

# M.G.A. TWIN-CAM

Manufacturers: M.G. Cars Ltd., Abingdon-on-Thames

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**I**NTRODUCED in July 1958, the Twin-Cam model was offered as additional to the existing range of M.G. products, the M.G.A. series remaining in production. Chief points of mechanical interest centre around the engine. From the cylinder head gasket downwards, this bears similarity to the B.M.C. "B" pushrod unit. The swept volume capacity has been increased to 1589 c.c. by a slight increase in bore size and the camshaft replaced by a half-speed shaft which drives the auxiliaries and transfers the drive from the crankshaft to the twin overhead camshafts.

The car is suitable for varying stages of engine tune, to match conditions of usage.

Running at a compression ratio of 9.9:1 the engine develops 97 b.h.p. at 5,000 r.p.m. and 110 b.h.p. at 6,750 r.p.m. Drive is transmitted through a single dry plate clutch and via a four-speed remote control synchromesh gearbox, and propeller shaft to the three-quarter floating hypoid bevel drive rear axle.

Suspension is conventional coil and wishbone link pattern at the front, and semi-elliptic leaf springing at the rear; in both cases damped by telescopic hydraulic shock absorbers.

Disc braking of Dunlop pattern is fitted all round. Front wheel units are self adjusting and in addition to this facility, rear wheel brakes have separate mechanically operated pads for handbrake actuation.

Identification of vehicles is by chassis serial numbers and letters, and follows usual B.M.C. practice. Chassis serials are to be found stamped on a plate secured to the top left-hand side of the dash panel beneath the bonnet. Engine numbers are stamped on a plate which is attached to a boss at the rear of the engine, behind the cylinder block. The body number is stamped on a plate which is secured to the right-hand side of the dash panel. It is most important that all these numbers and letters are quoted in all correspondence with the makers regarding the car or when ordering spare parts.

Threads and hexagons are, in the main, of the unified pattern and form.

Special tools are available from the makers or their agents, and a list of those considered the more essential is to be found on p. iii. Some of these tools, identified by part number also listed, will be found to have application to other cars of the range, and the extent of this facility may be ascertained by a comparison between the list in this data sheet and similar lists in previous publications on B.M.C. produced vehicles.



**DISTINGUISHING FEATURES.** From nearly all external viewpoints the car is practically identical to standard MGA cars; but there is a motif on each bulkhead and on the boot lid which bears the words "TWIN-CAM." Disc brake plates, more clearly visible through wire-spoke wheels are another clue to identity.

## ENGINE

### Mounting

At front, bonded rubber sandwich blocks bolted up to feet on angle irons attached to either side of engine front mounting plate. At rear large circular rubber bush is bolted up with nut and spring washer in annular lug on gearbox extension casing and to chassis frame member.

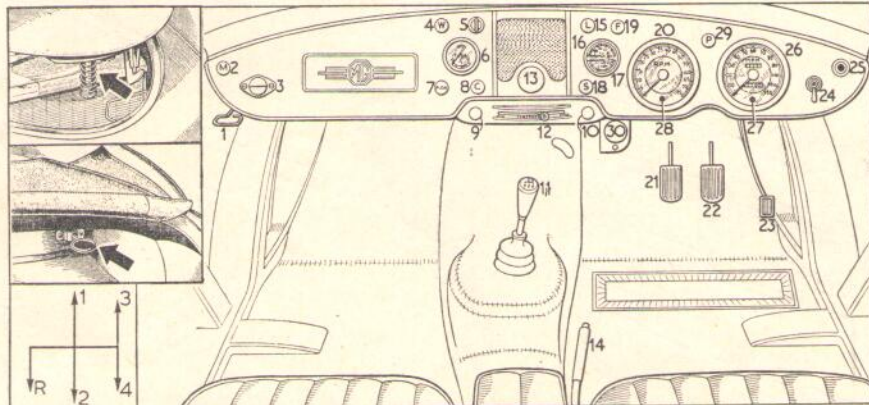
### Removal

Engine should be removed with gearbox as complete unit. Remove seats and frames, carpets, floor boards, toe boards, gearbox and propeller shaft covers. Undo handbrake cable adjuster nut and cable from relay lever. Mark propeller shaft and gearbox flanges, and disconnect propeller shaft. Remove gear lever bush,

grommet and remote control cover; also securing setscrews gearbox cover/frame and four nuts, bolts and spring washers securing left-hand sides of cross brace plates to gearbox cover. Take off gearbox cover. Remove speedo drive cable at gearbox end.

Undo two setscrews securing clutch slave cylinder to gearbox side, tie up out of way and leave cylinder pushrod attached to clutch operating fork. Drain oil from engine and gearbox and coolant from engine and radiator. Remove bonnet from hinges and take out radiator, by first releasing clips and top and bottom water hoses; removing three bolts each side and lifting out core.

Take off carburettors and air cleaners, remove heater air intake pipe, header tank and thermostat housing cover. Disconnect all pipes, wires and controls to engine

