor, fan belt and oil filter by using easily detachable brackets.

When fitting four extra lamps, use Competition Mounting Bar C-AJJ 3329, which is designed to swing forward after releasing two of the three fixing bolts.

One or two extra lamps can be separately mounted using Pivotting Lamp Bracket C-AJJ 3318, which takes only one lamp, and hinges forward to give access through the grille.

Fuel Pump

When regulations permit, fuel pump AUF 400 has dual electrical components and can be connected up in place of the existing pump, or moved inside the car and re-piped. Ensure that all connections are in perfect condition and that the pipes cannot chafe anywhere. See Mechanical Parts List for details of the twin fuel tank if this is not already fitted.

Seat Covers

Where regulations insist on the use of standard seats, additional support can be obtained by using Rally Padded Seat Cover AKF 1650 on the front seats.

Reclining Seats

B.M.C. reclining front seats are now available, which also give additional support. These are stocked in standard trim colours for both left and right.

Grey/Tartan Red R.H. 24E 537, L.H. 24E 541.
(See Body Parts List AKD 3510 for other colours)

B.M.C. Rosettes

B.M.C. Rosette transfers, similar to those on Works Team cars but worded "Ecurie Special Tuning" are now available in pairs under Part No. C-AKD 5100.

Steering Rack

For really arduous rally conditions, fit rack 21A 1961 R.H.D. or 21A 1962 L.H.D., which were fitted to all Cooper 'S' cars from Car No. 992021 R.H.D. and 995102 L.H.D.

IMPORTANT: Tuning of the kind described on this sheet is expressly excluded by the terms of the Warranty of the vehicle manufacturer.

Special Tuning

Issued by: THE BMC SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. LTD., ABINGDON-ON-THAMES, ENGLAND

Model MIDGET/SPRITE
948 & 1098cc Sheet Ba - 1 Issue 1

DESCRIPTIVE INDEX

Description	Part No.	Qty./Car	Sheet No.
<u>BODYWORK</u>			
Bonnet securing straps - Buckle half	C-AHH 5518	1	
- Tongue half	C-AHH 5519	1	
- Retainer	C-AHH 5517	2	
<u>BRAKES</u>			
DS 11 brake pad set (For disc brakes only)	C-AHT 16	1	B-3
<u>CAMSHAFT</u>			
Competition, 24°, 64°, 59°, 29°, 0.252" lift	C-AEA 731	1	B-4
<u>CARBURETTOR</u>			
1½" Twin S.U. Assembly	C-AUD 194	1	B-4
Installation Kit for C-AUD 194 Carbs.	C-AJJ 3304	1	B-4
Flare pipe for 1½" S.U. Carb. (Steel)	C-AEA 485	2	B-4
" " " " " " (Glassfibre)	C-AHT 10	2	
<u>CRANKSHAFT</u>			
Heavy duty red type (For all 948cc engines)	C-AEA 406	1	B-1
<u>CLUTCH</u>			
Competition clutch assembly complete	C-AEJ 31	1	B-1
Up to Engine No. 9CG 2139 only			
Competition clutch	(Cover assy. C-AEJ 66	1	B-1
From Engine No. 9CG 2140-36711	(Driven plate C-AEJ 77	1	B-1
Competition clutch	(Cover assy. C-BHA 4448	1	B-3
From Engine No. Prefix 10CC	(Driven plate C-BHA 4449	1	B-3
<u>DISTRIBUTOR</u>			
For use with 2A 948 or C-AEA 731 camshaft	C-27H 7766	1	B-1, B-2 B-4
<u>EXHAUST SYSTEM</u>			
Competition large bore Manifold	C-AHT 11	1	
Manifold (Includes clips AHA 5450)	C-AHA 5448	1	B-1, B-3
Pipe	C-AHA 5449	1	B-1
Silencer	C-ARA 135	1	B-1
<u>FINAL DRIVE</u>			
4.55:1 ratio, matched crown wheel & pinion	C-BTA 816	1	B-7
Limited slip differential	C-BTA 881	1	B-7
or	C-BTA 696	1	B-7
<u>GASKETS</u>			
Cylinder head joint	C-AEA 647	1	B-3
Manifold joint	C-AEA 411	1	B-1, B-3
Rocker cover joint	C-AEA 511	1	B-1, B-3

continued on Sheet Ba-2

IMPORTANT: Tuning of the kind described on this sheet is expressly excluded by the terms of the Warranty of the vehicle manufacturer.

Special Tuning

Issued by: THE BMC SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. LTD., ABINGDON-ON-THAMES, ENGLAND

Model MIDGET/SPRITE
948 & 1098cc

Sheet Ba - 2 Issue 1

DESCRIPTIVE INDEX (Cont'd)

Description	Part No.	Qty./Car	Sheet No.
<u>GEARBOX</u>			
Close ratio for AN5 only (Use with 22A 426, 22A 204 and 22A 207)	(2nd speed gear C-22A 226 (3rd speed gear C-22A 227 (1st motion shaft C-22A 228	1 1 1	B-1 B-1 B-1
Straight cut close ratio gear set complete	C-AJJ 3319	1	B-5
<u>LITERATURE</u>			
Special Tuning Booklet - Sprite Mk. I only	C-AKD 1021		B-1
Binder - for Tuning Sheets	C-AKD 5061		
Divider set for Binder	C-AKD 5093		
Tuning Booklet (948 & 1098cc Engines)	C-AKD 5097		
<u>PISTON</u>			
High compression flat top Std. (also +.010", +.020", +.030" & +.040") (For 9C and 9CG engines only)	C- 2A 946	4	B-1
Piston ring - compression, all sizes	C- 2A 954	8	B-1
Piston ring - scraper, all sizes	C- 2A 955	4	B-1
<u>SUMP</u>			
Deep sump and oil pick-up kit	C-AJJ 3324	1	B-3
<u>SUSPENSION</u>			
Shock absorber, competition setting	Front R.H. C-AHA 6451 Front L.H. C-AHA 6452	1 1	B-1, B-3 B-1, B-3
Shock absorber, adjustable (For $\frac{1}{4}$ elliptic springs only after Car No. HAN5/4333)	Rear R.H. C-AHA 6453 Rear L.H. C-AHA 6454	1 1	B-1 B-1
Shock absorber, adjustable (For $\frac{1}{2}$ elliptic springs only)	Rear R.H. C-AHA 7906 Rear L.H. C-AHA 7907	1 1	B-3 B-3
Lowered Rear Road Springs ($\frac{1}{2}$ elliptic)	C-AHA 8272	2	B-3
Front suspension lowering kit	C-AJJ 3322	1	B-3
Anti-roll bar kit complete	C-AJJ 3314	1	B-3

Continued on Sheet Ba - 3

IMPORTANT: Tuning of the kind described on this sheet is expressly excluded by the terms of the Warranty of the vehicle manufacturer.

