

# Longman



# Tuning

## INTRODUCTION

Richard Longman and Company have been successfully racing and tuning Minis for several years. We are now passing on the benefits of what we have learnt from experience.

All the parts listed in the catalogue have been developed in the light of competition successes and represent improvements in power, safety, durability, weight-saving etc., and at the same time we have endeavoured to keep the costs down in order to give good value for money.

Our work is not confined to Minis however, and other saloons, sports-cars and single seaters undergo preparation by us.

Roll Cages

Steering-Wheels

Instruments

Seats & Belts

Brakes

Suspension

Exhausts



Lightweight  
Coachwork

Carburettors

Cylinder  
Heads

Engines

Wheels & Tyres

Transmissions

Cooling

## CYLINDER HEADS

A cylinder head is one of the most important parts of a competition engine as it is where the "breathing" of the engine is regulated. Power increases are achieved by improving the "breathing", thus allowing the engine to inhale more explosive mixture.

We are proud to be one of the country's experts in preparing modified cylinder heads of many different types including Formula 5000 and Supersaloons for leading teams.

On our Racing Mini versions we retain the production cast iron 5-port head - suitably modified - as it represents so much better value for money than the specially made 8-port crossflow types. In addition the U.K. customer can provide a second-hand head for modification and obtain a generous exchange allowance. This is generally found to be impractical for the overseas customer.

The heads provided for part exchange must be:

- a) Complete with valves, springs, caps and cotters.
- b) Suitable for modification with no cracks or inserts.
- c) The same type of head as the modified one for which they are part exchanged.

### Compression Ratios

Our heads are individually prepared to the optimum compression ratio for their particular purpose. When the rest of the engine is not available, we require details of piston shape, height etc., so that we can work out the correct capacity.

The calculated Compression Ratio is :-

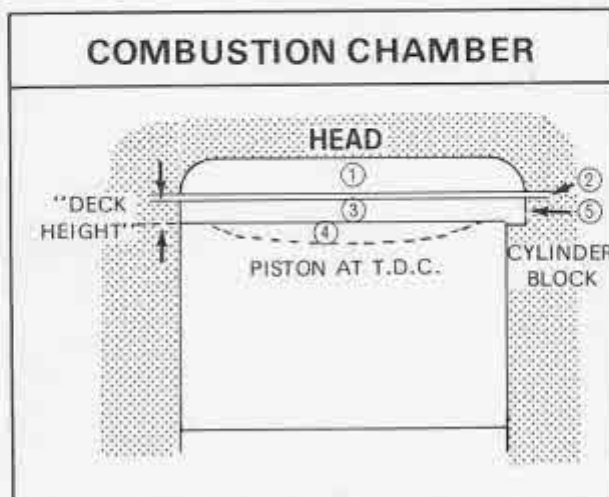
$$\frac{\text{Swept Volume} + \text{Chamber Volume}}{\text{Chamber Volume}}$$

$$CR = \frac{SV + CV}{CV} \quad \text{or for easier calculation: } CR-1 = \frac{SV}{CV}$$

For the sake of simplicity we consider one cylinder only, so the swept volume is the engine capacity divided by the number of cylinders. Engine capacity on a 4 cylinder is:-  $\text{Bore}^2 \times \pi \times \text{Stroke}$ . For example on a Cooper S the Bore is 70.64mm, and the Stroke 81.33mm

$$\text{Capacity} = 7.064^2 \times 3.142 \times 8.133\text{cm} = 1275\text{cc}$$

$$1 \text{ cylinder capacity} = \frac{1275}{4} = 318.75\text{cc}$$



The volume of the combustion chamber is the sum of:-

1) Head Capacity	e.g. 16.4
2) Gasket Volume	" 3.8
3) Volume Down Bore (.010"/cc)	" 4.0
4) Piston Dish	" 6.5
5) Valve Cutaway	" -

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$$\text{Total CV} = 30.7\text{cc}$$

## Cylinder heads

So in our Cooper S example:  $CR-1 = \frac{318.75}{30.7} = 10.38$

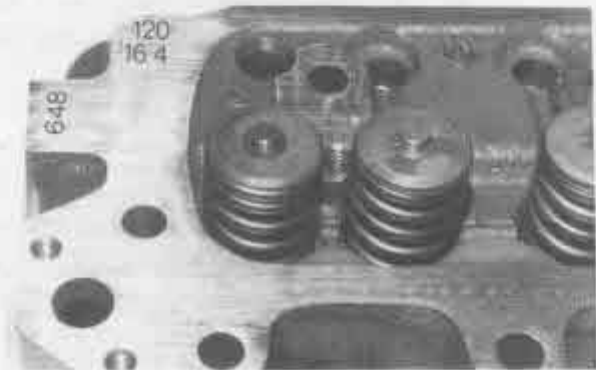
$$CR = 10.38 + 1 = 11.38$$

The Compression Ratio is 11.38:1

It is equally possible to work out the required head capacity for a given compression ratio, when this is done the head can be refaced as necessary allowing about .012" per cc on a Cooper S type.

We mark our modified heads with three sets of numbers:

Refacing Figure  
Chamber Capacity  
Serial Number

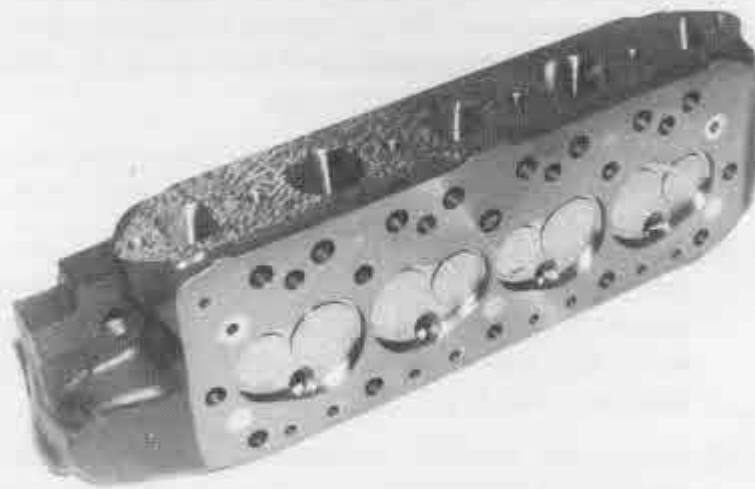


These numbers should be quoted when contacting us with a query or an order of spare parts for the head.

On many competition engines particularly where the 1300 head is used on 850 and 998 blocks with high lift cams the valves (usually exhaust) overlap and foul on the edges of the bores. Valve cutaways have to be machined allowing at least .025" block/valve clearance at full lift. When using these blocks it is also necessary for the coolant holes in the top face to be realigned to suit the different head and minimise head gasket trouble; we are equipped to carry out this sort of work.

On competition engines using long duration camshafts such as the "Sprint" and "Supersprint" it is usually necessary to machine valve cutaways in the piston crowns; we can carry out this work also.

## MODIFIED CYLINDER HEADS

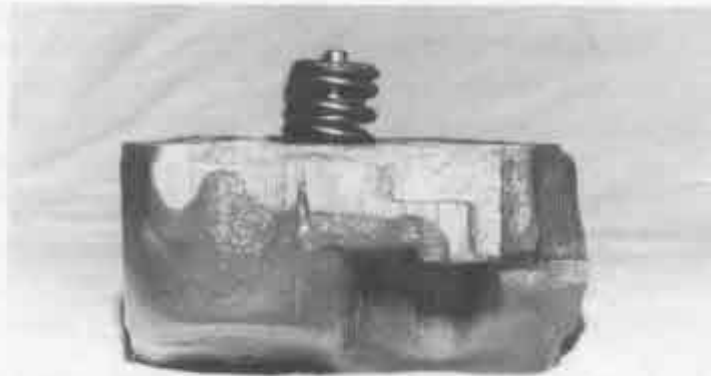


- Part No. GT 1, Casting Nos. 2A 629 or 12A 1456. Intended for road use on 850 or 998 Minis. Standard size valves. A small surcharge is made on exchange heads if the valves are unserviceable.
- Part No. GT 2, Same as GT 1 above except for inlet valves changed to larger (31mm) ones so surcharge only applies to exhaust valves.
- Part No. GT 3, Casting No. 12G 202. Intended for road use on 1100's. Inlet valve size increased to 31mm, surcharge same as GT 2.
- Part No. GT 4, Casting No. 12G 295. Intended for road use on Mini-Coopers, MG 1100's or 1098cc Spridgets, can also be used for mild competitions. Inlet valves 33.2mm, Exhaust valves 29mm. As these valves have longer stems it is necessary to pack up the rocker pillars to get the rockers operating at the right angle. It is possible to use pillar-shaped plates part no. 2A 515 for this purpose. It may also be necessary to machine valve cutaways in the block, especially if a high lift cam is fitted.
- Part No. GT 5, Casting No. 12G 940. Intended for road use. this head retains the standard valve sizes of the Mini 1275 GT, 1275 Spridget, Austin, Morris and Wolseley 1300's, Marina and Allegro 1.3 models.
- Part No. GT 6, Same as GT 5 above except for larger inlet valves as fitted to 1300 GT, MG and Mini-Cooper S MkIII. Same price so better value.
- Part No. GT 7, Casting No. AEG 163. Intended for road use on Mini-Cooper S Mks I and II, with standard valve sizes. As no new head castings of this type are available, this head is only obtainable on exchange.
- Part No. GT 9, Casting No. 12G 940. Intended for competition use, this head retains the standard valve sizes of 35.7mm inlet, and 29mm exhaust. The valves are made from special high grade materials and used with bronze valve guides, special springs etc. Inlet port dia 1.4".
- Part No. GT 90, Same as GT 9 above except for exhaust valve size increased to 31mm. Intended for "Budget Racing" such as Mini Seven or Miglia.

