THE XPAG ENGINE

DATA
SERVICE
SUPER-TUNING

WKF Wood

Classic MOTORBOOKS

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I N T R O D U C T I O N

The XPAG was fitted to the MG models TB, TC, TD, TF, Y saloon and tourer and to models of Morris and Wolseley. In 1955, The XPEG was introduced and it saw brief service in the TF.

This late 1930s design is by no means adequate for today's superhighways and sprint-type intown traffic. Indeed, with the new expressways that carry traffic across our larger cities, intown speeds are now greater than those on the highways of yesteryear when the XPAG was introduced.

In the years since, research and development have yielded designs and manufacturing techniques.such that today's engines meet today's needs. Many of these improvements can be incorporated in the XPAG in order to make it not only 50% more powerful, but 100% more reliable and durable.

No attempt is made here to obselete the TC Owners' Manual nor the TD-TF Workshop Manual. They cover many aspects of work not mentioned here. But these manuals tend to cover the how-to-do-it part of service. We cover, in the following pages, the why-to-do-it aspect of service. No time is spent on: "To remove the cylinder head, first drain the coolant, remove the valve cover, and disconnect..." This sort of trivia is overlooked here, and the owner who lacks such experience must take his courage in his hands and begin his on-the-job training. It is assumed that he has the normal complement of Whitworth hand tools and the will to use them. Every effort has been made to make this Manual as complete as possible for the enthusiast. To the seasoned technician the detail may seem overbearing. However, this is prepared for the layman owner who may wish to do his own work, or, at least, to know what needs to be done, and to direct its course. The identity of parts, where there might be a question, will be indicated by the part number in parentheses. Since Nuffield and Austin combined to form BMC, some of the part numbers have changed, or are in the process of change. In an effort to find some firm reference, the last published TC parts manual (AKD856) and TF parts manual (AKD804) were chosen. A shroud of anxiety covers us when we find that these are no longer being published, and copies are now rather dear. But we had to have some stable reference, and these were chosen as the most convenient to all concerned. Some of the units have had as many as three parts numbers, e.i. the crankshaft, which started as MG900/s, became 168828, and is now AAA3105. Moss Motors Catalog, an excellent source of information, contains the latest numbers, which should be used when ordering.

This work was written around the XPAG as it was fitted to the TB-TC. It is certainly recognised that the TD and TF used the same power unit, and in slightly refined form. But the greater interest in proper maintainance and super-tuning centers predominantly among TC owners (at least in the USA, where this was written). However, the basics of this material apply to all engines, TB to TF 1½ litre.

The information here is presented in three sections: I covers the general proceedures to be followed; II contains service data and gives specific recommendations for types and methods of service; III discusses the extraction of greater power, its pleasures and pitfalls. Also included is a listing of parts suppliers and service centers.

The writer makes no claim to being the final authority on matters related here. However, he likes to think that his experience is greater than that of others. Much of this was gained the hard way, with each failure carefully analysed. Othertimes, he was fortunate enough to examine the mistakes of some others, thus saving himself some of the agony. New materials and tecnniques are constantly being developed which can outdate the work presented here. Any assistance from readers will be greatly appreciated and duly credited. Future editions (when and if) will be revised in an effort to provide the very soundest of material.

Thanks are due the many who gave their suggestions, comments and critisisms for the preparation of this manual. Particular appreciation is given to Dick Knudson and Frank Churchill of the New England MG'T' Register, Eric Blower of Jaguar Cars North America, Angus Laidlaw of Leyland Motors, Jay Lockrow and Robinson Wright. Their interest and assistance contributed greatly to its completion.

G E N E R A L   P R O C E E D U R E S

The thoroughness of our work must have the strongest emphasis. It is useless to rebore the block and fit new pistons, then to use a worn crankshaft, even with new bearings. The bottom end will not likely stay together 10,000 miles. And the $5 or so spent for the inspection for cracks might be compared to an insurance policy. Ignoring the possibilty of cracks can lead to a rod through the side of the block, and this could spoil your whole day.

Now thoroughness does not mean that, should you have a burned valve, the complete engine must be rebuilt. But do a complete job on the head: new guides, valves, all machine work necessary. If the engine must be pulled for repairs in one aspect, then every possible point should be serviced. No one is sillier then the chap who pulls his engine first to cure oil burning, then to grind the shaft, next his clutch is gone, etc. Thoroughness is the order of the day.

Cleanliness is next to Godliness, and the author has the uneasy feeling that this is likely the closest hell come. Therefore, he pays particular attention to the removal of all dirt, sludge, gasket material and gasket compound from all surfaces, interior as well as exterior. A good standard is to require the same degree of cleanliness in the engine as for kitchen utensils and tableware.

The head and block may be cleaned in a hot caustic soda bath (sodium hydroxide or other). Remove all possible core plugs and oil passage plugs so that we receive the full benefit of the bath. Aluminum parts cannot be placed in the caustic bath, as they would be dissolved. "Carburetter cleaner", although expensive, is excellent for all ferrous and non-ferrous parts. This cleaner will quickly break down sludge, old paint, etc. The parts may be afterward rinsed in gasoline or hot water. Carb cleaner must never come in contact with the skin, so use a metal basket with which to submerge parts.

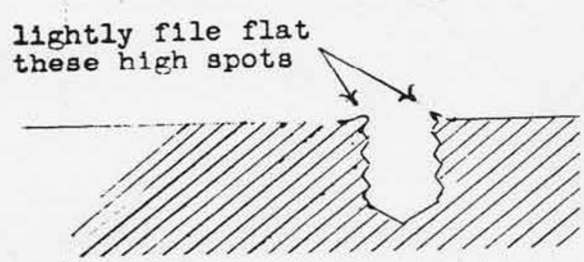
Gasoline is an excellent grease solvent, but some care should be exercised. Leaded fuel, when in prolonged contact, is harmful to the skin. It may be used to considerable advantage in cleaning smaller parts.

Should your wife (roommate, etc.) be an understanding type, a strong solution of Wisk (a laundry detergent available everywhere), brought to boiling on the kitchen stove, produces rather effective results. Rinse the parts afterward in warm water and dry. For the cast aluminum sump, let it sit for a few days in a strong solution of Wisk and hot water. Just fill the sink, and change the bath every six or twelve hours, as it becomes cold. Some automotive service shops have a vapor-degreasing bath that does the job more quickly, but no more effectively.

Exposed ferrous surfaces should be primed and painted to prevent rusting, and to facilitate later cleansing. Rustoleum paint has proved very effective for this purpose. The author has an aversion to paint on brass or aluminum parts. It seems a shame to hide their beauty under paint.

The exhaust manifold, after being wirebrushed, can be treated with one of the extreme-high-temperature paints that are made for this purpose. Also there are firms in larger cities that will porcelainize the manifold, a la XK Jaguar.

For proper sealing, all mating surfaces should be cleaned of old gasket materials and compound. Threaded holes in the block and head, sump, etc., should be cleaned with the appropriate taps and the edges on the face lightly touched with a file. Quite often



previous excessive tightening will have left a ridge here, as illustrated.

During assembly, nearly all gasket surfaces should be coated with a gasket cement, jointing compound or whatever you might name it. Do not use the form-a-gasket type, either hardening or non-hardening. Rather, use the #3 compound which will allow later disassembly without ruining the gasket. #3 will remain tacky and proves an effective sealant.

All threaded parts should be wirebrushed, and chased with tap or die, as the case may be. During assembly, use a good thread compound on all nuts, bolts, studs. Never-Seez is a thread compound that absolutely prevents binding and corrosion, even in salt water. Loc-Tite and Sta-Lok are anti-seize compounds that might be called a liquid lockwasher. A strong bond is formed that will securely hold threaded parts, and this bond may be broken only by the twisting action exherted by a wrench.

During assembly, all parts with rubbing contact, valve stems, rings, walls, gudgeon pins, bearings, cams and tappets, etc., should be liberally coated with Lubriplate. This is a lithium-base, synthetic grease that will supply boundary lubrication during the critical first revs. Oils of any type are not recommended because they have a tendency to run off the surfaces rather quickly, and they do not have the molecular sheer strength of a lithium grease. Lubriplate #105 is the prefered type, made especially for engine assembly.

A light viscousity oil (SAE 10), either detergent or non-detergent, is advised for running-in. Drain at 1000 miles and change the filter, too. After this, use a high-quality detergent oil (DG rating), SAE 30 in the warm or hot weather, SAE 20 or 10-30 during freezing conditions. Change the oil every 3000 miles and the filter with every second oil change.

The author has a slight preference for Pennsylvania-base oils, but in practice it makes little difference. Do not use any racing or specialized type oils. Exotic as they may seem, they are not suited to street or highway use. Certainly the car manufacturer and the oil refineries have a better knowledge of lubricating requirements than does the layman or backyard mechanic. It will be well to follow their recommendations.

The local automotive supply houses and machine shops can render considerable assistance. They usually have caustic soda baths (auto radiator shops do, too) and vapor-degreasing baths, Magnaflux and Magnaglo facilities, as well as a stock of hand tools, lubricants, paints. Thread compounds are more likely to be found in ball and roller bearing supply houses.. The yellow pages can yield the names of many suppliers.

Considerable assistance can be had from other TC owners. Most are friendly types, eager to help their fellow nuts. Just ply them with a beer or two.

There are two types of head and block. The TB, TC, and early TD (to XPAG TD2/17969) had banana-shaped water passages on the face of the block. The later TD and all TFs have round water holes on the face, and the passage behind the rear cylinder has a bridge accross it. At XPAG TD2/22735 a cylinder head with round water passages was introduced. Future reference will be made to the earlier types as the banana block and banana head, to the later types as the round block and round head. These heads and blocks are interchangeable, as are their gaskets.

XPAG SERVICE DATA

GENERAL

type	4 cylinder, overhead valve, pushrod operated
bore	66.5 mm. (2.6181 in.)
stroke	90 mm. (3.5433 in.)
bore/ stroke ratio	1 : 1.353
displacement	1250 cc.
firing order	1 3 4 2
piston area	21.57 sq.in.
power	54 HP at 5200 rpm.
torque	63 lbs./ft. at 2600 rpm.
BMEP	125 at 2600 rpm.
RAC rating	10.97 HP
BHP/ litre	43.5
maximum safe speed	5700 rpm.
valve crash speed	6000 rpm.
power unit weight	323 lbs.
cylinder head depth	76.75 mm. (3.022 in.)
compression ratio	7.25 : 1
test pressure	90 - 100 lbs./sq.in. throttle open, cranking speed
combustion chambers capacity	200 cc.
chamber size (per cylinder)	45.5 cc.
gasket capacity (per cylinder)	4.5 cc.
gasket thickness, compressed	.045 in.
octane requirements	74 minimum 82 maximum

PISTONS

type	Aerolite, aluminum, compensated expansion, solid skirt, tin plated
weight	9 oz.
compression height	45 mm. (1.7717 in.)
clearance	.0021 - .0029 in. at thrust face
compression ring	two, 2.25 mm. width (.0885 in.)
compression ring thickness	.109 in., .101 in. minimum
oil control ring	one, 4 mm. width (.1575 in.) eight slot
oil control ring thickness	.105 in., .097 in. minimum
groove side clearance	.001 - .002 in.
ring gap	.006 - .010 in.
gudgeon pin diameter	18 mm. (.7087 in.)
weight	2½ oz.
pin fit	two-thumb push

BORE SIZES, CAPACITIES & COMPRESSION RATIOS

std.	1250 cc.	7.25	.050	1299 cc.	7.5
.010	1260	7.3	.060	1309	7.54
.020	1270	7.35	.080*	1328	7.64
.030	1280	7.4	.100*	1348	7.74
.040	1290	7.45	.120*	1368	7.84

*not recommended by MG Car Co. Pistons for these bore sizes are supplied by independent piston makers.

CRANKSHAFT

Main Journal Dimensions

std.		52.	mm.	2.0472 in.
R.1	.3 mm. u/s	51.7		2.0354
R.2	.5	51.5		2.0276
R.3	.75	51.25		2.0187
R.4	1.	51.		2.0079
R.5	1.25	50.75		1.998
R.6*	1.5	50.5		1.9882

journal width, front & center	38 mm. (1.496 in.)
rear	40 mm. (1.575 in.)
radius	2.5 mm. (.100 in.)
oil clearance	.0008 - .002 in.
thrust bearing	integral with center main
end float	.0014 - .0037 in.
main bearing bore in block	56.54 mm. (2.2181 in.)

Crankpin Journal Dimensions

std.		45.	mm.	1.7717 in.
R.1	.3 mm. u/s	44.7		1.7598
R.2	.5	44.5		1.7515
R.3	.75	44.25		1.7432
R.4	1.	44.		1.7323
R.5	1.25	43.75		1.7225
R.6*	1.5	43.5		1.7126

journal width	28 mm. (1.102 in.)
radius	2.5 mm. (.100 in.)
oil clearance	.0005 - .001 in.

CONNECTING ROD

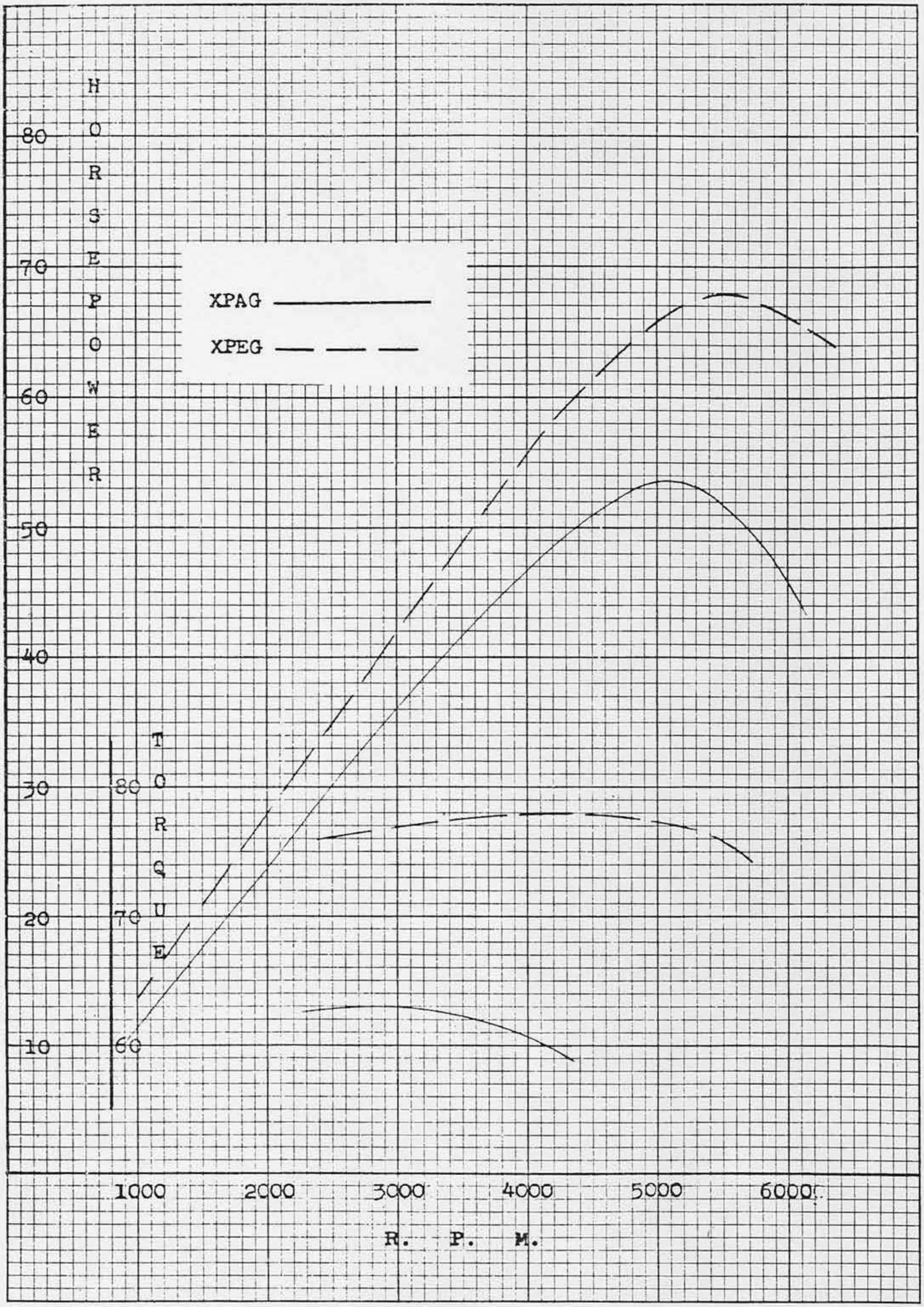
type	I beam, big end split at right angles
distance, centers	178 mm. (7.0078 in.)
big end diameter	48.67 mm. (1.9159 in.)
big end width	1.098 in.
end float	.004 - .006 in.
small end bore	18 mm. (.7087 in.)
small end width	19 mm. (.748 in.)
pin fit	by clamp bolt

CAMSHAFT

bearings, front	white metal, steel backed
center & rear	zinc alloy
journal sizes, front	41 x 29 mm. (1.6141 x 1.142 in.)
center	23 x 25 mm. (.9055 x 984 in.)
rear	23 x 29 mm. (.9055 x 1.142 in.)
oil clearance, front	.0016 - .004 in.
center & rear	.0018 - .0037 in.
end float	.005 - .013 in.
bearing bore in block	43.5 mm. (1.7126 in.)
drive	duplex chain, endless, 3/8 pitch, 60 roller links
tappet	one piece hollow
tappet bore in block	23 mm. (.906 in.)
working clearance	.0015 in.

*not recommended by MG Car Co. Bearings to these sizes are available from independent bearing makers.

VALVE TIMING	
inlet opens	11° BTDC
inlet closes	57° ABDC
exhaust opens	52° BBDC
exhaust closes	24° ATDC
valve lift	8 mm. (315 in.)
working clearance	.019 in. hot
Timing measured around flywheel	
inlet opens	28.3 mm. BTDC
inlet closes	119.5 mm. ABDC
exhaust opens	108.9 mm. BBDC
exhaust closes	50.3 mm. ATDC
VALVES	
diameters, inlet	33 mm. (1.299 in.)
exhaust	31 mm. (1.221 in.)
stem	8 mm. (.315 in.)
seat angle	30°
seat widths, inlet	1.25 mm. (.049 in.)
exhaust	2 mm. (.079 in.)
throat diameters, inlet	30 mm. (1.181 in.)
exhaust	26 mm. (1.024 in.)
guide type	cast iron, pressed in
guide diameter	15 mm. (.5906 in.)
guide lengths, inlet	59 mm. (2.333 in.)
exhaust	54 mm. (2.126 in.)
guide height above head	24 mm. (.945 in.)
stem clearance	.001 - .0015 in.
valve springs	coil, double
pressure shut, inner	31 lbs. at 1.753 in.
outer	62 lbs. at 1.847 in.
pressure open, inner	43 lbs. at 1.438 in.
outer	80 lbs. at 1.532 in.
LUBRICATION	
pump type	gear, running at half engine speed, externally mounted
capacity	7 gals./min. at 4000 rpm crankshaft speed
body bore	32.5 mm. (1.2795 in.)
depth	35.03 mm. (1.3792 in.)
gear diameter	32.2 mm. (1.2678 in).
gear length	35 mm. (1.378 in.)
radial clearance	.0056 - .0064 in.
end float	.0016 - .0035 in.
backlash	.020 - .025 in.
gearshaft diameter	13 mm. (5118 in.)
running clearance	.0007 in. maximum
pressure, normal	60 lbs./sq.in. running hot
minimim	40 lbs./sq.in. running hot
relief valve operates at	70 lbs./sq.in.
oil temperature, normal	75° C.
maximum	86° C.
filter type	full flow, separate
sump type	wet, aluminum casting
sump capacity	5 qts. U.S.


