MG MIDGET 1500
1st Edition

COMPETITION PREPARATION
MANUAL

by

"MIKE" BARRATT

Competition Technical Advisor
British Leyland Motors Inc.

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INTRODUCTION

Since 1929 when the first M.G. Midget was built, there has been a desire on the part of owners to make this unique breed of automobile go faster and safer on race tracks around the world. The 1500 M.G. Midget is no exception, therefore, we have produced this book to enable the amateur race driver to modify his car to produce the best possible performance consistent with reliability and safety.

Do not attempt to follow any of the procedures outlined in this book, however, without a copy of the Workshop Manual. Take particular notice of the instructions regarding ordering competition parts which appear at the head of Appendix I and on our competition parts lists. All procedures and parts listed in this book are legal under the S.C.C.A. rules for 1976. When further changes are made to the rules, amendments to this book will be available from the B.L.M.I. Competition Department.

This Department will not knowingly advise any modifications contrary to the rules and regulations of the S.C.C.A., however, it is the responsibility of each individual driver to ensure that his car conforms to the S.C.C.A regulations. Neither British Leyland Motors Inc., nor its Distributors and Dealers, can be held responsible for any protests or disputes resulting from illegal modifications or parts.

Modifications of the type described in this book are not suitable for vehicles licensed for street use, and it should be clearly understood that vehicles modified accordingly would be illegal for street use under existing Federal and State laws, as they would not conform to emission and safety regulations.

Modifications of the type described in this book or the use of your vehicle for competition also render the manufacturer's warranty null and void.

If any technical assistance is ever required, do not hesitate to contact your nearer BLMI Competition Department, as one letter or phone call may save countless hours of frustration and/or save you from damaging an expensive part.

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The contents of this preparation manual are derived from several years of campaigning the 1500 M.G. Midget sports car, and countless hours of dynamometer testing and development work on the 1500 M.G. Midget engine. I will endeavor to include all of the important steps and preparation of the winning M.G. Midget in the following text.

British Leyland Motors Inc., its Distributors, Dealers, Group 44 Inc. and Huffaker Engineering will not be held responsible for damage or injury which may occur in the following of any procedure outlined in this book.

SECTION I

ENGINE MODIFICATIONS

1. Preparation of the Cylinder Block.

The M.G. Midget 1500 cylinder block is of a good quality close-grain cast iron which, with good preparation, will stand up to racing stresses. The first step is to de-grease and clean up the block. Next, deburr the interior of the block, taking great care not to damage any machined surface. This can be done with a porting tool and a deburring stone.

Radius the holes in the main bearing saddles, paying particular attention to the tappet chests, as a great deal of casting flash may be found there.

The main bearing caps are shaped and polished to remove surface stresses and get a more uniform cross section. If shot peening facilities are available, have the caps shot peened also. The oil feed holes to the end main bearings are kept stock, but since the center main oil hole feeds two rods, it is drilled out to \( \frac{3}{16} '' \). Drill out the oil feed hole from the gallery (behind the \( \frac{1}{8} '' \) pipe plug) to \( \frac{3}{8} '' \) and remove all fazes from the intersections of the oil holes. Note: The distributor locating sleeve has to be removed to gain access from the main oil gallery drilling to the center main bearing. Replace the center main cap bolts with Grade 8 bolts which are \( \frac{3}{4} '' \) longer than stock. Bottom tap the holes to make sure the longer bolts don’t bottom.

Next, counterbore the first three threads from the center main cap bolt holes, to put the load deeper into the block and prevent web cracking.

As S.C.C.A. rules allow a maximum overbore of .047", we use stock TR-6 pistons (Part #148118S), which are .040\" larger than stock. Since the TR-6 pistons are shorter than the stock 1500, the block will have to be milled .165" to achieve zero deck height. The holes in the block face (see drawing, pg. 32) are bushed using a piece of stock valve guide prior to milling the block. Counterbore the block 3.175\" x .030\" to accommodate the sealing ring of the stock head gasket (#GEG373). With this setup we use 50 ft. lbs. of torque on the head bolts. It will be necessary to remove .020\" from the O.D. of the piston above the top ring to prevent contact with the head gasket which protrudes slightly beyond the edge of the bore. Radius the edge of the piston crown to insure gasket clearance and eliminate hot spots. Note that the pistons are fitted backwards, i.e. arrow facing toward rear of engine, which gives a more advantageous pin offset and raises the torque peak 600-800 RPM.
The block should be bored to give .006" piston to bore clearance measured at the piston skirt. It is a good idea to leave the final .0005-.001" for final honing to get the proper cross hatch finish. For good ring seating use a 200-250 grit stone with honing oil.

