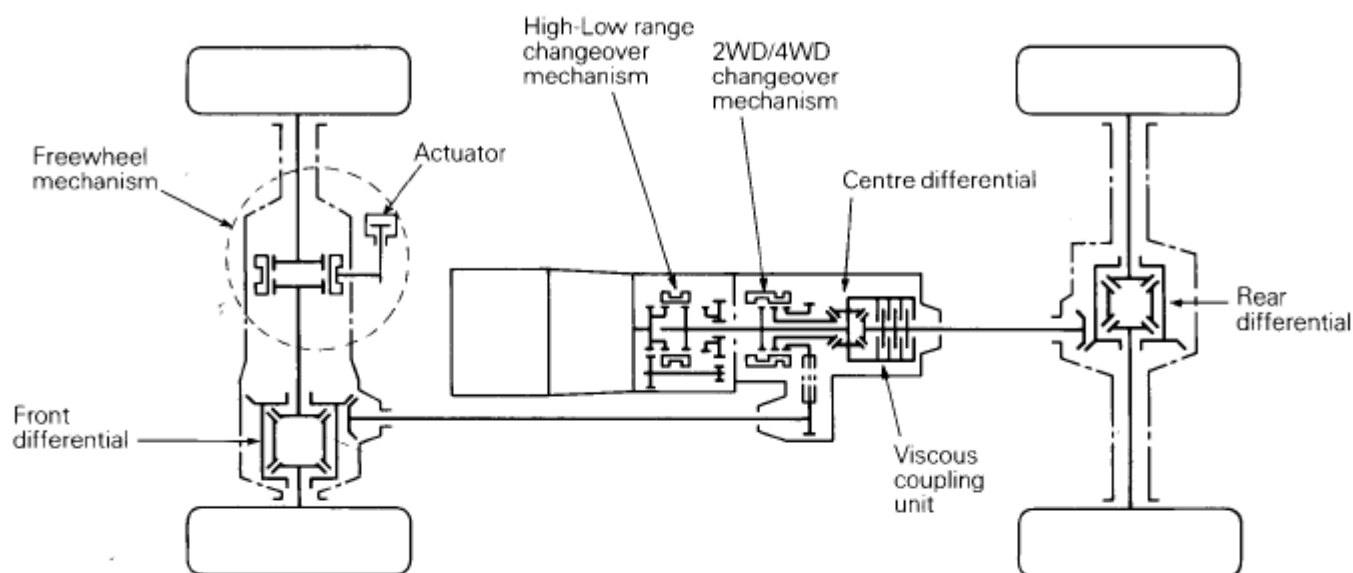


SYSTEM SCHEMATIC DIAGRAM



11E0004

PRINCIPAL COMPONENTS

Component		Function
Freewheel mechanism	Solenoid valves A and B	These valves operate in response to the ON/OFF signal from the transfer 2WD/4WD detection switch to change the passage of the vacuum which acts on the actuator.
	Actuator (2-way type)	This actuator moves the clutch in the freewheel mechanism by utilizing the vacuum built inside its chamber.
	Freewheel clutch assembly	A spline engagement type clutch provided on the right hand output shaft of the front differential. It functions to free (2WD state) or lock (4WD state) the freewheel mechanism of the differential.
	Freewheel engagement switch	This switch decides whether the freewheel mechanism is in free state or locked state by detecting the freewheel clutch shift fork position. (The switch turns ON in locked state.)
High-Low range changeover mechanism	High-Low range changeover device	According to the transfer shift lever position, this device changes the transfer gear to High, Neutral or Low.
	High/Low detection switch	This switch detects the High/Low shift rail position to determine whether the transfer gear is in High or Low range. (It turns ON when the gear is in either High or Low range and turns OFF when the gear is in Neutral.)
2WD-4WD changeover mechanism	2WD-4WD changeover device	This device with a synchronizer switches the drivetrain mode to 2WD, Full-time 4WD or Direct-coupled 4WD.
	2WD/4WD detection switch	When this switch detects the 4WD state of the transmission from the 2WD-4WD shift fork position, it sends a signal to solenoid valves A and B to activate them. (It turns ON when the drivetrain is in the 2WD state.)
	4WD position detection switch	By detecting the 2WD-4WD shift rail position, this switch determines whether the transfer shift lever is in the 4WD position or not. (It turns ON when the lever is in the 4WD position.)
	Centre differential locked state detection switch	By detecting the 2WD-4WD shift fork position, this switch determines whether the centre differential is in the locked or free state. (It turns ON when the centre differential is in the locked state.)
	Centre differential lock position detection switch	This switch determines whether the transfer shift lever is in the direct-coupled 4WD position or not from the 2WD-4WD shift rail position. (It turns ON when the shift lever is in the direct-coupled 4WD position.)



2WD-4WD Changeover Mechanism

This mechanism is a composite of the 2WD-4WD changeover mechanism and the centre differential locking mechanism. There are three positions: the 2WD-centre differential lock position, the 4WD-centre differential free position and the 4WD-centre differential lock position.

Moreover, to make it possible to change over between 2WD and 4WD while the vehicle is moving, a synchronizer is provided in the 2WD-4WD changeover section (between the 2WD/4WD hub and the drive sprocket).

