"MOTOR TRADER" Service Data

No. 369

MORRIS MINI-MINOR

Manufacturers : B.M.C., Ltd., Cowley, Oxford

COMPLETELY revolutionary in design concept, this car was first introduced in July 1959. Since this time, various modifications have taken place which affect the service procedures to a greater or lesser degree and it is for this reason that we have delayed producing an article in our service data series for this model.

The body design of the car is a two-door, four-seater saloon, and due to the adoption of a completely new suspension layout coupled with a complete revision of the mechanical disposition of the major components is actually capable of containing more within it than its compact dimensions would otherwise suggest. Chief points of interest, from a mechanical standpoint are centred around the combined engine/transmission unit which is arranged to drive the front wheels and the four-wheel independent suspension layout, which uses rubber as the suspensory medium.

Briefly, the four-cylindered engine is of unit construction with one reverse gear and four forward gears assembled into a combined transmission casing and oil sump below the engine crankcase. The whole unit is transversely and flexibly mounted, with the mainshaft in constant mesh with the differential gear which is mounted on the transmission casing side. Drive from the engine is taken back to the gearbox through a single dry plate hydraulically operated clutch, and thence by an idler and constant mesh gears to the differential unit of the final drive assembly. Drive to the front road wheels is effected by universally jointed drive shafts, which are splined at their inner ends for axial movement, from the differential side gears.

Cup and cone type suspension units are used at the front and rear of the car, and a feature of this layout is that little periodic attention is required for correct maintenance. Steering is by direct acting rack and pinion.

Identification of vehicles is by chassis and engine serials and these follow the usual B.M.C. pattern and practice, consisting of a serial number with prefix letters. The first letter indicates make i.e. M=Morris; 2nd letter, the model (c.c. capacity) A=800-900 c.c.; 3rd letter the body type, 2S=2-door saloon; 4th prefix the series of model, 4=4th series; and the 5th prefix is used to denote differences from standard right-hand drive, i.e., L=left-hand drive. In addition to the above, engines are also serial numbered and a breakdown of the coding together with the significance of the letters and symbols is to be found on p. ii.

Engine serials are to be found stamped on a plate which is secured to the right-hand side of the cylinder block, above the oil filter. Chassis numbers are to be found stamped on a plate secured between the radiator and the wing valance. It is important that all these serial letters and numbers are quoted when ordering spare parts or when corresponding with the makers.

Special tools for speeding up certain repair operations are available from the makers or their agents and a list of those considered the more essential is to be found on p. ii.

Threads and hexagons are in the main of the Unified thread series pattern and form.

DISTINGUISHING FEATURES. Instantly recognizable from any standpoint, the car is a two-door saloon. In the accepted sense, it is also a "four-light," but in fact the slender screen and door pillars give all-round vision.

ENGINE

Mounting

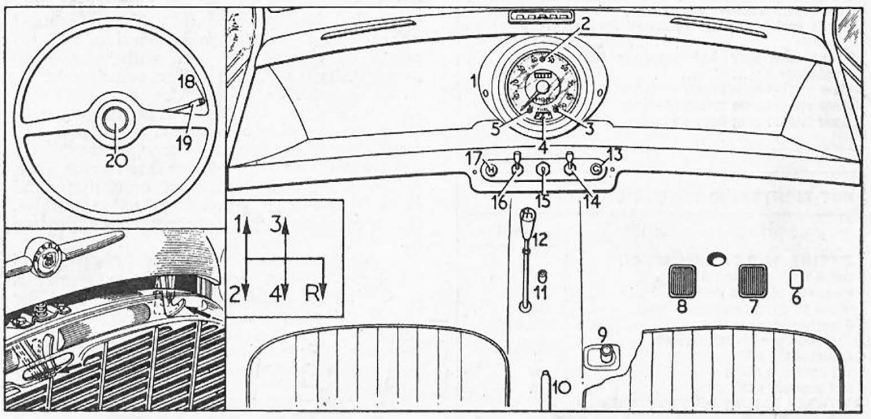
Engine/transmission unit is mounted on a sub-frame, which is in turn bolted up to abutments on body front section at either side by two bolts and nuts (each side of bulkhead cross member); four setscrews securing rear end of sub-frame to front floor panel and two screws securing front of frame to bottom of grille panel. Rubber mounting blocks are bolted up to abutment brackets either side of unit and to sub frame side members and body mounting points respectively.

Right-hand mounting is located with clutch cover, and should be removed with cover when dismantling. Remove three set screws to release mounting from cover. Tighten all bolts and nuts fully on reassembly.

Removal

Engine/transmission unit are best removed from the vehicle, complete with sub-frame, from beneath. The engine may be removed from the car through the bonnet aperture provided facilities exist for work to be carried out beneath the front of the vehicle.

To remove unit with sub-frame, unscrew hexagon plug and remove anti-rattle spring and plunger from gear change extension casing. Remove two set screws securing change speed lever retaining plate to casing and pull lever out of casing from inside car. Disconnect earth lead from battery, bonnet from hinges and remove bonnet. Disconnect all pipes, wires and controls to unit and remove carburettor. Unscrew sleeve nut and release speedometer drive cable from back of instrument. Disconnect hydraulic brake



INSTRUMENTS, CONTROLS, GEAR POSITIONS AND BONNET LOCK

1. Speedometer
2. Main beam warning lamp
3. Ignition warning lamp
4. Fuel gauge
5. Oil pressure warning lamp
6. Accelerator
7. Brake pedal
8. Clutch pedal
9. Starter switch
10. Handbrake
11. Headlamp dip switch
12. Gearlever
13. Choke control
14. Lighting switch
15. Ignition switch
16. Screen wiper switch
17. Heater switch
18. Direction indicator warning lamp
19. Direction indicator.
20. Horn push.

Inset upper left shows siting of steering column mounted controls, and below is shown detail of the bonnet safety catch and method of external release.

GENERAL DATA	
Wheelbase	6ft 8in
Track: front	3ft 11 7/32in
rear	3ft 9 3/8in
Turning circle	29ft 6in
Ground clearance	6 3/4in
Tyre size: front / rear	5.20—10
Overall length	10ft 0 1/2in
Overall width	4ft 7 1/2in
Overall height	4ft 5in
Weight (dry)	1,330lb

