

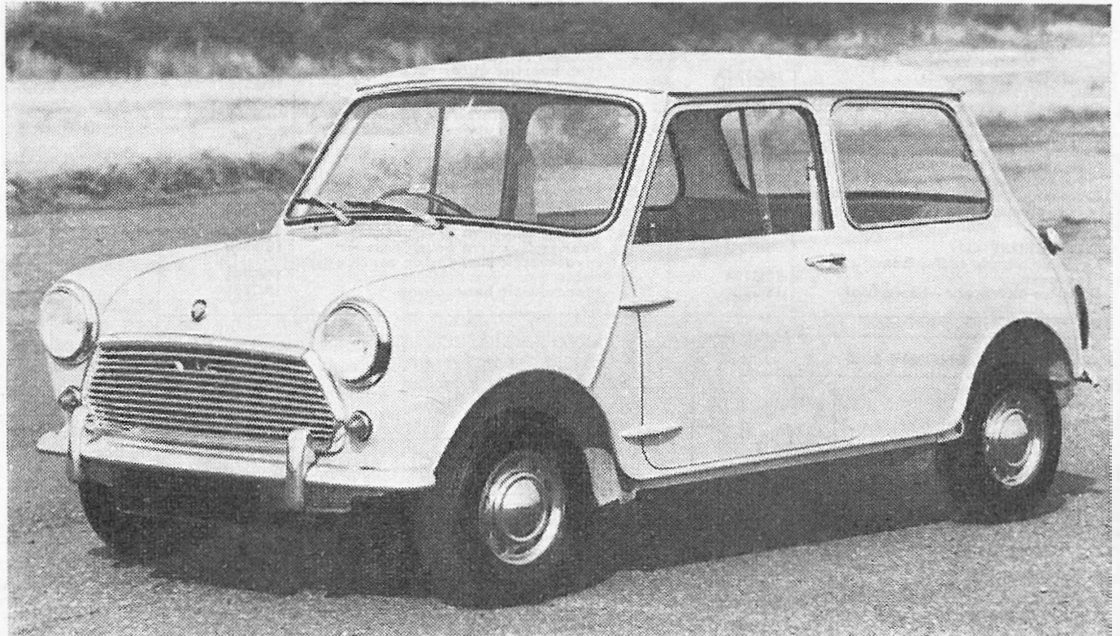
Motor Trader

SERVICE DATA No. 474

BMC Mini MkII

Manufacturers: BMC Ltd., Longbridge, Birmingham

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Austin version of the BMC Mini

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 bolts and nuts (each side of bulkhead cross member); three setscrews securing each side of rear end of sub-frame to front floor panel and two screws securing front of frame to bottom of grille panel. Sub-frame tower mounting brackets, welded to suspension units are flange bolted to body. 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 four setscrews to release mounting from cover. Tighten all nuts and bolts fully on reassembly.

Removal

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

To remove unit with sub-frame, synchromesh transmission models only. Disconnect battery, also all pipes, wires and controls to and from engine/transmission unit. Disconnect speedometer cable from instrument, undo heater hoses and disconnect pipes at three-way union. Using Service Tool No. 18G1063 part the steering rack ball joints. Undo engine tie rod. Remove right-hand and disconnect left-hand drive shaft and remove the exhaust pipe. Take off air

cleaner and carburettor. Remove hexagon plug with anti-rattle spring and plunger from gearchange extension. Remove gear lever retaining plate and pull lever out of casing into car.

Take off slave cylinder securing bolts and attach unit to bulkhead, but *do not* disconnect hose. On models fitted with Hydrolastic suspension depressurise and evacuate and disconnect both hoses. Support body with slings under front wings and engine below transmission casing. Knock back lock tabs and withdraw four body/sub-frame bolts (nuts on studs are fitted), two on each side of bulkhead crossmember. Take out four setscrews securing rear of sub-frame to front floor and two screws securing front of frame to bottom of grille panel. Lift body clear of engine and take out engine/subframe assembly.

Power pack unit is thus accessible for further dismantling as required by overhaul procedure. Refitting is a reversal of dismantling process, noting that suspension system must be recharged with fluid, for further details of this procedure see FRONT SUSPENSION section p. vi.

Crankshaft

Three main bearings, thin wall steel-backed, copper-lead, 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, copper-lead 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 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, solid skirt, with dished crown.

On initial production, pistons and con rods are fitted by selective assembly. Identification marks are stamped enclosed in diamond on crowns and should be fitted to a similarly graded bore. Oversize pistons available have O/S dimensions stamped on crowns in ellipse. When refitting, grade marks on pistons should be adjacent to markings on cylinder block top face. 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. Crank-

SPECIAL TOOLS

	Part No.		Part No.
ENGINE		First motion shaft remover adaptor	18G284B
Valve seat cutter handle	18G27	Dummy layshaft	18G471
Valve seat cutter pilot	18G167D	First motion shaft bearing circlip gauge	18G569
Valve seat finishing cutter	18G167	Synchromesh unit assembly ring	18G572
Valve seat glaze breaker	18G167A	Change speed shaft oil seal replacer	18G573
Valve seat narrowing cutter (top)	18G167B	Differential bearing replacer	18G578
Valve seat narrowing cutter (bottom)	18G167C	First and third motion shaft bearing replacer	18G579
Crankshaft gear and pulley remover	18G2	Front suspension and idler gear bearing remover	18G581
Crankshaft gear and pulley replacer	18G138	First motion shaft spigot bearing remover adaptor	18G581B
Bearing and oil seal replacer	18G134	First motion shaft spigot bearing replacer	18G589
Crankshaft primary gear oil seal replacer adaptor	18G134BC	Front suspension and idler gear bearing replacer	18G582
Timing case oil seal replacer adaptor	18G134BD	Final drive gear nut spanner	18G586
Oil pump release valve grinding-in tool	18G69	FRONT AND REAR SUSPENSION	
Shock spanner	18G98	Hub bearing outer race remover (basic tool)	18G260
Flywheel and clutch remover adaptor	18G304L	Front hub drive flange bearing outer race remover adaptor	18G260H
Camshaft liner remover and replacer (basic tool)	18G124A	Suspension rubber spring compressor	18G574
Camshaft liner remover adaptor	18G124K	Front and rear hub remover (basic tool)	18G304
Camshaft liner reamer (basic tool)	18G123A	Front and rear hub remover bolt adaptor	18G304F
Camshaft liner reamer pilot-centre	18G123AH	18G583	
Camshaft liner reamer pilot-rear	18G123AJ	18G584	
Camshaft liner reamer cutter	18G123AN	18G588	
Flywheel and front hub oil seal replacer (adaptor)	18G134BH	18G703	
Crankshaft primary gear oil seal protector sleeve	18G570	18G685	
TRANSMISSION			
Laygear needle roller bearing replacer	18G194		
Impulse extractor—basic tool	18G284		