HORSEPOWER
80
70
60
50
40
30
20
10
TORQUE
80
70
60
XPAG
XPEG
1000
2000
3000
4000
5000
6000
R. P. M.

XPEG SERVICE DATA

GENERAL

type	4 cylinder, overhead valve, pushrod operated
bore	72 mm. (2.8346 in.)
stroke	90 mm. (3.5433 in.)
bore/stroke ratio	1 : 1.25
displacement	1466 cc.
firing order	1 3 4 2
piston area	25.23 sq.in.
power	68 HP at 5700 rpm.
torque	78 lbs./ft. at 3400 rpm.
BMEP	131 at 3400 rpm.
RAC rating	12.86 HP
BHP/litre	46.4
maximum safe speed	5700 rpm.
valve crash speed	6500 rpm.
power unit weight	323 lbs.
cylinder head depth	76.75 mm. (3.022 in.)
compression ratio	8.33 : 1
test pressure	145 lbs./sq.in., throttle open, cranking speed
combustion chambers capacity	200 cc.
chamber size (per cylinder)	44.75 cc.
gasket capacity (per cylinder)	5.25 cc.
gasket thickness, compressed	.045 in.
octane requirements	78 minimum 90 maximum

PISTONS

type	Aerolite, aluminum, compensated expansion, solid skirt, tin plated
weight	10 oz.
compression height	45 mm. (1.7717 in.)
clearance	.0021 - .0029 in. at thrust face
compression ring	two, .0625 in. width
compression ring thickness	.109 in., .101 minimum
oil control ring	one, 4 mm. width (.1575 in.)
oil control ring thickness	.105 in., .097 in. minimum
groove side clearance	.001 - .002 in.
ring gap	.006 - .010 in.
gudgeon pin diameter	18 mm. (.7087 in.)
weight	2.7 oz.
pin fit	two-thumb push

BORE SIZES, CAPACITIES & COMPRESSION RATIOS

std.	1466 cc.	8.33	.030	1496 cc.	8.48
.010	1476	8.38	.040	1506	8.53
.020	1486	8.43			

CRANKSHAFT

main journal diameter	52 mm. (2.0472 in.)
widths, front & center	38 mm. (1.496 in.)
rear	40 mm. (1.575 in.)
thrust bearing	integral with center main

end float	.0014 - .0037 in.
oil clearance	.0008 - .002 in.
main bearing bore in block	56.34 mm. (2.2181 in.)
crankpin journal diameter	45 mm. (1.7717 in.)
width	28 mm. (1.1024 in.)
radius	2.5 mm. (.100 in.)

CONNECTING ROD

type	I beam, big end split at right angles, reinforced for 1½ litre displacement
distance centers	178 mm. (7.0078 in.)
big end diameter	48.67 mm. (1.9159 in.)
end float	.004 - .006 in.
small end bore	18 mm. (.7087 in.)
small end width	19 mm. (.748 in.)
pin fit	by clamp bolt

CAMSHAFT

bearing, front	white metal, steel backed
center & rear	zinc alloy
journal size, front	41 x 29 mm. (1.6141 x 1.142 in.)
center	23 x 25 mm. (.9055 x .984 in.)
rear	23 x 29 mm. (.9055 x 1.142 in.)
oil clearance, front	.0016 - .004 in.
center & rear	.0018 - .0037 in.
end float	.005 - .013 in.
bearing bore in block	43.5 mm. (1.7126 in.)
drive	duplex chain, endless, 3/8 pitch, 60 roller links
tappet	one piece hollow
tappet bore in block	23 mm. (.906 in.)
working clearance	.0015 in.

VALVE TIMING

inlet opens	5° BTDC
inlet closes	45° ABDC
exhaust opens	45° BBDC
exhaust closes	5° ATDC
valve lift	8.3 mm. (.327 in.)
tappet clearance, hot	.012 in.

VALVES

diameter, inlet	36 mm. (1.4173 in.)
exhaust	34 mm. (1.3386 in.)
stem	8 mm. (.315 in.)
seat angle	30°
seat width, inlet	1.25 mm. (.0492 in.)
exhaust	2 mm. (.0787 in.)
throat diameter, inlet	32.6 mm. (1.284 in.)
exhaust	28.6 mm. (1.126 in.)
guide type	removable, pressed in
guide diameter	15 mm. (.5906 in.)
guide length, inlet	59 mm. (2.3328 in.)
exhaust	54 mm. (2.126 in.)
guide height above head	24.5 mm. (.964 in.)

stem clearance	.001 O .0015 in.
valve springs	coil, double
pressure shut, inner	41.1 lbs. at 1.753 in.
outer	73.3 lbs. at 1.847 in.
pressure open, inner	55 lbs. at 1.438 in.
outer	95 lbs. at 1.532 in.
LUBRICATION	
pump type	gear, running at half engine speed, externally mounted
capacity	7 gals./min. at 4000 rpm. crank-shaft speed
body bore	32.5 mm. (1.2795 in.)
depth	45.03 mm. (1.3792 in.)
gear diameter	32.2 mm. (1.2678 in.)
gear length	35 mm. (1.378 in.)
radial clearance	.0056 - .0064 in.
end float	.0016 - .0035 in.
backlash	.020 - .025 in.
gearshaft diameter	13 mm. (.5118 in.)
running clearance	.0007 in. maximum
pressure, normal	60 lbs./sq.in. running hot
minimum	40 lbs./sq.in. running hot
relief valve operates at	70 lbs./sq.in.
oil temperature, normal	75° C.
maximum	86° C.
filter type	full flow, integral with pump body
sump type	wet, aluminum casting
sump capacity	6 qts. U.S.

N U T & B O L T T I G H T E N I N G S P E C I F I C A T I O N S

all engines

cylinder head studs	50 lbs./ft.
main bearing caps	63
con rod big end bolts	27
gudgeon pin clamp bolts	33
rocker shaft 8 mm. bolts	29
rocker shaft 10 mm. bolts	43
timing cover bolts	21
flywheel to crank bolts	50
clutch cover bolts	32
sump bolts	32
manifold clamping nuts	19

MODELS AND CHANGES OF THE XPAG

The triple valve springs of the TB were changed to double for the TC, and a timing chain tensioner was added. Otherwise the XPAG is identical for the two cars.

The XPAG TD introduced the following changes: block drain tap is moved from its central position below the exterior water passage to a more forward location, oil bath air cleaner and manifold, ring gear has more teeth, new smaller starter and generator units, modified oil pump (for left hand drive), carburetters are changed slightly for combination choke/slow running control, engine mounting is single point with stabilizer bar, fan blades have spacer hub, and water outlet neck, now ferrous, has a less acute angle.

The XPAG TD2 had the 8 inch clutch, with a new flywheel and ring gear (same number of teeth and starter). The bell housing had to be enlarged to accept the larger clutch.

The XPAG TD3 offered larger valves and carburetters. The first few TD3s may have had 9.3 compression, later dropped to 8.6, and finally 8.1 became standard for this model. The XPAG TF is the same as the TD3, but with individual pancake type air cleaners.

The XPEG required siamesed cylinders to accomodate the larger bore, connecting rods are heftier, new head gasket, 8.33 compression. It should be noted that many small improvements were adopted that considerably changed the engine when we compare the first XPAG with the XPEG. These are listed below.

XPAG 501 was fitted to TB/ 0251.

XPAG 0883 was fitted to TC/ 0251.

XPAG TD/0501 was fitted to TD/ 0251.

XPAG TD/2985	new type oil filter and wider brackets.
XPAG TD/6482	new water pump with improved seal.
XPAG TD/9008	revised rocker gear, new arms and shaft.
XPAG TD2/9408	new flywheel with 8 inch clutch.
XPAG TD2/14224	integral oil pump and filter housing.
XPAG TD2/14948	oil sump capacity increased to six quarts.
XPAG TD2/17298	shorter push rods and longer adjusting screws.
XPAG TD2/17969	new type block with round water passage holes.
XPAG TD2/20942	distributor fixing changed to cotter bolt.
XPAG TD2/20972	priming plug fitted to oil pump cap.
XPAG TD2/22251	rod replaces clutch actuating cable.
XPAG TD2/22735	new type head with round water holes, longer reach spark plugs.
XPAG TD2/24116	230° camshaft with 8.3 mm. lift.
XPAG TD2/26364	new type pickup in sump.
XPAG TD2/26635	modified oil pump body now retains its prime.
XPAG TD2/27865	valve guide height increased to 24.5 mm.
XPAG TF/31263	oil pump modified to be self-priming.
XPAG TF/31727	last of the $1\frac{1}{4}$ litres.

THE XPAG THREAD SYSTEM

Considerable confusion exists as to the thread system employed on the TC. To set the record straight, the chassis, body and proprietary fittings use the British Standard Fine (Whitworth form) thread and hex head.

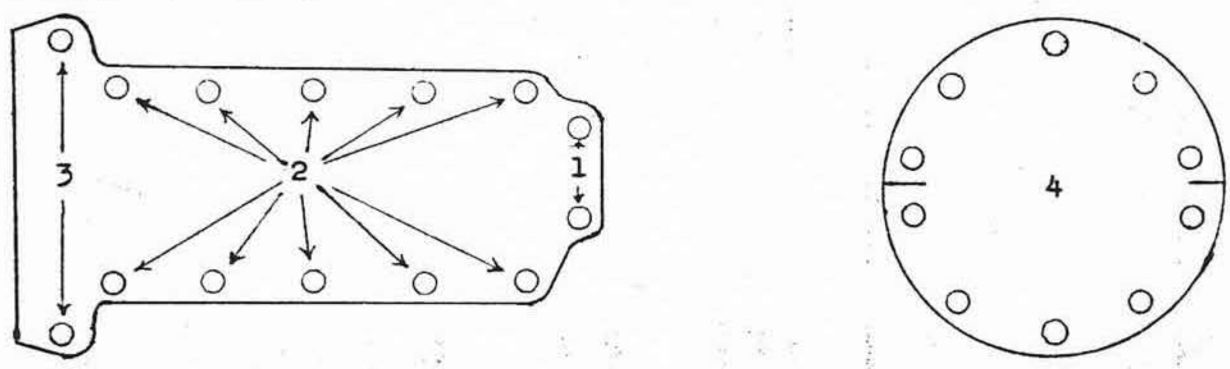
The XPAG and XPEG engines and their transmissions are the products of Morris Motors Ltd. and they have a thread system unto their own. This is based on the French form metric thread (not DIN), but the hex head demensions are Whitworth. Thus these nuts, bolts, studs, etc. are available only from BMC.

thread	hex head	tap drill
6 x 1 mm.	3/16 W	5 mm.
8 x 1 mm.	3/16, 1/4 W	7 mm.
10 x 1.5 mm.	5/16, 3/8 W	8.6 mm.
12 x 1.5 mm.	7/16, 1/2 W	10.5 mm.

Of course, the use of an outdated metric thread with a Whitworth hex head is rather confusing to the layman, but Morris Motors put the real challange in the oil gallery fittings. Some of the patterns are listed below.

part no.	location	thread	hex
X19089	oil filter bolt	1/2 x 19	1/2 W
X22924 X19520	bolts for line from block to head	3/8 x 28	3/8 W
X20247	brass plug above pump	3/8 x 16	3/16 W
X22732 X15393	plugs for main oil gallery	12 x 1.5 mm.	slotted screw

The sure sign that an engine has been previously serviced is the haphazard manner in which the bolts are returned around the sump and bell housing. Below are the original patterns.



1	(2)	X15268	deep head bolt, 3/16 W
2	(10)	LA7431	bolt, 3/16 W
3	(2)	X15269	deep head bolt, 3/16 W, slotted
4	(10)	JA5052	bolt, 1/4 W

Oh, yes. All the above bolts are the same thread pattern, 8x1 mm., and they may be interchanged in any of the holes. But returning the bolts to the holes for which they are intended gives the engine a properly finished look, and brands its builder as "knowledgeable."

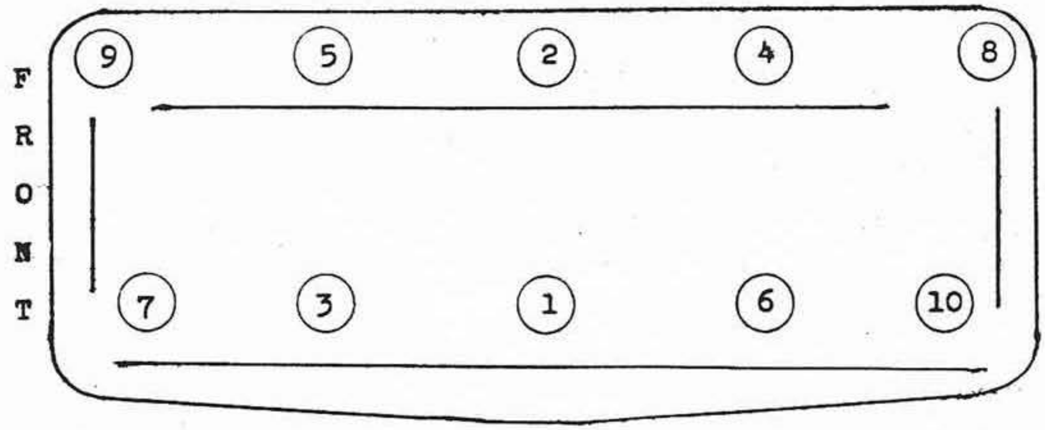
For the timing chain cover, the longer bolts are located at either side of the pulley, the three slightly shorter ones are above the pulley. On the rear of the engine bearer plate, two short bolts (X15012), either 3/16 or 1/4 W hex head size, hold the cover and plate tightly sealed.

Should a threaded hole in the aluminum castings (sump or chain cover) become damaged, it may be filled by welding, drilled and retapped, to return the part to original specification. To retap these units to other than original thread is indeed shoddy, Interchangeability of replacement parts is the very essence of our industrial revolution, and a non-standard thread chafes this concept, branding the mechanic who performs such work as being too lazy or unconcerned to do the job the right way.

In the block or head, because we are dealing with a ferrous casting, it will be necessary to fit a helicoil. Because the only helicoils readily available will have UNC or UNF threads, we must "butcher" to some extent. For easy identification, it would be well to use bright-metal nuts or bolts here.

THE CYLINDER HEAD

The face of the cylinder head must be flat within .001 in. No gasket sealing compound is necessary when fitting the head to the block. Note, however, that there is a front and a back to the gasket, and that it must be fitted so that the large water passage hole(s) is to the rear of the block. Tighten the head nuts in the order shown below.



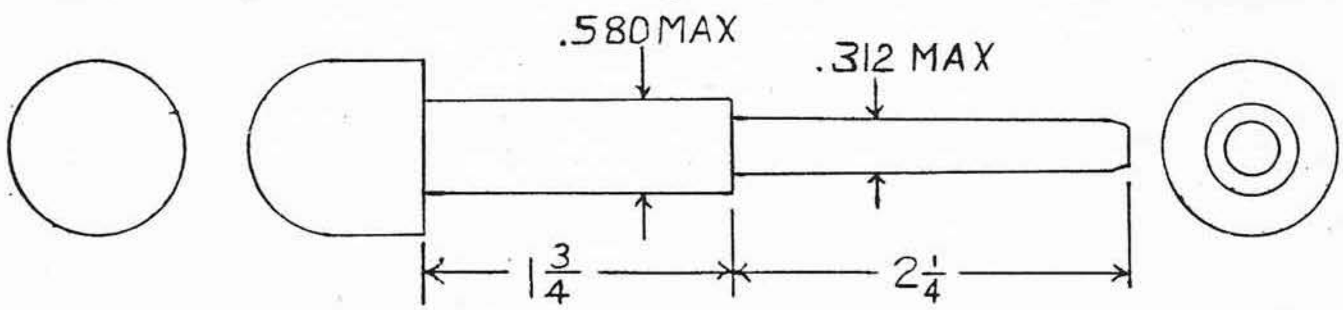
Run the engine at least one minute, blipping the throttle a few times, so as to increase the stress on the head studs and nuts. Then tighten the head once more to the full otrque reading. This is MANDATORY. Adjust the tappet clearance after the head has been torqued down for the final time, and with the engine at normal running temperature.

VALVE SERVICE

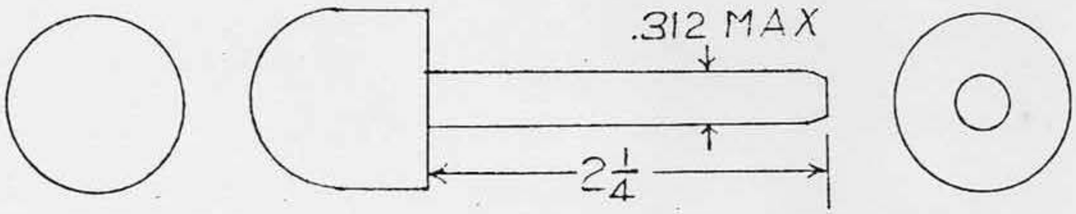
Compression pressure testing is performed in the usual manner, with the four plugs removed, throttle fully open, engine at normal running temperature.

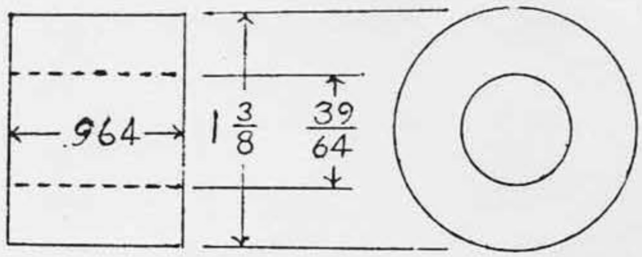
An ordinary valve spring compressor is required to remove the springs and valves.

Valve quide wear is significantly higher than in most engines. Therefore it is better to replace when in doubt. A guide removal tool is here illustrated.



The prefered method is to press out the old guide, as hammering may crack the wall of the guide and make the task more difficult. ALWAYS PRESS IN the new guides; hammering is not permisable. Liberally oil the guide bore in the head as well as the guide itself to facilitate fitting. Guide height (above spring seat face) is 24 mm. for the earlier engines, 24.5 mm. for later ones. This change was introduced for the higher lift camshaft and it would be wise to use it for all heads. The valve guide fitting tool is shown on the following page.





Even with proper care in installation, it will be found, on ocassion, that the upper end of the guide is peened inward, due to the installation process. This is checked by running a valve stem through the fitted guide. The inward peen may be removed by using a 3-edged hand deburring tool.

The center-line of the new guide will not likely coincide with that of the old one. Thus the seat must be recut. The prefered method is with a refacer-grinder.

The intake valves can likely be refaced, but the exhaust valves suffer most severely from the intense heat of the combustion process. Their replacement is strongly recommended.