Cleaning the cylinder block after return from the machine shop should be carried out carefully. First wash out the block assembly and all oil ways with kerosene then follow up with a good scrubbing in hot soapy water. The major oil passages may be scoured using a percolator brush. The minor passages should be cleaned with pipe cleaners and compressed air. After thoroughly cleaning the block, camshaft bearings (Part #142647 and 142648) should be installed. Note that the cam bearing journals will have to be ground if you plan on regrinding the stock camshaft.

2. Crankshaft and Connecting Rods.

Use stock factory main bearings with .0025" clearance and "Clevite
77" MGB rod bearings, Part #Clevite CB792P, in .010" undersize. File the outside edge of the locating tang on the bearings to fit the bearings to the rods. Even though the bearings are quite a bit wider than stock, they only need chamfering to fit. Grind the crankshaft to 1.8665" (about .009") to get the recommended .002" clearance. Prepared in this way, bearing life will be indefinite. Since there is no harmonic crankshaft damper available, use a small crankshaft pulley made up out of aluminum. (See drawing for details.) The connecting rods are run virtually stock except for the removal of casting marks and balancing. If shot peening is available, have the rods shot peened. Replace the rod bolts with ¾" socket head screws, Grade 8.

3. Oil Pan, Oil Pump and Oil Cooler.

The oil pan requires special attention as it is not possible to increase the capacity of the stock pan. If you follow the following drawings, you will produce an oil pan which will prove very satisfactory under all race conditions. To save weight, the windage tray can be made of aluminum but the baffle must be of .032" mild steel as it has to be welded to the oil pan.

To modify the oil pump to top and bottom feed, simply mill a slot across the cap. The pump rotor and float should be reduced to almost zero by lapping the pump body on a surface plate. The oil pick up should be extended by making a new pipe, but leave the pickup about ¾" off the bottom of the pan. Racing oil level is 3½" off the bottom of the pan or the bottom mark on a stock dip stick. The oil cooler can be mounted behind the right headlamp cut out, (Cooler #ARO 9809), with Aeroquip hoses to suit. A remote oil filter will fit in the space behind the left hand headlamp cut out. See photos. A remote filter adaptour (Ford type), will be required to take the cooler supply from the stock filter location on the engine. It is always a good plan to monitor oil temperature at a point in the return line from the cooler. A suitable T-connector can be obtained from Earl's Supply or any aircraft supply house.
1500 MIDGET WINDAGE TRAY

1500 MIDGET OIL PAN BAFFLE
INSTALLATION OF OIL COOLER IN RIGHT FRONT HEADLAMP CUTOUT
OIL TEMP. GAUGE TAKE OFF IN COOLER RETURN LINE

RIGHT FRONT HEADLAMP OPENING SHOWING OIL COOLER INSTALLATION
4. Cylinder Head Preparation.

Porting and Combustion Chamber Modifications. Starting with a stock 1500 cylinder head, resurface .200". Remove valve guides to simplify porting operations. Smooth intake ports at the outer face where production machining blends into the port. Intake ports should be opened up slightly, to 1¼", minimizing changes in cross section. The short turn radius should be flattened slightly, creating a 'D' shaped port, and blended into the pocket. The closer you get to the valve, the more critical changes in cross section become. It is very important to maintain smooth flow right up to the valve seat. The intake port should be left fairly rough, to create a boundary layer of turbulent flow to keep fuel in suspension.

Treatment of the exhaust port is slightly different, as the objective here is to enlarge and smooth the port as much as possible. The sides of the exhaust pocket should be ground straight down from the seat, with the turn into the port as gradual as possible. Polish the port to reduce heat loss to the cooling system.

