

PART TIME TRANSFER CASE**3240-01****GENERAL****1. SPECIFICATIONS**

Description		New Part Time T/C
Total length		343 mm
Mating surface of front flange		40 mm
Weight		33.8 kg (without oil)
Oil capacity		1.4 L
Location		Transfer case
Major elements	Housing	Part time & TOD (common)
	Tightening bolt	11 EA, M8 x 1.25
	Input shaft	A/T: External spline M/T: Internal spline
	Ring gear	Inserted into housing groove
	Sun gear	Separated input shaft and sun gear

Modification basis	
Application basis	
Affected VIN	

PART TIME TRANSFER CASE

REXTON 2006.09

DC 5-
SPEEDTGS
LEVERMANUAL
TRANSMISSION

CLUTCH

PART
TIMETORQUE
ONALL
WHEEL

IWE

AXLE

IOP/IRDA
AXLE

PROPELLER

STEERING

SUSPENSION

IRS
SUSPENSION

ELECTRONIC

BRAKE
SYSTEMANTI-
BRAKE

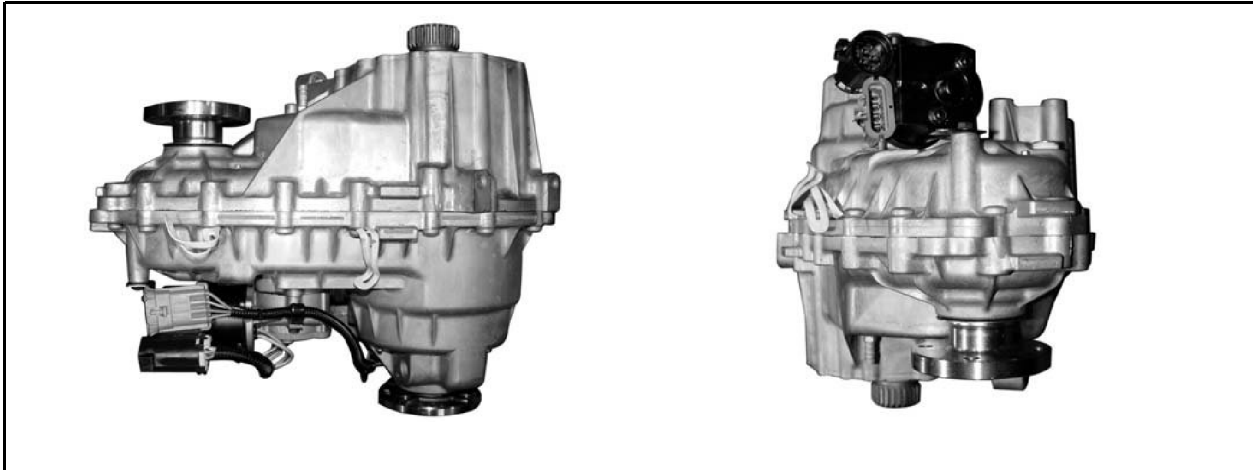
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OVERVIEW AND OPERATION PROCESS

1. OVERVIEW

By using the planetary gear sets, two-gears shift type part time transfer case achieves direct connection when selecting 4WD "HIGH" and 2.48 of reduction gear ratio when selecting 4WD "LOW". The silent chain in transfer case transfers the output power to front wheels.

Simple operation of switches on instrument panel allows to shift to "2H", "4H" and "4L" easily while driving. The warning lamp alarms the driver when the system is defective.