Special Tuning

Issued by: THE BMC SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. LTD., ABINGDON-ON-THAMES, ENGLAND

Model MIDGET/SPRITE
948 & 1098cc Sheet Ba - 3 Issue 1

Description	Part No.	Qty./Car	Sheet No.
<u>VALVE GEAR</u>			
Valve spring - Outer (9C engines only)	C- 2A 950	8	B-1
Bottom collar, for spring AEA 401	C-AEA 432	8	B-1
Valve spring - Inner, for 9CG and 10CC engines	C-AEA 494	8	B-1, B-3
Bottom collar for C-AEA 494 springs	C-AEA 493	8	B-1
Valve spring - Outer, for 10CC engines	C-AEA 524	8	B-3
Strengthened rocker shaft	C-AEG 399	1	B-6
Distance tube	C-AEG 392	3	B-6
Duplex timing chain kit	C-AJJ 3325	1	B-3
Lengthened tappet adjusting screw	C-AEA 512	8	B-3
<u>WHEELS</u>			
Wire, 60 spoke 13" x 5"	C-AHA 7573	5	B-1, B-3

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Special Tuning

Issued by: THE BMC SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. LTD., ABINGDON-ON-THAMES, ENGLAND

Model SPRITE H/AN5, H/AN6 & MIDGET G/AN1 Sheet B - 1 Issue 4
Engine Type Prefixes 9C & 9CG (cancelling Issue 3, pages 1 & 2)

N.B. Most of the engine parts can be fitted to any B.M.C. 948cc engine if care is taken in the selection of parts in conjunction with the Mechanical Parts List.

Detailed tuning information for 9C engines is described in Tuning Booklet C-AKD 1021 most of which also applies to 9CG engines. The following parts are still available, but before carrying out any tuning of this nature, ensure that the engine is in good condition.

High compression piston (9.3:1) (available in Std., +.010", +.020", +.030" & +.040" sizes)	C- 2A	946
Oil pump, large capacity	12G	793
Camshaft tuning (2A 948)	88G	229
Distributor, for tuning camshaft	C-27H	7766
Rocker cover joint - F.J. type	C-AEA	511
Valve spring - inner	9C ONLY	AEA 401
Bottom collar for inner spring	9C ONLY	C-AEA 432
Valve spring - outer	9C ONLY	C- 2A 950
Top cup, for double springs	9C ONLY	AEA 402
Valve spring, inner	9CG ONLY	C-AEA 494
Bottom Collar for spring	9CG ONLY	C-AEA 493
Top cup for springs	9CG ONLY	C-AEA 653
Clutch assembly (Up to Engine No. 9CG/2139 only)	C-AEJ	31
Bolt, competition clutch to flywheel (6 off)	53K	2037

Use the following parts to convert 9C gearbox to 9CG close ratios.

	Std.	C/R			
1st gear	3.63	3.20	1st speed wheel	22A	426
2nd gear	2.37	1.92	2nd speed gear (28 teeth)	C-22A	226
3rd gear	1.41	1.36	3rd speed gear (24 teeth)	C-22A	227
			Reverse gear	22A	204
			1st motion shaft (20 teeth)	C-22A	228
			Laygear (26,23,19 & 13 teeth)	22A	207
Competition exhaust system, comprising:					
			Manifold (Includes 2 clips AHA 5450)	C-AHA	5448
			Pipe C-AHA 5449, Silencer C-ARA 135 and gasket	C-AEA	411
Competition shock absorber			R.H. Front	C-AHA	6451
			L.H. Front	C-AHA	6452
Adjustable shock absorber			R.H. Rear	C-AHA	6453
(After Car No. H/AN5/4333 only)			L.H. Rear	C-AHA	6454
Strengthened disc road wheel				AHA	6455

N.B. No tuning was ever recommended for the 10CG Engine.

IMPORTANT: Tuning of the kind described on this sheet is expressly excluded by the terms of the Warranty of the vehicle manufacturer.

Special Tuning

Issued by: THE B.M.C. SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. Ltd., ABINGDON-ON-THAMES, ENGLAND

Model SPRITE H/AN8 & MIDGET G/AN3
ENGINE TYPE 10CC

Sheet B - 2 Issue 3
Cancelling Issue 2

ENGINE TUNING

A small increase in power can be obtained by lightly polishing the valve ports and combustion chambers. However, do not alter the shape of these as they are cast to optimum shape. In addition, the compression ratio can be raised by machining the face of the cylinder head in accordance with the following table, which shows the power output figures assuming polished valve ports.

Comp. Ratio	Machine Head	Combustion Chamber cc	Ignition Setting B.T.D.C. & B.H.P. @ 6000 RPM	
			Std. Camshaft	Camshaft 2A 948
8.9:1	NIL	29 cc	5°, 60 BHP	2°, 63 BHP
9.5:1	.035"	26.5 cc	3°, 62 BHP	1°, 65 BHP
10 :1	.060"	24.7 cc	3°, 62.5 BHP	0°, 67 BHP
10.5:1	.080"	23.2 cc	2°, 64.5 BHP	0°, 68.6 BHP

A camshaft with increased opening periods Part No. 2A 948 (88G 229) may also be fitted. This camshaft will give the power outputs shown in the chart and has the following specification,

Inlet opens 16° BTDC, closes 56°, ABDC. Exhaust opens 51° BBDC, closes 21° ATDC.
Valve lift 0.312" Tappet clearance .015"

With this camshaft a new Distributor Part No. C-27H 7766 will be required but the standard air cleaners and carburettor needles retained. Alternatively pancake type air cleaners 12A 222 may be fitted using screws ZCS 0513 (2 off) and ZCS 0512 (2 off). GZ needles (Part No. AUD 1473) should then be used (AH2 rich needles Part No. AUD 1059, EB weak needles Part No. AUD 1149) with red piston springs Part No. AUC 4387.