ENGINE DATA

General	
Type	99H
No. of cylinders	4
Bore x stroke: mm	64.588 x 76.2
in	2.543 x 3
Capacity cc	998
Max. bhp at rpm (net)	38-5.250
Max. torque at rpm (lb.ft.)	52-2.700
Compression ratio	8.3:1
BMEP at rpm	130psi-2,700
CAMSHAFT (dimensions in inches)	
Bearing journal: diameter (front)	1.6655-1.666
(centre)	1.62275-1.62325
(rear)	1.3725-1.3735
Running clearance	.001-.002
End float	.003-.007
Timing chain: pitch	$\frac{3}{8}$
no. of links	52

PISTONS AND RINGS
(dimensions in inches)

Clearance (bottom of skirt)	.0005-.0011	
Oversizes (max.)	.020	
Gudgeon pin: diameter	.624	
type	fully floating,	
fit in con. rod	circlip location	
	hand push fit	
	at 68° F.	
	Compression	Oil control
No. of rings	3	1
Gap	.007-.012	.007-.012
Side clearance		
in grooves	.0015-.0035	.0015-.0035
Width of rings	.0620-.0625	.124-.125

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 motion shaft nut	150
3rd motion shaft nut	150
Flywheel housing bolts and stud nuts	18
FINAL DRIVE	
Driven gear/diff. cage	60
Drive shaft flange nuts	70
Diff. housing end bolts	18
SUSPENSION AND STEERING	
Steering lever/hub bolts	35
Steering lever/ball joint	20/24
Front hub nut (drive shaft)	60
Rear suspension stub axle nut	60
Front suspension upper arm pivot nut	26-28

CRANKSHAFT AND CON. RODS
(dimensions in inches)

	Main Bearings	Crankpins
Diameter	1.7505-1.751	1.6254-1.6259
Length	1.187	—
Running clearance: main bearings	.001-.0027	
big ends	.001-.0025	
End float: main bearings	.002-.003	
big ends	.008-.012	
Undersizes (max.)	.040	
Con. rod centres	5.75	

VALVES
(dimensions in inches)

	Inlet	Exhaust
Head diameter	1.156	1.00
Stem diameter	.2793-.2798	.2788-.2793
Face-angle	45°	45°
Spring length: free	1.750	
No. of working coils	4½	
Pressure valve open	90lb	
valve closed	55lb	

shaft 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, double 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 counter-bored 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 grub screw 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

Two types of oil pump may be fitted. These are of Hobourn Eaton or Burman make. The first-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 1/4 and timing marks will be visible on rotation of the engine. Timing is correct when with piston at TDC No. 1 compression 1/4 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 table p. vii for further data and performance figures.

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 82 deg. C., and system is pressurised. 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 setscrews. At flywheel end, straps are anchored by three similar setscrews.

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. Clutch/flywheel straps are laminated. Mark all components for correct reassembly.

Adjustment of clutch in service is correct and established when a clearance of .020in-.060in on later models is obtained between external operating lever and adjustable clutch return stop.

A throw-out stop is also fitted, 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 .002-.005in (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 and remote control 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. Automotive Products automatic transmission is available as an option.

To Remove Transmission

Remove engine as detailed in engine section. Take off setscrews and remove clutch cover plate and extract flywheel and clutch (see clutch section). Remove starter motor, flywheel housing and withdraw 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 (.003-.008in) 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.

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:

Withdraw pivot pin and take out bell crank lever. Remove clamp screw securing lever to top of remote control shaft, and take out shaft. Remove nylon seating and tension spring from both remote control shaft and shaft lever. Extract split pin from slotted nuts securing left- and right-handed driving flanges to differential bearing shafts, remove nuts and draw off flanges. Do not use transmission case as leverage point when removing flange nuts or other components. Unscrew five setscrews from each final drive end cover, and remove covers from housings. Note number and thickness of shims between differential bearing and housing. Remove differential housing stud nuts, housing from transmission case and withdraw differential assembly.

Remove change speed reverse detent plunger plug and take out spring and plunger. Remove clamp screw from selector lever and take out gearchange operating shaft, preserving transmission case oil seal and Woodruff key in lower end of shaft. Unscrew speedometer pinion housing screw, remove housing, withdraw pinion. Take out two setscrews, take off retaining plate from front cover and draw out drive gear. Remove radiator, cowl, mounting bracket and spacer. Remove 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 18G284 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 strainer bracket screw, lock plate 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 selector fork. Extract detent spring and plunger. Release circlip from reverse gear shifter lever pivot pin and take out lever.

To Dismantle 3rd Motion Shaft

Remove 1st speed gear, hub and baulk rings from rear of 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.

GENERAL DATA

Wheelbase:	6ft 8 ³ / ₃₂ in
Saloons	7ft 0 ¹ / ₃₂ in
Van, pick-up, estate cars	47 ⁷ / ₁₆ in
Track: front	45 ⁷ / ₁₆ in
rear	28ft 6in
Turning circle (saloon)	6 ¹ / ₃₂ in
Ground clearance	5.20-10
Tyre size	10ft 1 ¹ / ₁₆ in
Overall length: saloons	10ft 9 ¹ / ₁₆ in
estate cars	4ft 7 ¹ / ₁₆ in
Overall width	4ft 5in
Overall height: saloons	4ft 5 ¹ / ₁₆ in
estate cars	4ft 6 ¹ / ₁₆ in
vans	1398lb
Kerb weight: saloons	1456lb
estate cars	1334lb
vans	

GEARBOX

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

BRAKES (dimensions in inches)

Type	Hydraulic 2LS front
Drum diameter	7
Lining: length	6.75
width	1.50*
thickness	not quoted
Material	DON 202

* Rear wheel brakes 1.25in

SUSPENSION (dimensions in inches)

	Front	Rear
Type	Hydroelastic	displacers
Toe in	1 ¹ / ₈	1 ¹ / ₈ pos
Camber		
Radius arm bushes (reamed bore)		.8125-.8130
Fluid pressure*	282psi	

*Austin (rhd) 830899 Morris (rhd) 370004

TUNE-UP DATA

Firing order	1.3.4.2.
Tapet clearance (cold) running timing	.012in .019in
Valve timing: inlet opens	5° BTDC
inlet closes	45° ABDC
exhaust opens	40° BBDC
exhaust closes	10° ATDC
Static ignition timing	5° BTDC
Location of timing mark	Dimples on timing wheels, marks on flywheel
Plugs: make	Champion
type	N5
size	14 mm
gap	.025in
Carburettor: make	SU
type	HS2
needles (standard) (rich) (weak)	GX M GG
Air cleaner: type	Paper element
Fuel pump: make	SU
type	electric
pressure	2-3psi

FRONT-END SERVICE DATA

Castor	3°
Camber	1°-3° pos
King pin inclination	9°-30'
Toe-out	1 ¹ / ₁₆ in
No. of turns lock to lock	2
Adjustments: castor	nil
camber	screwed tie rod ends
toe-in	