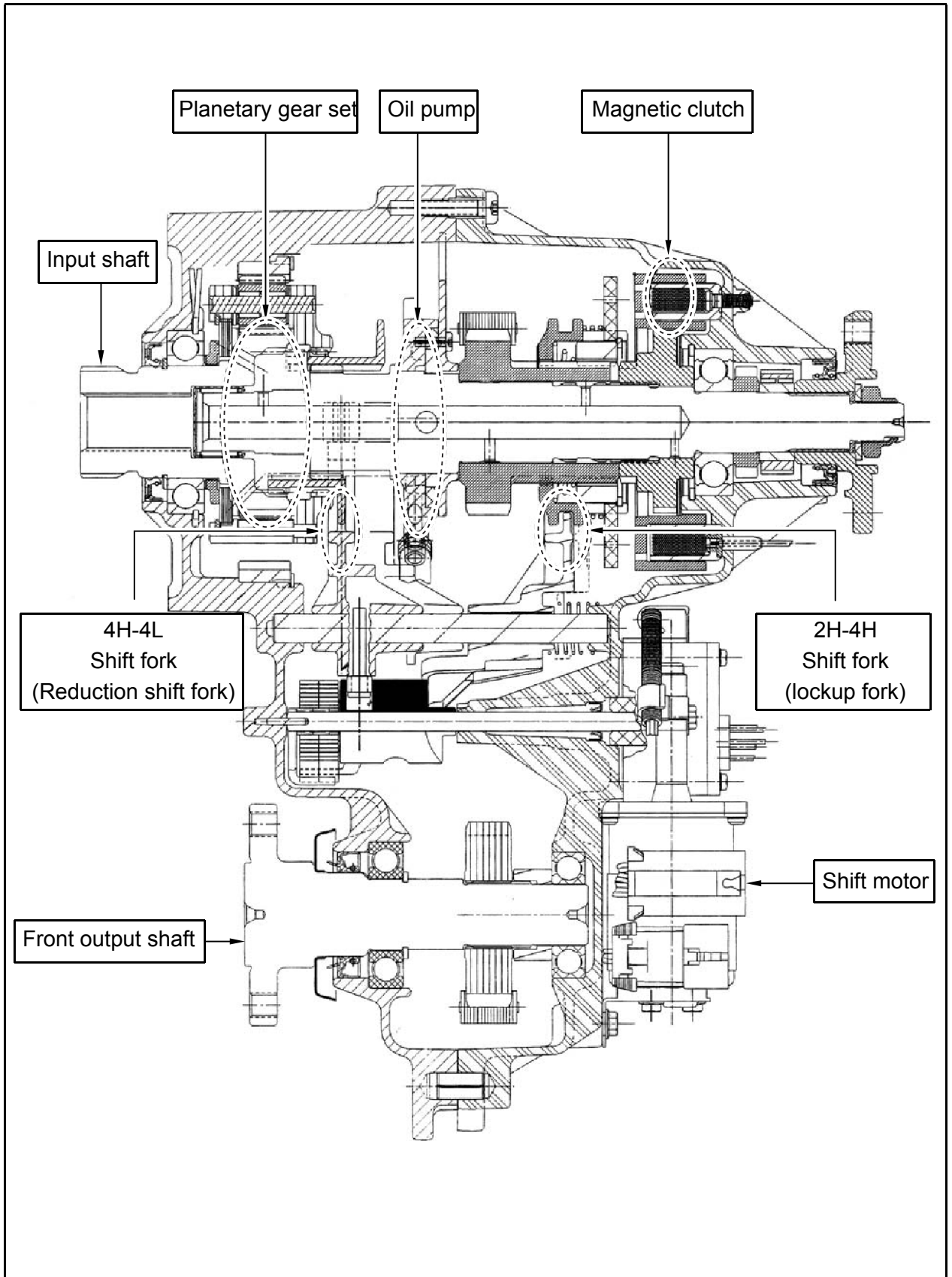


2. OPERATION

Application	Mode Position		Operating Condition
Driving type	2H	2WD Drive (Rear Wheel Drive)	Normal Driving on the normal road and highway, or high speed driving
	4H	4WD Drive (High Speed)	Slippery road such as snow, rainy, sand, mud etc.
	4L	4WD Drive (Low Speed)	Maximum driving force required condition such as towing, rough road. When a vehicle is driven in turning at low speed on the paved road, a vibration and a noise may be occurred by tight corner braking.
When shifting the mode	2H ↔ 4H	2WD Drive ↔ 4WD Drive (High Speed)	It is possible to shift the mode between 2WD and ↔ 4WD without clutch operation under the vehicle speed is below 70 km/h.
	2H, 4H ↔ 4L	2WD Drive, 4WD Drive (High Speed) ↔ 4WD Drive (Low Speed)	Manual Transmission <ul style="list-style-type: none"> Before shifting the mode, stop the vehicle and fully depress the clutch pedal. Automatic Transmission <ul style="list-style-type: none"> Before shifting the mode, stop the vehicle and place the selector lever at [N] position. Note To make the mode shift easier, stop the vehicle, depress the brake pedal, select the mode switch, and move the selector lever with the sequence of [N-P-N].

Modification basis	
Application basis	
Affected VIN	

3. SECTIONAL DIAGRAM



Modification basis	
Application basis	
Affected VIN	

PART TIME TRANSFER CASE

REXTON 2006.09

DC 5-SPEED

TGS LEVER

MANUAL TRANSMISSION

CLUTCH

PART TIME

TORQUE ON

ALL WHEEL

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IOPIRDA AXLE

PROPELLER

STEERING

SUSPENSION

IRS SUSPENSION

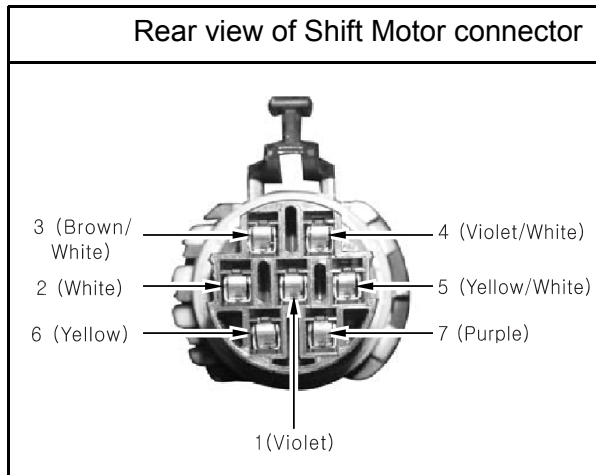
ELECTRONIC

BRAKE SYSTEM

ANTI-BRAKE

► Shift Motor

When selecting a position in 4WD switch, the shift control unit exactly changes the motor position to 2H, 4H and 4L by the position encoder in control unit that monitors motor position.

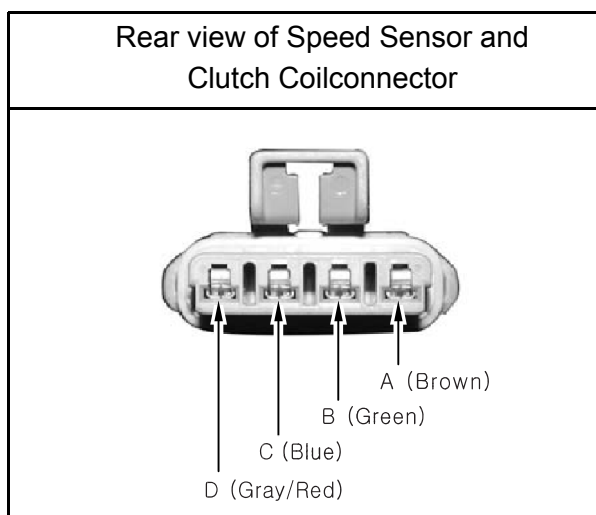


Pin	Function
1	Position A
2	Position B
3	Position C
4	Position D
5	Position ground
6	Control (4L - 4H - 2H)
7	Control (2H - 4H - 4L)

► Speed Sensor and Clutch Coil

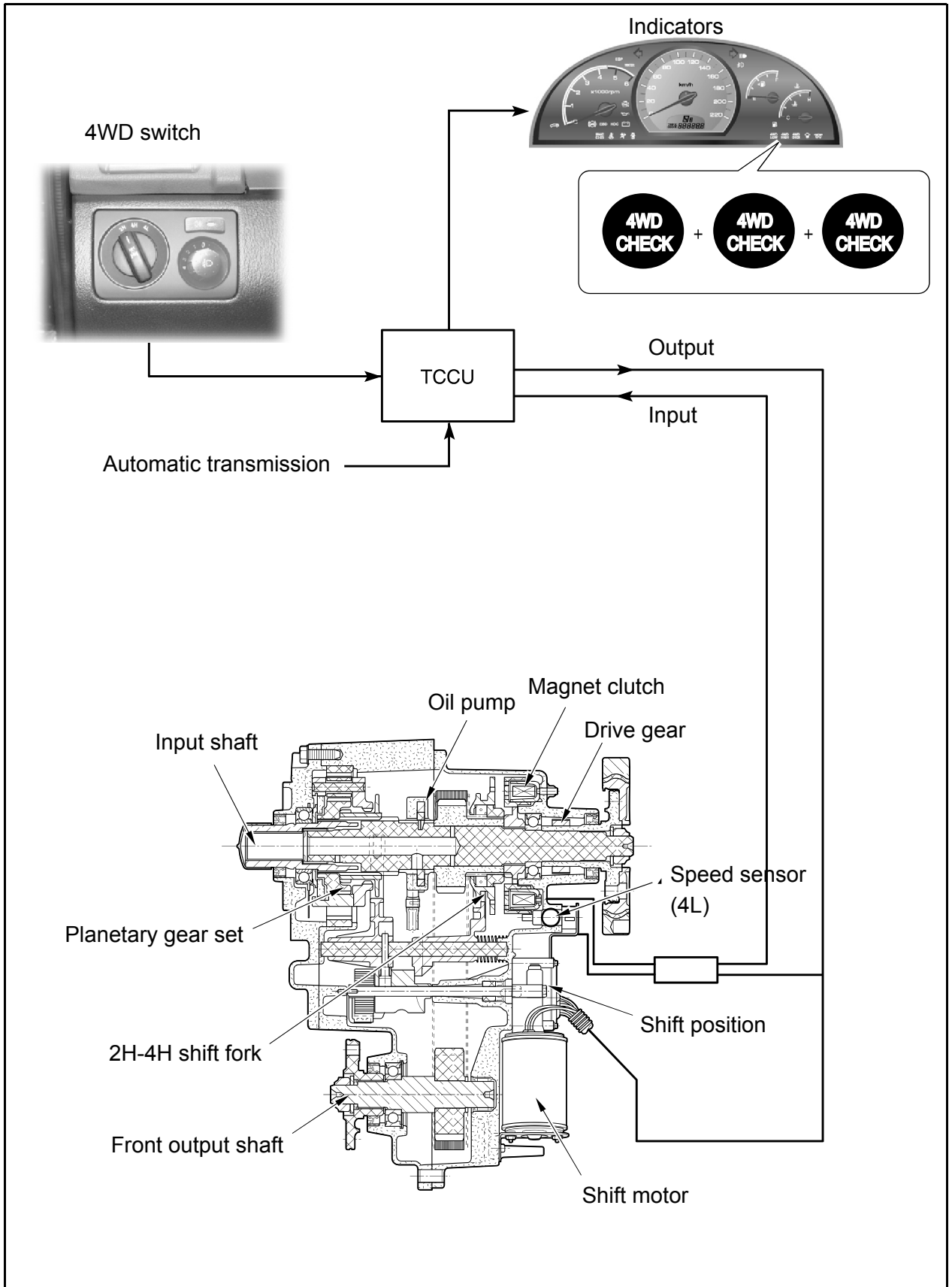
The rear speed sensor utilizes the hall effect. It generates 0V and 5V of square type digital wave according to the rotation of the wheel with teeth of transfer case rear output shaft. The speed signal from rear propeller shaft is entered into control unit.