SPECIAL TOOLS	Part No.
ENGINE	
Valve seat cutter handle	18G27
Valve seat cutter pilot	18G167D
Valve seat finishing cutter	18G167
Valve seat glaze breaker	18G167A
Valve seat narrowing cutter (top)	18G167B
Valve seat narrowing cutter (bottom)	18G167C
Crankshaft gear and pulley remover	18G2
Crankshaft gear and pulley replacer	18G138
Bearing and oil seal replacer	18G134
Crankshaft primary gear oil seal replacer adaptor	18G134BC
Timing case oil seal replacer adaptor	18G134BD
Oil pump release valve grinding-in tool	18G69
Shock spanner	18G98
Flywheel and clutch remover adaptor	18G304L
Camshaft liner remover and replacer (basic tool)	18G124A
Camshaft liner remover adaptor	18G124K
Camshaft liner reamer (basic tool)	18G123A
Camshaft liner reamer pilot-centre	18G123AH
Camshaft liner reamer pilot-rear	18G123AJ
Camshaft liner reamer cutter	18G123AN
Flywheel and front hub oil seal replacer (adaptor)	18G134BH
Crankshaft primary gear oil seal protector sleeve	18G570
TRANSMISSION	
Laygear needle roller bearing replacer	18G194
Impulse extractor—basic tool	18G284
First motion shaft remover adaptor	18G284B
Dummy layshaft	18G471
First motion shaft bearing circlip gauge	18G569
Synchromesh unit assembly ring	18G572
Change speed shaft oil seal relacer	18G573
Differential bearing replacer	18G578
First and third motion shaft bearing replacer	18G579
Front suspension and idler gear needle bearing remover	18G581
First motion shaft spigot bearing remover adaptor	18G581B
First motion shaft spigot bearing replacer	18G589
Front suspension and idler gear bearing replacer	18G582
Final drive gear nut spanner	18G586
FRONT AND REAR SUSPENSION	
Hub bearing outer race remover (basic tool)	18G260
Front hub drive flange bearing outer race remover adaptor	18G260H
Suspension rubber spring compressor	18G574
Front and rear hub remover (basic tool)	18G304
Front and rear hub remover bolt adaptor	18G304F
Rear radius arm brush remover	18G583
Rear radius arm brush replacer	18G584
Rear radius arm brush reamer	18G588

NUT TIGHTENING TORQUE DATA	lb/ft
ENGINE AND TRANSMISSION	
Cylinder head stud nuts	40
Con. rod big-end bolts	35
Main bearing setscrews	60
Flywheel centre bolt	110/115
Gudgeon pin clamp screws	25
Crankshaft pulley nut	70
1st rotation shaft nut	90
3rd motion shaft nut	20
Flywheel housing bolts and stud nuts	18
FINAL DRIVE	
Driver gear./diff. cage	60
Drive shaft flange nuts	60
Diff. housing end bolts	18
SUSPENSION AND STEERING	
Steering lever/hub bolts	35
Steering lever/ball joint	25
Front hub nut (drive shaft)	60
Rear suspension stub axle nut	60
Front suspension upper arm pivot nut	26—28

supply pipe at three-way union on engine bulkhead and plug union with clean 3/8in UNF screw.

Remove exhaust system and support body with suitable slings underneath each front wing. Remove two setscrews securing slave cylinder to flywheel housing, release lever tension spring and extract push-rod from slave cylinder securing cylinder against engine bulkhead.

Disconnect steering rack ball ends from steering levers and remove telescopic dampers. Release engine tie rod from bracket on rear of cylinder block. Support engine beneath transmission casing, undo lock plate tabs and withdraw four body/sub-frame bolts, two each side of bulkhead cross member. Take out four screws securing rear of sub-frame to front floor and two screws securing front frame to bottom of grille panel.

Arrange lifting tackle and lift body clear of engine, and withdraw engine/sub-frame unit. Care should be taken during removal to see that damage to radiator and cowling and also to steering rack rubber gaiters is avoided during lifting process.

To Remove Engine from sub-frame

Drain oil from transmission casing and disconnect drive shafts at inner ends. With sub-frame supported under both side members, take weight of engine unit with lifting tackle and remove two screws securing each engine mounting to sub-frame, and lift engine up and clear of frame. Note: paper gaskets are fitted between engine mountings, sub-frame and clutch cover on engines up to Eng. No. 4354. It is essential that new gaskets are refitted similarly to all engines up to this serial number.

Refitting is a reversal of previous procedure, but care should be taken to ensure that electric lead to rear of car is not trapped between body and sub-frame. Tighten steering arm ball joints to 25lb. ft.

It is most important to ensure that when exhaust system is assembled to car, pipe/manifold clamp is slack to allow movement and then to wedge engine to line up hole in tie rod with threaded hole in cylinder block; moving sub-frame attachment bolts as necessary. With unit *in situ*, sufficient slip packings to fill gap between transmission casing lug and pipe support stay should be inserted and bolt tightened. If hole in lug is threaded, it should be drilled out for 5/16in bolt to replace setscrew. Exhaust pipe/manifold clamp should be tightened, also pipe and tail pipe support clips and wedge removed from bulkhead.

Crankshaft

Three main bearings, thin wall steel-backed, white metal-lined located by tabs. End float controlled by split thrust washers recessed either side of centre main bearing and retained by tabs in cap. Fit with oil grooves to crankshaft, no hand fitting permissible.

Main bearings cannot be changed with engine in place, nor may thrust washers, etc., be changed, without removal of engine and transmission to achieve access to crankshaft.

Flywheel, with shrunk-on starter ring gear, spigoted on rear flange of crankshaft and retained by four equally spaced setscrews. Oil-impregnated spigot bearing bush pressed into end of shaft.

Timing sprocket and pulley hub, with oil thrower between lip to front, pressed on front end of crankshaft, sharing special flat Woodruff key, and retained by hexagon headed setscrew. Sprocket fits with longer boss to rear, with shims behind for alignment. Pulley hub passes through felt sealing ring in timing cover.

Connecting Rods

Big ends thin wall, steel-backed, lead bronze or copper lead shells, tin-plated surface, located by tabs. No hand fitting permissible. Rods split diagonally, cap and rod stamped on same side and shouldered for location with caps.

Big ends are offset. Fit Nos. 1 and 3 with larger boss to rear, 2 and 4 to front. Oil

ENGINE DATA	
General Type	8 MB
No. of cylinders	4
Bore × stroke: mm	62.94 × 68.26
in	2.478 × 2.687
Capacity: c.c.	848
cu in	51.7
R.A.C. rated h.p.	9.8
Max. b.m.e.p. at r.p.m.	128 lb/sq in @ 2900
Max. torque at r.p.m.	44 lb/ft @ 2900
Compression ratio	8.3 : 1

CRANKSHAFT AND CON. RODS	Main Bearings	Crankpins
Diameter	1.7505-1.751in	1.6254-1.6259in
Length	1.187in	—
Running clearance: main bearings		.0005-.002in
big ends		.001-.0025in
End float: main bearings		.002-.003in
big ends		.008-.012in
Undersizes (max.)		.040in
Con. rod centres		5.750in
No. of teeth on starter ring gear/pinion		—

PISTONS AND RINGS		
Clearance (skirt): bottom		.0006-.0012in
top		.0026-.0032in
Oversizes		.010, .020, .030, .040
Gudgeon pin: diameter		.624in
fit in piston		hand push
fit in con. rod		bolt clamped
	Compression	Oil Control
No. of rings	3	1
Gap	.007-.012in	.007-.012in
Side clearance in grooves	.0015-.0035in	.0015-.0035in
Width of rings	.069-.070in	.124-.125in

CAMSHAFT	Front	Centre	Rear
Bearing journal: diameter	1.6655-1.666in	1.622-1.623in	1.372-1.373in
Bearing clearance: Front	.001-.002in		
Centre and rear	.00125-.00275in		
End float	.003-.007in		
Timing chain: pitch	3/8in		
No. of links	52		

VALVES	Inlet	Exhaust
Head diameter	1.093-1.098in	1.00-1.005in
Stem diameter	.2793-2798in	.2788-.2793in
Face-angle	45°	45°
Spring length: free	1.750in	
Pressure at load: valve open	85 lb	
valve closed	52.5 lb	
No. of working coils	4 1/2	

POWER UNIT SERIAL NUMBER CODING
(Up to Engine No. 8MB25000)

1st PREFIX GROUP—Cubic capacity, make and type
1st Prefix number: 8—850 c.c.
1st Prefix letter: M—Morris
2nd Prefix letter: B—Variation of engine type

2nd PREFIX GROUP—Gearbox and ancillaries
U—Centre gear change gearbox.