DRIVE SHAFTS

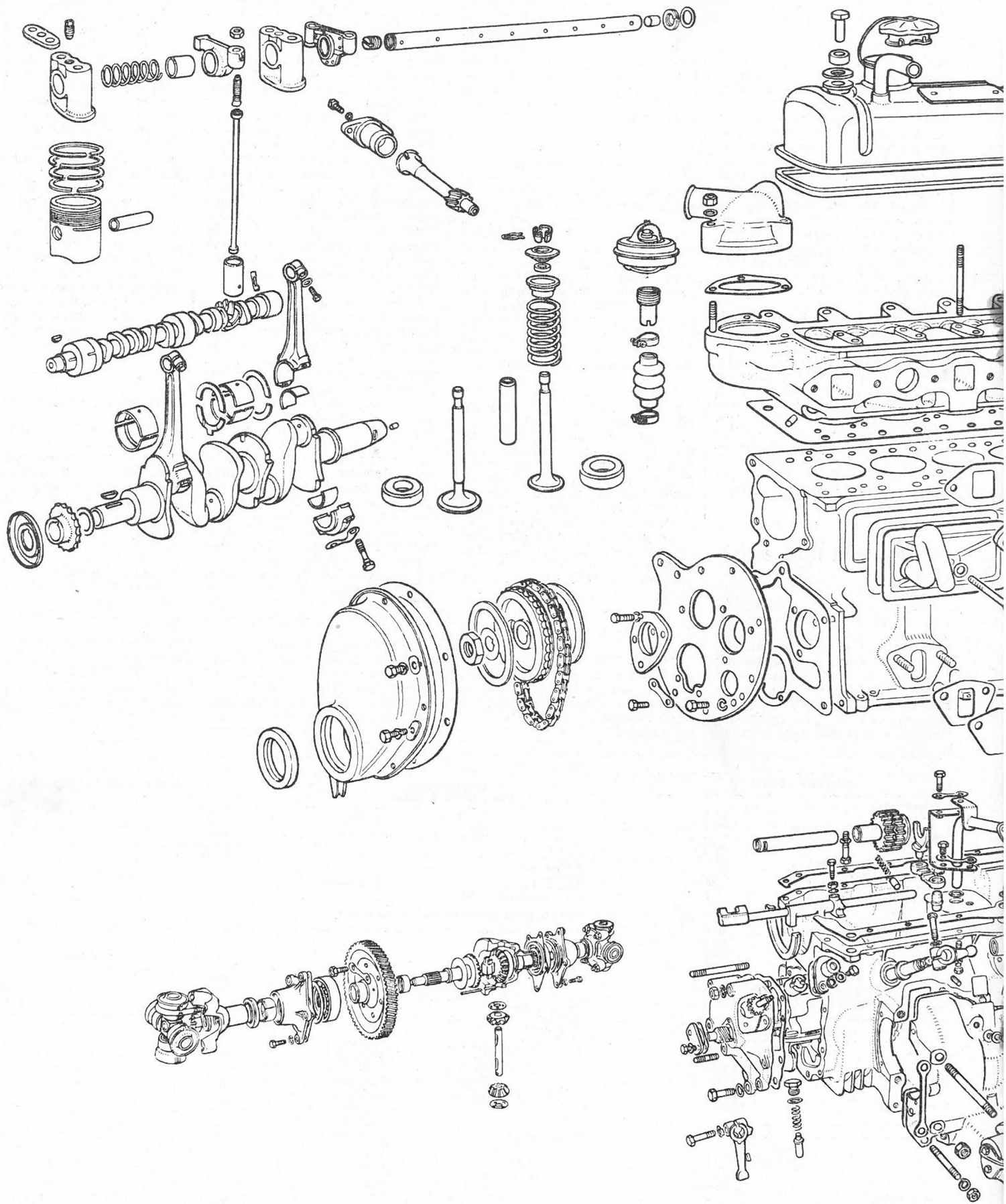
Make	Hardy Spicer
Type	Hemispherical joint

FINAL DRIVE

Ratio	3.44:1
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CHASSIS DATA

CLUTCH	
Type	sdp, 7 ¹ / ₁₆ dia
Pressure springs colour	black enamel
Diaphragm spring colour code	white spot
Springs: no.	Lt.-green 6



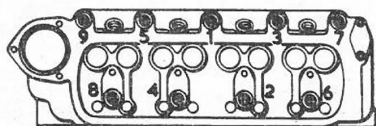
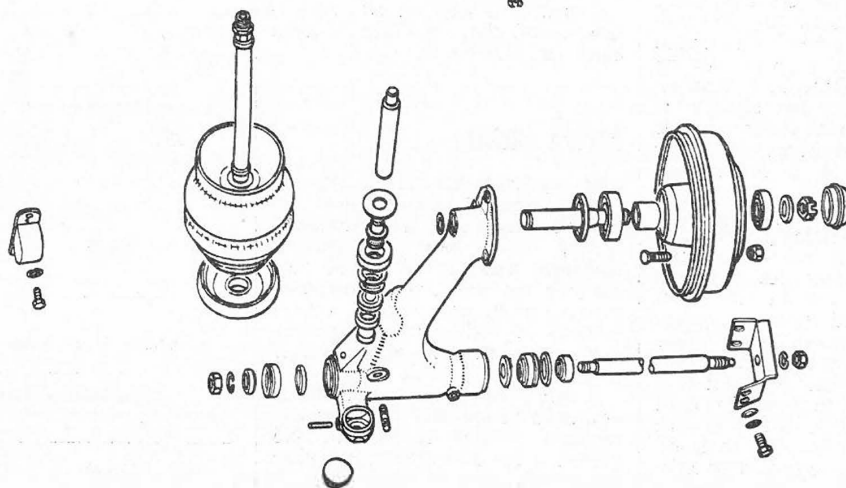
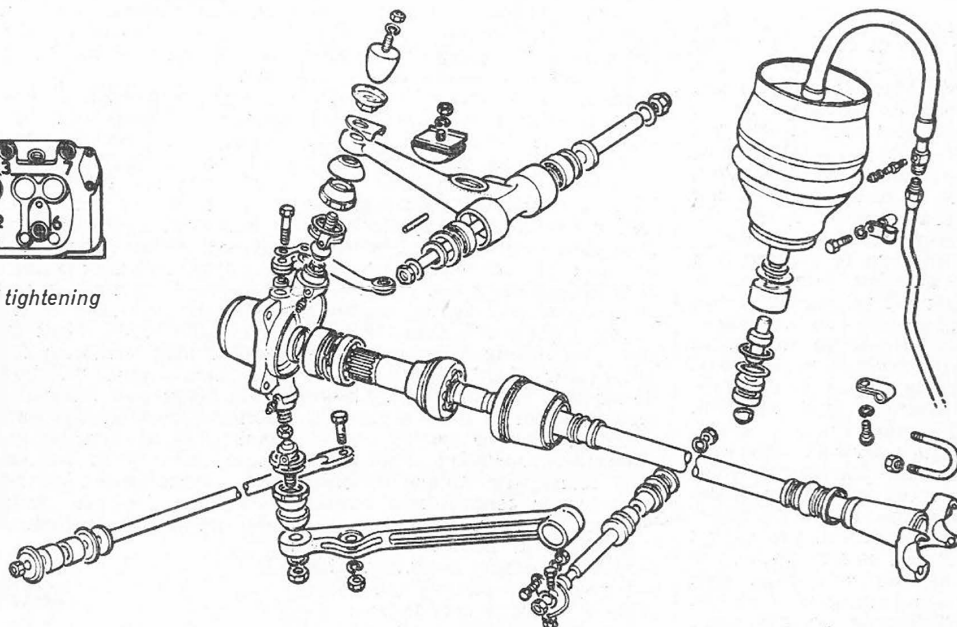
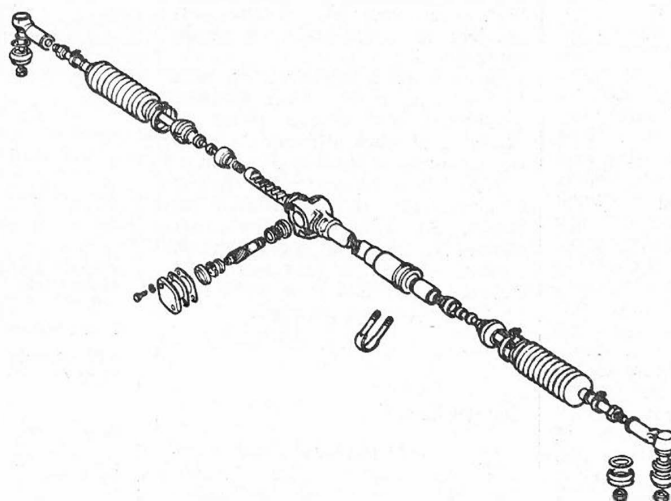
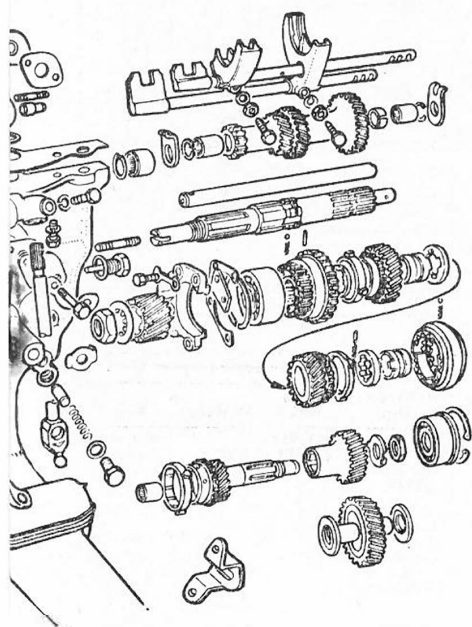


