

SECTION 5D1

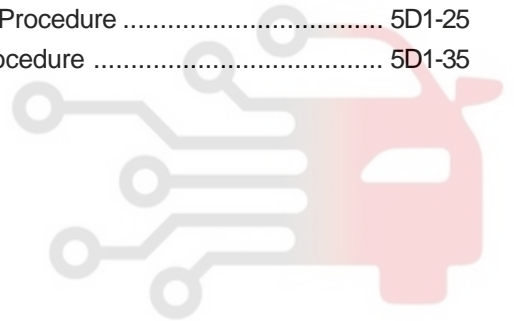
PART TIME - T/C

TABLE OF CONTENTS

General Information and Operation	5D1-2	Transfer Case Assembly	5D1-17
4WD Operation Overview	5D1-2	Disassembly and Assembly	5D1-18
System Structure	5D1-3	Maintenance and Repair	5D1-20
2H Mode (Rear Wheel Drive)	5D1-5	On-Vehicle Service	5D1-20
4H Mode (4WD Drive - High Speed)	5D1-6	Maintenance of Transfer Case Lubricant	5D1-20
4H Mode (4WD Drive - Low Speed)	5D1-7	4H and 4L Indicator	5D1-21
System Description	5D1-8	TCCU Inspection	5D1-21
Specifications	5D1-9	Transfer Case Assembly	5D1-22
Diagnostic Information and Procedures	5D1-10	TCCU	5D1-24
General Diagnosis	5D1-10	Unit Repair	5D1-25
Self-Diagnosis Test	5D1-11	Disassembly Procedure	5D1-25
Diagnostic Diagram	5D1-15	Assembly Procedure	5D1-35
Component Locator	5D1-16		
Cross Sectional View	5D1-16		

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SECTION 5D2

TRANSFER CASE - TOD

TABLE OF CONTENTS

General Operation and Description	5D2-2	Diagnostic Trouble Code (DTC) 1714	5D2-34
TOD System Function	5D2-2	Diagnostic Trouble Code (DTC) 1715	5D2-36
4WD Operation Overview	5D2-3	Diagnostic Trouble Code (DTC) 1716	5D2-38
System Structure	5D2-4	Diagnostic Trouble Code (DTC) 1721	5D2-40
4H Mode (4WD Drive - High Speed)	5D2-5	Diagnostic Trouble Code (DTC) 1722	5D2-42
4L Mode (4WD Drive - Low Speed)	5D2-7	Diagnostic Trouble Code (DTC) 1731	5D2-44
Specifications	5D2-9	Diagnostic Trouble Code (DTC) 1732	5D2-46
Tightening Specifications	5D2-10	Diagnostic Trouble Code (DTC) 1733	5D2-48
Component Locator	5D2-11	Diagnostic Trouble Code (DTC) 1734	5D2-50
Transfer Case Cross Sectional View	5D2-11	Diagnostic Trouble Code (DTC) 1735	5D2-52
Transfer Case Assembly	5D2-13	Diagnostic Trouble Code (DTC) 1736	5D2-54
Function Description	5D2-14	Diagnostic Trouble Code (DTC) 1741	5D2-56
TOD System Select Mode	5D2-14	Diagnostic Trouble Code (DTC) 1742	5D2-58
Component Function	5D2-14	Diagnostic Trouble Code (DTC) 1743	5D2-60
Definition fo Terminology	5D2-16	Diagnostic Trouble Code (DTC) 1750	5D2-61
Control Unit	5D2-18	Diagnostic Trouble Code (DTC) 1751	5D2-63
System Operation	5D2-20	Diagnostic Trouble Code (DTC) 1752	5D2-64
Diagnosis	5D2-30	Diagnostic Trouble Code (DTC) 1753	5D2-65
Diagnostic Tests	5D2-24	Diagnostic Trouble Code (DTC) 1754	5D2-66
Coding on TOD	5D2-25	Maintenance and Repair	5D2-67
Schmatic Wiring Diagram	5D2-27	On-Vehicle Service	5D2-67
TOD Control Unit Diagnostic System Check	5D2-28	Transfer Case (TOD) Component Locator	5D2-67
Diagnostic Trouble Codes (DTC's)	5D2-29	Transfer Case Assembly	5D2-68
4WD Check Indicator Stays on with Ignition		TOD Control Unit	5D2-70
Switch on	5D2-30	Shift Motor	5D2-70
4WD Low Indicator Stays on with Ignition		Speed Sensor in Front and Rear Propeller Shaft	5D2-71
Switch on	5D2-31	Unit Repair	5D2-74
No 4WD Check or 4WD Low Indicator with		Transfer Case Assembly	5D2-76
Ignition Switch on	5D2-32	Special Tools and Equipment	5D2-89
4WD Low Indicator Blink Steadily	5D2-33	Special Tools Table	5D2-89