After finishing the ports, install new valve guides, making sure they don’t interfere with the valve spring retainers at full lift.

The high areas in the combustion chamber on either side of the spark plug should be ground back to smooth the side of the chamber. On the opposite side, grind back the edge of the squish area on an angle to create a gentle radius, thereby improving flow into the cylinder. At this time place a head gasket on the face of the head and scribe lines to mark the edges of the cylinders. Open up the chambers on the intake valve side to the scribed line and radius the other side (on the exhaust valve side) to eliminate possible hot spots. Finally, after completing valve seat preparation, cc the chambers to get equal volume in all chambers. Volumes should end up close to 30cc.
5. Valve Seats and Valves.

Grind (or cut) seats on a 45 degree angle to the outside diameter of the valves. Next, break the top edge with a 30 degree cut to bring the outside edge of the seat in .010"-.020" from the edge of the valve. Finally, undercut the seat at a 60 degree angle to narrow the seat (.050" intake, .075" exhaust). Carefully blend the seat into the port.

The valves should be undercut on a 30 degree angle, out to the edge of the narrowed seat. See drawing. Polish the underside of the valve heads to remove possible stress areas. The tops of the heads should be polished to reduce carbon build-up.

Install valve springs as per the instructions supplied with the spring sets.

6. Camshafts.

There are currently 4 camshafts available for the 1500 Midget engine but for serious competition we would suggest the A-8, which will only work with the cylinder head modifications described in this book. The camshaft journals are the correct size to be used if the block has had the camshaft bearings installed.

Exact timing of the camshaft can be assured by following the procedure in the following section on degreeing camshafts. These camshafts are very carefully checked after grinding for specification, and if it is found that timing alters more than a couple of degrees from one lobe to another, it will be found invariably that one of the following problems exist; (1) the camshaft is bent (check between centers on a lathe), (2) the cam bearings are worn
(replace), or (3) the block is warped (usually after an engine blow-up—replace block). It goes without saying that the majority of mistakes blamed on the camshaft are in fact due to inaccurate readings or improper degreeing procedures.

7. Degreeing the Cam.

Unless you are familiar with the techniques involved in camshaft indicating, it is suggested that you simply fit the camshaft to the original timing marks as camshaft indicating does take time, knowledge, and equipment.

All checking clearances are taken from the camshaft, not from the valve. This is done to be certain that the camshaft is installed properly and thus we have eliminated such trouble spots as inaccurate rocker ratios, flexing push rods, etc.

Above is a drawing of the dummy push rod that should be made up for camshaft degreeing. This setup will provide sufficient weight to move the cam follower back to the cam after raising and will also provide a square end for the stem of the dial indicator to rest upon. The photo shows the setup as used for checking the camshaft timing.

Install either a degreed flywheel or a degree wheel on the crankshaft. Install a strong pointer that will not bend if accidentally touched. Install the camshaft, timing wheel and chain in the normal manner. Mount a dial indicator that has a solid support for the base and does not wobble even slightly in a position so that the indicator stem touches near the center of the Number One piston. Rotate the crankshaft until the indicator reaches its maximum reading. Continue rotating the crankshaft very carefully until the point is reached where the indicator starts to return.