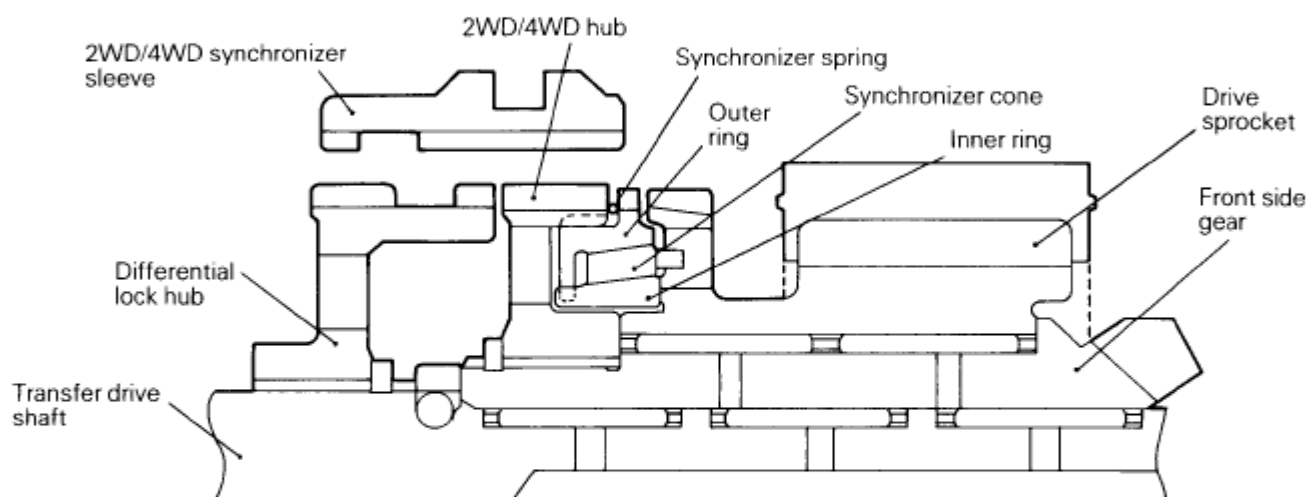
The front output shaft drive chain is a "random chain" which assures quieter operation.

2WD-4WD CHANGEOVER SECTION

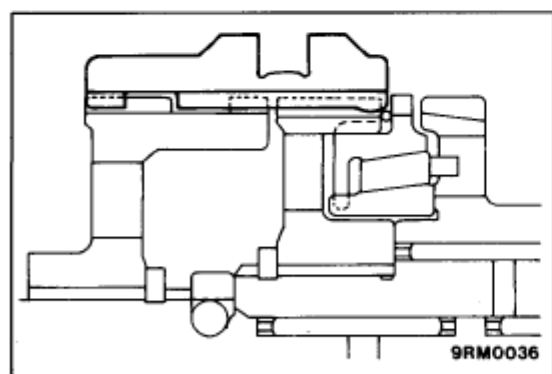
The 2WD-4WD changeover section consists of: a differential lock hub, a 2WD/4WD hub, a drive sprocket, a 2WD/4WD synchronizer sleeve, outer rings, inner rings, synchronizer cones, synchronizer springs, a front side gear, a transfer drive shaft, etc. (See illustration below.)

The differential lock hub is engaged with the transfer drive shaft; the 2WD/4WD hub is engaged with the front side gear, outer rings and inner rings; and the drive sprocket is engaged with the synchronizer cones. The parts included in each of these three engagement combinations move concurrently.

The 2WD/4WD synchronizer combines two or three of these combinations to accomplish a 2WD-4WD changeover.



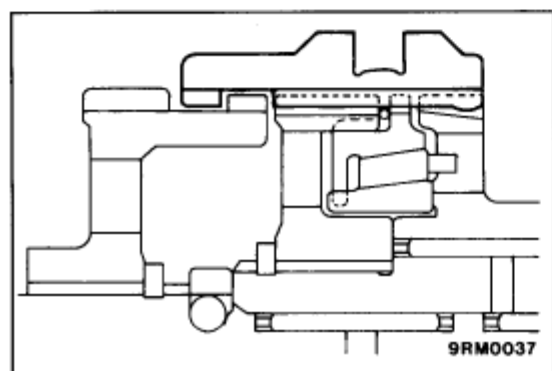
9RM0034



9RM0036

(1) 2WD (When the 2H Position is Selected)

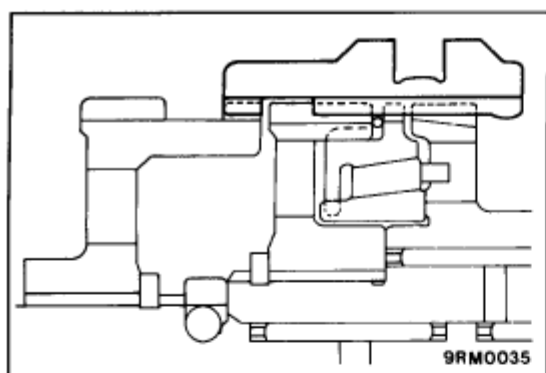
When the 2H position is selected, the synchronizer sleeve is at the leftmost position (see illustration). The sleeve combines the differential lock hub and the 2WD/4WD hub but the drive sprocket remains free. In this condition, the transfer drive shaft and the front side gear rotate together and, therefore, the centre differential is in the locked state. Because the drive sprocket is free to turn, power is not transmitted to the front differential so that the drivetrain is in the rear wheel drive mode.