With valve-grinding paste, hand-lap the valve to its newly ground seat. An accurate check for proper mating of the valve face and its seat can be made as follows:

1. Install spark plugs and rest the valves in their seats, sans springs.
2. With the cylinder face upward, pour gasoline into the chambers.
3. Any seepage of gasoline past the valve seat indicates improper seating, and lapping the valve and seat is again in order, until gas checking indicates perfect sealing.

The importance of cleanliness in the above operation is obvious. Any speck of dirt between the valve face and seat will cause leakage. Before assembly, wash the parts in a warm Wisk solution. Rinse in warm water and dry.

The life of valves and seats may be considerably extended (a superior seal assured) by doing a second "valve job" after new valves have been run in about 5000 miles. This running-in allows the valves to reach their final demensions (effected by the heat and working stresses). Disassemble the head and hand-lap the valves to their seats a second time. Refacing the valves and seats should never be required this time, if the work was done properly when these valves were installed new. Gas-checking is again in order. Fit new valve stem seals (AEK113) during assembly.

ROCKER GEAR

The rocker shaft (SA2232/1) will show wear (about 50,000 miles) on its under side and will be accompanied by wear in the rocker bushings (X20036). This worn condition can effect oil pressure, especially at idle, and it can also increase the quantity of oil to the valve stems, with smoke the result at the tail pipe.

The bushing can be replaced in each arm, then honed to size, but first examine the rocker face where it contacts the stem tip. This surface wears (fatigues) at about the same rate as the shaft and bushings. This face can be resurfaced, but once appreciable wear has started, its life is short-lived. Thus the prefered method is to replace the shaft and 8 rockers (bushings included). All other parts in the assembly may be retained.

When fitting the rocker assembly to the head, it will often be noted that the rocker tip does not squarely attack the valve stem tip. This out-of-line contact can cause the premature demise of the rocker face and valve stem tip. The position of the rocker may be changed by fitting one or more washers (X20128), as necessary, between the rocker and its adjoining bracket (X22914). Should we have the rare case that the rocker bushing boss is too wide, then the offending side should be ground down, until it allows proper contact of the face and tip.

THE CYLINDER BLOCK

After cleaning, the block should be checked for cracks by Magnaflux or other.

The face (top) of the block must be flat within .001 in.

Replace all core plugs and oil passage plugs, prime and paint the block.

Cylinder out-of-roundness, taper, or size must not exceed .003 in. otherwise reboring is in order. When boring the cylinder, always bore to the exact over size (the clearance is built into the piston). Thus a block that is presently .020 in. oversize can quite likely be cleaned at .040 in. o/s so that the finished bore size will be 2.6581 in. All imported pistons that have come to the author's attention are very well controlled as to size. Boring is not a critical work, and any good automotive machine shop can do it to complete satisfaction. Hone the cylinders in a cross-hatch pattern to a 25 microinch finish.

Should a block have been previously bored to an oversize such that a further rebore is not possible, then the block must be sleeved. The banana block may be processed to 72.mm. bore for 1466 cc. (see Super-Tuning Section). A round block must be sleeved back to a smaller size.

PISTONS

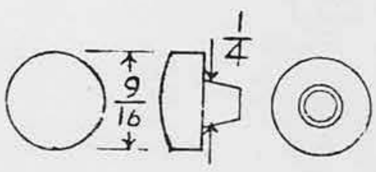
Of the many brands of piston that have come to the author's attention, he feels that the MOWOG (BMC) offers the greatest advantages. It is of solid skirt design (strong), it is among the very lightest, and has a very low coefficient of expansion. Its three ring construction yields minimum friction, its gudgeon pin is usually accurately fitted, and the piston is tin-plated for easy running-in.

A hard-chromium plated top ring of American manufacture (Perfect Circle, or Pedrick) is available for most bore sizes, and the benefits gained are well worth the extra price. Before the rings are fitted to the pistons, check each in its bore for proper end gap, using a feeler gauge. Prior to installing the rings put a quantity of Lubriplate in the grooves, fit the rings to the piston and run them around their grooves a few times. Stagger the ring gaps at 120° from one another when fitting the piston to the bore. Also smear the walls with Lubriplate before assembly.

GUDGEON PINS

The gudgeon pin must have a proper fit in its piston bore, or drag and cocking of the piston can take place if it is too tight, while looseness will be audible as "wrist pin" rap. In either case, early failure is the result. With the piston at room temperature, two thumbs are required to push the pin thru its bore. The pin bore finish should be 4 to 6 microinch.

If the piston is not correctly assembled to its connecting rod, twisting of the rod can result. Make up two buttons per the illustration.



Assemble the piston, rod and pin and finger-tighten the bolt (AMK804). Fit the two buttons into the ends of the gudgeon pin and clamp them in a vise. The bolt may now be tightened without fear of bending the rod.

The piston itself has no front or rear. Thus it can be installed on the rod in either position. But the connecting rod must always be installed with the gudgeon pin bolt on the offside, away from the camshaft. Otherwise, a jolly good vibration develops, and the bores are not properly lubricated.

CRANKSHAFT, CONNECTING RODS, AND BEARINGS

The bottom end of the XPAG is its most fragile area, but technological advancement in recent years has given new hope here. It is emphasized that only careful, complete service will yield satisfactory results.

The crankshaft is made by forging. Original equipment had a tendency to break at the web between the front main and the first throw, but replacement shafts that have been available for the past ten years are made of more suitable steel, which seems to have eliminated the problem. The new shaft carries part number 168828 on its third web, and usually the designation EN-16, which is the British steel specification.

Examine the shaft for cracks by Magnaglo or other. Any scoring, or out-of-roundness greater than .001 in. calls for regrinding. Tolerence given for the data is +.0000, -.0001 in. Such accuracy in the machine tool industry is common, but today's automotive machinist, pushed by his superiors for greater production, loses touch with precision, and this is reflected in poor grinding accuracy. It is strongly recommended that considerable time be spent searching for a qualified grinding service. Your effort in this direction will be reflected in long bottom end life.

The crankshaft grind sizes presented in the data are those recommended by MG Car Co. But it is suspected that even Morris Motors Rebuilding Service finds it expedient to remove an additional .0008 to .0014 in. on the diameter. This is because the recommended oil clearance requires too accurate work, both in grinding and in assembly. Again it is emphasized that the grinding tolerance is most important.

Should one or two journals be so severely undersized that the worth of the shaft is questionable, build-up is possible by arc-welding. The cost is high, particularly if all four throws had to be done, and for all seven journals the cost could exceed that of a new shaft. Second, no experience has been gained in heat-treating a shaft with welded journals, so welding, by far the best way to salvage a shaft, is an expedient, not a solution. Very unhappy results are had from metallizing, or metal-spraying. On big, low-revving engines this is a get-by-for-now remedy, but on the high-revving XPAG, this sprayed metal is knocked off very quickly.

All XPAG shafts, original or replacement, new or reground, seem to have a short life. This life may be more than doubled through heat-treatment by the Tufftride process, which introduces a surface hardness of 52-68 R_c, and also increases the fatigue strength in the order of 50%. This is performed after the shaft has been machined, since the low temperature involved can not effect the demensions. Cost is moderate. Afterward, lightly polish the journals.

If the engine is to be subjected to frequent high revs, hard chromium plating of all journals might be considered. Cost is high, but the anti-scoring properties and infinite life are very desirable. On the debit side, claims have been made that chrome plating has an embrittling effect, thus weakening the shaft. But it should be noted that very good results in racing circles are achieved with plated shafts. Chrome does not hold an oil film too well so oil pump and system must be of the first order. Some rebuilders resort to grinding a groove 1/16 x 1/16 in. around the center main and through the oil supply holes. This results in a slight oil pressure drop, indicating that a restriction did exist here. (Usually, bearing failure will take place at the third throw, or occasionally, the second.) Strictly speaking, grooving is considered poor practice, but here theory seems to have been proven wrong, while practice right.

BMC specifically recommend that the XPEG shaft not be reground. Rather, it should be exchanged through a BMC distributor or dealer for a new shaft. Practical experience, however, has shown no real reason for this attitude. Indeed, the author has run an R.5 shaft in his Stage II 1½ litre TC for many miles and with no adverse consequences.

There is much scuttlebutt to the effect that a reground shaft, whether XPAG or XPEG, does not wear as well as a new shaft, that it is not as strong, that after two or three regrinds its surface hardness is gone. Very little credit can be given to this grease-pit talk. The loss of strength in a reground shaft is mathmatically negligible, and all shafts are soft, standard or R.5. Properly performed machinework, heat-treating, assembly proceedures with the right parts, and reasonable running-in will yield a completely satisfactory bottom end.

CONNECTING RODS

Quite likely no other major part of the engine is so neglected in rebuilding as is the connecting rod. And no other rod demands service as does the XPAG.

Examine for cracks by Magnaglo or other. The big end of the rod has a marked tendency to elongate. This produces an out-of-round bearing, even when new ones are installed. The author has seen rebuilt engines (done by conscientious shops) that have mild bearing rap after only 10,000 miles. This elongated big end can be resized by most automotive service shops, but some caution should be observed to obtain a good job. Tolerance here should be held to +.0002, -.0000 in. Federal Mogul Services, with branches in larger cities, seem to offer satisfactory service here.

The small end of the rod needs no attention, but examine carefully the thread in its clamp. Previous service may have produced damage. Replacement of the gudgeon pin bolt (CA1009) and the big end bolts (AEF123) and nuts (AEF 131) is a sound precaution.

The beam of the rod should be checked for straightness within .001 in. at 6 in. distances. Again this work can be performed by any good shop, but preferably in your presence. Although the shop's reputation might be first class, an individual employee can rush a "half" job with "half" accuracy on your rods.

The reconditioned rod can be considerably enhanced by the Tufftride process. Hardness is not the concern here, but the increased fatigue strength.

New rods may seem like an easy solution. Let us discuss some of the points.
1) Newer rods (shown by the higher numbers on the beam) are usually lighter in weight.
2) The big end of the rod is already sized and the beam is straight. But the tolerance for size and roundness is usually much sloppier than that which we stated, and this will effect durability.
3) New bolts and nuts are supplied with the new rod.
4) No fatigue (but Magnaglo new rods anyway).
5) A used rod has been stress relieved by the working process. If it passes inspection and is properly serviced, it might even be preferable to a new rod.

THE BEARINGS

The author has a feverous preference for Vandervell bearings, and particularly for undersizes. Admittedly there are other good bearings on the market, but none compares to Vandervell as to strength and accuracy of fit.

The main and connecting rod bearings are steel-backed babbitt of the "thinwall" or "micro" type. No hand fitting is permissable, nor should it be necessary if all machinework has been properly done. Vandervell also supply a heavy duty, copper-lead con rod bearing and its use raises the rev limit (as far as the bearings are concerned) from 6100 rpm to well over 7000. It will be noted, however, that these figures are mathmatically derived, and sending the revs beyond the limits imposed by the characteristics of the camshaft can only be described as idiotic abuse. Running at normal super-highway speeds, (and at working oil temperatures), the copper-lead bearing has about ten times the strength of the babbitt bearing. Against this, it produces rapid wear, so it must be used only with a heat-treated or hard-chromed shaft.

The main bearings are thin-wall babbitt, and no real troubles are experienced here.

Prior to assembly, clean all oil passages in the crank with gasoline and a pipe cleaner. Clean also the hole in the big end upper side of the connecting rod. If possible, blast through all these passages with compressed air. Then wash everything in a warm Wisk solution, rinse and dry. This will remove all traces of grinding abrasive dust.

During the cleansing of the block, we will have checked that all oil passages are free of obstructions. When the main bearings are fitted to the block, be certain that all oil supply holes are present in the bearing upper halves. The author has seen a few rare instances in which a hole has been missing.

Some technicians like to line bore the main bearing saddles, on the theory that aging cause demensional changes in the block. The author has never found this to be necessary. However, this does not rule out the exceptional case.

Fit the crankshaft, clean and free of lubricant, into the main bearings, assemble the caps, and finger tighten the main cap nuts. The shaft should rotate without much effort. Then lightly tighten the center cap, and check for ease of rotation. Then lightly tighten the next cap, check the rotation, and then do the last cap. Next, fully torque the nuts of each cap, checking the ease of rotation before doing the next. The crank will turn in its bearings with a noticeable drag, but no heavy-handed twisting should be necessary. When lubricated, the shaft will spin freely, but this will not give us an indication of proper fit.

Should considerable drag be felt, every component must be checked for demensions. Prussian bluing (Dykham's recommended) may be applied to the bearings to show the offending spot(s). Bluing, incidentally, will act as a lubricant, so some drag will disappear with its use, but the trouble spot will be shown by where the bluing is wiped away.

With the crank out of the block and standing upright, bolted to its flywheel assemble the rods and their bearings to the shaft, again with everything clean and free of lubricant. One finger pressed against the smaller end of the rod should be able to turn the rod around the journal, again with the slight degree of drag evident.

When using copper-lead bearings, the drag-feel method is not applicable, as the greater oil clearance of the harder bearing will tell us nothing. Here it is best to use a device such as Plastigauge. Correct clearance with the copper-lead bearing is .001 to .0015 in.

When the complete engine is assembled, and properly lubricated, considerable effort will be necessary to turn the crankshaft. Most of this effort will be required to overcome the friction of the rings on the new cylinder walls. Were the engine to be removed after proper running-in, it would be found that the cylinder walls are polished to a dull mirror finish, and that one finger, inserted in a clutch spring hole, would turn over the engine.

FLYWHEEL AND CLUTCH

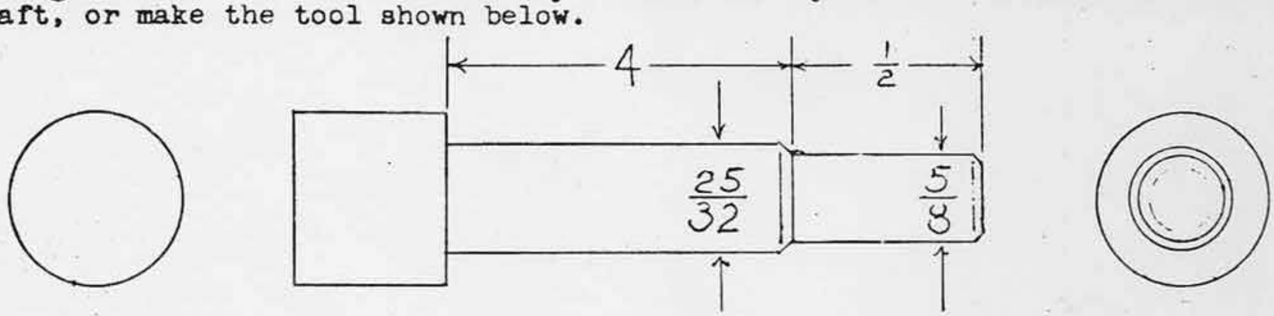
The teeth of the TC ring gear are much more durable than those on the TD and TF. However, replacement while the engine is being rebuilt is a sound precaution. The old gear may be drilled and chiseled in several places, then tapped off. The new gear is heated by an acetylene torch, when it will readily drop in place around the flywheel. Upon cooling, it will have shrunk to a secure fit.

The centerline of the crankshaft and the plane of the flywheel must be at right angles, and may be measured with a dial indicator. Maximum permissable run-out is .002 in. TIR.

Should the clutch surface of the flywheel be scored, it must be resurfaced. Consider also the Cobb Clutch (see Super-Tuning Section), as its additional torque carrying capacity is highly desirable.

The clutch disc should be replaced if lining wear is obvious; compare it to a new one when in doubt. Clutch servicing and rebuilding is thoroughly covered by the MG Workshop Manuals, so there is little point in duplicating this material here. Secondly, the more common, and better, policy is to replace the old clutch with a new or rebuilt unit. The expence is not great.

Alignment of the clutch disc may be assured by use of an old first motion shaft, or make the tool shown below.



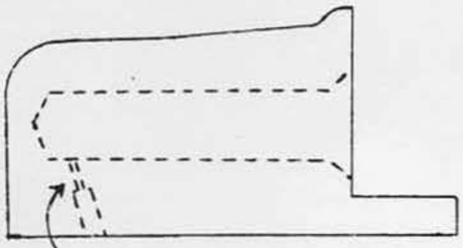
THE CAMSHAFT AND RELATED GEAR

Four "grinds" are available. X24084 is the camshaft originally fitted. In the late TDs 168553 was introduced and this gave the same top end performance, with better accelleration and less tappet noise. The author strongly recommends this new camshaft. The cams are further discussed in Section III. Note also that a change in camshafts sometimes requires a change in the ignition advance curve.

The front cam bearing (X22542) is a steel backed, babbitt lined sleeve. The old one is easily chiseled out, but press in the new one carefully, with particular attention given to the alignment of the oil supply holes. The bearing must now be reamed to size, using the center and rear bearings as guides. Use MOWOG tool 18G351, or this work may be done by a local automotive machine shop with the use of their universal boring machine.

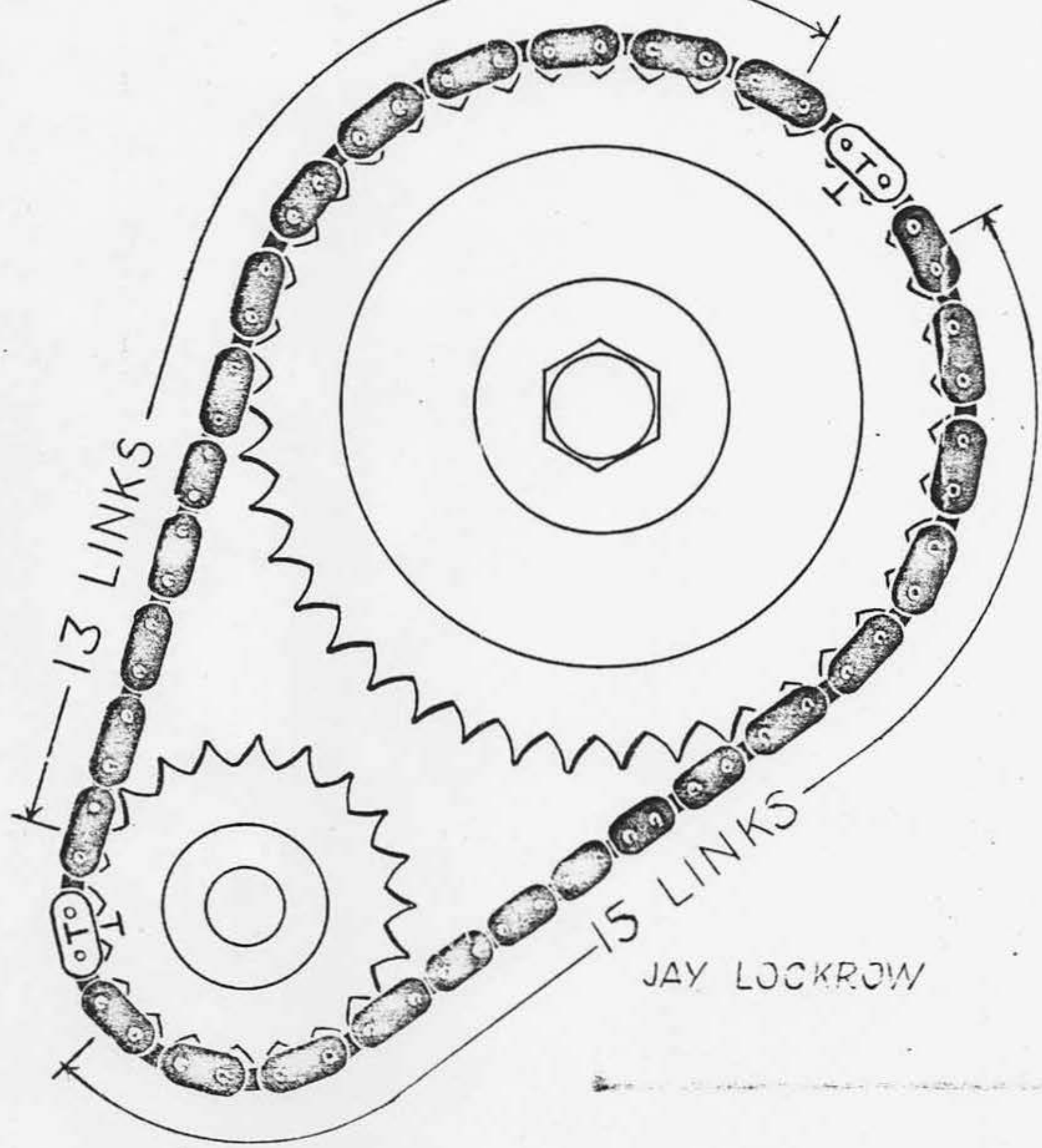
The rear cam bearing (X22546) is fitted after its core plug is in place. We must be careful this time to align both the oil supply hole and the locating hole which is fixed by a bolt (X22547).

