

Chapter 7 Part A: Manual transmission

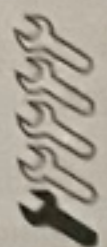
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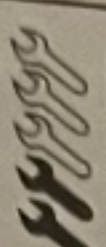
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Degrees of difficulty

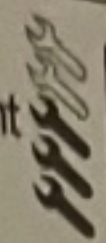
Easy, suitable for novice with little experience



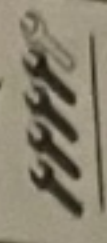
Fairly easy, suitable for beginner with some experience



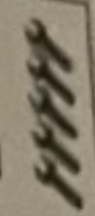
Fairly difficult, suitable for competent DIY mechanic



Difficult, suitable for experienced DIY mechanic



Very difficult, suitable for expert DIY or professional



Specifications

General

Type

Transversely mounted, front-wheel-drive layout, with integral transaxle differential/final drive. Five forward speeds, one reverse, all with synchromesh. Transmission code FM

Gear ratios (typical)

1st	3.38 : 1
2nd	1.76 : 1
3rd	1.12 : 1
4th	0.89 : 1
5th	0.70 : 1
Reverse	3.17 : 1
Final drive	3.61 : 1

Torque wrench settings

Bellhousing-to-engine block bolts:

M10	40
M12	70

Gear lever bracket-to-engine mounting bolts

	8
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Gear lever housing-to-floorpan bolts

	8
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Gear lever-to-selector rod bolt

	22
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Left-hand oil seal retaining housing

	24
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Oil level, filler and drain plugs

	50
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Reversing light switch

	24
--	----

Selector rod pinch-bolt

	22
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Nm

lbf ft

1 General information

The manual transmission is mounted transversely in the engine bay, bolted directly to the engine. This layout has the advantage of providing the shortest possible drive path to the front wheels, as well as locating the transmission in the airflow through the engine bay, optimising cooling.

The unit is cased in aluminium alloy, and has oil filler, drain and level plugs. The case has two mating faces; one to the bellhousing, which is sealed with 'liquid gasket' compound, and one to the gearbox end cover, which is sealed with a solid gasket. A 'labyrinth' vent

at the top of the gearcase allows for air expansion, and permits gases produced by the lubricant to escape. The vent also houses a filter to keep out ingress of water and dirt.

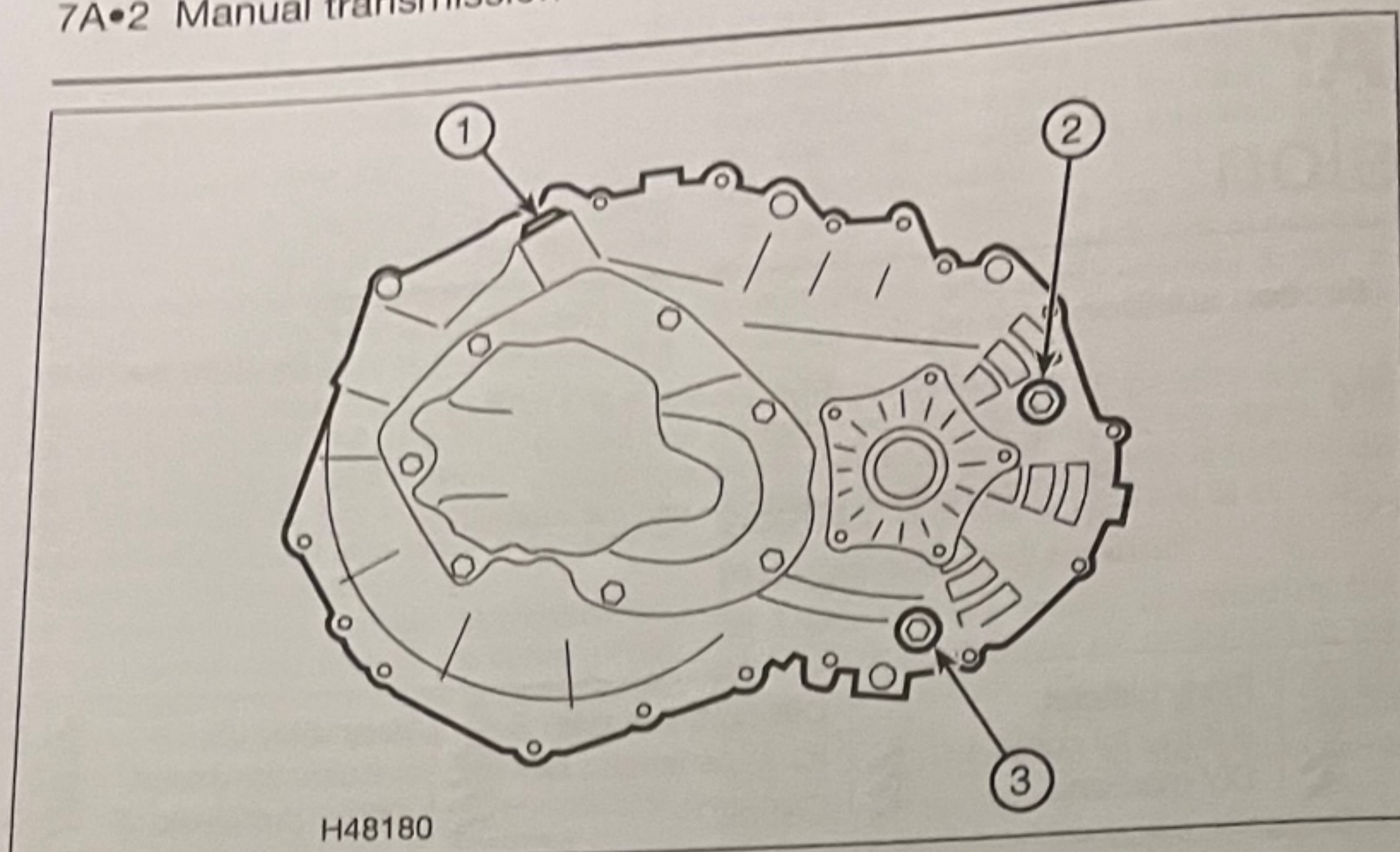
Drive from the crankshaft is transmitted via the clutch to the gearbox input shaft, which is splined to accept the clutch friction plate. All six driving gears (pinions) are mounted on the input shaft; reverse, first and second speed pinions are journaled on sliding contact bearings, and the third, fourth and fifth speed pinions are carried on needle bearings.

The driven gears for all five forward speeds are mounted on the output shaft, again with third, fourth and fifth speed gears carried on needle bearings. Reverse gear is integral with the first/second speed synchromesh sleeve.

The pinions are in constant mesh with their

corresponding driven gears, and are free to rotate independently of the gearbox shafts until a speed is selected. The difference in diameter and number of teeth between the pinions and gears provides the necessary shaft speed reduction and torque multiplication. Drive is then transmitted to the final drive gears/differential through the output shaft.

All gears are fitted with synchromeshes, including reverse. When a speed is selected, the movement of the floor-mounted gear lever is communicated to the gearbox by a selector rod. This in turn actuates a series of selector forks inside the gearbox, which are slotted onto the synchromesh sleeves. The sleeves, which are locked to the gearbox shafts, but can slide axially by means of splined hubs, press back rings into contact with the respective gear/pinion. The