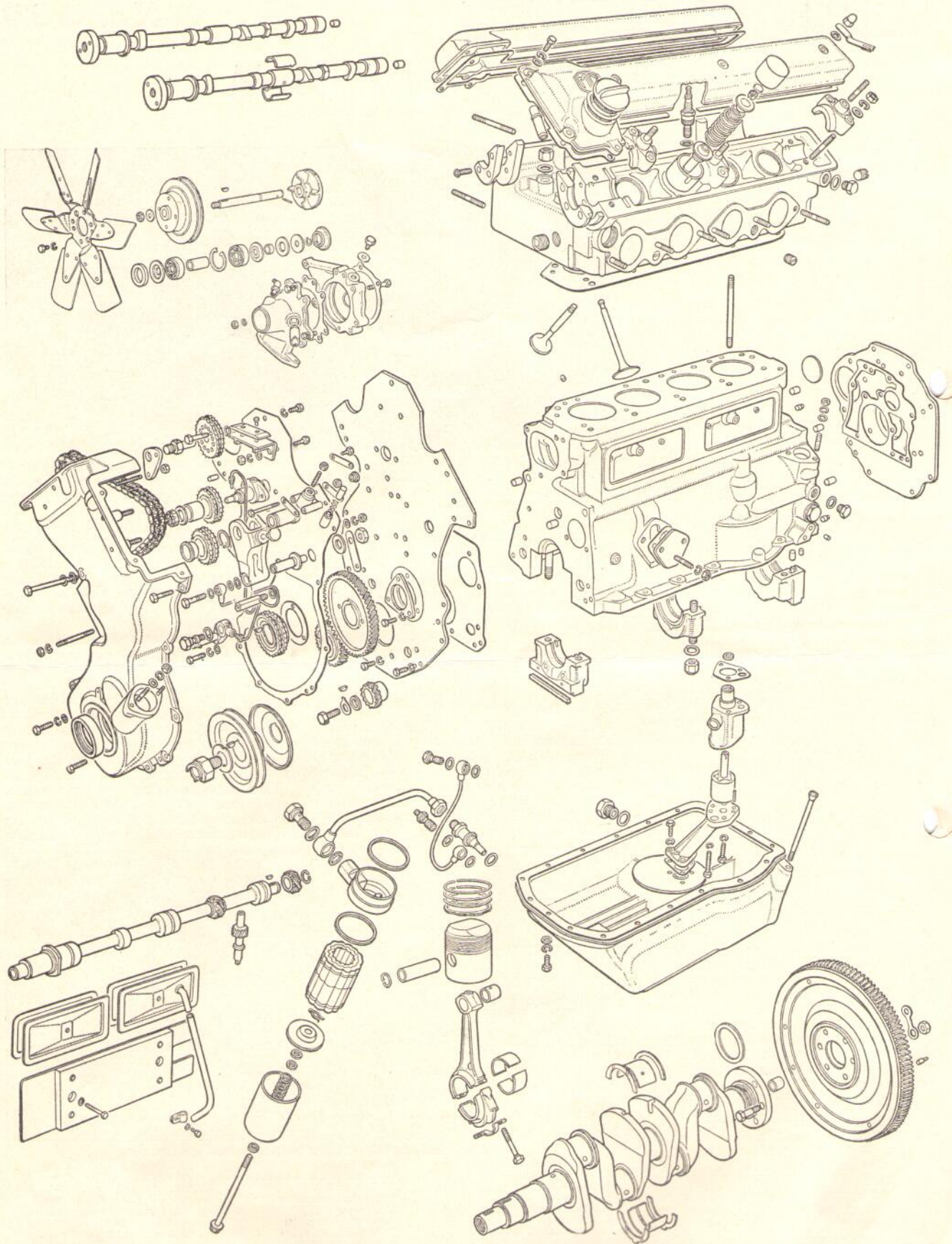


**INSTRUMENTS, CONTROLS, GEAR POSITIONS AND BONNET LOCK**

- |                          |                              |                               |
|--------------------------|------------------------------|-------------------------------|
| 1. Bonnet release        | 11. Gear lever               | 21. Clutch pedal              |
| 2. Map light switch      | 12. Heater blower fan switch | 22. Brake pedal               |
| 3. Map light             | 13. Horn push                | 23. Accelerator               |
| 4. Screenwiper switch    | 14. Handbrake lever          | 24. Director indicator switch |
| 5. Ignition switch       | 15. Lighting switch          | 25. Flasher warning light     |
| 6. Fuel gauge            | 16. Oil pressure gauge       | 26. Speedometer               |
| 7. Screenwasher switch   | 17. Water temp. gauge        | 27. Main beam warning lamp    |
| 8. Choke control         | 18. Starter switch (pull)    | 28. Ignition warning lamp     |
| 9. Air control to heater | 19. Fog lamp switch          | 29. Panel lamp switch         |
| 10. Demist control       | 20. Revolution indicator     | 30. Headlamp dip switch       |

Inset top left, shows method of external release of bonnet. Below: Method of boot lid release from behind passenger seat and bottom left: Operative positions of the gear lever.

SERVICE DATA SHEET	INDEX ENTRY—MARCH		COMPONENT SUPPLEMENT
M.G.A. Twin-Cam	339	6/4/60	Smiths Automatic Transmission (Part 4)



Engine components showing details of assembly of both fixed and moving parts. Note especially the drive to the camshafts together with intermediate drive and tensioner.

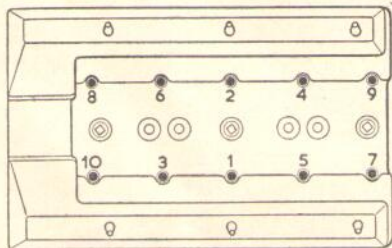
GENERAL DATA	
Wheelbase ... ..	7ft. 10in
Track: front ... ..	3ft 11 1/2 in
rear ... ..	4ft 0 1/2 in
Turning circle ... ..	28ft 0in
Ground clearance ... ..	6in
Tyre size: front } ... ..	5.90—15
rear } ... ..	
Overall length ... ..	13ft 0in
Overall width ... ..	4ft 9 1/2 in
Overall height ... ..	4ft 2in
Weight (approx.) ... ..	19 1/2 cwt

SPECIAL TOOLS	
	Part No.
<b>ENGINE</b>	
Camshaft timing keys ... ..	18G551
Oil pump relief valve grinding-in tool ... ..	18G69
Starting dog nut spanner ... ..	18G98
Impulse extractor (UNF-basic tool) ... ..	18G284
Main bearing cap removal adaptor ... ..	18G284A
Extractor—half speed shaft sprocket, distributor drive gear and crank gear ... ..	18G309
<b>CLUTCH</b>	
Assembly, dismantling and gauging fixture ... ..	18G99A
Adaptor ... ..	18G99B
Plate centralizer ... ..	18G279
<b>GEARBOX</b>	
Flange wrench ... ..	18G344
Synchro, assy. ring 2nd speed ... ..	18G222
Synchro, assy. ring 3rd top ... ..	18G223
Driving layshaft ... ..	18G471
<b>REAR AXLE</b>	
Pinion inner race extractor ... ..	18G285
Differential cage bearing extractor ... ..	18G470
Adaptors for use with the above ... ..	18G47T
Bevel pinion pre-load check tool ... ..	18G207
Rear axle setting tool ... ..	18G191B
Hub nut spanner ... ..	18G152
<b>FRONT AXLE</b>	
Front and rear hub extractors:	
Plate ... ..	18G304
Bolts ... ..	18G304B
Bolts (Front) ... ..	18G304C
Plug ... ..	18G304J
Steering wheel drawer ... ..	18G310
Steering tie rod spanner female "C" ... ..	18G313
Steering tie rod spanner male ... ..	18G312
<b>NUT TIGHTENING TORQUE DATA</b>	
	lb/ft
Cylinder head nuts ... ..	70
Main bearing nuts ... ..	70
Clutch assembly/flywheel ... ..	35-40

unit and release exhaust pipes from manifolds and from steady bracket on rear mounting plate. Slacken pipe clamp bolt at junction of front and rear pipes and pull out front section. Take out steering column by removing clamp bolts top and bottom and securing nut at rear of column universal joint. Remove dipper switch mounting bracket, and toeboard support plate.

Undo four bolts, nuts, and spring washers on front mounting plates either side of engine. Place sling around unit and arrange so that unit may be lifted forwards and upwards at a sharp angle. Take weight of unit on lifting tackle and remove rear mounting nut, bolt and spring washer to release gearbox from cross member mounting bracket; lift unit up and out of car.



Cylinder head diagram showing order of tightening nuts. See also table of "Nut Tightening Torque Data."

