



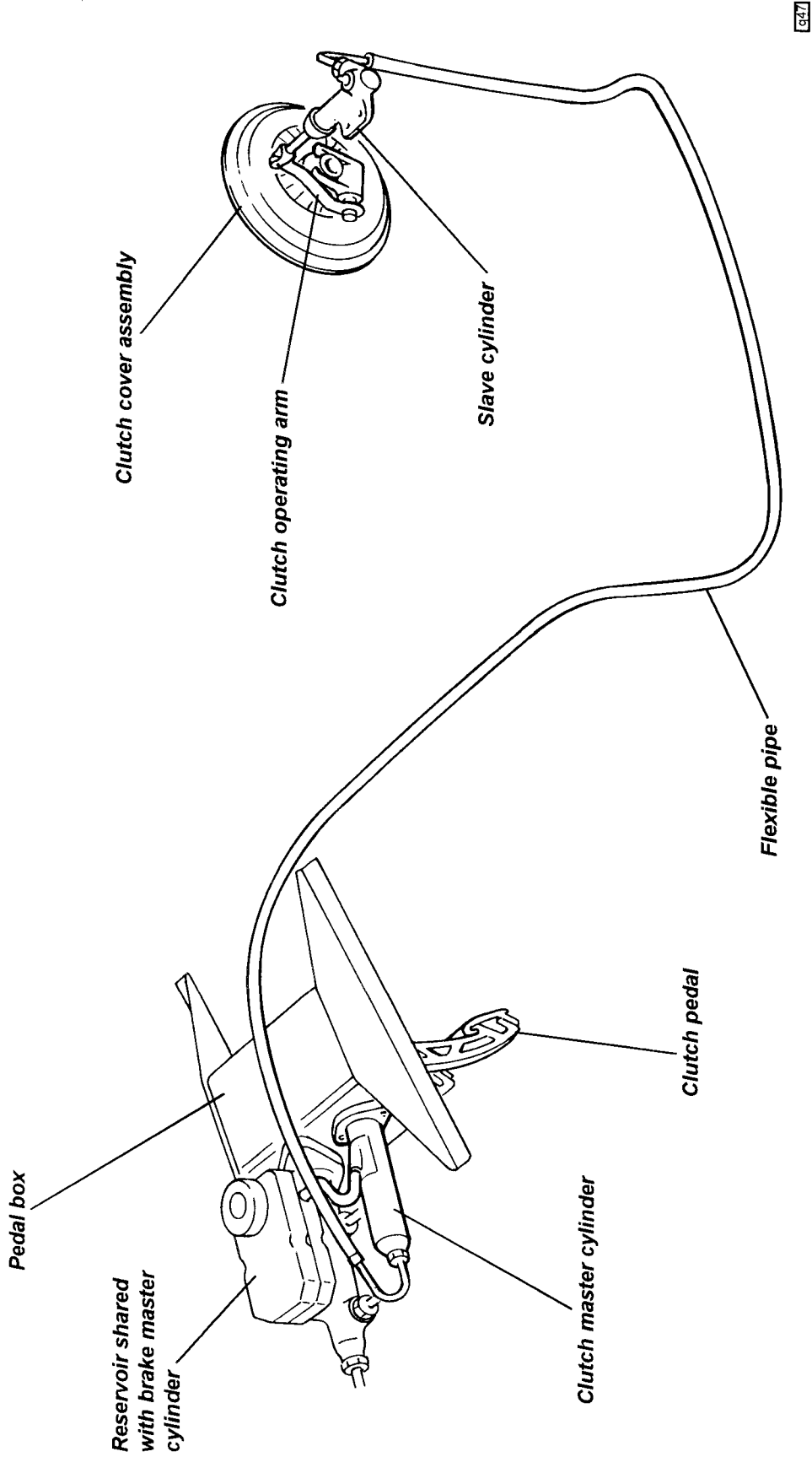
CLUTCH

SECTION QG - ELISE 2001 M.Y. Onwards

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Clutch system general arrangement





QG.1 - GENERAL DESCRIPTION

The driving element of the clutch assembly consists of the rear face of the engine flywheel, and a pressure plate fixed to the flywheel via the spring diaphragm clutch cover assembly. The driven element, is a single, dry, double sided friction plate, splined to the gearbox input shaft, and interposed between the flywheel and pressure plate. The diaphragm spring in the clutch cover clamps the friction plate between the pressure plate and flywheel to provide the drive connection between engine and gearbox. The gearbox input shaft, on which the friction plate is free to slide axially, is 'overhung' from the gearbox, with no spigot bearing in the rear end of the crankshaft.

The hydraulic clutch release mechanism uses a master cylinder fixed to the pedal box, and a slave cylinder mounted on a fabricated steel bracket attached to the transmission case. The master cylinder is connected to the fluid reservoir of the brake master cylinder, and uses a steel braided flexible synthetic pipe routed through the LH sill to connect with the slave cylinder. The slave cylinder operates a release arm which is connected by shaft to the release fork inside the clutch housing. The fork presses the ball type release bearing against the inner ends of the diaphragm spring fingers, which pivot about their fulcrums and relieve the clamping force applied to the pressure plate via the diaphragm outer edge. The release bearing slides on a guide sleeve surrounding the gearbox input shaft. A preload spring inside the slave cylinder applies light pressure to the release lever in order to ensure that contact between the release bearing and diaphragm spring fingers is maintained.

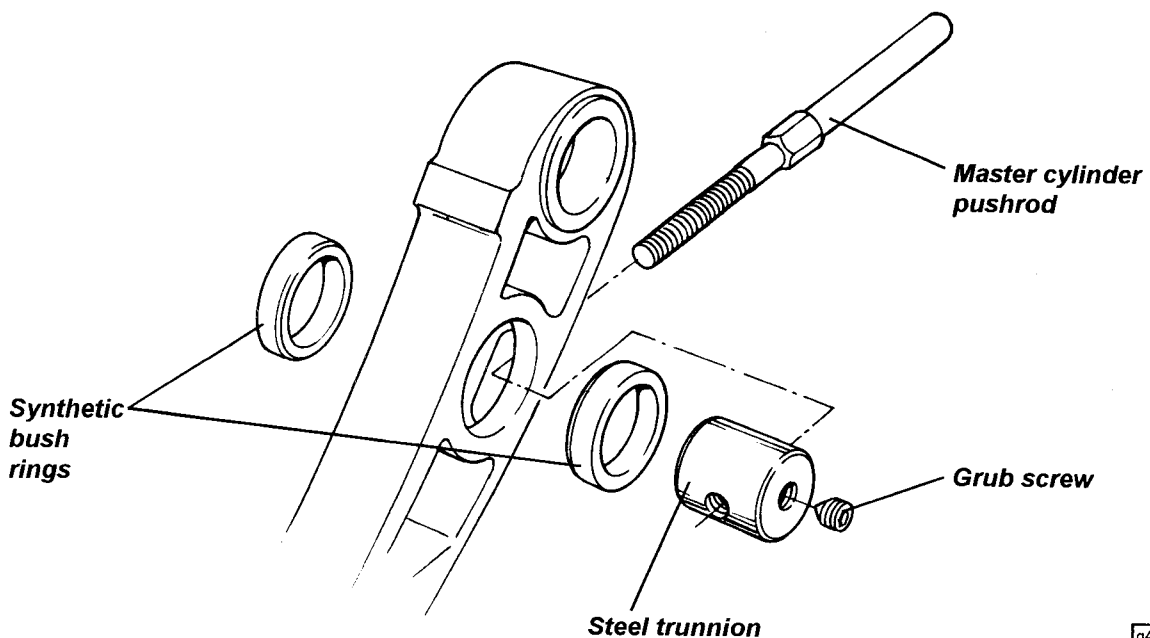
QG.2 - ADJUSTMENT

No routine adjustment of the clutch or release mechanism is required. The clutch slave cylinder is self adjusting, with the 'rest' position of the piston dependent on the thickness, or degree of wear, of the friction plate. As wear of the friction plate takes place, and its thickness is reduced, the slave cylinder piston is pushed progressively further back on the return stroke with fluid being returned to the master cylinder reservoir.