2.4 Location of transmission plugs

1 Filler plug

2 Level plug

3 Drain plug

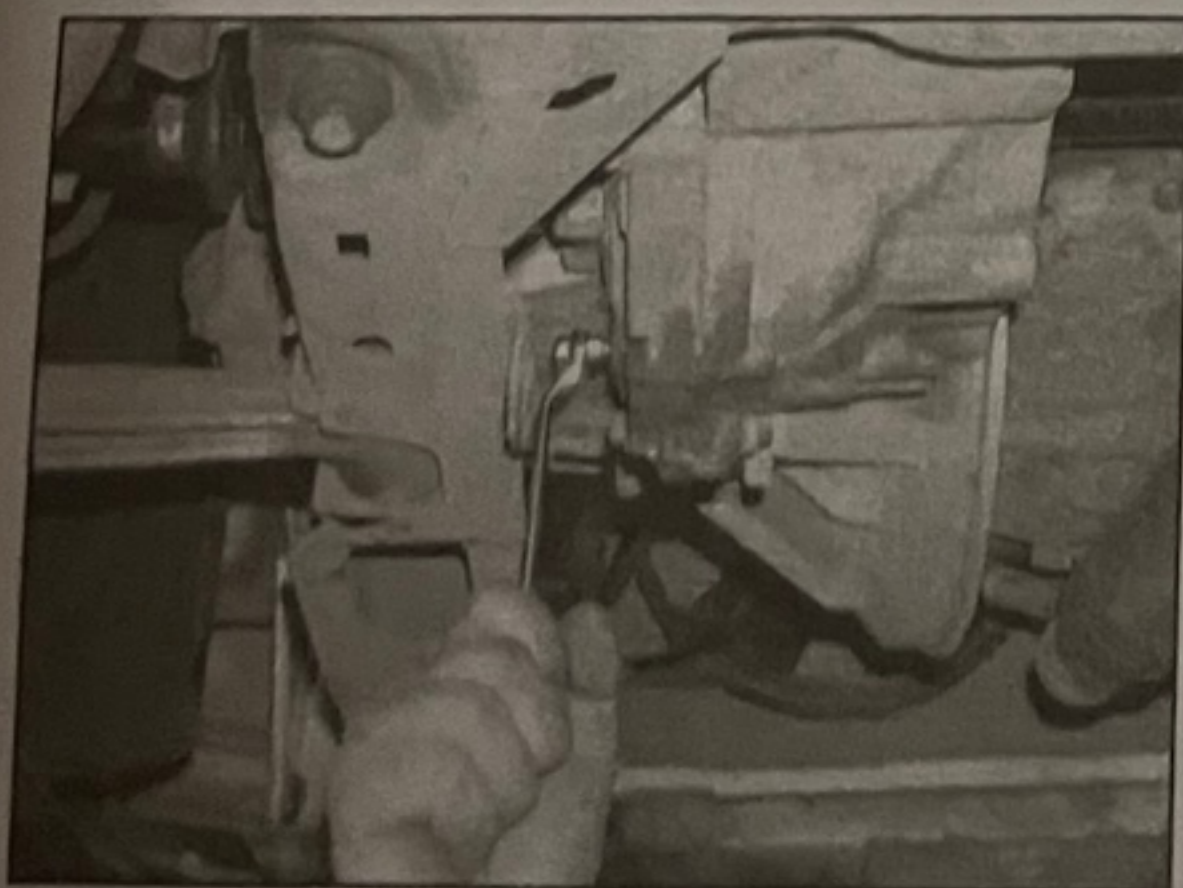
coned surfaces between the baulk rings and the pinion/gear act as a friction clutch, progressively matching the speed of the synchromesh sleeve (and hence the gearbox shaft) with that of the gear/pinion. The dog teeth on the outside of the baulk ring prevent the synchromesh sleeve from meshing with the gear/pinion until their speeds are exactly matched; this allows gearchanges to be carried out smoothly, and greatly reduces the noise and mechanical wear caused by rapid gearchanges.

When reverse gear is engaged, an idler gear is brought into mesh between the reverse pinion and the teeth on the outside of the first/second speed synchromesh sleeve. This arrangement introduces the necessary speed reduction, and also causes the output shaft to rotate in the opposite direction, allowing the vehicle to be driven in reverse.

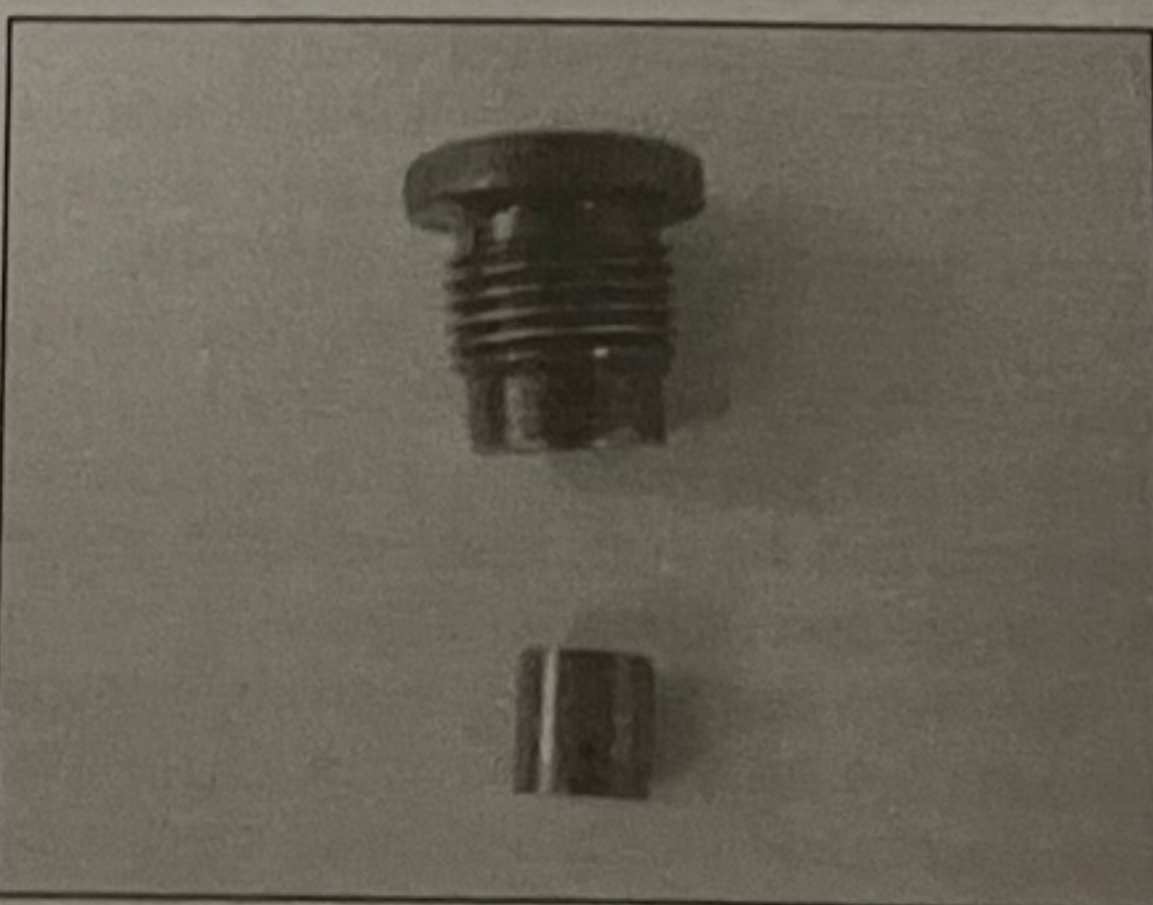
2 Transmission – draining and refilling

General information

1 The gearbox is filled with the correct quantity



2.5a Unscrew the drain plug from the transmission casing



2.5b Note that the drain plug contains a removable magnetic insert

and grade of oil at manufacture. The level must be checked regularly, and if necessary topped-up in accordance with the maintenance schedule (see Chapter 1A or 1B). However, there is no requirement to drain and renew the oil during the normal lifetime of the gearbox, unless repair or overhaul is carried out.

Draining

2 Take the car on a road test of sufficient length to warm the engine/transmission up to normal operating temperature; this will speed up the draining process, and any sludge and debris will be more likely to be drained out.

3 Park the car on level ground, switch off the ignition, and apply the handbrake firmly. For improved access, jack up the front of the car and support it securely on axle stands. **Note:** The car must be lowered to the ground and parked on a level surface, to ensure accuracy when refilling and checking the oil level. Undo the screws, and remove the engine undershield (where fitted).

4 Wipe clean the area around the filler plug, which is situated on the top surface of the transmission. Unscrew the plug from the casing, and recover the sealing washer (see illustration).

5 Position a container with a capacity of 2.5 litres (ideally with a large funnel) under the drain plug (see illustrations). The drain plug is located below the left-hand side drive shaft. Note that the drain plug contains a magnet, designed to catch the metal debris produced as the transmission components wear. If the plug is clogged with a large amount of metal debris, this may be an early indication of component failure.

6 Allow all the oil to drain completely into the container. If the oil is still hot, take precautions against scalding. Clean both the filler and level plugs thoroughly, paying particular attention to the threads. Discard the original sealing washers; they should be always replaced whenever they are disturbed.

Refilling

7 When the oil has drained out completely, clean the plug hole threads in the transmission casing. Fit a new sealing washer to the drain plug. Coat the thread with thread-locking compound, and tighten it into the transmission casing. If the car was raised for the draining operation, lower it to the ground.

8 When refilling the transmission, allow plenty of time for the oil level to settle completely before attempting to check it. Note that the car must be parked on a flat, level surface when checking the oil level. Use a funnel if necessary to maintain a gradual, controlled flow and avoid spillage.