An extractor exhaust manifold C-AHA 5448 is also available which will increase the power output by a further 2-3 B.H.P. when used with either the standard camshaft or 2A 948.

IMPORTANT: Tuning of the kind described on this sheet is expressly excluded by the terms of the Warranty of the vehicle manufacturer.

Special Tuning

Issued by: THE BMC SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. LTD., ABINGDON-ON-THAMES, ENGLAND

Model SPRITE HAN8 & MIDGET GAN3
(Engine Prefix 10CC only)

Sheet B - 3

Issue 5

Description	Part No.	Qty./Car
Deep sump and oil pick up kit	C-AJJ 3324	1
Cylinder head gasket, competition	C-AEA 647	1
Valve springs 140 lbs. - Inner	AEA 768	8
- Outer	AEA 767	8
Valve springs 165 lbs. - Inner	C-AEA 494	8
- Outer	C-AEA 524	8
Use with - Bottom cup	AEA 403	8
Rocker cover joint (F.J. type)	C-AEA 511	1
Lightened valve rocker (Use only screw AEG 167 or C-AEA 692)	AEG 425	8
Duplex timing chain and sprockets kit	C-AJJ 3325	1
Competition clutch cover assembly	C-BHA 4448	1
Competition clutch plate	C-BHA 4449	1
Exhaust manifold, 3 branch competition	C-AHA 5448	1
Manifold joint (F.J. type)	C-AEA 411	1
Competition shock absorbers R.H. Front	C-AHA 6451	1
" " " L.H. Front	C-AHA 6452	1
Adjustable shock absorbers R.H. Rear	C-AHA 7906	1
" " " L.H. Rear	C-AHA 7907	1
Front suspension lowering kit (Use with C-AHA 8272)	C-AJJ 3322	1
Lowered rear road springs (semi elliptic)	C-AHA 8272	2
Anti-roll bar kit, complete with instructions	C-AJJ 3314	1
Heavy duty wide rim wire wheel 5J x 13 in.	C-AHA 7573	5
Brake pad set (Competition DS 11 material)	C-AHT 16	1
Limited slip differential	C-BTA 881 or C-BTA 696	1
B.M.C. Special Tuning Rosettes (1 pair)	C-AKD 5100	1

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Special Tuning

Issued by: THE B.M.C. SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. Ltd., ABINGDON-ON-THAMES, ENGLAND

Model SPRITE MK. III (HAN8)
MIDGET MK. II (GAN3)
ENGINE TYPE 1000 ONLY

Sheet B - 4 Issue 3
Cancelling Issue 2

Fitting Larger (1½") S.U. Carburettors C-AUD 194.

Remove the standard carburettors, but before removing the heat shield, use one of the insulators Part No. AHH 5713 provided in the Installation Kit C-AJJ 3304 to mark out the larger diameter induction holes in the heat shield and file out to suit. Holes should be drilled in the lower edge of the heat shield immediately under the throttle return spring levers to anchor the springs. Two insulators for each carburetter must be fitted over the heat shield to maintain induction pipe length. The bore of the manifold is already chamfered to accept larger carburettors but can, with advantage, be cleaned and polished.

The existing connections for the throttle and mixture cables are used, but the mixture cable is clamped to the abutment bracket which, in turn, is bolted to the inside of the carburetter air cleaner flanges. No air cleaners are called for but trumpets C-AEA 485 are available to suit these carburettors.

The carburettors supplied C-AUD 194 are fitted with No. 6 needles, but some engines may be better suited by No. 5 needles which are slightly weaker throughout the range. Rich Needle No. 7.

Using these carburettors with polished valve ports, camshaft 2A 948, distributor C-27H 7766 and extractor exhaust system C-AHA 5448, the power output will be as shown in the following table according to the compression ratio.

Alternatively, camshaft Part No. C-AEA 731 may be fitted, which will give the power outputs shown in the table and has the following specification.

Inlet opens 24° BTDC, closes 64° ABDC. Exhaust opens 59° BBDC, closes 29° ATDC
Valve lift 0.320" Tappet clearance 0.015"

With this camshaft, the same needles and distributor will be required, but see the table for ignition timing.

Comp. Ratio	Machine Head	Combustion Chamber cc	Ignition Setting B.T.D.C. & B.H.P. @ 6000 RPM			
			Camshaft 2A 948 (88G 229)		Camshaft C-AEA 731	
8.9:1	NIL	29 cc	5°	68 BHP	4°	69 BHP
9.5:1	.035"	26.5 cc	5°	70 BHP	4°	71 BHP
10.0:1	.060"	24.7 cc	4°	72 BHP	3°	73 BHP
10.5:1	.080"	23.2 cc	3°	73.5 BHP	3°	74 BHP

IMPORTANT: Tuning of the kind described on this sheet is expressly excluded by the terms of the Warranty of the vehicle manufacturer.

Special Tuning

Issued by: THE BMC SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. LTD., ABINGDON-ON-THAMES, ENGLAND

Model SPRITE HAN8 & MIDGET GAN3

Sheet B-5

Issue 3

CLOSE RATIO GEARS (Helical cut) NO LONGER AVAILABLE

Although these gears are no longer available from the Factory, details are included for reference purposes.

After Engine No. 10CC/Da/H4642 and 10CC/Da/L2356, all production gearboxes were changed from having 'A' series teeth to 'B' series.

PRIOR to these changepoints, gearboxes could be converted to close ratio gears by using the following parts:

C-22G 304	1st Motion Shaft (21 teeth)	1 off
C-22G 305	Laygear (25, 23, 19, 13 teeth)	1 off

which gave the following ratios	C/R	(Std.)
1st	2.93	(3.2)
2nd	1.754	(1.92)
3rd	1.242	(1.36)

AFTER the above changepoints, parts C-22G 304 and C-22G 305 could only be fitted by first converting the gearbox back to 'A' series teeth using Installation Kit Part No. C-AJJ 3308.

N.B. Now these Helical gears are no longer available, use straight cut gear parts as detailed below.

