

## SPECIFICATIONS

Type .....	Single dry plate
Operation .....	Hydraulic
Pressure plate type .....	Diaphragm spring
Release bearing type .....	Prelubricated ball
Driven plate:	
Hub type .....	Spring cushion
Outside diameter .....	240 mm
Thickness .....	3.5 mm
Rivet head depth limit .....	0.3 mm
Runout limit 115 mm from hub centre .....	0.5 mm
Spline backlash at outside edge of driven plate .....	1.0 mm
Master cylinder:	
Bore diameter .....	15.875 mm
Slave cylinder:	
Bore diameter .....	22.0 mm
Clutch pedal free play (adjustable type) ..	10–15 mm
Clutch pedal height .....	190–200 mm

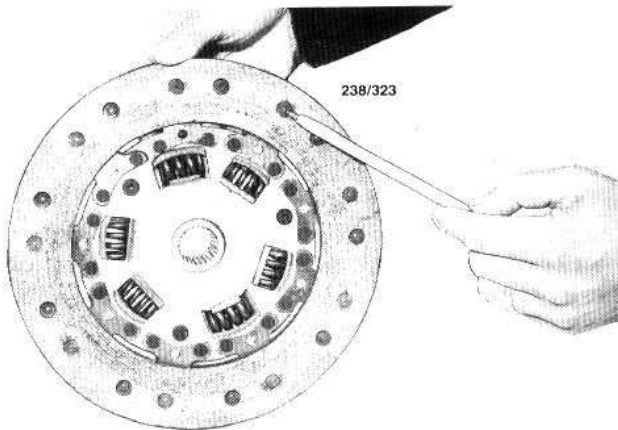
## TORQUE WRENCH SETTINGS

Master cylinder mounting nuts .....	11 Nm
Slave cylinder mounting bolts .....	40 Nm
Pressure plate to flywheel bolts .....	29 Nm
Hydraulic pipe union nuts .....	18 Nm

## 1. CLUTCH TROUBLE SHOOTING

### CLUTCH SLIPPING

- (1) Weak or broken pressure plate diaphragm spring: Check and renew pressure plate assembly.
- (2) Worn driven plate facings: Check and renew clutch driven plate.
- (3) Worn or scored flywheel face: Check and renew flywheel and ring gear.
- (4) Worn or scored pressure plate face: Check and renew pressure plate assembly.



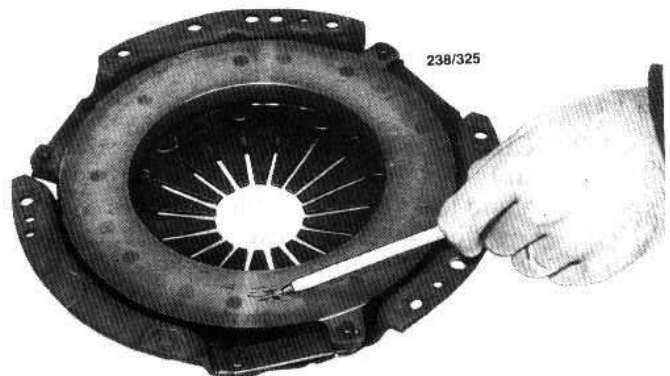
Renew the clutch driven plate if the friction material is worn down to or within 0.3 mm of the rivets.

- (5) Oil on driven plate facings: Check and renew clutch driven plate: Rectify oil leak.
- (6) Insufficient pedal free play: Check and adjust pedal free play.

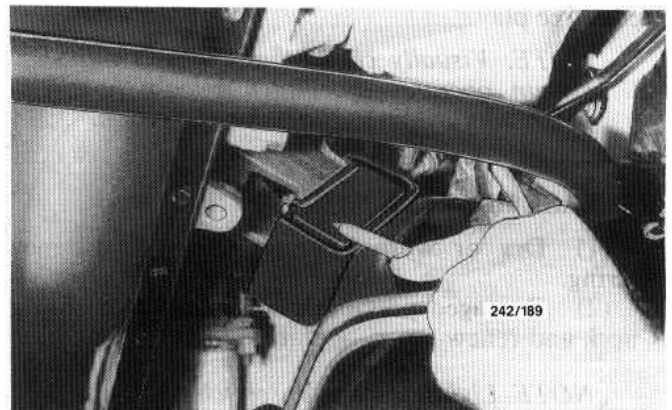
*NOTE: In most cases clutch slippage is first evident by a marked increase in engine revs, for no apparent reason, when pulling up a steep hill. The clutch condition can be positively diagnosed as follows: With the handbrake firmly applied, and with the road wheels chocked, place the transmission in top gear and with the engine revving at approximately 1500 rpm, slowly release the clutch. Clutch slipping is evident if the engine does not stall. Make the test as quickly as possible to prevent any further clutch damage.*

### CLUTCH SHUDDER

- (1) Oil on (gummy) driven plate facings: Check and renew clutch driven plate.
- (2) Scored pressure plate or flywheel face: Renew pressure plate assembly or flywheel and ring gear.



Check the clutch pressure plate for scoring



Check for loose or damaged engine mountings. If the mountings are damaged, renew the mountings as described in the Engine section.

(3) Loose or damaged driven plate hub: Check and renew clutch driven plate.

(4) Loose driven plate facings: Renew clutch driven plate.

(5) Cracked pressure plate face: Renew clutch pressure plate assembly.

*NOTE: Clutch shudder is usually most evident when reversing up an incline. As loose or damaged engine mountings are a cause for clutch shudder, thoroughly check the engine mounting rubbers and mounting hardware for damage or looseness before removing the clutch for inspection.*

### CLUTCH GRAB

(1) Gummy driven plate facings: Renew clutch driven plate.

(2) Cracked pressure plate face: Renew clutch pressure plate assembly.

(3) Loose or broken engine mountings: Check and renew engine mountings as necessary.

(4) Deteriorated slave cylinder piston seal: Check and renew slave cylinder piston seal.

*NOTE: Visually check the operation of the hydraulic system at the clutch release lever before removing the clutch for inspection.*

### INSUFFICIENT CLUTCH RELEASE

(1) Air in hydraulic system: Check the hydraulic system for fluid leaks and bleed the hydraulic system.

(2) Low fluid level in master cylinder reservoir: Top up with clean hydraulic fluid and bleed the hydraulic system.

(3) Leaking master cylinder or slave cylinder piston seals: Check the hydraulic system for fluid leaks and renew piston seals as necessary.

(4) Clutch driven plate warped: Renew clutch driven plate.

(5) Excessive pedal free play: Check and adjust pedal free play.

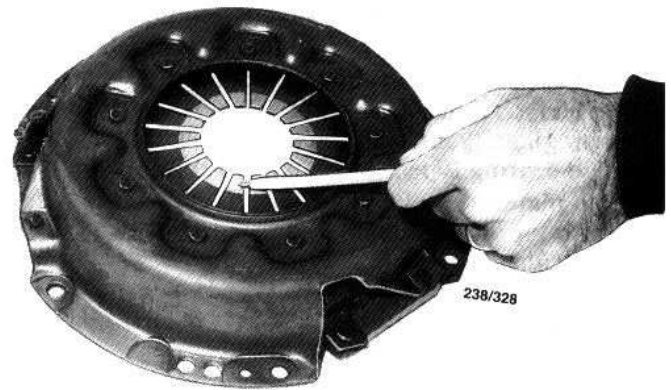
*NOTE: Visually check that the hydraulic system operates the clutch release lever before removing the clutch for inspection.*

### RELEASE BEARING NOISE

(1) Dry or worn bearing: Check and renew bearing.

(2) Damaged pressure plate diaphragm spring: Check and renew pressure plate assembly.

*NOTE: Lightly depress the clutch pedal with the engine running to check for release bearing noise. If the release bearing is faulty and has to be renewed always check the other clutch components.*



**Check the clutch pressure plate diaphragm fingers for scoring or other damage.**

## 2. DESCRIPTION

The clutch consists of a single dry driven plate assembly, splined to slide on the transmission input shaft. A diaphragm type pressure plate assembly is bolted to the engine flywheel.

The driven plate is sandwiched between the pressure plate and flywheel and transmits the drive from the engine to the transmission.

Damper springs are interposed between the hub of the driven plate assembly and the plate friction surfaces in order to cushion the drive.

The release mechanism is activated by the clutch pedal via the clutch master cylinder and clutch slave cylinder. The release mechanism consists of the release lever, release bearing and the diaphragm spring in the pressure plate assembly.

Operation of the clutch pedal moves the release bearing and diaphragm centre towards the flywheel. When the outer edge of the diaphragm deflects, the clutch is caused to disengage.

## 3. CLUTCH UNIT AND RELEASE MECHANISM

### Special Equipment Required:

To Renew Spigot Bush-Suitable extraction tool

To Instal-Clutch aligning tool

### TO REMOVE

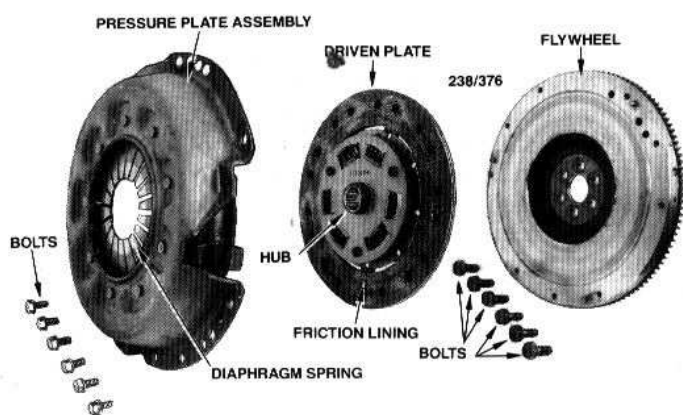
(1) Remove the transmission from the vehicle as described in the Manual Transmission section.

(2) Mark the pressure plate cover in relation to the flywheel so that they may be assembled in the original positions.

(3) Progressively loosen and remove the pressure plate assembly retaining bolts and washers, working in a diagonal sequence across the assembly.

(4) Remove the pressure plate and driven plate from the flywheel.

(5) Remove the rubber dust excluder from the release lever aperture in the side of the clutch housing.



View of the clutch pressure plate assembly, driven plate and flywheel.



Dismantled view of clutch release components.

(6) Withdraw the release bearing and lever from the input shaft bearing retainer and the clutch housing by pulling sharply on the bearing.

(7) Remove the release bearing and carrier from the release lever and separate the bearing assembly and retaining spring.

(8) If necessary remove the pivot bolt retaining spring from the release lever.

#### TO CHECK AND INSPECT

(1) Check the driven plate facings. If the driven plate facings are worn, highly glazed or gummy with oil, renew the driven plate as an assembly. If the driven plate is still serviceable, do not allow any cleaning fluid, oil or grease to contaminate the plate facings.

*NOTE: The driven plate must be renewed*

*when the facings are worn down to or within 0.3 mm of the rivet heads. Should there be any traces of oil on the facings the source has to be investigated and rectified.*

(2) Check the hub of the driven plate for looseness and the cushion springs for wear or breakage.

Instal the driven plate onto the transmission input shaft and measuring at the outer edge of the driven plate ensure that the backlash in the driven plate splines does not exceed Specifications. Check that the runout at 115 mm from the hub centre does not exceed Specifications.

(3) Check the pressure plate assembly for wear on the diaphragm spring fingers, cracked diaphragm spring and cracked or distorted cover. Check that the pressure plate face is not badly scored.

(4) Inspect the flywheel face for heat cracks, burn marks and scoring. Should the flywheel be scored or damaged and cannot be polished with emery paper, the flywheel can be removed and a light cut taken across its face in a lathe.

(5) Check that the transmission input shaft spigot bush in the crankshaft flange is serviceable. If necessary, renew the bush as follows:

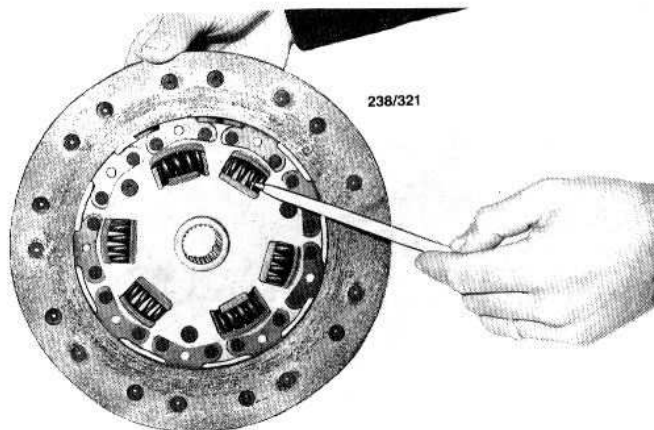
(a) Withdraw the bush using a suitable extractor.

(b) Clean the recess in the crankshaft flange and carefully instal a new bush using a suitable soft punch and hammer.

(6) Check the release lever for cracks, distortion and wear. Check the pivot ball in the clutch housing for wear.

(7) Check the release bearing for noise or roughness. If the bearing is to be renewed, remove the bearing from the carrier. Use a suitable socket or piece of tubing, support the release bearing on its outer edge and tap the carrier out of the bearing. Instal a new bearing so that the thrust face of the bearing is facing away from the lever end of the carrier.

*NOTE: When cleaning the clutch parts do not immerse the release bearing in cleaning*



Check the clutch driven plate hub cushion springs for wear or breakage.



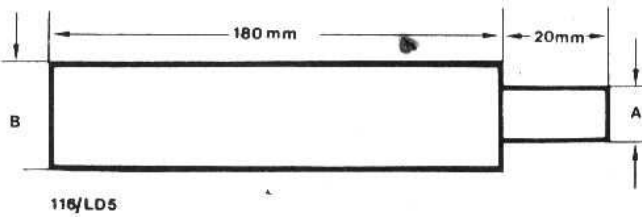


Illustration showing clutch aligning tool. The tool can be readily fabricated from a length of round section wood or metal. Dimension A = diameter of transmission input shaft spigot. Dimension B = inside diameter of driven plate hub.

*fluid. This bearing is lubricated when assembled and requires no further lubrication in service.*

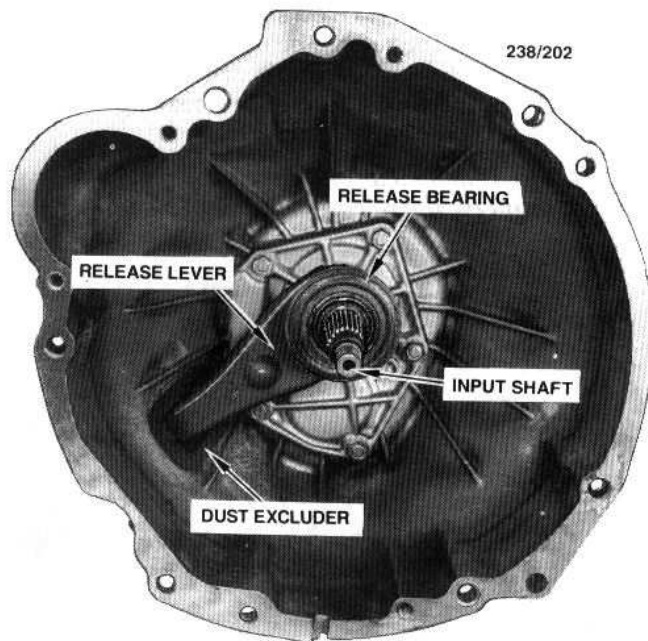
#### TO INSTALL

Installation is a reversal of the removal procedure with attention to the following points:

(1) Sparingly lubricate the splines of the transmission input shaft with molybdenum disulphide grease. Slide the driven plate onto the input shaft withdraw the plate and remove any excess grease from the driven plate hub and the input shaft.