9 Refill the transmission with the specified grade and quantity of oil, then check the oil level as described in Chapter 1A or 1B. If a large quantity flows out when the level checking plug is removed, refit both the filler and level plugs, then drive the car for a short distance so that the new oil is distributed fully around the transmission components. Recheck the level again upon your return.

10 On completion, fit the filler and level plugs with new sealing washers. Coat their threads with thread-locking compound and tighten them securely. Refit the engine undershield (where applicable).

3 Gearchange linkage – adjustment

1 If the action of the gearchange linkage is stiff, slack or vague, the alignment between the gearchange linkage and the gearbox selector rod may be incorrect (also check the oil level and type is correct). The operations in the following paragraphs describe how to check and, if necessary, adjust the alignment.

2 Park the vehicle, apply the handbrake and switch off the ignition.

3 Locate the alignment hole at the top of the gearbox casing, adjacent to the part number plate (see illustrations). Prise out the plug to expose the alignment hole. Select fourth gear, then take the locking tool (a screwdriver

with a shaft diameter of 4 mm) and insert it into the hole. Lock the gearbox in first gear. Insert a screwdriver from the bottom of the car, remove the screwdriver from the frame and mounting. Using a lever (or drill bit) with a 4 mm diameter, insert it into the side of the locking pin.

5 If the locking pin is difficult to move, then the alignment is correct. If the alignment is correct, the best course of action is to blame for the poor gearchange linkage damage – refer to the selector rod pinion.

6 If the locking pin cannot be inserted into the gearchange linkage, the gearchange linkage is damaged – refer to the selector rod pinion.

7 From the engine compartment, slacken the pinion coupling to allow the halves of the selector rod pinion to be inserted into the housing; ensure the gear position.

8 Move the gear selector rod pinion into the housing; ensure the gear position.

9 In the engine compartment, the selector rod pinion alignment hole.

10 Remove the lever housing.

11 Remove the lever housing.

12 Refit the lever housing.

13 Before refitting the gear lever, ensure the gear position is correct.

14 Finally, ensure that all gears are in the correct position.

4 Gear lever and selector rod pinion

Gear lever housing

1 Park the vehicle, apply the handbrake and switch off the ignition.

2 Refit the lever housing.

3 Operate the gear lever through all the gears.

4 Slacken the gear lever housing.

5 Drive the vehicle with the gear lever in each gear.

with a shaft diameter of approximately 4 mm), and insert it into the alignment hole; this will lock the gearbox in fourth gear. **Note:** Use a screwdriver; the handle will prevent the screwdriver from falling into the gearbox.

4 Inside the car, remove the gear lever gaiter and mounting frame to expose the gearchange lever housing. Using a locking pin (screwdriver or drill bit) with a diameter of approximately 4 mm, insert it into the alignment hole in the side of the lever housing (see illustration).

5 If the locking pin can be inserted without difficulty, then the gearchange linkage alignment is correct, and hence cannot be blamed for the poor gearchange quality; the best course of action now is to remove the gearchange linkage and inspect it for wear or damage – refer to Section 4 for details.

6 If the locking pin (screwdriver or drill bit) cannot be inserted into the alignment hole, then the gearchange linkage is incorrectly adjusted.

7 From the engine bay, at the point where the selector rod passes through the bulkhead, slacken the pinch-bolt adjacent to the rubber coupling to allow movement between the two halves of the selector rod (see illustration).

8 Move the gearchange lever such that the locking pin (screwdriver shaft or drill bit) can be inserted into the alignment hole in the lever housing; ensure that the lever is still in the 4th gear position.

9 In the engine bay, tighten the pinch-bolt on the selector rod, observing the correct torque.

10 Remove the screwdriver from the gearbox alignment hole, and fit the plastic plug.

11 Remove the screwdriver from the gear change alignment hole.

12 Remove the gear lever gaiter and mounting

13 Before moving the vehicle, check that the gear lever can be moved from neutral to all six gear positions. **Note:** Check the key can be removed while reverse is selected.

14 Finally, road test the vehicle, and check that all gears can be obtained smoothly and precisely.

4 Gearchange linkage – removal, inspection and refitting

Gear lever

Housing removal

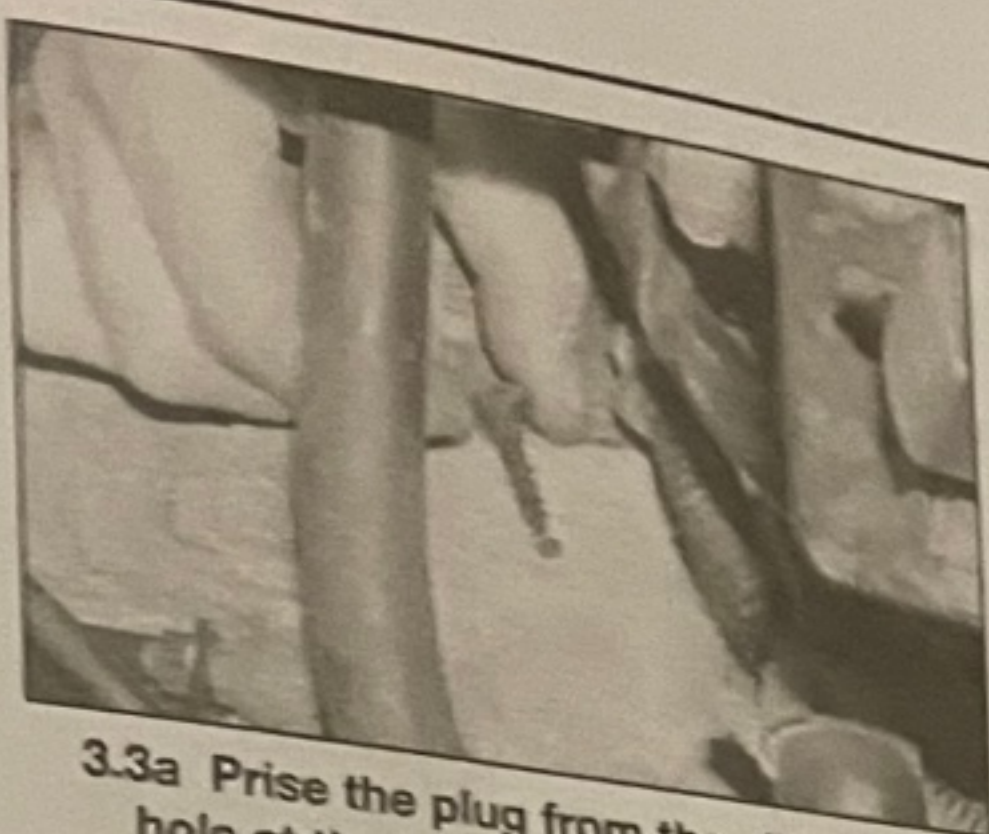
1 Park the vehicle, switch off the ignition, and apply the handbrake.

2 Referring to Chapter 11, remove the gear lever gaiter, centre console and side carpet trim panels.

3 Open the bonnet and undo the pinch-bolt clamp to the gear selector rod universal joint.

4 Slacken and remove the bolts that secure the gearchange lever housing to the floorpan.

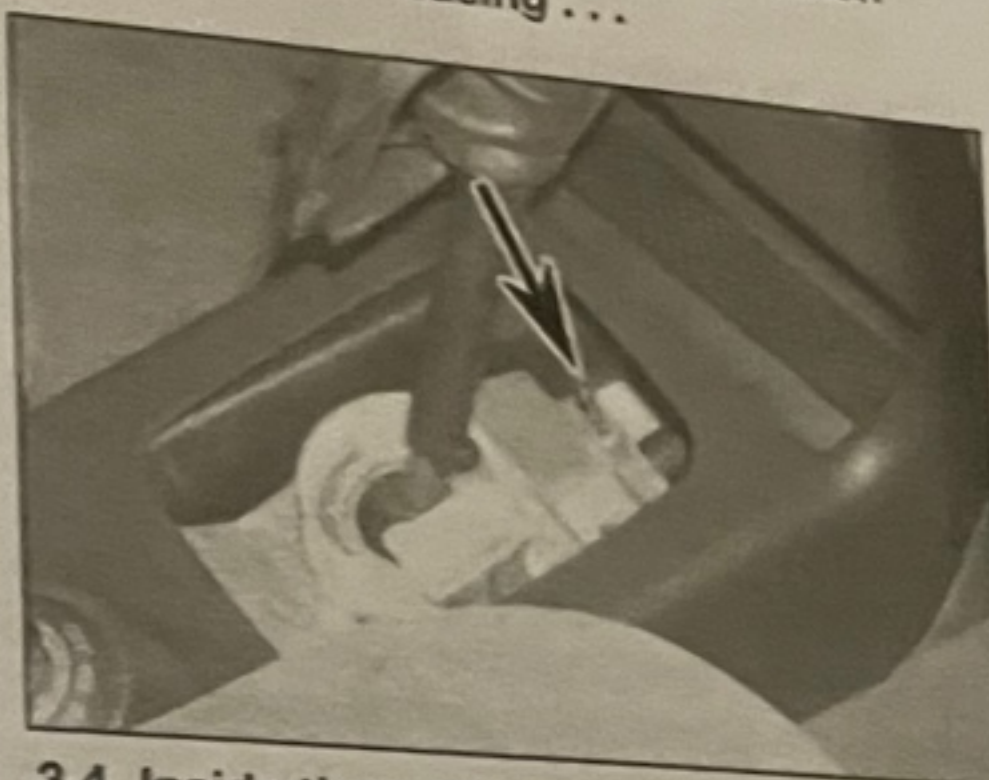
5 Disconnect the wiring plug from the ignition switch, then lift the gear lever housing up and withdraw it from the vehicle. Unbolt the gear lever from the selector shaft (see illustration).