Note the exact point that all movement stops and either move the degree wheel to coincide with the pointer on zero or move the pointer in the case of a degreed flywheel. Note the exact place on the degree wheel that the dial indicator starts to fall. This may be as much as two degrees. Without making any changes in any of the checking instruments, rotate the crankshaft
again until you reach the point exactly halfway between the two points noted 
on the degree wheel. This is top dead center. Now move the degree wheel 
zero mark to line up exactly with the pointer. Install a dry clean cam follower 
in the Number One intake valve lifter bore. Insert the dummy push rod. 
Move the dial indicator so that the stem of the indicator rests in the center 
of the dummy pushrod. (The indicator used must have a face reading total 
of at least the cam lift.) Rotate the crankshaft until the indicator shows the 
highest point of cam lobe lift. Note the position of the degree wheel. Rotate 
the crankshaft 360 degrees (one full turn) to the same degree previously 
noted. Set the indicator face to zero. Rotate the crankshaft until the indicator 
reads .012". This is the checking clearance for an A-8 cam. See cam specific-
cations for other checking clearances. It is at this point that the intake valve 
would just be leaving its seat. Note the reading on the degree wheel. The 
reading should coincide with the timing diagram for inlet opening. Continue 
to rotate the crankshaft until the indicator shows that full lift has been 
achieved and that the indicator has returned to .010". This is the point of 
closing for the intake valve and should coincide with the timing diagram. 
Twenty degrees off usually indicates you are off one tooth on the timing 
wheel. Ten degrees would indicate that you should rotate the timing wheel 
to the alternate set of bolt holes. Four or five degrees can be picked up by 
elongating the holes in the timing wheel. A new timing chain should be 
used as a worn chain can account for as much as four degrees of timing error. 
Worn sprockets can also account for timing differences. Be certain when 
doing this check that you take up the timing chain slack with your hand or 
you will not get the actual opening point. If it is necessary that a choice be 
made between having the opening or the closing point the most exact, give 
preference to the opening point as the valve is not very far off its seat on the 
closing side per degree and the engine will perform better. Plus or minus 
one and one-half degrees is acceptable on the opening point. When adjusting 
the valves for operation at the recommended .017" follow this sequence of 
adjustment:

With Number 1 Full Open Adjust Rocker Number 8  
With Number 2 Full Open Adjust Rocker Number 7  
With Number 3 Full Open Adjust Rocker Number 6  
With Number 4 Full Open Adjust Rocker Number 5  
With Number 5 Full Open Adjust Rocker Number 4  
With Number 6 Full Open Adjust Rocker Number 3  
With Number 7 Full Open Adjust Rocker Number 2  
With Number 8 Full Open Adjust Rocker Number 1


The standard push rods should not be fitted to a modified engine as they 
will not be the correct length and the geometry of the rocker system will be 
adversely affected. Special tubular push rods are available under Part
Number V.168. The steel ends of these push rods are an interference fit in the tube and therefore the tube can be shortened sufficiently without removing the ends by turning off the tube material in a lathe using a parting tool.

The push rods should only be shortened if insufficient tappet adjustment is found.


The rocker moves across the top of each valve with a wiping motion. This wiping leaves a witness mark on the valve stem. To be certain that the geometry in your engine is correct, apply die makers blue to the stem end of each valve, install the rockers and rotate the engine one time 360 degrees. Remove the rocker assembly. You should now have a trace in the "blue" that will show exactly where the rocker is wiping. If the wipe is not equally offset from center line of the valve, that is, directly in the middle of the valve stem, the geometry is not correct. If the wipe is predominant towards the side of the stem away from the rocker pedestals, the push rods must be shortened more and the height of the rocker pedestals must be reduced. If the wipe is predominate towards the rocker pedestals you need not be quite so concerned unless the wipe is obviously "way off". In this case you would need to increase the rocker pedestal height and fit longer push rods. The pedestals can be increased in height by fitting aluminum or steel shims under each pedestal. Make certain if you fit shims that the rear pedestal shim has the additional hole drilled in it for the oiling system to the rocker assembly.

All tests for rocker geometry must be made with the rocker arm adjustment exactly that used when running the engine.

10. Cooling System.

As the stock Midget cooling system is not suited to racing, considerable modification has to be done to provide proper cooling. The radiator is replaced with an aluminum Chevrolet Corvette radiator, Part Number 3155316, which is modified as per the following pictures. In addition, use a Chevrolet header tank, Part Number 3155416, mounted on the firewall and to insure proper purging of the cooling system, the system is vented back to the header tank from the thermostat housing and also via the original heater feed pipe to the back of the water pump. The radiator is also vented to the top of the header tank. The photographs clearly show the pipe runs and installation.
MODIFIED CORVETTE RADIATOR