When the control unit determines that 4WD HIGH operation is available, electric current flows into the clutch coil. The coil magnetized by this electric current pull in the lockup hub to engage into output spline. Accordingly, the power is transferred to front wheels.



Pin	Function
A	Clutch coil
B	Sensor power (5V)
C	Sensor signal
D	Sensor ground

4. SYSTEM LAYOUT



Modification basis	
Application basis	
Affected VIN	

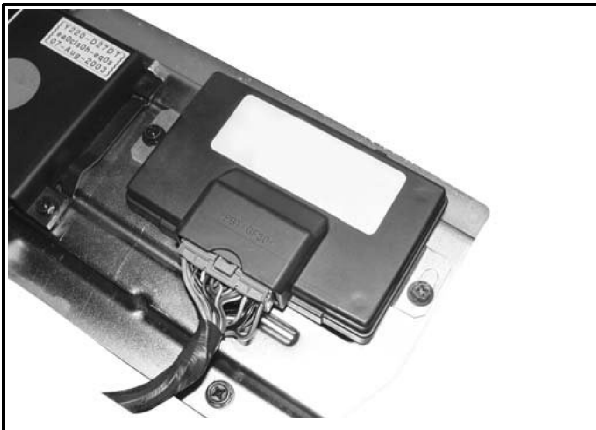
PART TIME TRANSFER CASE

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- DC 5-SPEED
- TGS LEVER
- MANUAL TRANSMISSION
- CLUTCH
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- SUSPENSION
- IRS SUSPENSION
- ELECTRONIC
- BRAKE SYSTEM
- ANTI-BRAKE

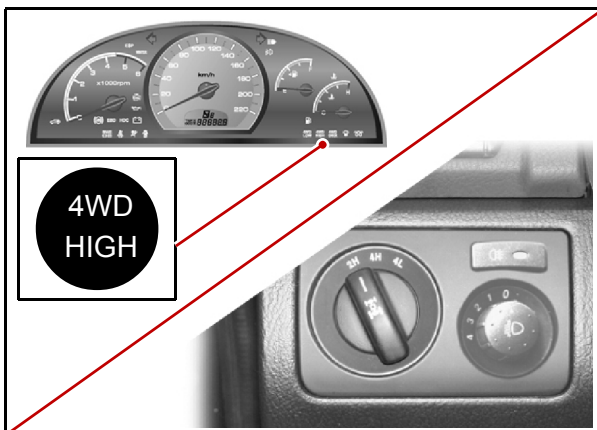
5. SYSTEM OPERATION

1) TRANSFER CASE CONTROL UNIT (TCCU)



► 4WD Operation

TCCU is located under the driver's seat and permits the vehicle to shift from two-wheel drive to four-wheel drive (and back shift) according to drivers switch operation during driving (For the shifting between 4WD HIGH and 4WD LOW, stop the vehicle).



1. 2H → 4H

- Change the 4WD switch in instrument panel from 2H to 4H.
- This shift is available during driving.
- "4WD HIGH" indicator in meter cluster comes on.

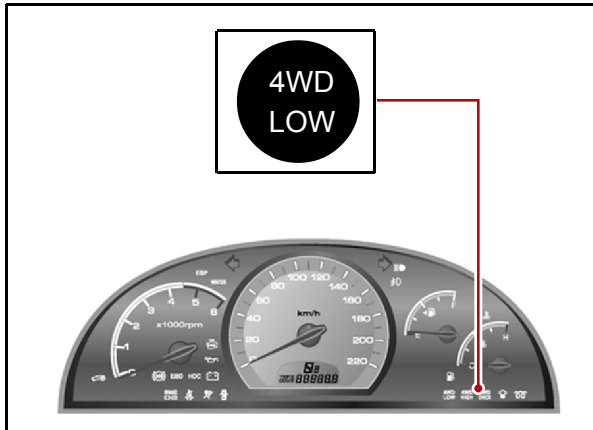
When the system is defective

- 4WD CHECK" warning lamp comes on

2. 4H → 2H

- Change the 4WD switch in instrument panel from 4H to 2H.
- This shift is available during driving.
- "4WD HIGH" indicator in meter cluster goes out.
- "4WD CHECK" warning lamp comes on when the system is defective.

Modification basis	
Application basis	
Affected VIN	



3. 4H → 4H

- This function is only available when the speed signal from speed sensor is about to stop (below 2 km/h).
- This function is only available when clutch pedal is depressed (manual transmission) or selector lever is selected to "N" position (automatic transmission). (TCCU must recognize the clutch pedal signal or "N" signal.)
- Change the 4WD switch in instrument panel from 4H to 4L.
- "4WD LOW" warning lamp in meter cluster flickers during this process, then goes out when the shift is completed.
- "4WD CHECK" warning lamp comes on when the system is defective.