Diagram showing order of tightening cylinder head stud nuts



Parts of the engine, transmission, steering, suspension and brakes



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.

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. Note: should 1st and 2nd speed gear assemblies have been dismantled, the correct position of gear on hub is vital, i.e., plunger in hub *must* align with cutaway tooth in gear assembly. 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. 18G579 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 arm 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 gearchange 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 gearchange 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 differential assembly in transmission casing with slight bias towards flywheel end of unit. Refit differential 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 preload 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 differential housing nuts, refit driving flanges to differential gear shafts securing with slotted nuts and split pins. Ensure equal freedom of drive shafts. Fit operating lever to splined end of gearchange 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 hinging 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.

Brakes

Lockheed hydraulic, with pressure-limiting valve in circuit. Two leading shoe drum brakes at front and leading and trailing rear brake layout, with lever operation of shoe expanders for hand-brake 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.

Suspension

Hydrolastic fluid suspension system used front and rear. System consists of four displacer units (two front and two rear) intercoupled longitudinally. Units are fabricated

of sheet steel and rubber and contain a piston, diaphragm and upper and lower chambers also a conical spring of compressed rubber. System is filled with fluid (water, alcohol and anti-corrosive agent) on initial assembly.

Front suspension also comprises upper and lower arms of unequal length (each side) located in side members of part sub. frame. Outer ends attached by ball joints to swivel hubs.

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.

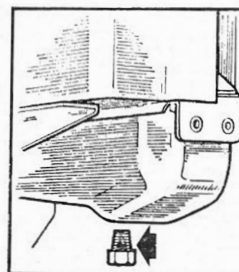
Rear suspension, in addition to Hydrolastic units, consists of independent trailing arms, auxiliary springs and anti-roll bar.

Note: Hydrolastic suspension system should *only* be checked and the system depressurised, etc., in conjunction with the use of proper service equipment B.M.C. Part No. 18G 703. This unit has combined filler for pressure and vacuum tanks with a sight level.

Steering Gear

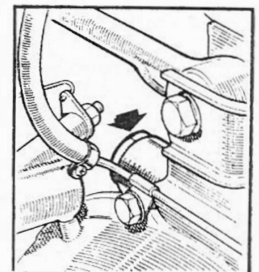
Rack and pinion. Tie rods operate steering arms and are attached to either end of rack by gaitered ball joints. Pinion end play is adjusted by shims beneath pinion tail bearing retaining plate. A damper pad beneath rack assembly controls backlash.