**Crankshaft**

Three main bearings, thin-wall, steel backed, lead/indium plated, located by tabs in caps and recesses in block. End float controlled by split thrust washers either side of centre main bearing, lower halves tabbed to locate in bearing cap. Fit with oil grooves to crank throws. No hand fitting permissible, bearings may not be renewed or changed without removal of shaft. Flywheel spigot mounted and flange bolted to crankshaft by six bolts and nuts. Spigot bush, renewable, pressed into crankshaft end; shrunk-on starter ring gear fitted. Timing sprocket keyed to front end of crankshaft by inner of two Woodruff keys. Aligning shim abuts against inner boss of sprocket. Dynamo and water pump drive pulley keyed to shaft by outer key; and retained by die-cast starter dog setscrew. Sump sealing effected by composition gasket around flange and square section seal on rear main bearing cap which forms lower half of collecting ring around oil return thread on crankshaft. A similar seal is fitted to front main bearing cap.

**Connecting Rods**

Big ends offset, thin-wall bearings, steel backed lead/indium plated liners located by tabs in rods and caps. No hand fitting permissible, bearings finished to size and oversize shells available for undersize shafts after regrind. H-section rods split diagonally for removal upwards through cylinder bore. Oil bleed hole on longer side of rod facing away from half-speed shaft. Gudgeon pins fully floating in bronze small end bushes which are a press fit in rod ends and are renewable; and may be reamed to specified dimensions and to achieve fit of pin indicated in data tables.

**Pistons**

Aluminium alloy, flat crown, chamfered to avoid contact with valves. When assembling, correct clearances of piston/bore measured at right angles to gudgeon pin axis on piston skirt one: top: .0058-.0083in; bottom, .0035-.0066in.

Top compression ring plain, second and third rings taper faced. When being assembled taper faced rings must be fitted with side marked "T" (top), uppermost. All rings including scraper fitted above gudgeon pin. Big ends will pass through bores, remove and assemble through top.

**Camshafts**

Double row roller endless chain drive. Each shaft runs in three, non adjustable white metal lined bearings in cylinder head; caps secured by nuts and lock-washers. Drive sprockets keyed on to front ends of shafts. Two idler sprockets used, one permanently located, and the other mounted on a fulcrum arm, the position of which may be varied by means of a manually operated chain tensioner.

Drive from the crankshaft is by direct gearing to the half-speed shaft and thence by chain to fixed sprocket, around inlet camshaft sprocket, exhaust camshaft sprocket and finally behind adjustable tensioner sprocket.

To check valve timing, first check tappet adjustment and then mount a dial test indicator to suitable fixed point on cylinder head; with indicator foot resting on No. 1 inlet valve tappet, ensuring that cam is clear of tappet, and set DTI to "O." Rotate engine until No. 1 piston is at TDC and valves rocking (i.e., No. 4

ENGINE DATA		
<b>GENERAL</b>		
Type ... ..	ohc	
No. of cylinders ... ..	4	
Bore x stroke: mm ... ..	75.41 x 89	
in ... ..	2.969 x 3.50	
Capacity: c.c. ... ..	1588	
cu in ... ..	96.90	
R.A.C. rated h.p. ... ..	14.2	
Max. b.m.e.p. at r.p.m. ... ..	163 lb/sq in @ 4,500	
Max. torque at r.p.m. ... ..	105 lb/ft @ 4,500	
Compression ratio ... ..	9.9 : 1	
<b>CRANKSHAFT AND CON. RODS</b>		
	Main Bearings	Crankpins
Diameter ... ..	2.00in	1.8759-1.8764in
Length ... ..	1.50in	1.223-1.225in
Running clearance:		
main bearings ... ..		.002-.0037in
big ends ... ..		.002-.0037in
End float: main bearings ... ..		.006in (max.)
big ends ... ..		.008-.012in
Undersizes ... ..		.020, .030, .040in
Con. rod centres ... ..		6.50in
No. of teeth on starter ring gear/pinion ... ..		120/9
<b>PISTONS AND RINGS</b>		
Clearance (skirt): top ... ..		.0058-.0083in
bottom ... ..		.0035-.0066in
Oversizes ... ..		.010, .020, .030, .040in
Weight without rings or pin ... ..		13 oz 5 dr
Gudgeon pin: diameter ... ..		.8750in
fit in piston ... ..		hand push fit at room temp.
fit in con. rod ... ..		
Compression height (top of crown/gudgeon pin axis) ... ..		2.250in
	Compression	Oil Control
No. of rings ... ..	3	1
Gap (min-max) ... ..	.008-.013in	.008-.013in
Side clearance in grooves ... ..	.0015-.0035in	.0015-.0035in
Width of rings ... ..	.054-.055in	.1552-.1562in
<b>CAMSHAFTS</b>		
Bearing journal: diameters ... ..		1.250-1.2505in
Bearing clearance ... ..		.001-.0025in
End float ... ..		.061-.005in
Timing chain: pitch ... ..		.375in
No. of links ... ..		132
<b>VALVES</b>		
	Inlet	Exhaust
Head diameter ... ..	1.59in	1.44in
Stem diameter ... ..	.342in	.342in
Lift ... ..	.375in	.375in
Face-angle ... ..	45°	45°
	Inner	Outer
Spring length: free ... ..	2.30in	2.54in
fitted ... ..	1.62in	1.78in
No. of working coils ... ..	7.8	6
at load (valve closed) ... ..	42lb	84lb

piston at TDC on compression) and line up notch in crankshaft pulley with projection in timing cover. If timing of inlet camshaft is correct, DTI will show a tappet movement of .072-.083in. Move DTI to bear on No. 1 exhaust tappet without moving engine from TDC and set DTI to "O." Turn engine until tappet has risen fully (cam clear of tappet) and check displacement.

If timing is incorrect, it may be reset as follows: Remove timing chain cover, knock back tab washer on chain adjuster securing bolts, remove adjuster, and swing adjuster sprocket fork clear of chain. Turn camshafts until slots in inner flanges line up with slots in front bearing housings. If chain has been removed ensure that pistons are half way down bores to avoid mistimed valves fouling piston crowns. Lock camshafts using tool No. 18G551. Check that "T" markings on half-speed

shaft gear and crankshaft gear are together when No. 1 piston is at TDC. Remove camshaft sprocket securing screws and slacken sprocket support spindles. Turn inlet camshaft sprocket clockwise to pull timing chain tight. If two opposite holes in sprocket do not line up with tapped holes in camshaft flange it will be necessary to use vernier adjustment provided by holes in sprocket.

Lift chain away from sprocket and turn it to suit condition above; fit sprocket securing screws and tighten support spindle. Similarly adjust exhaust camshaft and ensure that chain tension between inlet, exhaust and half-speed shaft sprockets is maintained. Refit components as dismantled checking valve timing as above and chain tension; adjuster beneath engine oil pillar cap. Set so that when adjuster screw has been tightened to a point where increased resistance is felt, it is released  $\frac{1}{4}$  of a turn to obtain required clearance of  $\frac{3}{32}$  in.

**Valves and Tappets**

Overhead, non interchangeable exhaust of different dimension and form to inlet. Split case cotter fixings double springs. Valve guides shouldered, may only be removed by driving through from combustion chambers. When refitting, guides should be pressed in until flange registers on bottom of valve spring recess.