Modification basis	
Application basis	
Affected VIN	

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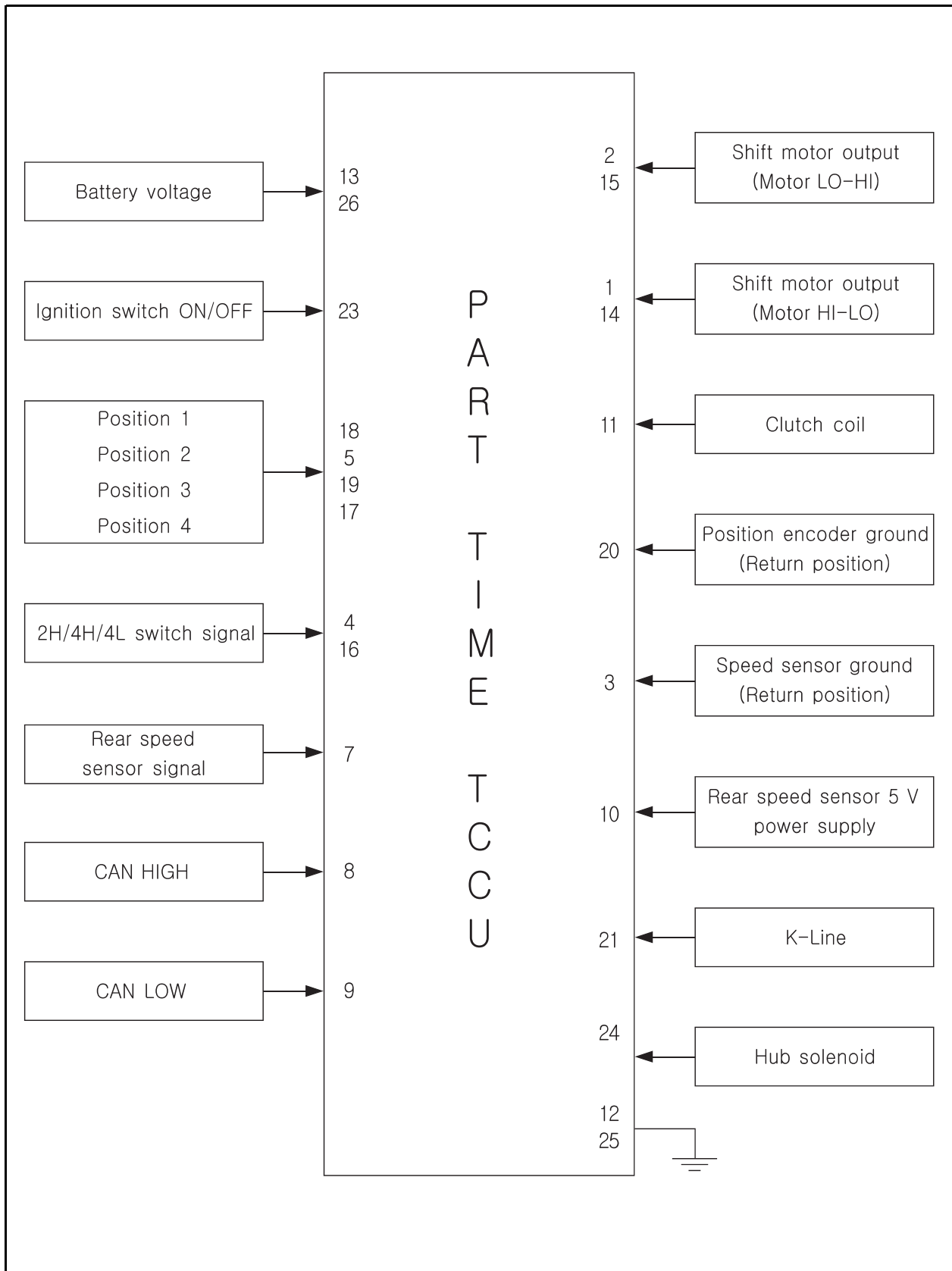
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NICBRAKE
SYSTEMANTI-
BRAKE

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2) Transfer Case Block Diagram



Modification basis	
Application basis	
Affected VIN	

Section	Pin No.	Name	Description
Power supply	12, 25	Ground	Part time TCCU ground
	13, 26	B+	Part time TCCU battery voltage input
Input side	23	Ignition switch	Ignition switch voltage : ON – above 4V, OFF – below 0.9 V
	18	Position 1	Position encoder : recognize shift motor position HIGH – above 4 V, LOW – below 0.9 V
	5	Position 2	Same a above
	19	Position 3	Same a above
	17	Position 4	Same a above
	4, 16	2H, 4H, 4L switch	Mode input by 2H, 4H, 4L selection : HIGH – above 4V, LOW – below 0.9 V
	7	Rear speed sensor	Rear speed sensor (Hall effect) signal input
Both sides	8	CAN HIGH	CAN bus HIGH line
	9	CAN LOW	CAN bus LOW line
	21	K – LINE	Connected to diagnosis connector
Output side	10	Speed sensor voltage	Supply 5V to front and rear speed sensors
	1, 14	Motor HI-LO	Motor output port - Connected to battery when shifting to LO from HI - Connected to ground when shifting to HI from LO or when braking the motor
	2, 15	Motor LO-HI	Motor output port - Connected to battery when shifting to HI from LO - Connected to ground when shifting to LO from HI or when braking the motor
	11	EMC	Supply voltage to clutch coil - Max. current: 9 A
	20	Position ground (return)	Provide ground to position encoder
	3	Speed ground (return)	Provide ground to speed sensor
	24	Hub solenoid	Supply voltage to hub solenoid

Modification basis	
Application basis	
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3) TCCU System

(1) Position Encoder

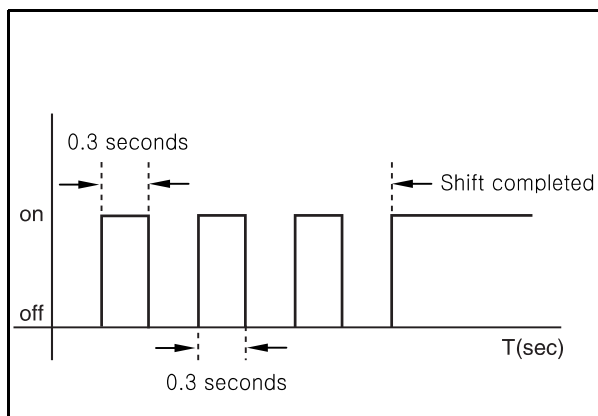
The position encoder is the code that TCCU can determine the shift motor position.

Position Code				Motor Position	Remark
1	2	3	4		
0	0	0	0	Left stop	Input voltage 1 : above 4.5 V (HIGH) 0 : below 0.5 V (LOW)
1	0	1	0	2 H	
0	0	1	0	Zone 1	
0	1	1	0	Zone 2	
0	0	1	0	Zone 3	
0	0	1	1	4 H	
0	0	0	1	Zone 4	
1	0	0	1	Zone 5	
1	0	0	0	Zone 6	
1	1	0	0	4 L	
0	0	0	0	Right stop	
1	1	1	1	Encoder OFF	

(2) Operation

► TCCU initialization and operation

- TCCU sends relevant data to meter cluster via CAN to diagnose and check the indicators when the ignition switch is turned to ON. At this time, the 4WD indicators (4WD LOW and 4WD HIGH) comes on for 0.6 seconds.
- TCCU starts diagnosis by operating clutch and hub solenoid for 1.5 seconds.
- If the selector switch position and the shift motor position code does not match when the IG power is turned ON, the shift is controlled to move in the direction of the selector switch position.
- The shift operation is controlled to move only toward selector switch position if the selector switch position is not met with shift motor position code when the ignition switch is turned to ON.



► Function of indicating lamp during shifting

- As the operation of shift motor starts, the indicator flickers in interval of 0.3 seconds and stops after the shifting operation is completed or cancelled.
- Operation diagram of "4H" indicator when changing the switch to 4H from 4L.
- Operation diagram of "4L" indicator when changing the switch to 4L from 2H/4H.

► Shift conditions

Shift operation is only allowed when some conditions are satisfied. These shift conditions should be satisfied for 2 seconds before starting motor. The motor has three seconds of delay at its initial operation to do trouble diagnosis.

Once the motor starts, the shift conditions are no longer checked.