DRAINING POINTS



Right: Cylinder block draining point

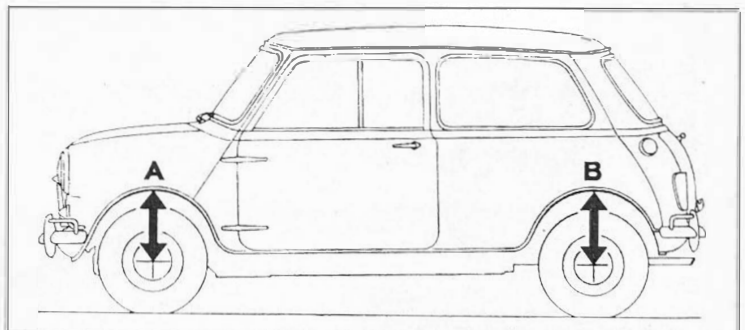
Left: Radiator draining point



SUSPENSION CHECKING

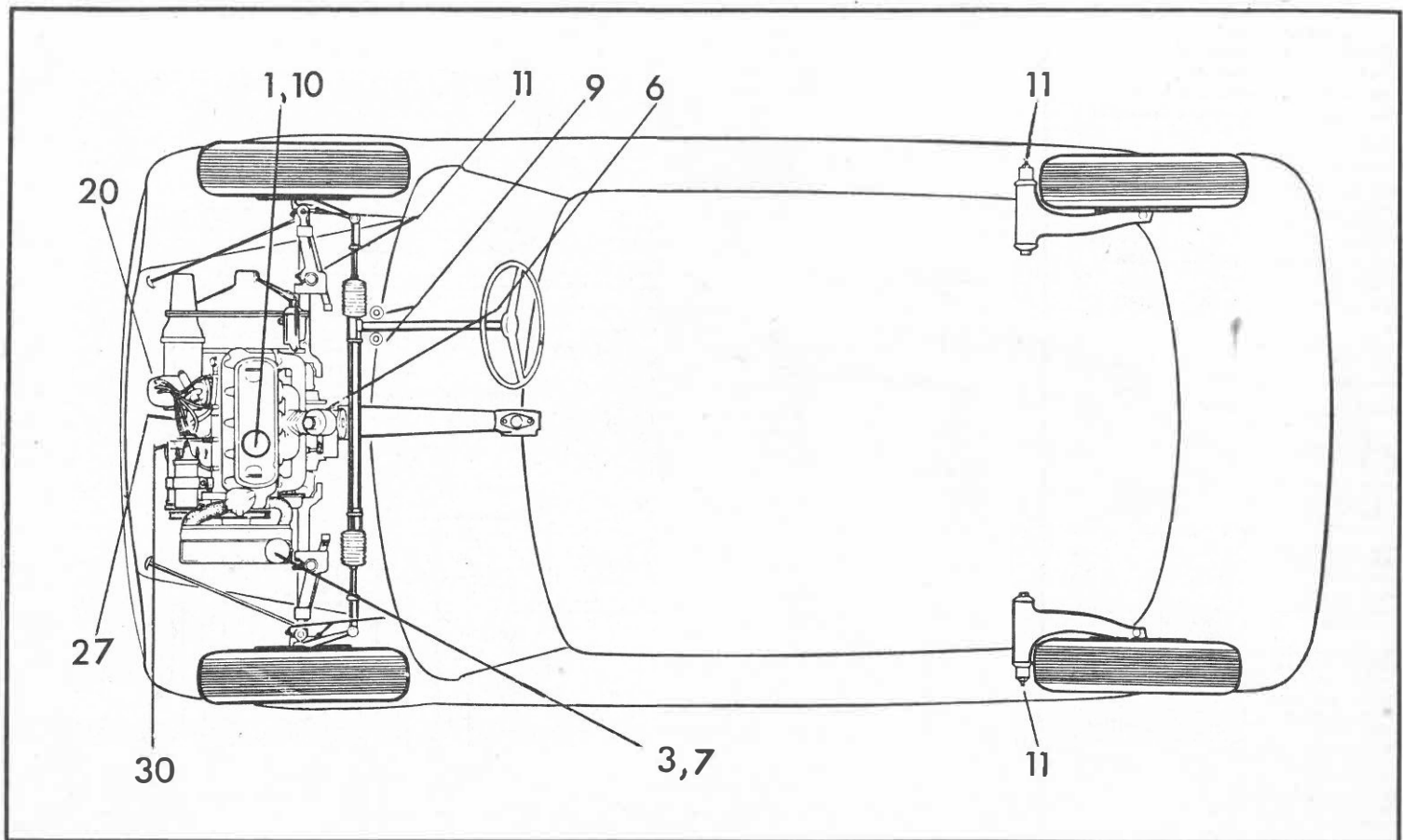
Condition of car; water; oil; petrol (max.) 4 Imp gall (4.8 US gall, 18.2 litres)

Wing heights (early models)		Wing heights (later models)	
A	B	A	B
$13 \pm \frac{1}{16}$ in (330 \pm 6.35mm)	$13 \frac{1}{2} \pm \frac{1}{16}$ in (343 \pm 6.35mm)	$12 \frac{1}{8} \pm \frac{1}{16}$ in (320.7 \pm 6.35mm)	$13 \frac{1}{2} \pm \frac{1}{16}$ in (333.4 \pm 6.35mm)



LAMPS

	Model	Part No.	Bulb or Sealed Beam Unit		
			Lucas No.	Wattage	Cap.
FRONT LAMPS					
Head (right hand & left hand) (non-dip)	F700P	59552 (l.h.) 52337 (r.h.)	54522917 No. 501	SW	S.B.U. Capless
Front Flasher	594	—54527 (l.h.) —54528 (r.h.)			
REAR LAMPS					
Stop/Tail, Flasher & Reflex	813	53837			
Number Plate	467				
PANEL LAMPS					
Ignition		863511	987	2.2W	M.E.S.
Oil		863511	987	2.2W	M.E.S.
Main beam		554734	987	2.2W	M.E.S.
Flasher		863511	987	2.2W	M.E.S.



KEY TO MAINTENANCE DIAGRAM

WEEKLY

- 1. Engine/transmission oil level
- *2. Battery electrolyte level
- 3. Radiator coolant level
- *4. Tyre pressures
- *5. Road wheel nut tightness

Check and
top up
Check

EVERY 3,000 MILES (as for weekly plus following)

- 6. Carburettor piston damper
- 7. Radiator
- *8. Screenwasher bottle
- 9. Clutch & brakes fluid reservoirs
- 10. Engine/transmission sump
(NB If using monograde oil or auto. trans fitted,
drain and refill)
- 11. Steering joints and rear suspension radius arms—
grease gun
- *12. Oil filter element (if auto. trans fitted)—renew
- *13. Steering column clamp bolt—check tightness
- *14. Brakes—check and adjust, if necessary
- *15. Brake pipes and hoses—make visual inspection
- *16. Headlamp beam alignment—check
- *17. Tyre pressures—check

Check
and
top up

EVERY 6,000 MILES (as for 3,000 miles plus following)

- *18. Engine valve rocker clearances
- *19. Fan belt tension

Check
and adjust

- 20. Distributor—oil shaft bearing, auto. advance
mechanism and contact breaker pivot, smear cam
with grease, clean and reset points to .014-.016in.
- *21. Sparking plugs—clean and reset
to .025in.
- *22. Clutch pedal adjustment
- *23. Wheel alignment
- *24. Tightness of nuts and bolts on
suspension and universal joints
- *25. Battery cell SG readings
- *26. Lamps correct functioning
- 27. Engine transmission (synchro. models)—drain and
refill
- *28. Engine oil filter element (synchro. models)—renew
- *29. Door locks, hinges, catches etc.—oil can
- 30. Dynamo end bearing—few drops oil

Check

EVERY 12,000 MILES (as for 6,000 miles plus following)

- *31. Breather control valve—test and clean
- *32. Oil filler cap and filter assembly—renew
- *33. Engine air cleaner element—renew
- *34. Sparking plugs—renew
- *35. Suspension and steering parts—check for wear
- *36. Brakes—remove drums, inspect linings and re-adjust
- * Not shown on diagram

FILL-UP DATA

	Pints	Litres
Engine sump and transmission case Cooling system	8 1/2	4.83
	5 1/4	3
	Galls.	
Fuel tank:		
saloons	5 1/2	25
vans	6	27.3
estate cars	6 1/2	29.6
Tyre pressures: front and rear	24psi	1.7 kg/cm ²