## Modified Cylinder Heads

- Part No. GT 10, Casting No. 12G 940. Intended for competition use, this head has large exhaust valves - inlet size 35.7mm, exhaust size 31mm. The valve centres are spaced further apart to maintain a reasonable gap between the valves and minimise the risk of head cracking. Inlet port dia 1.4" or 1.5" depending upon application.
- Part No. GT 14, Casting No. 12G 940. Intended for competition use, this head has large inlet valves - inlet size 37.7mm, exhaust size 29mm. Inlet port dia 1.4".
- Part No. GT 15, Casting No. 12G 940. Intended for competition use, this head has large inlet and exhaust valves - 37.7mm and 31mm. The valve centres are spaced further apart to allow room for these head diameters. This head works best with dished pistons, when the engine size allows a choice. Inlet port dia 1.5".
- Part No. GT 16, Casting No. 12G 940. Intended for competition use in North America under SCCA regulations where the valve centres cannot be moved. Inlet valves are 37.7mm and exhausts 29mm. Inlet port dia 1.5".
- Part No. GT 17, Casting No. 12G 940. Intended for competition use on 1300 Minis, Spridgets etc., this head has the same valve sizes as the GT 15, however the valves are not only spaced further apart but also inclined at about 3½°.

This head works best with flat top pistons and due to the repositioning of the valves, a realigned rocker assembly (part no. FL 21). In a back to back dynamometer test on a 1293cc engine, this head gave just over 5 BHP more than the GT 15.

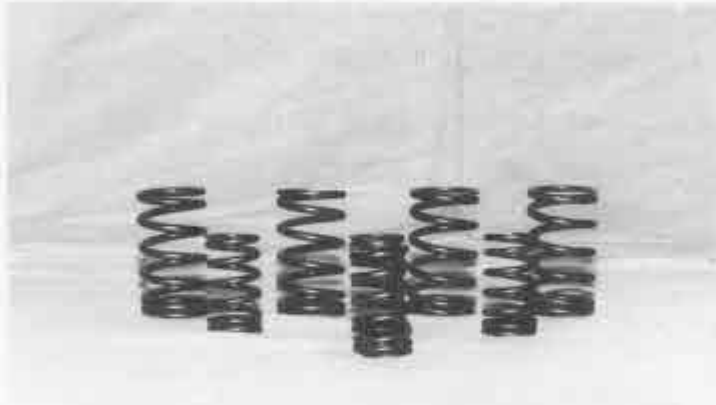


GT 17 Head  
showing angled valves

We also prepare other types of cylinder heads such as:-

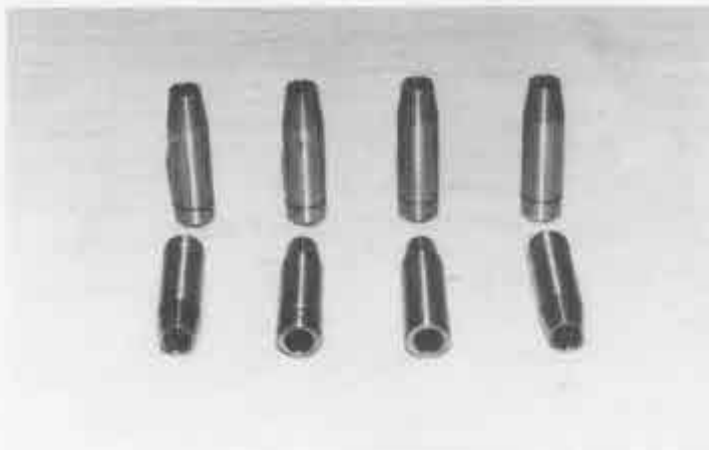
M.G.B.	Ford - non-crossflow
Marina 1.8	crossflow
B.M.W.	twin-cam
Triumph	B.D.A.
Chrysler	Mexico
Chevrolet	Formula Ford
Etc.	Formula 3 and Atlantic

## CYLINDER HEAD SPARE PARTS



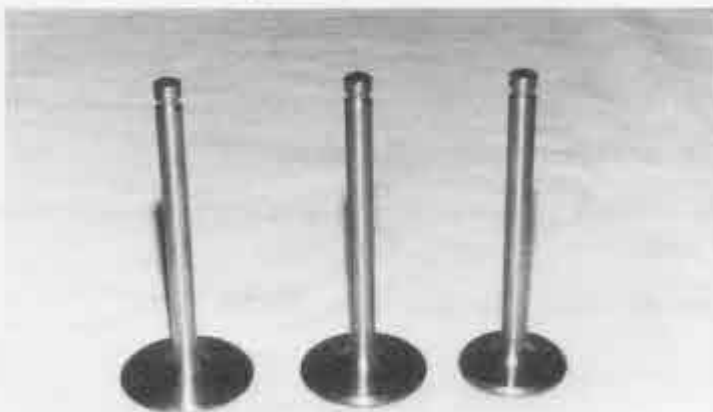
Valve Springs

- TS 15 Extra Strong Double Valve Springs for Mini 850, 998 and 1100 cylinder heads.
- TS 18 180 lb Double Valve Springs for competition use.
- TS 20 200 lb Double Valve Springs for competition use on high revving engines.
- TS 22 220 lb Double Valve Springs made specially for us by Herbert Terry for competition use on very high revving engines. These springs feature a closed coil which should be fitted at the bottom (stationery) end and are designed for a fitted length of 1.35".



Valve Guides

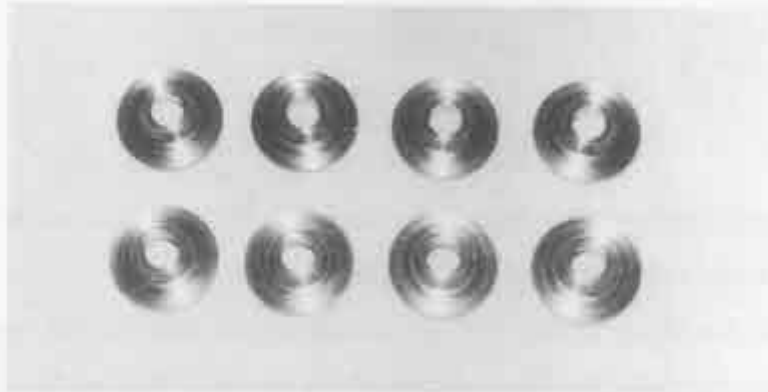
- VG 8 Bronze Valve Guides are specially made for our Competition Cylinder Heads.



Valves

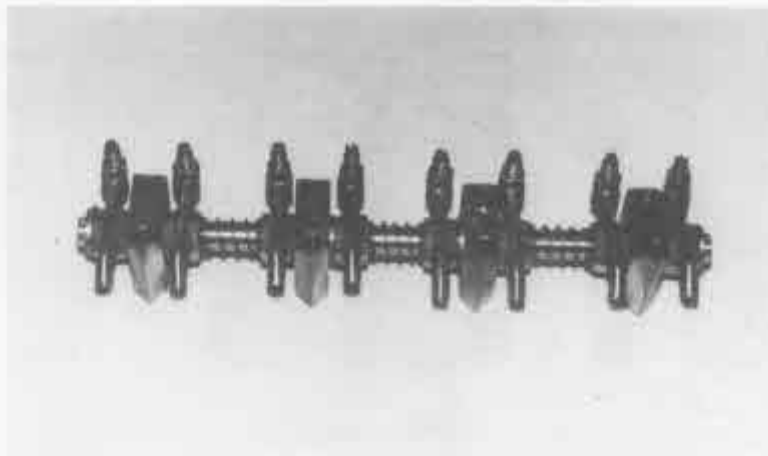
## Cylinder Head Spare Parts

- AM 29 29mm Exhaust Valve as used in our GT 9, 14 and 16 Heads.
- GM 31 31mm Exhaust Valve as used in our GT 90, 10, 15 and 17 Heads.
- GM 36 35.7mm Inlet Valve as used in our GT 9, 90 and 10 Heads.
- GM 38 37.7mm Inlet Valve as used in our GT 14, 15, 16 and 17 Heads.



Top Caps

- TT 8 Titanium top caps - about  $\frac{2}{3}$  the weight of steel ones.