Plain cylindrical tappets fit over valves and slide in guides machined in head; adjust clearance between cam and valve by pad on top of valve stem. Pads are available in thicknesses ranging from .086—116in, in .002in steps. Pads are identified by numbers (1-16) stamped on them, No. 1 being thinnest. Camshafts must be removed for tappet adjustment.

**Lubrication**

Hobourn Eaton eccentric rotor-type pump, spigoted and flange bolted in recess of crankcase, and driven by slotted shaft from skew gear on half speed, shaft pump may be removed after taking off

sump and pick-up strainer and three securing nuts. Pump body bolts to be undone after removal of assembly from engine to dismantle pump. Cylindrical gauze intake strainer in sump.

**Cooling System**

Pump and fan, thermostat in water outlet port on cylinder head. Pump spindle runs in two ball bearings and has renewable seal. Adjust fan belt until there is  $\frac{1}{2}$  in play in either way in vertical run of belt.

**TRANSMISSION**

**Clutch**

Borg and Beck single dry plate hydraulically operated. Sintered carbon thrust release bearing. Operating cylinder paired with brake master cylinder and mounted on chassis frame. Slave cylinder bolted to bell-housing and connected to clutch operating lever. Only adjustment provided is between master cylinder pushrod and piston, when clutch pedal is released. Adjust pushrod after slackening locknut to give  $\frac{3}{32}$  in clearance. Access to clutch obtained after removal of power unit and gearbox.

**Gearbox**

Four-speed, synchromesh on 2nd, 3rd and top speeds, sliding spur type gears on 1st and reverse. Remote control by short central lever.

**To Remove Gearbox**

Remove engine/gearbox unit as detailed in engine section, and take off starter motor. Unscrew bolts and nuts securing bell-housing and exhaust pipe brackets and withdraw gearbox and rear extension from engine, taking care to keep gearbox flange parallel with crankcase face until 1st motion shaft is clear of clutch.

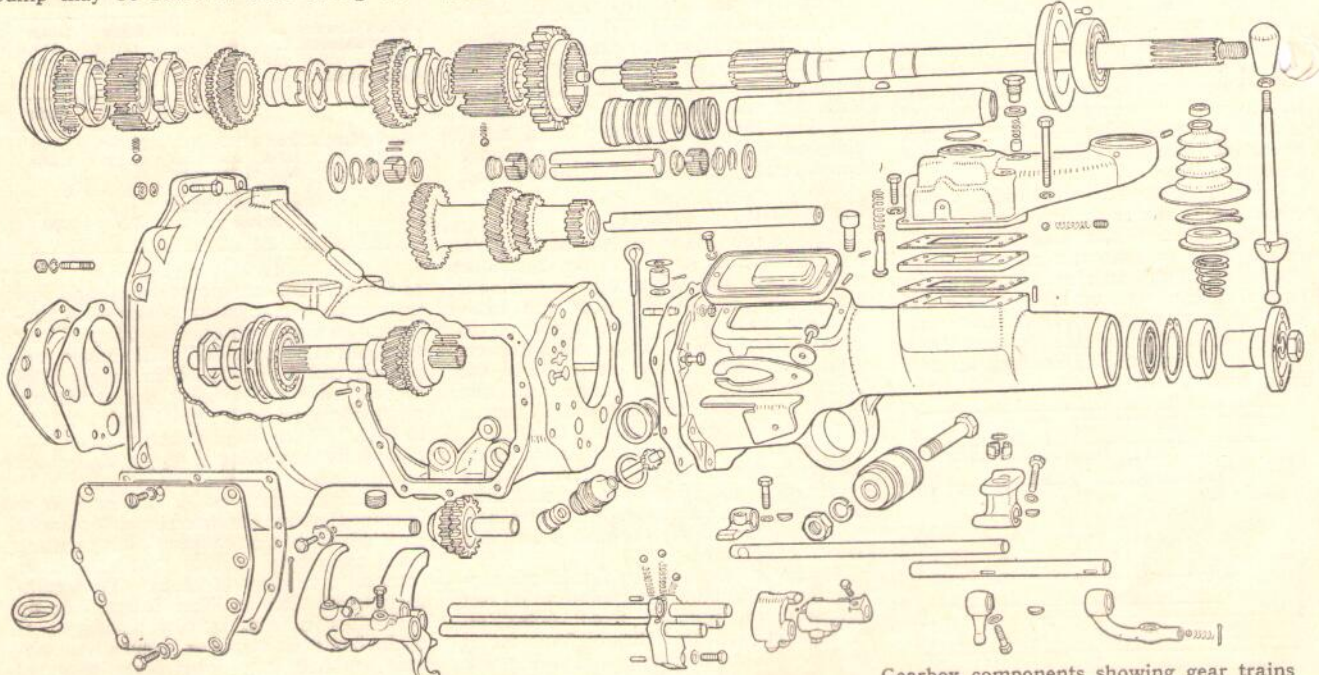
**To Dismantle Gearbox**

Extract dipstick, drain plug and speedometer drive; unscrew nuts and remove gear lever remote control tower and joint washer. Unscrew and remove six bolts

and take off rear extension cover and joint washer. Remove interlock arm and bracket. Remove one nut and seven setscrews and take off rear extension and manoeuvre remote control shaft selector lever from selectors. Unscrew three countersunk screws and seven hexagon head setscrews and take off gearbox cover and overshoot stop. Cut locking wire and unscrew three change speed fork setscrews. Unscrew two setscrews and remove shifter shaft locating block with shifter shafts; note two dowels in block, preserve three selector balls and springs. Withdraw forks from box in following order: Reverse, top and third, first and second. Unscrew clutch lever pivot nut, screw out pivot bolt and remove lever with thrust bearing. Unscrew nuts and take off gearbox front cover, noting bearing shims between cover and bearing. Tap out layshaft allowing cluster to rest in bottom of box. Take out retaining setscrew and remove reverse shaft and gear; withdraw mainshaft assembly to rear. Withdraw first motion shaft assembly complete with 18 spigot needle rollers using tool No. 18G266 if necessary. Lift out layshaft cluster and two thrust washers.

To dismantle rear extension, release front and rear selector levers from the remote control shaft by taking out clamping screws and sliding levers from rod. Extract keys from shaft and take out remote control shaft from extension.

To dismantle mainshaft assembly, remove items in following order: baulk ring, synchro sleeve and hub; second baulk ring. If and when synchro sleeve is removed from its hub, care should be taken to preserve three locating balls and springs. Press down third speed thrust washer locating peg, rotate splined washer to line up with those on shaft and remove washer. Take off 3rd speed gear and brass bush, also thrust washer to release 2nd speed gear, bush and baulk ring. Remove thrust washer from splined shaft and take off 2nd speed gear and hub. Take off rear retaining nut, washer and



Gearbox components showing gear trains on their respective shafts, together with gear casing and selector mechanism.

speedo drive gear and key together with distance-piece, from shaft. Take off bearing and its housing. Extract one circlip from laygear, push out bearing and distance tube assemblies (three needle races, two distance tubes equally spaced).