The center cam bearing (SA2224/2) is split at its center, and must be fitted as the camshaft is assembled into the block. It is located and locked in place in the same manner as the rear bearing. The camshaft is now locked in the block by the thrust plate (X22543).



The timing chain tensioner is oil pressure operated, and this oil pressure also supplies lubrication to the chain and sprockets. Examine closely to see that the supply hole in the tensioner block (X24138) is free of any obstruction. The author has frequently found blocks with no oil passage at all. This may be corrected by drilling a 1 mm. hole per the illustration.

The camshaft timing is affected by alignment of the T marks on the sprockets with the light coloured links of the chain. Should you be using other than a Mowog chain, the illustration will show the proper alignment.



No real wear takes place on the pushrods, nor are they subject to any great stress. But occasionally we will find one that is bent. A more common fault is the loosening of the ends. These loose ends can cause noise similar to excessive valve-to-rocker clearance, and no amount of adjustment will correct the clatter. There are methods of temporary repair to the pushrods, but replacement is the best policy.

Tappet wear is a severe problem with the XPAG, and this wear may be found as early as 5000 miles. Scuffing, then pitting, takes place, and this in turn scores the cam lobe. Now the damaged lobe quickens the demise of the tappet, and the severely damaged tappet now tears apart the lobe, and so on.

No certain solution has been found to this problem, but Tufftriding both the camshaft and the tappets has shown, so far (adequate testing has not been completed), to give completely satisfactory results.

THE IGNITION SYSTEM

The Lucas distributor, due to its being driven on the side of its shaft, is prone to wear its bushing rather rapidly, thus producing shaft wabble. This wabble, in turn, leads to misfiring on one cylinder, usually on number three. Curiously, this misfiring becomes noticeable just after installing new contact points, but sometimes disappears above idle. Thus the mechanic tends to blame himself for the condition, and spends much time looking for his mistake. A new distributor makes the matter right.

The distributor can be rebuilt, but Lucas offer an attractive exchange program, and this is the suggested policy. The distributor types are listed.

camshaft	dist.type	TC	TD	TF
X24084	DKY4A	40048	40162	-
168553	D2A4	-	40368	40367

NOTES: 40048 is NLS, use 40162 and fit the micro adjustor in the same manner.
Use 40162 prior to XPAG TD2/20942, 40368 after.
When increasing the compression ratio, changing the chamshaft, or both, refer to the super-tuning section.

DISTRIBUTOR INSTALLATION

Turn the engine by hand crank (or put in top gear, roll forward) until the first inlet valve just closes, then turn the engine just enough to line up the notch on the crank pulley and the arrow on the chain cover. This is TDC on the first cylinder. Install the distributor so that the rotor points to the #1 spark plug lead, with the points just opening (counter-clockwise rotation).

With the engine idling at 700 rpm or less, a strobe light may be used to set the spark to fire at TDC. Because of the better fuels now available, and because so many heads have had the compression increased, it may be necessary to advance the spark slightly. The correct setting will have to be determined by trial and error, looking for the best possible performance with no detonation (pinging).

A word about the setting of contact points. The correct gap (on all distributors built in the last ten years) is .014 to .016 in. Among psuedo-mechanics there is much talk of a "loose" or "tight" .015 in. The seasoned technician will not dally with this fuzzy type of thinking. Rather, he uses his 14 and 16 thou gauges to tell him he is within the required setting. Thus the 14 gauge will be loose between the points, while the 16 gauge will drag. After 100 miles or so, adjust the points again, to compensate for the wear that has taken place on the rubbing block. Use a distributor cam lubricant, such as Blue Streak Lubricam, to minimise this wear.

THE COIL

The coils originally supplied on T-series are now superseded by 45074. The characteristics of both types are shown below.

coil	type	primary resistance 20°C, ohms	low speed spark gap test 100 rpm, 5% miss	hi speed test dist. rpm no miss	max. test voltage
45020 45053	Q12	4.3-4.5	9 mm.	3000	12.5
45074	LA12	3.2-3.4	10 mm.	3000	12.5

The capacity of the condensor is .18 - .23 microfared.

SPARK PLUGS

Choice of the proper plug will depend on the condition of the engine and its stage of tune. A worn engine will need a hot plug to resist oil fouling, while a modified engine may require a colder plug to deter pre-ignition. Now a plug needs a wide operating range to resist both these problems, and it is a great credit to automotive and plug engineers that their products perform so well. The following are general recommendations, for no two engines, even when built to the same specification, will have exactly the same plug heat requirements. So, on occasion, some experimenting may be necessary.

		heat range application		
head type	reach	smoker	normal	hi-speed
banana	1/2	B or C	D or E	F or G
round	3/4			

The projected core plugs (*) offer a very wide heat operating range compared to the conventional type. It will be noticed, in the chart below, that one manufacturer's plug may not have an exact counterpart in another brand. Like many others, the author was once carried away with the romance of the imported plug. Frequent troubles have been disallusioning, and he is now convinced the Yanks make the best product, with Champion taking his preference. KLG are also quite suitable, offering the widest range of plugs with different heat values. KLG 'P' (or 'PS' resistor) type waterproof covers are the best plug terminals available.

1/2 INCH REACH					3/4 INCH REACH			
KLG	Champion	AC	Autolite		KLG	Champion	AC	Autolite
F20	L-14			A	FE20	N-21		AG9
			AE82*					AG82*
		47FF					47XL	
				B	FE30	N-18		AG7
						N-16Y*		
		46FF					46XL	
				C	FE45P*	N-14Y*	46XLS*	
			AE6					
		46FFX*	AE52*					AG52*
F50	L-10			D	FE50	N-8		AG5
F55P*	UL-15Y*				FE55P*	UN-12Y*		
		45FF					45XL	
F65P*		45FFX*	AE42*	E	FE65P*		45XLS*	AG42*
F70		44FF	AE4		FE70	N-6		AG4
	UL-12Y*	44FFX*				N-9Y*	44XLS*	AG32*
F75	L-7			F	FE75	N-5		AG3
							43XL	
								AG22*
F80	L-5	42FF		G	FE80	N-4		AG2
						N-6Y*	42XLS*	
						N-3		
F100				H	FE100			
					FE125P*			
F220				J	FE220			

THE OIL PUMP

Excessive clearance in the pump, due to wear, will cause loss of pressure, particularly at low revs. The pump is partially dismantled as it is removed from the block.

Remove the circlip that holds the gear to the shaft (X22730), and then tap the shaft downward about ½ in. Now place some nuts or other suitable spacers between the body and gear and drive the shaft outward another ½ in. Continue this proceedure until the gear is removed. This must be done because of the woodruff key that positions the gear on the shaft, which would gouge the bushings, were we to attempt to merely drive the shaft out of the gear and body without heightening the gear.

The bushings (X22403) in the pump body should be driven out and new ones fitted, then hone them to .0007 in. clearance on the shaft. Now the shaft may be returned to the body, and the key, gear and circlip refitted.

Check the filter by-pass components in the block for proper mating of the ball and its brass seat. Replace the driven gear shaft (OA10132) because wear takes place on its upper portion, allowing the gear to drop and wear the pump body. This shaft may be drawn out by using a piece of tubing 2.7 in. long, plus some washers and an 8x1 mm. bolt (sump bolt). The driven gear (SA1008), its bushing included, should be replaced too.

The cover has likely become scored from the driven gear running on its surface. The cover may be ground and again lapped flat, or it may be replaced. In the cover, renew the oil pressure relief ball (AMK739) as this likely has a groove worn in it. Inspect for grooving also in the ball seat (X20856), in the cover, although this is rare, but quite important. Should any appear, replacement is necessary. The relief valve spring may have been tampered with, so using a new one is wise.

There is no gasket between the pump body and cover.

THE SUMP

Dismantle completely the sump before cleaning, even the plug on its side passage. The pick-up strainer must be thoroughly cleaned, or should it be hard-clogged, replacement will be necessary.

The TC and early TD had the pick-up on the left side of the sump, so that some starvation took place in hard left corners. It is wise to replace this unit with the later type (168727). Build a vertical baffle plate around the scoop to minimise surge during accelleration. For five quart sumps this scoop should be shortened about 1 in. to insure good circulation around its opening.

BALANCING

A severe out-of-balance condition could shortly wreck an engine. For this reason, the manufacturers hold the weight variation of their products (pistons, gudgeon pins, conrods) within certain limits, which might be considered rather liberal by the specialized tuner. A good tolerance for static balance is 1 gram maximum variation; for dynamic balance, 1 oz./in. Much speculation has been ventured as to lost power due to imbalance. However testing has shown that this is only about ½ hp. The balanced engine minimises any adverse condition (which increases directly proportionally to the increase in revs) that conventionally exist. The high road speeds employed today place particular emphasis on minimising imbalance. It is strongly recommended.

MOTOR MOUNTING

It will be noted that there is provision for adjustment of the motor mounts, so that there is no strain on them or on the frame. The engine and gearbox should be set on the frame with all bolts loose. Tighten first the four bolts that hold the rear mounts to the transmission, then the four nuts that hold the mounts to the frame. Next tighten the four bolts and nuts that hold the front mounts to the frame. This proceedure will avoid the stresses that misalignment might produce. Now the two large front bolts (81878) may be fully tightened into the mounts and the rebound rubbers (83177) can be fitted to the bottoms. Do not tighten these too much or engine vibration will be introduced into the frame. Finally, fit the 5/16-22 locknuts.

NOTE: The motor mount protecting washer (X22106) should be fitted with its dish upward, otherwise it will dig into the rubber of the front mount.

It is quite important to frequently observe the condition of the transmission mounts. When these become soft with age and oil deterioration, the condition prompts breakage of the aluminum rear mounting plate on the transmission. To repair or replace this rear plate requires removing the engine and gearbox. Periodic inspection and prompt attention can avoid this ordeal.

TUNING

Tuning may be defined as adjusting the engine and its accessories to yield maximum power and smoothness. Our tuning proceedure must be just as thorough as that which went into the rebuilding of the engine. Proper proceedure seems non-existent, even in the best of shops. Therefore, we must rely on our own abilities. A newly rebuilt engine may be more accurately tuned after 2000 mi. or so running-in, so that it may be revved to its maximum in order to test for the desired results of tuning.

1. Torque head to proper setting.
2. With engine at working temperature, check compression pressure.
3. Adjust valve-rocker clearance.
4. Clean or replace spark plugs. Set gap.
5. Check coil output, condensor capacity.
6. Remove distributor and clean thoroughly, replace points. Check distributor in testing machine, looking for inaccurate spark distribution, incorrect advance, shaft wabble. Refit unit to car and set timing.
7. Remove carburetters from the inlet manifold, disassemble completely and clean thoroughly. Then re-assemble, making such adjustments as float level, jet centering, needle height, etc. Fit to the manifold and set for equal air draw. The best instrument to use here is the Uni-Syn, for this eliminates trying to interpret the hisses and gurgles and other silly sounds. Finally, adjust the mixture, and set the idle to 700 rpm with the headlamps on.

THE COOLING SYSTEM

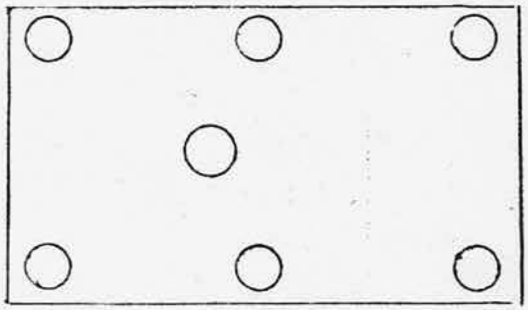
Adequate cooling has been a feature, rather than a problem, in any T series, but as a matter of caution the radiator should be cleaned and tested by an auto radiator shop. Use the 70°C. thermostat fitted as standard. Were this removed, it would adversely effect oil circulation and detergent action, the expansion rates of the metals of the engine components, and fuel-air mixture at low revs. TC and early TD water pumps were a troublesome lot, and should you have the original type, exchange it for a new one. Later TD and TF pumps give completely satisfactory service.

ADDENDA

Always replace the oil slinger cap (X22517) as this is the only source of oil leaking into the bell housing.

The crank pulley oil seals are recently being supplied (in several makes of gasket sets) rather short in length, allowing oil leaks here. Fit a new packing to the timing case cover, and fit the cover, with the bolts loose, to the block. Smear the seal running surface of the pulley with a lubricant and drive it home onto the crank. Now tighten the chain cover bolts. Into the sump fit another top seal (AEG125, not the AEG126 supplied). With this packing firmly in place, cut off the excess material with a razor blade, leaving about 1/16 to 1/8 in. standing proud on each end. This will insure proper compressing of the packing. With the gaskets and rear seal in place, fit the sump to the block and tighten all bolts.

The engine need not be pulled with the transmission in unit. Simply remove the ten bolts holding the block and sump to the bell housing. The block will pull forward, up, and out. A plate is shown to simplify the work. To its center hole is fitted an eyebolt and nut, slightly forward to tilt the engine. It is used with the head removed, fitted over the studs, and held by the nuts. Trace the six center stud holes from a head gasket onto a piece of 5/16 in. steel stock and drill 7/16 in.



The early TC engines were painted a medium green (about BRG), while the later ones were an unappealling gray-green. It should be noted that the entire engine compartment —bulkhead and bonnet undersides— was finished in this latter color for all early cars. This policy changed about the time of the first EXUs. Then the engine was painted a dark red and the compartment took on the color of the car exterior. The dark red was used for all TDs and TFs.

Always replace the bushing (AMK804) in the end of the crankshaft, and apply a small quantity of Lubriplate to the transmission shaft that fits into it.

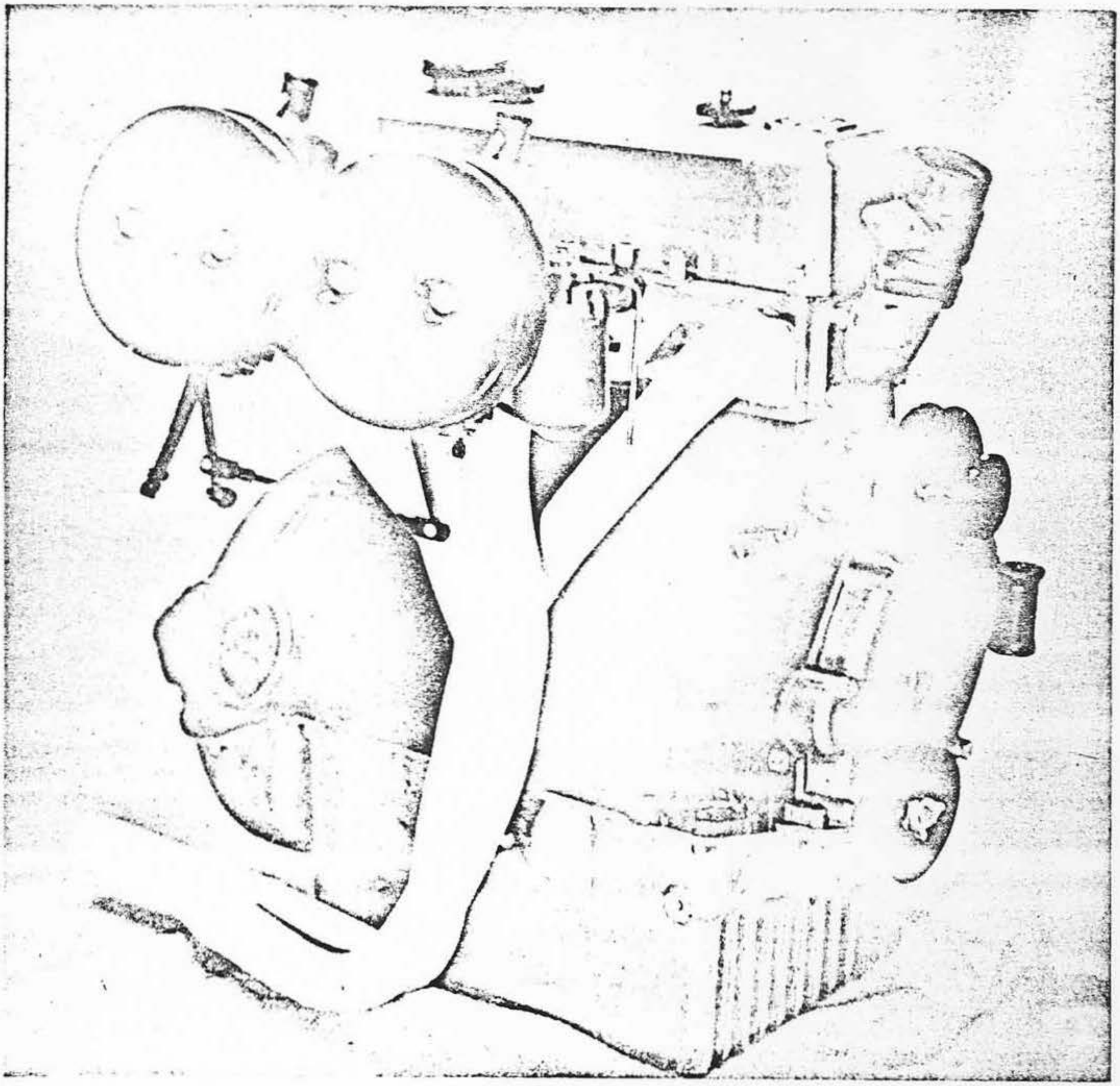
Carburettion is not discussed here because it is so well covered in SU bulletins. The following are recommended:

AUC9600	Workshop Manual, carbs and pumps
AUC9537	Basic and thermo types
AUC9593	Listing of cars, their carbs and pumps
AUA211	Construction and Functioning of Pumps

Carburetter parts lists are provided in the Super-Tuning Section for those who wish to fit the larger units of the TF.

Fan belts that are readily available from independent suppliers tend to be too long in length, thus there is not enough adjustment (especially on the TC) to keep the belt tight. The Mowog belt (AAA5780) will eliminate this problem.