3rd GROUP—Compression and serial number
H—High compression and serial number of unit.

(From Engine No. 8AM25001)

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bleed hole on longer side of big end must go to side away from camshaft.

Gudgeon pins cotter-clamped in small ends, clamp towards camshaft. Fit of pins in pistons is, to some extent, selective. Gudgeon pins must be thumb-push fit for three-quarters of their travel and tapped home with rawhide mallet; pistons and pins cold.

Pistons

Aluminium alloy, T-slot, aluminited finish, with dished crown.

Top compression ring plain, second and third rings taper faced and must be fitted with sides marked "TOP" upwards. Engine/transmission unit must be removed from car for removal of pistons.

Big ends will pass through bores, but pistons will not pass crank throws. Remove and assemble through top.

Camshaft

Single-row roller endless chain drive. Camshaft sprocket spigoted on camshaft, keyed with Woodruff key and retained by nut. No alternative fitting for valve timing. Crankshaft and camshaft sprockets must be removed and assembled together.

Dot-punched timing marks on sprockets must be together when chain is fitted, with No. 1 piston at T.D.C. on compression stroke.

Valves

Overhead, not interchangeable. Inlet larger than exhaust. Split cone cotter fixing, single springs. Cotters retained by spring clips. Rubber sealing rings with retainers on valve stems below collars.

Valve guides plain, no shoulder, non-interchangeable. Inlet guides are longer, exhaust guides counterbored at bottom and countersunk at top. Press in both types from top until they project 19/32in from spot face of spring seat.

Tappets and Rockers

Plain barrel tappets sliding directly in crankcase. Access through opening in side, after removal of carburettor, and manifolds.

Bushed rockers, all interchangeable on shaft carried in four pillars. Rockers may be either of two types, forged in which case they may be rebushed, or pressed steel which must *not* be rebushed. Shaft located by grubscrew in No. 1 pillar, which is drilled for oil feed through drillings in head and cylinder block. Pair of rockers for each cylinder located on either side of pillar, separating springs between rockers of adjacent cylinders.

Push rods can be removed singly after adjustment has been slackened right off. Inner rockers can be pulled aside against separating springs, but end rockers must be taken off after removal of split pin, plain washer and double-coil spring washer.

Lubrication

Three types of oil pump may be fitted. These are of Hobourn Eaton, Burman or Centrifugal Mfg. Co. make. The first two named may be dismantled for service, and the last-named is serviced as an assembly only.

Pump is located in crankcase casting recess at rear of cylinder block. Access achieved after removal of engine and subsequent dismantling of flywheel and clutch assembly. Unit is driven by pin and slotted shaft from rear end of camshaft and is secured by three ¼in UNF screws. When refitting, renew paper joint washer to ensure that intake and delivery ports are unobstructed.

Oil is delivered under pressure to crankshaft, main and big end bearings. Con-rods are drilled for oil passage to gudgeon pins. Bleed hole in long side of con-rod provides cylinder wall lubrication. Oil is also delivered to hollow rocker-shaft via camshaft under pressure and through radial drillings to rockers and ball ends of adjuster screws. Surplus oil percolates down pushrods to lubricate tappets and cams on camshaft and returns to engine/transmission case sump.

Ignition

Vacuum and centrifugal advance distributor spigot mounted on engine crankcase (to front of vehicle).

To check timing, remove clutch pit inspection cover and with aid of a mirror, the TDC ¼ and timing marks will be visible on rotation of the engine. Timing is correct when, with piston at TDC No. 1 compression ¼ mark on flywheel is in line with pointer on clutch cover, or that in a similar engine position dimples on crankshaft and camshaft timing gears are lined up. Slot of spindle drive dog is offset and when correctly assembled will assume 1 o'clock position, large segment of drive dog uppermost. See data tables p. vii for further data and performance figures, also notes at foot of *Tune-Up Data* regarding static ignition timing.

Cooling System

Pump, fan and thermosyphon, thermostat located in water outlet port of cylinder head.

Owing to the lateral disposition of the engine/transmission unit, and increased air flow caused by suction resulting from placing the matrix in the nearside front wing arch, a *blower* fan is fitted and care should be taken to see that this is replaced correctly.

Pump has carbon seal and should not be over lubricated (see Key to Maintenance Diagram, p. viii). Thermostat opens at 70-75 deg. C., and system is pressurized. One-piece cowling fitted up to Car No. 3941; two-piece thereafter. Adjust fan belt to give 1in free play in longest run of belt.

TRANSMISSION

Clutch

Single dry plate hydraulically operated. Pressure and inner plates operate on inner face of flywheel. Lugs on pressure plate extend through flywheel and are secured to driving straps on outer flywheel face and to pressure spring housing by three shouldered setpins. At flywheel end, straps are anchored by three similar setpins.

Driven plate is maintained in contact with inner flywheel face by pressure-plate spring pressure, and disengagement achieved by axial movement of lever pressure pad against thrust plate of pressure spring housing, thus forcing pressure plate away from driven plate, which is then free to rotate with crankshaft.

Access to clutch unit for service after removal of starter, slave cylinder and partial dismantling of engine/transmission and subframe. Note: turn engine to TDC 1 & 4 *before* removing flywheel, to extract "C" washer locating primary gear. Preserve flywheel in vertical position when removing, to prevent oil seal retained oil from contact with clutch linings. If oil leakage is evident past crankshaft rear end seal, brass plug should be driven into gallery firmly and new rubber plug fitted. Clutch/flywheel straps are laminated. Mark all components for correct reassembly.

Adjustment of clutch in service is correct and established when a clearance of ·060in is obtained between external operating lever and adjustable clutch return stop.

Later models are fitted with throw-out stop and this should not normally require adjustment in service. If it is found necessary to remove this during overhaul it may be reset by screwing stop and locknut up to limit of their travel (away from cover boss), depress clutch fully and in this position screw locknut up against stop, release clutch pedal and screw stop up a further ·007-·010in (one flat of hexagon head) and tighten locknut, checking clearance at lever stop screw.

Gearbox and Differential Gear

Gearbox has four forward speeds, one reverse and synchromesh engagement on the upper three ratios. Selection is effected by central lever, relay levers and rods to the selector mechanism within the gearbox. Drive to the gearbox mainshaft is taken, from the flywheel end of the crankshaft, through an idler gear to the constant mesh pinion on the gearbox mainshaft. A helical gear on gearbox output shaft drives the main differential gear (which replaces the crown wheel in conventional layout). This, in turn, is bolted up to the differential gear and drive is taken from this unit via short shafts to road wheels.