CLOSE RATIO GEARS (Spur cut)

For serious competition use, where gear noise is acceptable, close ratio straight cut gears are now available which will give the following ratios:

	C/R	(Std.)
1st	2.573	(3.2)
2nd	1.722	(1.92)
3rd	1.255	(1.36)

PRIOR to the above changepoints, use the following parts:

Close ratio gear kit	C-AJJ 3319
1st Speed wheel & synchroniser	22G 326
Reverse wheel	22G 240

AFTER the changepoints only kit C-AJJ 3319 is required.

N.B. These gears will NOT fit gearboxes with Engine No. prefix 9C.

IMPORTANT: Tuning of the kind described on this sheet is expressly excluded by the terms of the Warranty of the vehicle manufacturer.

Special Tuning

Issued by: THE BMC SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. LTD., ABINGDON-ON-THAMES, ENGLAND

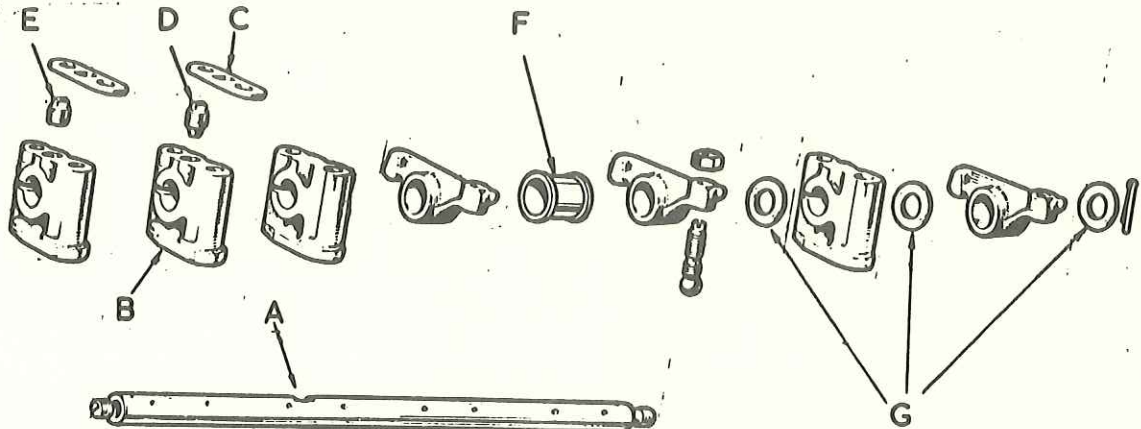
Model SPRITE HANS & MIDGET GAN3

Sheet B-6

Issue 2

A strengthened rocker shaft (A) Part No. C-AEG 399 is now available, which requires an additional tapped pedestal (B) 12A 210, locking plate (C) 2A 515 and locating screw (D) 2A 258. The locating screw (E) in the rear pedestal should be cut off flush with the end of the thread, so that the oil feed to this pedestal is still maintained. The location is now maintained by the adjacent pedestal (B) which should line up with the repositioned hole in the new rocker shaft.

Alternatively, one of the existing pedestals may be drilled to supply the oil feed from the head to the shaft, but ensure it is fitted in the correct position.



To reduce friction, the coil spring rocker spacers can be replaced by solid distance tubes (F) Part No. C-AEG 392 (3 off) and spacing washers (G) AEG 168 (6 off). These should normally be either side of the end pedestals, but may be moved to ensure each rocker is immediately above the valve stem.

Where regulations permit running without a dynamo, use the standard water pump pulley 2A 601 and short fan belt Part No. C-AEA 539.

Where a considerable increase in power has been obtained, it may be found desirable to use strengthened shafts in the rear axle. These are available under the following part numbers:

Axle shaft - strengthened - Disc wheels only BTA 806
" " " " - Wire wheels only BTA 807

At this stage of tuning it is also advisable to fit the strengthened swivel axles BTA 744 (R.H.) and BTA 745 (L.H.), if these have not already been incorporated.

A Limited Slip Differential Part No. C-BTA 696, is available for these models, or any 'A' series B.M.C. axle using differential carrier assembly BTA 549.

IMPORTANT: Tuning of the kind described on this sheet is expressly excluded by the terms of the Warranty of the vehicle manufacturer.

Special Tuning

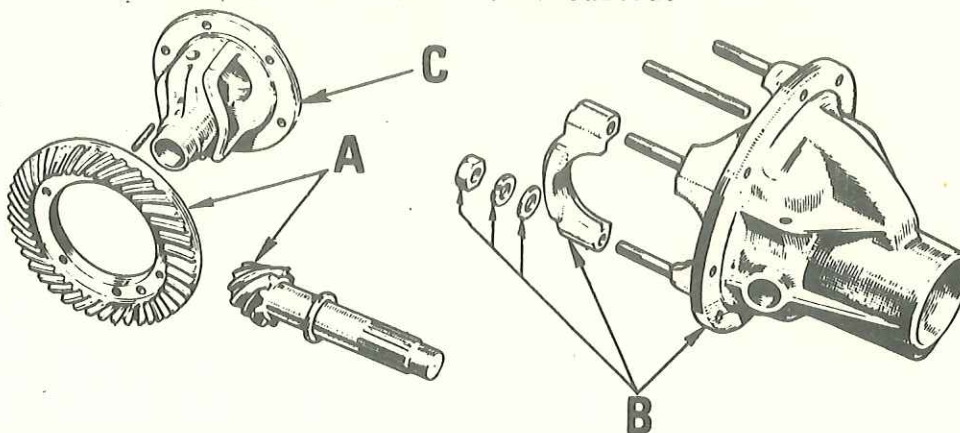
Issued by: THE B.M.C. SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. Ltd., ABINGDON-ON-THAMES, ENGLAND

Model SPRITE AND MIDGET

Sheet B - 7 Issue 1

ALTERNATIVE AXLE RATIOS

Two types of rear axle have been fitted to these cars, and not all crown wheels and pinions are interchangeable on the earlier type. The following table shows the relative part numbers of the main components, for use on Mk. I and Mk. II Austin-Healey Sprite UP TO CAR NO. H-AN7/24731 and M.G. Midget UP TO CAR NO. G-AN2/16183 ONLY. These may be identified by the oil filler plug being in the carrier assembly 'B', and not in the axle case. For part numbers of spacers and bearings, the appropriate vehicle Mechanical Parts List should be consulted.