(2) Position the clutch driven plate onto the flywheel with the raised cushion spring section towards the pressure plate.

*NOTE: Some clutch driven plates are marked 'flywheel side' near the hub to assist in installation.*



Installed view of the clutch release mechanism components.

(3) Place the pressure plate assembly over the driven plate and align the marks made on dismantling if the original pressure plate is being used. Install the retaining bolts and washers finger tight.

(4) Using a clutch aligning tool or discarded transmission input shaft, align the centre of the driven plate with the spigot bush in the crankshaft.

(5) Tighten the clutch cover retaining bolts in a diagonal sequence in stages to Specifications. Withdraw the aligning tool or input shaft.

(6) Sparingly lubricate the recess in the release bearing carrier, the pivot bolt groove in the release lever and the carrier ends of the release lever with molybdenum disulphide grease.

(7) Install the release bearing assembly to the release lever and secure the carrier with the retaining spring.

(8) Install the retaining spring to the release lever and install the release lever and the release bearing assembly into position in the clutch housing. Seat the release lever onto the pivot ball.

(9) Install the rubber dust excluder ensuring that it is correctly located in the clutch housing.

(10) Install the transmission assembly. If necessary refer to the Manual Transmission section for the correct procedure.

*NOTE: As the clutch hydraulic system is of the compensating type, no adjustment is provided in service.*

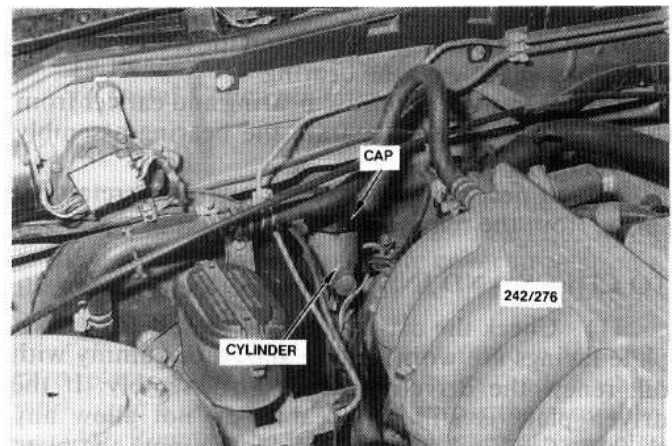
#### 4. MASTER CYLINDER

##### TO REMOVE AND INSTALL

(1) Working inside the vehicle, remove the instrument panel lower cover.

(2) Remove the hairpin clip and clevis pin securing the master cylinder pushrod to the clutch pedal.

(3) Working in the engine compartment, discon-



Installed view of the clutch master cylinder.

nect the hydraulic pipe at the union on the master cylinder and plug the pipe to prevent dirt entering the hydraulic system.

(4) Remove the mounting nuts and remove the master cylinder from the vehicle.

*NOTE: Care should be exercised when removing or installing the master cylinder assembly to ensure that hydraulic fluid is not permitted to drop onto the surrounding paintwork of the vehicle. Hydraulic fluid, if accidentally spilt, should be immediately washed away with water and then allowed to dry naturally and not wiped with a cloth.*

Installation is a reversal of the removal procedure with attention to the following points:

(1) Bleed the clutch hydraulic system as described under Hydraulic System.

(2) Check the clutch pedal height and free play as described under the Clutch Pedal heading.

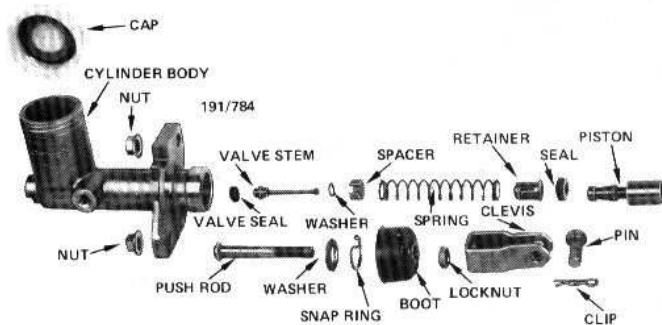
#### TO DISMANTLE

(1) With the master cylinder removed from the vehicle, take off the filler cap and empty the fluid from the reservoir.

(2) Pull the rubber dust boot off the open end of the cylinder, remove the retaining snap ring and withdraw the pushrod and retaining washer.

(3) Withdraw the piston, valve and spring as an assembly from the cylinder bore.

(4) Prise up the tab on the spring retainer and detach the retainer, spring and valve assembly from the forward end of the piston.



Dismantled view of the clutch master cylinder.

(5) Compress the spring, detach the end of the valve stem from the slot in the retainer and separate the two components.

(6) Remove the spring from the valve stem, slide the valve spacer and waved washer off the valve stem and remove the valve seal.

(7) Remove the piston seal over the spigot end of the piston.

(8) Where necessary, remove the rubber dust boot from the pushrod and discard all rubber parts.

#### TO CLEAN AND INSPECT

(1) Thoroughly clean the master cylinder components and the inside of the master cylinder bore with methylated spirits. Do not use petrol or other mineral spirits.

(2) Check the inside of the cylinder bore for wear, corrosion and/or pitting. If necessary renew the master cylinder as an assembly.

(3) Check the piston for wear and the rubber dust boot for deterioration. Check the return spring tension.

(4) Check that the breather hole in the reservoir filler cap is free of dirt.

(5) Remove any sediment that may have accumulated in the bottom of the reservoir.

#### TO ASSEMBLE

Assembly is a reversal of the dismantling procedure with attention to the following points:

(1) Liberally lubricate all master cylinder components with clean hydraulic fluid.

(2) Instal a new seal on the piston with the lip of the seal facing towards the spigot end of the piston. Ensure that the seal is seating correctly in the groove in the piston.

(3) Place the waved washer on the valve stem so that the convex side contacts the shoulder of the stem flange.

(4) Instal the valve seal on the valve stem so that the lip of the seal faces the closed end of the cylinder bore.

(5) Slide the valve spacer on the valve stem to abut the washer, with the legs of the spacer over the valve seal.

(6) Position the spring on the valve stem assembly, place the spring retainer in the other end of the spring, compress the spring to locate the knob end of the valve stem in the slot in the retainer.

(7) Insert the spigot end of the piston in the spring retainer and secure it in position with the retainer tab located behind the front shoulder on the piston.

(8) Dip the piston and valve assembly in clean hydraulic fluid and insert the assembly in the bore of the master cylinder, valve end first. Push the piston assembly into the cylinder bore until the end of the piston is below the end of the cylinder bore and hold the assembly in this position.

*NOTE: When inserting the piston assembly into the cylinder bore take care that the piston seal is not turned back or damaged.*

(9) Insert the ball end of the pushrod to hold the piston assembly against the pressure of the return spring, position the retaining washer and instal the snap ring in the groove in the end of the cylinder to secure the assembly. Ensure that the snap ring is correctly seated in its groove.

(10) Draw the rubber dust boot over the end of the pushrod and position the large end of the boot over the end of the master cylinder. Ensure that it is seating correctly.

(11) Pour a small quantity of clean hydraulic fluid into the master cylinder reservoir, instal the reservoir filler cap and pump the master cylinder pushrod until the fluid begins to emerge from the cylinder outlet.

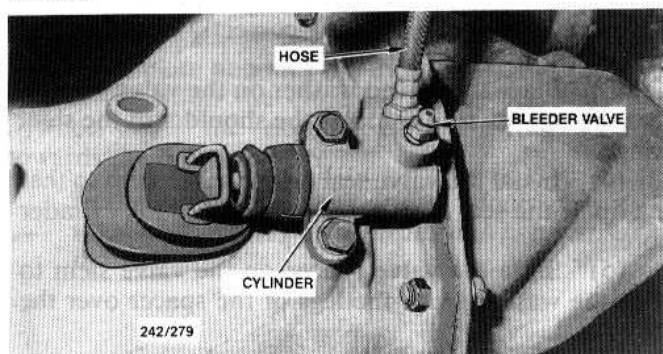
(12) Instal the master cylinder as previously described.

## 5. SLAVE CYLINDER

### TO REMOVE AND INSTAL

(1) Raise the front of the vehicle and support it on chassis stands.

(2) Position a suitable drain tin under the slave cylinder to collect spilt fluid, disconnect the hydraulic pipe from the flexible hose at the mounting bracket and remove the retaining clip from the flexible hose. Plug the pipe to prevent the loss of fluid and the entry of dirt.



Installed view of the clutch slave cylinder.

(3) Disconnect the flexible hose from the mounting bracket and remove the flexible hose from the slave cylinder.

(4) Remove the slave cylinder retaining bolts and remove the slave cylinder from the vehicle.

Installation is a reversal of the removal procedure with attention to the following points:

(1) Tighten the slave cylinder retaining bolts securely.

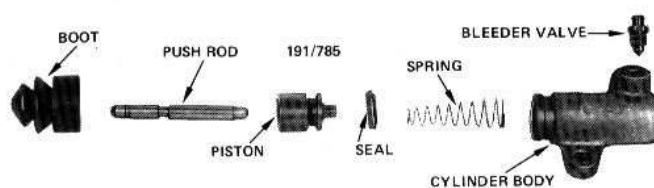
(2) Instal the flexible hose to the slave cylinder aperture from which it was removed.

(3) Bleed the clutch hydraulic system as described under the heading Hydraulic System.

*NOTE: The design of the clutch release mechanism is such that no return spring is required.*

### TO DISMANTLE

(1) With the slave cylinder removed from the vehicle, draw back the rubber boot and withdraw the pushrod from the slave cylinder.



Dismantled view of the clutch slave cylinder.

(2) Apply a low air pressure to the hydraulic hose aperture in the closed end of the cylinder and remove the piston, seal and spring from the cylinder bore.

(3) Remove the piston seal by easing the seat out of the groove and off the small end of the piston.

(4) If necessary, unscrew and remove the bleeder valve.

### TO CLEAN AND INSPECT

(1) Clean all parts in methylated spirits. Do not use petrol or mineral solvents for this purpose.

(2) Check the bore of the cylinder for wear, scoring, corrosion and/or pitting and hone or renew as required.

(3) Check the piston for wear, scoring and pitting and renew as required.

(4) Check the piston spring for tension.

(5) Discard the piston seal and rubber boot.

### TO ASSEMBLE

(1) Dip a new piston seal in clean hydraulic fluid and instal the seal to the piston. Ease the seal into the groove on the piston so that the lip of the seal faces the spigot end of the piston. Ensure that the seal is correctly seated in the groove.

(2) Where removed, screw the bleeder valve into the slave cylinder but do not tighten past finger tight.

(3) Lubricate the cylinder bore with clean hydraulic fluid and instal the piston spring and the piston and seal assembly into the cylinder bore with the spigot end of the piston facing into the closed end of the cylinder. Ensure that the piston seal is not turned back or damaged.

(4) Instal the rubber boot and piston pushrod to the open end of the slave cylinder and seat the rubber boot into the groove on the outer periphery of the cylinder body.

(5) Instal the slave cylinder and bleed the hydraulic system as described under the Hydraulic System heading.

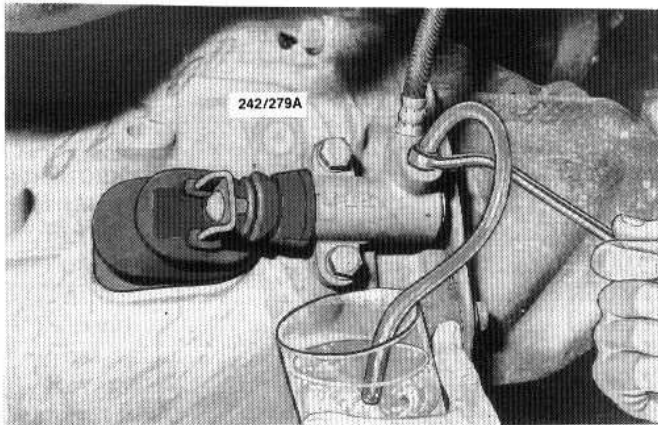
## 6. HYDRAULIC SYSTEM

### TO BLEED

(1) Clean around the master cylinder reservoir cap, remove the cap and fill the fluid reservoir with clean hydraulic fluid to the level mark on the reservoir.

(2) Attach a bleeder tube to the bleeder valve on





**Bleeding the clutch hydraulic system at the slave cylinder.**

the slave cylinder. Immerse the other end of the tube in a glass container partially filled with hydraulic fluid.

(3) Open the bleeder valve slightly and pump the clutch pedal slowly by hand until fluid free of air bubbles emerges from the open end of the bleeder tube.

*NOTE: During the above operation, it is important to allow the clutch pedal to return slowly to avoid drawing air into the system, and to maintain the fluid level to at least halfway in the fluid reservoir.*

(4) Close the bleeder valve and remove the bleeder tube.

(5) Top up the hydraulic fluid to the level mark on the reservoir.

## 7. CLUTCH PEDAL

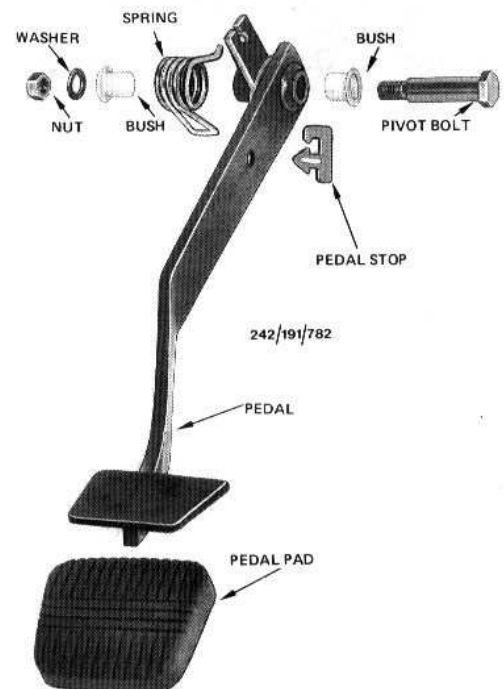
### TO REMOVE AND INSTAL

- (1) Remove the instrument panel lower cover.
- (2) Remove the hairpin clip from the clutch pedal clevis pin, remove the clevis pin and disconnect the clutch pedal from the clutch master cylinder pushrod clevis.
- (3) Loosen the locknut on the clutch pedal stop bolt or the clutch switch on models with cruise control and fully release the stop bolt or switch by screwing it away from the clutch pedal.
- (4) Remove the retaining nut and washer from the clutch pedal pivot bolt.
- (5) Push the clutch pedal upwards to release the spring tension and withdraw the pivot bolt from the clutch pedal bracket.
- (6) While taking note of the clutch pedal spring position, lower the clutch pedal and the spring from the clutch pedal bracket.
- (7) Remove the pivot bolt bushes from the clutch pedal boss and check the bushes, the pivot bolt and the pedal boss for wear and damage. Renew components as necessary.