9RM0037

(2) Full-time 4WD (When the 4H Position is Selected)

When the 4H position is selected, the synchronizer sleeve is at the centre (see illustration) combining the 2WD/4WD hub and the drive sprocket together but leaving the differential lock hub free. Under this condition, power is distributed through the centre differential to both the front side gear and the rear output shaft. Because the differential lock hub is free to turn, the centre differential operates without restrictions and, therefore, it absorbs the difference in speed between the front and rear axle for smooth driving.



- (3) Direct-coupled 4WD (When the 4HLc or 4LLc Position is Selected)

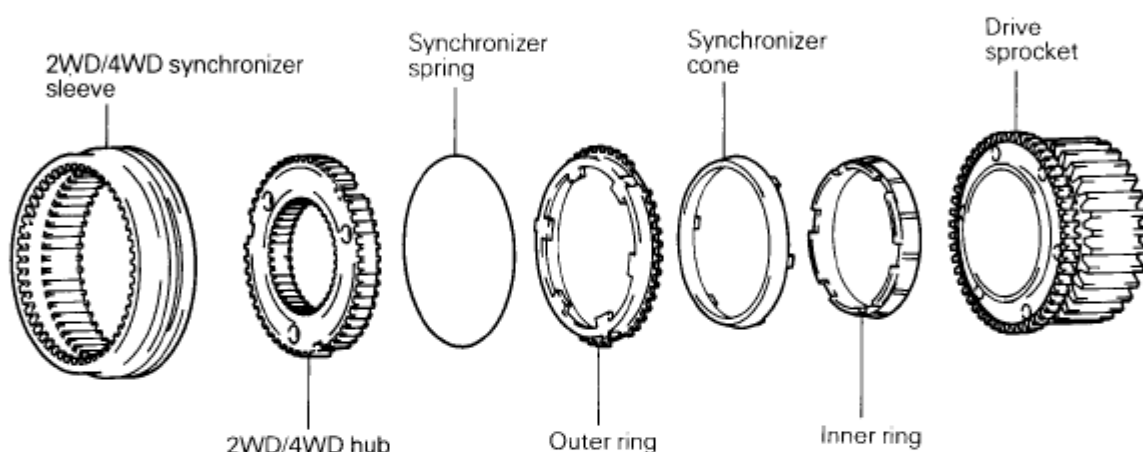
When the 4HLc or 4LLc position is selected, the synchronizer sleeve is in the rightmost position (see illustration) combining the drive sprocket, the 2WD/4WD hub and the differential lock hub.

Under this condition, the transfer drive shaft and the front side gear rotate together (i.e., the centre differential is locked) along with the drive sprocket. This means that both the front and rear drive axles rotate at the same speed.

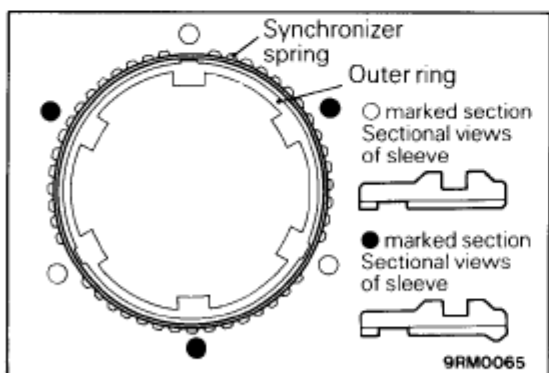
DOUBLE CONE SYNCHRONIZER

The synchronizer used in the 2WD–4WD change-over section is a “double cone synchronizer”.

This synchronizer constructed as illustrated below.



TRM0261



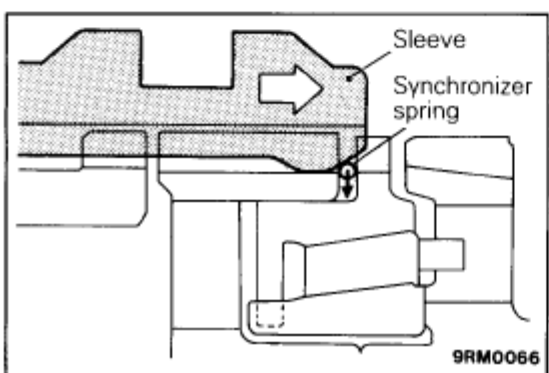
The synchronizer spring is an annulus spring.

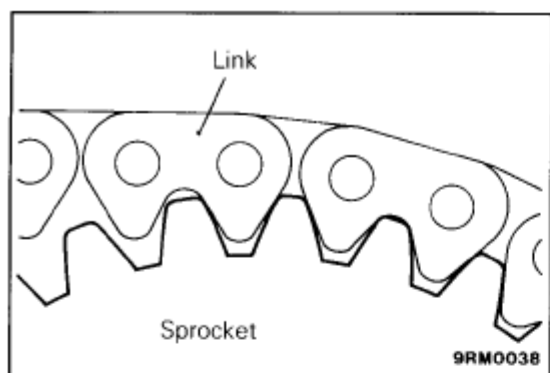
Resting on the projections (indicated by circles ○ in the illustration) on the outer periphery of the outer ring, the spring is in contact with the outer ring.