Ratio	No of Teeth	C.W. & P. 'A' Part No.	Carrier Assy. 'B' Part No.	Differential Assy. Part No.	Standard Model
3.727	11/41	ATA 7240 *	ATA 7167	ATA 7239 *	Early Riley 1.5
3.900	10/39	C-ATA 7354	ATA 7167	ATA 7353 *	-
4.222	9/38	ATA 7266	ATA 7032	ATA 7326	Early Sprite/Midget
4.555	9/41	8G 7129	ATA 7032	ATA 7093	Morris 1/4 Ton Van
4.875	8/39	C4 110	ATA 7032	2A 7230	A35 Van
5.375	8/43	ATA 7040	ATA 7032	ATA 7073	Morris GPO Van

Parts marked * are no longer available from the Factory, but are included for reference.

AFTER Sprite Car No. 24732 and Midget Car No. 16184, a new axle assembly was fitted, which may be identified by the oil filler plug in the axle case. This was fitted with 9/38 Crown wheel and pinion BTA 539, Carrier Assembly BTA 549, and the Differential Assembly Part Number is BTA 550.

Only the following alternative ratios will fit this differential assembly:

3.727, 11/41 teeth Crown wheel and pinion BTA 535
4.555, 9/41 teeth Crown wheel and pinion C-BTA 816

N.B. ALL axles mentioned are fitted with Differential Cage ATA 7036 'C', and can ALL be fitted with Limited Slip Differentials C-BTA 696 and C-BTA 881 (alternatives).

IMPORTANT: Tuning of the kind described on this sheet is expressly excluded by the terms of the Warranty of the vehicle manufacturer.

Special Tuning

Issued by: THE B.M.C. SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. Ltd., ABINGDON-ON-THAMES, ENGLAND

Model M.G.A. 1500 AND 1600

Sheet C - 1 Issue 4
Cancelling Issue 3

Before carrying out any tuning, it is essential to ensure that both the engine and the chassis are in good mechanical order. Workshop Manual AKD 600 and Parts Lists AKD 1055 (M.G.A. 1500) and AKD 1215 (M.G.A. 1600) are still available providing full details of the car for its correct maintenance and repair.

Reprinted M.G.A. Tuning Booklet C-AKD 819E is available which covers both the 1500cc and 1600cc engines. It does NOT cover either the 1622cc engine prefix number 16GC or the M.G.A. TWIN CAM engine, as there is no tuning information available for either of these engines.

The following special parts are still available, but in some cases further supplies cannot be obtained when present stocks become exhausted.

Description	Part No.	Qty/Car
Pistons, 9.0:1 flat top, 1500cc (Std., +.010", +.020", +.030")	C- 1H 1178	4
Pistons, 10.1:1 raised top, 1500cc (Std., +.010", +.020", +.030" & .040") (Use only with connecting rods C-AEH 642 & C-AEH 644)	C- 1H 1180	4
Connecting rod (Cylinders 1 and 3)	C-AEH 644	2
Connecting rod (Cylinders 2 and 4)	C-AEH 642	2
1 $\frac{3}{4}$ " S.U. carburetters H6 (1 pair)	C-AUD 229	1
Manifold for H6 carburetters	12H 911	1
Gasket for carburetters, rubber	C-AHH 5791	2
Ram pipe, for H6 carburetters	C-AHH 7209	2
Camshaft	48G 184	1
Valve spring, inner 57 lb.	C- 1H 1112	8
Valve spring, outer 140 lb.	C-AHH 7264	8
Clutch driven plate, competition	C-MG 862/99	1
Close ratio gears, 1st motion shaft	C- 1H 3297	1
Laygear	C- 1H 3298	1
2nd speed mainshaft gear	C-22H 1094	1
3rd speed mainshaft gear	C- 1H 3300	1
Crown wheel & pinion 3.9 ratio	C-ATB 7236	1
Brake shoes, competition linings, M.G.A. 1500 only	C- 8G 8215	4
Shock absorber, competition setting R.H. Front	C-AHH 5609	1
Shock absorber, competition setting L.H. Front	C-AHH 5610	1
Special Tuning Booklet, M.G.A. 1500 and 1600	C-AKD 819	

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Special Tuning

Issued by: THE B.M.C. SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. Ltd., ABINGDON-ON-THAMES, ENGLAND

Model M.G.B.

Sheet C-2

Issue 4

TUNING INFORMATION

Tuning Booklet C-AKD 4034 D is now available, which covers engines with 3 Main Bearings identified by engine number prefix 18G or 18GA and 5 Main Bearing engines, identified by the prefix 18GB. Where there is any difference between the 'Tourer' and 'GT' versions, this is also covered.

This reprinted version contains sections to enable the best performance to be obtained from your MGB, whether it be in standard form or tuned to full 'Le Mans' specification.

Tuning is dealt with in six stages, plus such additional requirements as close ratio gears, competition brakes, suspension modifications etc. A section is also included which gives all the standard data relative to this car, together with a list of BMC Part Numbers for all the special parts, to enable the correct part to be ordered.

It should be used in conjunction with the Workshop Manual AKD 3259 which gives all necessary information for correct maintenance and repair.

COMPETITION HOMOLOGATION

Most competitive events are run under rules agreed by the F.I.A. which limits modifications for certain groups or categories. As soon as improvements are incorporated into production or become available as special parts, the necessary steps are taken to have these parts approved for competition and included on the homologation forms.

However, whilst every care is taken, we can accept no responsibility for ensuring that any specifications or modifications comply with the F.I.A. Regulations or homologation forms. Copies of homologation forms are available ONLY from the R.A.C. Competitions Department, 31 Belgrave Square, London S.W.1., who will also be able to advise on any queries concerning eligibility of modified cars.

IMPORTANT: Tuning of the kind described on this sheet is expressly excluded by the terms of the Warranty of the vehicle manufacturer.

Special Tuning

Issued by: THE BMC SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. LTD., ABINGDON-ON-THAMES, ENGLAND

Model 848cc MINI,
997cc & 998cc MINI COOPER

Sheet D - 1 Issue 2

ALTERNATIVE GEARBOX GEARS

Full details of close-ratio helical cut gears and also stronger, but more noisy, straight cut standard and close-ratio gears are shown on Tuning Sheet A-3 for fitting to certain other 'A' Series Transverse gearboxes.

