"MOTOR TRADER" Service Data

M.G.A. TWIN-CAM

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

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INtroduced 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 1599 c.c. by a slight increase in bore size and the camshaft replaced by a half-speed shaft which drives the auxiliary and transfers the drive from the camshaft 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 9:1:1 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 synchronesh gearbox, and propelling 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 of Dunlop pattern is fitted all round. From wheel units are self adjusting and in addition to this facility, rear wheel brakes have separate mechanically operated pads for handbrake action.

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. ii. 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 identification.

ENGINE

Mounting
At front, bonded rubber sandwich blocks bolted up to feet on angle iron 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.
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.
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 bearing. Bearing, lower halves tabbed to locate in bearing cap. Fit with oil grooves to crank throws. No high grade performance bearings may not be renewed or changed without removal of shaft. Flywheel spigot mounted and flanged bolts to crankshaft by six bolts and nuts. Spigot bush, renewable, pressed into crankshaft end; shrink-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 diecast 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 reground. H-section rods split diagonally for removal upwards through cylinder bore. Oil bleed hole on longer side of rod facing away from halfshaft. Cgudgeon pins fully floating in small bronze end bushings 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 pistons/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 mark facing up (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. End shaft runs in three, non adjustable, white metal lined bearings in cylinder head; caps secured by nuts and lock-nuts. Chain drive, top end, 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 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 tap-pet 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 stroke to clear of chain. Turn camshafts until No. 1 inner flanges line up with slots in front bearing housings. If chain has been removed ensure that pistons are half way down holes 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 spindle. Turn inlet camshaft sprocket clockwise to pull timing chain tight. If two opposite holes in sprocket do not line up with tapped holes in cylinder block, 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; adjust 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 3 of a turn to obtain required clearance of 0.006in.

Valves and Tappets

Overhead, non-interchangeable exhaust of different dimension and form to inlet. Split case cover fixings double springs. Valve guides shouldered, may only be removed by driving through from camshaft end. When retightening, guides should be pressed in until flange registers on bottom of valve spring recess. Plain cylindrical tappets fit over valve 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 0.086—116in, in 0.02in steps. Pads are identified by numbers (1—16) stamped on them. No. 1 is thinnest. Camshafts must be removed for tappet adjustment.

Lubrication

Hobourn Eaton eccentric rotor-type pump, spigotted 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 groove 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 3/4in play in either way in vertical run of belt.

TRANSMISSION

Clutch

Borg & 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 0.006in 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 overhose stop. Cut locking wire and unscrew three change speed fork set-screws. Unscrew two setscrews and remove 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. Tip out layshaft, showing 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. 18Z255 if necessary. Lift out layshaft cluster and two thrust washers.

To dismantle rear extension, release from 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

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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

The process of dismantling, noting following points: Layshaft—fit circlip to innermost groove in gear, hold shaft vertically in vice, assemble a roller bearing (at vice face), 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 and retaining circlip. Slide distance tube into locating pin 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 forward. Oil bush in hole must register with oil hole in shaft. Cutaway at front end of second (shorter) bush must line up with locating peg in shaft when dogs of two bushrs and washers are engaged. Fit 2nd speed baulk ring and gear. Push into bush plain side forwards. Slide on brass thrust washer and shorter brass bush, hub located in thrust washers. Fit on 3rd speed gear, cone forwards and plunger and circlip 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/third 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 spigot 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 from selector lever in shifter rod selector. Replace interlock arm on rear extension side cover plate and retch cover.

Laygears in box complete with thrust washers, assemble and replace 1st motion shaft together with B spigot needle rollers. Insert 3rd motion shaft from rear, reverse shafts, reverse bearing and housing, and enter spigot in needle roller race of 1st motion shaft. Fit layshaft and thrust washers, lining up cutaway portion of shaft end with locating groove in front cover. Fit reverse gear and shaft, front end cover and bearing washers, clutch lever and fork. Select forkers to shaft rear end assembly together with locating block, balls and springs. Insert shafts followed by selector forks. Refit rear extension, locate change speed gear and fit side cover; screw in speedometer drive gear, dogs 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 box housing.