GENERAL INFORMATION AND OPERATION

TOD system means the full time 4WD system and the registered trade mark of Borg Warner. TOD is an abbreviation of Torque On Demand.

TOD control unit automatically tailors torque distribution to road, offering full time four wheel drive. TOD distributes electronically-controlled power into front and rear wheels whose ratio change from 0 : 100 to 50 : 50 complying with wheel speed differences.

Also TOD control unit analyzes data from wheel speed sensor and engine output then changes pressure of electromagnetic clutch. This pressure controls front propeller shaft and power to front wheel. Power to front wheel depends on degree of pressure corresponding clutch slip.

TOD is designed to distribute the power to front and rear axle by operation of 4H/4L switch and shift motor. Shifting 4WD high (4H) to 4WD low (4L) is performed towards reducing high-low collar by means for connection high-low shift fork with output shaft in order to join with planetary gear. Torque transmits input shaft then sun gear rotating front planetary gear. Front planetary gear joins with output shaft and drives at low position.

The TOD system has 2 selectable mode, 4H and 4L. 4H is the normal operating mode when drive of which gear ratio is 1:1 and 4L mode distributes power to front and rear wheels 50 : 50 of which gear ratio is 2.48:1.

TOD SYSTEM FUNCTION

4H Mode

The TOD system transfer case controls the clutch mechanism to comply with rotation in front and rear propeller shaft and if its difference exceeds the permissible range, corresponding power is distributed into front wheel through electromagnetic clutch (EMC).

Hall effect speed sensors are located front and rear propeller shafts, send signals to TOD transfer case control unit (TCCU). The EMC coil is activated by variable current on exceeding difference of speed in front and rear propeller shafts.

4L Mode

When select 4L mode, EMC is locked to apply maximum torque into front and rear propeller shafts. Shift motor rotates also 4L position by rotation of cam thus propeller shaft torque changes from 1:1 to 2.48:1 by planetary gear set.

Transfer Case Control Unit (TCCU)

Transfer case control unit (TCCU) receives, front and rear propeller shaft speed, shift motor position and 4H/4L switch signals and controls electromagnetic clutch (EMC), shift motor. TCCU communicates with scan tool with K-line for diagnosis. It located under the front LH seat.

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4WD OPERATION OVERVIEW

Application	Mode Position		Operation Condition
Driving Type	4H	4WD Drive(High Speed)	Normal Driving on the normal road or highway, or high speed driving Slipped road such as snow, rainy, sand, mud etc.
	4L	4WD Drive(Low Speed)	Max driving force requiring condition such as towing, rough road. Same function as part time transfer case 4L.
Transferring	4H ↔ 4L	4WD Drive High Speed ↔ Low Speed	A vehicle should stop for transfer. Manual Transmission <ul style="list-style-type: none"> Transfer starts after the vehicle stops and the clutch is applied Automatic Transmission <ul style="list-style-type: none"> Transfer starts after the vehicle stops and the shift lever is shifted [N] position.

Notice: After the vehicle stops and the mode switch is selected with applying the brake pedal, shifting [N-R-N] makes the mode transfer easier.