The synchronizer, on the other hand, also has projections on some of its spline teeth at the end facing the synchronizer spring. These teeth with projection are located at the places that correspond to the midpoints of each space between adjacent projections on the outer ring (these locations are indicated by dots ● in the illustration).

When the synchronizer sleeve moves toward the outer ring, the projections push the spring at the midpoints between outer ring projections. This causes the spring to push the outer ring and thrust pressure is applied to the synchronizer cone surface. When the synchronizer sleeve pushes the spring with a greater force, the projections forces the spring down and the sleeve comes into direct contact with the chamfered section of the outer ring.

In this synchronizer, therefore, the synchronizer spring plays the role of both synchronizer keys and springs in a conventional synchronizer.





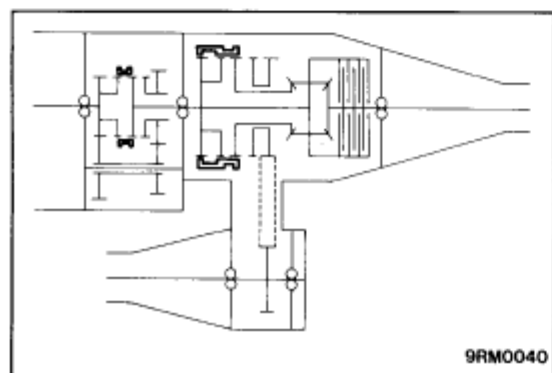
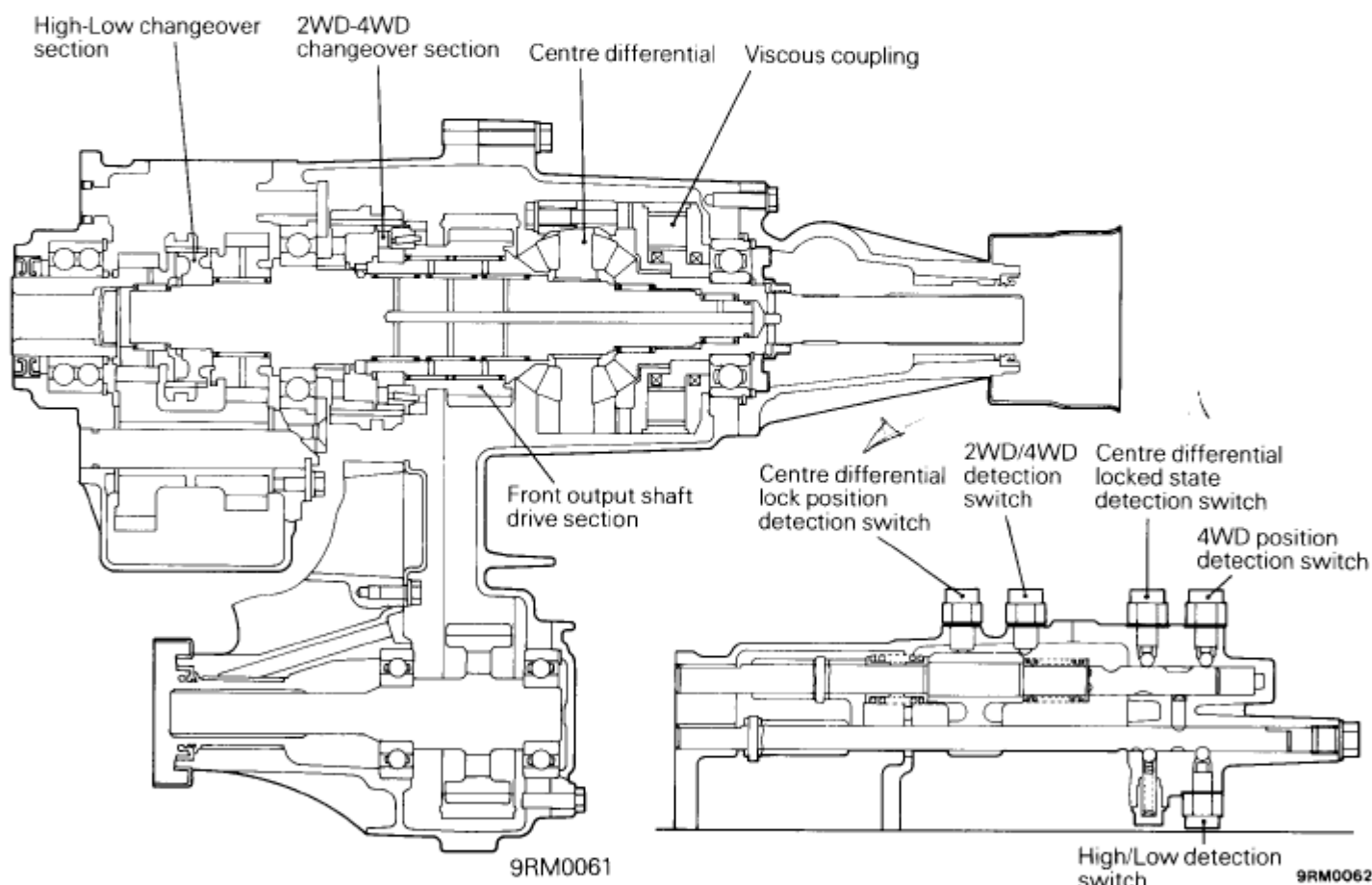
RANDOM CHAIN

The random chain has two kinds of links randomly connected. These links are different in shape so that they contact the sprocket teeth in different ways. This design is effective to reduce the noise when driving the sprocket.