To Remove Transmission

Remove engine as detailed in engine section. Take off eight setscrews and remove clutch cover plate and extract flywheel and clutch (see clutch section above). Remove starter motor, flywheel housing and withdraw 12 setscrews from transmission case flange, noting lengths and positions fitted. Lift engine, and part engine from transmission case.

To Reassemble Transmission

Refitting is a reversal of dismantling process, note following points: Renew all gaskets, etc., clean off joint faces. If new gear train is fitted, check idler gear endfloat before transmission case is refitted. When refitting housings tighten evenly, to ensure good jointing and correct location of crankshaft primary gear, roller gear and first motion shaft driving gear. Ensure that front bearing cork oil seal is correctly positioned as engine is lowered on to casing. Insert short sump/crankcase screw, located near change speed remote control shaft boss before crankcase is lowered into transmission case and screw this up as far as possible before flanges are finally brought together.

To Dismantle Transmission Unit

Remove transmission casing from crankcase as detailed above. Take off idler gear, note thrust washers, and remove idler gear bearing. Remove differential assembly in following manner: Take off hexagon cap, remove change speed lever anti-rattle spring and plunger, remove bottom cover plate and clamp screw securing lever to top of remote control shaft. Withdraw shaft. Remove nylon seating and tension spring from remote control shaft and shaft lever. N.B.: If found to be fitted, nylon seating and tension spring in cup of remote control shaft lever may be discarded on reassembly of earlier engines during overhaul. Extract split pins and remove diff. gear shaft flange securing nuts. Remove nuts and take out flanges. Take off five screws either side and remove final drive end covers. Note shims fitted between diff. bearing and housing. Remove diff. housing stud nuts, withdraw housing and remove diff. assembly.

Remove change speed reverse detent plunger plug and withdraw gearchange operating shaft, preserve transmission casing oil seal and Woodruff key fitted to lower end of shaft. Take out speedo drive pinion, remove two screws and take off retaining plate from front cover, and draw out drive gear. Remove nine setscrews and take off casing end cover. Remove oil pump suction pipe bracket, flange and external blanking plate. Unscrew and remove setpins and locking plate securing 3rd motion shaft bearing retainer to casing centre web, extract retainer together with shims, followed by drive pinion nut, lock washer and drive pinion. Take off circlip and roller bearing from 1st motion shaft end, knock up tabs of lock washers, remove nut and draw out 1st motion shaft drive gear.

Remove layshaft and reverse shaft lock plates, push layshaft out and take out laygear with thrust washers. Remove screwed retaining plugs from outside of casing, extract selector rod interlocking plungers and spring. Extract 1st motion shaft bearing circlip and draw off bearing (tool 18G 284 and adaptor 18G284B). Unlock 1st and 2nd speed selector fork, withdraw fork rod and take out fork. Remove 3rd motion shaft bearing (drift shaft forwards), using bearing circlip to lever bearing from web bore. Care should be taken to see that when drifting 3rd motion shaft, selector forks are not damaged. Remove 3rd motion shaft, after removal of bearing. Unscrew and remove remaining oil

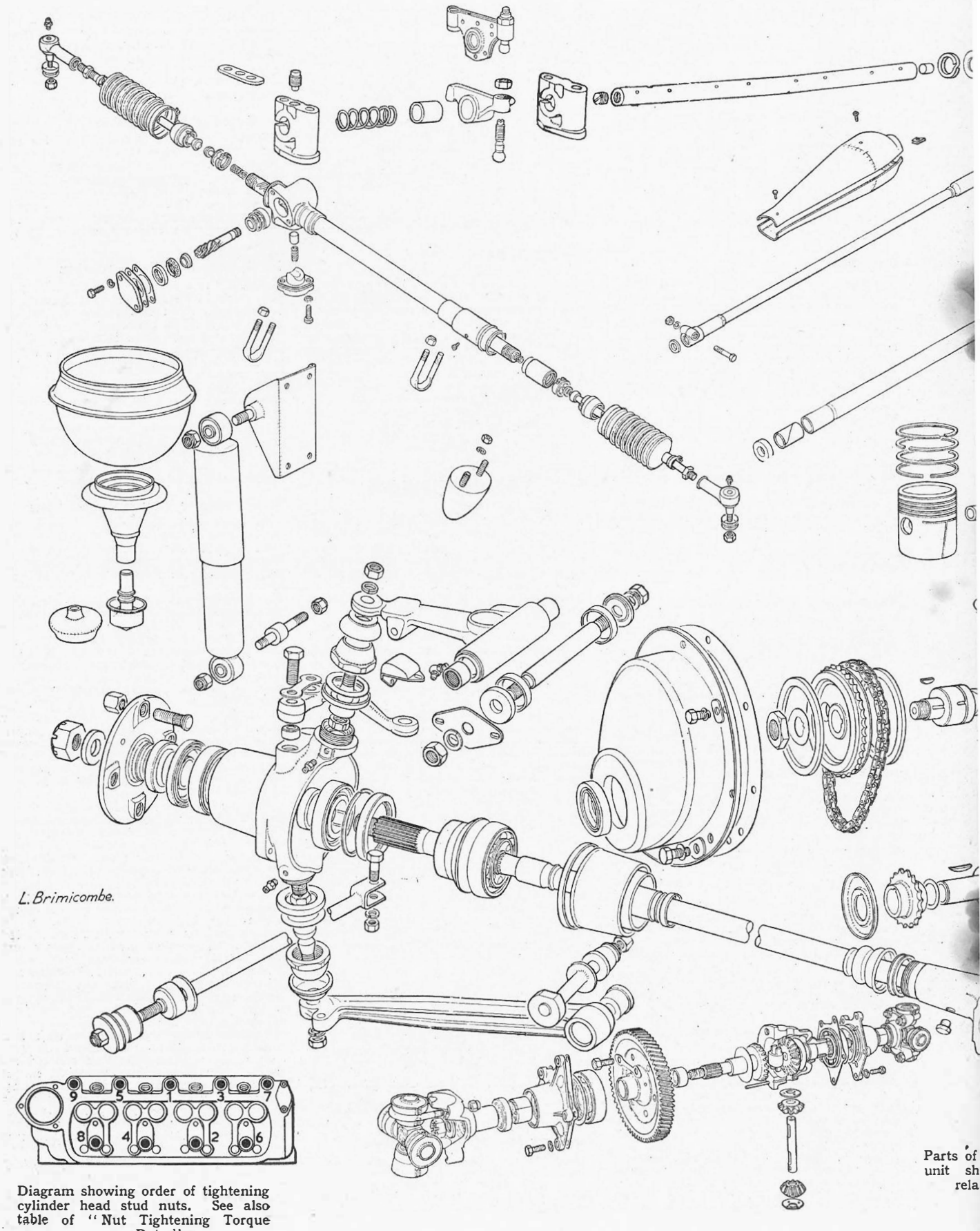

Diagram showing order of tightening cylinder head stud nuts. See also table of "Nut Tightening Torque Data."