Rocker Assemblies

- FL 20 Offset Rocker Assembly utilises modified and lightened forged steel rockers in conjunction with eccentric phosphor bronze bushes and special steel pillars to give an improved leverage ratio, which results in about .020" extra valve lift.

Rocker pillars available separately under part no. FL 15.

- FL 21 Incorporates different pattern steel pillars to align the rockers with the valves on a GT 17 head.

Rocker pillars available separately under part no. FL 17.



## CARBURETTORS

The carburettor has been jokingly described as a device that delivers an incorrect fuel/air mixture at all speeds. The correct mixture is usually about 14 parts air to one part petrol. Richer mixtures are required for conditions of cold-starting and acceleration, leaner mixtures for economic running at steady speeds. All carburettor designs are compromises between the various conflicting requirements.

### Reece Fish



Excellent in single carburettor installations where there is a high gas speed. In widespread use for Mini-Seven Racing, also suitable for road use.

### S. U.



An excellent carburettor for road use - efficient, economical and quiet. The initials stand for Skinner Union, the Company is now owned by British Leyland, and this means that there is a good range of spares and needles readily available. We have found that on a racing installation SU's can give a similar max power figure to a 45 DCOE Weber - but not quite so much in the mid-range.

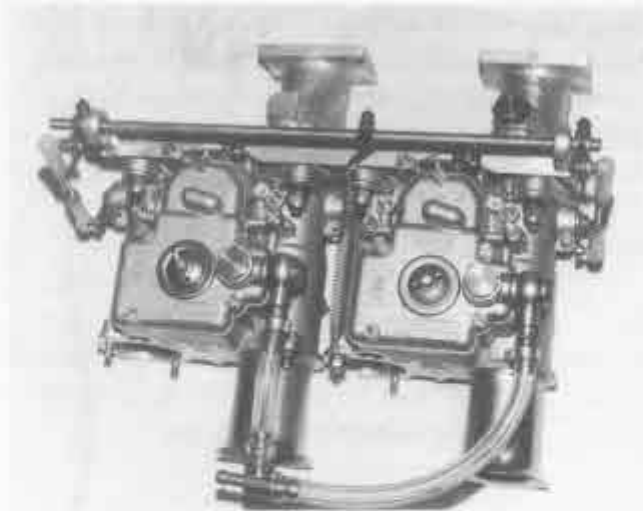
### Weber



The best for ultimate performance, but thirsty and noisy for road use. We use the 45 DCOE mostly as it is suitable for Minis of all sizes and jets and spares are in widespread supply.

## Carburettors

## Split Webers



Originally "invented" by Timo Makinen as an expedient way of using Weber Carburettors with the FIA Regulation standard inlet manifold.

When a single 45 DCOE is fitted to a Mini there has to be a splay on the manifold as the inlet ports are spaced further apart than the choke tubes. This splay has the effect of centrifuging the fuel droplets towards the outer two cylinders (Nos. 1 and 4) causing these cylinders to run richer than the inner two.

Our Split Weber Layout has no splay on the manifolds and thus ensures an even mixture distribution to all cylinders. There is an additional benefit of allowing shorter manifold lengths, which work better at the high racing rev range.

As assembling one of these carburettor kits is a job requiring considerable expertise we do not market a set of parts for the "do-it-yourself" enthusiast to assemble, but if carburettors are supplied we will do the necessary work.

Our CA 4 Extra Large Air Intake Trumpets reduce turbulence at the carburettor intake and further increase the efficiency.



Trumpets

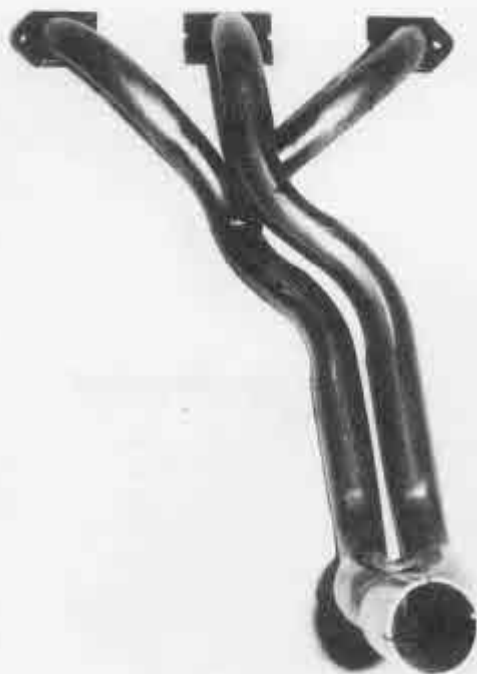
Bendix & T piece

We also keep a supply of carburettor spares including jets, chokes, needles, venturis, O rings and O ring plates, inlet manifolds, throttle cables, fuel pipe and pumps (SU and Bendix), T pieces etc.

## EXHAUSTS

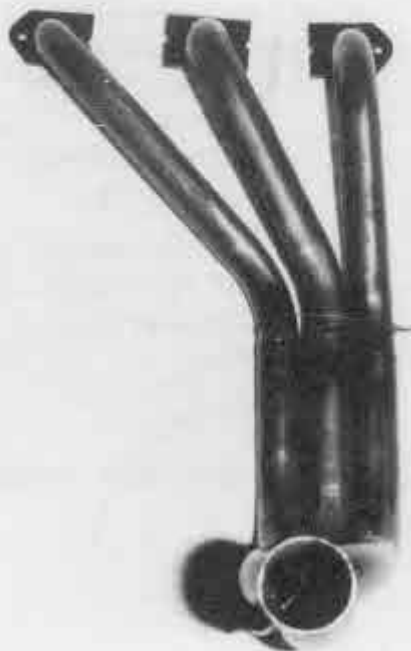
Contrary to what may be popularly believed exhaust gas does not merely flow like water through a pipe, but carries a series of positive and negative pressure waves travelling up and down the pipe at the speed of sound. The theory of good exhaust design is to arrange things so that a negative pressure wave travels up the pipe to the exhaust valve just as it is opening and has the effect of sucking the gas out. So when considering exhausts in addition to good gas flow, pipe lengths and pairings are important too.

- MF 1 A simple one piece fabricated manifold that gives useful improvements on roadgoing 850 and 998 Minis.
- MF 2 Same as MF 1 above except for larger diameter pipes suitable for Cooper and S models. Much more efficient than the standard manifold.
- MF 6 "Long Centre Branch" 3-piece fabricated manifold suitable for both road and competition.



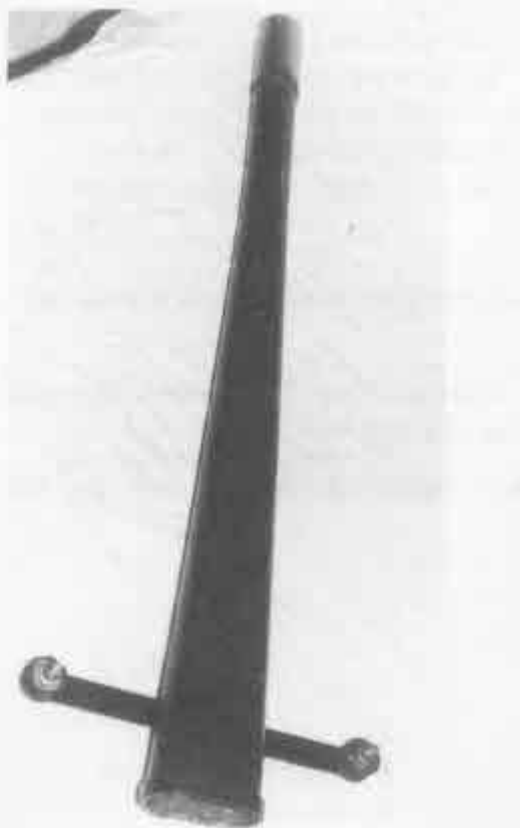
- MF 7 A custom-built exhaust system with tandem absorption silencers for unobtrusive power.

- MF 8 Similar to MF 7 above but with extra ground clearance and protective skirts for rally type use.

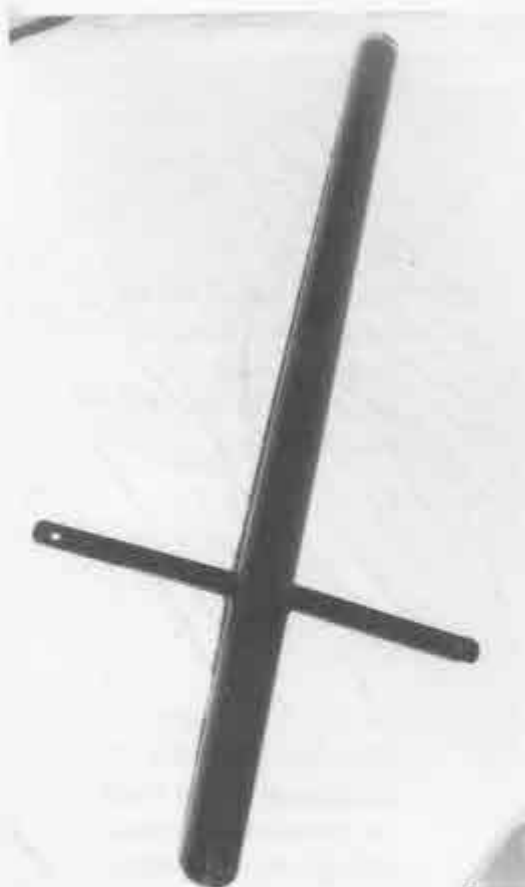


- MF 10 "3 into 1" 4-piece fabricated manifold. Developed on the track for maximum efficiency at high revs - suitable for Minis from 850 to 1300cc.