RADIATOR INSTALLATION
NOTE: TOP AIR BLEED HOSE ON THERMOSTAT HOUSING

The carburetor modifications are quite simple, i.e. all the emission passages on the right hand side of the carburetor are blocked off either with aluminum plugs or epoxy. Fill the holes in the carburetor throat as smoothly as possible thus reducing the amount of sanding and polishing afterwards. The throttle shaft is thinned down to approximately one-half its diameter by filing flats on either side, pop-rivet the throttle in place, silver solder the whole assembly, and afterwards lightly grind the pop-rivets flush with the shaft. Leave the choke assembly on the left side of the carburetor intact as this will assist starting. The fuel inlet valve is replaced with a 2.5 #12855. Fuel pressures of 3.5-5 P.S.I. can be used if the modified float spindle #B22561 and spring =B22562 are fitted as in photo.

The needle holder in the piston can be modified to hold S.U. needles by turning up a bush with a $\frac{1}{8}$" hole and pressing this into the piston bottom. Grind off the spring loaded plunger on the needle retaining screw and solder in a piece of $\frac{3}{32}$" rod to extend through the bush and lock the needle. Alternatively, S.U. needles can be modified to fit the Stromberg piston by forming a ball of silver solder on the needle shank to match the Stromberg design. The best needles to use are RC. =AUD 1287. Use velocity stack #V.619. Remove the damper assembly from the top cap and use no oil in the piston.

If the Stromberg needle holder is retained, turn it so as the slot does not line up with the set screw, or else it will move up or down on its own. Mixture is altered by moving the needle holder up to richen and down to lean. Initial setting is with the needle holder up $\frac{1}{16}$" in the piston. Use the stock piston spring and fit the diaphragm with the vent hole to the rear.

The carburetor body is taper bored from stock size at the bridge to 1.530" at the intake flange. The V.619 velocity stack is altered to fit the new intake dimension by cutting off the flare pipe at a point where its inside diameter matches the 1.530" carburetor dimension. The flange is then cut off, bored out and rewelded to the flare pipe. The bridge is lowered .100" by boring in the lathe. Smooth off the sharp edge of the bridge. The carburetor is mounted to the manifold with a $\frac{3}{16}$" aluminum spacer plate with grooves on either side to accept ‘O’ rings. The carburetor is held in place with double coil spring washers and nylock nuts. Tighten only as much as necessary to prevent air leaks.


Use the A.T.L. 8 gallon economy fuel cell, obtainable from Aero Tec Labs Inc., Hewson Avenue, Waldwick, New Jersey 07463. Note: It is installed the right way up but the steel box supplied with it is inverted and the flange is bolted to the trunk floor. This makes a neat and safe installation. The fuel pump is mounted on a bracket attached to the fuel cell flange and the fuel lines are run through the car alongside the tunnel. This protects the lines in case of an off-course excursion. A fuel pressure regulator should be mounted on the firewall to enable fuel pressure to be maintained at 3.5-5 lbs. sq./in. We use a Holley Model P6145 fuel pump, which is a low pressure high output type pump. This set up is imperative with a high
consumption single carburetor. Mount the fuel pump on a bracket attached to the fuel cell flange.

13. Exhaust Header and Tail Pipe.

Use exhaust header, Part #V.616, and for maximum power make up a 2" diameter tail pipe to come level with the rear body panel. A slight improvement at maximum speeds can be obtained by using a megaphone to replace the last 13" of the tail pipe. The megaphone should measure 4"x13"x2" and be made of 20 gauge mild steel.

Support the tail pipe on at least two flexible hangers and use two safety loops around the pipe to hold it in the event of the flexible hangers letting go. Attach the tail pipe to the header with a slip joint welded to the tail pipe. Also weld two right angle brackets to the pipe and header, pre-drilled to accommodate a securing bolt. This makes a very quickly detachable exhaust system.