ALTERNATIVE FINAL DRIVE GEARS

Ratios of 3.44, 3.764 (std.), 3.978, 4.133, 4.267 and 4.35 are normally available for fitting to any 'A' Series Transverse manual gearbox. See Tuning Sheet A-3 for Part Number details. Limited slip differential C-AJJ 3303 can also be fitted to any cars with rubber drive shaft couplings.

SUSPENSION MODIFICATIONS

The information detailed in Tuning Sheets A-6 and A-7 can also be applied to the suspension on the Mini and Mini Cooper.

OIL COOLER

The large capacity Cooper 'S' oil cooler kit C-AJJ 3309 which contains detailed fitting instructions can also be fitted to the Mini and Mini Cooper. Alternatively, a small capacity oil cooler is available in kit 18G 8113.

WHEELS AND SPACERS

Mini Cooper 'S' standard and wide rim wheels MUST NOT be fitted to the Mini or normal Mini Cooper, as these wheels require the modified front hub assemblies, drive shafts and rear brake drums as fitted to the Cooper 'S'. The fitting of wheel spacers is not recommended by B.M.C., other than for special conditions of obtaining tyre clearance, since the hub bearings and wheel studs become grossly overloaded.

BRAKES

There are NO alternative brake lining materials available from B.M.C. for the Mini and Mini Cooper, but Automotive Products Ltd., Banbury, Oxfordshire, will be able to advise competition users of alternative materials. If harder linings are fitted, the increase in pedal pressure necessary for their operation may be reduced by fitting a Brake Servo Unit, using Part Numbers 18G 8171 (Basic Kit) and 18G 8173 (Mini and Cooper Supplementary Kit), which contain the necessary fitting instructions.

N.B. The fitting of a brake servo unit will NOT increase the efficiency of the brakes, but will only reduce the pedal effort required.

AUXILIARY FUEL TANK

Full details of all the parts necessary to fit fuel tank 21A 1317 to the R.H. side of the car are shown in the Mini Cooper Mechanical Parts List.

IMPORTANT: Tuning of the kind described on this sheet is expressly excluded by the terms of the Warranty of the vehicle manufacturer.

Special Tuning

Issued by: THE BMC SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. LTD., ABINGDON-ON-THAMES, ENGLAND

Model MIDGET/SPRITE 1275cc

Sheet Ea - 1 Issue 2

DESCRIPTIVE INDEX

Description	Part No.	Qty./Car	Sheet No.
<u>BODYWORK</u>			
Bonnet securing straps - Buckle half	C-AHH 5518	1	
- Tongue half	C-AHH 5519	1	
- Retainer	C-AHH 5517	2	
<u>BRAKES</u>			
DS 11 brake pad set (competition)	C-AHT 16	1	
<u>CAMSHAFT</u>			
Road 16 ⁰ , 56 ⁰ , 51 ⁰ , 21 ⁰ , Lift .250"	C-AEG 567	1	Z-2
Rally 10 ⁰ , 50 ⁰ , 51 ⁰ , 21 ⁰ , Lift .250"	C-AEG 542	1	Z-2
Racing 50 ⁰ , 70 ⁰ , 75 ⁰ , 45 ⁰ , Lift .315"	C-AEG 529	1	Z-2
<u>CARBURETTOR</u>			
1½" Twin S.U. Assembly	C-AUD 194	1	
Installation Kit for C-AUD 194 Carbs.	C-AJJ 3334	1	
Flare pipe for 1½" S.U. Carb. (Steel)	C-AEA 485	2	
" " " " " " (Glassfibre)	C-AHT 10	2	
<u>CLUTCH</u>			
Competition clutch cover assembly	C-AEG 546	1	
Competition clutch driven plate	C-AEG 547	1	
<u>DISTRIBUTOR</u>			
Competition timing (Lucas 40111)	C-22H 7766	1	
<u>EXHAUST SYSTEM</u>			
Competition large bore manifold	C-AHT 11	1	
<u>FINAL DRIVE</u>			
4.55:1 ratio, matched crown wheel & pinion	C-BTA 816	1	
Limited slip differential	C-BTA 881	1	
	or C-BTA 696	1	
<u>GEARBOX</u>			
Straight cut close ratio gear set complete	C-AJJ 3319	1	
<u>LITERATURE</u>			
Special Tuning Booklet	C-AKD 5098		
B.M.C. Special Tuning Rosettes (1 pair)	C-AKD 5100	1	
<u>OIL COOLER</u>			
Oil cooler kit complete	C-AJJ 3323	1	
<u>SUMP</u>			
Deep sump and oil pick-up kit	C-AJJ 3324	1	

continued on Sheet Ea-2

IMPORTANT: Tuning of the kind described on this sheet is expressly excluded by the terms of the Warranty of the vehicle manufacturer.

Special Tuning

Issued by: THE BMC SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. LTD., ABINGDON-ON-THAMES, ENGLAND

Model MIDGET/SPRITE 1275cc

Sheet Ea - 2 Issue 2

DESCRIPTIVE INDEX (Cont'd)

Description	Part No.	Qty./Car	Sheet No.
<u>SUSPENSION</u>			
Shock absorber, competition setting	Front R.H.	C-AHA 6451	1
	Front L.H.	C-AHA 6452	1
Shock absorber, adjustable	Rear R.H.	C-AHA 7906	1
	Rear L.H.	C-AHA 7907	1
Lowered rear road springs		C-AHA 8272	2
Front suspension lowering kit		C-AJJ 3322	1
Anti-roll bar kit complete		C-AJJ 3314	1
<u>VALVE GEAR</u>			
Inlet valve - large 1.406" (35.7 mm.) dia.		C-AEG 544	4
Inlet valve (std. size competition material)		C-AEG 569	4
Valve rocker spacer		C-AEG 392	3
Strengthened rocker shaft		C-AEG 399	1
Lightened tappet		C-AEG 579	8
Camshaft sprocket - lightened		C-AEG 578	1
Valve spring - inner		C-AEA 652	8
- outer		C-AEA 524	8
- locating collar		C-AEA 654	8
<u>WHEELS</u>			
Wire, 60 spoke 13" x 5"		C-AHA 7573	5

IMPORTANT: Tuning of the kind described on this sheet is expressly excluded by the terms of the Warranty of the vehicle manufacturer.