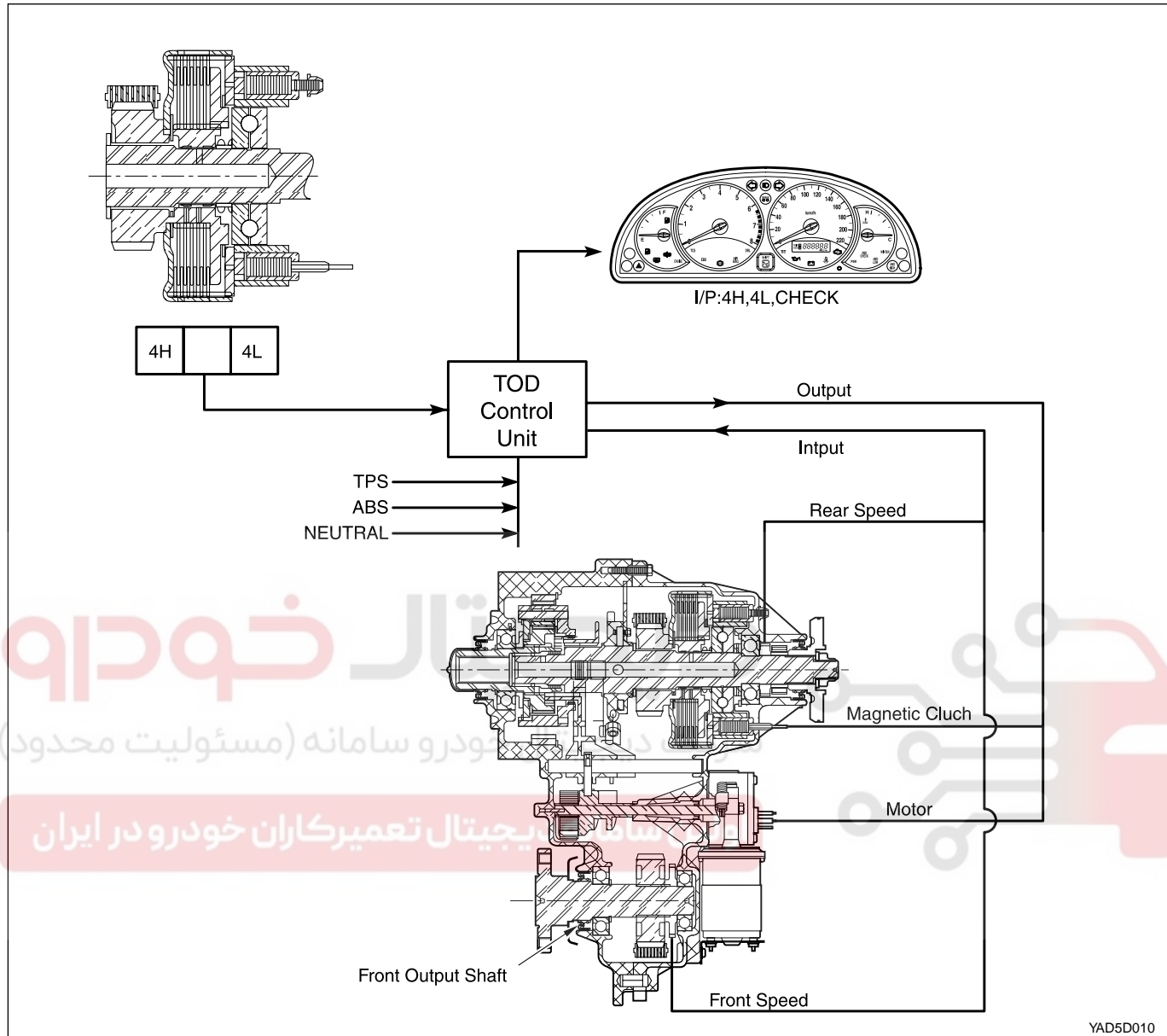
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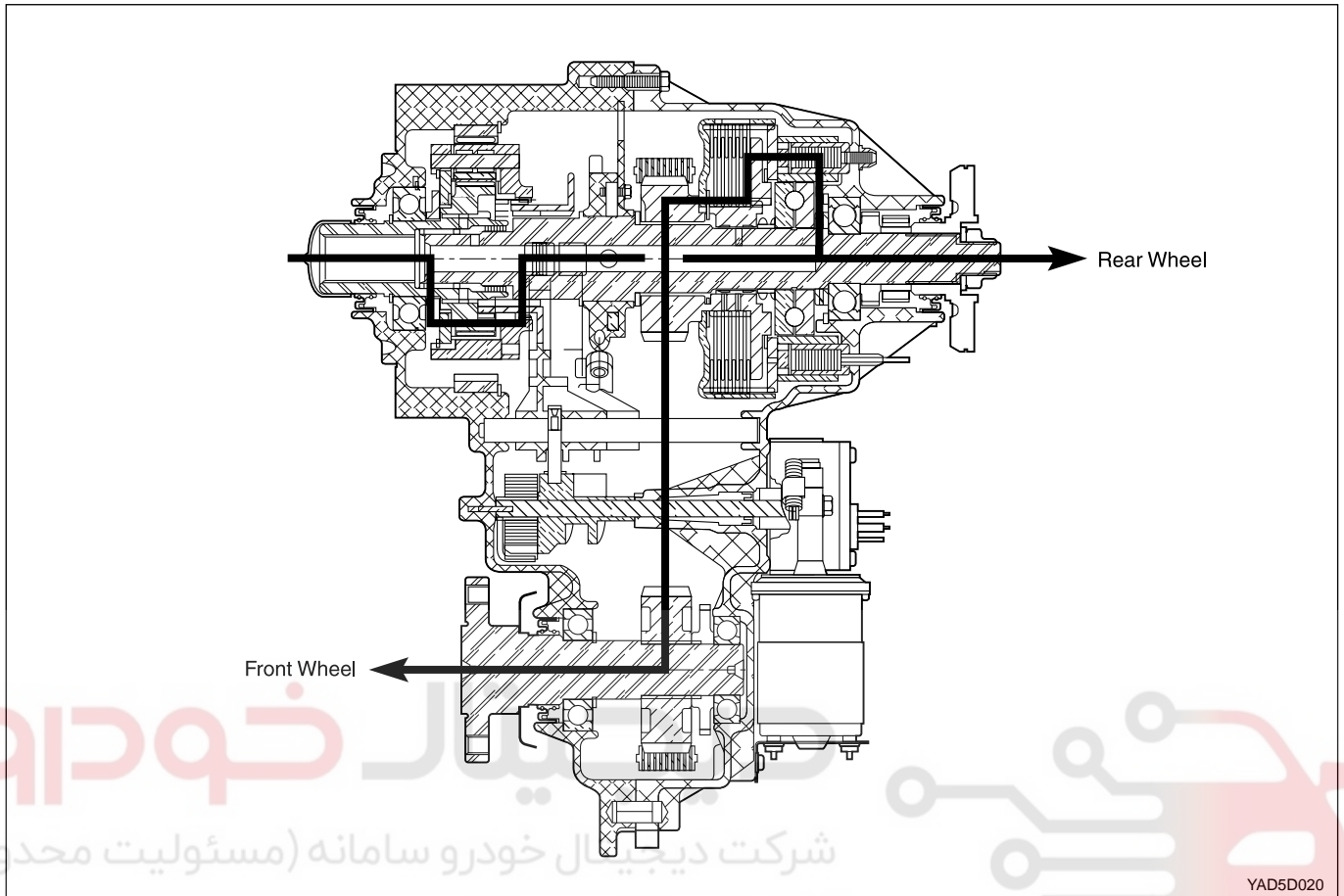
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SYSTEM STRUCTURE