The master cylinder pushrod length requires adjusting only on assembly in order to ensure:

- a) the master cylinder piston is allowed fully to return under the action of its internal spring, and open the port to the fluid reservoir;
- b) maximum effective stroke of the cylinder is achieved.

The effective length of the pushrod can be adjusted by screwing the hexagonal pushrod into or out of the pedal trunnion. Too much preload will not allow the reservoir port to open, whereas too much free play will not allow sufficient fluid displacement and may induce a rattle from the pedal. To check the pushrod adjustment:



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- i) Remove the locking grub screw (3 mm key) in the side of the pedal trunnion, and apply PermaBond A131 to the thread. Refit loosely.
- ii) Screw the pushrod into or out of the trunnion until the pedal just contacts the pedal box flange (upstop).
- iii) Apply ½ turn of preload to the pushrod, and tighten the trunnion lock screw to 5 Nm.

Note that no pedal downstop is fitted, and that the pedal will contact the pedal box before the master cylinder 'bottoms out'.

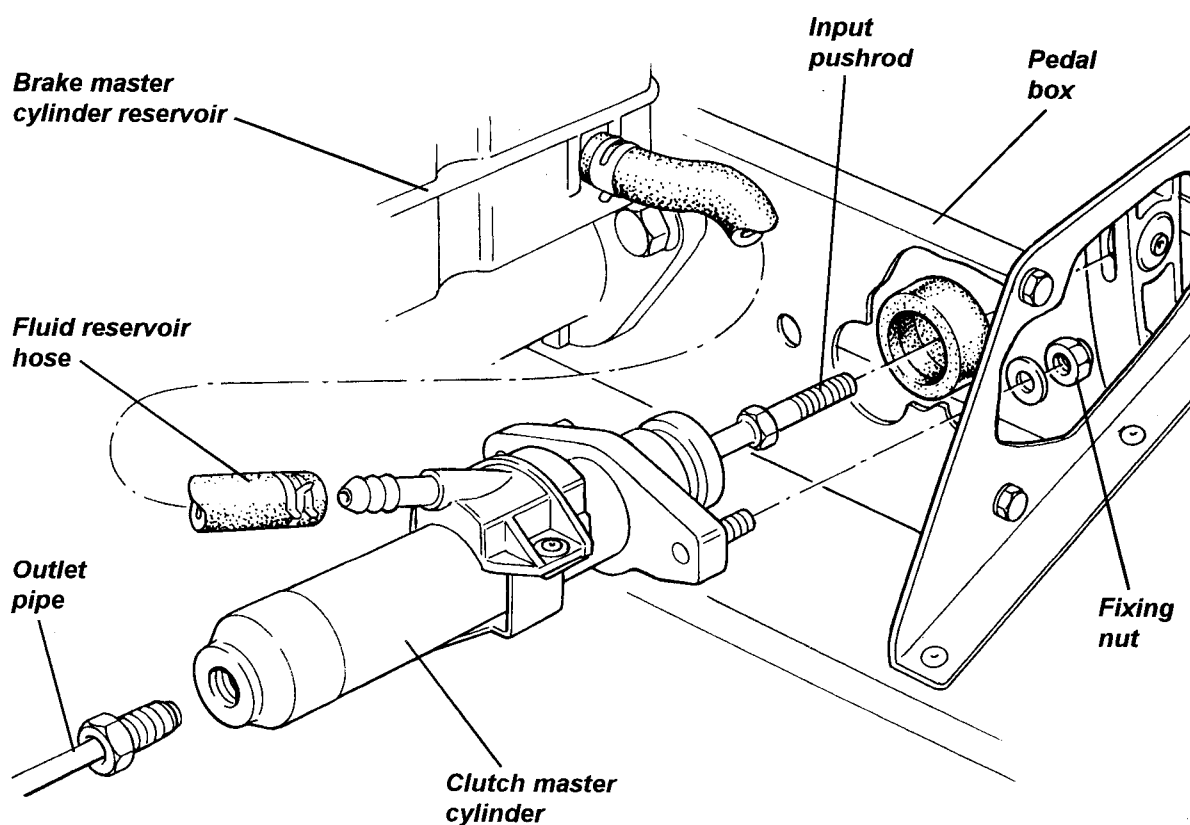
Adjusted as above, full pedal travel should produce a slave cylinder pushrod movement of 13 - 15 mm. If this is not achieved, bleed the hydraulic system using new DOT 4 non-mineral type fluid.

Note that the two synthetic bush rings, used to support the steel trunnion, may be replaced with the pedal 'in-situ', by using a suitable bolt with clamp washers to press the rings into position. Each bush has an outer diameter chamfer at one end to aid insertion.

QG.3 - HYDRAULIC RELEASE SYSTEM

Master Cylinder

The 5/8" (15.9 mm) bore master cylinder is mounted on the pedal box, and is accessible from within the front services compartment. The cylinder is not equipped with its own fluid reservoir, but instead is linked via hose to the adjacent brake fluid reservoir.



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To replace the master cylinder:

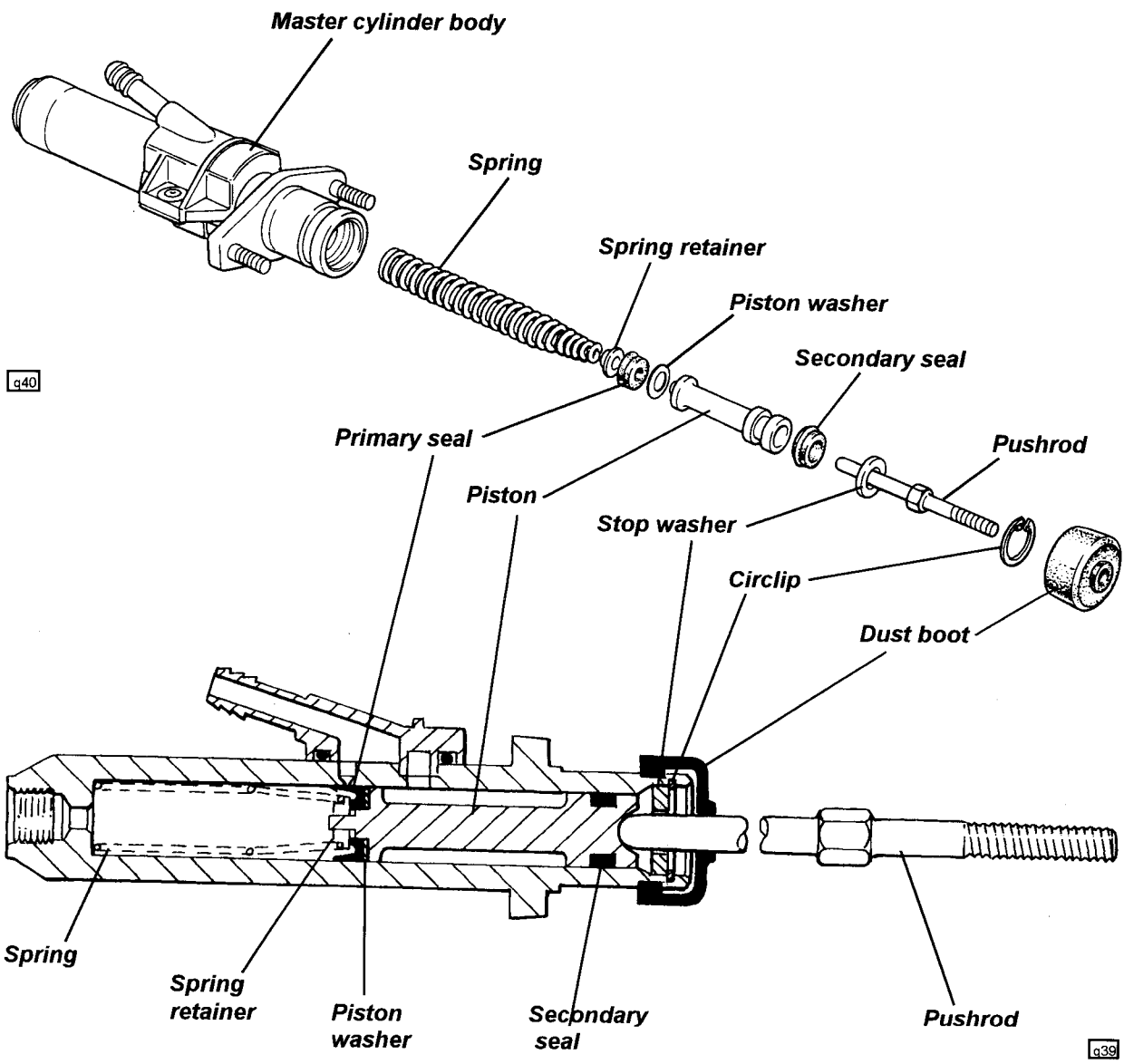
- Clean the master cylinder and surrounding area with methylated spirit. **Do not use petrol or paraffin.**
- Take all necessary precautions to guard against contamination of painted surfaces with brake fluid.
- Disconnect and immediately plug and cap the hose connection to the fluid reservoir, and the output pipe connection.



- From inside the footwell, remove the two bolts securing the cylinder to the pedal box. Withdraw the cylinder from the front services compartment.
- To refit, reverse the removal procedure, taking care to feed the pedal pushrod through the dust boot and into the end of the master cylinder as the cylinder is positioned. Tighten the outlet pipe connection to 20 - 24 Nm and bleed the hydraulic system of air.

To overhaul the master cylinder:

- Clamp the cylinder in a soft jawed vice, and pull the rubber dust boot off the cylinder end.
- Remove the circlip from the end of the cylinder, taking care not to scratch the bore surface. Remove the stop washer and extract the cylinder internal parts. Lay the components in their correct order on a clean sheet of paper.
- Remove the rubber seals from the piston, taking note of the position and orientation of all parts.
- Clean all parts thoroughly with only new brake fluid, and dry with a lint free cloth. Carefully examine the cylinder bore for scoring, corrosion or visible wear, and replace if any such signs are apparent. Check that all drillings in the cylinder body and piston are clear. If the cylinder is serviceable, rebuild the unit using new seals and components from the appropriate overhaul kit.
- Note that the chamfer on the inside diameter of the stop washer should face rearwards (i.e. towards open end of cylinder).