The three studs (X17052) on the exhaust manifold are often butchered because the wrong nuts have been fitted. These can be removed and replaced by a good blacksmith. Use only the stock brass nuts (CA1605). Never-Seez is absolutely necessary here, and tighten these nuts carefully and evenly.



1½ Litre TC engine with Laystall head and Derrington manifold, larger carburetters, six quart sump

S U P E R - T U N I N G

Super-tuning, and particularly super-charging, have received dubious reputations because of improper approach. We find in the Tuning Manual supplied by the MG Car Co. that the guarantee is void on cars to which the recommended modifications are performed. Two reasons account for this: 1) The car, at its time of manufacture, was not built to have its power considerably increased. It was not built to be raced. It was not built to be driven even in the sporting manner for which it was designed. It was built to be driven in a very sane conservative manner only. 2) The manufacturer's position is dictated by marketing and economic pressures. MG Car Co. are in business to make money, to show a profit. For the young rake who wishes to dash about the countryside in an improper (sic) manner, the Company supply certain suggested (?) modifications, but he had better not bring to them (via guarantee) the troubles that these modifications might bring to him. Further, the Company had no controls on the quality and testing of such work.

How, then, do we dare to mill a few thou off the head, or to send the revs above 3000? The durability of the XPAG has been proved by the many years and countless miles of racing. The MG Car Co. themselves prepared and sponsored EX135 and EX179 record breaking cars. The former used a blown TD engine, the latter an unblown XPEG that developed 95 hp at 6500 rpm. At one time the Company had an XPEG blown to the modest pressure of 27 psi, and this gave 220 hp at 7000 rpm.

An intelligent approach to super-tuning can give very satisfactory results. Ignorance and impulsiveness can yield only disaster. Never plan modifications on a well-worn or questionable engine. Super-tuning must be performed on an engine in prime condition only, prepared with the greatest care according to Section II.

The durability of the properly prepared engine can easily be double that of its original form. Modifying, to take advantage of today's fuel potential, will not significantly deminish this great durability. Further, the car may now be driven in the sporting manner that matches its character. Certainly occasional running through the gears against more modern 1½ litre cars would not be detrimental, but trying to show your tail to the 7 litre monsters would be folly. Cruising on super-highways at 4-5000 rpm is now within the scope of the XPAG. In a TC with high speed axle (4.87) this means 70-85 mph.

The MG Car Co. super-tuning booklets offer stages of tune which mate together various modifications in order to achieve differing results, and are outlined below. These stages are not necessarily in numerical order for performance development. A stage II car would likely tromp a stage IV car, and from personal experience the author knows that a stage IA TC (1¼ litre) will gain a tenth mile on a stage IVB TC (1½ litre) before reaching top gear, and the same car will edge a stage IVA to about 90 mph, and only then does the hotter car go by. If in the rebuilding of a car we use stage I and the 230° cam (168553) the torque curve will be favorably enhanced (better acceleration, less shifting) way out of proportion to the money expended. Top speed will go up 1 or 2 mph, not enough to talk about. The various stages of tune are for differing uses: rallying, circuit racing, long distance road racing. Only mad Australians race their TCs today (Bravo! chaps), while the Yanks appease themselves with a few tours. But the social malcontents among us (such as the author) like nothing better than a run through the gears and sliding corners on back roads. The wind in the face, the roar of the exhaust, trying to pass the TC in front of you while keeping a lead on those behind, all give idiotic reason to a highly illegal race to a pub halfway across the county. To those few the following is recommended. In the hot rod venacular, there ain't nuttin' like cubes: 1½ litres give us a 20% increase in torque and power. From this point all recommendations will apply to both engine sizes. Use the Laystall Lucas head, 1½ SUs and twin fuel pumps, extractor exhaust, retain the 230° camshaft, fit Mallory ignition and Cobb Clutch. For reliability chrome the crank journals and use an integral pump-filter and six quart sump. Remove the fan blades unless you drive in moderate to heavy traffic. These modifications aim at a fairly flat torque curve just above the middle of the rev range, rather than at maximum horsepower. The result will be a car challanged only by the best 1½ litre machinery made today.

STAGE I. Raise compression to 8.6:1. Clean and match ports to the manifolds, fit appropriate distributor. Any engine, during rebuilding, should have this work performed in order to take advantage of the potential in today's fuels.

STAGE IA. Raise compression to 8.6:1. Install larger valves, clean and match the ports and manifolds. Fit appropriate distributor and use 1½ SUs with GJ needles, .090 jets. This stage was standard in the TDC (Mark II) and TF, and the results are outstanding for the moderate cost. The 1½ SUs are not essential, but they give a more balanced performance on the upper end of the revs.

STAGE II. Raise compression to 9.3:1. Install larger valves and polish combustion chambers quite well. Enlarge, match, and polish the ports and manifolds. Fit appropriate distributor and use 1½ SUs with GJ needles, .090 jets. Twin fuel pumps are optional. The high cost of the handwork in this stage of tune gives only marginal improvement.

STAGE III (1¼ litre only). Raise compression to 12:1 with special pistons and standard head thickness; polish chambers thoroughly. Fit large valves, and enlarge, match and polish the ports and manifolds. Fit appropriate distributor, use 1½ SUs with .125 jets and VE needles (richer VG, weaker VA). Fuel is 80% methanol (.796 specific gravity at 60°F.) and 20% 100 octane, or for a further slight increase in power, use 100% methanol with needles VJ (richer VL, weaker VI). This stage of tune was recommended in the late 1940s when pool petrol was a poor quality in the British Isles. The high cost of this fuel and the poor mileage derived, plus the frequent cleaning of the fuel lines required, make it rather impractical today.

STAGE IV. Fit a supercharger to an engine in standard tune. This is a quick bolt-on-and-take-off-anytime modification. The blower itself requires special care. Usually this cost may be better invested in another stage of tune to give comparable, or superior performance with less maintainance proplems.

STAGE IVA (1½ litre only). Raise compression to at least 10:1, and polish the chambers thoroughly. Fit large valves and stronger valve springs. Enlarge, match, and polish the ports and manifolds, using an extractor exhaust system. Fit 1½ SUs, .090 jets, LS1 needles and twin fuel pumps. Fit the AEG122 camshaft and appropriate distributor. For the TC and TD1 use a Cobb Clutch. For TD2 and TF use a pressure assembly from the early MGA 1600.

STAGE IVB (1½ litre only. Raise compression to at least 10.7:1, and polish chambers thoroughly. Install large valves and stronger valve springs. Enlarge, match and polish ports and manifolds, using an extractor exhaust system. Use 1 3/4 SUs with .100 jets, CV needles (richer GK, weaker BC or KTA), and twin fuel pumps. Fit the 168551 camshaft. For TC and TD1 use the Cobb Clutch Racing; for TD2 and TF use a clutch from a double cam MGA.

The opposite chart compares the stages of tune for power, torque, cost, and application. Cost is based on the owner's removing and replacing the engine himself, and includes completely rebuilding the block, head, oil pump, clutch, distributor, but not the water pump, carbs, starter or generator. Cost of the higher stages of tune is basic, not including the extra work that would be required to increase reliability. Thus a more realistic cost for Stages IVA and IVB would be about $1200.

stage	hp at rpm	torque	cost	remarks
standard	54 at 5200	63	625	Quite underpowered by today's standards.
Stage I	57 at 5500	65	645	Noticeable improvement.
Stage IA	63 at 5600		685	Strongly recommended for 1¼ litre, brings car to acceptable level of performance.
Stage IA 1½ litre	73 at 5600	78	830	Very pleasant to drive, brings car to modern standard of performance. Use high speed axle.
Stage II	66 at 5700	68	725	Good performance. High speed axle could be used.
Stage II 1½ litre	78 at 5700	80	880	For hillclimbs use standard axle; for street use a high speed axle.
Stage III	76 at 6000	75	725	Rather impractical today.
Stage IV	65 at 5500	72		Cost varies according to supercharger manufacturer. Installation is fast, easy.
Stage IVA	86 at 6000		950	For hillclimbs use standard axle; for fast track racing use high speed axle. Sluggish on the street, ok for highway travel.
Stage IVB	90 at 6300		1000	For sustained high speed racing only, no good on street. Use high speed axle.

SUPERCHARGING

Supercharging is a quick way of gaining a noticeable improvement in performance. The supercharger, or blower, comes as a ready-to-install kit that even the novice should be able to install in less than a day's work. The blower is mounted on the intake manifold, and driven by twin belts from the crankshaft. Power increase is in the order of 20%. Even greater outputs can be achieved by use of limited super-tuning to improve the gas flow. Larger valves and increased compression (8.3:1 maximum) could yield 70 hp, and 1½ litres would result in 85 hp and 93 lbs./ft. torque. This would be a marvelously tractable car.

Supercharging augments the natural aspiration of the engine, or in simpler terms, it pushes the air into the chamber under pressure much greater than atmospheric. The result is a greater charge of fuel-air being compressed and ignited, with a proportional increase in power output, minus the power to drive the blower.

More information may be had from the manufacturers of this type equipment.

To minimise hotspots, and pre-ignition, the combustion chambers should be cleaned and polished. This will discourage the buildup of carbon deposits. Be certain to always use premium fuel.

Use a high-energy coil, since the greater pressures mean greater resistance to sparking. The Mallory coil and distributor would be ideal under these conditions.

DISPLACEMENT

The standard bore of the XPAG is 66.5 mm., and this may be overbored up to .125 in., IF the casting is sound. On occasion, a block was cast with the core pattern slightly off center, leaving one side of a cylinder wall slightly thin. This block would suffer cracks when bored larger than .060 in. Unfortunately, we cannot tell if the block will take the larger bore until we have run the engine. Thus it might be wise to limit overbore to .060 in. The increase in power and torque is directly proportional to the increase in displacement.

The standard bore of the XPEG is 72 mm., which gives a 20% increase in power and torque over the older unit. As an alternative to the high cost of an XPEG block, the XPAG can be fitted with sleeves (Wakefield P2/102) for the same 1½ litres. This sleeving may be performed only on the banana block, for, at the level of the external water gallery, there is a support in the casting to give the sleeves the necessary rigidity. This support is missing in round blocks.

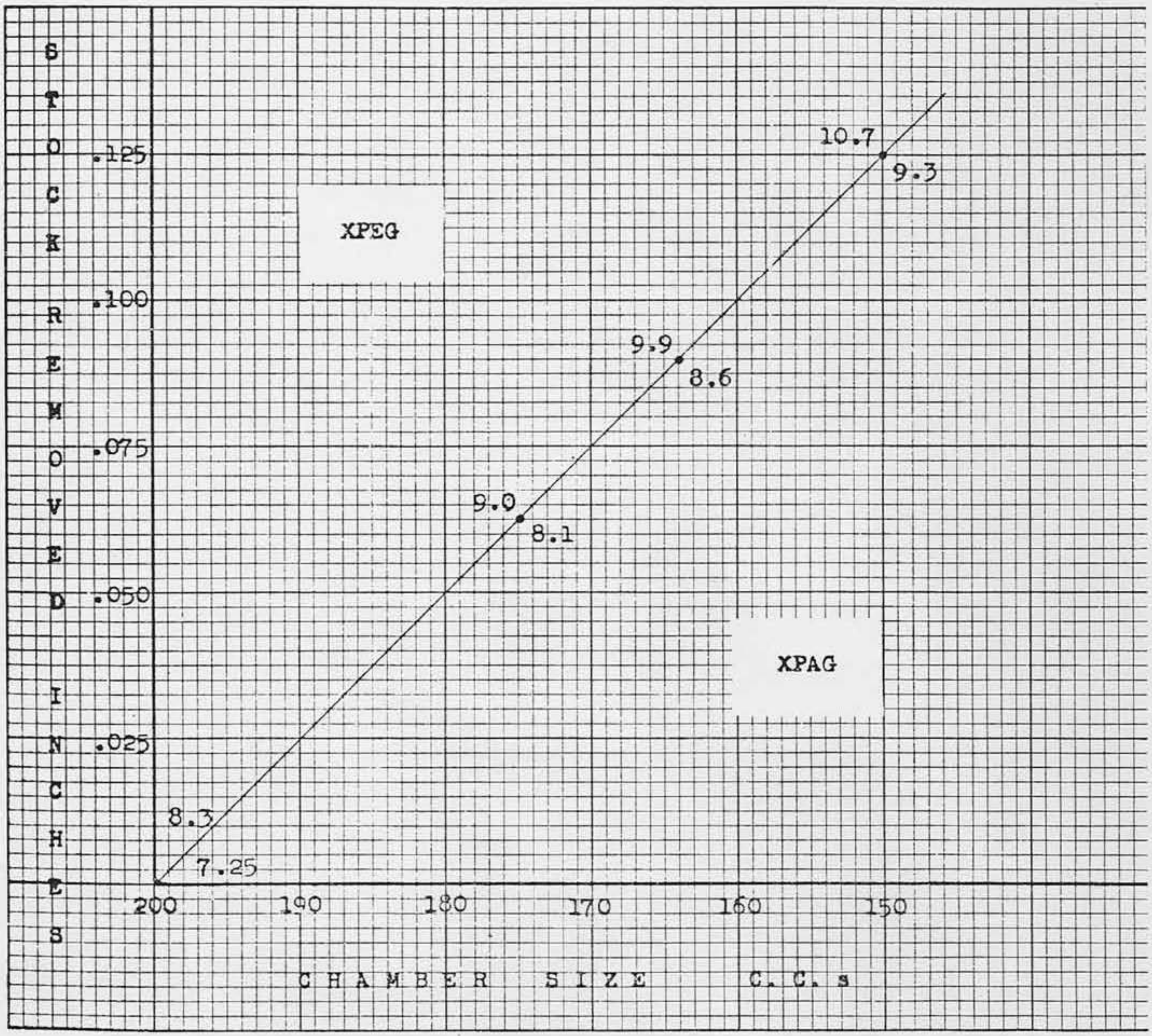
Nothing raises power, and more important, the torque, as does an increase in displacement. Acceleration and low speed running are improved in direct proportion to the increase in displacement. An XPEG block is expensive, but Wakefield sleeves cut this cost about in half. Boring the XPAG .060 in. o/s costs no more than a modest rebore, while a .125 in. overbore costs about $20 more. The importance of displacement cannot be stressed too greatly. Whether we are after blinding speed or just driving ease, an increase in displacement is the place to begin. The other modifications are, by comparison, frosting on the cake. The benefits of greater displacement are most noticeable through the gears. A 1½ litre TC will take off more briskly and smoothly in 2nd gear than will a stock TC in first. A Stage II 1½ litre car will have torque such that first gear becomes much too low, so that a high speed axle ratio should be fitted in order to take advantage of what has been gained. Even with this higher ratio, only the best cars (of similar displacement) can present a challenge in a run through the gears.. Truly, a larger bore is our first consideration.

COMPRESSION RATIO

The compression ratio may be increased by removal of stock from the face of the head. Grind away any local sharp edges that this might leave at the combustion chambers and cut the ridge at the spark plug bosses to about 1/32 in. With the very high ratios (above 9:1), polish the chambers quite well to deter carbon deposits and consequent hot spots.

remove	head finished depth	chamber size	ratio $1\frac{1}{4}$ litre	ratio $1\frac{1}{2}$ litre
std.	76.75 mm. (3.022 in.)	200 cc.	7.25	8.33
1/16 in.	75.16 mm. (2.959 in.)	175 cc.	8.1	9.
3/32 in.	74.37 mm. (2.928 in.)	165 cc.	8.6	9.9
1/8 in.	73.58 mm. (2.898 in.)	150 cc.	9.3	10.7

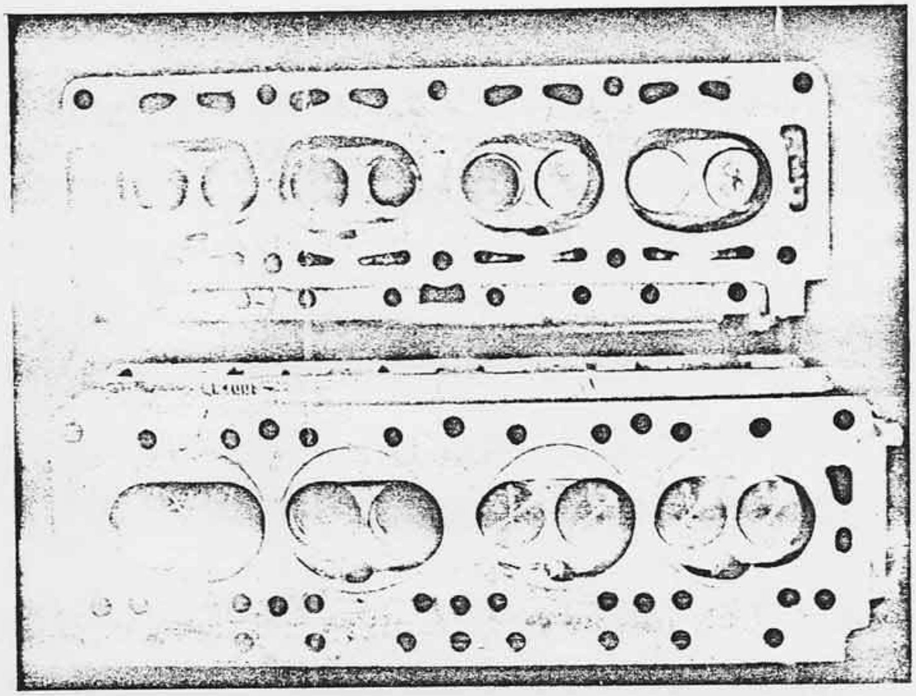
Additional material can be removed, but with some risk involved. Due to the slight variations in production casting, some heads may have thin faces. Reducing the head depth below 73.58 mm. could render the head excessively weak.



Special pistons (MG862/458) give a 12:1 ratio with the standard head depth and a special gasket (MG862/472). These are available for the 1¼ litre only, and a methonal based fuel must be used. Also available are special domed pistons, in a variety of compression ratios, by Jahns and Hepolite, but the extra weight of these pistons raises the reciprocating mass, thus limiting rpm.

Increasing the compression ratio is by far the cheapest way to gain power. With the use of premium fuel, no real problems arise. When combining the compression increase with a larger bore, take into account that the ratio goes higher still. Thus a .060 in. overbore and a 73.58 mm. head depth would yield a ratio of 9.6:1, still quite practical for street use.