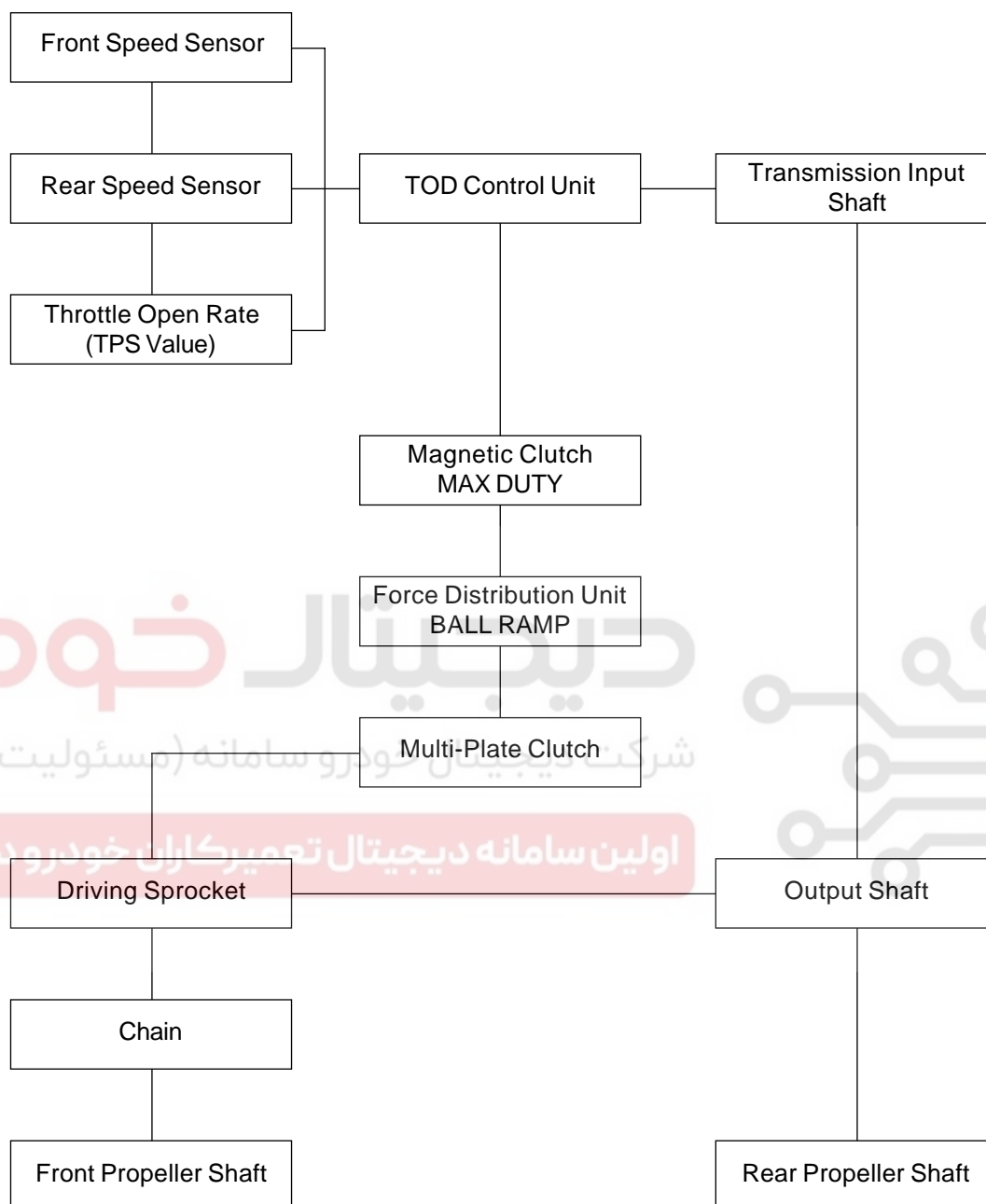
4H MODE (4WD DRIVE - HIGH SPEED)