C-AJJ 3333C

The contents of this Tuning Sheet Set is as follows, but will be revised as soon as further sheets are issued.

Aa-1	Issue 2	Ba-1	Issue 1
Aa-2	" 2	Ba-2	" 1
Aa-3	" 2	Ba-3	" 1
A -1	" 5	B -1	" 4
A -2	" 6	B -2	" 3
A -3	" 5	B -3	" 5
A -4	" 7	B -4	" 3
A -5	" 4	B -5	" 3
A -6	" 2	B -6	" 2
A -7	" 3	B -7	" 1
A -8	" 4	D -1	" 2
A -9	" 2	Z -1	" 3
C -1	" 4	Z -2	" 5
C -2	" 4	Z -3	" 3
Ea-1	" 2	Z -4	" 2
Ea-2	" 2		
G -1	" 1		

Use with Special Tuning Binder C-AKD 5061 and Divider Set C-AKD 5093.

Special Tuning

Issued by: THE B.M.C. SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. Ltd., ABINGDON-ON-THAMES, ENGLAND

Model GENERAL

Sheet Z-1

Issue 3

The following information is issued in order to facilitate the choice of a suitable final drive ratio for any particular application.

The table indicates the wheel revolutions per mile for the tyre size commonly used on B.M.C. vehicles. From this the vehicle speed per 1000 engine revolutions per minute can be calculated using the formula.

$$\begin{aligned} \text{M.P.H./1000 R.P.M.} &= \frac{60000}{\text{axle ratio} \times \text{wheel revs per mile}} \\ \text{or K.P.H./1000 R.P.M.} &= \frac{96560}{\text{axle ratio} \times \text{wheel revs per mile}} \end{aligned}$$

This formula gives the speed in direct top gear only but the equivalent road speed in any intermediate gear can be calculated by dividing this by the gearbox gear ratio.

Tyre Size & Type (Dunlop)	Wheel revs per mile @ 30 MPH	Tyre Size & Type (Dunlop)	Wheel revs per mile @ 30 MPH
520 x 10 C41	1058	145 x 13 SP	934
145 x 10 SP	1095	165 x 13 SP	892
520 x 10 CW44	1060	175 x 13 SP	874
500 x L10 R7	1053 *		
		520 x 14 C41	865
550 x 12 C41	960	550 x L14 R7	807 *
145 x 12 SP	980	560 x 14 C41	853
155 x 12 SP	960	590 x 14 RS5	842
550 x 12 CW44	955	590 x 14 C41	831
		145 x 14 SP	892
520 x 13 RS5	914	155 x 14 SP	873
520 x 13 C41	917	165 x 14 SP	854
560 x 13 C41	884		
550 x L13 R7	840 *	550 x L15 R7	775 *
590 x 13 RS5	871	560 x 15 C41	814
590 x 13 C41	867	590 x 15 RS5	807
600 x L13 R7	807 *	590 x 15 C41	803
		600 x L15 R7	747 *
		165 x 15 SP	820

* Wheel revs @ 100 M.P.H.

For further information contact the tyre manufacturers direct.

IMPORTANT: Tuning of the kind described on this sheet is expressly excluded by the terms of the Warranty of the vehicle manufacturer.

Special Tuning

Issued by: THE BMC SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. LTD., ABINGDON-ON-THAMES, ENGLAND

Model AUSTIN & MORRIS 1800
AND WOLSELEY 18/85

Sheet G - 1 Issue 1

Competition development of these models is still being undertaken, but the following parts have already been proved and will be available shortly.

Power Unit

Competition hardened crankshaft	C-AEH 822
Bearing set for C-AEH 822	C-18G 8103
Lightened flywheel	C-AHT 86
Competition clutch cover assembly	C-12H 2711
Competition clutch driven plate	C-12H 2712
Polished cylinder head & exhaust kit	C-AJJ 3341
Inlet manifold for twin carburettors	C-AEH 200
Competition exhaust manifold	C-12H 2710
Up-rated 2nd speed gear	C-22H 1244
Up-rated laygear	C-22H 1243
Oil cooler kit	C-AJJ 3337

Body Unit

Wide rim steel road wheels, 5 $\frac{1}{2}$ "	C-11H 1865
Wide rim magnesium wheels, 5 $\frac{1}{2}$ "	C-11H 1866
Sump shield	18G 8267
"Monza" Headlamp cowl kit	C-AJJ 3335
Adjustable front tie-rod	C-11H 1897
Competition brake pads (DS11)	C-11H 1898
Competition brake shoes (VG95/1)	C-11H 1899
Auxiliary 4 lamp bar kit	C-AJJ 3336

IMPORTANT: Tuning of the kind described on this sheet is expressly excluded by the terms of the Warranty of the vehicle manufacturer.

Special Tuning

Issued by: THE BMC SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. LTD., ABINGDON-ON-THAMES, ENGLAND

Model GENERAL

Sheet Z - 3 Issue 3

Overheating

Assuming that the cylinder head gasket is not leaking due to distortion and that the correct sparking plugs, ignition timing and mixture are being used, check the following possible causes if an accurately graduated gauge confirms excessive temperatures. Note boiling points under pressure - 5psi 226°F, 7psi 232°F, 13psi 246°F.

Examine bottom hose 2A 245 on 'A' series engines in case heater outlet portion protrudes into the main bore. Cut off surplus with a sharp knife or replace if there is any sign of flaking. The water pump should be checked to ensure clearance between vane and body in no more than .020 to .030 in (.508 to .762 mm). The water pump intake bore should be as large as possible and the grinding of a slight taper into the bore will also assist flow.

Assuming the thermostat is working correctly, overheating can result if it is removed without fitting blanking sleeve 11G 176 in its place. Alternatively, the by-pass connection between the cylinder head and water pump may be sealed on 'A' series engines.

If the car is fitted with a heater, overheating in traffic can often be prevented by opening the water valve and running the heater so that this acts as an extra radiator. For running under hot conditions, it may be desirable to fit a thermostat which opens at a lower temperature, such as 13H 3584 (74°C, 165°F).

After continual use in dusty conditions, the radiator core may become partially blocked, possibly with leaves and insects. This can be cleared by compressed air or a jet of water used in the opposite direction to normal air flow.