**To Assemble Gearbox**

Reverse procedure of dismantling, noting following points: Layshaft—fit circlip to innermost groove in gear, hold shaft vertically in vice, assemble a roller bearing on shaft against vice jaws and slide gear over shaft and bearing with largest gear downwards. Remove shaft from vice and push bearing into gear against circlip. Fit end roller bearing assembly end retaining circlip. Slide distance tube into other end of gear followed by other end bearing and circlip.

**Mainshaft**

Assemble from front, locate internally splined thrust washer on front end of splines. Push longer brass bush up to splines, dogs frontwards. Oil hole in bush must register with oil hole in shaft. Cut-away at front end of second (shorter) bush must line up with locating peg in shaft when dogs of two bushes and washer are engaged. Fit 2nd speed baulk ring and gear on to bush plain side frontwards. Slide on brass thrust washer and shorter brass bush, lugs locating in thrust washers. Fit on 3rd speed gear, cone frontwards. Insert spring and plunger into hole in shaft, threading on front thrust washer depressing plunger through hole in 3rd gear cone, and turn washer to lock. Fit three springs and balls to top/3rd synchro assembly and slide into position with two baulk rings. Following items to be assembled from rear: three balls and springs in second gear bush followed by synchro-hub; first speed gear; synchro-hub and baulk ring to splines on shaft. Press rear bearings into housing and fit to shaft. Push on distance sleeve, speedo drive gear and key, lock washer and nut. Assemble rear extension and fit to gearbox locating control shaft front selector lever in shifter rod selectors. Replace interlock arm on rear extension side cover and refit cover.

Replace laygear in box complete with thrust washers, assemble and replace 1st motion shaft together with 18 spigot needle rollers. Insert 3rd motion shaft from rear and push home shaft, rear bearing and housing, and enter spigot in needle roller race of 1st motion shaft. Fit layshaft and thrust washers, lining up cut-away portion of shaft end with locating groove in front cover. Fit reverse gear and shaft, front end cover and bearing shims, clutch lever and fork. Fit selectors to shifter shaft rear ends together with locating block, balls and springs. Insert shafts followed by selector forks. Refit rear extension, locate change speed gate and fit side cover; screw in speedometer drive gear, plugs and breather.

**Propeller-shaft**

Hardy-Spicer needle roller bearing universal joints. Nipples provided for lubrication of joints.

**Rear Axle**

Three-quarter floating, hypoid bevel drive. Rear cover welded to banjo housing.

To remove axle from car, lift rear of car and remove wheels, disconnect propeller shaft rear end and shock absorbers. Take weight of axle on jack and remove

brake pipe lines from back plates. Remove split pin and clevis pin securing brake cables to each operating lever. Remove small nut and Phillips screw securing handbrake cable clip to axle; take off brake balance lever from pivot on casing. Release exhaust pipe from manifold and supporting brackets and remove pipe assembly complete. Remove rear and then front bolts of spring anchorages and take out "U" bolts. Draw out axle to rear clear of car.

Half-shafts (interchangeable) upset at outer ends to form flanges which register on wheel studs on hub flanges. Hubs run on ball bearings retained on axle tube ends by nuts with tab-washers. Lipped oil seal in hub behind bearing (lip to bearing), and spacer washer is fitted on outer side of bearing. If shaft is withdrawn, note paper gasket behind flange.

Bevel pinion shaft runs in taper roller bearings. Outer races pressed into final drive housing. Distance-piece between inner races, which are nipped up by driving flange nut. Shims between distance-piece and front bearing (.004-.012in available) regulate preload on bearings, which should give 13-15lb/in drag with oil seal fitted. No adjustment for pinion mesh without special tools and graded distance pieces.

Crown wheel spigoted on one-piece differential cage and retained by six set-screws. Differential side bevel gears run directly in cage, planet pinions have spherical washers.

Differential assembly carried in semi-thrust ball bearings in split housings. Thrust side of bearings must face outwards. Shims between differential cage and inner races of bearings for mesh adjustment. Adjust so that the crown wheel is just free without play, and backlash is as etched crown wheel (usually .005-.007in), then add shims to offside bearing to give .002in total preload. Differential assembly should then be light push fit in housing. Backlash must be not less than .007in.

**CHASSIS**

**Brakes**

Dunlop disc type on all four wheels, handbrake operates mechanical linkage to rear wheels. Brake units comprise hub-mounted disc and braking unit rigidly attached to rear axle. Caliper unit houses a pair of brake pads and pad carriers. Since friction pads are self-adjusting, adjustment and maintenance are confined to examination and replacement of pads when worn to 1/4in thick. Handbrake should be adjusted by adjuster screws on rear calipers and then only to compensate for pad wear.

Further details of this braking system are contained in Service Supplement No. 310/C44.

**Rear Springs**

Semi-elliptic. Loose rubber shackle and anchorage bushes (all interchangeable). Shackle pins and anchorage bolts shouldered, tighten fully. Anchorage bolts have heads drilled for peg spanner, and are inserted from inner side of bracket. **Shackle pins and anchorage bolts must be tightened with car in static laden position.**

**Front Suspension**

Independent, coil springs and double wishbone links. Inner ends of upper links pivot on shock absorbers. Inner