3.3a Prise the plug from the alignment hole at the top of the transmission casing ...



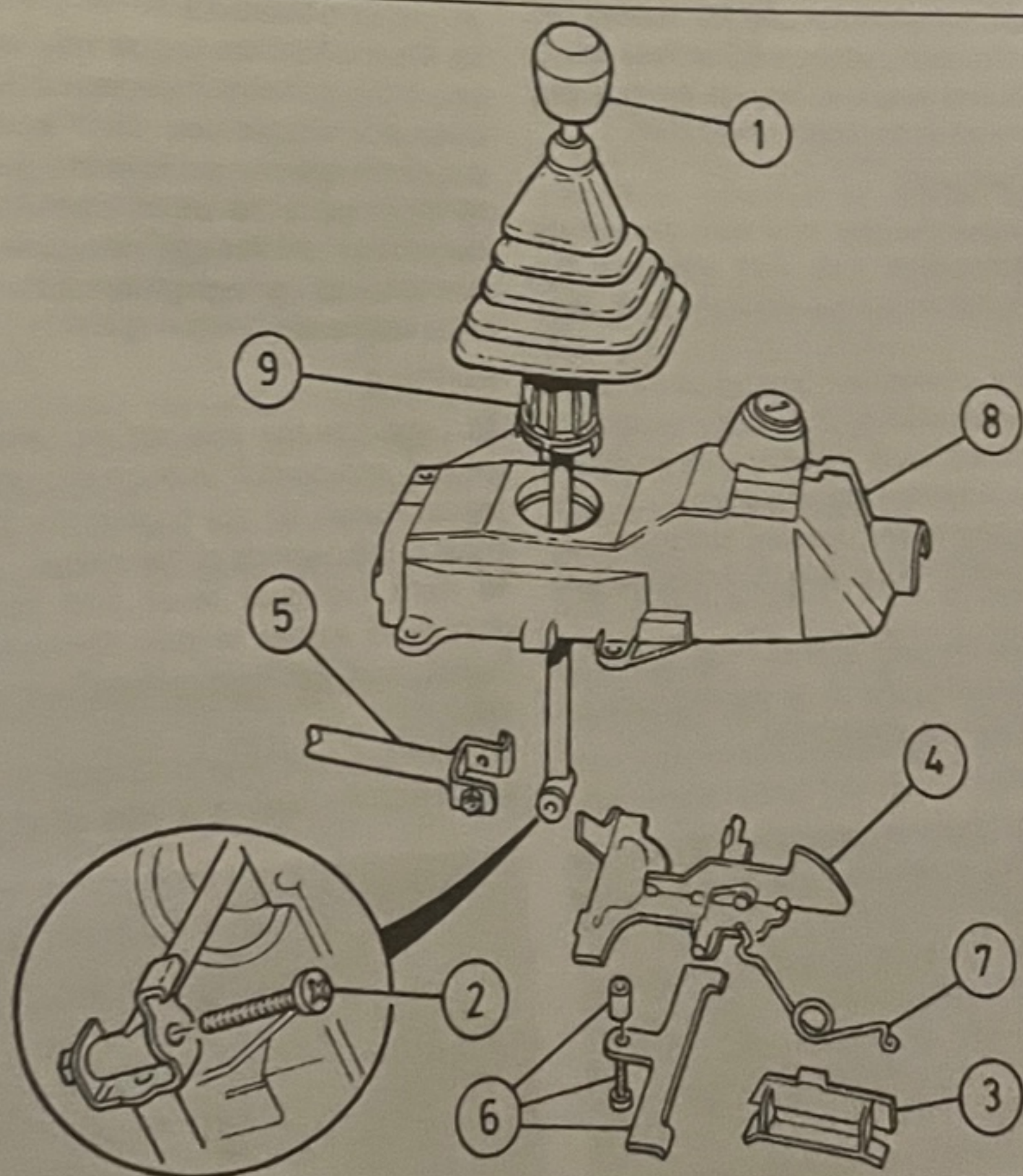
3.3b ... then select fourth gear, and insert a screwdriver into the alignment hole; this will lock the transmission in fourth gear



3.4 Inside the vehicle, insert a locking tool (drill bit) into the alignment hole in the side of the lever housing



3.7 Slackening the selector rod pinch-bolt



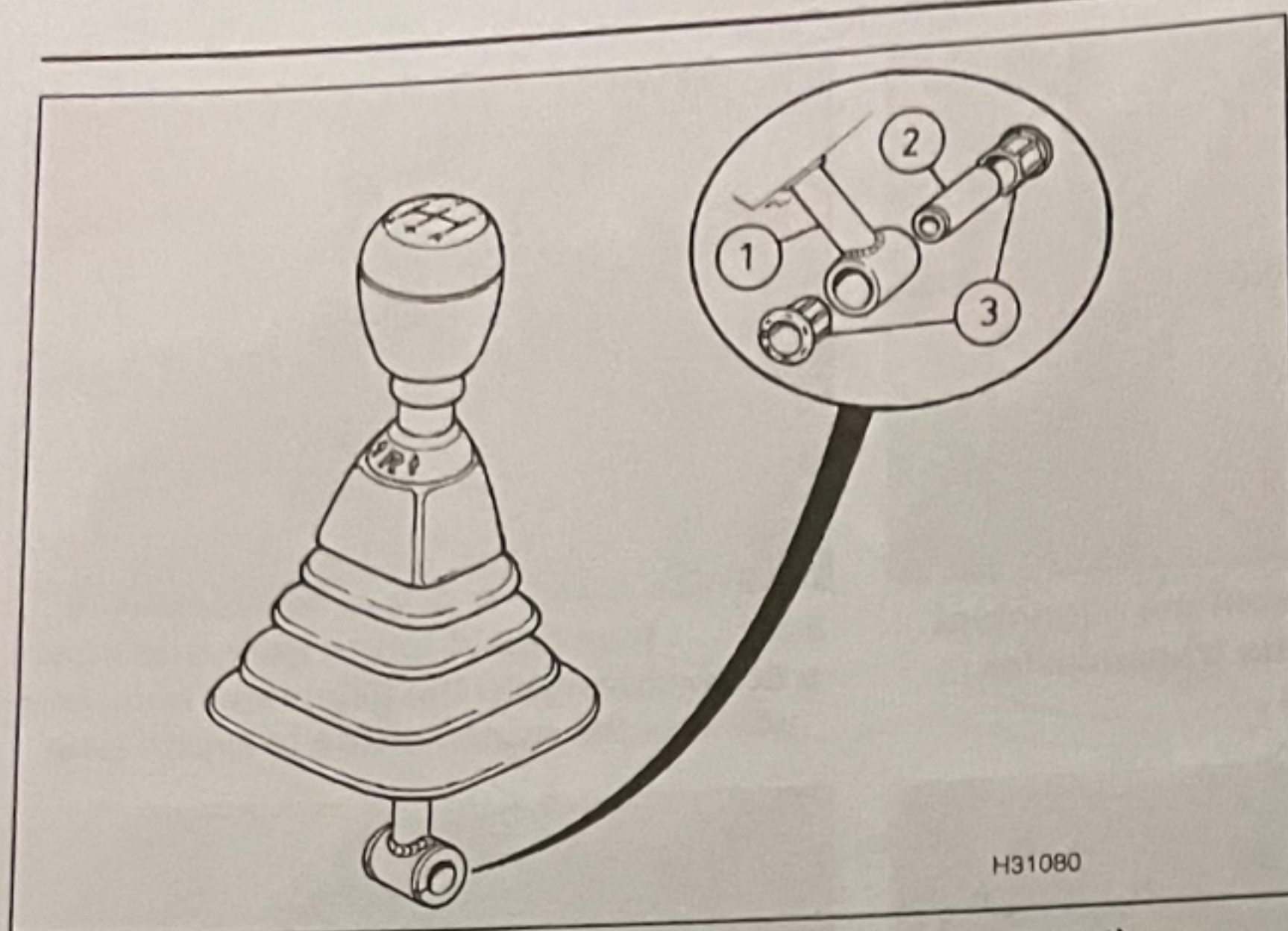
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4.5 Gearchange lever and housing assembly

- 1 Gearchange lever
- 2 Gearchange lever-to-selector rod screw
- 3 Stop-plate

- 4 Locking plate
- 5 Selector rod
- 6 Screw and collar

- 7 Locking plate spring
- 8 Gearchange lever housing
- 9 Gear lever ball socket



4.6 Gearchange lever selector rod bushes (inset)

1 Gearchange lever 2 Sleeve 3 Bushes

Recover all bushes, washers and spacers, and remove the housing.