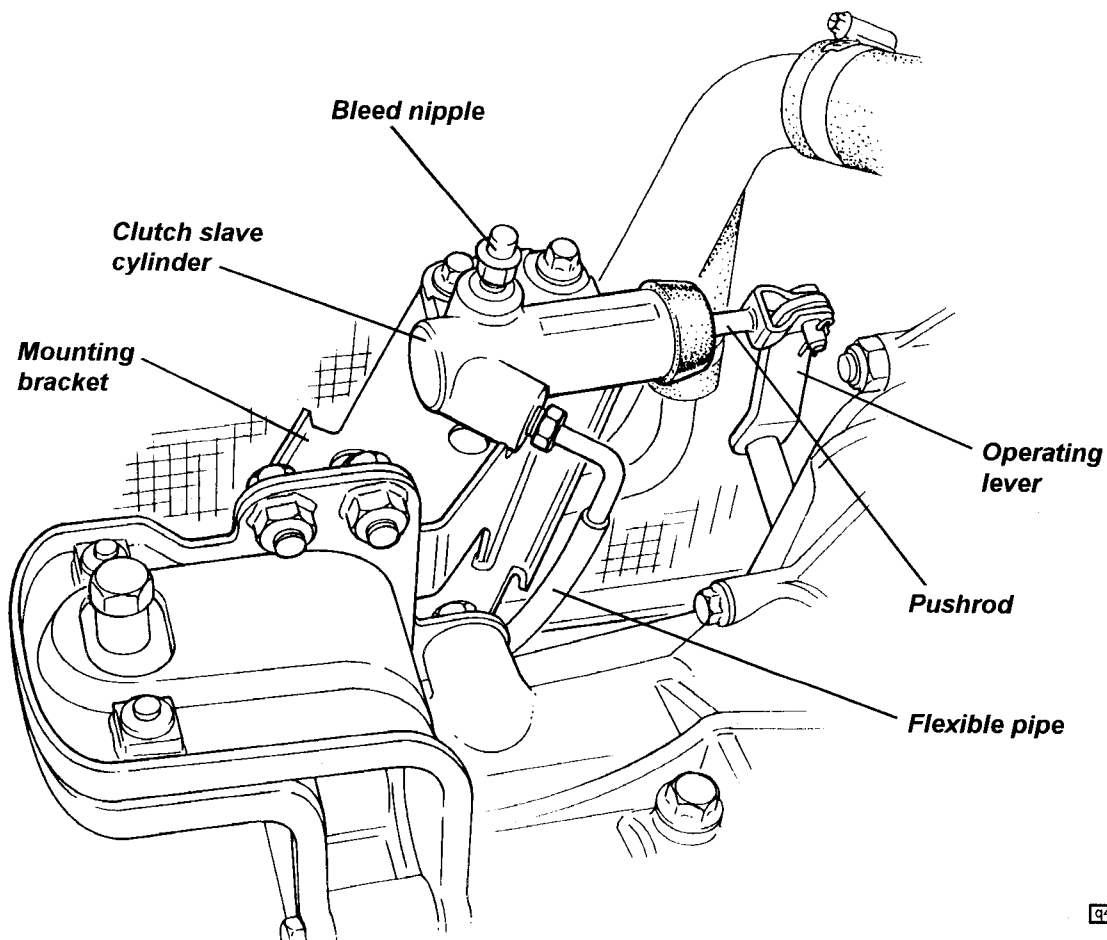




- On reassembly, scrupulous cleanliness is essential. Clean hands thoroughly beforehand.
- Lubricate all seals, the cylinder bore, and all internal components with clean brake fluid.
- Fit the secondary seal into its groove on the piston, with the lip towards the front.
- Fit the piston washer, primary seal and spring retainer onto the front end of the piston, with the lip of the seal facing forwards.
- Insert the spring and piston assembly into the cylinder, taking care not to bend back the seal lips. Fit the stop washer and retain by fitting the circlip into the groove in the rear end of the cylinder bore. Check that the circlip is seated correctly in the groove. Pack the inside of the dust boot with rubber grease and seat the lip of the boot in the groove on the outside of the cylinder body.
- Use a suitable rod to operate the piston by hand several times to check for free movement of the internal parts.
- Refit the cylinder as detailed above.

Slave Cylinder

The slave cylinder is secured by two bolts to a mounting bracket on the transmission, and is connected to the clutch operating lever by a fixed length pushrod and clevis pin. A sleeve nut is used to connect the flexible hydraulic pipe, and a bleed nipple is provided by which to bleed air from the hydraulic system.



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To replace the slave cylinder:

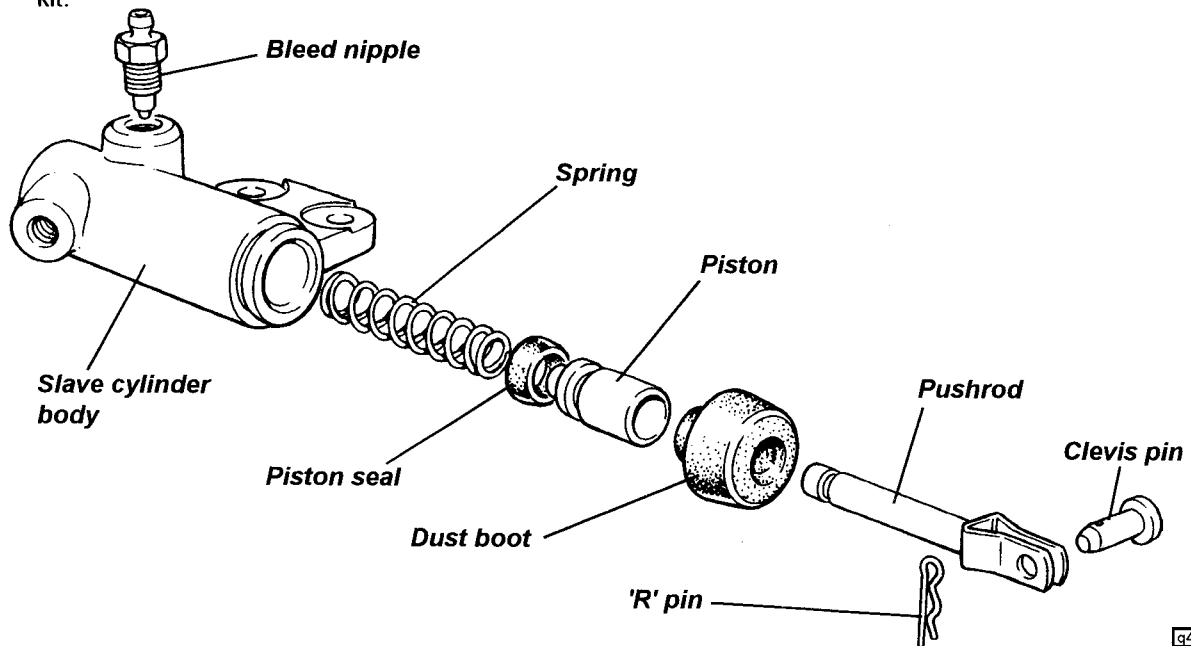
- Clean the slave cylinder and surrounding area with methylated spirit. **Do not use petrol or paraffin.**
- Take all necessary precautions to guard against contamination of painted surfaces with brake fluid.
- Remove the 'R' pin and clevis pin connecting the pushrod to the clutch operating lever.
- Disconnect and immediately plug and cap the hydraulic hose connection.
- Remove the two bolts securing the cylinder to the mounting bracket, and withdraw the cylinder.



- To refit, reverse the removal procedure, tightening the slave cylinder mounting bolts to 25 Nm. Clean and refit the specially coated clevis pin and 'R' pin to connect the pushrod to the release lever and check that the pushrod is correctly centralised in the slave cylinder piston. Tighten the hydraulic pipe connection to 20 - 24 Nm, and bleed the hydraulic system of air in the usual way. Tighten the bleed nipple to 7 Nm.

To overhaul the slave cylinder:

- Clamp the cylinder in a soft jawed vice, and withdraw the pushrod and rubber dust boot from the cylinder.
- Withdraw the piston and spring and remove the rubber seal from the piston, taking note of the orientation.
- Clean all parts thoroughly with only new brake fluid, and dry with a lint free cloth. Carefully examine the cylinder bore for scoring, corrosion or visible wear, and replace if any such signs are apparent. If the cylinder is serviceable, rebuild the unit using new seals and components from the appropriate overhaul kit.



- On reassembly, scrupulous cleanliness is essential. Clean hands thoroughly beforehand.
- Lubricate the seal, the cylinder bore, and all internal components with clean brake fluid.
- Fit the seal into its groove on the piston, with the lip towards the closed end of the cylinder.
- Insert the spring and piston assembly into the cylinder, taking care not to bend back the seal lips.
- Pack the inside of the dust boot with rubber grease and seat the lip of the boot in the groove on the outside of the cylinder body.
- Fit the pushrod through the dust boot and press the piston against its spring several times to check for free movement of the piston.
- Refit the cylinder as detailed above.

Hydraulic Hose

The one piece, steel braided, flexible synthetic hose between master and slave cylinders is routed through the dash baffle panel and along the outside of the left hand chassis sideframe, enclosed within the composite sill panel, and wrapped with foam sleeving to suppress rattles. The hose is common to right and left hand drive, with the surplus length on left hand drive cars being accommodated by routing the hose in a loop in the front of the sill area. Service replacement hoses are supplied with a separate front end 'U' bend to aid assembly of the hose through the sill and baffle panel.