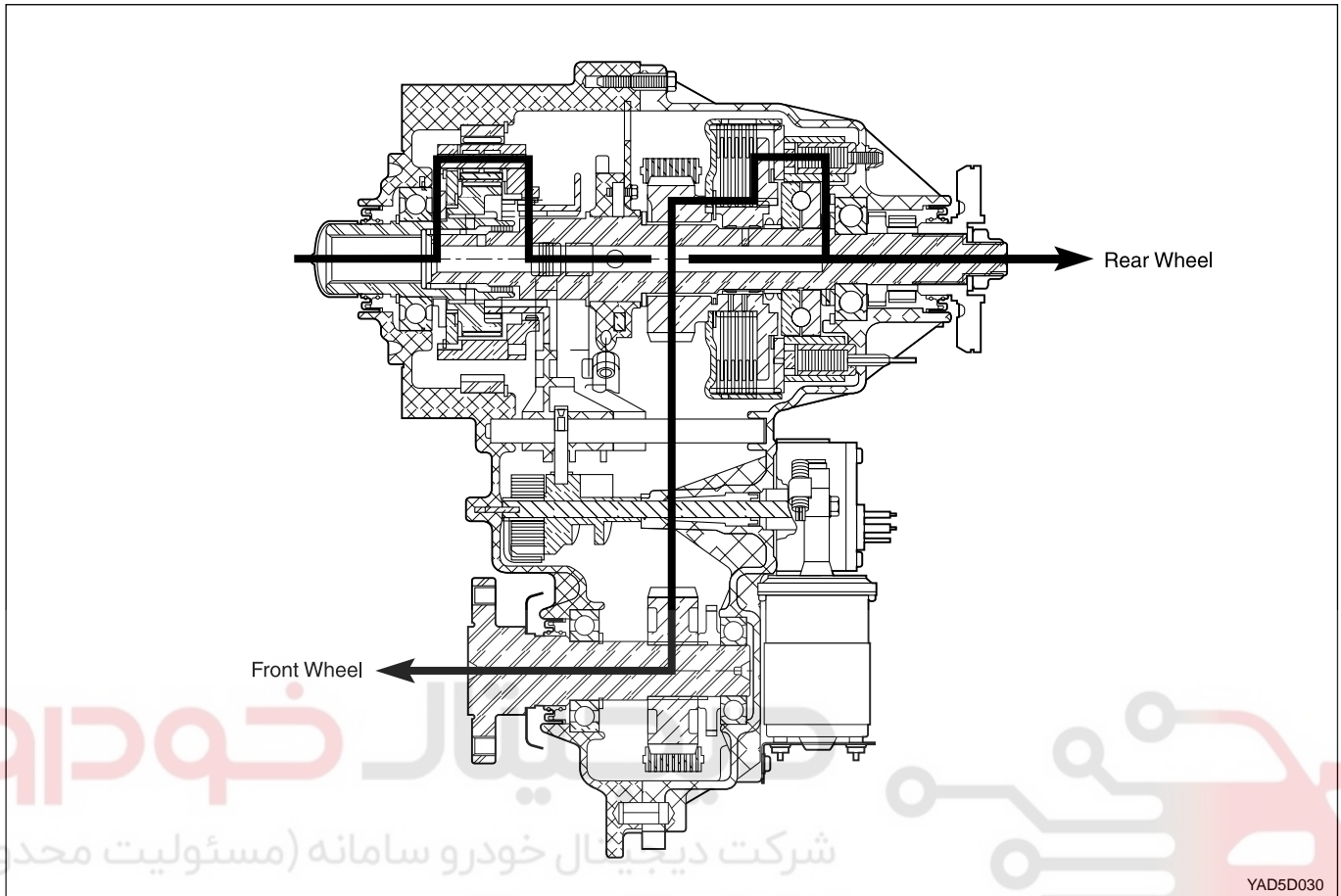
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Power Flow