Inspection

6 It is possible to remove the gear lever from its housing, to allow the bearings to be inspected and renewed. It is most likely, however, that any slack found in the mechanism will be caused by worn bushes between the gear lever and the selector rod. Extract the bushes from the gear lever linkage (**see illustration**) and inspect them; if they appear worn or corroded, renew them.

Lever removal

7 To remove the gear lever from the housing (**see illustration 4.5**), first withdraw the lockplate holder then unclip the locking plate spring.

8 Using a screwdriver, disengage the pawl, which is controlled by the ignition switch. Lift up the locking plate together with its plastic bracket and remove the stop-plate.

9 Set the gear lever to reverse, and then undo the screw securing the selector rod to the gear lever.

10 Remove the gear lever and ball socket by carefully pressing the three locking tabs on the socket using a screwdriver.

Refitting

11 Refit the gearchange lever and housing by reversing the removal sequence, noting the following:

- Observe the correct torque for the gear lever-to-selector rod bolt and the gear lever housing-to-floorpan bolts.
- Refit the wiring plug connector to the ignition switch.
- On completion, check that the gear lever can be moved from neutral to all six gear positions. **Note:** Check the key can be removed while reverse is selected.
- Finally, road test the vehicle, and check that all gears can be obtained smoothly and precisely.

Selector rod

Removal

12 Refer to the previous sub-section, and remove the gear lever and housing. Ensure that 4th gear is selected before removal. Remove the plug from the alignment hole in the top of the gearbox casing, and lock the gearbox in 4th gear using a suitable screwdriver, as described in Section 3.

13 From within the engine bay, at the point where the selector rod passes through the bulkhead, slacken the pinch-bolt collar to detach the selector rod from the gearbox.

14 From inside the cabin, carefully withdraw the selector rod through the bulkhead, taking care to avoid damaging the rubber grommet in the bulkhead.

Refitting

15 Lubricate the selector rod with silicone grease, and push it through the grommet in the bulkhead; do not tighten the pinch-bolt collar at the gearbox at this stage.

16 Refit the gear lever and housing as described earlier in this Section. Fit the bushes, and bolt the gear lever to the selector rod.

17 Lock the gear lever in 4th gear by inserting a screwdriver with a 4 mm shaft into the



5.4 Driveshaft intermediate shaft (arrowed)

alignment hole on the gear lever housing, as reference to Section 3.

18 Tighten the pinch-bolt collar on the selector rod at the gearbox, observing the specified torque.

19 Remove the screwdriver from the housing and refit the gear lever gaiter.

20 Before moving the vehicle, check that the gear lever can be moved from neutral to all gear positions. Finally, road test the vehicle and check that all gears can be obtained smoothly and precisely.

5 Oil seals – renewal

Right-hand driveshaft oil seal

1 Park the vehicle on a level surface, engage the handbrake, and chock the rear wheels. Remove the wheel centre caps, and slacken the wheel bolts.

2 Apply the handbrake, then raise the front of the vehicle, rest it securely on axle stands and remove the roadwheels; refer to *Jacking and vehicle support* for guidance.

3 Refer to Section 2 and drain the transmission oil. Clean and refit the drain plug as described in Section 2.

4 Working from Chapter 8, remove the intermediate driveshaft and bearing assembly (**see illustration**).

5 Using a suitable lever, prise the driveshaft oil seal out from the transmission housing (**see illustration**), taking care not to damage the sealing surface. Discard the old seal.

6 Thoroughly clean the mating surfaces of the bearing housing and differential casing. Take precautions to prevent debris entering the bearings of either assembly.

7 Lubricate the new oil seal with clean oil and carefully refit it into the transmission housing, ensuring that it is seated squarely (**see illustration**).



5.5 Levering out the oil seal, using a block of wood to allow better leverage

8 Refer to Chapter 8 for driveshaft and bearing assembly.
9 Refit the roadwheels to the ground, and torque the correct torque for the caps/trims.
10 Refer to Section 2 for mission with the vehicle.

Left-hand driveshaft oil seal

11 Park the vehicle on a level surface, engage the handbrake, and chock the rear wheels. Remove the wheel centre caps, and slacken the wheel bolts.

12 Apply the handbrake, then raise the front of the vehicle, rest it securely on axle stands and remove the roadwheels; refer to *Jacking and vehicle support* for guidance.

13 Refer to Section 2 and drain the transmission oil. Clean and refit the drain plug as described in Section 2.

14 Working from Chapter 8, remove the intermediate driveshaft and bearing assembly (**see illustration**).

15 Using a suitable lever, prise the driveshaft oil seal out from the transmission housing (**see illustration**), taking care not to damage the sealing surface. Discard the old seal.

16 Thoroughly clean the mating surfaces of the bearing housing and differential casing. Take precautions to prevent debris entering the bearings of either assembly.

17 Lubricate the new oil seal with clean oil and carefully refit it into the transmission housing, ensuring that it is seated squarely (**see illustration**).

18 Refer to Chapter 8 for driveshaft and bearing assembly.
19 Refit the roadwheels to the ground, and torque the correct torque for the caps/trims.
20 Refer to Section 2 for mission with the vehicle.

Refer to Chapter 8 and refit the intermediate driveshaft and bearing assembly.
 Refit the roadwheels, and lower the vehicle to the ground. Tighten the roadwheel bolts to the correct torque, and refit the wheel centre caps/trim.

Left-hand driveshaft oil seal and O-ring

11 Park the vehicle on a level surface, apply the handbrake, and chock the rear wheels. Remove the wheel centre caps, and slacken the wheel bolts.

12 Apply the handbrake, then raise the front of the vehicle, rest it securely on axle stands and remove the roadwheels; refer to *Jacking and vehicle support* for guidance.

13 Refer to Section 2 and drain the transmission oil. Clean and refit the drain plug as described in Section 2.

14 Working from the relevant section of Chapter 8, disconnect the left-hand driveshaft from the transmission at the inboard universal joint.

15 Place a container beneath the driveshaft housing mating face, then slacken and withdraw the five retaining screws.

16 Withdraw the seal retaining housing from the transmission, then remove the O-ring seal from the housing (see illustration).

17 Note the fitted depth of the oil seal in its housing and the correct fitted position. Using a suitable lever, carefully prise the oil seal out from the housing, taking care not to damage the sealing surface.

18 Thoroughly clean the mating surfaces of the bearing housing and differential casing; take precautions to prevent debris entering the bearings of either assembly.

19 Lubricate the new oil seal with clean oil, and carefully refit it into the oil seal retaining housing, ensuring that it is seated squarely (see illustration 5.7).

20 Refit the O-ring seal to the seal retaining housing, then refit the housing to the transmission. Tighten the five retaining screws to the specified torque setting.

21 Refer to Chapter 8, and reconnect the left-hand driveshaft at the universal joint.

22 Refit the roadwheels, and lower the vehicle to the ground. Tighten the roadwheel bolts to the correct torque, and refit the wheel centre caps/trim.