## Exhausts



MF 11  
Megaphone, fits directly  
onto MF 10, for optimum  
exhaust extraction.



MF 16  
Exhaust pipe, alternative  
to MF 11.

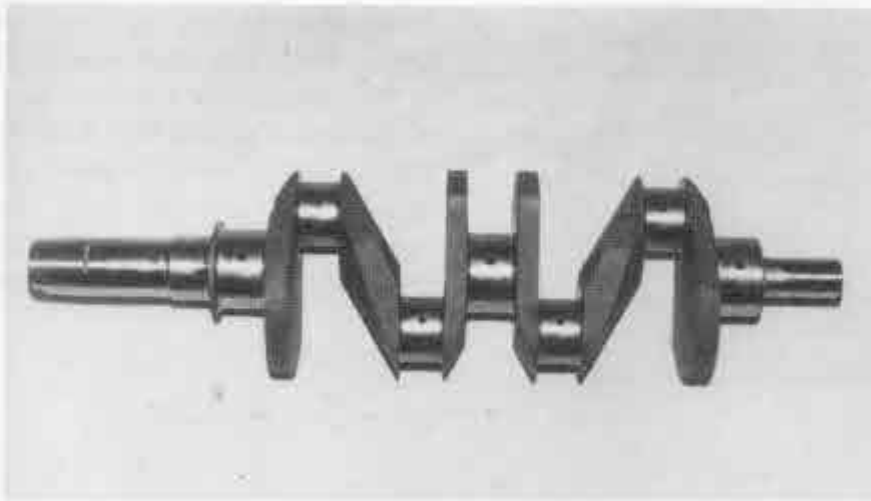
MF 14 Large bore version  
of MF 6 suitable  
for competition cars  
with ground  
clearance problems  
or sump guards.

MF 15 Large bore version  
of MF 10 suitable  
for Minis of over  
1300cc.

Other manifolds and systems available for BMC 'A' and 'B' series, Fords, Formula Fords, Chrysler etc., details on application.

## ENGINES

Competition engine preparation is our main speciality. We can supply brand new units built to order, or we can rebuild existing engines to competition specification. Consequently we carry a comprehensive stock of engine spares and associated parts, and in addition we have some parts specially made for us.



### Crankshafts

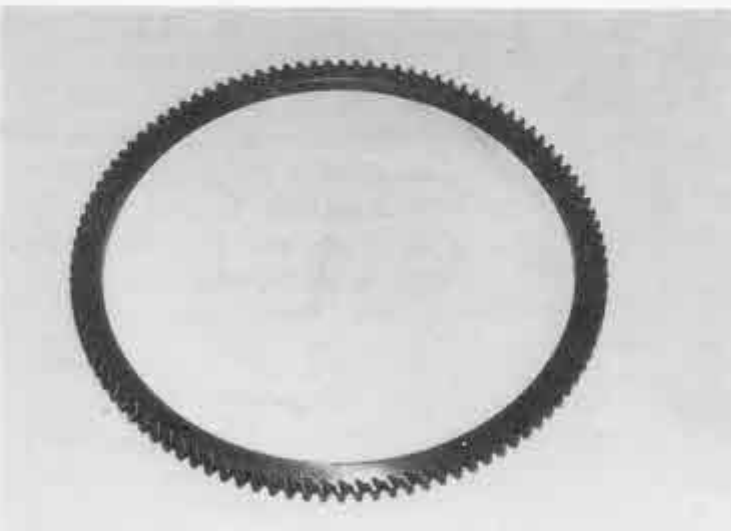
Available in either "long" or "short-stroke" configuration. The latter versions can be used to increase the bore/stroke ratio of an engine of given capacity, usually resulting in a greater power output at higher engine speeds. The most extreme (and successful) example of this is the

short-stroke 850 S engine with a bore/stroke ratio of over 1.4:1.



### HV8 Flywheel

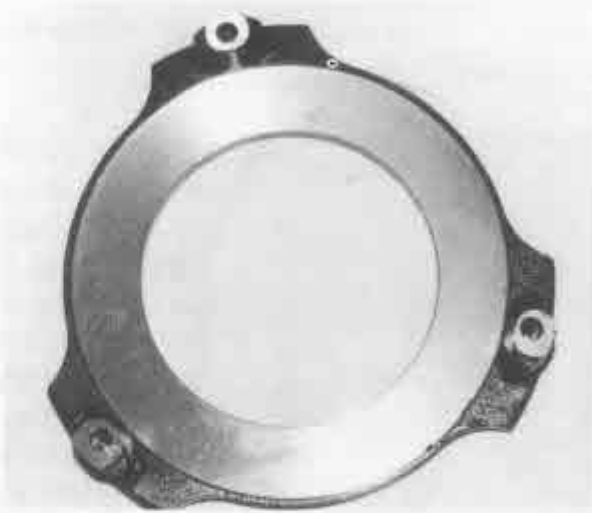
This item is specially made for us. Machined from one piece of steel it is approx 1 lb lighter than the Leyland S.T. ultra-light version.



### RH 8 Ring Gear

A "thin" ring gear to suit the lightweight flywheel.

## Engines 2



HV 10 Pressure Plate

Lightened steel clutch pressure plate - weight approx 3 lbs. NB Cast Iron Plates, which can usually be identified by the manufacturer's name "Qualcast" or the lack of ringing tone when hit like a gong, should NEVER be used on a competition engine especially when lightened, as they have frequently been known to burst under centrifugal stress.



FE 12 Clutch Disc

Lined with Ferodo competition material Rivetted and bonded for extra security.



AP 10 Clutch Diaphragm

"Orange" diaphragm spring, extra thick thrust pad with reinforced locating lugs for extra security. Also available with "Grey" coded spring (stronger).

## Engines 3



### ML 73 Mahle Piston

73.53mm diameter, with flat top and forged. Made specially for us. Spare rings available under part no. ML 74.

### PM 17 Powermax Piston

Dished crown and also forged. Made for the Cooper S range.

### PM 18 Powermax Piston

Flat top version of above.

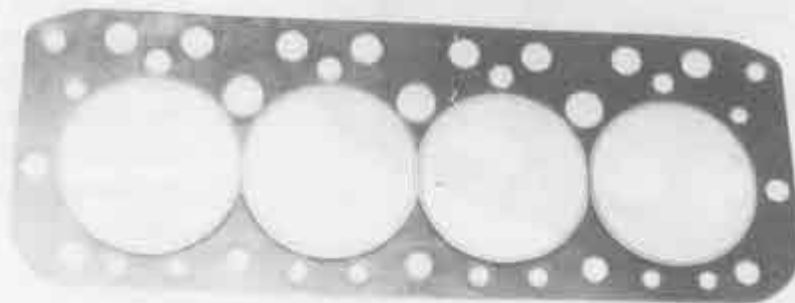
### PM 20 Powermax Ring Sets

Suitable for PM 17 and 18 pistons.

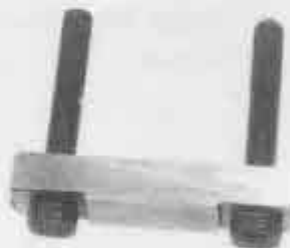
We are Powermax Piston Stockists and consequently keep a good supply but unusual items not in stock can generally be obtained at short notice.

We use and stock Vandervell lead indium crankshaft bearings and crankshaft thrusts. We also keep specially modified thrusts (part no. HV 85) to enable an S crankshaft to fit a 1300 block.

We use and stock a large range of gaskets including CA 38



**Competition Head Gasket**, which should always be used on competition engines incorporating the 12G 940 head casting.



### HV 4 Strongback

Steel strap and bolts for reinforcing the centre main bearing caps of 850, 998 or 1100 Engines. (Not necessary on S or 1300 Units).

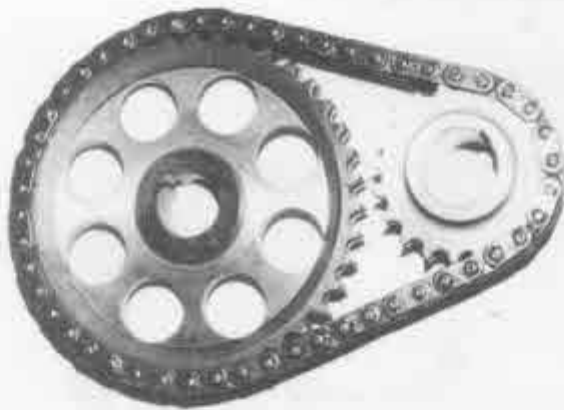
## Engines 4 Camshafts



We use and fit the Manufacturer's range of standard and special tuning camshafts, and do not favour the use of reground cams. The exception that proves the rule is the '544' type, which is no longer obtainable new.