The Laystall-Lucas cylinder head is particularly desirable for ratios over 10:1. Its aluminum means greater heat disapation (so ratios to 11.5:1 can be used), very important to reliability, and with the larger valves and ports, the power increase is at least 25%. A word of caution when using this head. Always use a thread compound on nuts, bolts, and studs. Torque 8 mm. bolts and studs to 20 lbs./ft., 10 mm. bolts to 25 lbs./ft., spark plugs to 20 lbs./ft. Use flat washers (Fiat part 12629871) under the head nuts, and torque the head first to 30 lbs./ft. on all nuts, then to 40 lbs./ft. Run the engine for about one minute, blipping the throttle a few times to stress the hold of the head studs and nuts. Then retorque to 40 lbs./ft. Torque the head a third time after driving the car about 25 miles. For this final tightening, be certain that the engine is stone cold. Aluminum cylinder heads are easily warped through unequal stress by the head nuts. Check the torque (cold) during the tuning proceedure of normal maintainance (about every 10,000 miles).



standard XPAG
banana head

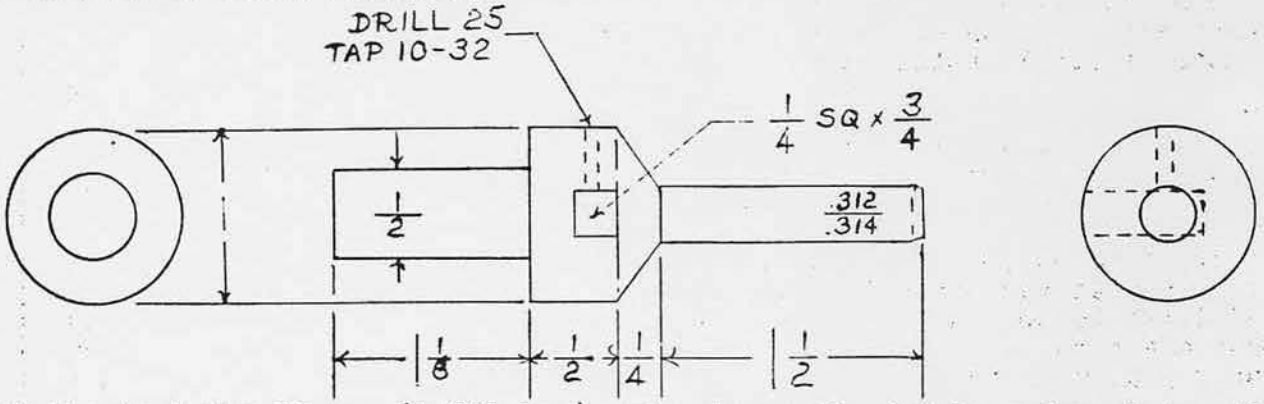
and

Laystall Lucas
round head

In earlier tuning booklets, the MG Car Co. advised the use of rocker stand shims (MG862/459) when removing stock from the face of the head. More recently, this suggestion has been dropped because it is so obviously wrong. These packing pieces serve only to adversly effect the angle of attack of the rocker on its valve stem tip. Usually the loss of head depth can be taken up by the adjustment screw (X20194). If a pushrod is too long for practical adjustment, draw off the end and shorten the rod an amount equal to that removed from the head. Be certain that the tube is deep enough for the end to go right home. It will be necessary to pinch the end of the tube somewhat to lock in the end.

LARGER VALVES

To increase the volummetric efficiency, larger valves (168426 intake, AJJ193 exhaust) may be fitted, and for these the chamber walls must be slightly cut away and the valve chokes enlarged and contoured. A tool holder, piloted off the valve guide, is shown below. The ¼ in.² tool is a side and face cutter having a 1 mm. (.040 in.) radius, adjustable for the four operations and locked by a 10-32x5/16 Allen setscrew.



Set the tool for 33 mm. (1.299 in.) and enlarge the intake valve choke, then reset the tool to 38 mm. (1.496 in.) and cut away the chamber wall. With the tool set at 29 mm. (1.142 in.), bore the exhaust valve choke, then reset to 36 mm. (1.417 in.) and cut away the chamber wall. Feather off by grinding any local ridges left in the ports. Recut the intake valve seat to 30°x 34.8 mm. (1.374 in.) top diameter, the exhaust seat to 30°x32.8 mm. (1.291 in.) top diameter.

PORTING

It is possible to grind off 1/32 in. from each side of the inlet port seperating stud boss. Do not remove the boss completely as this would adversely effect the gas flow, but it should be contoured to a streamlined shape. Also grind off 1/32 in. from the port walls (top, side, bottom) and taper this into the inner section to preserve the venturi effect.

Of particular importance is the matching of the ports and the manifolds, in order to promote a smooth gas flow, free of eddies and swirls. The cost is relatively small when compared to the gain. To accurately locate the manifolds on the head, drill and fit 1/8 in. pins, so that the manifolds fit in only one exact position. Polishing the ports and manifolds can slightly improve the gas flow, but the cost is high for a small benefit.

VALVE SPRINGS

To prevent valve float at high revs, fit the stronger valve springs (168248 outer, 168249 inner). These are good around 6500 rpm. Stronger springs increase the tappet and cam lobe wear, already a plague in the XPAG, thus if the car is being used on the street,, the standard springs are prefered. Stiffer springs should only be used with AEG122 and 168551 camshafts and when the revs are to be frequently sent above 6000. Cost is negligeable.

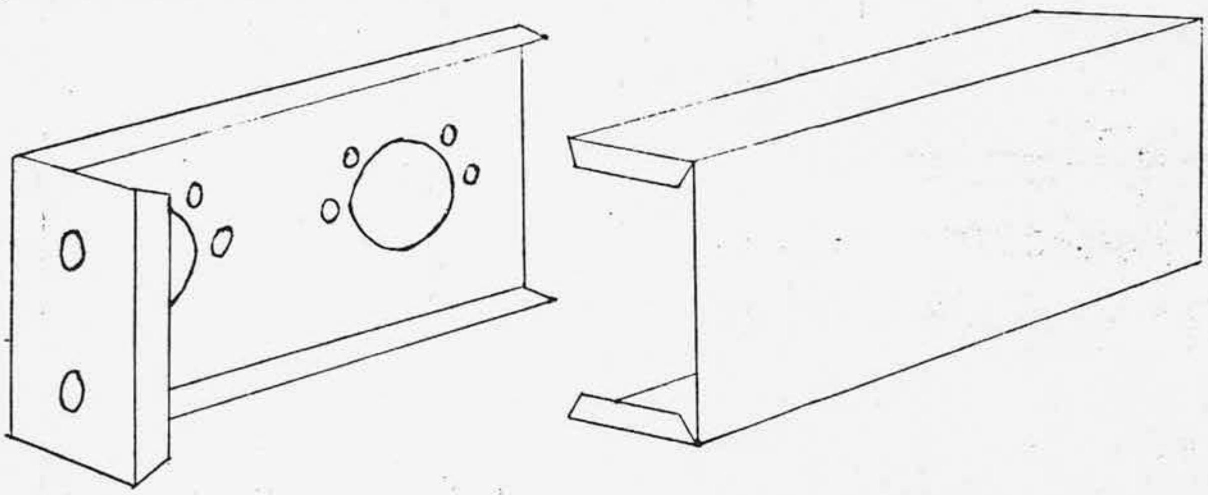
To reduce the reciprocating valve weight, cut off the tubular portion of the valve stem shroud (X24086), leaving about 1/8 in. to locate the inner spring. These shrouds are cyanide hardened and must be cut with a grinding wheel.

To minimise rocker friction, replace their springs (X19206, X20428, X20429) with steel distance tubes, 19/32 in. ID, leaving .003 - .005 in. end float.

FUEL DELIVERY

Fit 1½ inch SU carburetters (AUC728) in conjunction with the bigger intake manifold (SA2440/1). Alternatively, the stock manifold may be enlarged, but a restriction on the outer sides will remain. Use needles GJ, but with the AEG122 camshaft use LS1. A more even mixture may be had by replacing the rear float bowl (AUC3496) with a front one (AUC3495). For this, the throttle arm (AUC3272) must be relocated to the connecting spindle (AUC2402). This accomplishes two things. First, both carburetters will be slightly enriched when it is needed going uphill (slight leaning occurs downhill but this is not critical), whereas we previously had one enrichened and the other leaned when on inclines. Second, when the throttle arm is attached to a carburetter spindle, flexing of the couplings (AUC4334) would allow less air draw on the other carburetter. Moving the arm to the connecting spindle avoids this.

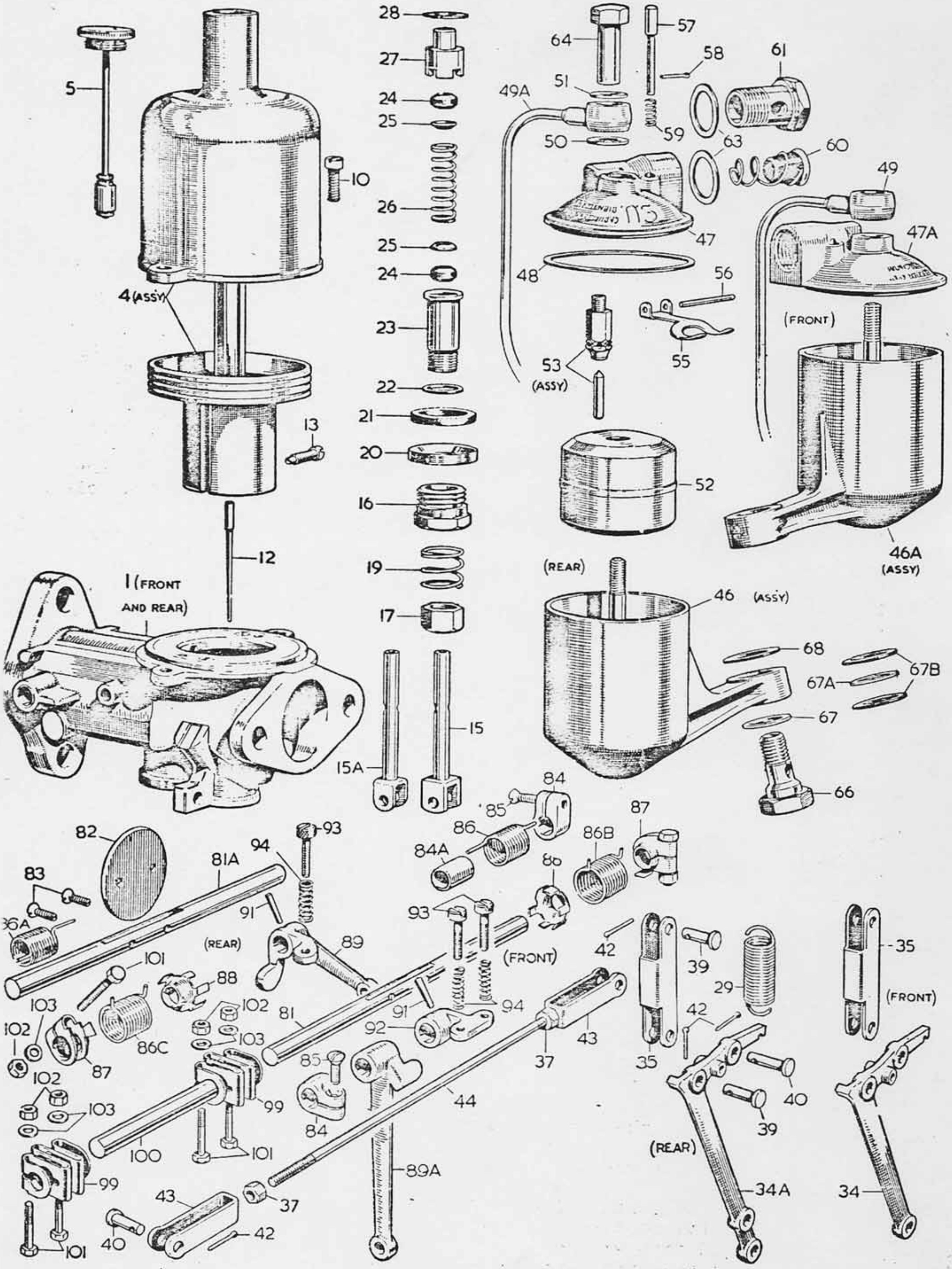
For full racing at continuous high speed, a further slight increase may be had by fitting 1 3/4 SUs (AUC723) with needles CV, but it is necessary to make a special manifold. Follow a design similar to the original, with boxes up from the head, inclined at 15°, and with a 5/8 in. ID balance pipe that has a restrictor with an 11 mm. (7/16 in.) hole located in its center, or a better solution is to use the special exhaust manifold available from V.W.Derrington. This has the intakes incorporated into it, but the bonnet cannot be closed with this unit because its intake necks are longer than standard, so the side panels must be altered or removed. Use air cleaners 11B621 or make a cold air box per the illustration below.



To insure an adequate fuel delivery at speed, fit two SU fuel pumps (AUA25), with separate fuel lines from the tank to each pump and each pump has its line to a carburetter, with a balance line connecting these. Do not use the high pressure pump of the TF, as, due to its design (high pressure, low vacuum), it is not suitable for firewall mounting, and, therefore, it will give inadequate delivery. Further, it is not as reliable as the low pressure unit.

From the fuel tank remove the drain plug(AJJ55) and replace it with a second feed adaptor (99612). Connect to this another fuel line (81869) to the second pump. To the forward carburetter fit a double banjo union (AUC1832), so that it will take two lines, the one from the pump as well as a balance line. .Fit the pumps in positions such that the flex lines to the carbs are about the same length. The balance line may be as short as possible.

Illustrations and parts lists follow for the 1¼ and 1½ SUs. From these may be determined the parts required to convert your 1¼ SUs to 1½s. These larger carbs may also be had from wrecked MGAs, TR2s, older Volvos and Healeys, etc. Again the lists will show the parts necessary to convert to the TC.



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(FRONT)
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46A (ASSY)
(REAR)
46 (ASSY)
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(REAR)
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PAIR OF CARBURETTERS (Type H2)

Illus. No.	Part No.	Qty. off	DESCRIPTION
	Spec. No.	**1**	**Carburetter complete—front.**
	AUC429	**1**	**Carburetter complete—rear.**
			BODY SUB-ASSEMBLY
1	AUC.6080	2	Body—bare.
			SUCTION CHAMBER AND PISTON SUB-ASSEMBLY
4	AUC8005	2	Suction chamber and piston assembly (P).
5	AUC8100	2	Oil cap assembly—Mk. II.
10	AUC2175	4	Suction chamber securing screw.
12	ES	2	Jet needle—standard.
13	AUC2149	2	Jet needle locking screw.
			JET SUB-ASSEMBLY
15A	AUC8182	2	Jet with head—pressed head.
16	AUC3232	2	Jet screw.
17	AUC2121	2	Jet adjusting nut.
19	AUC2114	2	Jet adjusting lock spring.
20	AUC2117	2	Jet sealing ring—brass.
21	AUC2118	2	Jet sealing ring—cork.
22	AUC3233	2	Jet copper washer—bottom half.
23	AUC3231	2	Jet bearing—bottom half.
24	AUC2120	4	Jet gland washer—cork.
25	AUC2119	4	Jet gland washer—brass.
26	AUC1158	2	Jet gland spring.
27	AUC3230	2	Jet bearing—top half.
28	AUC2122	2	Jet copper washer—top half.
29	AUC3117	2	Return spring—jet lever.
			JET LEVER AND LINK SUB-ASSEMBLY
34	AUC3007	1	Jet lever—front carburetter.
34A	AUC3097	1	Jet lever—rear carburetter.
35	AUC2382	2	Jet link.
37	AUC2156	2	Nut (2 BA)—connecting rod.
39	AUC2381	4	Pivot pin—short.
40	‡AUC2108	4	Pivot pin—long.
42	AUC2109	8	Split pin ($\frac{1}{16}''$).
43	AUC2256	2	Fork—jet connection.
44	AUC1851	1	Connecting rod—jet lever.
			FLOAT-CHAMBER SUB-ASSEMBLY
46	AUC3496	1	Float-chamber—bare—with stud and plug—rear carburetter.
46A	AUC3495	1	Float-chamber—bare—with stud and plug—front carburetter.
47A	AUC1160	1	Float-chamber lid—front carburetter.
47	AUC1161	1	Float-chamber lid—rear carburetter.
48	AUC1147	2	Oakenstrong washer—lid.
49	AUC3202	1	Drain tube and banjo union—front carburetter.
49A	AUC3203	1	Drain tube and banjo union—rear carburetter.
			Float-chamber Sub-assembly—*continued*
50	AUC1928	2	Fibre washer.
51	AUC1557	2	Plain washer—aluminium.
52	AUC1123		Float.
53	AUC8170	2	Float needle and seat assembly.
55	AUC1980	2	Float hinged lever.
56	AUC1153	2	Float hinged lever pin.
57	AUC1149	2	Float tickler pin.
58	AUC1175	2	Split pin for tickler.
59	AUC1151	2	Float tickler pin spring.
60	AUC2139	2	Filter.
61	AUC2698	2	Banjo bolt.
63	AUC2141	4	Banjo bolt fibre washer.
64	AUC1867	2	Cap nut—long.
66	AUC1541	2	Holding up bolt—float-chamber.
67	AUC4642	2	Holding-up bolt washer—copper.
67A	AUC5026	2	Skid washer—brass. } in sets.
67B	AUC5027	4	Washer—fibre } in sets.
68	AUC2130	2	Holding-up bolt washer—fibre.
			THROTTLE SPINDLE, COUPLINGS, AND LEVER SUB-ASSEMBLY
81	AUC3059	1	Throttle spindle—front carburetter.
81A	AUC3054	1	Throttle spindle—rear carburetter.
82	AUC2169	2	Throttle disc.
83	AUC1358	4	Throttle disc screw.
84	AUC1380	3	Collar for return spring (loose lever).
84A	AUC3350	2	Sleeve for return spring.
85	AUC2542	3	Screw for collar (4 BA).
86	AUC3352	1	Return spring—front carburetter (1st type).
86A	AUC3351	1	Return spring—rear carburetter (1st type).
86B	AUC4781	1	Return spring—front carburetter (2nd type).
86C	AUC4781	1	Return spring—rear carburetter (2nd type).
87	AUC4771	2	Retaining clip with bolt, nut, washer.
88	AUC4770	2	Anchor plate—throttle return spring.
89	AUC3507	1	Throttle lever—pinned-on—rear carburetter.
89A	AUC3498	1	Throttle lever—loose—front carburetter.
91	AUC2106	2	Taper pin.
92	AUC3497	1	Throttle stop—front carburetter.
93	AUC2521	3	Stop adjusting screws—long.
94	AUC2451	3	Adjusting screw spring.
99	AUC4334	2	Coupling assembly (folded type).
100	AUC2402	1	Connecting rod.
101	AUC2669	4	Bolt (4 BA).
102	AUC2673	4	Nut (4 BA).
103	AUC4612	4	Washer—plain.

Finish: P=Polished.

‡ Used with solid jet head, replaced by pivot pin—short (Part No. AUC2381) when pressed jet head (Part No. AUC8182) is fitted.