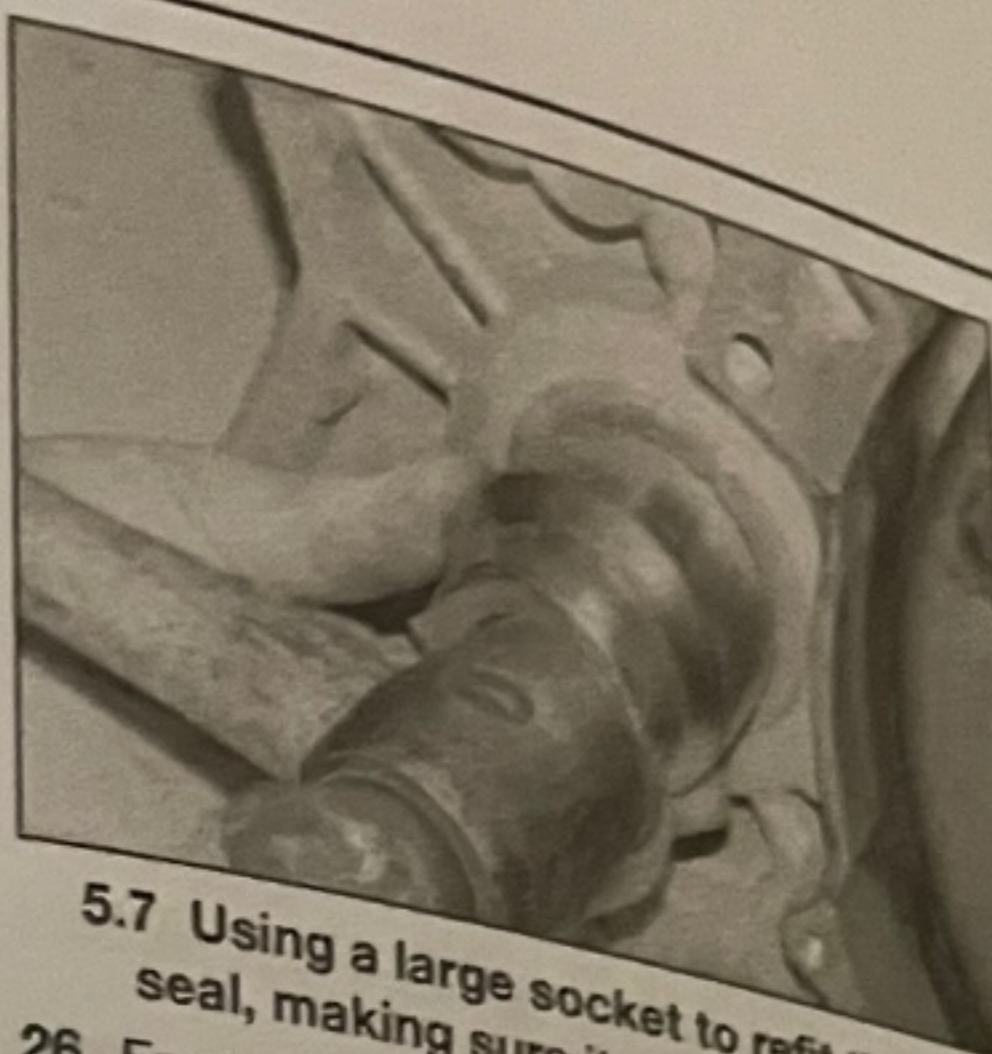
23 Refer to Section 2 and refill the transmission with oil of the correct grade.

Input shaft oil seal

24 The oil seal is part of the clutch slave cylinder assembly and cannot be renewed separately; see Chapter 6, Section 4 (*Clutch slave cylinder/release bearing - removal and refitting*) for further information.

Selector rod oil seal

25 Clean off the area around the selector rod seal in the transmission, to prevent dirt entering the transmission.



5.7 Using a large socket to refit the oil seal, making sure it seats squarely

26 Ensure that 4th gear is selected, remove the plug from the alignment hole in the top of the gearbox casing, and lock the gearbox in 4th gear using a suitable 4 mm locking tool/screwdriver, as described in Section 3.

27 Slacken and remove the selector rod retaining bolt, then select 3rd gear to disengage the selector rod from the transmission.

28 Note the fitted position of the oil seal in its housing, then using a suitable lever carefully prise the oil seal out from the transmission, taking care not to damage the sealing surface.

29 Thoroughly clean the sealing surface and selector rod, check there are no burrs on the selector rod; take precautions to prevent debris entering the transmission.

30 Lubricate the new oil seal and selector rod with clean oil, and carefully refit the new seal into the transmission housing, ensuring that it is seated squarely.

31 Refit the selector rod and securely tighten the retaining bolt. Remove the locking tool/screwdriver from the housing, and check the gearchange linkage adjustment as described in Section 3.

32 Before moving the vehicle, check that the gear lever can be moved from neutral to all six gear positions. Check the transmission oil level. Finally, road test the vehicle, and check that all gears can be obtained smoothly and precisely.

6 Reversing light switch - testing, removal and refitting

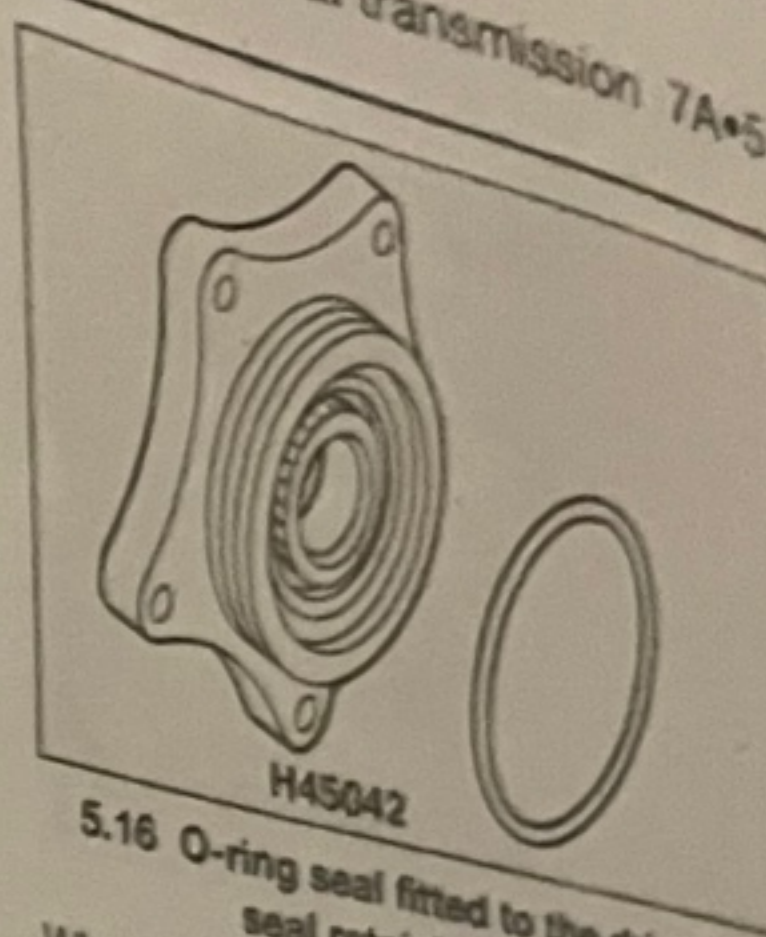
Testing

1 Disconnect the battery negative cable, and position it away from the terminal.

2 Unplug the wiring harness from the reversing light switch at the connector. The switch is located on the rear of the transmission casing (see illustration).

3 Connect the probes of a continuity tester, or a multimeter set to the resistance function, across the terminals of the reversing light switch.

4 The switch contacts are normally open, so with any gear other than reverse selected; the tester/meter should indicate an open-circuit.



5.16 O-ring seal fitted to the driveshaft seal retaining housing

When reverse gear is then selected, the switch contacts should close, causing the tester/meter to indicate a short-circuit.
 5 If the switch appears to be constantly open- or short-circuit, or is intermittent in its operation, it should be renewed.

Removal

6 If not already done, disconnect the battery negative cable, and position it away from the terminal.

7 Unplug the wiring harness from the reversing light switch at the connector.

8 Using a suitable spanner, unscrew the switch, recovering any washers that may be fitted; these must be refitted, to ensure that the correct clearance exists between the switch shaft and the reverse gear shaft.