Shift conditions are as follows:

- Normal battery voltage and shift motor for all gears
- 2H and 4H shifts has nothing to do with vehicle speed, "N" position in automatic transmission or clutch signal.
- Shift operation between 2H/4H and 4L is only available when the vehicle speed is below 46 km/h.
- No defective speed sensor

► Motor controls

- The shift steps have the sequence of 2H → 4H → 4L and 4L → 4H → 2H. TCCU operates the shift motor until it reads required position code. If it detects the faulty code, the system is operated with the compensation mode.
- Once the shift operation is started, it is completed regardless of ignition power. If there are not operating signals from position sensor, the shifting failure due to timeout occurs. This failure appears when the shifting time between 2H and 4H and between 4H and 4L is delayed over 5 seconds compared to normal shift. Once the shifting time exceeds the specified time, TCCU cannot properly supply the voltage to shift motor and is operated in compensation mode.
- Even though the system recognize a fault before motor starts, it is considered as fault.
- Motor stops operation when it reaches at target range.

► Synchronization

Synchronization occurs during shifting from 2WD (2H) to 4WD (4H or 4L). The synchronizer clutch and hub solenoid are controlled during synchronization as follows:

- Clutch coil operates when the selector changes from 2H to 4H/4L.
- Shift motor moves in 4H mode.
- Hub solenoid starts its operation 4 seconds after shifted to 4H.
- Clutch coil stops its operation 5 seconds after the hub solenoid is activated.

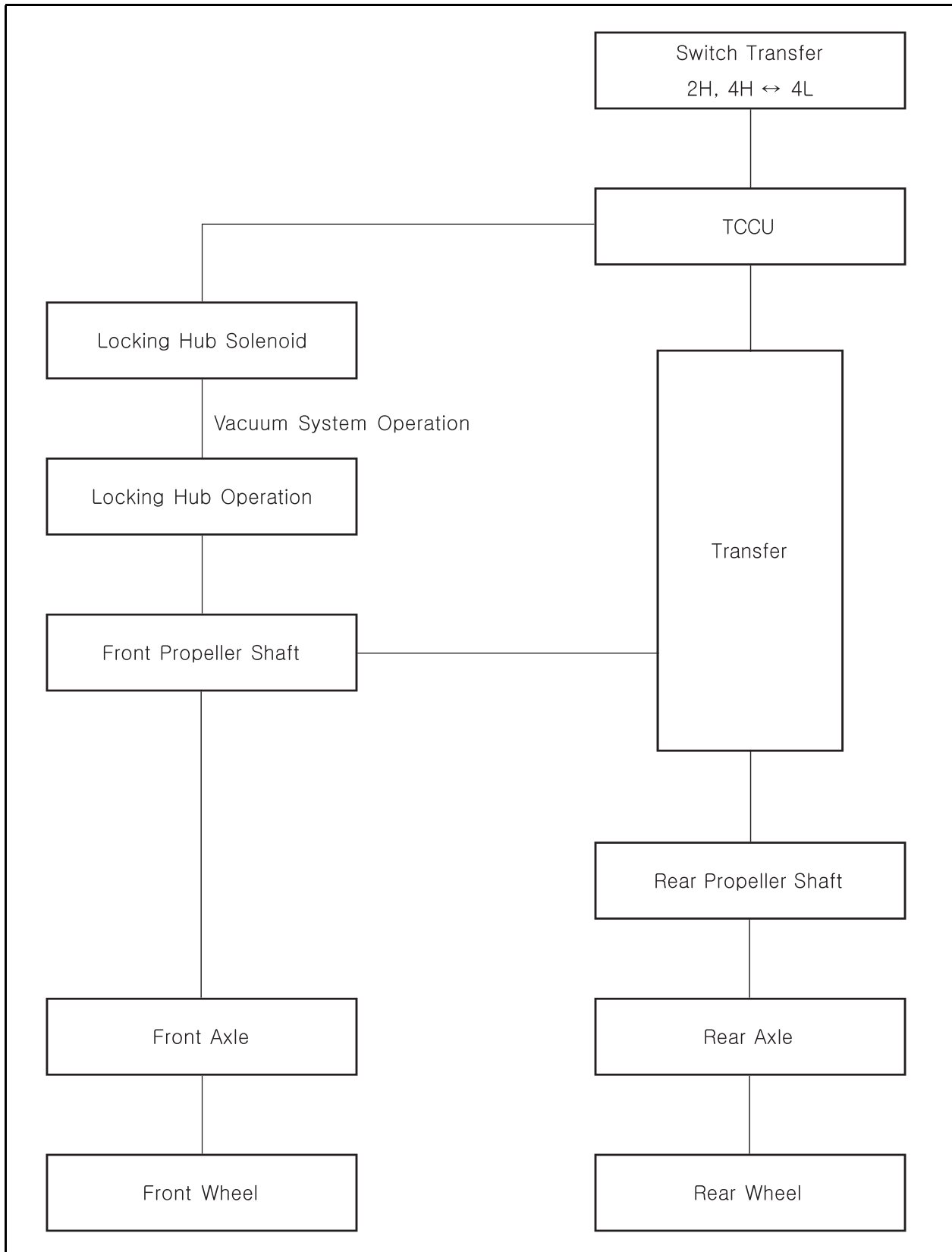
► Compensation

The motor stops when the encoder related troubles are detected during shift operation. It moves toward LOW-HIGH direction for 5 seconds so that the motor is not left in unidentified position.