Installation is a reversal of the removal procedure with attention to the following points:

- (1) Instal the pivot bolt bushes to the clutch pedal boss and lightly apply high melting point grease to the bushes and the pivot bolt.
- (2) Instal the clutch pedal spring to the clutch pedal as noted during removal.
- (3) Enter the clutch pedal and spring assembly into the clutch pedal bracket and while pushing against the spring pressure align the clutch pedal boss with the pivot bolt holes in the clutch pedal bracket, then instal the pivot bolt, spring washer and nut.

*NOTE: Ensure that the head of the pivot bolt located in between the two lugs on the clutch pedal bracket before finally tightening the pivot bolt retaining nut.*



**Dismantled view of the clutch pedal and associated components.**

- (4) Instal the clevis pin and the hairpin clip and adjust the clutch pedal height and free play as described under the following headings.

### TO ADJUST CLUTCH PEDAL HEIGHT

- (1) Remove the instrument panel lower cover, if applicable.
- (2) Draw back the floor carpeting and the insulation material.
- (3) Measure the distance (at right angles) from the floor to the top face of the pedal pad. Note the measurement obtained and compare with Specifications.
- (4) If necessary correct the clutch pedal height

by loosening the clutch pedal stop bolt locknut and rotating the stop bolt in or out as required.

*NOTE: It may be necessary to loosen the clutch master cylinder pushrod locknut and to adjust the length of the pushrod to gain adequate clearance.*

*On vehicles equipped with cruise control, the clutch switch is used instead of the stop bolt in the above adjustment.*

(5) Tighten the stop bolt locknut and adjust the clutch pedal free play as described under the following heading.

#### TO ADJUST CLUTCH PEDAL FREE PLAY

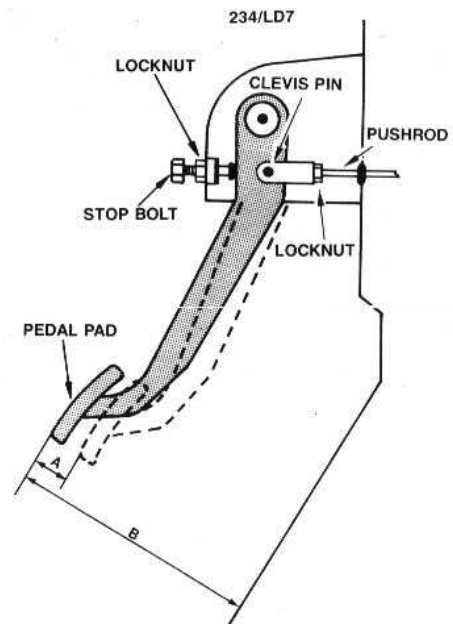
(1) If applicable, remove the instrument panel lower cover.

(2) Ensure that the clutch pedal height is correct as previously described.

(3) Check the clutch pedal free play and compare with Specifications.

(4) If necessary correct the clutch pedal free play by loosening the locknut on the clutch master cylinder pushrod and rotating the pushrod to achieve the specified free play.

(5) Tighten the locknut securely and instal the instrument panel lower cover.



**Line drawing showing clutch pedal height and freeplay measuring and adjusting points. Dimension A = clutch pedal freeplay. Dimension B = clutch pedal height. Note that the clutch pedal height should be measured with the carpet and the insulation material removed.**



## SPECIFICATIONS

Model .....	FS5W71C
Type .....	5 speed synchromesh
Synchromesh .....	On all forward gears
Gear ratios:	
Fifth .....	0.838:1
Fourth .....	1.000:1
Third .....	1.308:1
Second .....	1.902:1
First .....	3.321:1
Reverse .....	3.382:1
Gear end float:	
Reverse idler .....	0.05–0.50 mm
Fifth .....	0.32–0.39 mm
Second and third .....	0.11–0.21 mm
First .....	0.31–0.41 mm
Synchroniser ring to gear clearance:	
Standard —	
First and second .....	1.00–1.60 mm
Third and input shaft .....	1.20–1.60 mm
Fifth .....	1.00–1.40 mm
Wear limit —	
Except fifth .....	0.8 mm
Fifth .....	0.5 mm
Transmission snap ring availability:	
Input shaft bearing .....	1.73–2.08 mm in increments of 0.7 mm
Mainshaft front .....	2.40–2.60 mm in increments of 0.10 mm
Mainshaft rear bearing .....	1.10–1.40 mm in increments of 0.10 mm
Layshaft drive gear .....	1.40–1.60 mm in increments of 0.10 mm
Layshaft front bearing shim requirements:	
Clearance —	
4.52–4.71 mm .....	nil
4.42–4.51 mm .....	0.1 mm shim
4.32–4.41 mm .....	0.2 mm shim
4.22–4.31 mm .....	0.3 mm shim
4.12–4.21 mm .....	0.4 mm shim
4.02–4.11 mm .....	0.5 mm shim
3.92–4.01 mm .....	0.6 mm shim

## TORQUE WRENCH SETTINGS

Reverse lamp switch .....	29 Nm
Selector housing bolts .....	18 Nm
Speedometer driven gear housing .....	5 Nm
Selector return spring plugs .....	29 Nm
Reverse check sleeve bolts .....	5 Nm
Extension housing to carrier plate .....	20 Nm
Bearing retainer to carrier plate .....	25 Nm
Drain and level plugs .....	34 Nm
Front bearing retainer .....	21 Nm
Detent and interlock plugs .....	25 Nm
Mainshaft nut .....	167 Nm
Layshaft nut .....	127 Nm
Propeller shaft rear flange coupling bolts .....	44 Nm

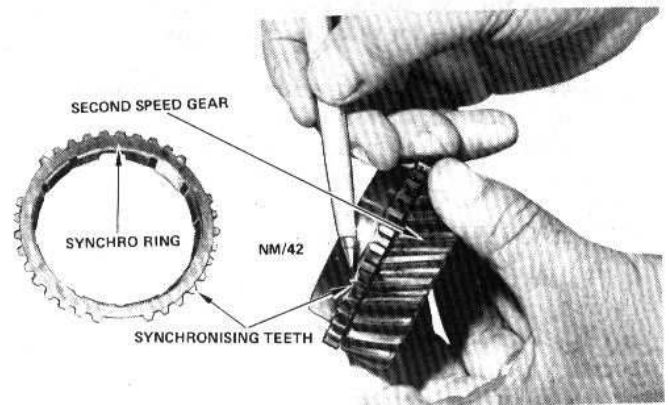
Clutch housing retaining bolts:

60 and 65 mm long bolts .....	49 Nm
25 mm short bolts .....	39 Nm
Transmission crossmember to underbody ...	54 Nm

## 1. TRANSMISSION TROUBLE SHOOTING

### DIFFICULT GEAR CHANGE

- (1) Faulty clutch or clutch release mechanism: Check and overhaul clutch or release mechanism.
- (2) Worn selector mechanism: Check and renew faulty components in selector mechanism:
- (3) Faulty gear synchroniser mechanism: Overhaul transmission assembly.



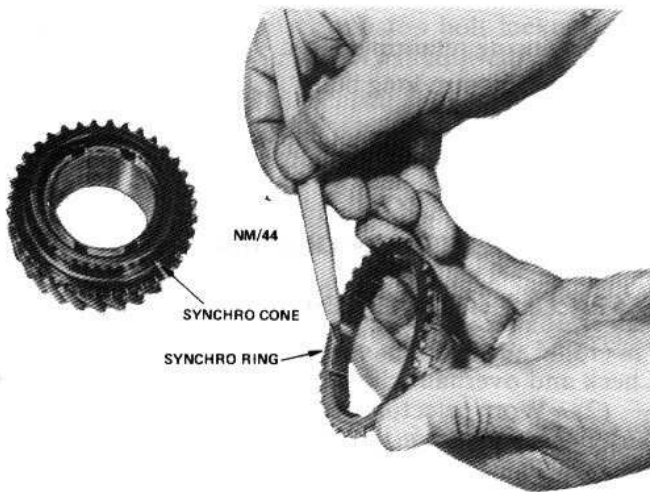
**Check the synchronising teeth on the gears and synchro rings for chipping and wear.**

*NOTE: First check the clutch for correct operation. If reverse gear can be selected without any sign of gear clash this is a fairly good indication that the clutch is functioning normally. Also check that the correct type and viscosity oil is used in the transmission as this can also cause difficult gear changing.*

### GEAR CLASH ON CHANGING DOWN

- (1) Faulty clutch or clutch release mechanism: Check and overhaul clutch or release mechanism.
- (2) Faulty synchro rings and cones: Check and overhaul transmission, renew components as required.
- (3) Broken or incorrect positioning of synchro shift plate springs: Check and overhaul transmission, renew components as necessary.
- (4) Lubricating oil too heavy: Drain transmission housing and refill with correct grade and quantity of oil.

*NOTE: Here again check the clutch for correct operation as previously outlined be-*



**Check the friction surface of the synchro rings and cones for wear and damage.**

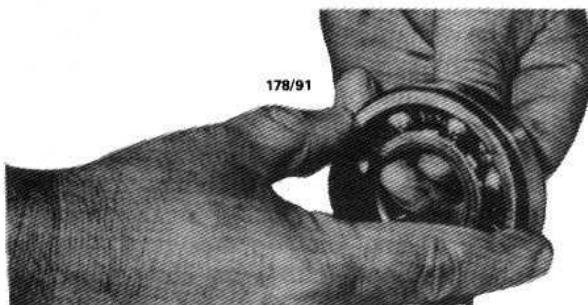
*fore removing the transmission for dismantling and inspection. Also check that the correct type of transmission oil is being used.*

#### SLIPPING OUT OF GEAR

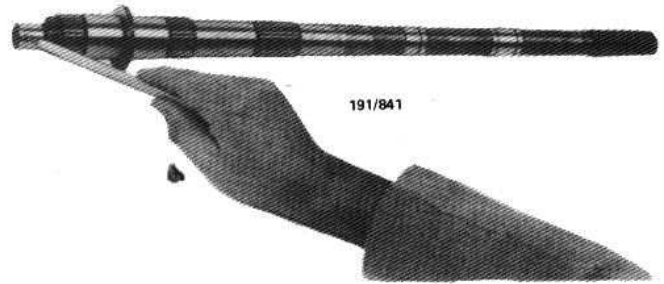
- (1) Weak or broken detent springs: Renew detent springs.
- (2) Worn detent balls: Renew components as necessary.
- (3) Worn or chipped synchro teeth: Check and overhaul transmission, renew components as required.
- (4) Worn transmission front or rear bearings. Check and renew worn bearings.
- (5) Worn shift selector mechanism: Check and renew faulty components.

#### TRANSMISSION NOISE (IN NEUTRAL)

- (1) Worn transmission front bearing: Overhaul transmission and renew bearing.
- (2) Chipped or pitted constant mesh gears (layshaft front drive gear or 1st, 2nd, 3rd or 5th speed mainshaft gears): Overhaul transmission and renew components as necessary.



**Wash the bearings thoroughly in cleaning solvent, lightly oil and turn slowly by hand to check for roughness.**



**Check the mainshaft spigot for pitting.**

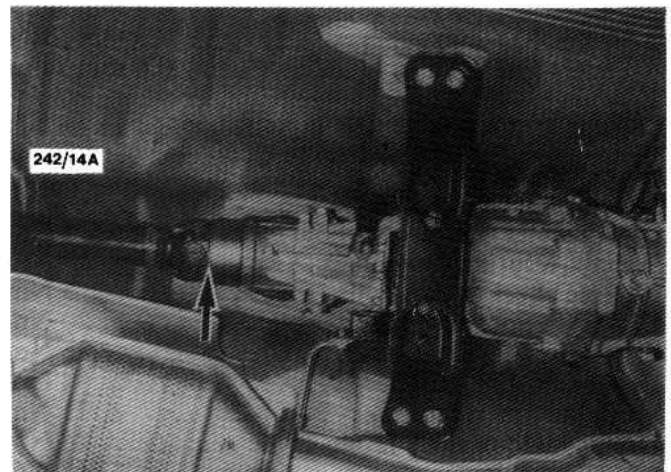
- (3) Excessive layshaft end float: Check and renew worn layshaft bearings.
- (4) Insufficient lubricant: Fill the transmission with the correct quantity and grade of lubricant.
- (5) Worn mainshaft spigot bearing: Renew mainshaft spigot bearing and check all other transmission bearings.

*NOTE: First check the lubricant level in the transmission. Transmission front bearing or layshaft bearing noise can be isolated by depressing the clutch and placing the transmission in any gear.*

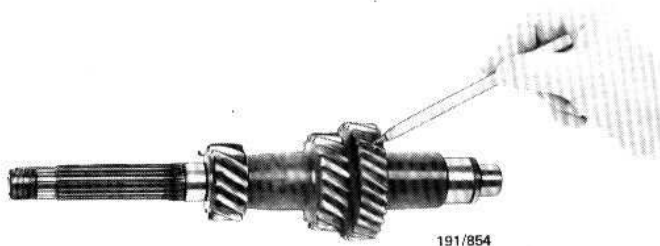
#### TRANSMISSION NOISE (FORWARD GEARS ENGAGED, VEHICLE MOVING)

- (1) Worn front and/or rear bearings: Overhaul transmission and renew bearings.
- (2) Chipped or pitted constant mesh gears (layshaft front drive gear or 1st, 2nd, 3rd or 5th speed mainshaft gears): Overhaul transmission and renew components as necessary.
- (3) Excessive layshaft end float: Check and renew worn layshaft bearings.
- (4) Insufficient lubricant: Fill the transmission with the correct quantity and grade of lubricant.

*NOTE: Check oil level in transmission before dismantling transmission.*



**Check the transmission rear oil seal as a likely source of oil leakage.**



Check the teeth on all gears for wear and damage.