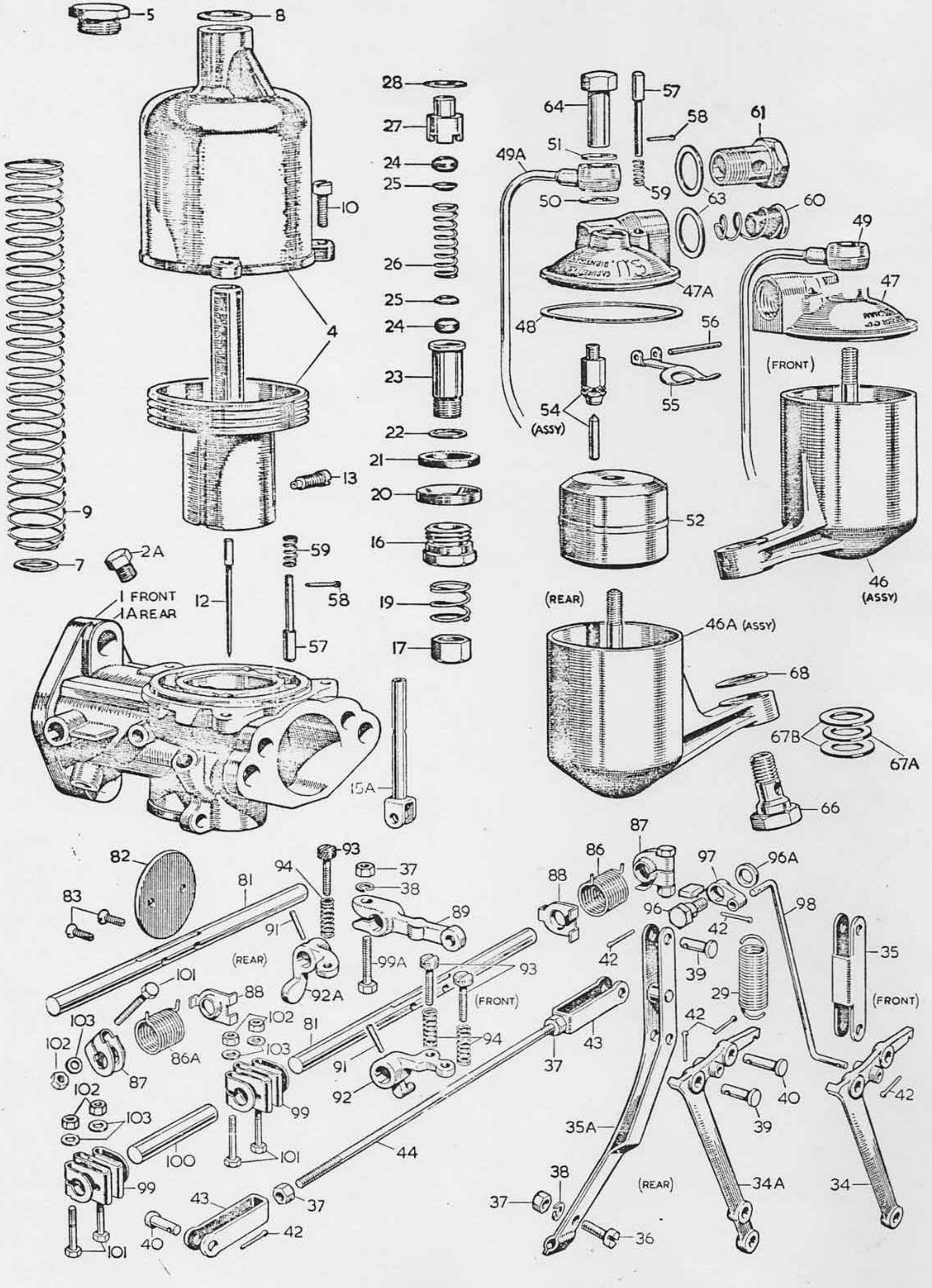
The original type of holding-up bolt has a large head ·92" across flats, and can only be used in conjunction with the cork sealing washer (Part No. AUC1542) which fits into a recess in the head.

Holding-up bolt with head ·71" across flats is used in conjunction with a single washer (Part No. AUC4642) or the later assembly of three special washers (Part No. AUC5026 (1 off) and Part No. AUC5027 (2 off)). If the holding-up bolts are changed it is essential to fit the correct corresponding washers.

Retaining clip (Part No. AUC4771) supersedes collar and screw (June 1950).

Return spring (Part No. AUC4781) supersedes Part No. AUC3351 (June 1950).

Anchor plate (Part No. AUC4770) was introduced June 1950.



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35A
(REAR)
34A
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PAIR OF CARBURETTERS (Type H4)

Illus. No.	Part No.	Qty. off	DESCRIPTION
—	Spec. No. **AUC728**	1	**Carburetter complete—front.**
		1	**Carburetter complete—rear.**
			BODY SUB-ASSEMBLY
1	AUC6030	1	Body—bare—front.
1A	AUC6021	1	Body—bare—rear.
2A	AUC4627	2	Plug—boss—air bleed.
N.I.	AUC1055	2	Washer—fibre—plug.
57	AUC1149	2	Pin—piston lifting.
58	AUC1175	2	Split pin.
59	AUC1151	2	Pin spring.
			SUCTION CHAMBER AND PISTON SUB-ASSEMBLY
4	AUC8015	2	Suction chamber with piston (P).
5	AUC4602	2	Oil cap.
7	AUC3071	2	Thrust washer.
8	AUC4900	2	Fibre washer—oil cap.
9	AUC4587	2	Piston spring—light blue.
10	AUC2175	6	Suction chamber securing screws.
12	G.J.	2	Jet needle—standard.
13	AUC2468	2	Jet needle screw.
			JET SUB-ASSEMBLY
15A	AUC8182	2	Jet with head.
16	AUC3232	2	Jet screw (W).
17	AUC2121	2	Jet adjusting nut.
19	AUC2114	2	Jet adjusting lock spring.
20	AUC2117	2	Jet sealing ring—brass.
21	AUC2118	2	Jet sealing ring—cork.
22	AUC3233	2	Jet copper washer—bottom half.
23	AUC3231	2	Jet bearing—bottom half.
24	AUC2120	4	Jet gland washer—cork.
25	AUC2119	4	Jet gland washer—brass.
26	AUC1158	2	Jet gland spring.
27	AUC3230	2	Jet bearing—top half.
28	AUC2122	2	Jet copper washer—top half.
29	AUC4667	2	Return spring—jet lever (W).
			JET LEVER AND LINK SUB-ASSEMBLY
34	AUC4763	1	Jet lever—front carburetter.
34A	AUC3234	1	Jet lever—rear carburetter.
35	AUC3419	1	Jet link—front carburetter.
35A	AUC3235	1	Jet link—rear carburetter.
36	AUC1453	1	Bolt (2 BA)—jet link—rear.
37	AUC2156	1	Nut (2 BA).
38	AUC2246	1	Washer (2 BA)—spring.
39	AUC2381	6	Pivot pin—short.
40	AUC2108	2	Pivot pin—long.
42	AUC2109	10	Split pin ($\frac{1}{16}$").
43	AUC2256	2	Fork—jet connection.
44	AUC1851	1	Connecting rod—jet lever.

Illus. No.	Part No.	Qty. off	DESCRIPTION
			FLOAT-CHAMBER SUB-ASSEMBLY
46	AUC3495	1	Float-chamber with stud—bare—front carburetter.
46A	AUC3496	1	Float-chamber with stud—bare—rear carburetter.
47	AUC4260	1	Float-chamber lid—front carburetter.
47A	AUC4261	1	Float-chamber lid—rear carburetter.
48	AUC1147	2	Oakenstrong washer—lid.
49	AUC3202	1	Drain tube and banjo union—front carburetter.
49A	AUC3203	1	Drain tube and banjo union—rear carburetter.
50	AUC1928	2	Serrated fibre washer.
51	AUC1557	2	Plain washer—aluminium.
52	AUC1123	2	Float.
54	AUC8170	2	Float needle and seat assembly.
55	AUC1980	2	Float hinged lever.
56	AUC1153	2	Float hinged lever pin.
57	AUC1149	2	Float tickler pin.
58	AUC1175	2	Split pin for tickler.
59	AUC1151	2	Float tickler pin spring.
60	AUC2139	2	Filter.
61	AUC2698	2	Banjo bolt (W).
63	AUC2141	4	Banjo bolt fibre washer.
64	AUC1067	2	Cap nut—air vent.
66	AUC1541	2	Holding-up bolt—float-chamber (W).
67A	AUC5026	2	Skid washer—brass } in sets
67B	AUC5027	4	Washer—fibre } in sets
68	AUC2130	2	Holding-up bolt washer—fibre.
			THROTTLE SPINDLE, COUPLINGS AND LEVER SUB-ASSEMBLY
81	AUC3242	2	Throttle spindle.
82	AUC2169	2	Throttle disc.
83	AUC1358	4	Throttle disc screw.
86	AUC4782	1	Return spring—throttle—front carburetter (W).
86A	AUC4781	1	Return spring—throttle—rear carburetter (W).
87	AUC4771	2	Retaining clip with bolt, nut, and washer (W).
88	AUC4770	2	Anchor plate—throttle return spring clip.
89	AUC3272	1	Throttle lever—rear carburetter.
91	AUC2106	2	Taper pin.
92	AUC3437	1	Throttle stop—front carburetter.
92A	AUC2199	1	Throttle stop—rear carburetter.
93	AUC2521	3	Stop adjusting screw—long (W).
94	AUC2451	3	Stop adjusting screw spring—long (W).
96	AUC3471	1	Pivot bolt—intermediate jet and throttle—front carburetter (W).
96A	AUC4848	1	Pivot bolt washer—front carburetter (W)
97	AUC3502	1	Rocking lever—front carburetter (W).
42	AUC2109	2	Split pin ($\frac{1}{16}$").
98	AUC4853	1	Tension link—front carburetter (W).
99	AUC4334	2	Coupling (folding type) (W).
99A	AUC2694	1	Bolt (2 BA)—throttle lever (W).
100	AUC2402	1	Connecting rod—throttle.
101	AUC2669	4	Bolt (4 BA)—coupling (W).
102	AUC2673	4	Nut (4 BA)—coupling (W).
103	AUC4612	4	Plain washer—coupling (W).

For better accelleration, use red dashpot spring (AUC4387) and damper (AUC8102). For maximum power, use light blue spring (AUC4587), or no spring, and cap (AUC602) without damper, or cap with damper may be used, but do not put oil in piston shaft.

LUBRICATION

The oil pressure may be increased by the use of a supplementary oil spring (MG706/226) or with a spigoted washer (SK1039) or both. Either will bring the pressure to about 80 lbs. hot.

An oil pressure regulator may be fitted to the lower cover (X22951) by drilling (7 mm.) and tapping (8x1 mm.) its center. Fit an adjustment bolt (X15268) and locknut (X15117), and use the SK1039 disc as a thrust washer.

The TD2-TF type oil pump, with its integral filter, eliminates the possible troubles due to exposed oil lines. Furthermore, the filter is much easier to replace, and far less expensive. When fitting this later type pump-filter, it will be necessary to block the old oil entrance at the rear of the gallery. From one of the filter lines (X24358 or X24359) cut off a banjo end. On the banjo braze closed its side opening (at the cutting spot), and remove the excess braze with a file for a finished appearance. Now fit the piece to the gallery inlet with the copper washers (X19090, AEG3122) and its bolt (X19089). The oil now enters the gallery directly at the pump-filter assembly.

A six quart sump (SA2411/5) and its pickup-scoop assembly (AEG119) will aid in keeping a low oil operating temperature. To prevent surge, and consequent oil starvation during acceleration, make a vertical baffle plate and attach it to the horizontal plate (168249). Fit this new baffle about midway in the sump and so that it closely surrounds the scoop.

CAMSHAFTS

Four camshafts are listed below, all supplied by the MG Car Co. Old and new part numbers are given to minimise (?) confusion when ordering.

camshaft	intake opens BTDC	intake closes ABDC	exhaust opens BBDC	exhaust closes ATDC	duration	lift	setting hot
MG862/171 X24084 AAA5776	11°	57°	52°	24°	248° I 256° X	8 mm.	.019 in.
168553 AAA3096	5°	45°	45°	5°	230°	8.3 mm.	.012 in.
AEG122	13°	59°	50°	22°	252°	8.3 mm.	.015 in.
168551 AAA3095	32°	58°	60°	30°	270°	8.3 mm.	.012 in.I .019 in.X

X24084 was supplied originally in the TC and early TDs. Its characteristics are inferior to 168553 for accelleration and street use, and for higher revs it is inferior to AEG122.

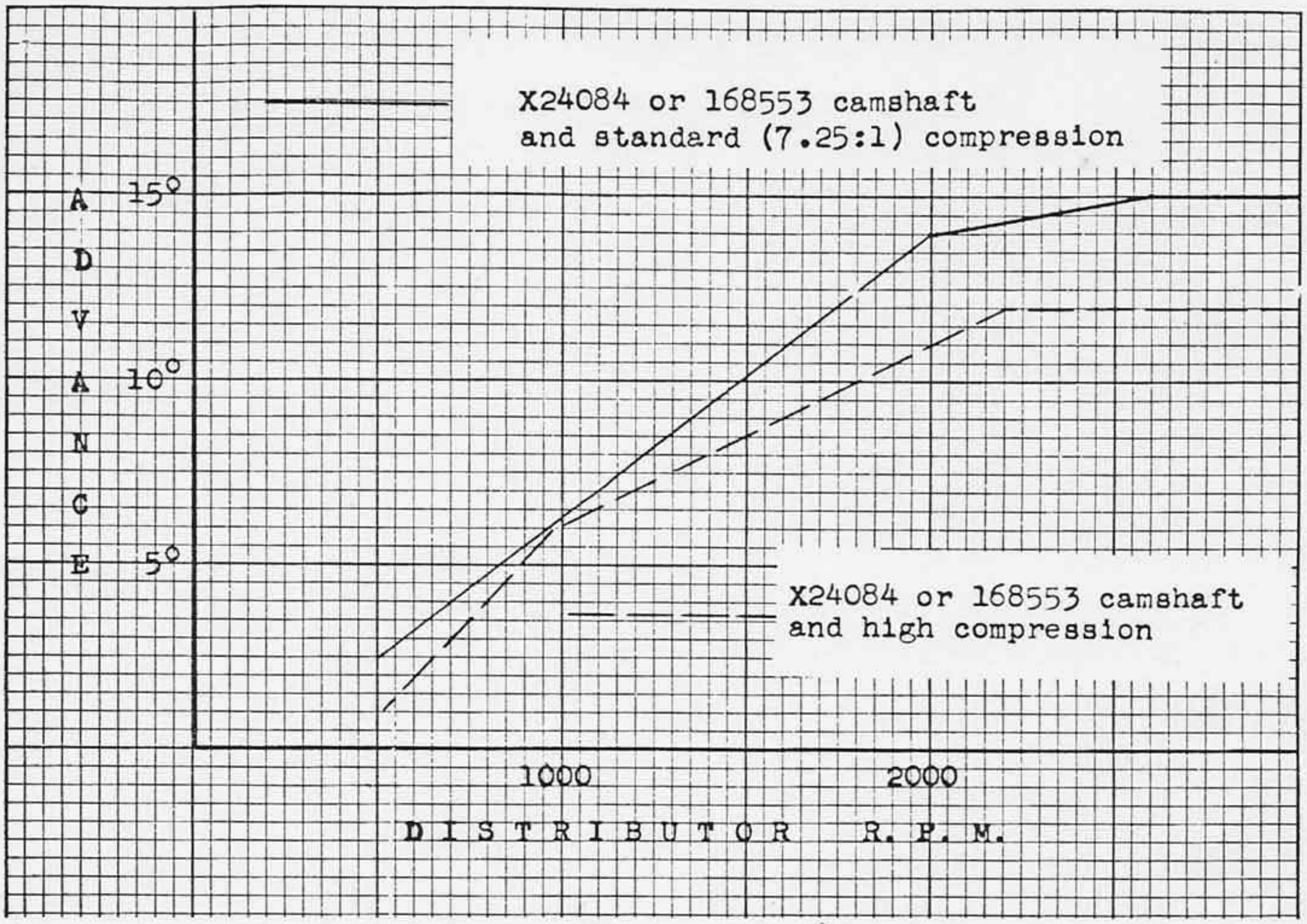
168553 was introduced after TD2/24116. It has very good low speed characteristics, hence good accelleration and pulling on hills. Its peak power output is equal to, or perhaps a bit better than, X24084. Use this cam in any street machine, whether standard or of fairly high tune.

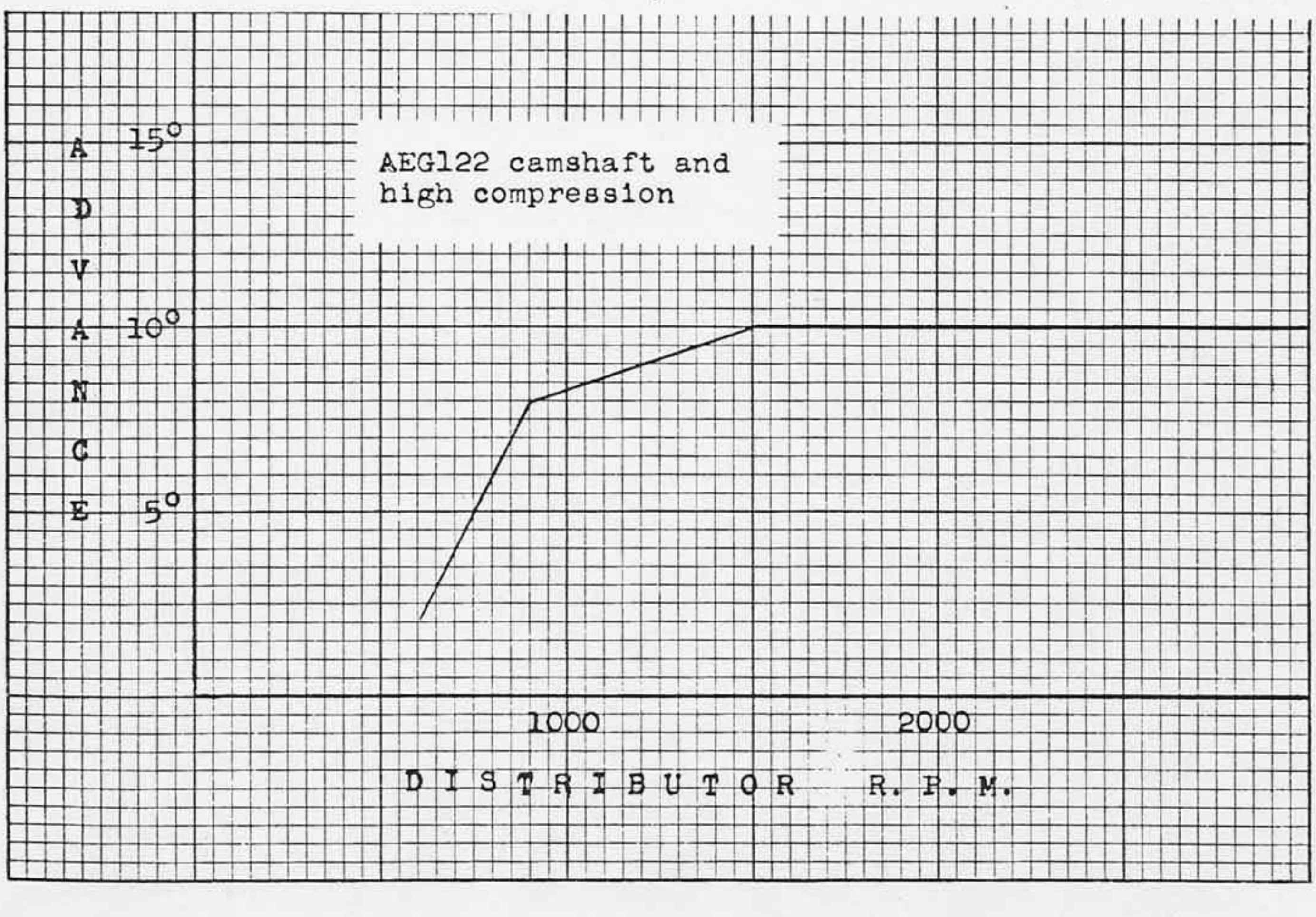
AEG122 should be used with not less than 10:1 compression, larger valves and 1½ SUs, extractor exhaust, and preferably, 1½ litres. There is a noticeable loss of power below 4000 rpm, and it adds only 1-2 hp to the top end (above 5500 rpm). Therefore it is not suggested except for the car that is going to be used frequently in the 4000-6000 rpm range.