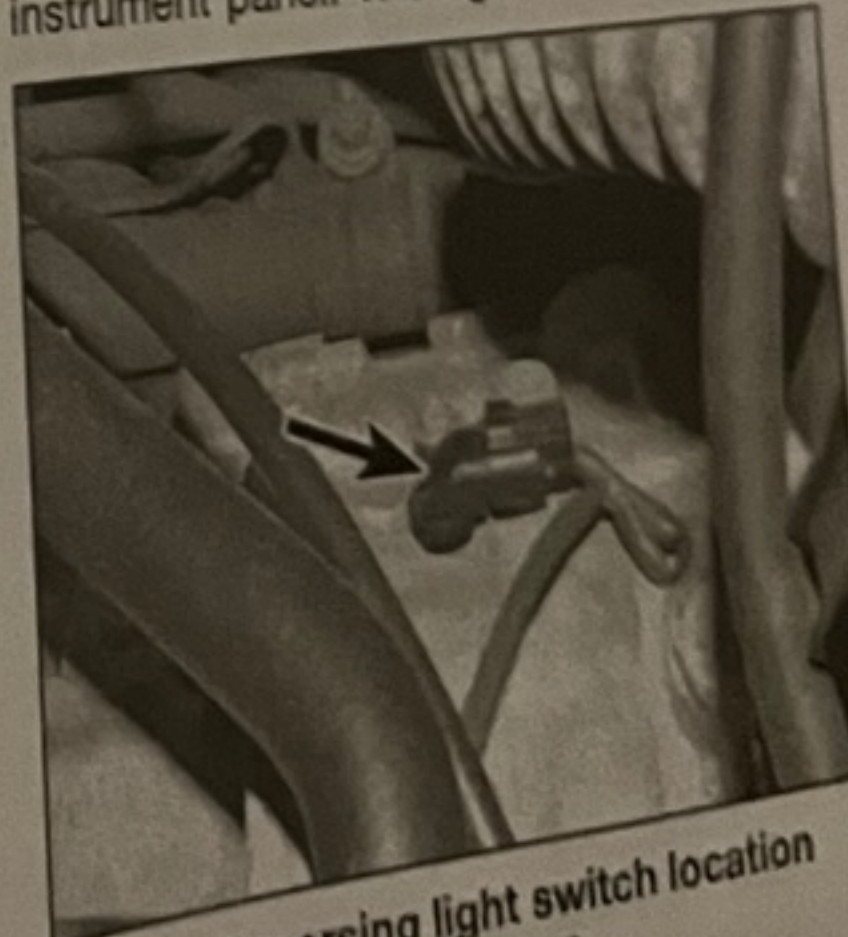
Refitting

9 Refit the switch by reversing the removal procedure, reconnect the battery negative cable.

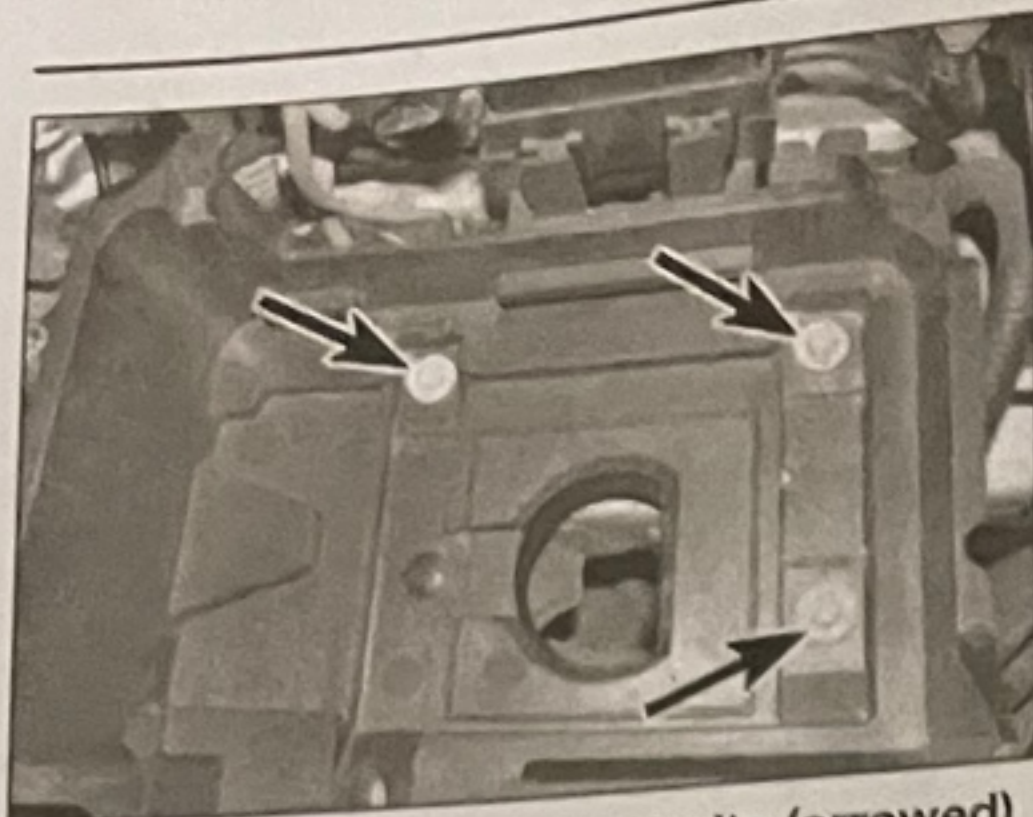
7 Speedometer drive - removal and refitting

General information

1 Vehicles are fitted with an electronic transducer in place of the drivegear. This device measures the rotational speed of the transmission final drive, and converts the information into an electronic signal, which is then sent to the speedometer module in the instrument panel. The signal is also used as



6.2 Reversing light switch location (arrowed)



8.6 Undo the battery tray bolts (arrowed)

an input by the engine management system ECM (and where fitted, by the cruise control ECM, the trip computer and the traction control system ECM).

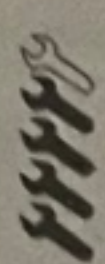
Removal

- 2 Locate the speed transducer, which is on the differential housing, at the rear of the transmission case.
- 3 Unplug the wiring harness from the transducer, at the connector.
- 4 Remove the transducer retaining screw, and unscrew the unit from the transmission casing.
- 5 Where applicable, recover and discard the O-ring seal.

Refitting

- 6 Refit the transducer by following the removal procedure in reverse. **Note:** Where applicable, a new O-ring seal must be used on refitting.

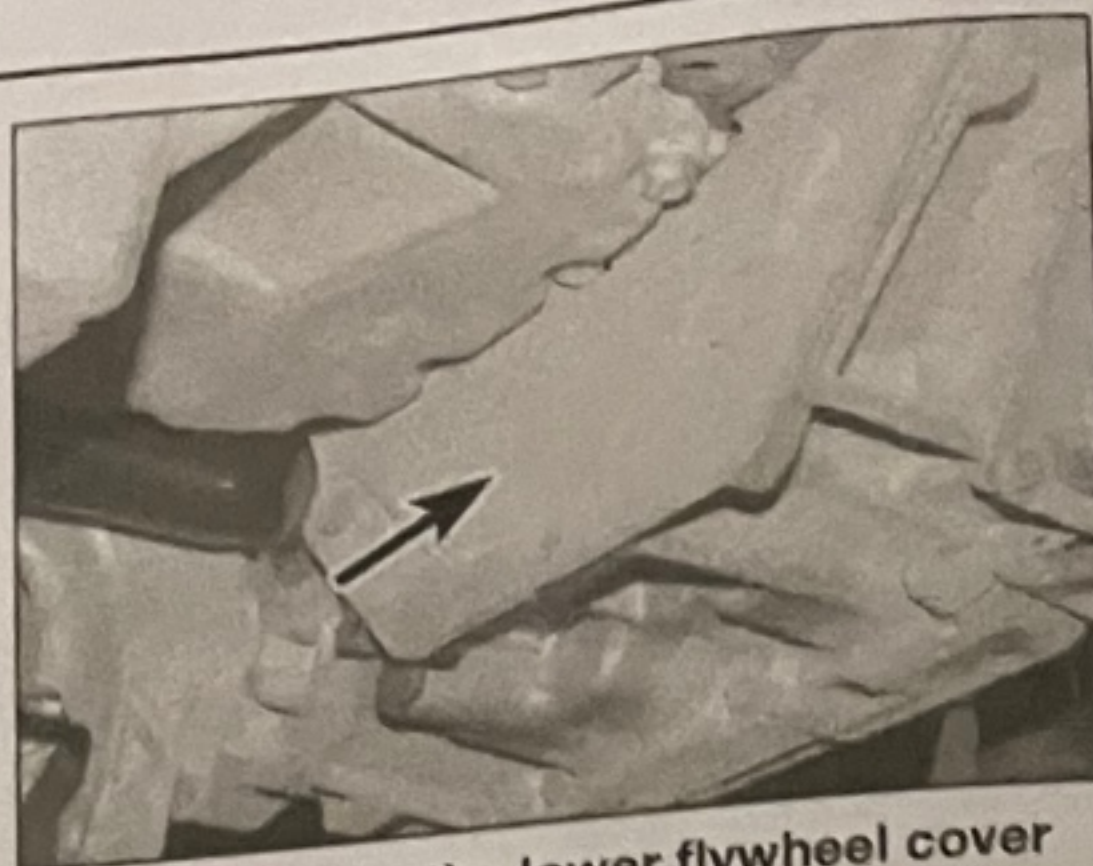
8 Transmission – removal and refitting



Note: Refer to Chapter 2C for details on removal of the engine and transmission as a complete assembly.