As the U.S. version of the Midget 1500 is fitted with Lucas electronic ignition designed to meet emission requirements, for racing purposes it will be necessary to change the distributor. Use distributor, Part #313232, which is a points type distributor with the added advantage of a mechanical tachometer drive. This enables you to use a mechanical tachometer which has proven over the long run to be more reliable than its electronic counterparts. To prepare the distributor, remove the top plate and vacuum capsule, being careful not to rotate the top plate. Drill a hole through the top plate ½" in diameter at the point where the vacuum capsule push rod was located and continue to drill down through the lower plate. Insert a ½" dia. x ⅛" long pop rivet from the underside of the lower plate to lock the top and lower plates together. We are now left with mechanical advance only. Replace the points with a set of Mallory #100 points gapped at .015". We have found that these points give the best performance with very little point bounce at high RPMs. To seal the distributor where the vacuum capsule was removed, wrap the body with two turns of good quality ¾" wide plastic tape. Pierce the tape to allow installation of the top plate/cap lock retaining screws. The modified top plate can now be re-installed. You will note we do not recommend any modifications to the mechanical advance mechanism as the distributor is at full advance long before the RPM range at which the engine will be operated is reached. We are not, therefore, concerned with special advance curves. The only factor to consider is total advance. With the engine modifications previously described in the book, maximum power will be obtained with the ignition timed for 30 to 32 degrees at maximum advance. It is a good idea to mark the front pulley with ignition timing marks whilst you have the dial indicator and timing wheel set up to check valve timing. Accurately mark the T.D.C. point on the pulley and also mark the pulley at 30-32-34 degrees B.T.D.C. One word of caution: When installing the distributor, do not over-tighten the clamp bolt. Otherwise, you will distort the distributor body.
Replace the stock resistor high tension wire with a good quality metal thread wire such as Packard 440 or Lucas Yellow Jacket and install "Rajah" straight type plug terminals on the high tension wire. These plug terminals are a high quality snap-on type which will stand a great deal of vibration without falling off.

The choice of ignition coils is unlimited, however, we have used the Mallory #28675 with good success and this coil provides more than enough fire for this engine.

SECTION II

1. Gearbox and Clutch.

To convert the gearbox to close-ratio gears for racing, the following parts are required:

- 216972 1st motion (input) shaft
- 213527 Laygear (cluster)
- 155207 3rd gear
- 155206 2nd gear
- 154821 1st gear
- 132292 Seal

To install these gears, follow the instructions in the Workshop Manual under the gearbox section. Before installing the 1st motion shaft, have a local machine shop shorten it 1". When assembling the 1st motion shaft delete the shim washer between the snap ring and the bearing. The sleeve on which the clutch release bearing assembly slides must be modified as per drawing, to clear the larger diameter 1st motion shaft and to accept an oil seal, #132292.

On late type Spitfire 1500 and Midget 1500 gearboxes, the mainshaft spigot bearing location in the 1st motion shaft will have to be modified to accept the larger bearing, as per Fig. 2. On late Spitfire 1500 and Midget 1500 it is also necessary to fit the early type mainshaft thrust washer, which is a selective fit. See parts list for numbers. Also fit bush #111423 and thrust washer #106262.

A suitable clutch plate with a bolt-in center can be obtained from Mueller Fabricators, 10872 Stanford Avenue, Lynwood, California 90262. Specify Spitfire conversion clutch 7½” with GT-6 center spline, when ordering.
SECTION III

SUSPENSION AND STEERING

1. Front Shock Absorbers and Suspension.

In order to de-camber the front end, provide more advantageous movement of the shock absorber, and prevent piston bottoming with a lowered suspension, the competition shock arm has to be removed. This is a comparatively simple operation, provided you follow our instructions to the letter.

Use a ‘Snap-On’ Pitman Arm Puller, #CJ89, to put a fairly heavy load on the arm, then momentarily heat up the eye 180 degrees from the arm with a Heli-Arc torch. This will expand the eye and allow you to remove the arm. Re-position the arm at 30 degrees from horizontal in the fully raised position (stock position is 12 degrees). See photo for detailed view. Mark arm and shaft with an alignment mark then heat up the arm to expand it, press it back on to the shaft and tighten the nut to 80 lbs. and refit the cotter pin. Whilst the arm is off the shock, it can be shortened ¼” and re-welded (Heli-Arc) as per photo.

The front suspension bushings are replaced with Delrin bushes which at the time of writing are obtainable from Various Imported Parts, 705 Argonne Ave., Sterling, VA. 22170. The front hubs should be converted to taper roller bearings, Timkin #30205 inner, and Timkin #30303 outer. Leave in the distance piece and shim to obtain zero preload or free play with the nut torqued to 140 lbs. Check inner bearing to make sure it bottoms against the spindle shoulder.