Transfer Section

The transfer used in the Super Select 4WD system consists of a High-Low changeover section, a 2WD-4WD changeover section, a centre differential, a viscous coupling, front output shaft drive section, etc.

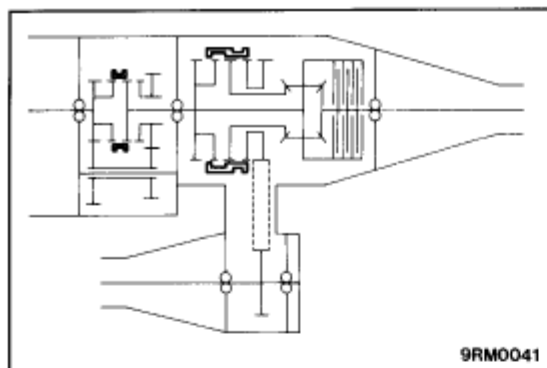
In the gearshift control section, there are detection switches for various controls.



WHEN THE 2H POSITION IS SELECTED

When the 2H position is selected, the High-Low changeover section setting is at "High" and the 2WD-4WD changeover section setting is at "2WD" (the drive sprocket is set free). The engine power arriving at the transfer input gear through the transmission section is directly transmitted to the transfer drive shaft.

This power is then transmitted to the 2WD-4WD changeover section where the differential lock hub is coupled with the 2WD/4WD hub while the drive sprocket remains free. Since the centre differential does not perform its function under this condition, power is only transmitted to the rear output shaft.



9RM0041

WHEN THE 4H POSITION IS SELECTED

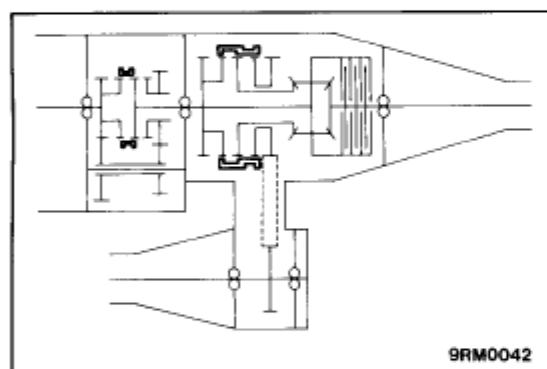
In the 4H position, the High–Low changeover section setting is at “High” and the 2WD–4WD changeover section setting is at “4WD” (the centre differential is not locked).

The engine power arriving at the transfer input gear through the transmission section is directly transmitted to the transfer drive shaft.

This power is then transmitted to the 2WD–4WD changeover section where the 2WD/4WD hub and the drive sprocket are coupled but the differential lock hub remains free. Power is consequently distributed to both the front and rear output shafts via the centre differential.

Since the centre differential does perform the differential function, it absorbs the speed difference between the front and rear output shafts to assure smooth driving.

The viscous coupling in the centre differential functions as a differential limiter which, according to the speed difference, adjusts the torque transfer to both shafts for optimum power distribution.



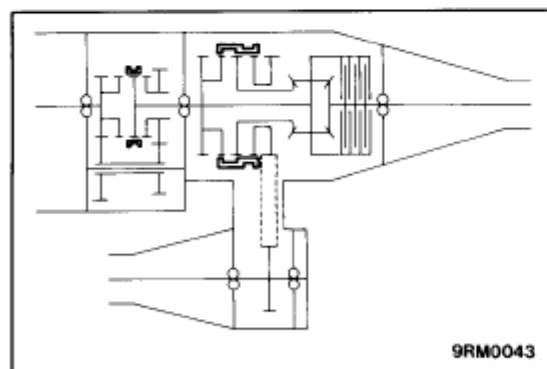
9RM0042

WHEN THE 4HLc POSITION IS SELECTED

In the 4HLc position, the High–Low changeover section setting is at “High” and the 2WD–4WD changeover section setting is at “4WD” (the centre differential is locked).

The engine power arriving at the transfer input gear through the transmission section is directly transmitted to the transfer drive shaft.

This power is then transmitted to the 2WD–4WD changeover section where the 2WD/4WD hub, drive sprocket and differential lock hub are coupled together (i.e., the centre differential is locked). Consequently, the power is distributed evenly to both the front and rear output shafts.