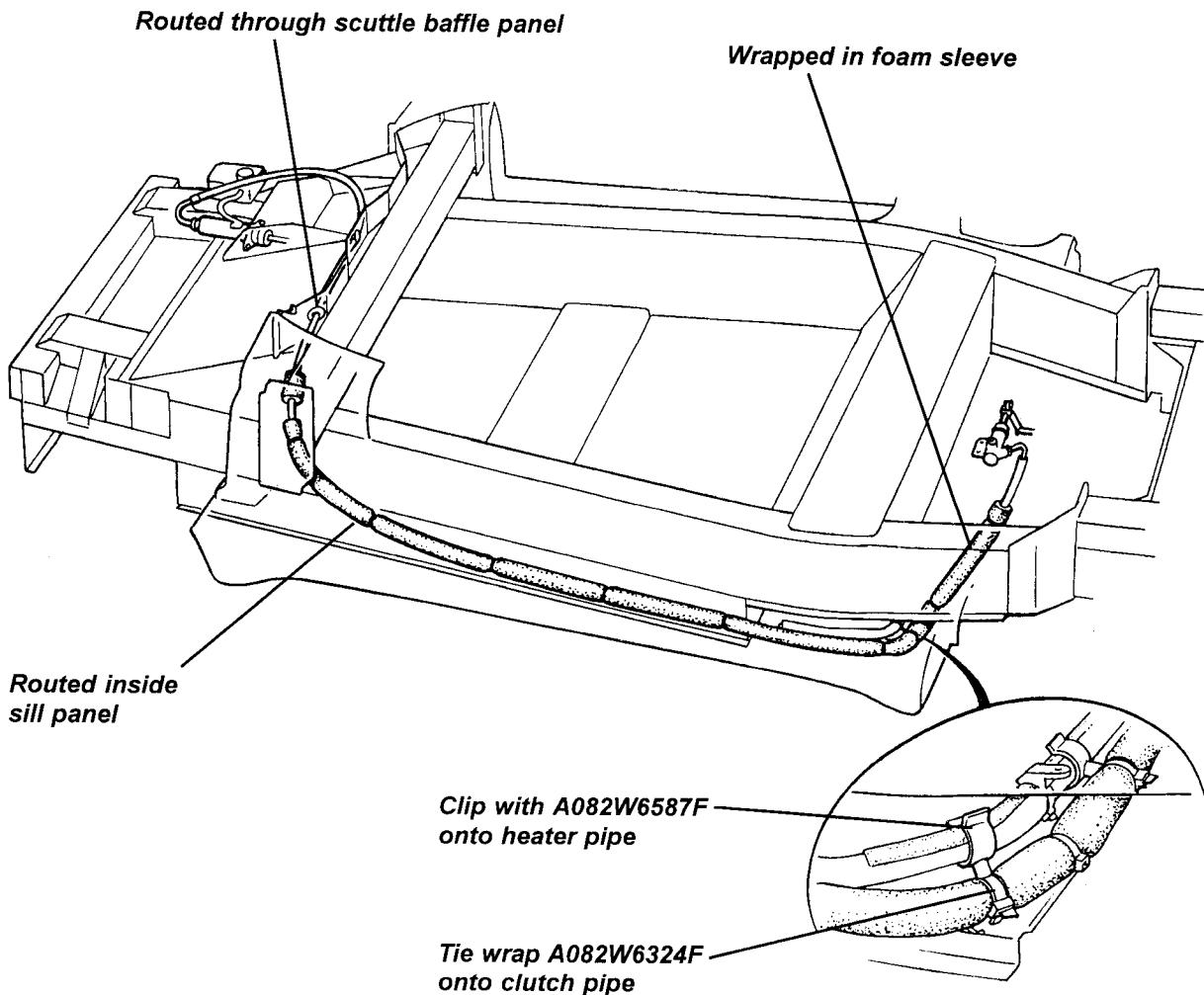
Note that the hose should not be withdrawn from the car without first attaching a guide wire with which to aid routing of the new hose.



Replacing Hydraulic Hose

During this operation, take all appropriate precautions to protect against damage caused by contamination of painted surfaces with hydraulic fluid.

1. For access to the dash baffle, remove the dash panel, fascia left hand end panel, and the left hand sill trim (see Service Notes sub-section BP.13). Remove the engine bay undertray/diffuser panel and the shear panel beneath the fuel tank.
2. Release the clutch hose from the master cylinder and slave cylinder, and immediately cap the cylinder ports to minimise fluid loss and prevent dirt ingress. Drain the hose of fluid, and cap both ends to prevent drips and fluid contamination of painted surfaces.
3. To ease withdrawal of the hose, cut off the 'U' bend from the front end, and securely attach a guide wire.
4. Cut the cable ties securing the hose to the heater pipe clips; 2 at the front end, and 3 at the rear end.
5. Remove the grommet from the scuttle baffle panel, and withdraw the hose towards the rear, leaving the draw wire in its place.



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6. Service replacement hoses are supplied with a detachable front end 'U' bend which should be removed before routing the hose. Check that the anti-rattle lagging is fitted. Attach the hose to the guide wire and draw the new clutch hose into place from the rear.
7. Feed the hose through the baffle panel and fit the grommet. If fitting on a LHD car, loop the hose in the 'A' post area to accommodate the excess length.
8. Fit the 'U' bend pipe to the front end of the hose and connect to the master cylinder, tightening to 20 - 24 Nm. Connect the hose rear end to the slave cylinder and tighten to 20 - 24 Nm.
9. Secure the hose (and aerial co-ax. cable) as previously to the heater pipe, using pipe clips A082W6587F and tie strap clips A082W6324F. Use of these clips ensures that the two lines are separated, in order to minimise heat transmission from the heater pipe to the clutch fluid.
10. Bleed the clutch system of air using conventional techniques, and refit all panels removed for access.

QG4 - CLUTCH ASSEMBLY

The clutch assembly comprises the friction plate, clutch cover assembly (pressure plate/diaphragm spring) and release bearing. For access to the clutch assembly, the transmission must first be removed, with or without the engine 'in situ'. Access is improved if the rear topshell is removed.

Removal of clutch assembly:

With the car supported on a 'wheel free' lift:

1. Remove the LHR lower wishbone:
 - Release the bolt securing the spring/damper unit to the lower wishbone;
 - Release the wishbone to chassis pivot bolts;
 - Release the parking brake cable ties, and swing the wishbone out of the way.
2. Release the RHR suspension toe control link from the hub carrier, and release the top ball joint plinth from the hub carrier taking note of the camber adjustment shimplates in order to allow withdrawal of the driveshaft from the transmission.
3. Release both driveshaft inboard C.V. joints from the transmission using special wedge tool T000T1276 on the RH side, and/or applying a shock pull to the C.V. joint body using a slide hammer with a forked end. Fit blanking plug T000T1014 into the transmission to limit the amount of transmission oil loss.

CAUTION: Do NOT attempt to remove an inboard C.V. joint from the transmission by pulling on the driveshaft. This action will cause the joint to become disassembled and may require replacement of the joint. The components of the inboard plunging joint are held in position, for transit purposes only, by a collar within the boot which will be overridden if excessive axial force is used. Apply pressure only to the 'tulip' or outer body of the joint.