To remove axle from car, lift rear of car and remove 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 caliper and end 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 pivot and complete. Remove rear and then from bolts of spring anchors and take out "U" bolts. Draw out axle to rear clear of car.

Hail-shaft (not 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 be 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 case and retained by six setscopic. Differential side bevel gears run directly against planet pinions have spherical pinions.

Differential assembly carried in semi-thrust ball bearings in split housings. Thrust side of bearings must face outwards. Shims between differential case and inner races of bearings for mesh adjustment. Adjust so that the crown wheel is just free without play, and backligh is as described crown wheel (usually 0.009-0.017in). 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.

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 .001 in 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.

Front 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 spacer, and are inserted from inner side of bracket. Shackle pins and anchorage bolts must be tightened with car in static laden position.

Front Suspension

Independence coil springs and double wishbone links. Inner ends of upper links pivot on shock absorbers. Inner 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. Rear 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 are 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.
**KEY TO MAINTENANCE DIAGRAM**

**EVERY 250 MILES**
1. Radiator check and top up
2. Engine sump check and top up

**EVERY 1,000 MILES**
3. Steering ball joints grease gun
4. King pins grease gun
5. Upper suspension links grease gun
6. Clutch and brake master cylinders—top up
7. Gearbox check and top up
8. Rear axle check and top up
9. Handbrake cable grease
10. Propeller shaft universal joints grease
11. Carburetters—top up pintion 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 easily with grease
14. Gearbox
15. Rear axle—drain and refill

**EVERY 12,000 MILES**
16. Front wheel hubs—clean and repack with grease
17. Water pump—one stroke of gum filled with SAE 140 oil
18. Steering rack—give up to 15 strokes to sponge on rack housing and two strokes only to pintion shaft nipple

**DRAINING POINTS**

**FILL-UP DATA**

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<tr>
<th>Part</th>
<th>Pints</th>
<th>Litres</th>
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<td>Engine sump (including filter)</td>
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<td>3.78</td>
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<tr>
<td>Gearbox</td>
<td>1</td>
<td>0.04</td>
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<td>Rear axle</td>
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<td>Cooling system</td>
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<td>Fuel tank</td>
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*Fast motoring—Front 21lb in 1.55 kg/cm², Rear 24lb in 1.99 kg/cm². Sustained High Speed—Increase standard pressures by 6lb/sq in.*

**DRAINING POINTS**

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

**RECOMMENDED LUBRICANTS**

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<tr>
<th>Ingredient</th>
<th>Duckham’s</th>
<th>Wakefield</th>
<th>Esso</th>
<th>Mobil</th>
<th>Shell</th>
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<th>Filtrate</th>
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<td>NOL 30</td>
<td>Castrol XL</td>
<td>Extra Motor Oil 20W/50</td>
<td>Mobilloil A</td>
<td>X-100 30</td>
<td>Energol SAE 20</td>
<td>Medium Filtrate 30</td>
<td>WW 30</td>
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<tr>
<td>Gearbox</td>
<td>NOL 30</td>
<td>Castrol XL</td>
<td>Extra Motor Oil 20W/50</td>
<td>Mobilloil A</td>
<td>X-100 30</td>
<td>Energol SAE 20</td>
<td>Medium Filtrate 30</td>
<td>WW 30</td>
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<td>Rear axle, steering, gear box</td>
<td>Hypoid 80</td>
<td>Castrol Hypoy</td>
<td>Excee Compound 90</td>
<td>Mobilex GX 90</td>
<td>Spirax 90 EP</td>
<td>Energol E.P. SAE 90</td>
<td>Hypoid Filtrate Gear 80</td>
<td>Ambersol EP 80</td>
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<td>Wheel hubs, fan bearings</td>
<td>L.R.10 O.</td>
<td>Castrolase L.M.</td>
<td>Multi-Purpose Grease 11</td>
<td>Mobilegrease M.P.</td>
<td>Revitax A</td>
<td>Energrease L2</td>
<td>Super Lithium Filtrate Grease</td>
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