The steering column on the Group 44 car, is the stock inner column supported by a plain bearing on the dash panel, with the sliding joint welded up and an MGB type universal joint, installed at the bottom. No modifications are made to the side steering arms or the rack assembly. Front Huffaker springs, Part #HAE 948, are used with a free length of 7½” and have a diameter of 4½”.

FRONT SWAY BAR MOUNT
RE-LOCATION OF FRONT SHOCK ARMS

KING PIN OFFSET TOP BUSH.
2. Rear Shock Absorbers.

Group 44 cars use the MGB type fitted to adaptor plates made from 3/4" aluminum plate (see photo), or alternatively, the factory adjustable shocks can be used on the stock mount. Whichever method is chosen, the existing links should be replaced with heim joints and adjustable links. See photos. As we also use the shock arm to transmit sway bar reaction to the axle, a fully adjustable rear sway bar can be made up from 5/8" 304 stainless steel. See photo for details. The offset rear springs can be obtained from the suppliers listed in Appendix II. Note that spacer bushes must be made up to allow them to fit the stock spring mounts, and lowering blocks with a locating boss must also be made up. See photo for details.

The rear axle is located using a single adjustable link as per photo, equipped with heim joints. Sufficient adjustment must be allowed to enable the axle to be adjusted to be parallel to the driveshaft position, in a loaded condition, i.e. fuel and driver. Use BTA 940 axle shafts and Federal Mogul 1207M bearings with the filling slot installed in the 12 o’clock position.
REAR SHOCK & SWAY BAR LINKS

REAR SHOCK SHOWING MOUNTING PLATE
REAR SWAY BAR ASSY. WITH SHOCK ASSEMBLERS ATTACHED

DRIVE SHAFT TUNNEL SHOWING AXLE LOCATOR MOUNTING
3. Rear Axle.

It has been found that most drivers today prefer to drive with locked rear ends as opposed to the rather expensive and sometimes unreliable limited slip or locker types. Locking the Midget unit is quite simple. First strip the unit and de-grease thoroughly. Remove the crown wheel and bearings from the diff box and cut two small wedges of scrap iron to wedge between the side gears and center pin. This insures that the side gears are hard up against the housing. Heat the whole assembly to cherry red and immediately heli-arc the side gears to the housing (see photo). The assembly should now be allowed to air cool to prevent distortion. When re-assembling, stick to stock clearances as per the Workshop Manual. Use a 90W racing gear oil in both the rear axle and gear box which has an anti-foaming additive. The existing breather should be removed and a pipe fitting installed to enable a hose to be run up to a 1 pint catch tank in the trunk. To prevent excessive amounts of oil accumulating in the axle tubes, baffle the inside of the axle casing and provide flap drains. See photo.
REAR SPRING MOUNT WITH OFFSET SPACER

REAR AXLE LOWERING BLOCK & EXTENDED "U" BOLTS
DETAILS OF FRONT & REAR, REAR SPRING HANGERS, OFFSET SPACERS & SPRING CLAMP

DIFF. ASSY. SHOWING WELDED UP DIFF. BOX
LOWERING BLOCK TO AXLE LOCATION

REAR AXLE CASE WITH OIL BAFFLES

The stock dual master cylinder is replaced with a single bore ¾” master cylinder, Part #130887, with the reservoir modified for vertical location. See photo or use ¾” Hurst/Airheart Master Cylinder Part #03-8676 which will require an adaptor flange and push rod making up. All flexible lines are replaced with Aeroquip lines.

A worthwhile modification is to spray the hollow section of the brake caliper pistons, with V.H.T. white paint, to help reduce heat transfer from the brake pads to the fluid.