RECOMMENDED LUBRICANTS

	B.P.	Castrol	Duckhams	Esso	Filtrate	Mobil	Shell	Sternol
Engine/transmission Oil can/carburettor Temps. above—12°C (10°F)	Super Viscostatic 20W/50	XL (20W/50) or GTX	Q20-50	Extra Motor Oil 20W/50	20W/50	Mobiloil Special 20W/50	Super Motor Oil 100 20W/50	WW Multi- grade 20W/50
Temps.—16°C to —7°C 0°F to 20°F	Super Viscostatic 10W/40	Castrolite or Super 10W/40	Q5500	Extra Motor Oil 10W/30	10W/30	Mobiloil Super 10W/40	Super Motor Oil 101 10W/30	WW Multi- grade 10W/40
Temps. below—18°C (0°F)	Super Viscostatic 5W/20	CR 5W/20	Q5-30	Extra Motor Oil 5W/20	5W/20	Mobiloil 5W/20	Winter Special Motor Oil or Super Motor Oil 5W/30	WW Multi- grade 5W/20
Grease points	Energrease L2	Castrolase LM	LB 10 Grease	Multipurpose Grease H	Super Lithium filtrate grease	Mobil Grease MP	Retinax A	Ambroline LHT
Upper cylinder lubricant	Upper cylinder lubricant	Castrollo	Adcoid Liquid	Upper cylinder lubricant	Petroyle	Upperlube	Upper cylinder lubricant	Magikoyl

Bodywork Repair Data

BMC MINI Mk II

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Checking Vertical Alignment

Raise vehicle and support it parallel to a level floor using comparative measurements given in Fig. 1. Check relative heights of all intermediate points for distortion of vehicle in vertical plane. Chalk floor below points shown in Fig. 2. With a plumb-line, project checking points from vehicle onto the floor and mark position. Mark central points between each pair of checking points on floor. Mark diagonals between any two pairs of points and intersections. Stretch a length of chalk-covered cord so that it passes through as many of the marked central points and intersections as possible.

While the cord is held taut by two operators, a third should raise the cord and allow it to spring back and leave a white line on the floor. Any points through which the resulting white line does not pass will indicate the point where the underframe is out of alignment. Considerable deviation in measurements given in Figs. 1 and 2 confirm body misalignment. Allowance must be made for normal manufacturing tolerances.

CONSTRUCTION is monocoque with front and rear sub-frames to carry engine and suspensions. Body units of early models are lighter than those of later models.

Bodies available are saloon, van, estate and pick-up. Vans and estates have longer wheelbases than saloons. Saloon bodywork only is dealt with here.

BODY SERVICE TOOLS

Tool No.	Function
18G 468B	Rubber moulding glazing tool adaptor to replace wind-screen and back-light finishers. For use with handle from 18G 468. From BMC.
18G 308B	Body jack and case. Designed to deal with repairs to bodies of all-steel construction. From BMC.
7-700 Body Jig	See p. iv. Jig obtainable from V. L. Churchill & Co. Ltd., PO Box No. 3, London Road, Daventry, Northants (Tel: Daventry 2235).

ADHESIVES RECOMMENDED BY BMC

Materials	Adhesive	Method of application
Rubber to bare, primed or painted metal. Carpet to primed metal. Carpet to hardboard or mill-board. Rubber-backed needleloom felt to metal (rubber side to metal).	Dunlop S889	Opposing surfaces to be treated with uniform coating of adhesive and allowed to become tacky. Press together.
Polyurethane foam to primed metal.		Apply an even coating to metal. Press the foam on to the metal immediately.
PVC-coated felt to bitumastic compound coated surfaces.		Apply to both surfaces and press together after five minutes.
Leathercloth to primed or painted metal. Leathercloth to hardboard. Leathercloth to leathercloth. Leathercloth to phosphated metal.	Dunlop S 758/MG	Opposing surfaces to be treated with a uniform coating of adhesive and allowed to become tacky. Press together.
Needleloom felt to primed metal.		Apply to metal surface only and stick the felt on immediately.

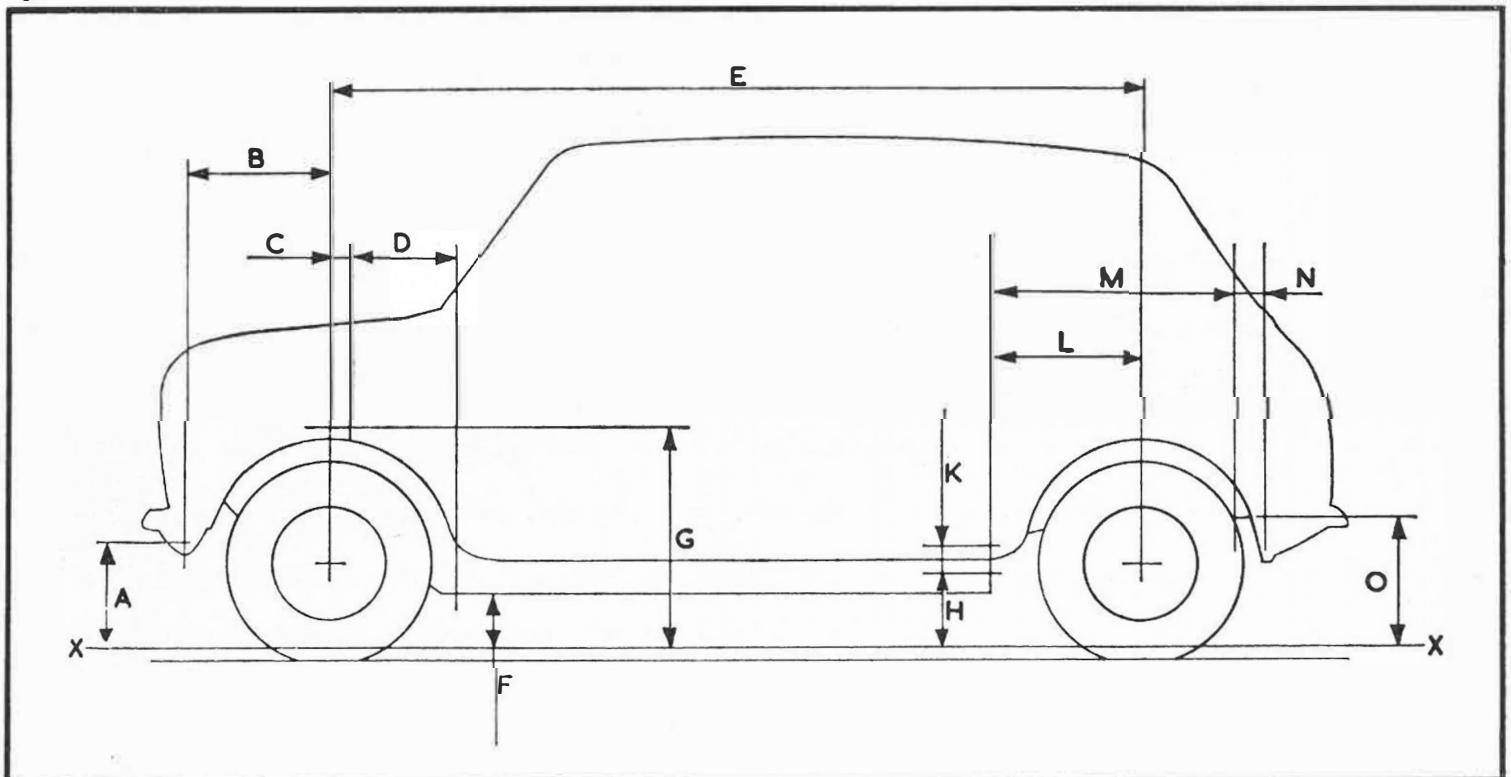
KEY TO FIG. 1

A, 10¹³/₃₂in. front sub-frame mounting (front)
B, 16¹¹/₃₂in. front sub-frame mounting (front) to wheel centre
C, 1²⁵/₃₂in. wheel centre to tower mounting
D, 10⁷/₃₂in. front sub-frame mounting (tower) to front sub-frame mounting (extreme rear)
E, 80⁷/₃₂in. wheelbase