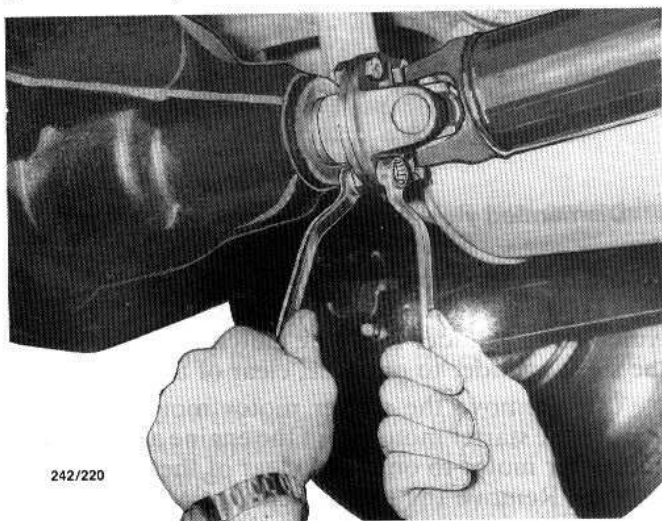
## 2. PROPELLER SHAFT TROUBLE SHOOTING

### PROPELLER SHAFT VIBRATION

(1) Propeller shafts bent or out of balance: Balance or renew propeller shafts as an assembly.

(2) Excessive wear in universal joint trunnion and bearings: Renew complete universal joint (trunnion and bearings).

(3) Worn constant velocity assembly: Renew joint assembly.



Checking the universal joint flange bolts and nuts for tightness.

(4) Excessive wear of front joint sleeve in rear extension housing: Renew extension housing and sleeve.

(5) Rear universal joint flange to pinion flange bolts loose: Renew and tighten loose flange bolts.

(6) Worn centre bearing or insulator: Renew worn components.

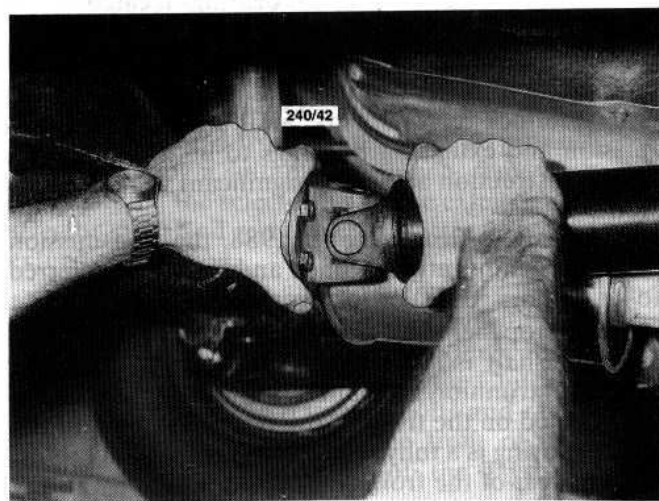
*NOTE: First check that all coupling bolts and nuts are tight. Check universal joints for wear by manual manipulation. It will be necessary to use a dial indicator gauge or pointer if propeller shaft runout is suspected. Check that the propeller shaft is still carrying its balance weights.*

### EXCESSIVE PROPELLER SHAFT BACKLASH

(1) Worn universal joint trunnion and bearings: Renew joint trunnion and bearings as an assembly.

(2) Worn mainshaft and universal joint sleeve: Renew worn components.

*NOTE: Check the universal joints and universal joint splined sleeve for wear by manipulation with the transmission in neutral and with the rear of the vehicle clear of the floor so that the rear road wheels are free to turn.*



Checking the universal joint for wear by manual manipulation.

## 3. DESCRIPTION

Nissan Skyline vehicles are equipped with an FS5W71C, five speed transmission incorporating synchromesh on all forward gears, which are helical cut and run in constant mesh with the layshaft gears. The reverse driven gear is a spur gear cut into the outer surface of the fifth speed synchroniser sleeve.

The first, second, third and fifth speed driven gears rotate on needle roller bearings on the mainshaft and the reverse idler gear rotates on a needle roller bearing on the reverse idler shaft. Forward gear selection is achieved by coupling the required gear to a synchroniser assembly using the internal splines of the synchroniser sleeve which mesh with the synchronising teeth of the required gear.

Synchronisation is achieved when the synchroniser rings engage the cones on the side of the gear, bringing the gear and the synchroniser assembly to the same speed, providing quiet engagement.

Reverse gear selection is achieved by sliding the fifth speed synchroniser sleeve into mesh with the reverse idler gear.

The gearshift has an interlock plunger located between the selector shafts to prevent the selection of two gears simultaneously.



The selector shafts are held by spring loaded detent balls to maintain gear engagement and this load must be overcome before the shafts can be moved to select or disengage a gear.

The transmission input shaft rotates in a ball bearing located in the front of the transmission housing and is supported at the front end by a bush in the rear of the engine crankshaft.

The mainshaft rotates in ball bearings located in the carrier plate and the extension housing with a needle roller bearing, located in the rear of the input shaft, supporting the front of the shaft.

The layshaft rotates in ball bearings located in the transmission housing and carrier plate.

The carrier plate in addition to providing rigidity and strength to the assembly also houses the detent and interlock components and allows the transmission and extension housings to be of aluminium alloy construction achieving significant weight reductions.

On models from October 1988, the transmission has been significantly modified and should be referred to an authorised dealer for overhaul.

The propeller shaft is of a two piece open design. The rear shaft is connected at the rear by a needle roller and trunnion type universal joint.

Located on the front of the rear shaft, behind the centre bearing is a fully sealed constant velocity joint.

The rear of the front shaft is supported by a fully sealed ball bearing, mounted in rubber, which is attached to the vehicle floor panel.

The universal joints, constant velocity joint and centre bearing assembly are specially lubricated and sealed at manufacture and require no disassembly for maintenance or lubrication during the normal service life.

#### 4. TRANSMISSION ASSEMBLY

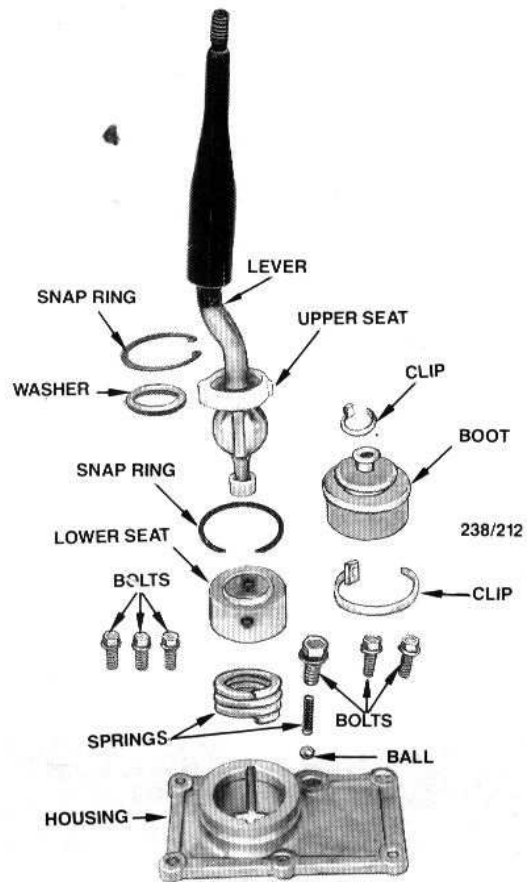
##### Special Equipment Required:

To Dismantle and Assemble — Press and suitable press plates, puller set

To Measure Layshaft Bearing Protrusion — Vernier caliper

##### TO REMOVE AND INSTAL

- (1) Disconnect the negative battery terminal.
- (2) Remove the centre console as described in the Body section of this manual.
- (3) Release the retaining clips and slide the gear lever boot up the gear lever, exposing the pivot components.
- (4) Remove the snap ring retaining the gear lever to the selector housing and lift the gear lever out of the selector housing.
- (5) Raise the vehicle and support it on chassis stands.
- (6) Disconnect the speed sensor and reverse lamp switch wiring from the transmission. Secure the wiring to one side, clear of the work area.



Dismantled view of the gear lever components.

Secure the wiring to one side, clear of the work area.

(7) Remove the retaining bolts and remove the clutch slave cylinder from the clutch housing. Secure the slave cylinder to one side, clear of the work area.

(8) Remove the starter motor mounting bolts, remove the starter motor from the engine and position the starter motor to one side, clear of the engine.

(9) Remove the clutch housing lower retaining bolts and remove the cover from the lower front of the clutch housing.

(10) Remove the drain plug and drain the transmission lubricant into a clean drain tin. Note any metal or foreign particles in the lubricant to assist in locating worn components if the transmission is to be dismantled.

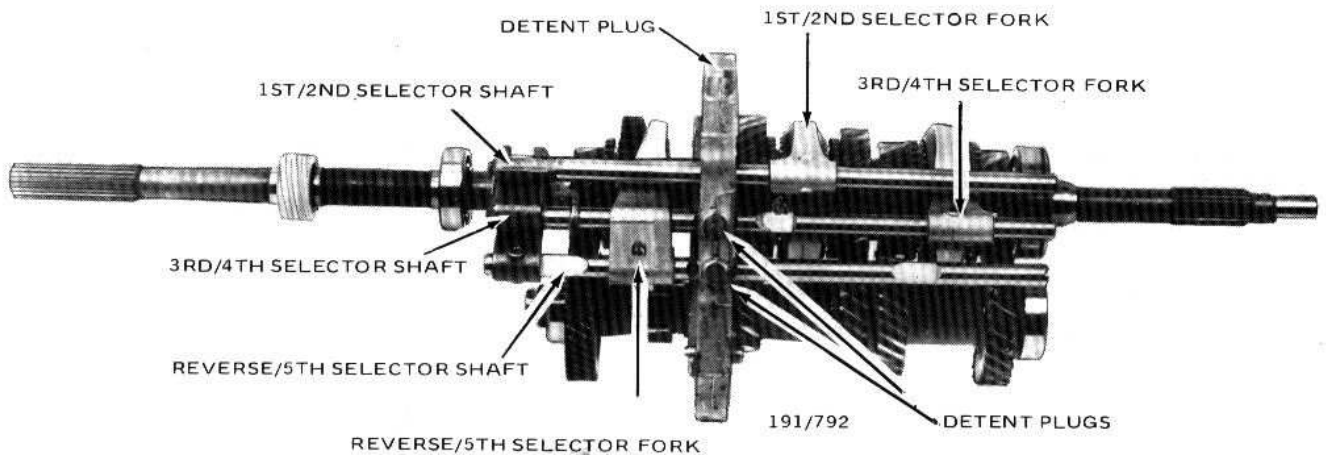
(11) Suitably mark the rear universal joint flange and the differential pinion flange to ensure replacement to the original position and remove the coupling bolts from the flange.

(12) Remove the centre bearing mounting bolts and slide the propeller shaft assembly out of the transmission.

(13) Position a jack and a suitable timber block under the rear of the engine sump to support the rear of the engine.

(14) Position a trolley jack under the trans-





**View of the transmission with the extension housing and transmission housing removed.**

from the carrier plate. Note the lengths of the various springs to aid assembly.

(16) Using a suitable pin punch, remove the roll pins retaining the selector forks to the selector shafts.

(17) Slide the selector shafts out of the selector forks and the carrier plate and remove the interlock balls and plunger from the carrier plate as access is gained with the removal of each selector shaft.

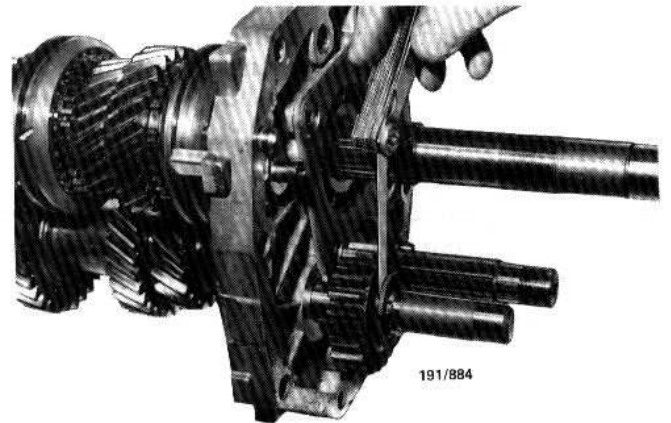
(18) Using a feeler gauge, measure the end float of the first, second, third, fifth and reverse idler gears. Note the measurements. If the end float of any gear is not as specified at the front of this section, it will be necessary to renew the components required to restore the end float to Specifications.

(19) Engage reverse gear and second gear.

(20) Using a suitable puller, remove the layshaft front bearing.

(21) Using suitable snap ring pliers, remove the snap ring from the front of the layshaft. Remove the collar, conical spring and sub-gear from the front of the layshaft.

(22) Using a suitable puller, remove the layshaft drive gear. As the layshaft drive gear is removed, support and remove the input shaft, fourth gear synchroniser ring and the needle roller bearing.

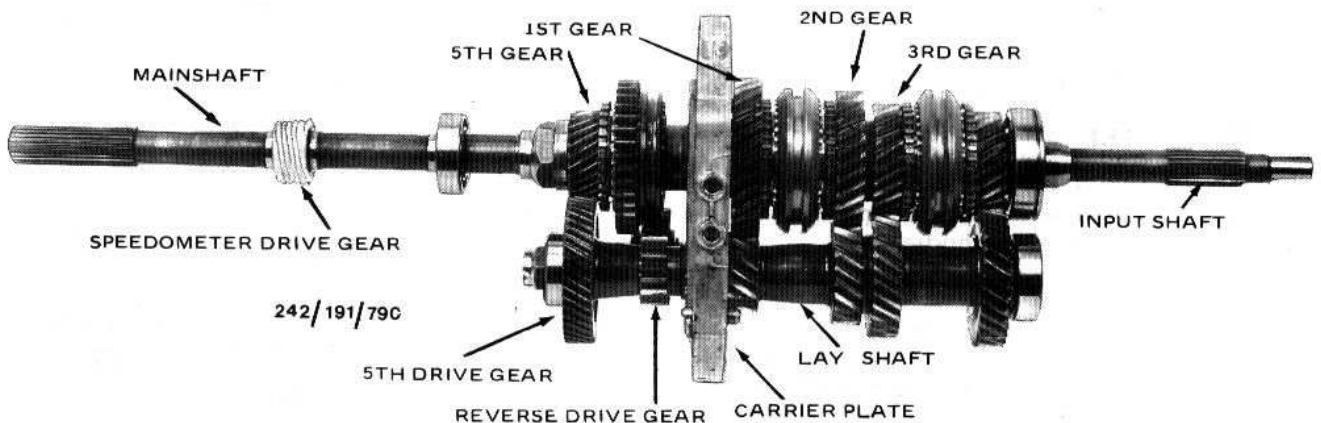


**Measuring the reverse idler gear end float.**

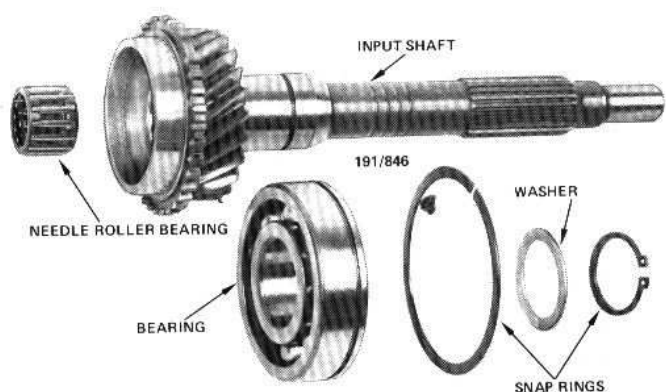
(23) Carefully remove the layshaft drive gear keys from the layshaft. The keys are stepped to facilitate removal.