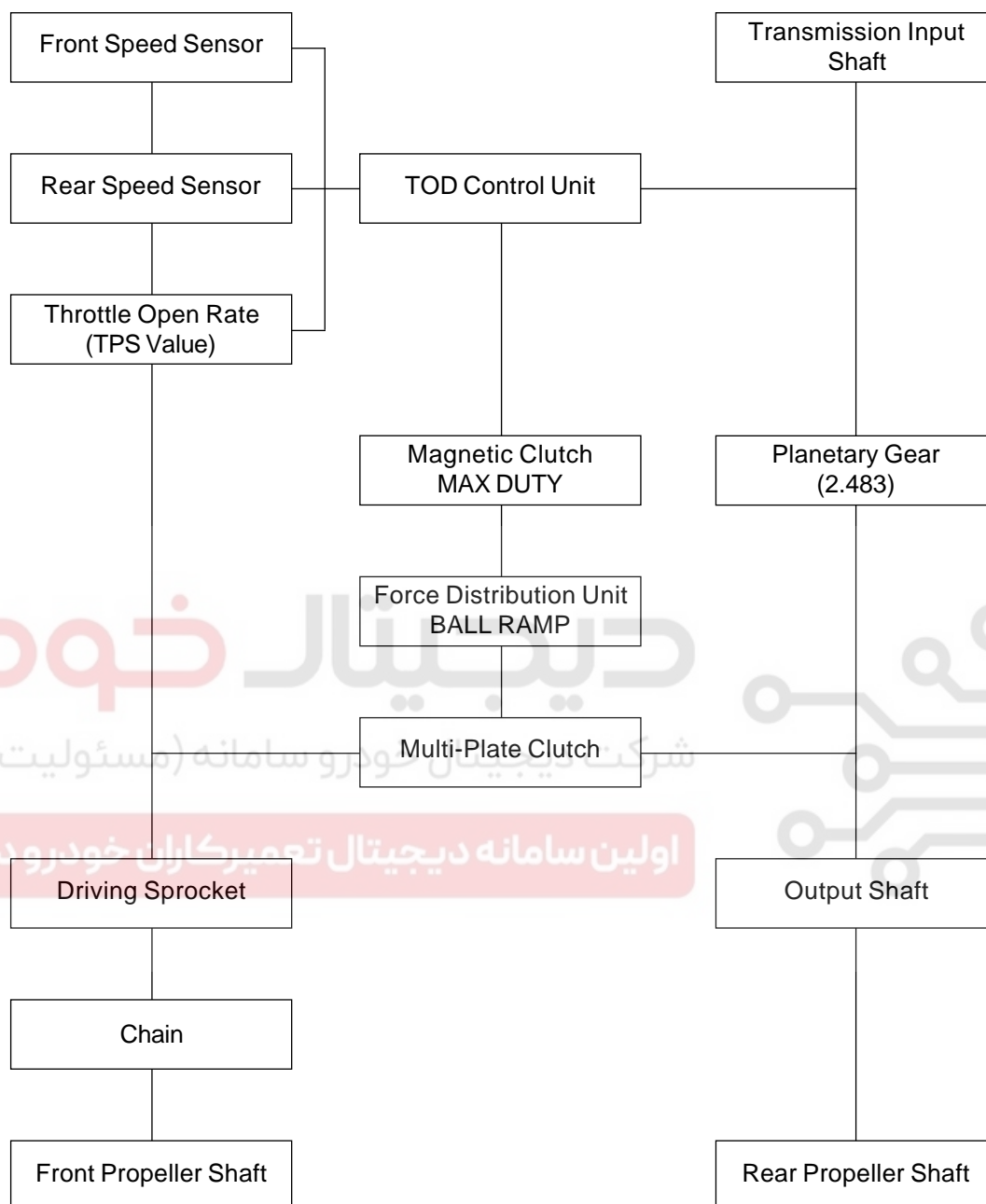
4L MODE (4WD DRIVE - LOW SPEED)