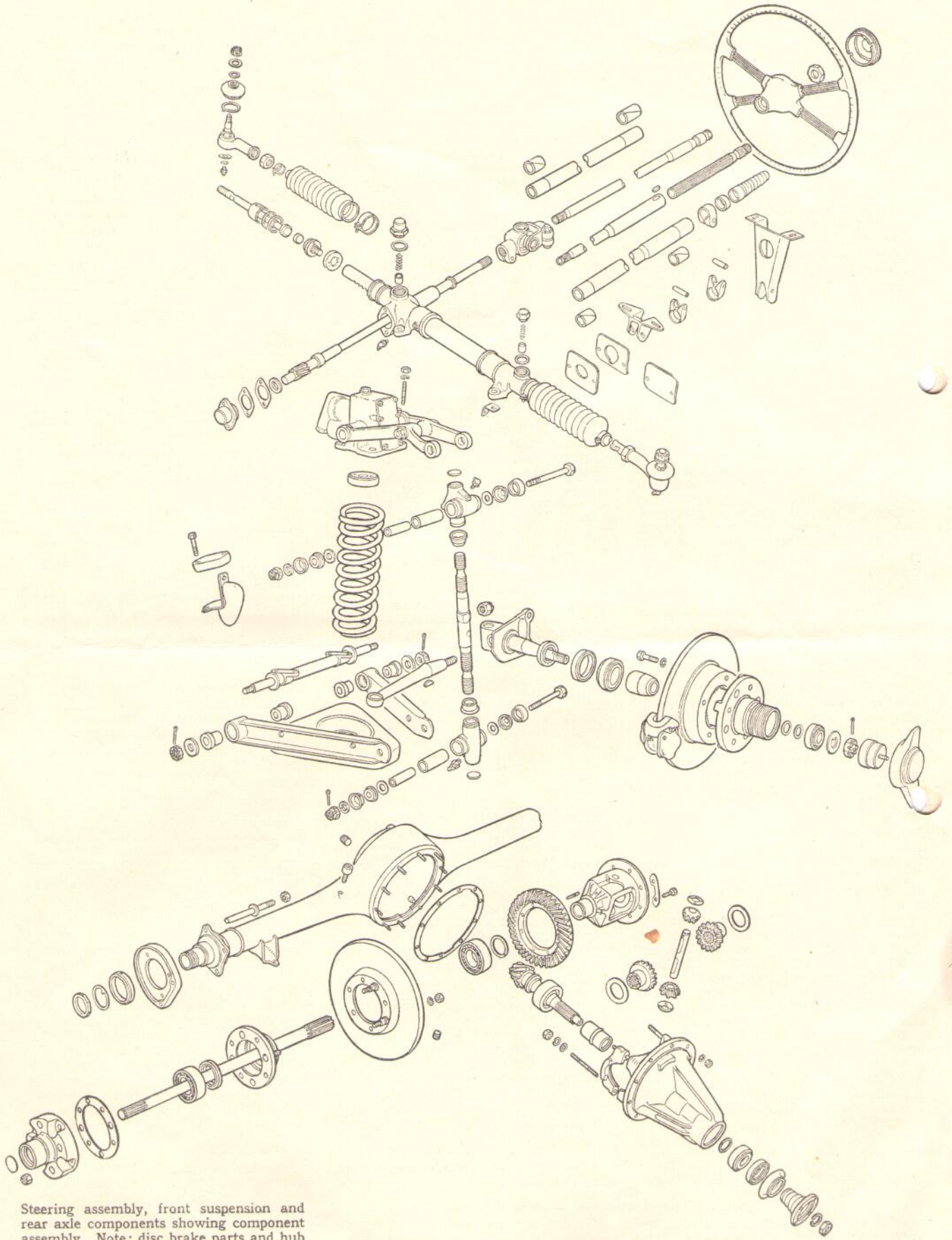
CHASSIS DATA		
Clutch:	Borg & Beck	
Make ... ..	8-AR-G	
Type ... ..	6	
Springs: No. ... ..	light grey	
colour ... ..	2.68in	
free length ... ..	6	
Centre springs: No. ... ..	maroon/lt. green	
colour ... ..	.087-.077in	
Linings: thickness ... ..	8.010-7.980in	
dia. ext. ... ..	5.760-5.750in	
dia. int. ... ..		
GEARBOX		
Type ... ..	synchromesh	
No. of forward speeds ... ..	4	
Final ratios: 1st ... ..	15.652:1	
2nd ... ..	9.520:1	
3rd ... ..	5.908:1	
4th ... ..	4.30:1	
rev. ... ..	20.468:1	
PROPELLER SHAFT		
Make ... ..	Hardy-Spicer	
Type ... ..	Needle roller bearing U.J.	
FINAL DRIVE		
Type ... ..	3/4-floating hypoid	
Crownwheel/bevel pinion teeth ... ..	43/10	
BRAKES		
Type ... ..	Dunlop disc	
Disc diameter ... ..	11in	
Brake cylinder bore dia.: ... ..		
Front ... ..	2 1/2in	
Rear ... ..	1 1/2in	
SPRINGS		
	Front	Rear
Length (eye centres, laden) ... ..	—	42 1/2in
Width (or wire dia. of coils) ... ..	.54in	1 1/2in
No. of leaves (or coils) ... ..	7.2	6
Free camber (length, coil) ... ..	9.09in	3.60in
Loaded camber (length, coil) at load ... ..	6.6in @ 1,193lb	Nil @ 450lb
SHOCK ABSORBERS		
Make ... ..	Armstrong hydraulic top up	
Type ... ..		
Service ... ..		
STEERING BOX		
Make ... ..	B.M.C.	
Type ... ..	rack and pinion	
Adjustments:		
Column end float ... ..	shims on damper	
Cross shaft end float ... ..	thrust washer shims on damper	
Mesh ... ..		
FRONT-END SERVICE DATA		
Caster ... ..	4°	
Camber ... ..	1° pos. to 1/2° neg.	
King pin inclination ... ..	9°-10 1/2°	
Toe-in ... ..	Nil	
No. of turns lock to lock ... ..	2 1/2	
Adjustments: caster } ... ..	Nil	
camber } ... ..		
toe-in ... ..	screwed track rod ends	

ends of lower links rubber bushed. Outer ends of both links pivot in bronze bushes in pivot lugs, which are threaded on to king pins. Near side king pin and stub axle have left-hand threads.

This suspension system compares in detail with that used on earlier M.G.A. cars and readers are referred to Service Data No. 265 for full constructional details.

**Steering Gear**

Rack and pinion. Inner ends of short track rod attached to ends of rack by ball joints covered by concertina gaiters and lubricated from steering gear. Track rods interchangeable. Upper section of steering column connected to universal joint fixed to column tube.



Steering assembly, front suspension and rear axle components showing component assembly. Note: disc brake parts and hub build-up.