**RL 20 Lightened Tappet Set**  
A set of standard tappets lightened in our workshops so that the strength is not impaired.



**DP 6 Duplex Kit**  
Consisting of a DP 1 lightened camshaft sprocket, crank sprocket and duplex chain. The sprockets are made from steel and not cheaper material which has been known to disintegrate in severe competition use.



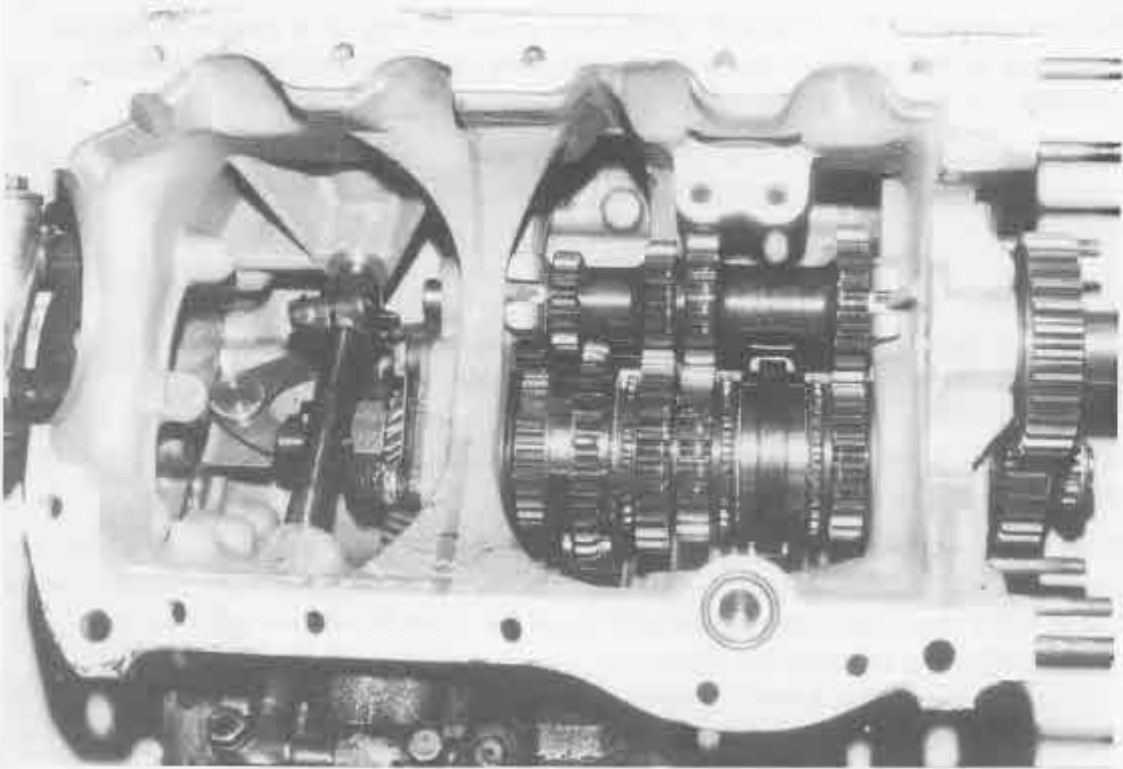
**HV 9 Oil Pump Spacer**  
Precision turned from aluminium alloy, it enables a star-drive camshaft and oil pump to be used on the 850, 998 and 1100 cylinder blocks.

## Engineering Services

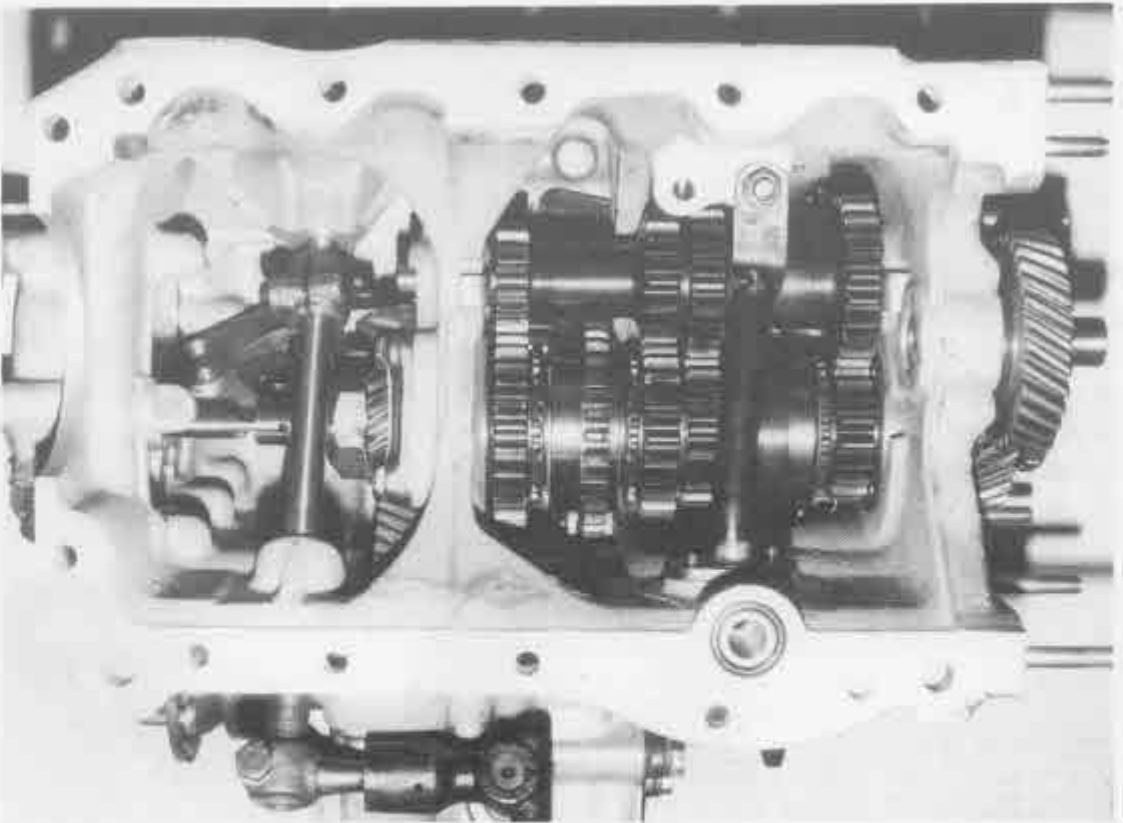
We are able to carry out most aspects of this work, such as :- boring, honing, grinding, facing, reaming, lightening, balancing, heat treatment, shot-peening etc.



## TRANSMISSIONS



3 Speed Synchro Mini Gearbox fitted with straight cut close ratio gears and straight cut Taper Roller Idler gear.



All Synchro Mini Gearbox fitted with close ratio straight cut gears and competition oil pick up pipe.

## Transmission 2

The gearing of a competition car is a very important and complex subject. Mini owners are fortunate in having a large selection of special parts to choose from, and usually the desired gearing can be achieved by fitting a suitable combination of these parts.

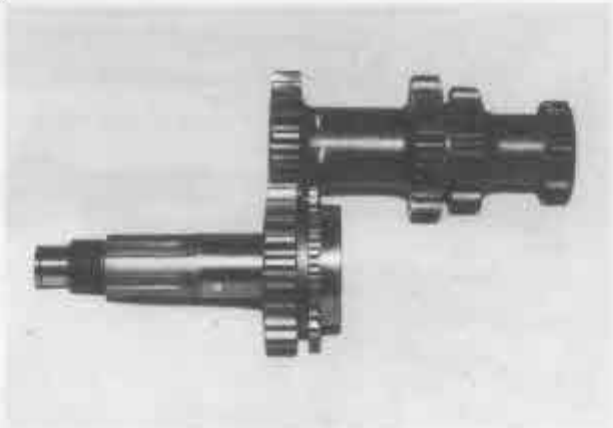
The main object of fitting special gears is to allow the engine to operate within the relatively narrow maximum power band; the other considerations being increased strength and the reduction of power losses.

British Leyland has made close ratio gear sets and different final drive gears for some years now, and as they are manufactured in series production they are cheaper than the specialist made "one-off" gears.

### Gearbox

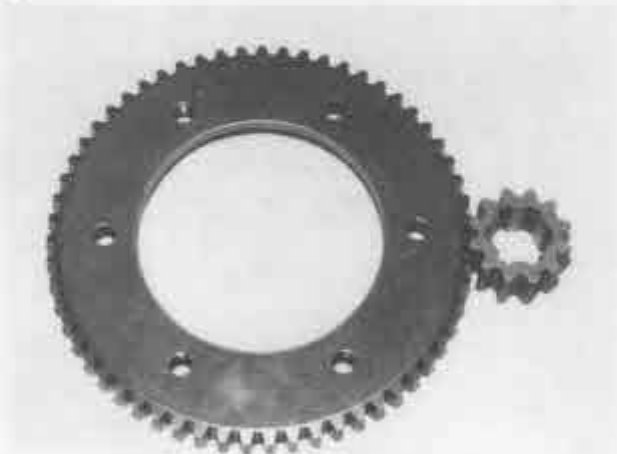
British Leyland has produced two basically different types of gearbox for the Mini. One without synchromesh on first gear and, subsequently, one with; they are not interchangeable. We prefer the former type as it permits a faster gearchange, but for certain applications where first gear has to be frequently selected when on the move the all-syncho box is favourite.