Removal

- 1 Park the vehicle on a level surface, apply the handbrake and chock the rear wheels. Remove the wheel centre caps, and slacken the wheel bolts.
- 2 Apply the handbrake, then raise the front of the vehicle, rest it securely on axle stands and remove the roadwheels; refer to *Jacking and vehicle support* for guidance.
- 3 Refer to Section 2 of this Chapter and drain the oil from the transmission. Refit and tighten the drain plug as described in Section 2.
- 4 Refer to Section 3, and set the gearchange linkage in a reference position, to ensure correct alignment of the linkage on refitting. Undo the retaining bolt and disconnect the gear linkage from the transmission.
- 5 Referring to Chapter 5A, remove the battery cover, disconnect both battery cables and remove the battery.
- 6 Unbolt the battery tray from the side of the engine bay (see illustration).



8.17 Remove the lower flywheel cover plate (arrowed)

- 7 Working from Chapter 6, seal off the clutch hydraulic system by fitting a clamp to the flexible section of the slave cylinder supply hose.

8 Release the securing clip and disconnect the connection for the fluid delivery at the top of the transmission. Refit the securing clip to the connector after it has been disconnected for safe-keeping. Plug both sides of the open fuel lines to minimise leakage and to prevent the ingress of foreign material.

- 9 Unplug the wiring connector from the reversing light switch at the transmission; refer to Section 6 of this Chapter for further information.

10 Slacken and remove the three upper transmission retaining bolts.

- 11 Unplug the wiring connector(s) from the oxygen sensor; refer to Chapter 4B, Section 2, for further information.

12 Slacken and remove the centre retaining nut from the rear engine mounting, and then slacken the three outer mounting bolts.

- 13 Position a lifting beam across the engine bay, locating the support legs securely in the sills at either side, in line with the strut top mountings. Hook the jib onto the engine lifting eyelet and raise it, so that the weight of the engine is taken off the transmission mounting. Most people won't have access to an engine lifting beam, but it may be possible to hire one. Alternatively, an engine hoist may be used to support the engine, but when using this method, bear in mind that if the vehicle is lowered on its axle stands to adjust the working height, for example, then the hoist will have to be lowered accordingly, to avoid straining the engine mountings.

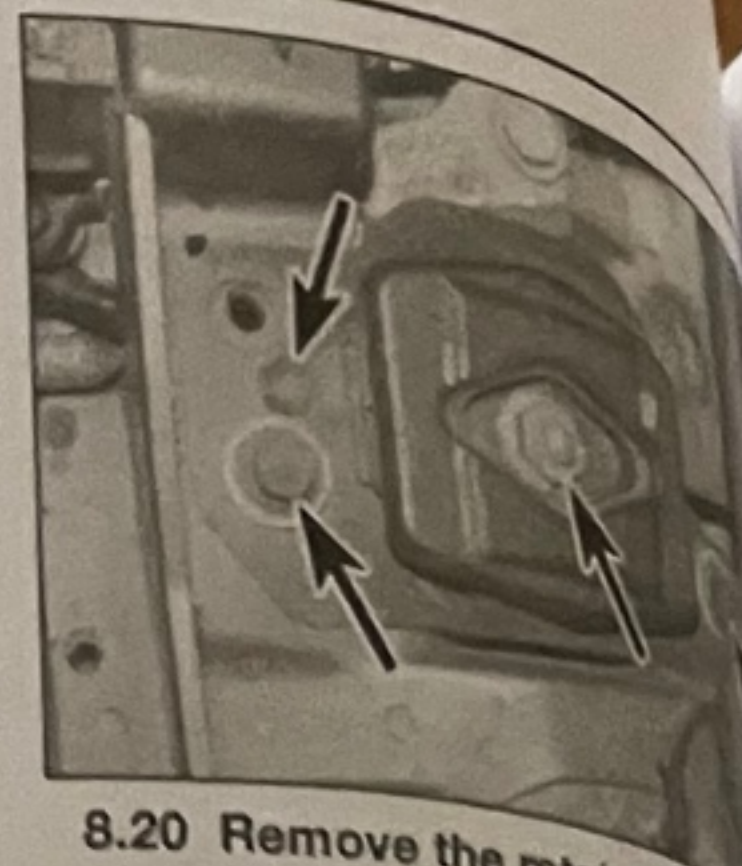
14 Remove the subframe from under the engine with reference to Chapter 10.

15 Remove the three retaining bolts from the rear engine mounting bracket and withdraw it from the engine bay.

16 With reference to Chapter 8, remove the both driveshafts from the transmission.

17 Undo the retaining bolts and remove the lower cover plate from the flywheel (see illustration). **Note:** On HOT Aero models (B235R) also remove the bolts between the transmission and the engine oil sump.

18 Undo the retaining bolt(s) and disconnect the earth cable(s) from the transmission housing.

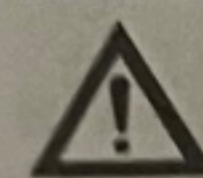


8.20 Remove the retaining bolts (arrowed)

- 19 Position a jack underneath the transmission, and raise it to take the weight of the unit. Check that nothing remains connected to the transmission before attempting to separate it from the engine.

20 Unscrew the bolts securing the left-hand engine/transmission mounting bracket from the bodywork and the centre nut from the transmission is supported, taking care to avoid straining the other engine mounting as you do this. Withdraw the mounting from the inner wing panel and transmission.

21 Work around the circumference of the bellhousing, and remove the last retaining bolt from the bellhousing. Pull the transmission away from the engine, extracting the input shaft from the clutch friction plate – this should only be attempted with the help of an assistant.



Warning: Maintain firm support on the transmission, to ensure that it remains steady on the jack head.

22 When the input shaft is clear of the clutch friction plate, lower the transmission out of the engine bay using the jack.

23 At this point with the transmission removed, it would be a good opportunity to check and if required renew the clutch assembly; refer to Chapter 6 for further information.

Refitting

24 Refit the transmission by reversing the removal procedure, noting the following points:

- a) Apply a smear of high melting-point grease to the transmission input shaft. Do not apply an excessive amount, as there is a possibility of the clutch friction plate being contaminated.
- b) Refit the subframe with reference to Chapter 10.
- c) Refit the engine/transmission mountings with reference to Chapter 2A or 2B.
- d) Observe the specified torque wrench settings (where applicable) when tightening all nuts and bolts after refitting.
- e) Bleed the clutch hydraulic system, referring to Chapter 6 for reference.
- f) On completion, if the transmission was drained, refill with the specified type and quantity of oil as described in Section 2.

The overhaul of a transmission is a complex (and often a task for the DIY home mechanic) which involves dismantling the transmission into its small components, and if necessary, by the selection of the transmission components.

9 Transmission overhaul – general information

The overhaul of a manual transmission is a complex (and often expensive) engineering task for the DIY home mechanic to undertake, which requires access to specialist equipment. It involves dismantling and reassembly of many small components, measuring clearances precisely, and if necessary adjusting them by the selection shims and spacers. Internal transmission components are also often

difficult to obtain, and in many instances extremely expensive. Because of this, if the transmission develops a fault or becomes noisy, the best course of action is to have the unit overhauled by a specialist repairer, or to obtain an exchange reconditioned unit.

Nevertheless, it is not impossible for the more experienced mechanic to overhaul the transmission, if the special tools are available and the job is carried out in a deliberate step-by-step manner, to ensure that nothing is overlooked.

The tools necessary for an overhaul include internal and external circlip pliers, bearing

pullers, a slide hammer, a set of pin punches, a dial test indicator (dial gauge), and possibly a hydraulic press. In addition, a large, sturdy workbench and a vice will be required.

During dismantling of the transmission, make careful notes of how each component is fitted, to make reassembly easier and accurate.

Before dismantling the transmission, it will help if you have some idea of where the problem lies. Certain problems can be closely related to specific areas in the transmission, which can make component examination and renewal easier. Refer to *Fault finding* at the end of this manual for more information.