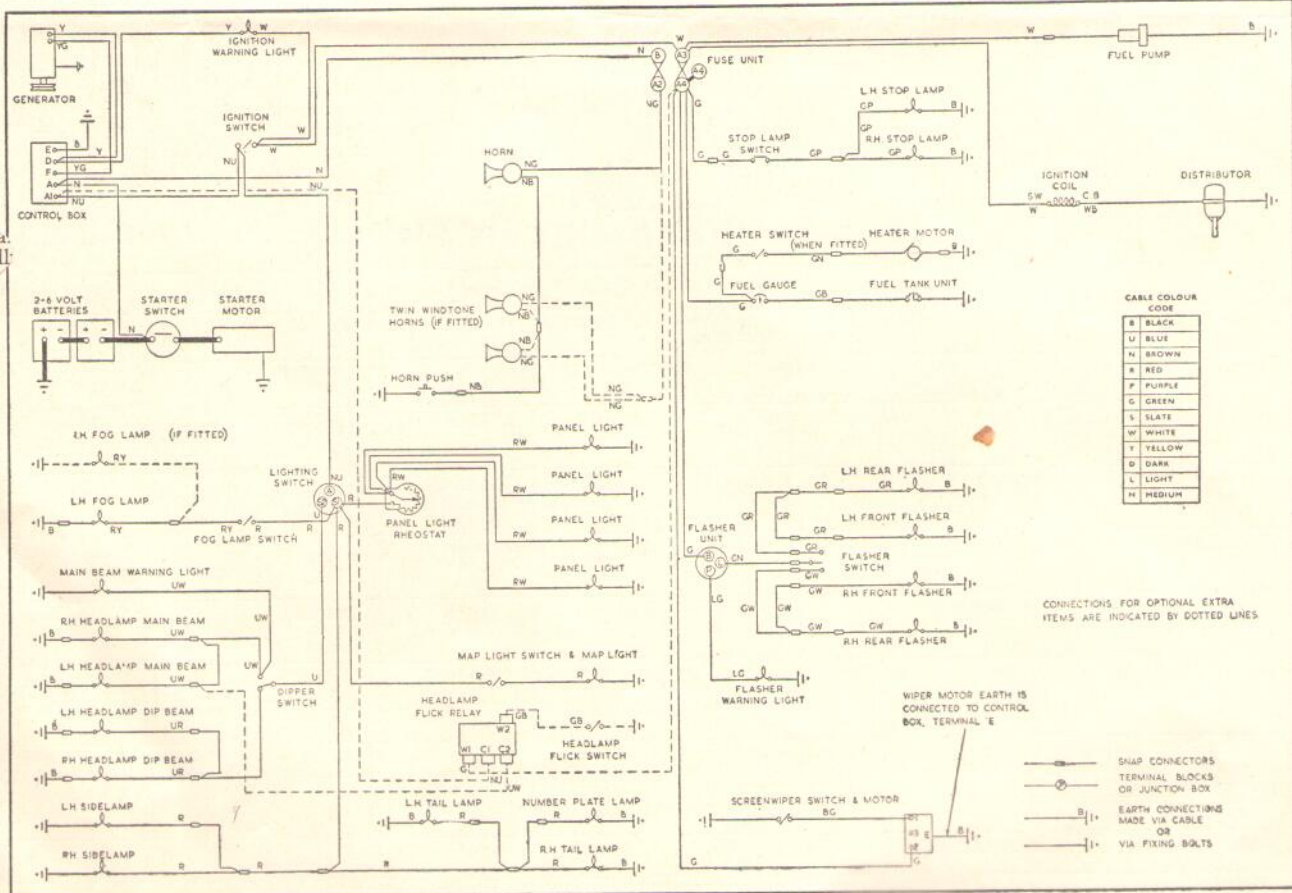
TUNE-UP DATA			
Firing order ... ..	1-3-4-2	Settings: choke ... ..	1 1/2 in
Tappet clearance (cold): inlet	.014-.015 in	main jet ... ..	.10 in
exhaust ... ..	.014-.015 in	needle ... ..	OAG
Valve timing: inlet opens ... ..	20° BTDC	piston spring ... ..	red-4 1/2 oz.
inlet closes ... ..	50° ABDC	Air cleaner: make ... ..	Vokes
exhaust opens ... ..	50° BBDC	type ... ..	Oil wet
exhaust closes ... ..	20° ATDC	Fuel pump: make ... ..	S.U. electric
Standard ignition timing ... ..	TDC*	delivery test ... ..	12.5 gal/hr
Location of timing mark ... ..	c/shaft	suction lift ... ..	35 in
	pulley and pointer	output lift ... ..	48 in
Plugs: make ... ..	Champion		
type (normal touring) ... ..	N3		
(optimum performance) ... ..	N58R		
size ... ..	14 mm		
gap ... ..	0.25 in		
Carburettor: make ... ..	S.U. (twin)		
type ... ..	H.6 semi-dd		

\*On no account must ignition be advanced beyond this point. Fuel used should be 95-98 octane for normal touring; for optimum performance 99-101 octane. If fuels of a lower grade are used ignition should be retarded to 2°-3° BTDC.

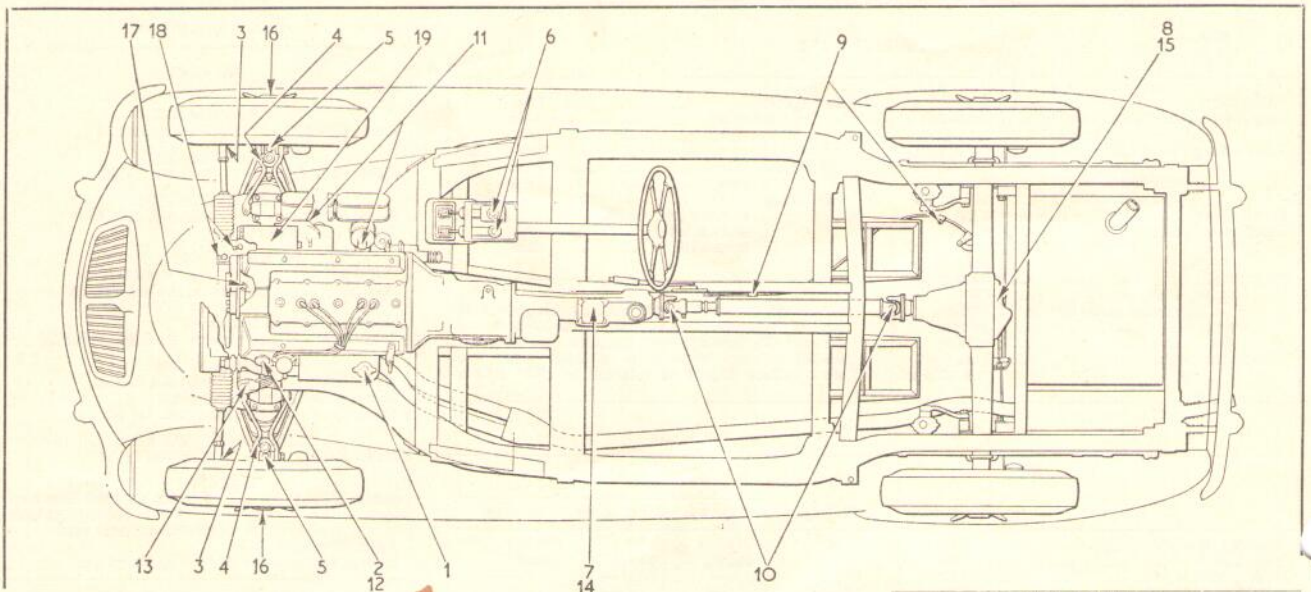
LUCAS EQUIPMENT	
<b>BATTERY</b>	
Model SG9E.—2 OFF	
<b>GENERATOR</b>	
Model C39PV-2	Part No. 22295
<b>CONTROL BOX</b>	
Model RB106	Part No. 37182
<b>STARTING MOTOR</b>	
Model M35G	Part No. 25022
Drive 'SB' Inboard	
<b>DISTRIBUTOR</b>	
Model 23D4	Part No. 40718
Max. centrifugal advance (crank degrees) 28° at 7,000 r.p.m.	
No advance below 500 r.p.m.	
Centrifugal advance springs. Part No. 54412530	
<b>IGNITION COIL</b>	
Model HA12	Part No. 45054
Primary resistance 3.0-3.5 ohms	
Running current at 1,000 r.p.m. 1.0 amp.	
<b>WINDSCREEN WIPER</b>	
Model DR2	Part No. 75297
<b>HORN(S)</b>	
Model WT618	Part No(s) 69046 (low note) 69047 (high note) (69047 optional fitment.)
Type: Windtone	
Current consumption 7 1/2-8 1/2 amp. (per horn)	