British Leyland S.T. straight-cut, close-ratio gear kits are available for both models of gearbox and give useful benefits. However for those who want something better we have had an ultra close ratio conversion (part no JK 22) made to our requirements by Jack Knight; it is intended for those cars, already fitted with the 3 speed syncho close-ratio gears. See graph on following pages.



### Final Drive Gears

British Leyland manufacture a good range of final drive gears, from 3.4:1 to 4.3:1 ratios with both standard Mini and Salisbury pattern crownwheels. Other ratios down to 4.9:1 are available under part no. JK 20, and Jack Knight have made a lower one still specially for us at 5.2:1, the part no. JK 21.



Other ratios such as 2.9 and 3.1:1 are available with helical teeth suitable for road use.



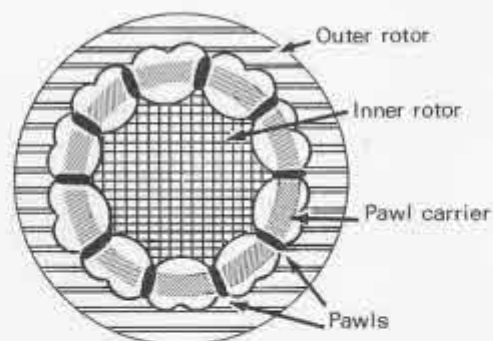
These consist of the 3 gears (primary, idler and input) which transmit the power from the clutch to the gearbox. The standard items have helical teeth and a 1:1 ratio. Straight cut ones are specially made in 3 ratios, 1:1 (JK 11), 1.044:1 (JK 14) and 1.087:1 (JK 18). The first two (1:1 and 1.044:1) have common idler and input Gears, so the ratios are interchangeable by only changing the primary gear. The latter two (1.044:1 and 1.087:1) have the effect of lowering the final drive ratio and also reduce gearbox revs in relation to engine speed. So by permutating final drive and drop gear ratios it is possible to select the best combination to suit your performance and rev range to the track conditions. See the final drive ratio chart on following pages.

On powerful Minis with a high torque output it is not unknown for the idler gear needle roller bearings to fail, with subsequent damage to the gearbox and flywheel casings. To overcome this failing, straight cut drop gears are available with Taper-Roller bearings located in the idler gear and a shaft that does not revolve in the casings.

### Differentials

Where the conditions and regulations allow, a Limited Slip Differential will provide better performance by improving the traction out of the bends. There are 2 basic types available for the Mini.

- 1) The pawl type, which operates on the ZF principle. The drive from the crownwheel is transmitted by the pawl carrier through the pawls to the inner and outer rotors, which are each connected to a driveshaft. The pawls allow small relative movement between the inner and out rotors, but a large difference in relative speeds, which would occur if one wheel spins, causes the mechanism to jam and act like a locked differential. This type is more forgiving to drive, but the disadvantages are the high wear rate and the metal particles which rub off as the wear is taking place and circulate in the engine oil. The Jack Knight Mk II version is improved in this respect.



## Transmissions 4

- 2) The Power-Lok Type, manufactured by Salisbury Transmissions, operates on a slipping, multi-plate diaphragm clutch principle. It initially acts like a locked differential and then starts to slip at a preset torque, however this slipping is delayed by the application of power, which causes the bevel gears to ride up ramps and increase the clutch spring tension. This type is generally preferred, but when driving with one, a vital fact must be borne in mind - cornering must be carried out with power applied, if you 'back off' the throttle the car will tend to go straight on.



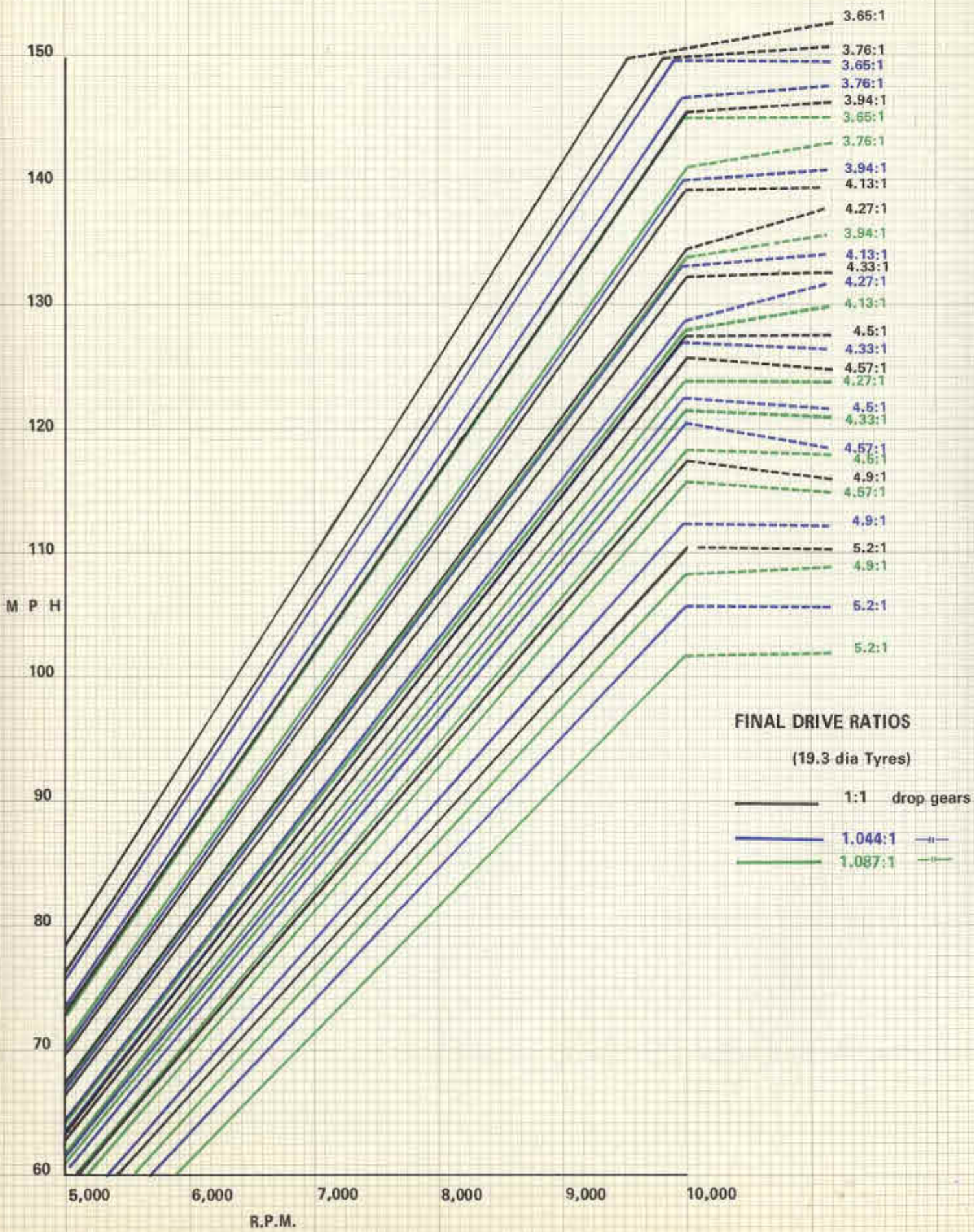
The Power-Lok differential can be "set up" to compensate for wear and to suit different driving conditions. We specialise in this work and carry comprehensive spares for this purpose; we also modify gear casings to accept this type of differential. We carry out Mini gearbox rebuilds and stock most replacement parts such as bearings, layshafts, baulk rings, selector forks, synchro hubs etc.



RL 15. Reverse Lock.

Spring-loaded catch for fitting to "remote control" gear levers, assists fast gear-changing by blocking off the reverse gear position.