(24) Using suitable snap ring pliers, remove the snap ring from the front of the mainshaft. Remove the washer adjacent to the snap ring.

(25) Remove the third/fourth synchroniser assembly and the third gear from the front of the mainshaft, using a suitable puller, if necessary.



**View of the transmission with the extension housing, transmission housing and selectors removed.**



**Dismantled view of the input shaft components.**

(26) Remove the third gear needle roller bearing from the mainshaft.

(27) Using suitable snap ring pliers, remove the snap ring retaining the speedometer drive gear to the rear of the mainshaft.

(28) Remove the speedometer drive gear, the steel ball and the speedometer drive gear front snap ring from the mainshaft.

(29) Using suitable snap ring pliers, remove the rear mainshaft bearing rear snap ring.

(30) Using a suitable puller, remove the rear mainshaft bearing and using suitable snap ring pliers, remove the bearing front snap ring.

(31) Using a drill with a diameter equal to the

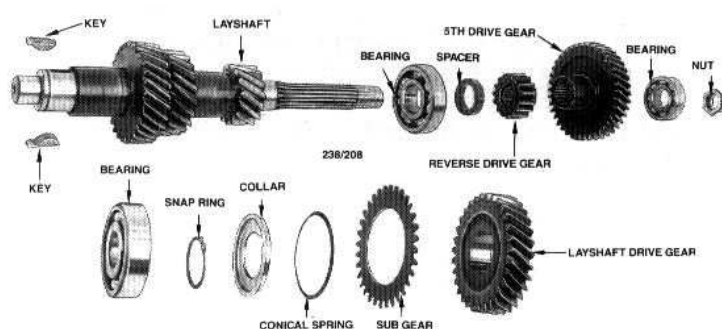
width of the slots in the mainshaft and the layshaft, drill out the staking on the mainshaft and the layshaft nuts.

(32) Loosen and remove the mainshaft and the layshaft nuts noting that the mainshaft nut has a left hand thread.

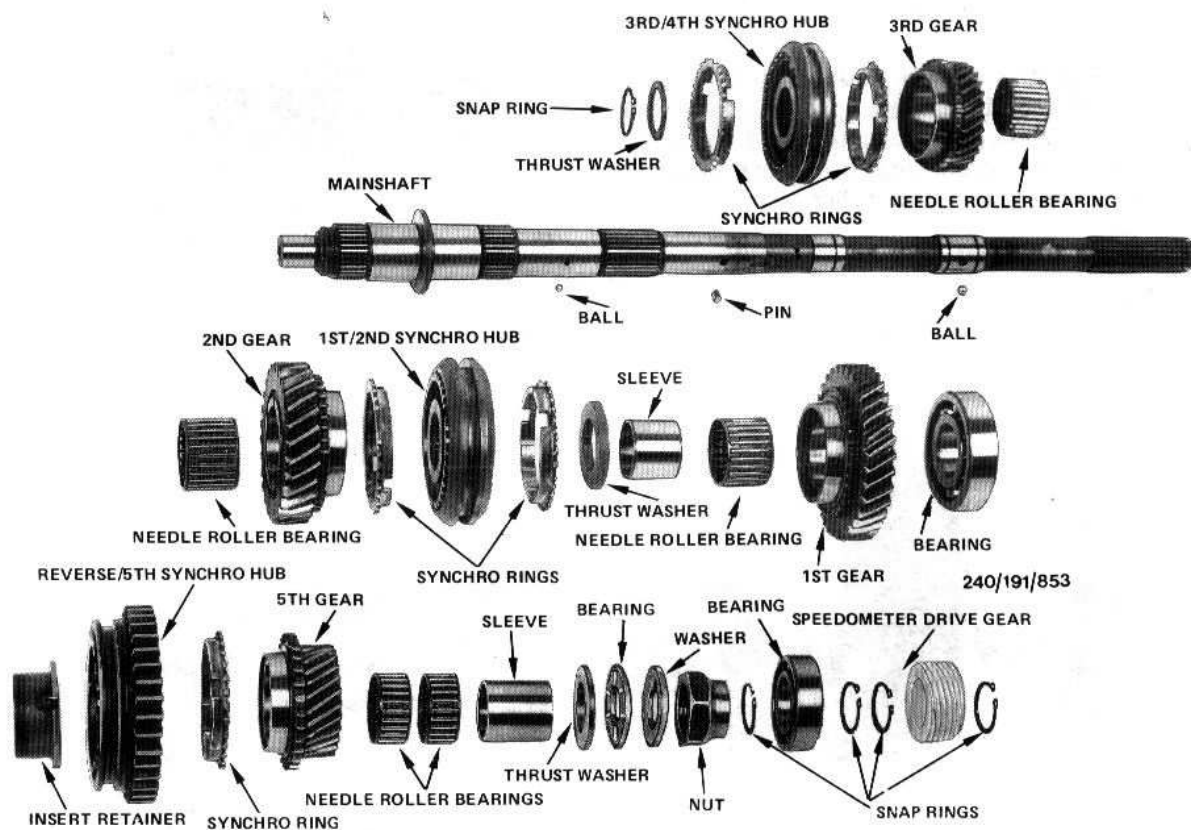
(33) Remove the thrust bearing rear washer, the steel pin, the thrust bearing and the front washer from the mainshaft.

(34) Using a suitable puller, remove the fifth drive gear and the rear bearing from the layshaft. Remove the reverse drive gear and the spacer.

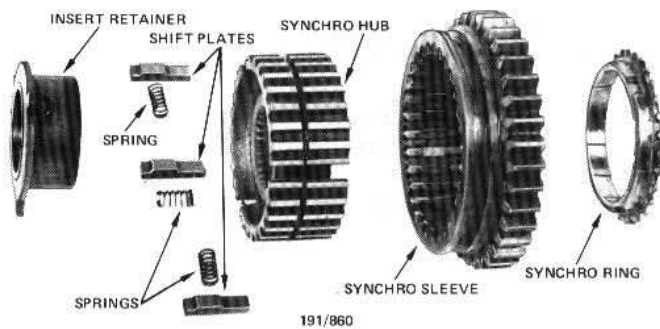
(35) Using suitable snap ring pliers, remove the snap ring from the reverse idler shaft and remove the



**Dismantled view of the layshaft components.**



**Dismantled view of the mainshaft components.**



#### Dismantled view of the reverse/fifth gear synchro assembly.

reverse idler gear, thrust washers and needle roller bearing.

(36) Remove the fifth gear, the needle roller bearing and the synchroniser ring from the mainshaft.

(37) Using a press and suitable press plates, remove the insert retainer, the fifth speed synchroniser assembly and the needle roller bearing sleeve from the mainshaft.

(38) Carefully tap the mainshaft together with the layshaft out of the carrier plate using a soft faced hammer.

(39) Remove the retaining screws and remove the bearing retainer from the carrier plate. Carefully tap the mainshaft and layshaft bearings out of the carrier plate. Remove the reverse idler shaft from the carrier plate.

(40) Remove the thrust washers, the steel ball, the first gear and the needle roller bearing from the mainshaft.

(41) Using a press with suitable press plates supporting the second gear, remove the first gear needle roller bearing sleeve, the first/second synchroniser assembly and the second gear from the mainshaft. Remove the second gear needle roller bearing.

#### TO CHECK AND INSPECT

(1) Thoroughly wash all the transmission internal components with suitable cleaning solvent and blow dry with compressed air.

(2) Suitably mark the components of the synchroniser assemblies, remove the synchroniser rings and slide the sleeves off the hubs. Remove the shift plates and springs from the hubs. Where applicable, remove the circular type springs prior to removing the synchroniser sleeves. Do not mix the components of the various synchroniser assemblies.

(3) Check the tapered face and the teeth of each synchroniser ring for wear and damage. The ridges and grooves on the tapered face must be sharp and clearly defined.

(4) Pushing each synchroniser ring onto its respective gear cone, turn the synchroniser ring and verify that binding occurs. Measure the synchroniser ring to gear clearance and renew the ring and/or the gear if the clearance is below the specified wear limit.

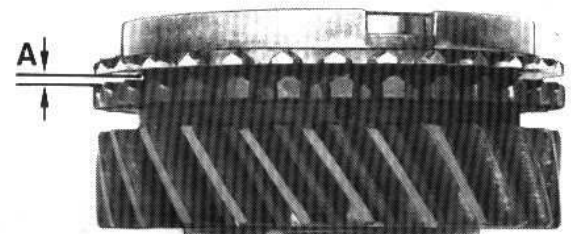
(5) Inspect the synchroniser shift plates and springs for wear, loss of tension and damage.

(6) Inspect the synchroniser hubs and sleeves for wear and damage, particularly the splines, shift plate locations and selector fork grooves.

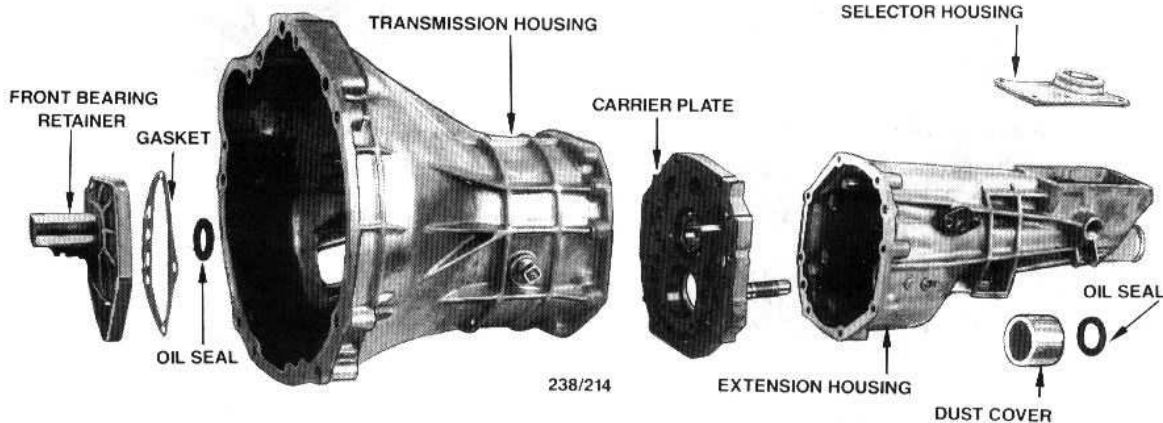
(7) Inspect the various gears, shafts and bearings for wear, pitting, bend and damage. The fifth drive and driven gears must be renewed as a matched pair, if unserviceable.

(8) Inspect the selector forks and shafts for wear, bend and damage, particularly the detent and interlock locations on the shafts.

(9) Inspect the transmission housing, the exten-



Check clearance A between the synchro ring and the gear cone and compare with Specifications.



Dismantled view of the transmission external components showing the oil seals.

sion housing and the carrier plate for cracks, wear and damage.

*NOTE: It is possible and economically viable to repair damaged threads in alloy housings. Consult a reliable specialist workshop.*

(10) Inspect the oil seals in the front bearing retainer and the rear of the extension housing. If necessary, prise out the old oil seals using a suitable lever and tap in new oil seals using a suitable punch.

(11) Renew all the parts found to be unserviceable in the above inspections.

If the transmission has seen considerable service it is advisable to renew all the bearings, oil seals, snap rings and roll pins routinely during the overhaul.

Referring to the gear end floats measured in the dismantling procedure, check and renew any components which have caused an incorrect end float.

### TO ASSEMBLE

(1) Lubricate all the transmission components with the specified transmission lubricant prior to assembly and/or installation.

(2) Assemble the synchronisers, aligning the components to the positions marked during dismantling.

(3) Instal the needle roller bearing, second gear and the first/second synchroniser assembly to the mainshaft and press the first gear needle roller bearing sleeve onto the mainshaft.

(4) Instal the first gear together with the needle roller bearing to the mainshaft. Smear suitable grease on the steel ball and the thrust washer to aid assembly and instal the steel ball and the thrust washer to the mainshaft.

(5) Instal the mainshaft and the layshaft bearings to the carrier plate. Instal the reverse idler shaft, the bearing retainer and the retaining screws. Tighten the screws to the specified torque and stake the edge of the screws at two places using a centre punch.

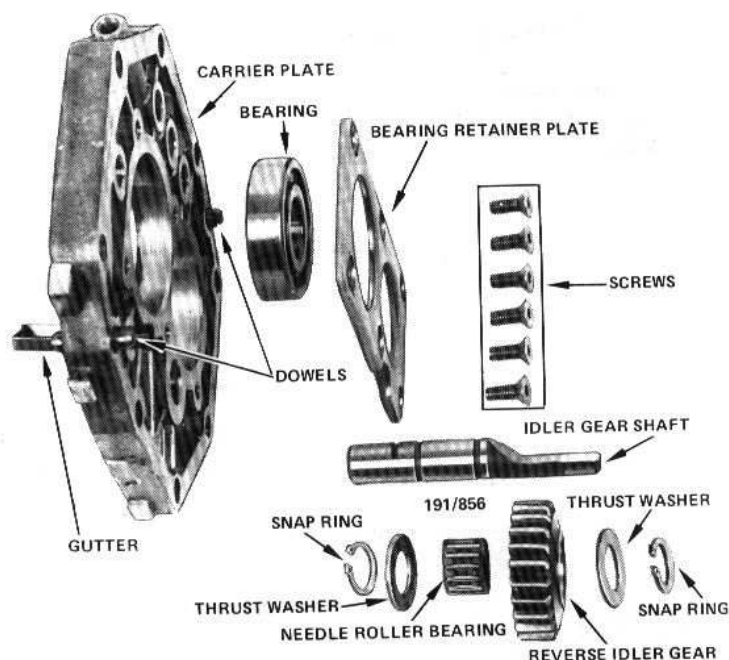
(6) Using suitable press plates to support the mainshaft bearing inner race, press the mainshaft through the carrier plate.

(7) Using the above press plates to support the layshaft bearing inner race, press the layshaft through the carrier plate.

(8) Instal the third gear together with the needle roller bearing to the front of the mainshaft.

(9) Instal the third/fourth synchroniser assembly to the mainshaft adjacent to the third gear, ensuring that the synchroniser hub chamfer is to the front of the transmission. Instal the washer adjacent to the synchroniser assembly.

(10) Select a snap ring from the sizes listed in the Specifications to provide minimum clearance in the mainshaft groove. Instal the snap ring and ensure that the snap ring is positioned correctly in the mainshaft groove.



**Dismantled view of the carrier plate components.**

(11) Instal the roller bearing to the front of the mainshaft.