F, 5²⁷/₃₂in. body sill to datum line
G, 20²⁷/₃₂in. tower mounting (sub-frame) to datum line
H, 8⁹/₃₂in. lower rear sub-frame mounting (front) to datum line
K, 2¹/₃₂in. mounting hole centres—rear sub-frame mounting (front)
L, 14²⁷/₃₂in. rear sub-frame mounting (front)—body

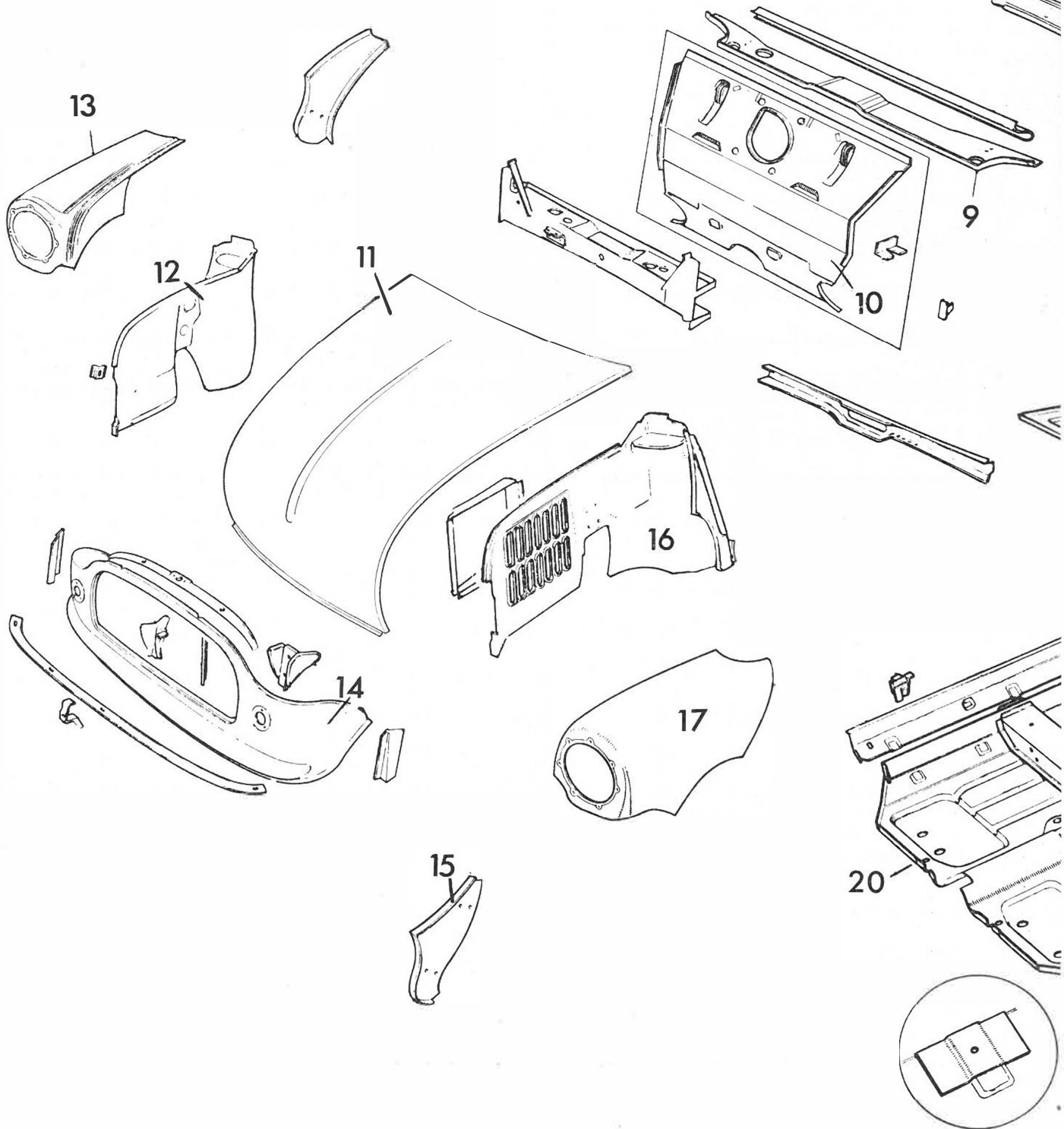
face to wheel centre
M, 23²⁷/₃₂in. rear sub-frame mounting (front)—body face to rear sub-frame mounting (rear) forward fixing hole
N, 2¹/₃₂in. rear sub-frame mounting (rear) fixing hole centres
O, 12¹⁵/₃₂in. rear sub-frame mounting (rear)—body face to datum line