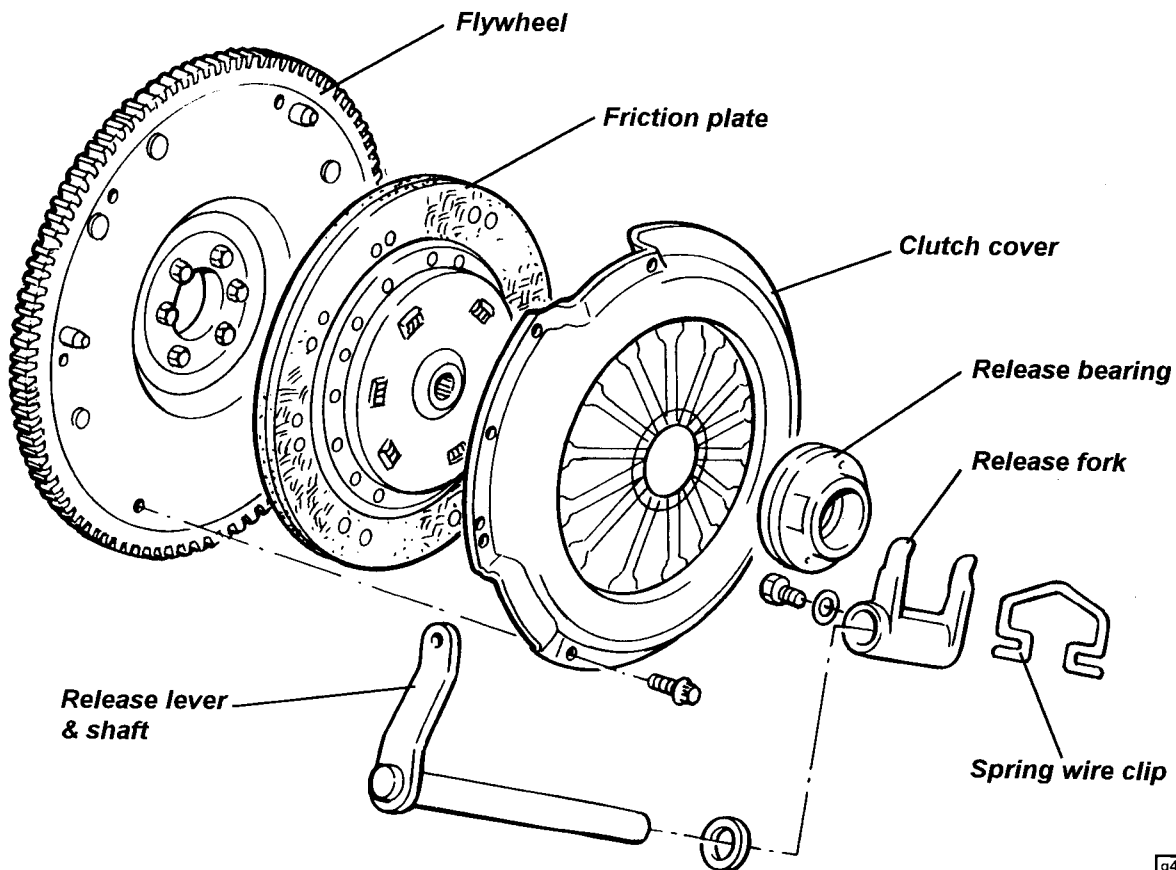
4. Remove the intake hose between air cleaner housing and engine. Pull out the button retaining the housing to the mounting bracket, and withdraw the cleaner housing from its mounting grommets. Release the mounting bracket from the roll over bar strut.
5. Remove the 'R' clip and clevis pin connecting the clutch slave cylinder to the release arm. Remove the four bolts fixing the slave cylinder bracket to the transmission, and support aside.



6. Release the two bolts securing the starter motor and dirt shield to the clutch housing. Remove the shield, and withdraw and support the starter motor, taking care to protect the live starter motor lead from grounding.
7. Remove the dirt shield from the top front of the clutch housing.
8. Disconnect the reverse light switch.
9. Disconnect the two gearchange cables from their transmission levers, and release the cables from the abutment bracket.
10. Support the weight of the transmission assembly before removing the LH engine (transmission) mounting and bracket.
11. Remove the six bolts securing the clutch housing to the engine:
 - 2 bolts to the sump;
 - 1 bolt each side through the block lower 'wings';
 - 2 bolts securing the top of the clutch housing to the engine.
12. Pushing the engine to the right and downwards at the flywheel end, withdraw the transmission from the engine.

Inspection of components:

13. Before removing the clutch cover from the flywheel, place a flat plate over the ends of the diaphragm spring fingers, and use a feeler gauge to measure the any gaps between individual fingers and the plate. If any clearance is greater than 1mm, the clutch cover assembly should be replaced.
14. Progressively loosen, and then remove the six fixings securing the clutch cover to the flywheel. Remove the cover and friction plate.



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- 15. Examine the friction plate for oil contamination, broken cush drive springs, cracking of the spring apertures, or any other damage.

Measure the overall thickness across the friction material;

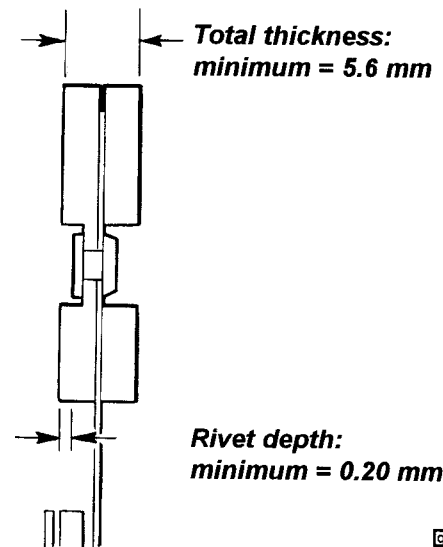
New thickness: 6.9 - 7.4 mm
 Service limit: 5.6 mm

Measure the depth of the rivet heads below the friction material surface;

New rivet depth: 1.0 mm
 Service limit: 0.2 mm

Measure axial run-out of the friction plate surface;

New run-out: 0.8 mm max.
 Service limit: 1.0 mm max.



Renew the plate if any damage is detected, or if outside service limits. If there were symptoms of clutch judder, the friction plate should be replaced as a precaution regardless of inspection results.

- 16. Inspect the surface of the pressure plate for excessive wear or scoring, and replace if in any doubt. If there were symptoms of clutch judder, or the cover is accidentally dropped, the clutch cover assembly should be replaced as a precaution regardless of inspection results.
- 17. Check the surface condition and run-out of the flywheel friction surface (see section ED.14) and replace the flywheel if necessary.
- 18. Withdraw the release bearing and examine for signs of wear, damage or roughness, and replace if in doubt.
- 19. Examine the condition of the clutch release fork, pivot shaft bushes and oil seal (see transmission repair section), and replace components as necessary.

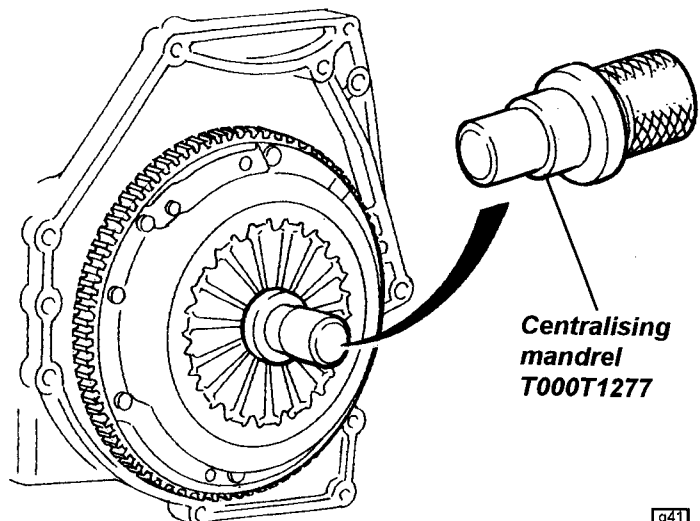
Re-fitment of clutch assembly:

- 20. Smear the splines of the friction plate with molybdenum disulphide grease, and fit against the flywheel with the 'FLYWHEEL SIDE' marking towards the flywheel. Fit the clutch cover over the friction plate and locate on the flywheel dowels.