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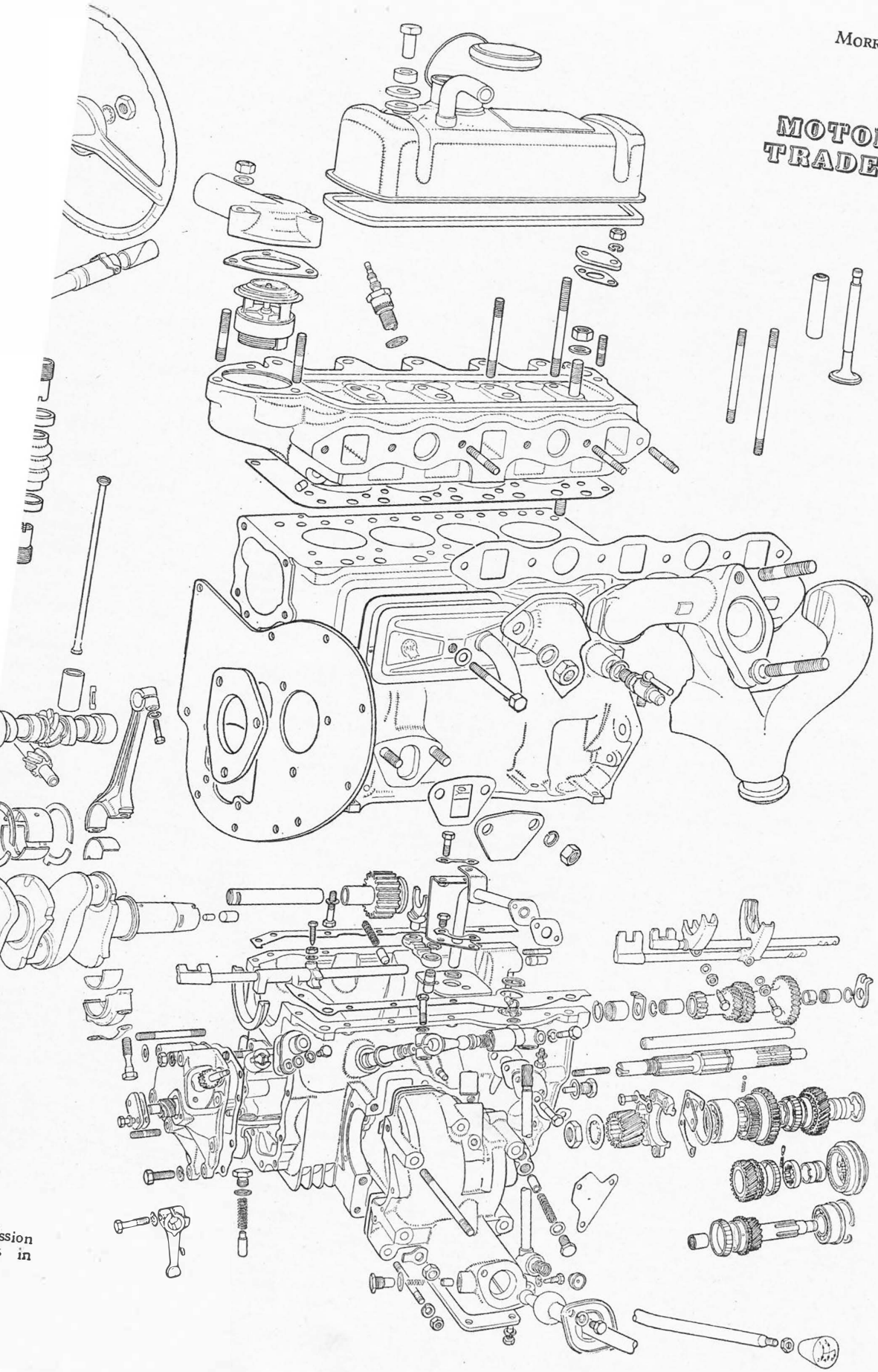

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strainer bracket screw, lockplate, withdraw strainer assembly. Release locknut and slacken off 3rd/4th gear selector fork locating setscrew. Withdraw rod and remove fork from casing, followed by reverse gear shaft, gear and sclector fork. Extract detent spring and plunger. Release circlip from reverse gear shifter lever pivot pin and take out lever.

To Dismantle 3rd Motion Shaft

Withdraw top/3rd gear synchro. hub from front end of shaft (plain side of hub to rear of gearbox). Remove front thrust washer by depressing spring loaded locating plunger and rotating washer until splines register with those on shaft. Take out plunger and spring, followed by 3rd gear bush and interlocking ring. Draw off 2nd speed gear and bush. Remove rear thrust washer, 1st speed gear and hub. If 2nd/3rd or 4th speed striking dogs and hubs and cones are parted, preserve three balls and springs located in each hub. Reassembly is reversal of dismantling procedure, noting that end float of 2nd and 3rd speed gear when assembled on shaft must be .0035-.0055in.

To Reassemble Transmission Unit

Press reverse gear shifter lever pivot pin into its drilling in casing and fit lever, securing it to pivot with circlip. Place reverse gear and fork in position to engage reverse shifter lever and push reverse gear shaft through centre web of casing into gear; plain end foremost, slotted end exposed. Insert reverse selector rod interlock spring and plunger, also reverse selector rod in casing from front to pick up fork on rod insertion. Similarly fit 3rd/4th gear selector rods and forks, fitting fork setscrews and lock up with wire.

Replace oil pick-up strainer in casing, refit screws leaving nuts slack. Smear sealing ring with grease to facilitate suction pipe insertion. Refit 3rd motion shaft in casing, slotted end first, through centre web, so that 1st and 2nd synchro hubs engage selector forks. Place ball bearing on mainshaft, insert assembly into casing. Position 3rd motion shaft bearing in centre web of casing, lining up 1st and 3rd motion shafts. Drift both bearings into position (Tool No. 18G-579 together with distance collar) so that outer race will be driven into casing and inner race on to 3rd motion shaft simultaneously.

Refit 1st and 2nd speed selector forks and rod, retaining screw and locknut. Refit 1st/2nd and 3rd top selector rod detent plungers and springs also sealing washers under head of screwed retaining plugs. Replace drive pinion, lock washers and nut on front of 3rd motion shaft and 1st motion shaft gear. Fit pegs of lock washer to holes in gear. Refit laygear, thrust washer at each end and slotted shaft end to front. End float of laygear should be .002-.006in with washers fitted. Revolve layshaft so that slotted end lines up with similar slot on reverse shaft end, so that locating plate may be refitted.

Replace 3rd motion shaft bearing retainer and shims as necessary, secure with lock plates and setscrews. Remove front screw of filter bracket, insert suction pipe, replace gaskets, blanking plate and casing; tighten setscrews. Replace strainer bracket screw, lock plate and tighten up screws and lock tab washers. Refit selector interlock arms and front cover and gasket. Refit speedo drive gear and cover plate. Examine (and replace if necessary) pinion shaft housing seal. Replace housing and secure with one setscrew. Insert gear change operating shaft in casing with Woodruff key fitted to lower half of shaft. Position selector lever inside casing with end engaged in interlock arm and push shaft through lever boss, insert and tighten setscrew. Refit gear change operating shaft reverse detent plunger. spring and plug. Refit differential as follows (note idler gear end float is .003-.008in, with housing nuts tight).