Lamps	Model	Part No.	BULB		
			Lucas No.	Wattage	Cap
Head R.H.D. ... ..	F700	51344	414	50/40	B.P.F.
Head L.H.O. ... ..	F700	51345	355	42/36	B.P.F.
Head Export U.S.A. ... ..	F700	51467	—	—	—
Head Export U.S.A. (later) ... ..	F700	58570	—	—	—
Head Export Europe (except as under) ... ..	F700	58272	410	45/40	Unified European Cap (U.E.C.)
Head Export, France ... ..	F700EF	58273	411	45/40	U.E.C.
Head Export, Sweden ... ..	F700	58451	410	45/40	U.E.C.
Fog ... ..	SFT576	55128	323	48	B.P.F.
Long Range driving ... ..	632	52425	382	21	S.C.C.
Side/flasher ... ..	632	52430	989	6	M.C.C.
Side/flasher (N. America) ... ..	549	53330	380	6/21	S.B.C.C.
Stop tail ... ..	594	52337	382	21	S.C.C.
Rear flasher ... ..	594	53600	382	21	S.C.C.
Rear flasher (U.S.A.) ... ..	467	53093	222	4	M.B.C.
Number plate ... ..	—	863511	—	—	—
Ignition warning light (bulb holder) ... ..	—	554734	—	—	—
Main beam warning (bulb holder) ... ..	—	38132	—	—	—
Flasher warning ... ..	WL13	—	—	—	—

Sundry Equipment	Model	Part No.
Mirror { R.H. (alternative) ...	406/1/29A	062587
{ L.H. (alternative) ...	406/1/41A	062590
Foglamp Relay (optional) ...	5B40/1	33169
Headlamp Relay (optional) ...	5B40/1	33135
<b>SWITCHES</b>		
Ignition ... ..	S45	31449
Starter ... ..	ST19/2	76423
Lighting ... ..	PPG1	31251
Foglamp ... ..	PS7	31515
Direction indicator ... ..	TP51	31250
Dip ... ..	FS22	31284
Stop light ... ..	HL2	31082
Panel light ... ..	CHR1	78311
Wiper ... ..	PS7	31515
Map light ... ..	PS7	31515
Headlamp Flasher (optional) ...	235A	31898



Wiring diagram by permission of J. Lucas, Ltd.



**KEY TO MAINTENANCE DIAGRAM**

**EVERY 250 MILES**

- 1. Radiator
- 2. Engine sump } check and top up

**EVERY 1,000 MILES**

- 3. Steering ball joints
- 4. King pins
- 5. Upper suspension links } grease gun
- 6. Clutch and brake master cylinders—top up
- 7. Gearbox
- 8. Rear axle } check and top up
- 9. Handbrake cable } grease
- 10. Propeller shaft universal joints } gun
- 11. Carburettors—top up piston dampers

**EVERY 3,000 MILES**

- 12. Engine sump—drain and refill: also clean external oil filter element

**EVERY 6,000 MILES**

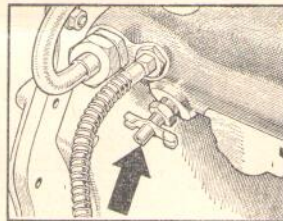
- 13. Distributor—oil shaft bearing, auto advance mechanism, contact breaker pivot, smear cam with grease
- 14. Gearbox
- 15. Rear axle } drain and refill

- 16. Front wheel hubs—clean and repack with grease
- 17. Water pump—one stroke of gun filled with SAE 140 oil
- 18. Steering rack—give up to 10 strokes to nipple on rack housing and two strokes only to pinion shaft nipple

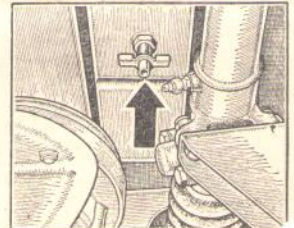
**EVERY 12,000 MILES**

- 19. Dynamo—oil rear end bearing
- N.B.—Engine external oil filter element should be renewed at 6,000-mile intervals

**DRAINING POINTS**



Left: shows cylinder block drain tap on near side of engine; and right: radiator matrix drain tap; access from beneath car.



FILL-UP DATA		
	Pints	Litres
Engine sump (including filter)	13	7.38
Gearbox ...	4½	2.69
Rear axle ...	2½	1.56
Cooling system ...	13½	7.7
Steering rack ...	½	.28
Fuel tank ...	10 galls	45.4
Tyre pressures*: front ...	18lb/sq in	1.27 kg/cm <sup>2</sup>
rear ...	20lb/sq in	1.4 kg/cm <sup>2</sup>

\*Fast motoring—Front 22lb/sq in (1.55 kg/cm<sup>2</sup>).  
Rear 24lb/sq in (1.69 kg/cm<sup>2</sup>).  
Sustained High Speed:—increase standard pressures by 6lb/sq in.

**RECOMMENDED LUBRICANTS**

		Duckham's	Wakefield	Esso	Mobil	Shell	B.P. Energol	Filtrate	Sternol
Engine oil bath, air cleaner	Above 32°F	NOL 30	Castrol XL	Extra Motor Oil 20W/30	Mobiloil A	X-100 30	Energol SAE 30	Medium Filtrate 30	WW 30
	32°-0°F	NOL 20	Castrolite		Mobiloil Arctic	X-100 20/20W	Energol SAE 20W	Zero Filtrate 20	WW 20
	Below 0°F	NOL 10	Castrol Z	Motor Oil 10	Mobiloil 10W	X-100 10W	Energol SAE 10W	Sub Zero Filtrate 10W	WW 10
Gearbox	All temperatures	NOL 30	Castrol XL	Extra Motor Oil 20W/30	Mobiloil A	X-100 30	Energol SAE 30	Medium Filtrate 30	WW 30
Rear axle, steering, gearbox	Above 10°F	Hypoid 90	Castrol Hypoy	Expee Compound 90	Mobilube GX 90	Spirax 90 EP	Energol EP SAE 90	Hypoid Filtrate Gear 90	Ambroleum EP 90
	Below 10°F	Hypoid 80	Castrol Hypoy Light	Expee Compound 80	Mobilube GX 80	Spirax 80 EP	Energol EP SAE 80	Hypoid Filtrate Gear 80	Ambroleum EP 80
Wheel hubs, fan bearings		LB.10 Grease	Castrollease L.M.	Multi-Purpose Grease "H"	Mobilgrease M.P.	Retinax A	Energol L2	Super Lithium Filtrate Grease	Ambrolite LHT
Chassis nipples, dynamo, cables, central joints. (Alternative rec. except for components above)		NOL EP 140	Castrol Hi-Press	Expee Compound 140	Mobilube GX 140	Spirax 140 EP	Energol EP SAE 140	EP Filtrate Gear 140	Ambroleum EP 140
Brake fluid:		Wakefield Crimson							