Two types of centralising tool are available:

Using Centralising Tool T000T1277

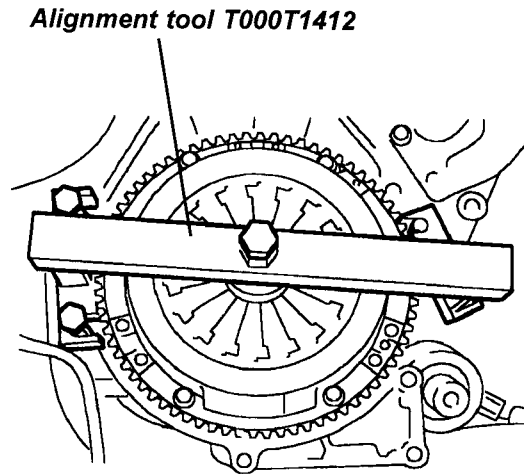
- 21. Fit clutch alignment mandrel T000T1277 to centralise the friction plate, and fit the clutch cover retaining screws finger tight. Using a diagonal sequence, progressively tighten the cover screws, and monitor the free turning of the mandrel. If the diaphragm spring fingers begin to pinch the mandrel, and a drag on its turning is felt, remove the tool. Finally tighten the cover fixing screws to 25 Nm.





Using Alignment Tool T000T1412

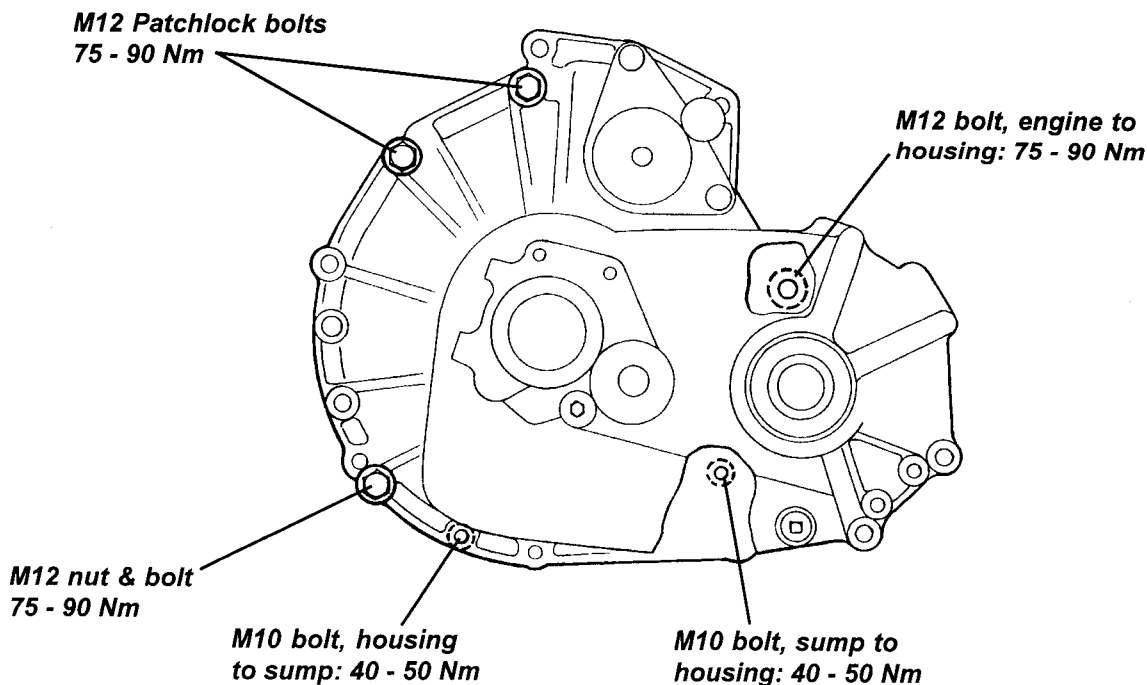
- 21. - Loosely assemble clutch plate and cover onto flywheel dowels and fit but do not tighten cover bolts.
- Unwind tool T000T1412 until 60mm dia. flange touches the body of the clutch tool.
- Secure the clutch tool to the block (as shown) using existing bolts.
- Wind bolt onto clutch cover fingers, ensuring that the hub of the driven plate is engaged.
- Wind in the bolt to compress the clutch fingers until the driven plate is released and can be rotated.
- Tighten the clutch cover bolts in a diametrically opposite sequence to 25 Nm.
- Unwind the bolt to unload the clutch fingers, and then remove the tool.



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- 22. Refit the transmission to the engine, engaging the gearbox input shaft into the friction plate splines, and locating the clutch housing onto the engine mating face dowels.
- 23. Continue re-assembly in the reverse order to disassembly with the following notes:
 - Use new circlips on the spigots of the inboard C.V. joints, and check that the driveshafts are fully inserted into the transmission by pulling on the inboard joint bodies.
 - Use a new 'O' ring on the speedo drive cable, and lubricate on assembly.
 - Renew the two topmost bell housing to engine patchlock bolts, or apply a suitable threadlocking compound if re-using original bolts.
 - Use special tool T000T1390 to protect the output shaft seals during driveshaft refitment; see subsection FH.5.

Engine/Transmission Fixings (viewed onto LH end)



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15. Examine the friction plate for oil contamination, broken cush drive springs, cracking of the spring apertures, or any other damage.

Measure the overall thickness across the friction material;

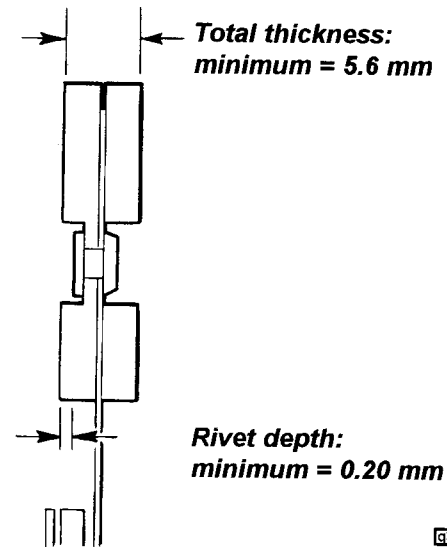
New thickness: 6.9 - 7.4 mm
Service limit: 5.6 mm

Measure the depth of the rivet heads below the friction material surface;

New rivet depth: 1.0 mm
Service limit: 0.2 mm

Measure axial run-out of the friction plate surface;

New run-out: 0.8 mm max.
Service limit: 1.0 mm max.



Renew the plate if any damage is detected, or if outside service limits. If there were symptoms of clutch judder, the friction plate should be replaced as a precaution regardless of inspection results.