Place diff. assembly in transmission casing with slight bias towards flywheel end of unit. Refit diff. housing with nuts slack to allow right-hand end cover to be fitted. Ensure setscrew holes are lined up and tighten up setscrews in cover evenly. Fit left-hand final drive cover without joint washer. Tighten setscrews so that cover register nips bearing outer race; check evenness of tightening with feeler gauges. If feelers cannot be inserted, shims must be added between cover flange and housing shims, up to .008in thick, between outer race and register on end cover.

Compressed thickness of cover joint washer is .007in. Bearing pre-load is .001-.002in. Any deviation from these tolerances must be made up with shims. With tolerances established remove end cover, refit joint washer and tighten up cover screws. Tighten diff. housing nuts, refit driving flanges to diff. gear shafts securing with slotted nuts and split pins. Ensure equal freedom of drive shafts. Fit operating lever to splined end of gear change operating shaft and align recess with drilling in boss. Refit remote controls and replace bottom cover plate.

Finally, refit transmission casing complete to engine assembly. This is a reversal of removal procedure detailed earlier in this section; ensuring that all gaskets, etc., are renewed and that tolerances quoted earlier are adhered to.

Drive Shafts

Hardy-Spicer-Birfield constant velocity joints. Hemispherical interior of driven shaft and exterior of driving shaft have six grooves machined axially, and a ball cage carrying six steel balls interposed between each. Ball bearings engage grooves of each member and key them together, also allowing free hingeing between each part.

Rubber boot coverings should be examined periodically for wear and replaced if this is evident. No provision for adjustment; complete drive shaft must be removed to fit new boot.

CHASSIS

Brakes

Lockheed hydraulic, with pressure-limiting valve in circuit. Two leading shoe front brakes with separate cylinder for each shoe. Leading and trailing rear brake layout, with lever operation of shoe expanders for handbrake operation by cables.

Square ended adjusters on each brake back plate. Turn adjuster clockwise until brake drum is locked and back off one "click," or until drum is just free to rotate.

Handbrake adjustment is usually compensated by adjustments as above. As additional check, set handbrake pawl to 5th notch on ratchet, raise car on jack and adjust nuts at handbrake lever until rear wheels are just free to rotate.

Rear Suspension

Independent, cup and cone type units, rubber used as suspensory medium. Suspension is mounted on a sub-frame, and this should be removed for work involving this part of the car. Removal effected after disconnecting eight mounting bolts of frame unit and taking off hydraulic pipe lines, pressure-limiting valve, exhaust pipe/manifold clamp and exhaust assembly from car.

Gill panels, etc., should be removed and rear dampers disconnected from inside luggage boot. Hand-brake cables should be disconnected from lever trunnion block and body supported while suspension unit is removed from car. Radius arms may be removed without removal of rear sub-frame, but this involves removal of fuel tank.

Front Suspension

Independent, upper and lower suspension arms are located in side members of front sub-frame. Outer ends are attached to swivel hubs by ball joints. Rubber cone spring units are mounted in sub-frame towers, tubular struts interposed between springs and suspension upper support arms. Telescopic dampers are mounted on upper support arms, and top spigots of these units are anchored to wing valance.

Hubs run on ball bearings and are splined for drive shaft flanges. Removal effected after taking off road wheel and dismantling as follows: disconnect ball end from steering lever and drive shaft at inner flexible joint, removing four outer nuts from coupling "U" bolts. Mark drive flange and universal joint for correct replacement. Slacken off brake hose at frame union and remove from brake backplate. Release upper suspension arm from swivel hub ball pin. Remove nut and spring washer from rear end of lower pivot arm and push pin forward to release arm. Withdraw swivel hub complete with drive shaft.

Maintenance of this suspension is confined to lubrication as detailed on p. viii.

Steering Gear

Rack and pinion. Tie rods operate steering arms and are attached to either end of rack by gaitered ball joints. Pinion end play is adjusted by shims beneath pinion tail bearing retaining plate. A damper pad beneath rack assembly controls backlash.

CHASSIS DATA	
Clutch	
Make	BMC
Type	s.d.p.
Diameter	7¼in
Material	wound yarn
Pressure springs: No.	6
colour	red spot
Damper springs	Nil

GEARBOX	
Type	synchromesh
No. of forward speeds	4
Final ratios: 1st	13.657 : 1
2nd	8.176 : 1
3rd	5.137 : 1
4th	3.765 : 1
Rev.	13.657 : 1

DRIVE SHAFTS	
Make	Hardy Spicer
Type	Hemispherical joint

FINAL DRIVE	
Differential ratio	3.765 : 1

BRAKES	
Type	Lockheed hydraulic
Drum diameter	7in
Lining: length	6.25in
width	1.25in
thickness	—
Material	M32

SPRINGS	Front	Rear
Type	Rubber cone	spring
Toe in	—	¼in
Camber	—	10 pos
Radius arm bushes (reamed bore)	—	.8125-.8130in

SHOCK ABSORBERS	
Type	Tubular Telescopic
Service	Replacement.

STEERING BOX	
Type	Rack & pinion
Adjustments:	
pinion end float	Shims
rack backlash	Damper pad

FRONT-END SERVICE DATA	
Castor	3°
Camber	1° pos-3° pos
King pin inclination	9° 30′
Toe-out	1/16in
No. of turns lock to lock	2–
Adjustments: castor	Nil
camber	Nil
toe-in	Screwed tie rod ends

TUNE-UP DATA

iring order	1-3-4-2
appet clearance running	.012in
timing	.019in
alve timing:	
inlet opens	5° BTDC
inlet closes	45° ABDC
exhaust opens	40° BBDC
exhaust closes	10° ATDC
tandard ignition timing	TDC*
ocation of timing mark	Flywheel and pointer
lugs: make	Champion
type	N5
size	14mm
gap	.025in
arburettor: make	S.U.
type	HS2

Settings: Choke	1¼in
Main jet	.090in
std. needle	EB
rich needle	M
weak needle	GG
Air cleaner: type	paper element
Fuel pump: make	S.U. electric
type	PD
pressure	2-3lb/sq in

*For fuel of 90 octane and below alternative distributor is fitted; identified by letters Fa. Static timing for engines up to serial No. 14824 with this distributor unit is 3½° BTDC. For engines subsequent to this, set to 2½° BTDC.