(12) Instal the layshaft drive gear keys to the layshaft, ensure that the stepped end of the key is towards the front of the transmission.

(13) Using a press and suitable press plates, instal the layshaft drive gear to the layshaft, simultaneously instal the input shaft to the mainshaft ensuring that the fourth gear synchroniser is correctly installed.

*NOTE: Ensure that the keys on the layshaft are exactly aligned with both the keyways in the layshaft drive gear.*

(14) Select a snap ring from the sizes listed in the Specifications to provide minimum clearance in the layshaft groove.

(15) Instal the subgear, conical spring, collar and snap ring to the front of the layshaft. Ensure that the snap ring is correctly located in the groove.

(16) Using a press and suitable press plates, instal the bearing to the front of the layshaft.

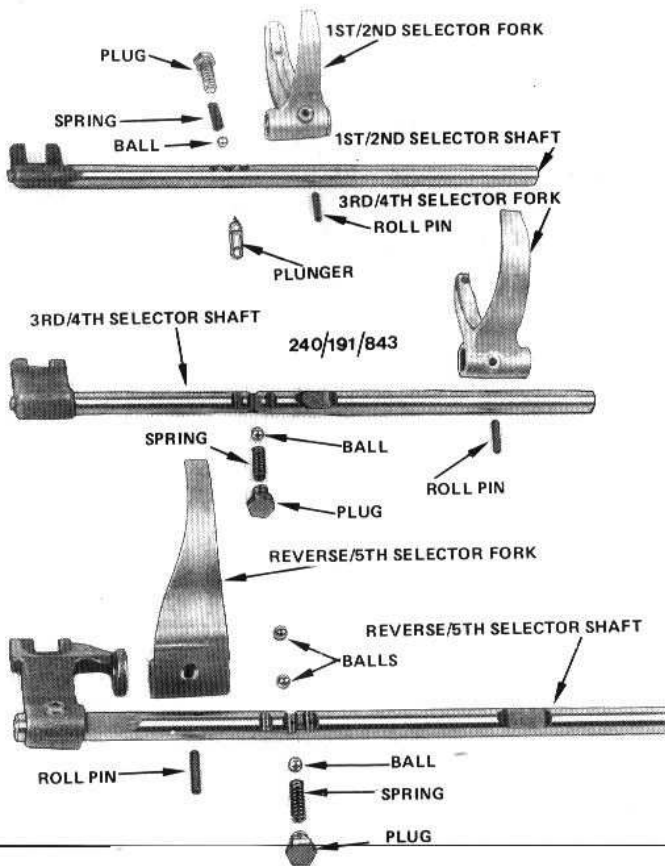
*NOTE: The convex side of the conical spring is installed adjacent to the collar. It may be necessary to compress the conical spring slightly when installing the snap ring.*

(17) Instal the reverse idler gear front snap ring ensuring that the snap ring is in the correct position in the snap ring groove.

(18) Instal the reverse idler gear together with the roller bearing and the thrust washers to the reverse idler shaft.

(19) Instal the reverse idler gear rear snap ring ensuring that the snap ring is in the correct position in the snap ring groove.





**Dismantled view of the selector mechanism.**

(20) Install the insert retainer and the fifth speed synchroniser assembly to the mainshaft ensuring that the groove around the synchroniser hub external splines is towards the front of the transmission.

(21) Install the fifth gear needle roller bearing sleeve using a suitable tube.

(22) Install the fifth gear together with the needle roller bearing and the synchroniser ring to the mainshaft.

(23) Install the spacer, the reverse drive gear and the fifth drive gear to the layshaft.

(24) Install the thrust bearing front washer, the thrust bearing, the steel pin and the thrust bearing rear washer to the mainshaft ensuring that the slot in the rear washer locates on the steel pin.

(25) Loosely install a new mainshaft nut to the mainshaft.

(26) Install the rear bearing to the layshaft, using careful taps on the bearing inner race.

(27) Loosely install a new layshaft nut to the layshaft.

(28) Select second and reverse gears to lock the transmission and tighten the layshaft and the mainshaft nuts to the specified torque.

(29) Using a feeler gauge, measure the end float of the first, second, third, fifth and reverse idler gears.

(30) If the above end floats are correct, stake the mainshaft and the layshaft nuts into the slots in the mainshaft and the layshaft using a suitable punch.

(31) Install the selector forks to the respective synchroniser sleeves.

(32) Install the first/second selector shaft to the carrier plate and the selector fork. Install the roll pin retaining the first/second selector fork to the selector shaft using a suitable pin punch.

(33) Install the interlock plunger to the interlock passage.

(34) Install the third/fourth selector shaft to the carrier plate and the selector fork. Install the roll pin retaining the third/fourth selector fork to the selector shaft using a suitable pin punch.

(35) Install the interlock balls to the interlock passage.

(36) Install the reverse/fifth selector shaft to the selector fork and the carrier plate. Install the roll pin retaining the reverse/fifth selector fork to the selector shaft using a suitable pin punch.

(37) Install the detent balls, springs and plugs to the carrier plate. Tighten the plugs to the specified torque. Select each gear in turn and ensure that the transmission rotates smoothly in each gear. Investigate and rectify any binding or tight spots.

(38) Apply suitable sealant to the mating face of the transmission housing and insert the transmission and carrier plate assembly into the transmission housing using careful taps with a soft faced hammer, if necessary.

(39) Install the selector lever to the extension housing selector shaft. Install the lock bolt washers and nut. Tighten the nut securely.

(40) Install the selector shaft to the extension housing and install the selector lug to the selector shaft using a suitable pin punch to install the roll pin.

(41) Apply suitable sealant to the mating face of the carrier plate and install the extension housing to the carrier plate. Tighten the retaining bolts to the specified torque.

(42) Install the reverse check sleeve, the plungers, springs, selector return plugs and the speedometer drive to the extension housing. Tighten the bolts and plugs to the specified torque.

(43) Install the snap ring to the input shaft bearing outer race ensuring that the snap ring is in the correct position in the snap ring groove.

(44) Using the depth gauge facility of a vernier caliper, measure the distance from the outer edge of the layshaft front bearing to the mating face of the transmission housing. Refer to the Specifications and, if necessary, obtain the shim to suit the distance measured.

(45) Install the front bearing retainer using a new gasket and the appropriate shim, if required.

(46) Install and tighten the front bearing retainer bolts to the specified torque, using suitable sealant on the threads of the bolts.

(47) Install the ball and spring to the extension housing and install the selector housing using a new gasket. Tighten the retaining bolts to the specified torque.

(48) Select each gear in turn and ensure that the transmission rotates smoothly in each gear. Investigate and rectify any binding or tight spots.

## 5. PROPELLER SHAFT ASSEMBLY

### Special Equipment Required:

To Remove and Instal Constant Velocity Joint — Press and press plates

To Renew Centre Bearing — Press and press plates

### TO REMOVE AND INSTAL

(1) Raise the vehicle to a suitable working height and support it on chassis stands.

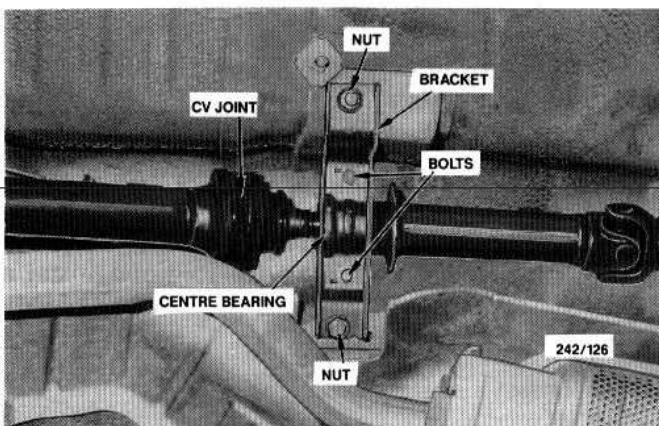
(2) Suitably mark the rear propeller shaft flange and the differential drive pinion flange to ensure replacement to the original locations, remove the coupling bolts and nuts from the flanges and separate the propeller shaft flange from the differential flange.

*NOTE: It may be necessary to lightly tap the end of the shaft with a soft hammer to free the shaft assembly from the drive pinion flange.*

(3) Remove the nuts retaining the centre bearing support bracket to the vehicle underbody, slide the front propeller shaft out of the transmission extension housing and remove the propeller shaft from the vehicle.

(4) Plug the end of the transmission extension housing to prevent the loss of lubricant and the entry of dirt.

*NOTE: A used propeller shaft yoke sleeve can be used for this purpose or a length of plastic or metal pipe sealed at one end and with a diameter the same as the yoke sleeve of the propeller shaft. Rag should not be jammed in the end of the transmission extension housing as this could distort the seal lip causing failure.*



Installed view of the propeller shaft centre bearing and constant velocity joint.

Installation is a reversal of the removal procedure with attention to the following points:

(1) Tighten the centre bearing retaining bolts securely.

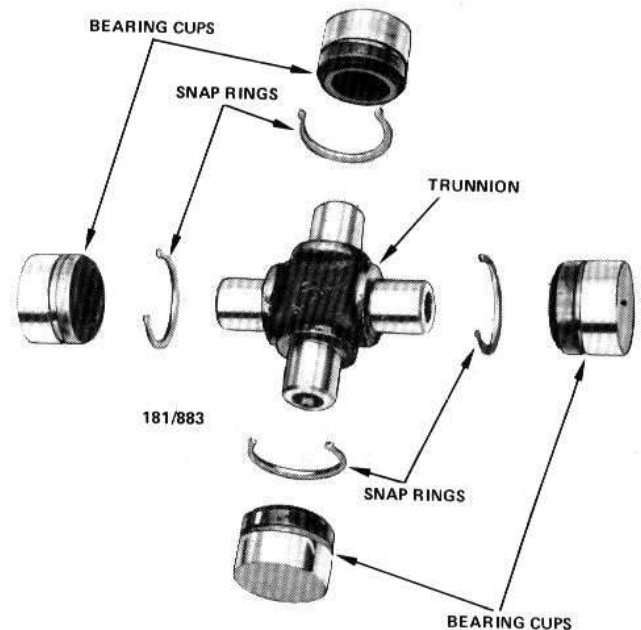
(2) Check and if necessary top up the transmission with the specified lubricant.

## UNIVERSAL JOINTS

### To Renew

*NOTE: Each universal joint is serviced as a kit which includes trunnion, seals, snap rings and the needle roller bearings and cups.*

*Do not dismantle a universal joint unless the components are to be renewed. Do not hold the sleeve of the front universal joint in the unprotected jaws of a vice, otherwise damage will result.*



Dismantled view of universal joint.

(1) Remove the propeller shaft assembly from the vehicle as previously described.

(2) Remove the snap rings securing the needle roller bearings of the front universal joint.

(3) Support the propeller shaft in a partially opened vice and using a metal drift, tap one of the bearing cups in to drive the other bearing cup out of the yoke.

(4) Again using the drift, tap the trunnion of the bearing just removed to drive the other cup back into and then out of the yoke.

*NOTE: The propeller shaft is balanced to fine tolerances and must not be dented or otherwise damaged.*

(5) Manoeuvre the front yoke and trunnion out of the propeller shaft.

(6) Treat the other two bearings of the front universal joint and the bearings of the rear universal joint in a similar manner to completely dismantle the universal joints.

Installation is a reversal of the dismantling procedure.

## CONSTANT VELOCITY JOINT

### To Remove and Instal

(1) Remove the propeller shaft from the vehicle as previously described.

(2) Mark the front and rear shafts and the constant velocity joint to ensure correct relocation on assembly.

(3) Remove the six socket head screws securing the rear shaft to the constant velocity joint.

*NOTE: If it is necessary to clamp the assembly in a vice use soft protective vice jaws. Clamp the shaft only on the extremities outward of the weld beads and use only sufficient pressure to provide a stable working unit. Support the protruding section of the shaft.*

*Do not tighten the vice up to prevent the overhanging weight of the shaft from rotating the unit in the vice jaws. If pressure of the vice is used to do this, distortion of the shaft will occur.*

(4) Use a soft punch and tap the rear propeller shaft flange off the constant velocity joint.

(5) Remove the rear snap ring from behind the constant velocity joint.

(6) Tap the dust boot retainer away from the constant velocity joint and remove the gasket if applicable.

(7) Mark the splines of the constant velocity joint inner race and the front shaft. Using suitable adaptor plates to provide contact with the inner section of the constant velocity joint, press the constant velocity joint from the front shaft.

(8) Remove the thrust washer and remaining snap ring.

(9) If the dust boot is split or damaged release the holding clamps and remove the dust boot.

Installation of the constant velocity joint is a reversal of the removal procedure with attention to the following points:

(1) Ensure that the parts are clean and free from dust and foreign matter.

*NOTE: It is essential that extreme cleanliness is used at assembly of the unit if a full service life is to be obtained. If the dust boot is split or perished it must be renewed.*

(2) Pack the assembly with 80 g of molybdenum disulphide grease, working it well into the joint.

(3) Align and instal the parts as marked during disassembly.

(4) Apply sealant to clean, grease free mating areas on the constant velocity joint and dust boot retainer.

(5) Apply sealant to the rear shaft flange and the threads of the socket head screws.

(6) Tighten the socket head screws to a torque of 40 Nm.

## CENTRE BEARING ASSEMBLY

### To Renew

*NOTE: The centre bearing should not be removed unless it is faulty. If the centre bearing is removed a new bearing and rear dust slinger must be installed.*

(1) Remove the constant velocity joint as previously described.

(2) Remove the bolts and nuts and separate the halves of the centre bearing support bracket.

(3) Using a suitable punch, tap off the bearing rear dust slinger.

(4) Remove the bearing retainer snap ring.

(5) Using suitable adaptor plates to fit as closely to the centre line of the shaft as possible, press off the centre bearing.

(6) From the front end of the rubber mounting cup press the bearing out its seat.

*NOTE: During the above operations take care not to damage the front dust slinger which is fixed to the shaft.*

Installation is a reversal of the removal procedure with attention to the following points:

(1) Renew the rubber mounting cup if it is damaged.

(2) Keep the bearing and shaft clean and free from dirt.

(3) Instal the new bearing into the rubber mounting and, applying pressure to the outer race only, press the bearing into position.

(4) Press the centre bearing assembly onto the shaft by applying pressure to the inner race only.

(5) Instal the retaining snap ring and instal a new rear dust slinger. Instal the constant velocity joint.