Modification basis	
Application basis	
Affected VIN	

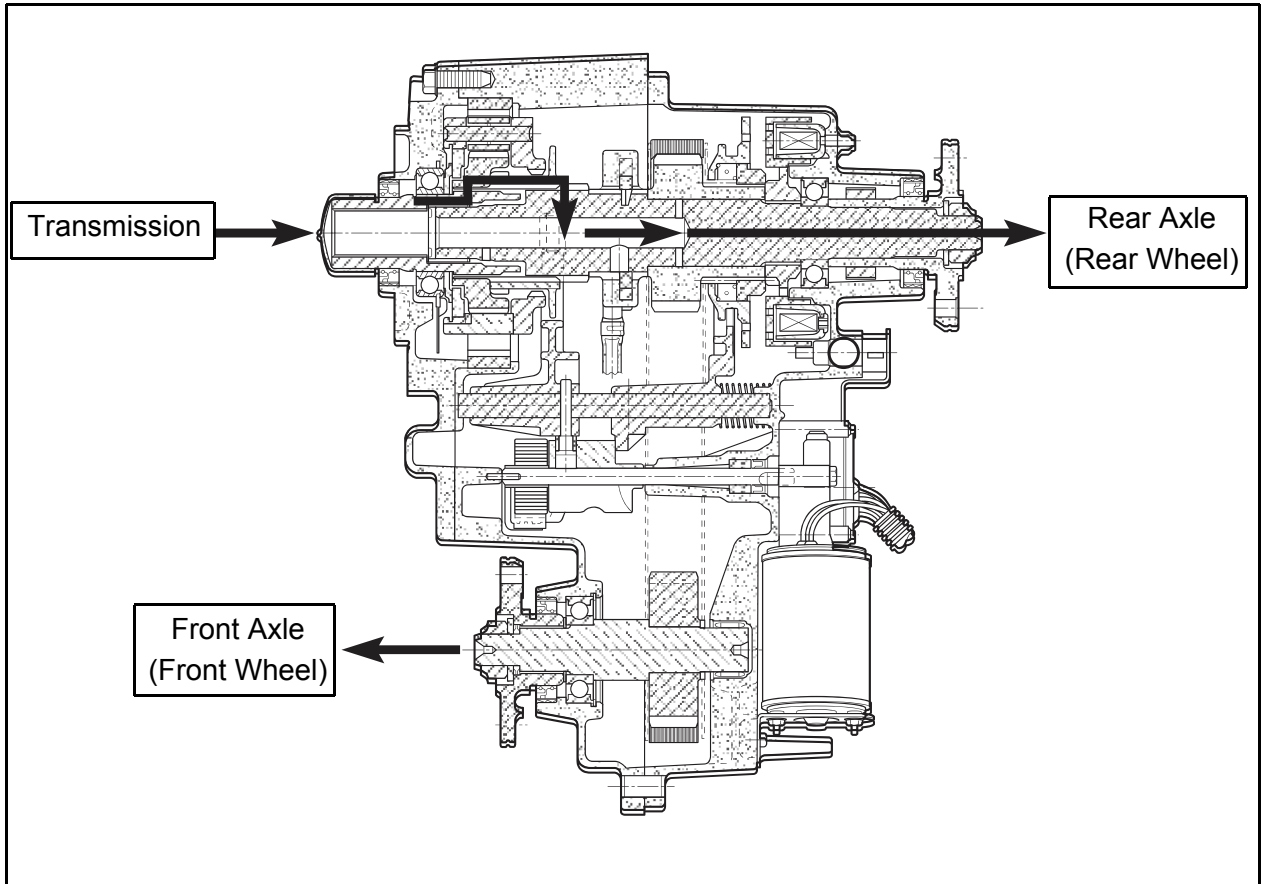
6. POWER FLOW

▶ POWER FLOW

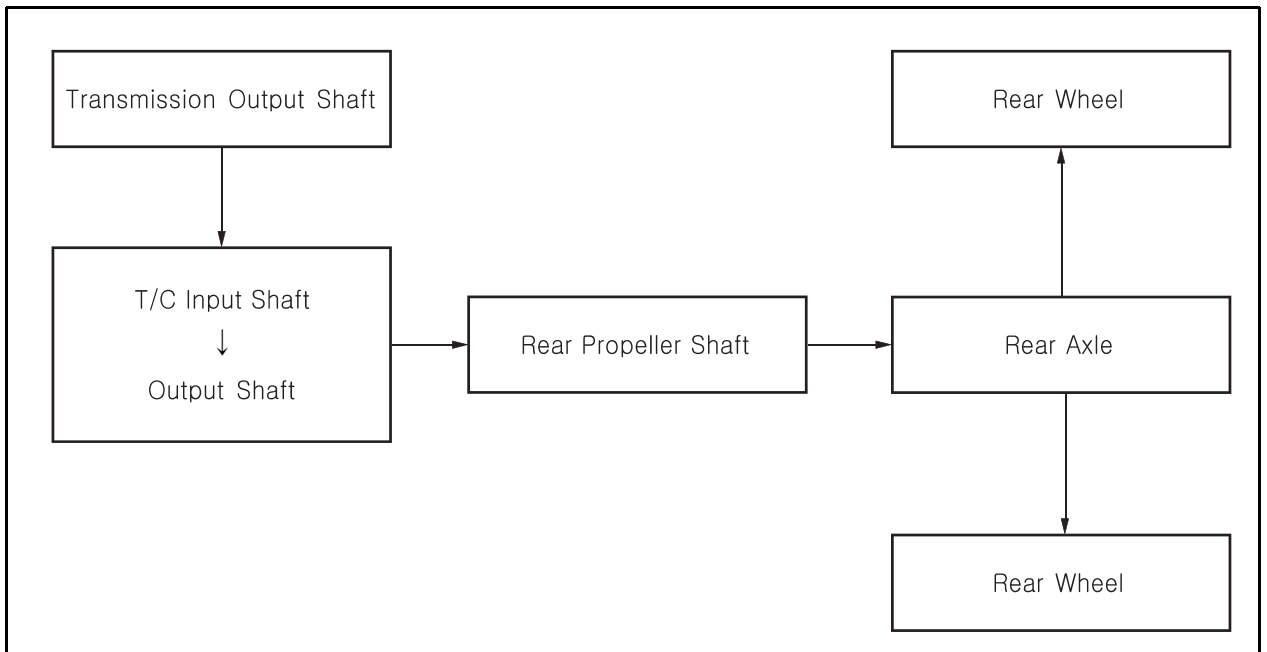


Modification basis	
Application basis	
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1) 2H MODE (REAR WHEEL DRIVE)



► Power Flow



Modification basis	
Application basis	
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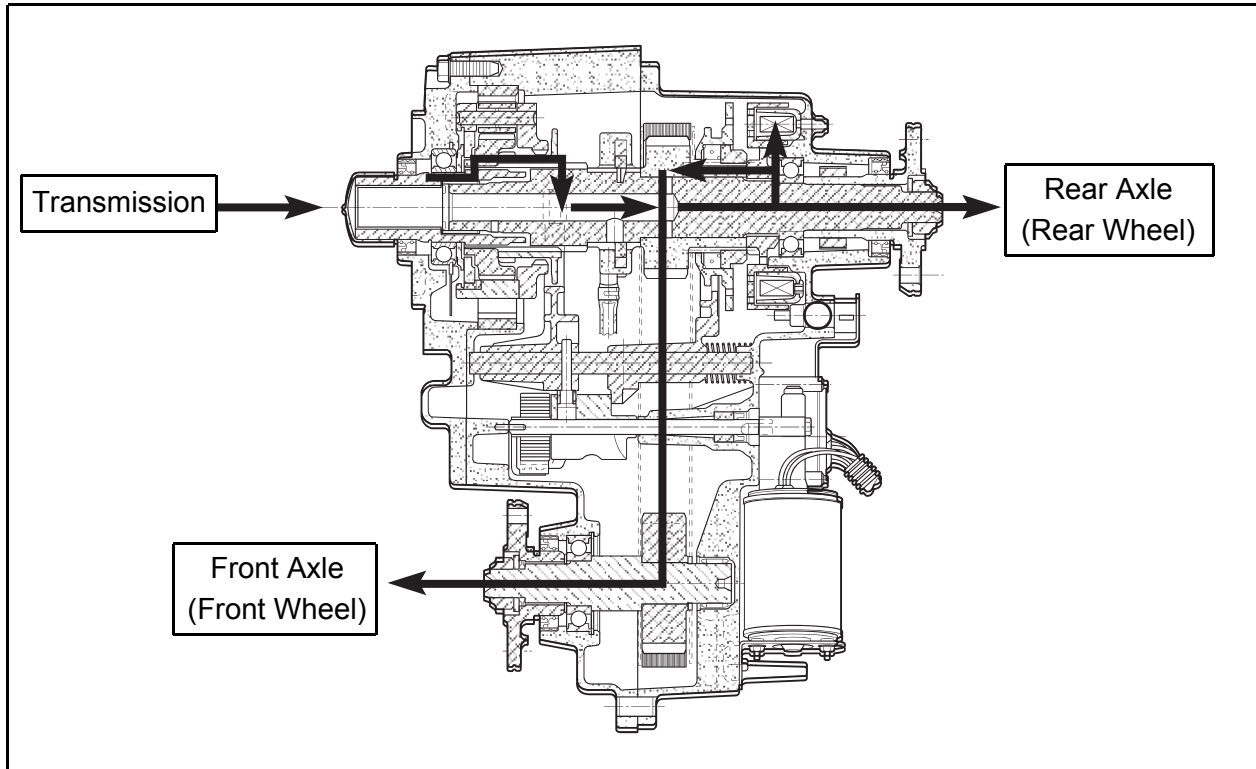
IRS SUSPENSION