Lamps	Model	Part No.	BULB Lucas No.	BULB Wattage	BULB Cap
ead R.H.D. dip left (Home)	F700P	58388	989 (side)	6	M.C.C.
			414 (main)	50/40	B.P.F.
R.H.D. dip left (Export)	F700	51336	414	50/40	
L.H.D. dip right	F700	51337	355	42/36	
Export Europe (except France and Sweden)	F700	58230	410	45/40	Unified
France	F700	58231	411	45/40	European
Sweden	F700	58456	410	45/40	cap
U.S.A.	F700	58497	—	—	
de/flasher (Export)	594	52338	380	6/21	S.B.C.
ront Flasher (Home)	594	52337	382	21	S.C.C.
Stop tail and L.H.	647	53797	380 (S.T.)	6/21	S.B.C.
Rear flasher R.H.	647	53798	382 (F.)	21	S.C.C.
Number plate	467-2	53101	222	4	M.C.C.
Number plate (de luxe)	467-2	53093			
everse					
anel light Bulb holder	—	554734	987	2.2	M.E.S.
arcel shelf					
nition warning bulb holder	—	863511	987	2.2	M.E.S.
ain bearm warning bulb holder	—	554734	987	2.2	M.E.S.
l warning bulb holder	—	863511	987	2.2	M.E.S.
top Tail and Rear Flasher L.H.	647	53799	380 (S.T.)	6/21	S.B.C.
orth America) R.H.	647	53800	382 (F.)	21	S.C.C.
amber Plate (later)	467	53837	222	4	M.C.C.
(de Luxe) (later)	467	53836			

LUCAS EQUIPMENT

†BATTERY
Model GLT7A

†GENERATOR
Model C40 ... ... | Part No. 22704

CONTROL BOX
Model RB106-2 ... ... | Part No. 37290

†STARTING MOTOR
Model M35G ... ... | Part No. 25075
Drive: "SB" Inboard

†DISTRIBUTOR
Model DM2 ... ... | Part No. 40707
(Low Compression) Max. centrifugal advance (crank degrees) 26° at 6,000 r.p.m. No advance below 850 r.p.m.
Centrifugal advance springs ... | Part No. 544 127 14
Max. vacuum advance (crank degrees) ... ... 14°-18° with 15 in Hg.
No advance below 3 in Hg.

IGNITION COIL
Model LA12 ... ... | Part No. 45113 (45111 when re-ordering)
Primary resistance ... ... | 3.0-3.4 ohms
Running current at 1,000 r.p.m. 1.5 amp.

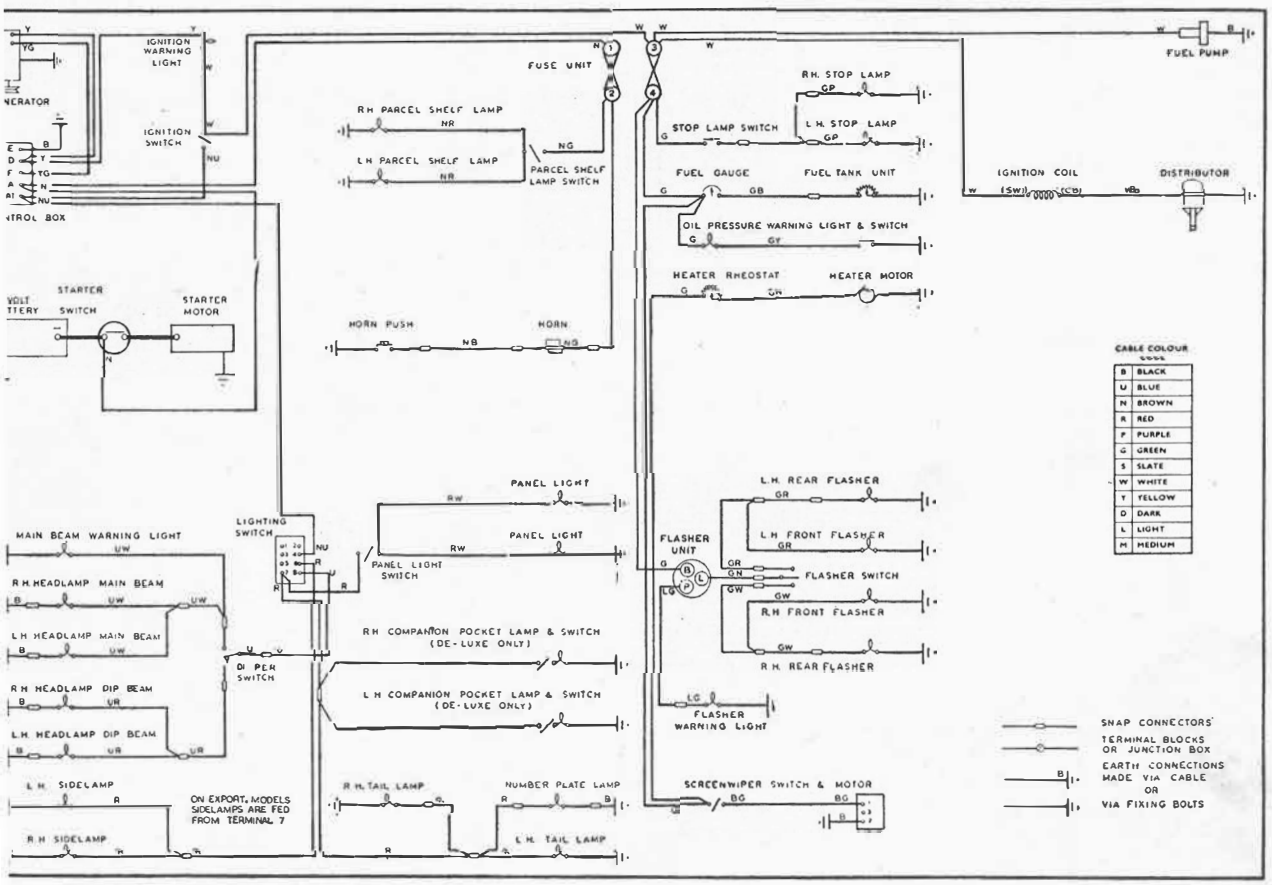
WINDSCREEN WIPER
Model DR2 ... ... | Part No. 75385

HORN
Model HF1849 ... ... | Part No. 70141
Type: High frequency
Current consumption ... ... | 2½-3½ amp.