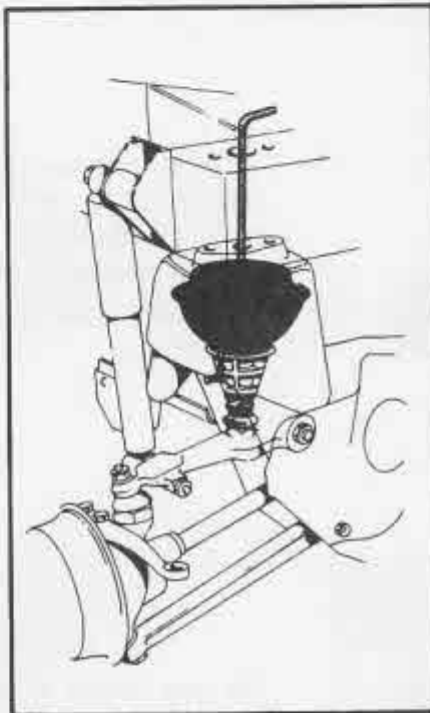
## SUSPENSION

There are 4 basic factors involved when setting up the suspension of a competition Mini:

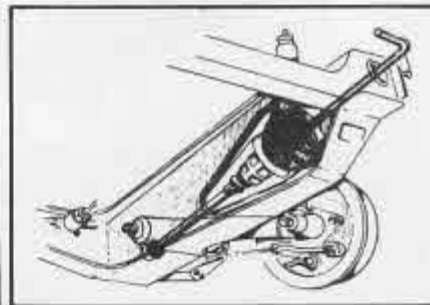
- 1) Ride Height
- 2) Camber Angle
- 3) Castor Angle
- 4) Wheel Alignment.

### 1) Ride Height Adjustment

This usually means lowering, which can be accomplished by shortening the suspension trumpets. A good way of having adjustable ride height is to fit a 'Hi-Lo' kit, which gives the added advantage of stiffening the spring rate.



Hi-Lo Units

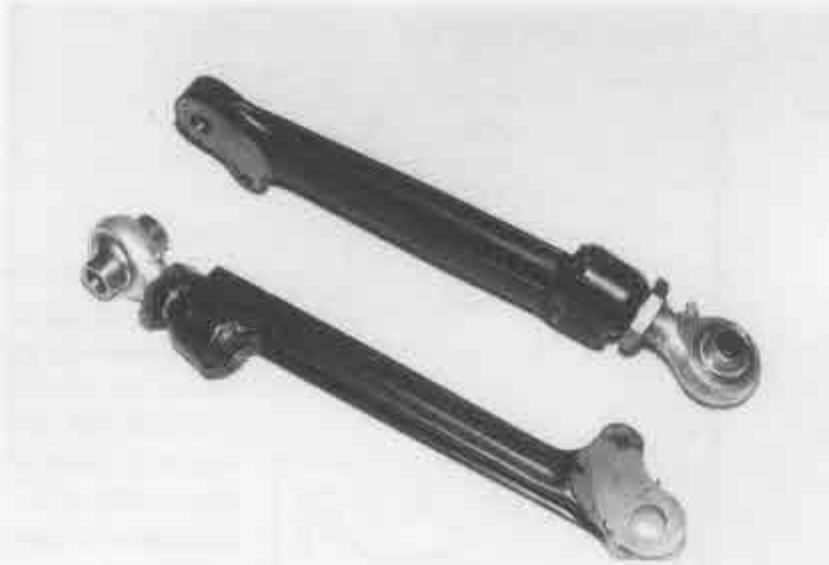
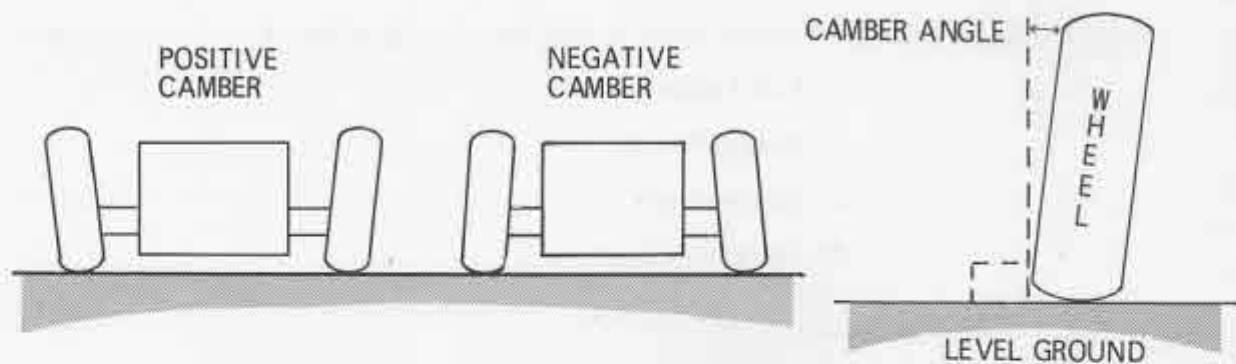


We find that the 'Hi-Lo' kit requires slight modification to get a really low ride height. Whenever the ride height is lowered appreciably it is necessary to raise the wheel arches.

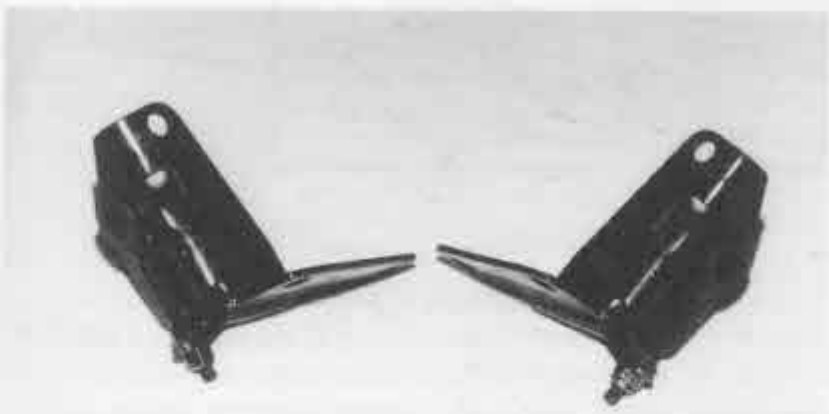
### 2) Camber Angle

This is the angle the wheel assumes to the perpendicular. A wheel that is perpendicular has  $0^\circ$  Camber Angle, a wheel that leans out at the top has a positive camber angle and vice-versa. It is essential that checking is carried out on a flat and level surface, the measurements can be made with a Camber Gauge or failing that a spirit level of suitable size. It is normal practice to regulate the front camber by altering the length of the bottom arms. The factory produces a kit - part no. C-AJJ 3364, which consists of two arms with the holes cunningly drilled in slightly different positions to give negative camber without affecting the castor angle. Alternatively existing arms can be lengthened by heating and stretching, or cutting, inserting and welding; this is very much a job for the expert as failure of this component could be disastrous (illustrations overleaf).

## Suspension 2



We produce Rose-jointed arms (part no. PE 2), which, as well as being adjustable, locate the wheels more positively by dispensing with the rubber brushes.



The rear camber is usually altered by raising or lowering the outer pivot hole, which locates the trailing arm pin; for this purpose we supply a pair of modified brackets (part no. PE 5) with screw adjustment.

Our recommended settings for Racing Minis are:-

- Front     1 - 1½° Negative
- Rear     ¾ - 1° Negative

It is important that the angles are the same side to side. On the latest wide tread, low profile tyres the camber angle should be reduced to allow the full width of the tread to have sufficient contact with the road surface.

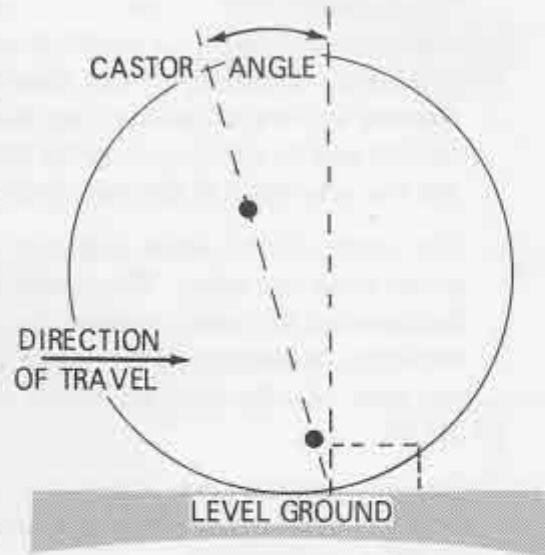


## 3) Castor Angle

This is the angle of the steering swivel axis to the perpendicular in the fore and aft plane; it affects the self centering action of the steering as well as the amount of camber variation when lock is applied.

Measurement requires the use of special equipment, involving turntables, ramps, gauges etc.

On a Mini the castor angle can be made adjustable by fitting 21A 1092 Tie Rod Ends. This involves cutting and threading the tie rod, which can then be screwed in or out for adjustment.



We produce Rose-jointed tie rods (part no. PE 4), with similar adjustment, but they provide much more positive location and obviate the tendency of weaving under very heavy braking.

Some form of castor angle adjustment is desirable when longer bottom arms are fitted, as the lengthening affects the position of the tie rod hole.

Our recommended settings for Racing Minis are:-

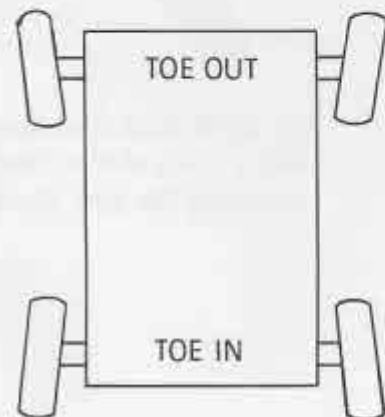
$$3 - 3\frac{1}{2}^{\circ}$$

This can be varied slightly to suit circuits of different characteristics and also driver preference.