ELECTRONIC

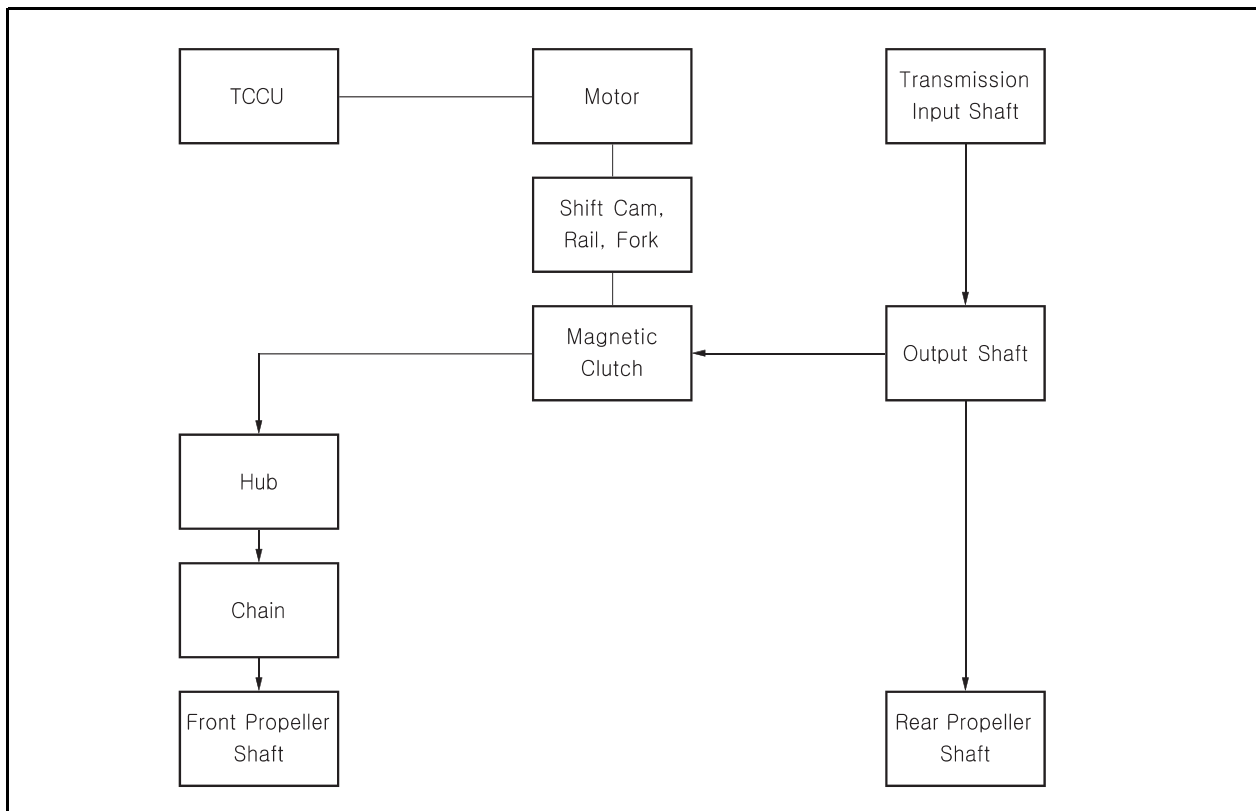
BRAKE SYSTEM

ANTI-BRAKE

2) 4H MODE (4WD DRIVE - HIGH SPEED)