## SPECIFICATIONS

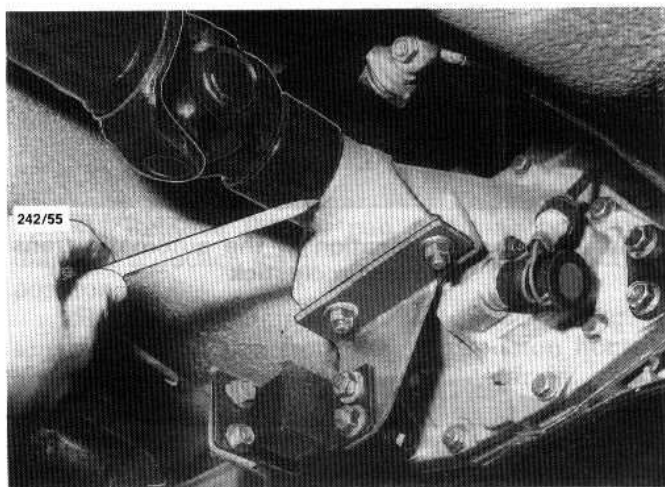
Model .....	E4N71B
Type .....	Four forward speeds and reverse, epicyclic gear trains with clutch operated lock up torque converter
Operation .....	Electronically controlled automatic, hydraulic
Gear ratios:	
Fourth .....	0.686:1
Third .....	1.000:1
Second .....	1.458:1
First .....	2.458:1
Reverse .....	2.182:1
Lubricant:	
Type .....	Dexron 11
Capacity .....	7.0 litres
Band adjustment	
Front band .....	Tighten adjusting screw to 10 Nm and back off two turns
Rear band .....	Tighten adjusting screw to 15 Nm and back off three turns

## TORQUE WRENCH SETTINGS

Converter to drive plate bolts .....	49 Nm
Converter housing to engine bolts .....	49 Nm
Dipstick tube retaining bolt .....	7 Nm
Oil pan retaining bolts .....	7 Nm
Front band locknut .....	39 Nm
Rear band locknut .....	39 Nm

## 1. AUTOMATIC TRANSMISSION TROUBLE SHOOTING

*NOTE: The following transmission faults can be caused by conditions that may be rectified within the scope of the information given in this section.*



If the fluid level is low, check the extension housing oil seal as a likely source of leakage.

## NO DRIVE IN ANY RANGE

(1) Low fluid level in the transmission: Check the fluid level in the transmission and top up if necessary.

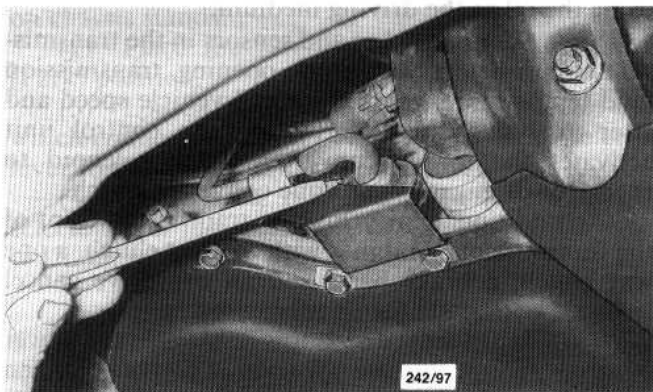
(2) Incorrectly adjusted selector linkage: Check and adjust the selector linkage as detailed later in this section.

(3) Incorrect or contaminated transmission fluid: Drain and refill the transmission with the recommended grade of fluid.

## ROUGH ON UPSHIFT

(1) Faulty vacuum diaphragm or piping: Check the vacuum diaphragm and the piping as detailed later in this section.

(2) Engine tuning not to Specifications: Tune the engine as detailed in the Engine Tune-up section.

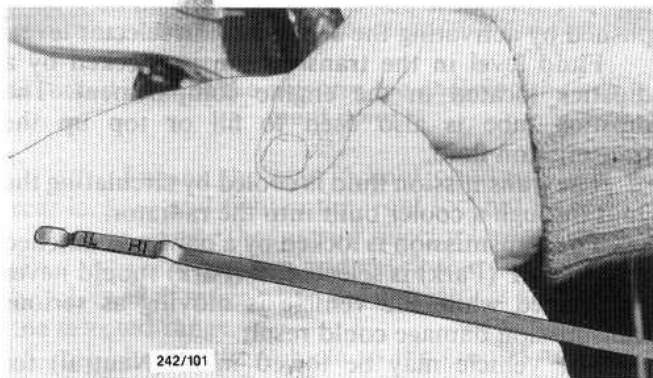


Check the vacuum diaphragm valve vacuum pipe if the transmission is rough on upshift.

(3) Incorrect or contaminated transmission fluid: Drain and refill the transmission with the recommended grade of fluid.

## ENGINE WILL NOT START IN P OR N RANGE OR WILL START IN ANY RANGE

(1) Neutral safety switch faulty or out of adjustment: Renew or adjust the neutral safety switch as necessary.



Check the transmission fluid level for correct level and contamination.



(2) Incorrectly adjusted selector linkage: Check and adjust the selector linkage as detailed later in this section.

## 2. DESCRIPTION

The automatic transmission fitted to the Skyline range of vehicles covered by this manual is a four speed, overdrive unit with the gear selection controlled by an electronic control unit.

The torque converter has a lock up capability operated by a clutch within the converter, engaging at various vehicle speeds which are programmed into the control unit. When the clutch is applied, the driven member of the torque converter is locked to the driving member creating positive engagement and when the clutch is released the normal characteristics of the torque converter are used to propel the vehicle, using the oil as the driving medium.

The various switches and sensors in the transmission circuit detect the throttle opening, transmission fluid temperature, gear in use and vehicle speed and after analysing this information the control unit activates the torque converter clutch solenoid to engage or disengage the torque converter clutch.

An additional epicyclic gear train in the front of the transmission combines with a direct clutch, a one way clutch, a brake band and an overdrive cancel solenoid to provide the overdrive gear ratio.

The control unit cancels this ratio when the power mode switch on the selector lever is activated, when full throttle is applied or when the transmission temperature is below 45 deg C, maintaining optimum performance and minimum fuel consumption and emissions. The control unit is also programmed to arrange two distinct shift patterns depending on operating conditions.

The standard shift pattern is used in normal circumstances where use of the overdrive ratio and the torque converter clutch are advantageous. The power shift pattern is used in circumstances where use of the overdrive ratio and the torque converter clutch would impose excessive loading on the engine. Manual selection of the power shift pattern can be accomplished by activating the switch on the selector lever.

Fluid level in the transmission is checked by a dipstick located in the engine compartment. The dipstick tube is also used to fill or top up the transmission fluid.

The transmission fluid is cooled by circulating the fluid through a cooler built into the radiator.

The transmission is locked by a pawl and notched gear when P (Park) is selected. P (Park) should never be selected while the vehicle is moving as serious transmission damage could result.

The vehicle may be towed in N (Neutral) for distances under 10 km at speeds not exceeding 30 km/h. If the vehicle has transmission damage, the propeller shaft must be disconnected from the differ-

ential and secured to the underbody, leaving the transmission sealed against dirt and contamination.

The transmission can be removed from the vehicle, as an assembly without removing the engine.

*NOTE: As extensive knowledge and equipment is required to overhaul the automatic transmission it is not considered a viable repair proposition for the average person. However, if the transmission must be removed for overhaul by a specialist, or replacement with an exchange unit the removal and installation procedure is described at the end of this section.*

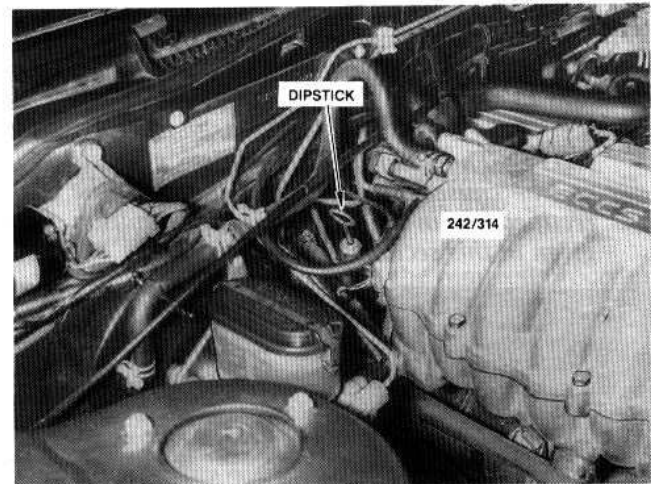
## 3. TRANSMISSION FLUID

Only the recommended automatic transmission fluid should be used when topping up or changing the transmission fluid. Refer to the Specifications at the beginning of this section for the recommended fluid.

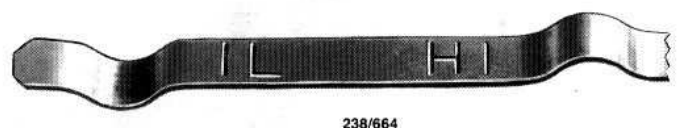
### TO CHECK AND TOP UP

(1) Bring the transmission to the normal operating temperature, fluid temperature above 50 deg C, preferably by driving the vehicle on the road until the engine temperature gauge registers normal temperature.

(2) Park the vehicle on a level surface. With the engine idling and the handbrake firmly applied, select



View showing the location of the automatic transmission dipstick



View of the automatic transmission dipstick. The level must be between the L and H marks.

P (Park). Allow the engine to idle in this range throughout the checking procedure.

(3) Clean around the dipstick tube and the top of the dipstick to ensure that dirt cannot enter the transmission when the dipstick is withdrawn.

(4) Withdraw the dipstick and wipe it clean on a piece of lint free cloth. Replace the dipstick fully into the dipstick tube.

(5) Withdraw the dipstick and check the level which must be within the two level marks on the dipstick. Check the fluid for contamination, discoloration and burnt smell.

*NOTE: Difficulty can be encountered when judging the actual fluid level on the dipstick. Repeat operations (4) and (5) above and check both sides of the dipstick until the true fluid level is ascertained. Fluid which is contaminated, discoloured or smells burnt usually indicates a mechanical problem within the transmission requiring specialist assistance.*

(6) If necessary, add a sufficient quantity of the recommended fluid through the dipstick tube to bring the level to within the marks on the dipstick. Allow a reasonable period of time for the fluid to drain out of the dipstick tube to avoid a false reading when the level is checked.

*NOTE: Do not overfill the transmission or foaming and unsatisfactory operation of the transmission may result. If it has been necessary to add a substantial amount of fluid to the transmission the cause of the fluid loss should be immediately investigated and rectified.*

#### TO DRAIN AND REFILL

(1) Ensure that the transmission is cold, raise the vehicle and support it on chassis stands placed clear of the work area.

(2) Clean the outside of the transmission oil pan and the area of the transmission housing around the oil pan mating face.

(3) Position a suitable drain tin under the transmission oil pan, preferably the drain tin should be larger in area than the oil pan to avoid fluid spills.

(4) Remove the oil pan retaining bolts in a diagonal sequence leaving the front bolts loosely in position.

(5) Carefully tap the corner of the oil pan to separate the oil pan from the transmission housing and tilt the oil pan to allow the fluid to drain.

(6) Remove the remaining front bolts from the oil pan and remove the oil pan from the transmission. Drain the remaining fluid into the drain tin, checking the fluid and the bottom of the oil pan for abnormal metal and friction material particles which would indicate an internal mechanical problem.

(7) Clean the inside of the oil pan and the oil pan and transmission housing mating faces.

*NOTE: A sticky film which will not wipe clean indicates a varnish build up which can cause transmissions failure.*

(8) Instal the oil pan, using a new gasket, and instal and tighten the retaining bolts to the specified torque in a diagonal sequence.

(9) Lower the vehicle to the ground and refill the transmission with new fluid, approximately the same amount as drained. Carry out the procedure described previously under the heading To Check and Top Up.

#### 4. SELECTOR LINKAGE

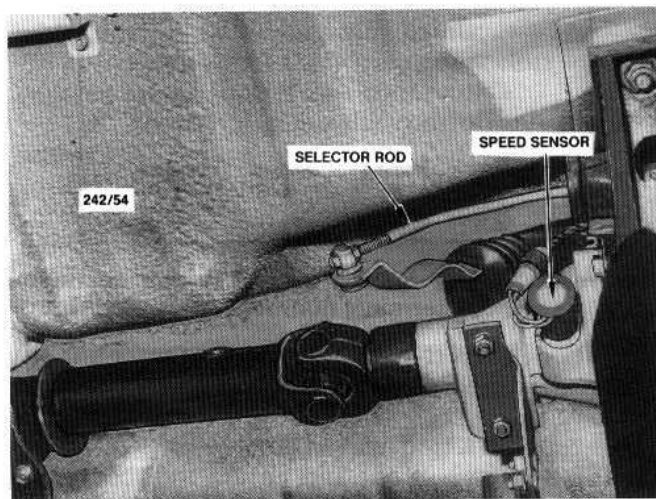
##### TO ADJUST

(1) Raise the front of the vehicle and support it on chassis stands.

(2) Place the interior selector lever in the P (Park) position.

(3) Loosen both locknuts on the selector rod which connects the lower end of the interior selector lever to the transmission selector lever.

(4) Tighten the rear locknut until the interior selector lever moves slightly towards the R (Reverse) position.



**Installed view of the selector rod showing the adjustment point.**

(5) Loosen the rear locknut one turn, hold the rear locknut and tighten the front locknut securely.

(6) Operate the interior selector lever from the P (Park) to the 1 position and check that the detent can be felt in each range when the indicator is aligned with the selected range.

(7) Lower the vehicle to the ground and check the operation of the selector lever and the neutral safety switch. Road test the vehicle and check for correct transmission operation.

## 5. NEUTRAL SAFETY SWITCH

The neutral safety switch is wired in series with the starter motor solenoid to ensure that the vehicle can only be started in the P (Park) or N (Neutral) positions. A reverse lamp switch is incorporated in the switch body to operate the reverse lamps when R (Reverse) is selected. The switch is mounted on the transmission housing behind the transmission selector lever and also informs the electronic control unit of the position of the selector lever. The switch is non-repairable but can be adjusted should the engine start in a position other than P (Park) or (Neutral).

### TO TEST

- (1) Disconnect the neutral safety switch wiring connector at the vehicle bulkhead.
- (2) Select P (Park) with the selector lever and referring to the illustration, ensure that continuity exists between terminals 2 and 5 of the connector using a suitable ohmmeter.
- (3) Select R (Reverse) and ensure that continuity exists between terminals 1 and 3.