Obstructions to air flow, such as badges, extra lights and rally plates can all cause overheating, and should obviously be reduced as much as possible. If a sump guard is fitted, it is essential to use a large capacity oil cooler, and this is also desirable for competition or motorway use. On the Mini, Cooper and Cooper 'S', use a cooler such as that contained in kit C-AJJ 3309. On the M.G.B., Midget and Sprite full details of oil cooler installations are shown in the Mechanical Parts Lists, but a larger M.G.B. oil cooler is available to Part No. C-ARO 9875, and Part No. ARO 9809 can be fitted to the Midget and Sprite.

On the Mini Cooper 'S', the radiator efficiency has now been improved by changing from 13 gills per inch (25.4 mm) to 16 gills per inch (25.4 mm). This may be checked by counting vertically the number of horizontal fins in a given height of the radiator core. The latest Part No. ARA 2064 MUST be used with the correct cap ARA 1633 and improved top hose 12G 751 on the 'S' only. This same radiator ARA 2064 and cap ARA 1633 can also be used on the Mini Cooper, but top hose 12G 104 must be used on this model.

For the Mini range, 6 bladed Fan 2A 998 and Stiffener 2A 803 are the most efficient for cooling. The 16 bladed Fan 12A 404 is quietest, but for racing 1 or 2 off 2 bladed Fan C-2A 997 may be used with Stiffener 2A 803.

The latest thermostat Part Nos. are as follows:

13H 3584 (74°C, 165°F), 13H 3585 (82°C, 180°F), 13H 3586 (88°C, 192°F).

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Special Tuning

Issued by: THE BMC SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. LTD., ABINGDON-ON-THAMES, ENGLAND

Model GENERAL

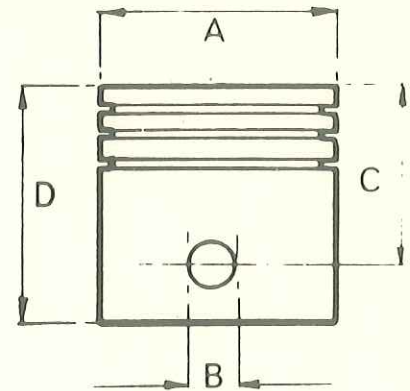
Sheet Z-4

Issue 2

SPECIAL PISTONS

Many requests are received for details of B.M.C. pistons suitable for some non-standard use to make up a special engine.

Details of standard pistons are available in the various Workshop Manuals, but the following special pistons are also available. It is not possible to give advice on the feasibility of any non-standard use of these pistons, but further dimensional or material details will be given on request.



Part No.	C-2A 946	C-AEA 639	C-AEA 711	* C-AEG 190	C-1H 1178	* C-12H 173	C-1H 1180
'A' Bore	2.478"	2.538"	2.667"	2.780"	2.875"	2.969"	2.875"
'B'	0.625"	0.687"	0.687"	.813"	0.687"	0.875"	0.875"
'C'	1.339"	1.400"	1.339"	1.495"	1.656"	1.656"	1.718"
'D'	2.592"	2.152"	2,092"	2.310"	3.031"	3.031"	3.094"
Rings	4	3	3	3	4	4	4
Crown	Flat top	Domed	Flat top	Flat top	Flat top	Flat top	Domed
Oversize stocked	+ .010" + .020" + .030" + .040"	Nil	Nil	Nil	+ .010" + .020" + .030" + .040"	Nil	+ .010" + .020" + .030" + .040"
Normal Use	Sprite 948	Formula Junior	Formula Junior	Cooper 'S'	M.G.A. 1500	M.G.A. 1600	M.G.A. 1500
Special Rods	Std.	C-AEA 620 & 621	C-AEA 706 & 709	Std.	Std.	C-AEH 642 & 644	C-AEH 642 & 644

* Parts no longer available from the Factory, but included for reference purposes.

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Special Tuning

Issued by: THE BMC SPECIAL TUNING DEPARTMENT
THE M.G. CAR CO. LTD., ABINGDON-ON-THAMES, ENGLAND

Model GENERAL

Sheet Z -2 Issue 5

The following chart shows details of the various B.M.C. camshafts produced for 'A' series in-line and transverse engines.

Part Nos with pin type oil pump drive.	8G 712 2A 297 2A 571	12G 165 AEA 630	AEG 148	88G 229 2A 948 12A 122	AEG 510	C-AEA 731	C-AEA 648
Marking	-	2 rings	-	1 ring	1 ring	3 rings	AEA 649
Cam lobe width	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "
Standard use	Mini	ADO 16 Midget	Cooper'S' Midget II	Cooper 997cc	Cooper'S' 1966 *		Racing
Inlet opens BTDC	5°	5°	5°	16°	10°	24°	50°
closes ABDC	45°	45°	45°	56°	50°	64°	70°
Exhaust opens BBDC	40°	51°	51°	51°	51°	59°	75°
closes ATDC	10°	21°	21°	21°	21°	29°	45°
Inlet period	230°	230°	230°	252°	240°	268°	300°
Exhaust period	230°	252°	252°	252°	252°	268°	300°
Cam lift	.221"	.250"	.250"	.250"	.250"	.252"	.315"
Valve lift	.285"	.318"	.318"	.318"	.318"	.320"	.394"
Running clearance	.012"	.012"	.012"	.015"	.015"	.015"	.015"
Part Nos with spider pump drive.	12A1065 +	12G 726 +	AEG 522 AEG 537 ①	C-AEG567	C-AEG542	-	C-AEG 529
Cam lobe width	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{1}{2}$ "	$\frac{1}{2}$ "		$\frac{1}{2}$ "
Markings	-	-	-	AEG 567	AEG543		AEG 530
	-	2 rings	-	-	1 ring		-

For identification see markings and cam lobe width. ($\frac{3}{8}$ " = 9.5 mm., $\frac{1}{2}$ " = 12.7 mm.)

* Fitted from Engine No. 9F-SA-Y/40006.

① Fitted to 1275cc Midget and Sprite with engine prefix 12CC-

+ Fitted to automatic versions of Mini or 1100 (ADO 16)

N.B. See Mechanical Parts List of appropriate vehicle for full details of change-points etc.

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