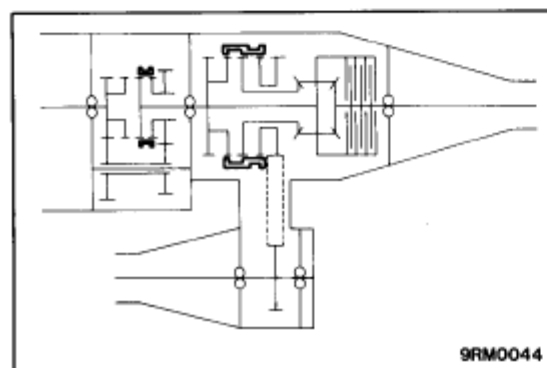
9RM0043

WHEN THE N POSITION IS SELECTED

When the N position is selected, neither the High nor Low gear engages in the High–Low changeover section (the gear is in neutral) and the 2WD–4WD changeover section setting is “4WD” (the centre differential is locked).

The engine power arriving at the transfer input gear through the transmission section is transmitted to the counter gear which runs idle but no further.

This position is used to transfer the power from the counter gear to external apparatus if the vehicle is equipped with a power take-off.



9RM0044

WHEN THE 4LLc POSITION IS SELECTED

When the 4LLc position is selected, the High–Low changeover section setting is at “Low” and the 2WD–4WD changeover section setting is at “4WD” (the centre differential is locked).

The engine power arriving at the transfer input gear through the transmission section is transmitted to the transfer drive shaft via the counter gear.

This power is then transmitted to the 2WD–4WD changeover section where the 2WD/4WD hub, drive sprocket and differential lock hub are coupled together (i.e., the centre differential is locked). As a result, the power is distributed evenly to both the front and rear output shafts.

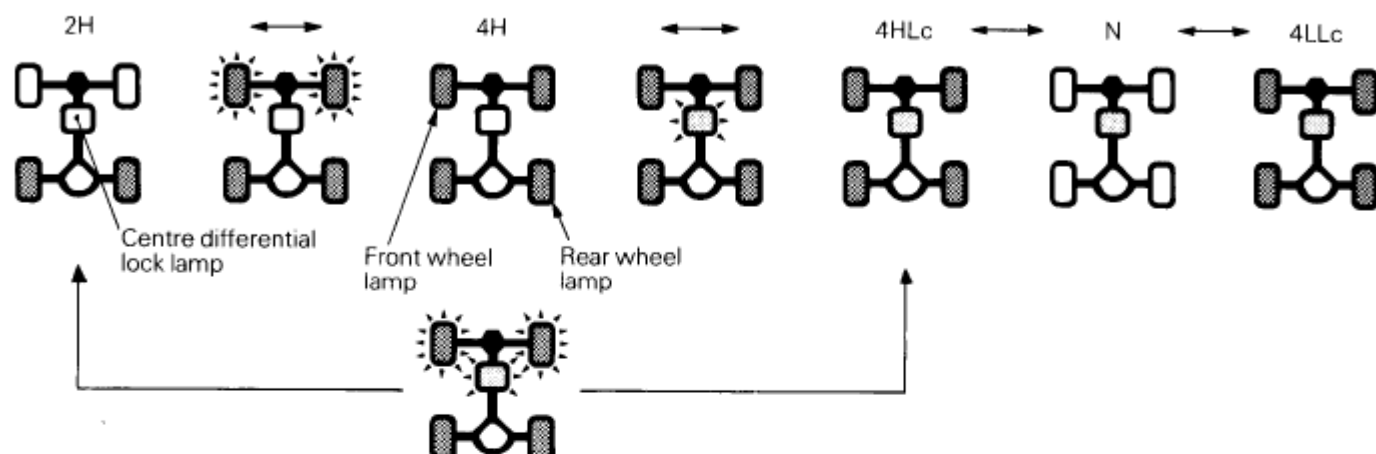
4WD Indicator Control

4WD INDICATOR

The driver can check the state of the drivetrain engagement on the 4WD indicator located in the combination meter panel.

The lamps inside the indicator illuminate to indicate the 2WD, 4WD and locked centre differential states. The lamps flash while selections take place.

The 2WD and 4WD states are respectively indicated by illuminating in green the two rear wheel symbols and all wheel symbols. When the centre differential is locked, the central symbol lamp lights or flashes in amber.