## 4) Wheel Alignment

This involves the toe in or out of the front (and rear) wheels as well as the correct alignment front to rear so that the car does not crab along in a straight line.

The toe in or out can be measured with a trammel bar or preferably optical equipment. When checking the rear it is as well to remember that the equipment will read "back to front" and what is indicated as toe in will really be toe out.

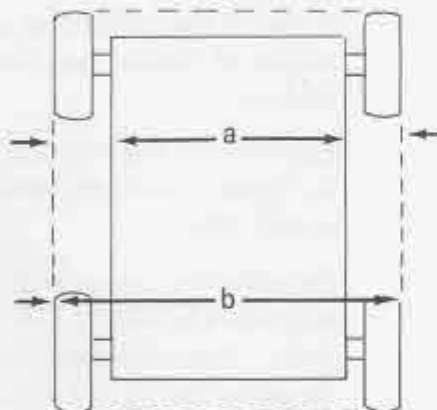


## Suspension 4

The alignment front to rear can be checked with highly sophisticated and very expensive equipment - a length of string! This is passed right round the car and tied tightly enclosing all four wheels. With steering set straight ahead there should be a uniform gap on either side at the front sills (a) and the side-walls of the rear tyres (b).

Correction of front wheel alignment is adjusted on the track rod ends. When negative camber bottom arms are used the wheel hub is moved outwards, necessitating the use of longer track rod ends, like the ones we market under part no. TH 14.

Correction of the other alignments is not readily adjustable and usually means a certain amount of basic modification.



Our recommended settings for Racing Minis are:-

Front    Toe Out     $0 - \frac{1}{16}$ "

Rear     Toe In      $\frac{1}{16}$ " -  $\frac{1}{8}$ "

When correcting or altering one of the four basic factors, the others are likely to be affected, so it is necessary to recheck and correct the camber, castor and alignment until everything is spot on.

We carry out a car suspension setting service for Minis and most other competition cars including single seaters.



We stock most Mini suspension parts and a range of Koni Shock absorbers including the Koni Sports.



We also market coil spring damper units (part no. IS 16) suitable for the rear of a Racing Mini.

## BRAKES



GC 11 Alloy Caliper Kit.  
Approx  $\frac{1}{2}$  the weight of the standard  
cast iron S calipers.



HG 10 10'' Dia. Disc Conversion  
Kit with LO 12. Large Alloy Calipers  
to suit.

Suitable for cars with 13'' dia. wheels.



MINIFIN Brake Drums.  
Fit to the rear and reduce unsprung  
weight.

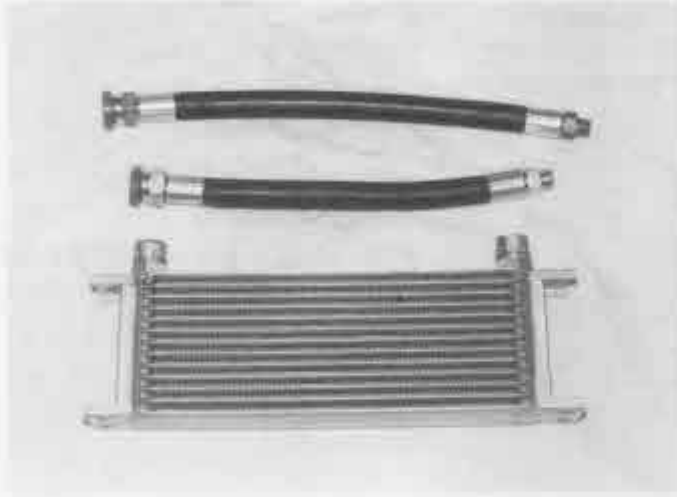
## Brakes



**SUPER MINIFIN Brake Drums.**  
Similar to above but with built-in  
spacer and extra long studs.

We can also supply a comprehensive range of spares for road or competition use, such as brake pads and shoes, vacuum servos, hydraulic cylinders, hoses, pipes and fittings.

## COOLING



MC 52 Oil Cooler Kit.  
"13 row" cooler and flexible pipes  
suitable for fitting to a Mini. Also  
available with longer hoses to suit the  
Clubman shape.

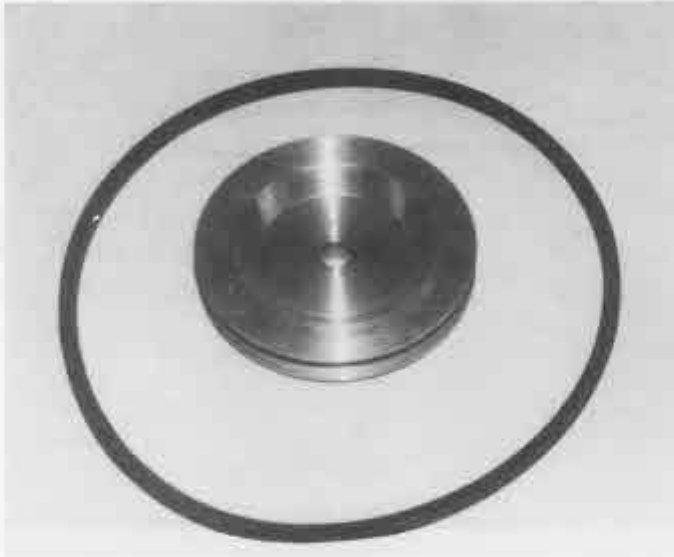


HD 40 Large Capacity Radiator.  
This radiator is specially made with an  
extra row core to give the greater cooling  
efficiency necessary on a competition car.



QH 75 Alloy Water Pump.  
Lighter and more efficient than the cast  
iron original.

## Cooling



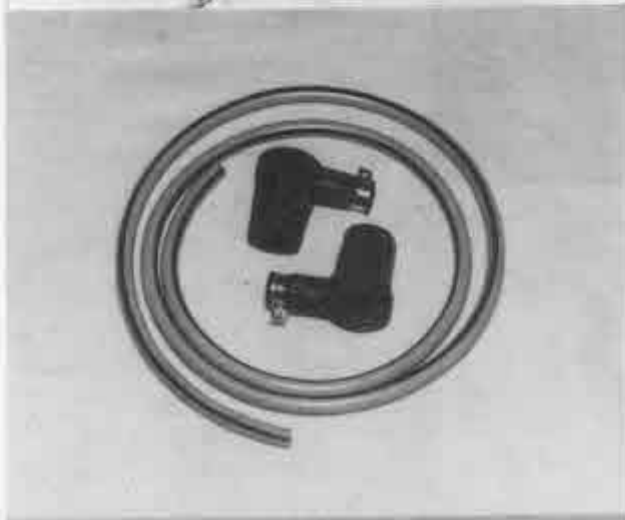
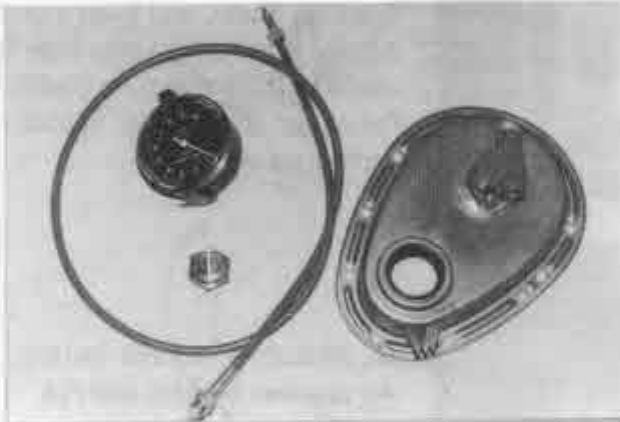
HV 6 Dynamo Pulley and  
MN 42 Fan Belt.  
High revving engines used to have  
difficulty keeping fan belts on until we  
developed this kit.



RL 96 Tensioner  
Used in conjunction with MN 69 short  
fan belt achieves the same purpose as  
above in applications that do not require  
a dynamo.

## INSTRUMENTS & ELECTRICAL FITTINGS

In addition to the usual range of Smiths De Luxe Supplementary Instruments we produce a Chronometric Rev Counter Kit - Part No. CR 10 - for the Mini. It comprises a drive dog for fixing onto the camshaft, a specially modified timing cover fitted with the drive gearbox, a flexible drive and the instrument itself which is calibrated to 10,000 rpm and has a red tell-tale needle.



HL 10 Competition HT Lead and LR 90 Rubber Plug Caps.



HB 12 Bosch 12 volt Coil.

LC 40 Opus Ignition Kit.  
Contactless ignition system comprising coil, distributor, amplifier and resistor, necessary on engines that attain very high (9,000+)rpm.

## Instruments & Electrical



We use and recommend Champion Sparking Plugs, and keep a good supply in stock, ranging from N9Y (soft) to N57R (hard), including Gold Palladium versions for specialist applications.



HL 76 Battery Isolator Switch.  
As required by RAC and FIA scrutineers.