16. Inspect the surface of the pressure plate for excessive wear or scoring, and replace if in any doubt. If there were symptoms of clutch judder, or the cover is accidentally dropped, the clutch cover assembly should be replaced as a precaution regardless of inspection results.
17. Check the surface condition and run-out of the flywheel friction surface (see section ED.14) and replace the flywheel if necessary.
18. Withdraw the release bearing and examine for signs of wear, damage or roughness, and replace if in doubt.
19. Examine the condition of the clutch release fork, pivot shaft bushes and oil seal (see transmission repair section), and replace components as necessary.

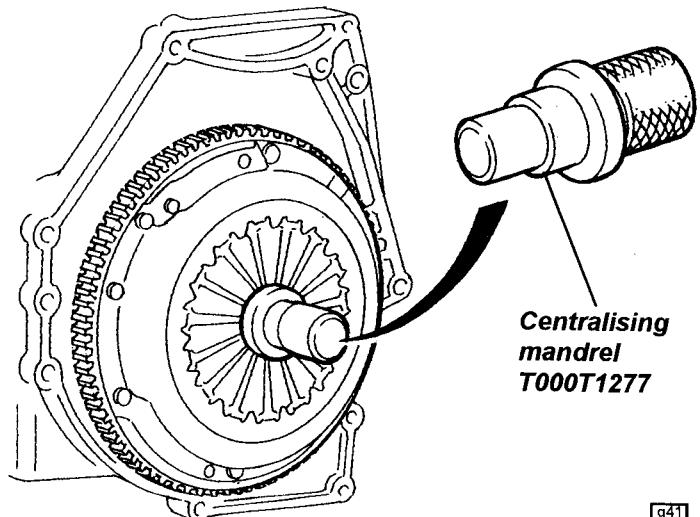
Re-fitment of clutch assembly:

20. Smear the splines of the friction plate with molybdenum disulphide grease, and fit against the flywheel with the 'FLYWHEEL SIDE' marking towards the flywheel. Fit the clutch cover over the friction plate and locate on the flywheel dowels.

Two types of centralising tool are available:

Using Centralising Tool T000T1277

21. Fit clutch alignment mandrel T000T1277 to centralise the friction plate, and fit the clutch cover retaining screws finger tight. Using a diagonal sequence, progressively tighten the cover screws, and monitor the free turning of the mandrel. If the diaphragm spring fingers begin to pinch the mandrel, and a drag on its turning is felt, remove the tool. Finally tighten the cover fixing screws to 25 Nm.



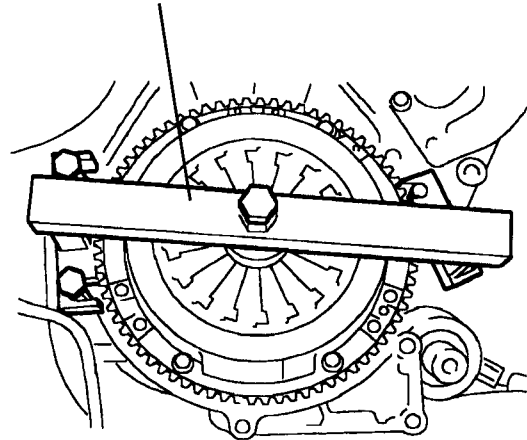
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Using Alignment Tool T000T1412

- 21. - Loosely assemble clutch plate and cover onto flywheel dowels and fit but do not tighten cover bolts.
- Unwind tool T000T1412 until 60mm dia. flange touches the body of the clutch tool.
- Secure the clutch tool to the block (as shown) using existing bolts.
- Wind bolt onto clutch cover fingers, ensuring that the hub of the driven plate is engaged.
- Wind in the bolt to compress the clutch fingers until the driven plate is released and can be rotated.
- Tighten the clutch cover bolts in a diametrically opposite sequence to 25 Nm.
- Unwind the bolt to unload the clutch fingers, and then remove the tool.

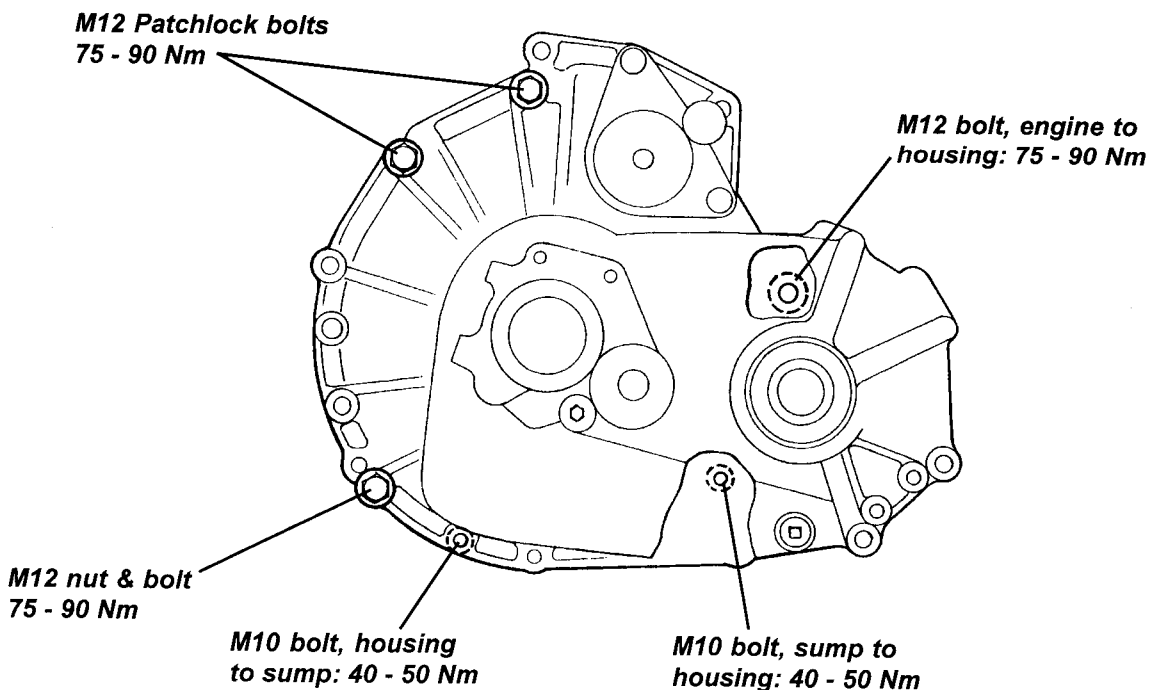
Alignment tool T000T1412



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- 22. Refit the transmission to the engine, engaging the gearbox input shaft into the friction plate splines, and locating the clutch housing onto the engine mating face dowels.
- 23. Continue re-assembly in the reverse order to disassembly with the following notes:
 - Use new circlips on the spigots of the inboard C.V. joints, and check that the driveshafts are fully inserted into the transmission by pulling on the inboard joint bodies.
 - Use a new 'O' ring on the speedo drive cable, and lubricate on assembly.
 - Renew the two topmost bell housing to engine patchlock bolts, or apply a suitable threadlocking compound if re-using original bolts.
 - Use special tool T000T1390 to protect the output shaft seals during driveshaft refitment; see sub-section FH.5.

Engine/Transmission Fixings (viewed onto LH end)



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