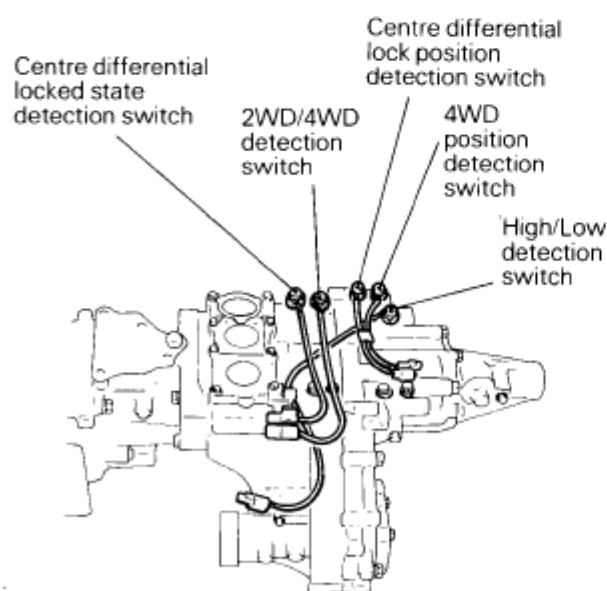
11E0008

4WD INDICATOR CONTROL UNIT

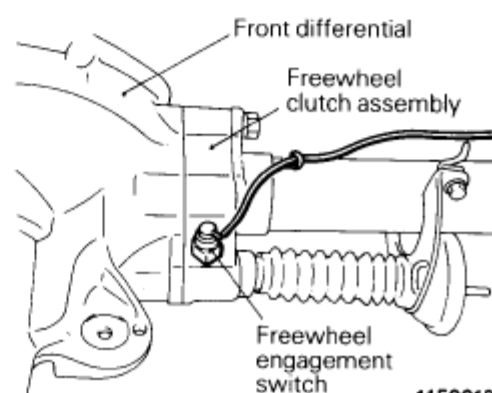
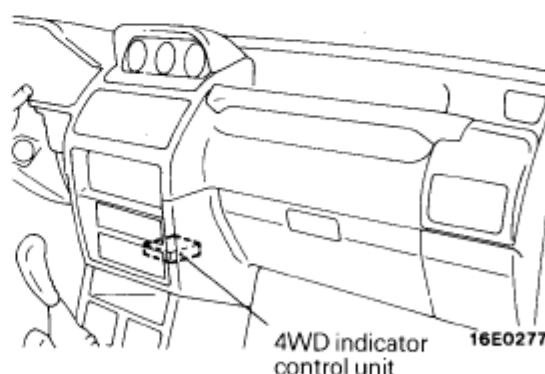
The 4WD indicator control unit controls the illumination of indicator lamps using the ON-OFF signals from the switches located in the transfer and freewheel clutch in order to display the current drivetrain engagement state.

The locations of the switches and control unit are shown in the illustration below.

The relationship between the state of each switch and the illumination of each lamp is shown in the table on the next page.



11E0141



11E0013

INDICATOR LAMP ILLUMINATION TABLE

Transfer shift position		2H	→	4H	→	4HLc	→	4LLc	→	4HLc	→	4H	→	2H	→	→	4HLc	→	→	2H
4WD indicator	Front wheel symbols	OFF	Flash	ON		OFF	ON	OFF		ON	Flash	OFF	Flash	ON	Flash		ON	Flash	OFF	OFF
	Rear wheel symbols			ON		OFF	ON	OFF						ON						
	Centre differential lock symbol	OFF		Flash		ON				Flash		OFF		Flash	ON	Flash		ON	Flash	OFF
Detection switches	4WD position detection switch	OFF				ON						OFF		ON						OFF
	2WD/4WD detection switch	ON				OFF						ON		OFF						ON
	Freewheel engagement switch	OFF				ON						OFF		ON						OFF
	High/Low detection switch		ON			OFF	ON	OFF					ON							
	Centre differential lock position detection switch	OFF				ON				OFF			ON							OFF
	Centre differential locked state detection switch	OFF				ON				OFF			ON							OFF

PART-TIME 4WD SYSTEM

The new part-time 4WD transfer is the same in basic construction as that used in the current PAJERO/MONTERO models which consists of the High-Low changeover section, 2WD-4WD changeover section, etc.

The major improvements the new transfer incorporates are easier control of the transfer shift lever and quieter operation thanks to the employment of a new type drive chain.

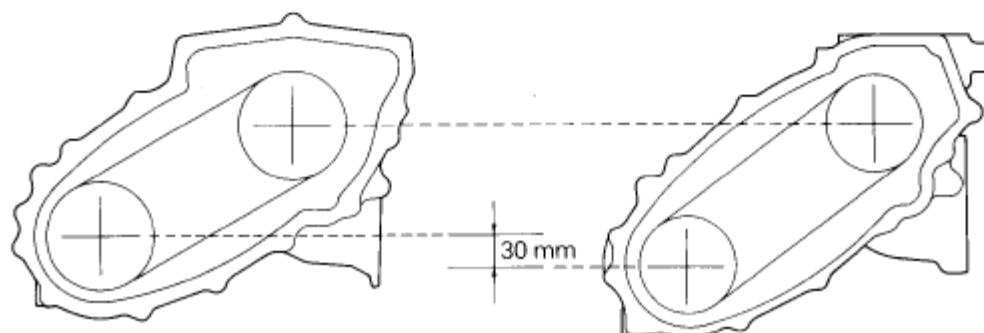
Transfer Case

To increase the minimum ground clearance, the new transfer case has the configuration changed

with the front output shaft axis position raised by approximately 30 mm.

New

Current



9RM0060

Transfer Powertrain

To reduce the chain drive noise, a random chain has been adopted.

In accordance with the adoption of the new type chain, the front and rear output shafts have been adapted to the chain.