Use Dow Corning Silicone Brake Fluid, check brake discs and remachine if required for .004” maximum runout both horizontal and vertical, ventilate rear backing plates with ½” holes. Normally, it will be found that ¾” rear wheel cylinders. Part =GWC 1101, will give the best front to rear ratio but if you feel the need for more braking on the rear, use ¾” cylinders, Part #GWC 1102. Brake linings are much a personal choice. We have had good success with DS-11 front pads and VG-95 rear linings. See competition parts list for brake lining part numbers. For 1976, alternate 9.125” front brakes are legal. To make the conversion, use Disc Part #208715 and calipers 27H4650 and 27H4651. A hub adaptor, part #V735, will also have to be used. Slight relieving of the caliper and disc may be required to gain clearance.
CYLINDER BLOCK PREPARATION BEFORE MACHINING, SEE TEXT PAGE 5.
APPENDIX A

The following competition parts can be ordered through any British Leyland Dealer. We regret that we cannot supply parts direct from the Competition Department, however, we will be happy to provide you with any technical information you may require.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>V. 175</td>
<td>&quot;Camshaft. B. 280 degrees, .409&quot; lift</td>
</tr>
<tr>
<td>V. 110</td>
<td>&quot;Camshaft. A-6. 288 degrees, .391&quot; lift</td>
</tr>
<tr>
<td>V. 624</td>
<td>&quot;Camshaft. A-7. 298 degrees, .410&quot; lift</td>
</tr>
<tr>
<td>V. 687</td>
<td>&quot;Camshaft. A-8. 290 degrees, .465&quot; lift</td>
</tr>
<tr>
<td>V. 549</td>
<td>Competition valve springs &amp; retainers</td>
</tr>
<tr>
<td>V. 731</td>
<td>Competition valve springs &amp; retainers</td>
</tr>
<tr>
<td>V. 168</td>
<td>Push rod set. alloy. (steel ends)</td>
</tr>
<tr>
<td>V. 619</td>
<td>Velocity stacks</td>
</tr>
<tr>
<td>148118S</td>
<td>Pistons for .040&quot; o:s</td>
</tr>
<tr>
<td>514082</td>
<td>Oil cooler kit (street use only)</td>
</tr>
<tr>
<td>ARO 9875</td>
<td>Oil cooler. 16 row. competition</td>
</tr>
<tr>
<td>130148</td>
<td>Adaptor (oil cooler installation)</td>
</tr>
<tr>
<td>140987</td>
<td>Unions for adaptor (2 required)</td>
</tr>
<tr>
<td>142647</td>
<td>Camshaft bearing, outer (2 required)</td>
</tr>
<tr>
<td>142648</td>
<td>Camshaft bearing, inner (2 required)</td>
</tr>
<tr>
<td></td>
<td>Gearbox—See Section II for conversion to close-ratio</td>
</tr>
<tr>
<td>BTA 535</td>
<td>Ring gear/pinion, 3.727</td>
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<tr>
<td>BTA 1223</td>
<td>Ring gear/pinion, 3.9</td>
</tr>
<tr>
<td>BTA 539</td>
<td>Ring gear/pinion, 4.22</td>
</tr>
<tr>
<td>BTA 940</td>
<td>Competition axle shaft</td>
</tr>
<tr>
<td>AHH 7217</td>
<td>Competition shock valve (front)</td>
</tr>
<tr>
<td>AHH 7218</td>
<td>Competition shock valve (rear)</td>
</tr>
<tr>
<td>AHT 56</td>
<td>¾&quot; Anti-sway bar (front)</td>
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<tr>
<td>AHT 57</td>
<td>1½&quot; Anti-sway bar (front)</td>
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<tr>
<td>AJJ 3356</td>
<td>Installation kit for sway bars</td>
</tr>
<tr>
<td>AKM 3267</td>
<td>Workshop Manual</td>
</tr>
<tr>
<td>208715</td>
<td>9.125&quot; Front brake discs</td>
</tr>
<tr>
<td>27H 4650</td>
<td>Brake caliper, right hand</td>
</tr>
<tr>
<td>27H 4651</td>
<td>Brake caliper, left hand</td>
</tr>
<tr>
<td>V735</td>
<td>Hub adaptor (2 required)</td>
</tr>
</tbody>
</table>

* Use competition valve spring & retainer set, V. 549.
** Use competition valve spring & retainer set, V. 731.