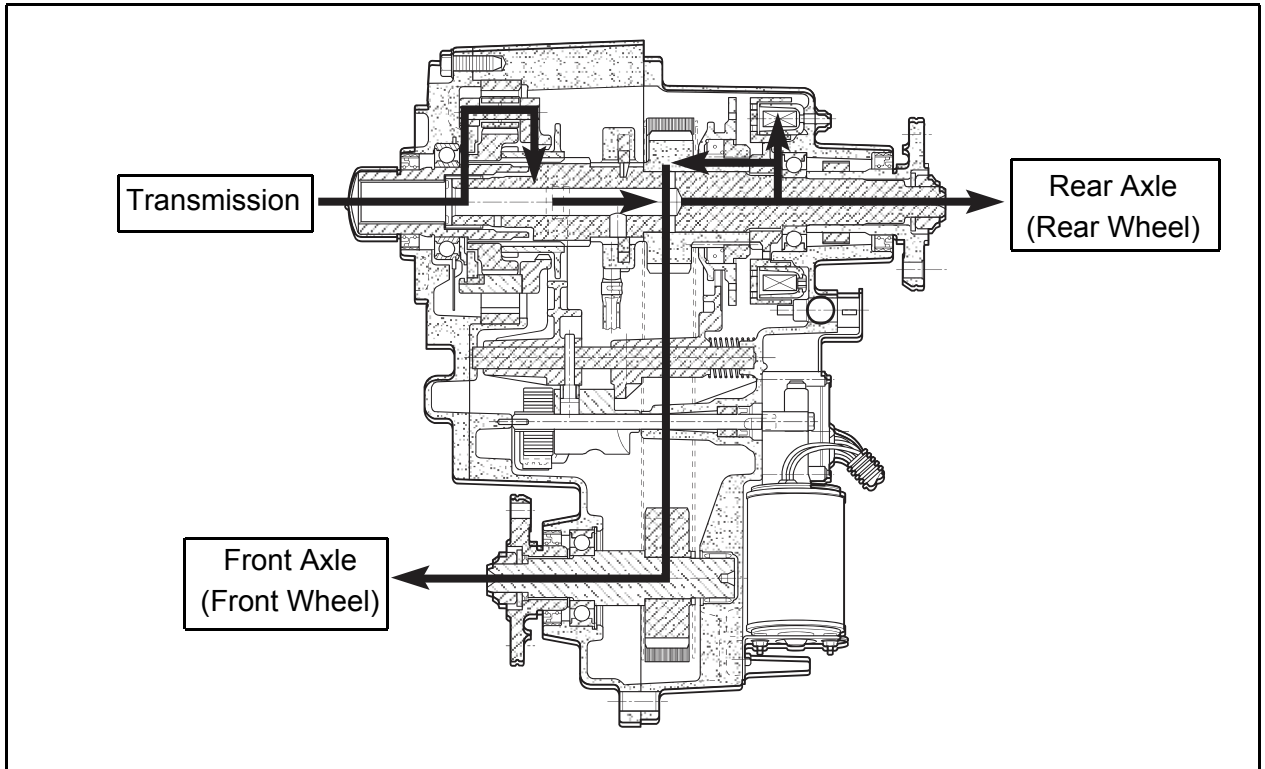


► Power Flow

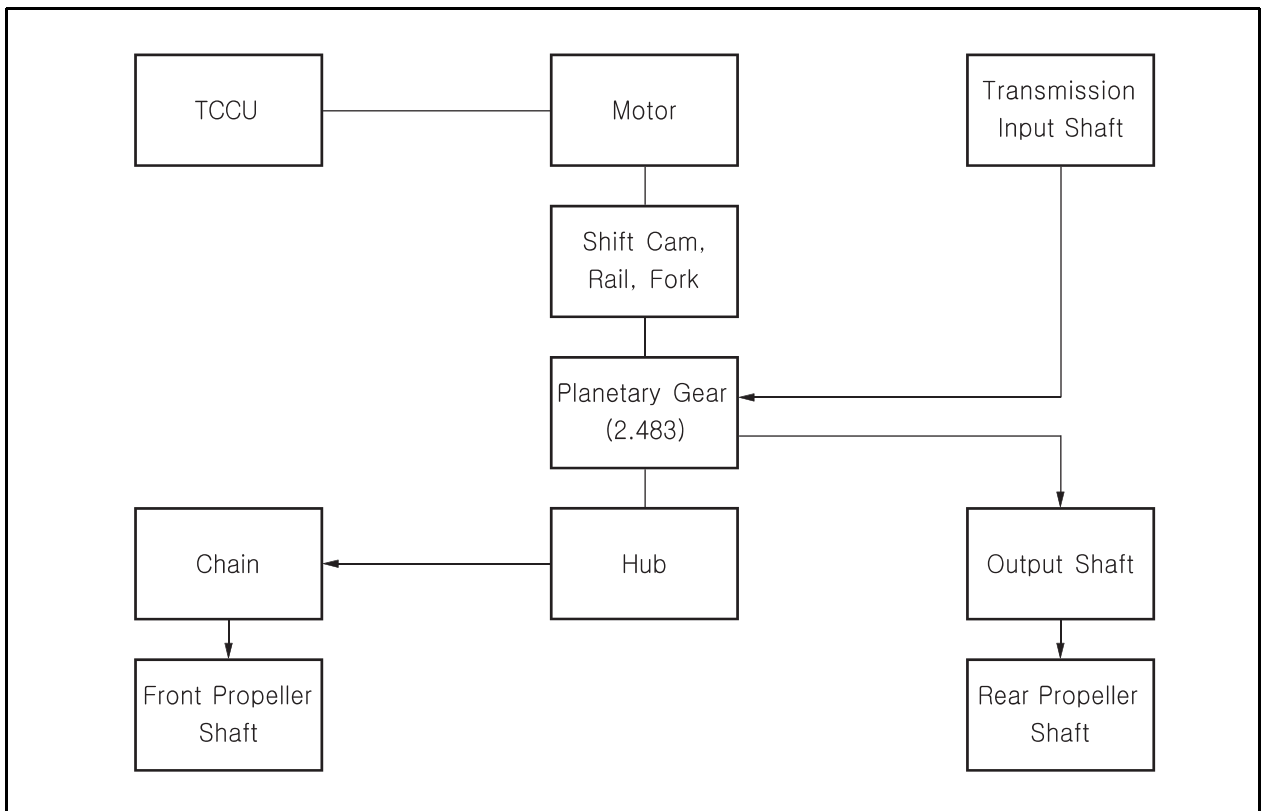


Modification basis	
Application basis	
Affected VIN	

3) 4L MODE (4WD DRIVE - LOW SPEED)



► Power Flow



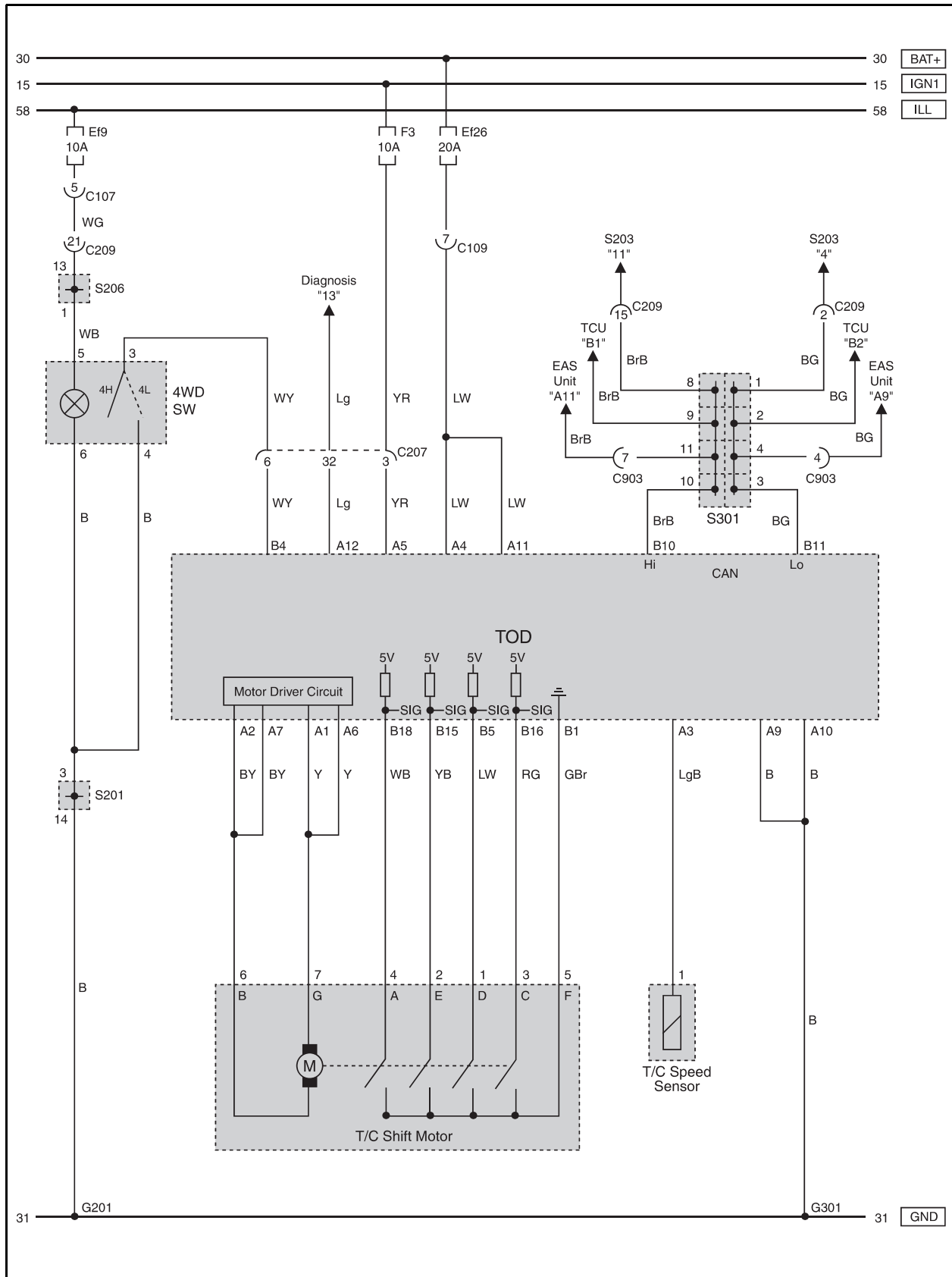
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7. CIRCUIT DIAGRAM (DI & 5-SPEED A/T)



Modification basis	
Application basis	
Affected VIN	