Item	Current	New
Number of link type	1	2
Number of links	82	68
Number of sprocket teeth	33	28

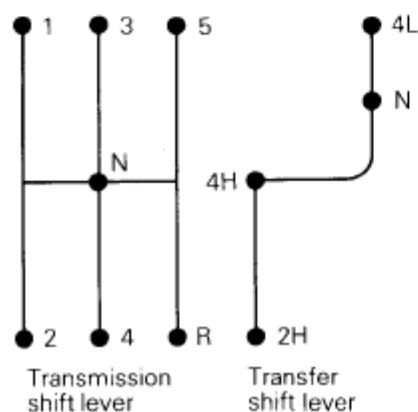
Transfer Gearshift Control

For easier gearshift control, the more frequently used transmission shift lever is positioned on the driver side.

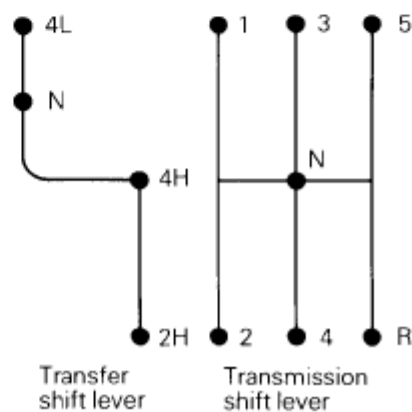
Also, the transfer gearshift pattern is arranged so that the more frequently used 2H and 4H positions are on the same line.

New

L.H. drive vehicles



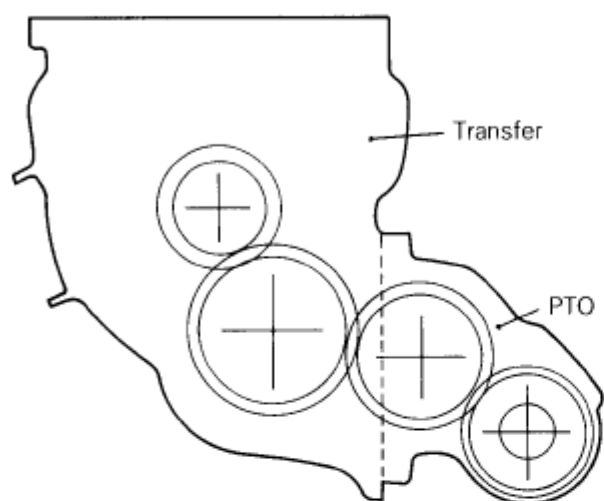
R.H. drive vehicles



Power Take-off (PTO)

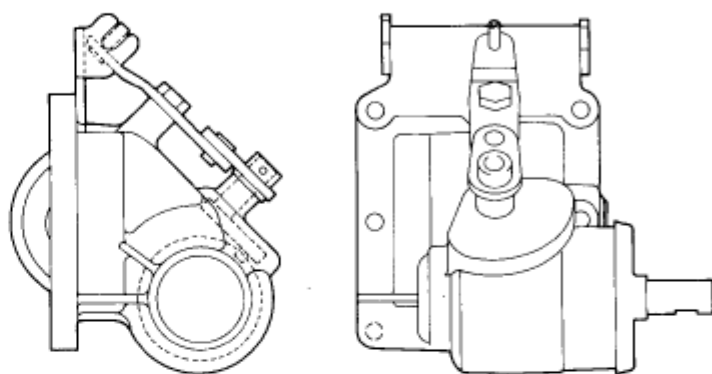
The power take-off, a mechanism used to deliver the engine power to an external apparatus, is located on the side of the transfer case. Similarly to the PTO mechanism used in current models, the end of the PTO shift lever engages with

the PTO output gear sleeve. This is so that the PTO output gear can slide on the PTO output shaft splines according to the shift lever movement to engage with the PTO idler gear.



9RM0053

PTO external views

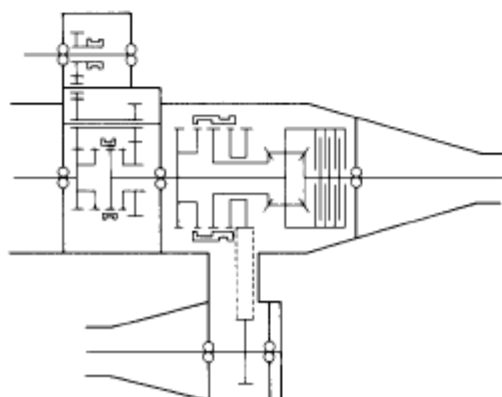


9RM0052

When the transfer shift gear is placed in the N position and the PTO shift lever in the ON position, the engine power from the transmission section arrives at the counter gear in the transfer High-Low

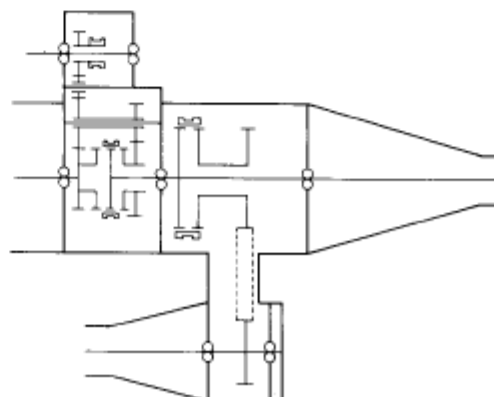
changeover section. This power then flows through the PTO idler gear to the PTO output gear and is finally output from the PTO output shaft.

Super Select 4WD



9RM0046

Part-time 4WD



9RM0045