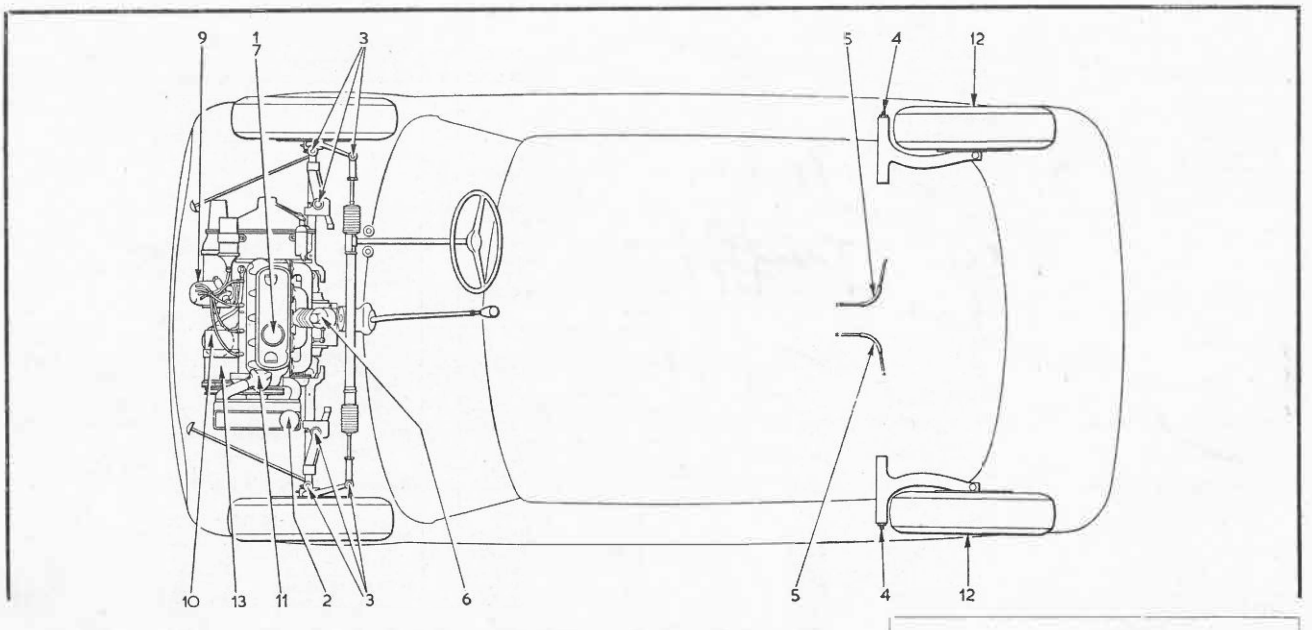
FLASHER UNIT
Model FL5 ... ... | Part No. 35020

FUSE UNIT
Model 4FJ
Fuse ratings: ... ... 35 amp.

† See p. viii for further electrical data



Wiring diagram by permission of Joseph Lucas Ltd.



KEY TO MAINTENANCE DIAGRAM

DAILY

1. **Engine and transmission**—check oil level and top up
2. **Radiator**—check and top up

EVERY 1,000 MILES

3. **Steering joint nipples** } oil gun
4. **Rear suspension radius arm** } oil gun
5. **Handbrake cable guide channels**—grease gun
6. **Carburettor**—remove cap from suction chamber and add a teaspoon of oil (S.A.E. 20)

EVERY 3,000 MILES

7. **Engine and transmission**—drain and refill
*8. **Body**—lubricate door hinges, bonnet lock and operating mechanism

EVERY 6,000 MILES

9. **Distributor**—oil auto advance mechanism, shaft bearing and spindle, smear cam with grease, also contact breaker pivot
††10. **Oil filter element**—wash bowl in petrol, and fit new element
11. **Water pump**—remove plug from pump body and lubricate unit sparingly with S.A.E. 140 oil
12. **Rear Hubs**—remove each wheel disc, and retainer cap, refill with grease (see chart below)

EVERY 12,000 MILES

12. **Dynamo**—oil commutator end bearing

* Not shown on diagram

†† N.B. Disconnect battery cable from terminal on starter before working on filter unit

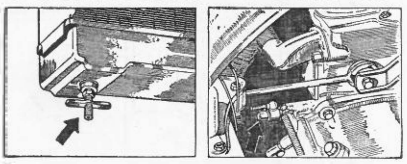
FILL-UP DATA

		Pints	Litres
Engine sump and transmission (including filter)		8½	4.83
Cooling system	...	5¼	3
Fuel tank: saloon	...	5½ galls	25
van	...	6 galls	27.3
traveller	...	6½ galls	29.6
Tyre pressures: front and rear (fully loaded)	...	24lb/sq in	1.7 Kg/cm²
front normal	...	24 lb/sq in	1.7 Kg/cm²
rear normal	...	22 lb/sq in	1.6 Kg/cm²

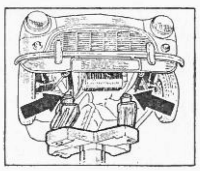
† LUCAS COMPONENT	Model	Part No.
Battery (later fitment) ...	B77A	—
Generator (alternative) ...	C40-1	22700
(Part Nos. and performance as for 22704)		
Starting Motor (alternative)...	M35H	25071
Armature (25075)	—	54250096
,, (25071)	—	5250822
Field Coils (25075)	—	251089
,, ,, (25071)	—	54250820
Commutator End Bracket (25075 and 25071) ...	—	251935
Drive End Bracket (25075 and 25071) ...	—	5425032
(Performance of 25075 and 25071 as for (25022)		
Distributor (L.C.)	DM2	40648
Max. Centrifugal Advance (Crank Degrees) 30°-34° at 4400 r.p.m. No advance Below 500 r.p.m.		
Centrifugal Advance Springs. Part No. 54410984.		
Max. Vacuum Advance (Crank Degrees) 8°-12° with 18in Hg. No Advance Below 4½ in. Hg.		

LUCAS SWITCHES	Model	Part No.
Ignition/starter	8A5	31899
Starter	ST18	76438
Lighting	57SA	31788
Direction indicator	37SA	31945
Dip	21SA	31800
Stop light	HL2	31802
Wiper	57SA	31780
Heater	3R	78339

DRAINING POINTS

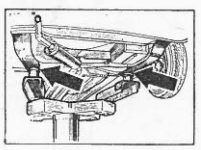


Left: the radiator matrix drain point. Right: cylinder block drain tap.



JACKING POINTS

When lifting complete vehicle, with weight off road wheels, place supports in positions arrowed in drawings. Left: front of car. Right: rear of car.



RECOMMENDED LUBRICANTS

		Castrol	Esso	B.P.	Duckham's	Mobil	Shell	Filtrate	Sternol
Engine and transmission	Above 32°F. (0°C.)	Castrol XL	Extra Motor Oil 20W/30	Energol SAE. 30	N.O.L. Thirty	Mobiloil A	X-100 30	Medium Filtrate 30	WW 30
	32° to 10°F. (0°C. to −12°C.)	Castrolite		Energol SAE 20W	NOL Twenty	Mobiloil Arctic	X-100 20/20W	Zero Filtrate 20	WW 20
	Below 10°F. (−12°C.)	Castrol Z	Motor Oil 10	Energol SAE 10W	NOL Ten	Mobiloil 10W	X-100 10W	Sub. Zero Filtrate 10W	WW 10
Steering gear and water pump		Castrol Hipress	Expee Compound 140	Energol EP SAE 140	NOL EP 140	Mobilube GX 140	Spirax 140 EP	EP Filtrate Gear 140	Ambroleum EP 140
Wheel hubs and lubrication nipples		Castrolease LM	Multi-purpose Grease H	Energrease L2	L.B. 10 Grease	Mobilgrease MP	Retinax A	Super Lithium Filtrate Grease	Ambroline LHT Grease
Distributor, Oil can SU. carb. dashpot		Castrolite	Extra Motor Oil 20/W30	Energol SAE 20W	NOL Twenty	Arctic	X-100 20/20W	Zero Filtrate 20	WW 20
Upper Cylinder lubrication		Castrollo	Upper Cylinder Lubricant	Energol UCL	Adcoid Liquid	Upperlube	UCL	Petroyle	Magikoyl

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