168551 is a full race camshaft, having erratic running below 2000 rpm. The usuable range is well above 4000 rpm, making it totally unsuitable for running on the street. It is only acceptable for Mille Miglia type courses, and must be fitted with the extractor system, as the stock manifold would seriously inhibit the gas flow, negating the effects of the camshaft.

Camshafts from independent grinders, with a wide variety of durations and lifts, are readily available. Their use will depend on the engine characteristics desired, and on the ability of the technician to prepare and to test the engine for these desired results. Usually, those who suggest a "wild" cam are hot rod boys who consider the camshaft some sort of magic wand, to be used but not understood. The 168553 camshaft is strongly recommended.

Please note that any change from the camshaft originally fitted to a given engine will likely require a change in the ignition advance curve. Otherwise, maximum performance will be slightly inhibited. This is discussed next.


X24084 or 168553 camshaft and standard (7.25:1) compression
X24084 or 168553 camshaft and high compression
A D V A N C E
15°
10°
5°
1000
2000
D I S T R I B U T O R R. P. M.


AEG122 camshaft and high compression
A D V A N C E
15°
10°
5°
1000
2000
D I S T R I B U T O R R. P. M.

IGNITION

The standard coil is good to about 6000 rpm. For high revs, especially with high compression, fit a sports coil (45038), which is good to about 8000 rpm.

The type of block, compression ratio, and camshaft, all influence the choice of distributor and its advance curve.

TC and TD to XPAG TD2/20942: These blocks use a DKY4A distributor. The TC distributor (40048) is NLS, superceded by the TD distributor (40162). For the TC use this later distributor but remove from the old unit the micro adjustor (405903) and fit this to the new distributor. This advance curve is suitable for either X24084 or 168553 camshafts and standard compression. When using high compression, change to a 40348A distributor. When using the AEG122 camshaft and high compression, fit the 40115H distributor.

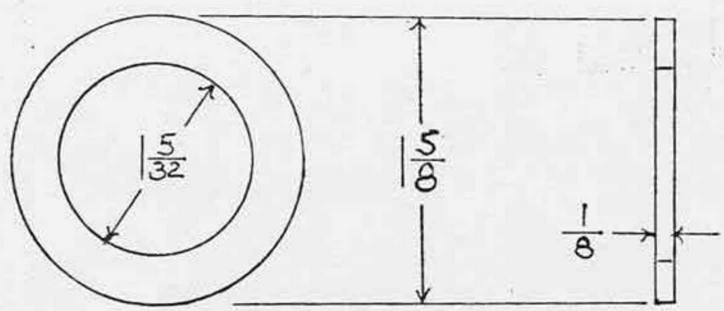
Later TD and TF: These blocks use the D2A4 distributor becaase of the change in the method of mounting and locking. Distributor 40368 is suitable for the 168553 camshaft and standard compression, but change to 40367 distributor for high compression, and for AEG122 camshaft and high compression use 40441.

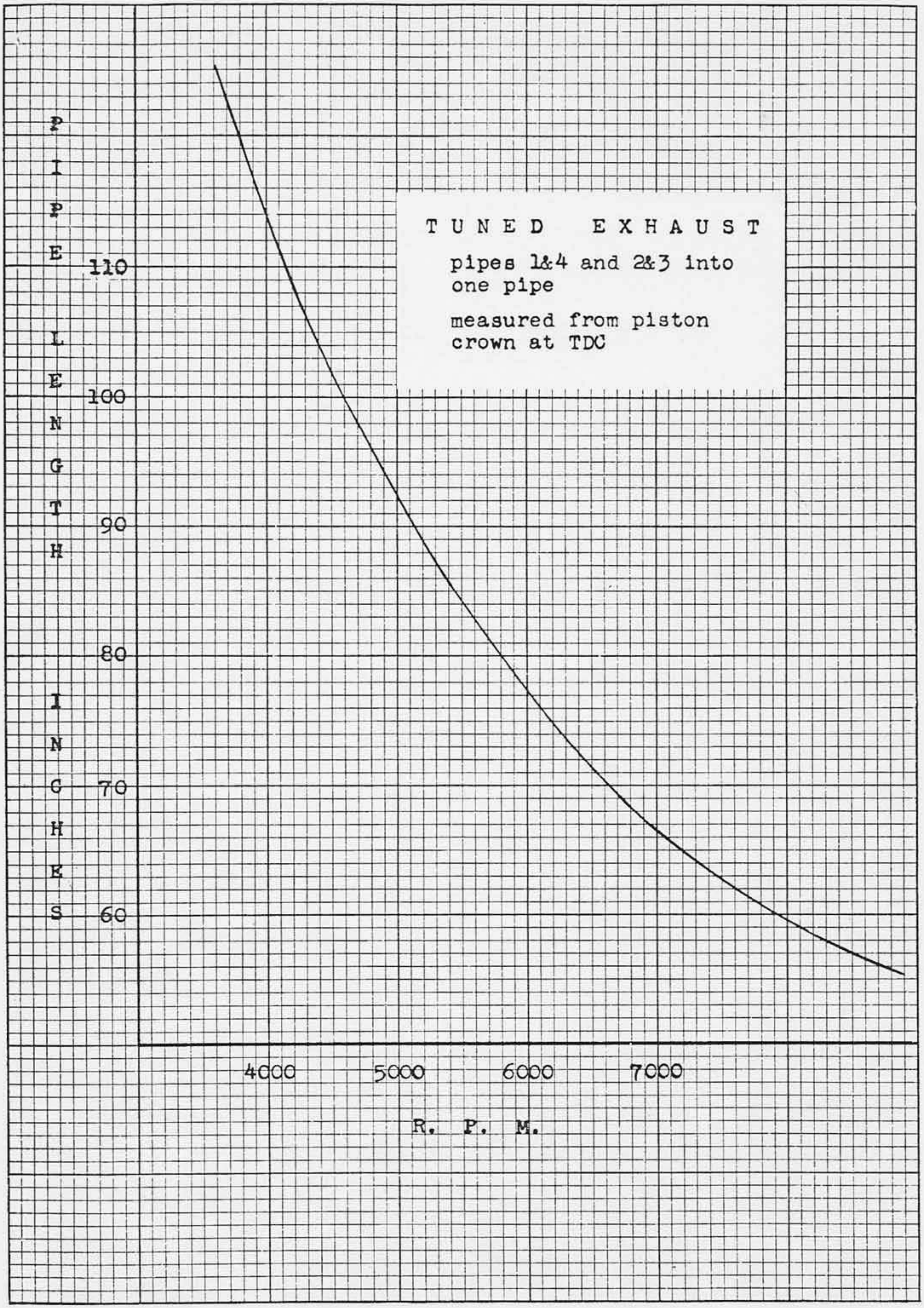
There are no recommended distributors for use with 168551 camshaft, nor are any advance curves available. The engine should be set on a dynamometer, and the curve tailored to suit the particular needs of the engine.

The American Mallory distributor offers great accuracy in its spark distribution, and the durability of the unit is considerably greater than that of a Lucas unit. The point sets (dual) will last tens of thousands of miles, unless the Mallory coil (MS12VP) is used, but this is highly recommended for its intense spark, even at high revs, and cold starting ease. Use YCM-287A distributor with X24084 or 168553 camshafts and standard compression, and with high compression use YCM-287C. The last letter on a Mallory distributor type indicates the advance springs. For camshaft AEG122 there is no recommendation but the great variety of advance springs that Mallory makes available should allow the technician to tailor the distributor to a particular engine. Further slight adjustment can be made, after the cap is removed, to the advance spring tension control.

The accompanying chart shows the advance curves most suitable to the various stages of tune.

The TC micro adjustor cannot be used with the Mallory distributor. Rather, use a 404422 clamp from a TD. After XPAG TD2/20942, fit to the Mallory distributor the shim that is on the Lucas unit. This shim was found on all TDs but it has no part number, so it seems that new ones may not be ordered. The print below will help, should you find it necessary to make one. This shim is necessary in order to align the distributor gear with its driver on the cam.

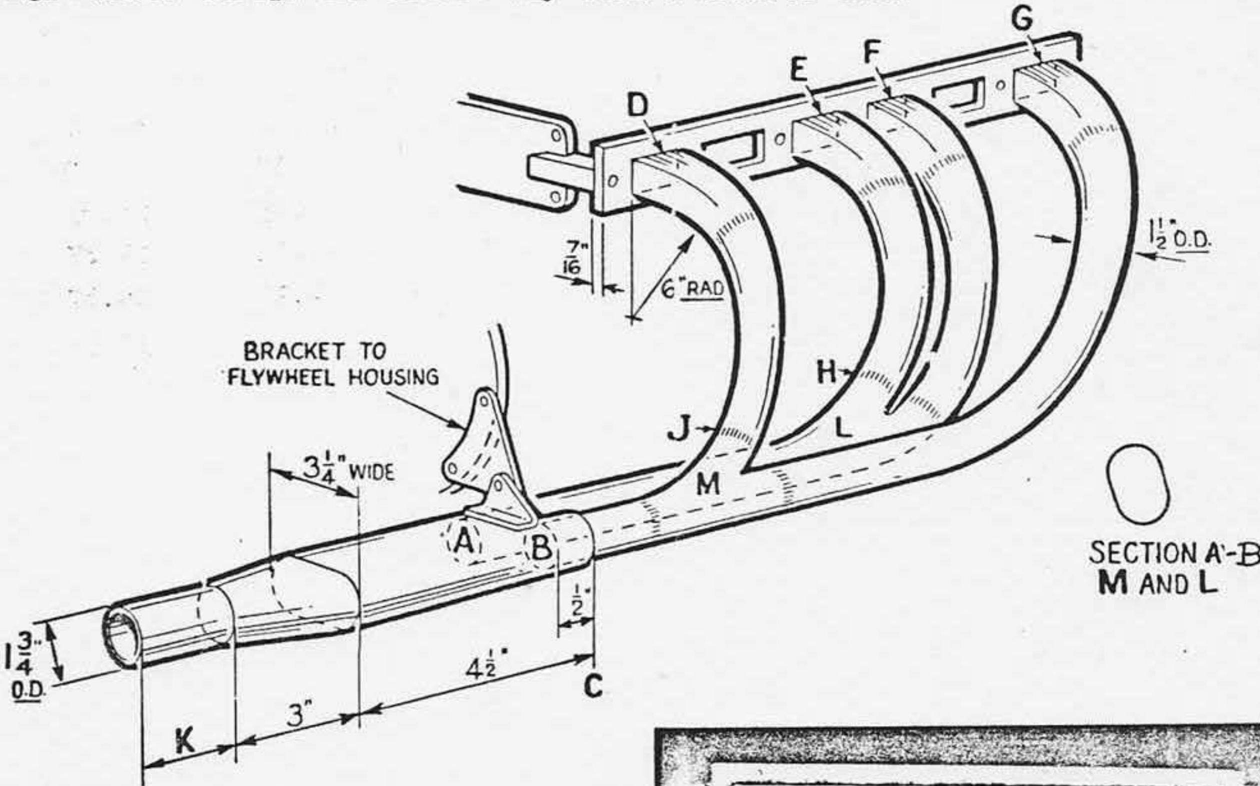



TUNED EXHAUST
pipes 1&4 and 2&3 into one pipe
measured from piston crown at TDC
PIPE LENGTH INCHES
110
100
90
80
70
60
4000
5000
6000
7000
R. P. M.

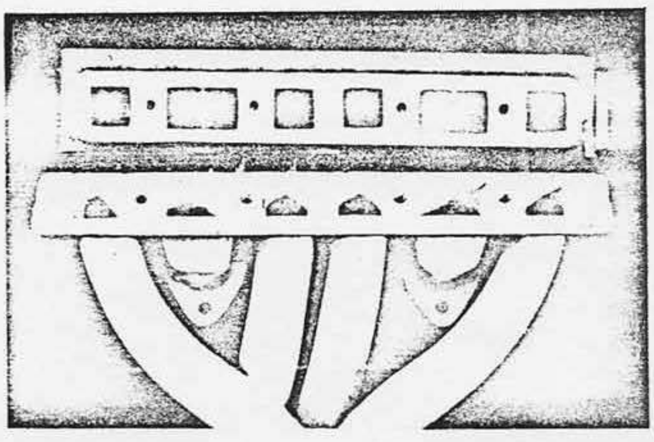
THE EXHAUST SYSTEM

The "bunch of bananas" cast iron exhaust manifold of the MG is a reasonably good design when compared to other 1930s designs, but its pain lies in the joint with the pipe leading to the muffler, for the gasket here deteriorates rapidly if the manifold and pipe do not mate perfectly.

An extractor type system is lighter than stock, eliminates the troublesome gasket, and adds 3-4 hp all the way up the rev range. It further slightly improves fuel economy and exhaust valve life. The extractor system, due to its branching, uses the exhaust impulses of one cylinder to draw the gases from another. The illustration below will assist in fabricating one. The length of the pipe may be adjusted to suit the desired torque or horsepower peak, per the graph. For a street machine using the 230° camshaft, tune to the maximum torque. With the 252° or 270° camshafts, adjust the length for maximum power. It may be necessary to bring the pipe out just below the running board. This is a very desirable item for any engine, standard or modified. An increase in power is had even at low revs. It may be used with either a muffler or just a straight pipe, though the latter may turn a head or two.



V.W. Derrington offer an extractor system that incorporates into it the intake manifold, and may be had for either 1½ or 1 3/4 carbs. This is a very sound piece of equipment but it is unsuitable if a stock appearance must be maintained. The intakes are 1½ in. longer than stock, so the bonnet cannot be closed, even if the air cleaners are omitted. At right we see the excellent matching to the ports of the Laystall-Lucas head.



THE CLUTCH

The stock TC clutch is barely adequate for the car in standard tune, and a stiffer assembly (MG862/92) with 150 lb.. springs (light blue) is necessary in any modified engine.

For 1½ litre machines use the Cobb Clutch assembly (Wakefield P4/101). This comprises the specially machined flywheel, with an 8 inch disc and cover similar to the TD2-TF. Its torque capacity is quite suitable for all stages of tune but IVB, when the Cobb Clutch Racing is advised. The Cobb Clutch retains the TC bell housing without any modifications, and the TC ring gear and starter. Its weight is about the same as the stock unit, therefore it is most suitable to free revving.

The TD2 and TF use an 8 inch clutch that is quite suitable for all stages of tune except IVB, for which a racing unit (MG862/99 disc and MG862/98 cover) is more suitable. The TD2-TF flywheel is much too heavy and some material can be removed from its front (block) side.

FLYWHEEL & CLUTCH ASSEMBLY WEIGHTS

	flywheel	disc	cover	total
TC	20.	1.5	7.12	28.62
TC Cobb	15.62	1.87	9.75	27.25
TC Cobb Racing	15.62	2.12	12.12	29.87
TD2-TF	23.25	1.87	9.75	34.87
TD2-TF Racing	23.25	2.12	12.12	37.5

ADDENDA

The fan blades may be removed for a 1 hp gain provided that close traffic is avoided. Removal of the thermostat in warm weather allows moderate in-town driving.

Lighter gudgeon pins, Hepolite GP-4729 for 66.5 mm. pistons, and G-J777 for 72 mm. pistons, will help to reduce reciprocating weight.

Stronger connecting rods (AEF7) may be fitted to highly tuned engines. This rod's greater weight may make it desirable to lighten the piston by removing a part of the skirt (at right angles to the thrust face), in order to keep the reciprocating weight to a minimum.

For a stronger flywheel-crankshaft connection, remove the two locating pins and drill out to 13/32 in. Drill (8.6 mm.) and tap (10x1.5 mm.) the pinholes in the crankshaft. At right angles to these, add two more to make a total of eight retaining bolts (TA13079).

CONCLUSION

Obviously, there are holes in the information supplied here as there are in any manual. But we have spent over fifty pages on a subject that is normally treated in twenty, so it is hoped that the holes left by others have been leveled, and those remaining are not nearly so deep. We cannot discuss every minute detail of theory, engineering, service and the pros and cons of each. As an example, little is said of assembly itself. This is something that must be learned by doing, preferably with the assistance of a more experienced associate. But it is hoped that these efforts are enough to stimulate the mind so that any problems are squarely faced, carefully examined, and intelligently solved. Let us suppose that the rear oil return cap becomes NLS. Do we let the oil leak to the ground, make the dies to cast new ones, or sell the car by the pound? It should be a simple matter to babbitt the worn surface and hand scrape it to fit. And we haven't discussed the American practice of "blueprinting" an engine, making certain that everything is ideal: bringing all chambers to exactly the same CCs, all ports identical, fitting the sprockets with offset keys for absolutely perfect valve timing, etc.

The author is frail to mistakes as is anyone, so the revelation of errors is solicited, as are suggestions to improve the material and its clarity. Any assistance by readers to upgrade future editions will be warmly received and acknowledged.

OTHER SOURCES OF INFORMATION

Instruction Manual for TC
TD-TF Workshop Manual
TC, TD, and TF Parts Manuals
TC, TD, and TF Special Tuning Booklets
SU Parts and Service Manuals

Nuffield Press (BMC)

Eric Blower	MG Workshop Manual (all Models)
Colin Campbell	The Sports Car Engine: Its Tuning and Modification
Philip Smith	Design and Tuning of Competition Engines Scientific Design of Exhaust and Intake Systems Valve Mechanisms for High Speed Engines
Sir Harry Ricardo	The High Speed Internal Combustion Engine
E. Malloy	Automobile Engineers' Reference Handbook

PARTS AND SERVICES

British Motor Corporation, through its distributors and dealers
Mowog and SU Parts (original equipment)

Lucas Electrical Services, through British car and motorcycle distributors and dealers
Lucas electrical units and parts (original equipment)

Nisonger Corp. 125 Main St. New Rochelle, N.Y.
SU Carburetters, pumps and parts (original equipment)

Beck Distributing Corp. Melville, L.I. 11749
British Auto Parts, 407 W. Compton Blvd. Gardena, Calif. 90247
Columbia Motor Corp. 419 E.110th St. N.Y.N.Y. 10029
Geon, Box 2000, Woodbury, L.I. 11797
above supply engine replacement parts (Vandervell, Borg & Beck, etc.). Some are original equipment.

Gerard Goguen, 278 High Rock St. Needham, Mass. 02192
Jack Jeffries, Box J2, 110 Brooklyn Ave. Freeport, L.I.
Moss Motors Ltd. 5775 Dawson Ave. Goleta, Calif.
above specialize in T series parts

V.W. Derrington Ltd. 159 London Road. Kingston-on-Thames, Surrey
Laystall-Lucas heads, extractor exhausts, special parts for T series

Wakefield Eng. Box 255 Tnpk. Sta. Shrewsbury, Mass. 01545
1½ litre sleeves, Mallory ignition, Cobb Clutches, parts and service for XPAG and TC

Federal Mogul Corp. branches in larger cities
crankshaft and conrod service

Kolene Corp. 12890 Westwood Ave. Detroit, Mich. 48223
Tufftriding and other heat treating services

Metric & Multi-Standard Components Corp. 197 So. Broadway, Yonkers, N.Y. 10705
metric taps and dies