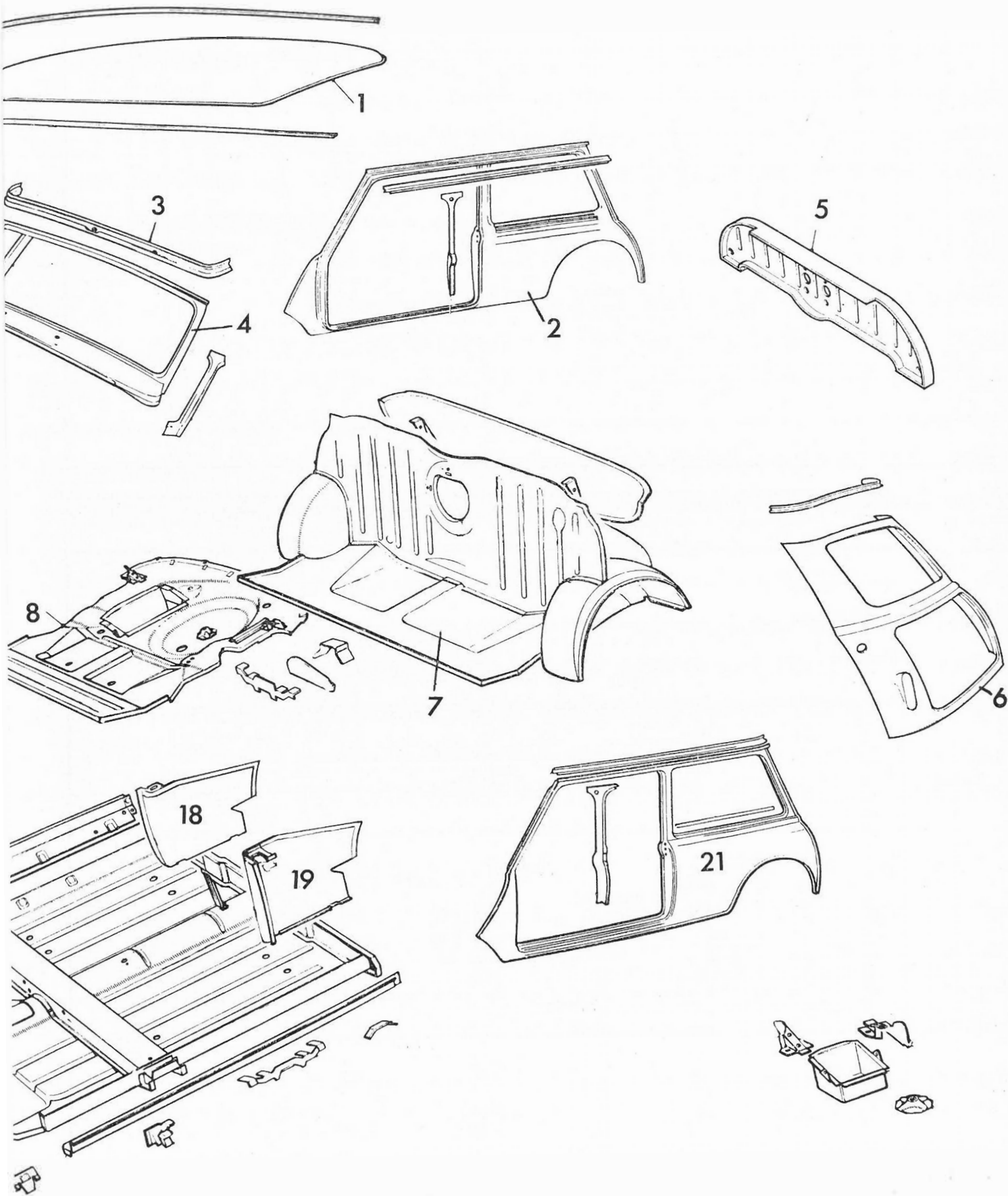
Fig. 1

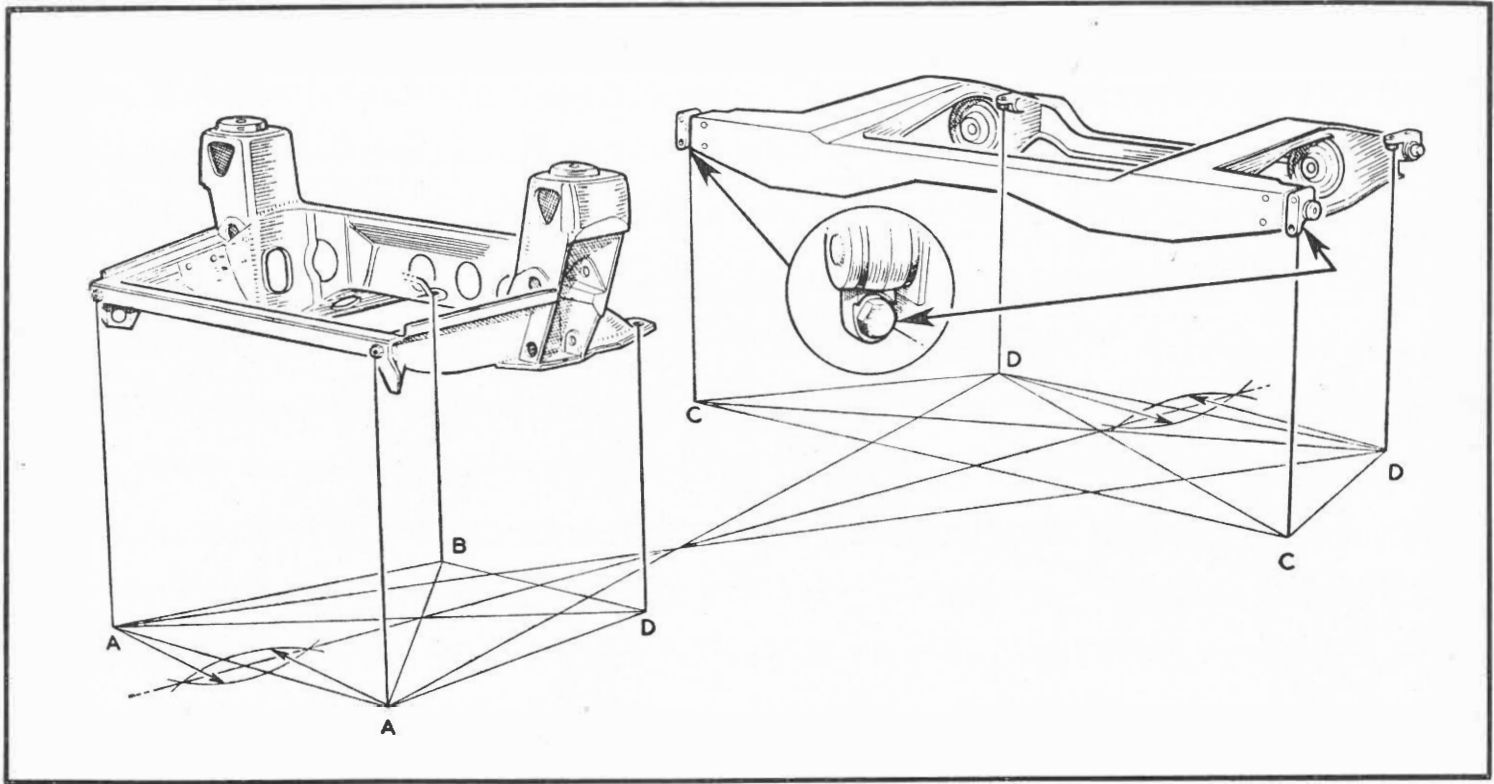


KEY TO BODY PARTS

- 1. Roof panel
- 2. Offside body panel
- 3. Cant rail (front)
- 4. Windscreen panel
- 5. Rear window tray
- 6. Body rear panel
- 7. Rear seat pan and boot assy.
- 8. Boot pan
- 9. Front parcel shelf
- 10. Toeboard
- 11. Bonnet
- 12. Inner wing
- 13. Top wing
- 14. Grille & lower wing panel
- 15. Lower rear panel (front wing)
- 16. Inner wing
- 17. Top wing
- 18, 19. Rear stowage compartment panels
- 20. Floor pan
- 21. Body side panel (left hand)







Above: Fig. 2. Transverse dimensions; AA, between centres of front sub-frame front mounting set screws 26in; BB, between centres of front sub-frame rear mounting set screws 16½in; CC, between centres of rear sub-frame front mounting block lower set screws 50½in; DD, between centres of rear sub-frame rear mounting block set screws 38½in. Below: Churchill 7-700 body jig with bracket numbers indicated