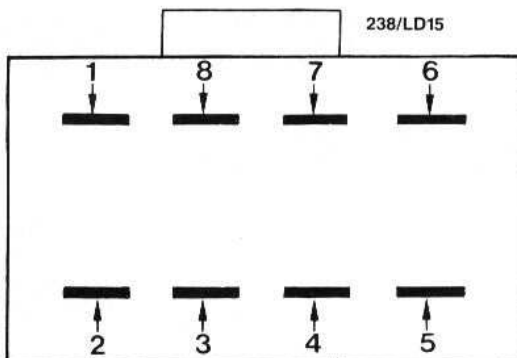


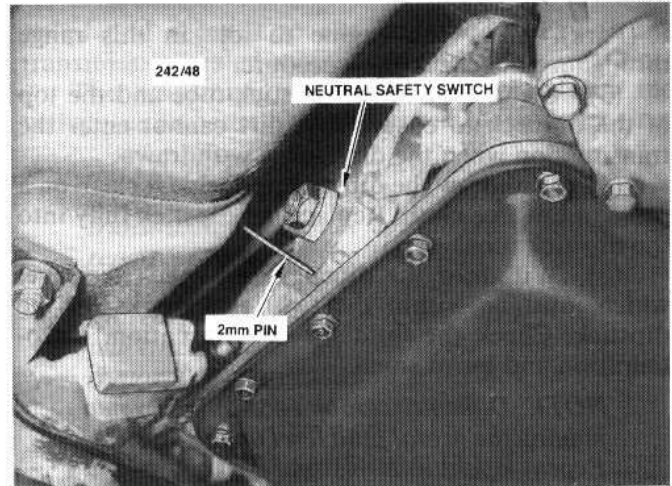
Illustration of the neutral safety switch connector terminal numbers.

- (4) Select N (Neutral) and ensure that continuity exists between terminals 1 and 4.
- (5) Select D (Drive) and ensure that continuity exists between terminals 1 and 6.
- (6) Select 2 (Two) and ensure that continuity exists between terminals 1 and 7.
- (7) Select 1 (One) and ensure that continuity exists between terminals 1 and 8.

Renew the neutral safety switch if continuity does not exist in any of the above tests.

### TO REMOVE AND INSTAL

- (1) Raise the vehicle and support it on chassis stands.
- (2) Remove the nut retaining the transmission selector lever to the transmission selector shaft and detach the selector lever from the transmission.
- (3) Remove the neutral safety switch retaining screws, disconnect the wiring connector and any ties



View of the neutral safety switch showing a 2 mm diameter pin inserted in the screw hole when adjusting the switch.

or clips retaining the wiring and withdraw the neutral safety switch from the transmission.

Installation is a reversal of the removal procedure with attention to the following points:

- (1) Adjust the neutral safety switch as detailed under the following side heading.
- (2) Check the operation of the switch to ensure that the engine starts only in P (Park) or N (Neutral) and that the reverse lamps operate when R (Reverse) is selected.
- (3) Road test the vehicle and check for correct gear changes.

### TO ADJUST

- (1) Place the selector lever in the N (Neutral) position.
- (2) Remove the screw from the side of the neutral safety switch, directly under the centre of the selector shaft.
- (3) Insert a 2.0 mm diameter pin into the screw hole. The pin should enter fully into the switch rotor.
- (4) If necessary, loosen the switch retaining screws and rotate the switch body until the pin enters fully into the switch rotor. Hold the pin into the switch and tighten screws. Remove the pin and replace the screw previously removed.
- (5) Test the neutral safety switch operation as previously described.

## 6. VACUUM DIAPHRAGM VALVE

### TO TEST VACUUM SUPPLY

- (1) Raise the front of the vehicle and support it on chassis stands.
- (2) Disconnect the vacuum pipe from the diaphragm valve and instal a suitable vacuum gauge into the end of the pipe.
- (3) Start the engine and monitor the vacuum



readings at idle and at various throttle openings. The vacuum reading should alter with the different throttle openings.

(4) Check the inlet manifold union and the vacuum pipe for damage and restrictions if abnormal vacuum readings occur.

### TO TEST DIAPHRAGM VALVE

(1) Raise the front of the vehicle and support it on chassis stands.

(2) Disconnect the vacuum pipe from the diaphragm valve and remove the diaphragm valve from the transmission housing being careful not to lose the rod inside the housing. Discard the O ring.

(3) Connect a suitable vacuum pump with gauge to the diaphragm valve fitting.

(4) Apply and hold a vacuum of 100 mm Hg to the diaphragm valve.

(5) Check that the diaphragm holds the vacuum and renew the valve if the diaphragm will not hold the vacuum.

(6) Check that the rod is in position and renew the O ring when installing the diaphragm valve.

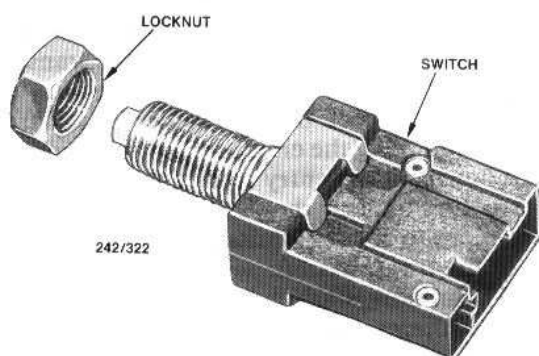
## 7. KICKDOWN SWITCH

### TO TEST

(1) Disconnect the negative battery terminal.

(2) Disconnect the wiring terminals from the kickdown switch located at the throttle pedal.

(3) Connect an ohmmeter to the terminals of the switch.



View of the kickdown switch removed from the vehicle.

(4) Check that no continuity exists between the terminals when the throttle pedal is released.

(5) Fully depress the throttle pedal and check that continuity exists between the terminals.

(6) If continuity does not exist when the throttle pedal is fully depressed, adjust the switch as described later and again check for continuity at the terminals.

(7) If continuity does not exist after adjustment, renew the switch.

### TO ADJUST

(1) Adjust the throttle cable as described in the Fuel and Engine Management section.

(2) Fully depress the throttle pedal and check that the switch plunger is pushed fully into the switch body. A click should be heard.

(3) If necessary, adjust the switch by loosening the locknut and screwing the switch in or out to achieve the correct position.

*NOTE: If the switch adjustment and condition are satisfactory and the operation of the kickdown is suspect, the vehicle should be taken to a Nissan dealer for inspection of the electronic control system.*

## 8. ELECTRONIC CONTROL UNIT

### TO REMOVE AND INSTALL

(1) Disconnect the negative battery terminal.

(2) Remove the mounting bolts and remove the passengers side front seat. Unclip the trim pieces to gain access to the rear mounting bolts.

(3) Remove the screws retaining the control unit to the floor panel.

(4) Separate the wiring connectors from the control unit and remove the control unit from the vehicle.

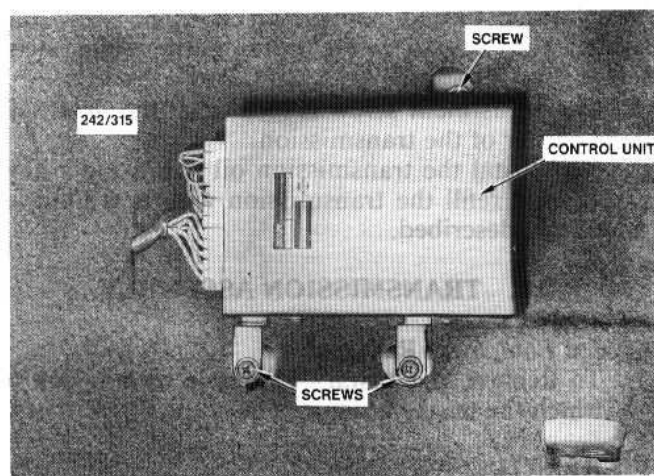
Installation is a reversal of the removal procedure with attention to the following points:

(1) Ensure that the wiring connectors are fully engaged on the control unit connectors.

(2) Securely tighten the control unit retaining screws.

(3) Ensure that the trim pieces are installed correctly to the rear of the seat slides after firmly tightening the seat mounting bolts.

(4) Road test the vehicle and check for correct transmission operation.



Installed view of the transmission control unit with the passengers seat removed for photographic purposes.

## 9. FRONT BAND

### TO ADJUST

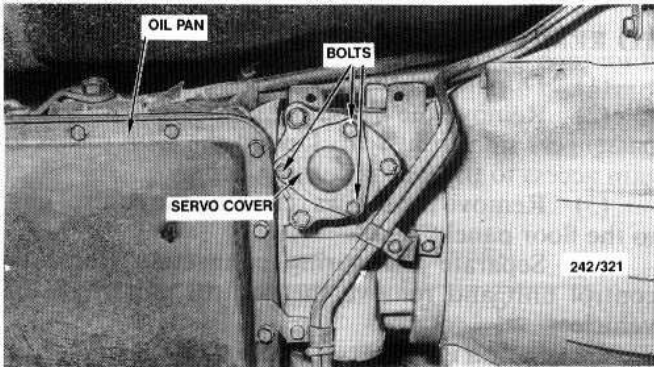
(1) Raise the vehicle and support it on chassis stands.

(2) Remove the front band servo cover retaining bolts. The servo is located forward of the oil pan on the right hand side of the transmission.

(3) Loosen the adjustment screw locknut and tighten the adjustment screw to a torque of 10 Nm. Loosen the adjustment screw two turns and tighten the locknut while holding the adjustment screw.

(4) Renew the gasket and instal the front band servo cover.

(5) Instal and tighten the front band servo cover retaining bolts securely.



Location of the front band adjustment.

## 10. REAR BAND

### TO ADJUST

(1) Drain the fluid from the transmission as previously described.

(2) Loosen the rear band adjustment screw locknut and tighten the adjustment screw to a torque of 15 Nm. Loosen the adjustment screw three turns and tighten the locknut while holding the adjustment screw.

The adjustment screw is located at the front left hand corner of the transmission.

(3) Instal the transmission oil pan using a new gasket, and refill the transmission with new fluid as previously described.

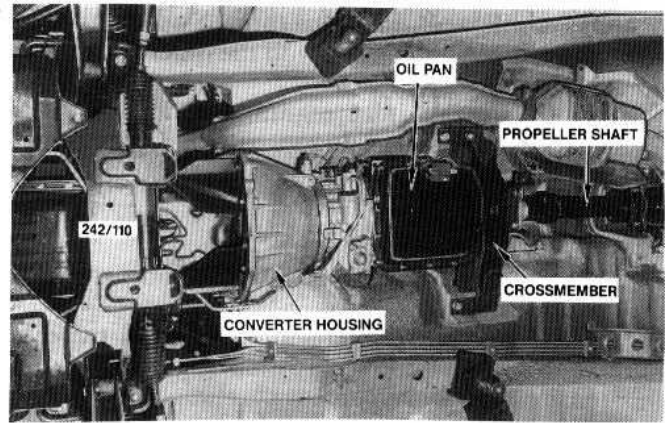
## 11. TRANSMISSION ASSEMBLY

### Special Equipment Required:

To Remove and Instal — Suitable trolley jack to which the transmission can be secured

### TO REMOVE AND INSTAL

(1) Disconnect the negative battery terminal.  
 (2) Raise the front of the vehicle and support it on chassis stands.



Installed view of the automatic transmission.

(3) Remove the retaining bolts and remove the cover from the front lower face of the converter housing.

(4) Remove the bolts retaining the drive plate to the torque converter, rotating the engine as necessary to gain access to the bolts.

(5) Suitably mark the drive plate and the torque converter to ensure replacement to the original position.

(6) Disconnect the selector rod from the transmission selector lever.

(7) Disconnect the wiring from the vehicle speed sensor, the neutral safety switch, the torque converter clutch solenoid, the overdrive cancel solenoid and the kickdown solenoid. Secure the wiring to one side, clear of the transmission.

(8) Disconnect the vacuum pipe from the vacuum diaphragm valve on the side of the transmission. Remove any brackets securing the pipe to the transmission and secure the pipe clear of the transmission. Plug the end of the pipe to prevent the entry of dirt.

(9) Disconnect the oil cooler pipes from the transmission. Plug the ends of the pipes to prevent the loss of fluid and the entry of dirt.

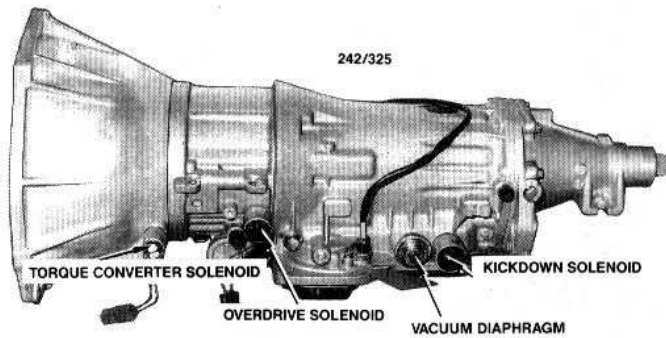
(10) Disconnect the brackets securing the oil cooler pipes to the transmission and secure the pipes clear of the transmission.

(11) Suitably mark the rear propeller shaft flange and the differential drive pinion flange to ensure replacement to the original position and remove the coupling bolts from the flanges.

(12) Remove the bolts retaining the propeller shaft centre bearing to the vehicle underbody and slide the propeller shaft assembly rearwards out of the transmission. Plug the end of the transmission extension housing to prevent the loss of fluid and the entry of dirt.

(13) Position a trolley jack under the transmission with a piece of timber between the head of the jack and the transmission oil pan. Raise the jack to the oil pan and secure the transmission to the jack.

(14) Remove the nuts retaining the transmission crossmember to the vehicle underbody.



**Left hand side view of transmission removed from the vehicle.**

(15) Lower the trolley jack slightly and support the rear of the engine on a chassis stand with a timber pad to protect the engine.

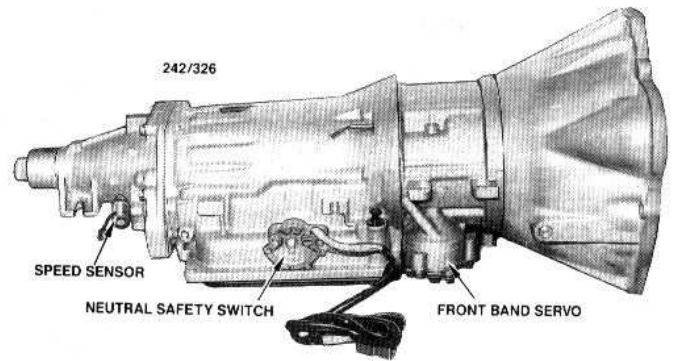
(16) Remove the bolt retaining the dipstick tube to the engine and remove the dipstick and tube from the transmission.

(17) Remove the bolts retaining the converter housing to the rear of the engine and manoeuvre the transmission rearwards away from the engine. Attach a suitable strap to the face of the converter housing to prevent the displacement of the torque converter.

(18) When the transmission is clear of the engine, lower the trolley jack and withdraw the transmission from under the vehicle.

Installation is a reversal of the removal procedure with attention to the following points:

(1) Ensure that the distance from the front of the



**Right hand side view of the transmission removed from the vehicle.**

torque converter mounting lug to the front face of the converter housing is more than 35 mm.

(2) Ensure that the converter housing and engine mating faces are clean and free from burrs.

(3) Ensure that the converter housing and engine mating faces are parallel during installation.

(4) Instal the torque converter to the position marked on the drive plate. Apply suitable locking compound to the threads of the torque converter retaining bolts.

(5) Tighten all bolts to the specified torque.

(6) Check the engine for free rotation with the transmission installed.

(7) Fill the transmission with the specified quantity and grade of fluid.

(8) Road test the vehicle and check for correct transmission operation.