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Power Flow



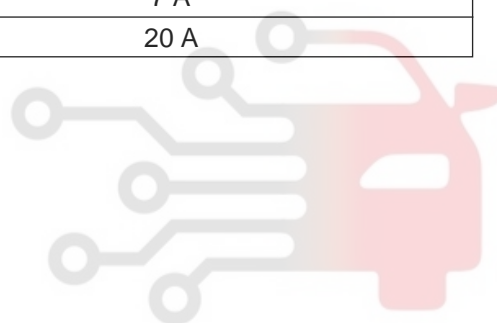
SPECIFICATIONS

Check			Action
TOD	Model		TOD (Torque On Demand) Transfer Case (4423E)
	Length		343.0 mm
	Weight (w/oil)		37.9 kg
	Shift Mode		4H and 4L
	Gear Ratio	High	1 : 1
		Low	2.48 : 1
	Oil	Specification	ATF S-3, S-4 or Dexron II, III
		Capacity	1.4 L
		Interval	Inspect Every 15,000km,
TOD Control Unit	Max. Torque		Replace Every 50,000km
			550 lb ft (76kg cm)
	Voltage	Normal Range	9-16 V
		CAN Comm.	6-16 V
	Current(Below Max. Operation Voltage)	Ignition Switch OFF	2 mA
		Ignition Switch ON	1 A
	Max. Operation Current	Motor OFF	7 A
		Motor ON	20 A

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TIGHTENING SPECIFICATIONS

Application	N•m	Kgf.m
Clutch Coil Retaining Bolt	10	1.0
Drain Plug	25	2.5
Filter Plug	25	2.5
Front Case - Rear Case Mounting Bolt	31	3.1
Front Propeller Shaft - Front Output Shaft/Flange Mounting Bolt	85	8.6
Planner Damper - Transfer Case Mounting Bolt	35	3.6
Rear Output Shaft Flange Mounting Nut	167	17.0
Rear Propeller Shaft - Rear Output Shaft/Flange Mounting Bolt	85	8.7
Shift Motor Adjusting Nut	5	0.5
Shift Motor Bracket Bolt	10	1.0
Shift Motor Mounting Bolt	10	1.0
Speed Sensor Retaining Bolt	5	0.5
Transfer Case Control Unit (TCCU) Retaining Bolts	10	1.0
Transfer Case - Transmission Adapter Housing Mounting Bolt	48	4.9

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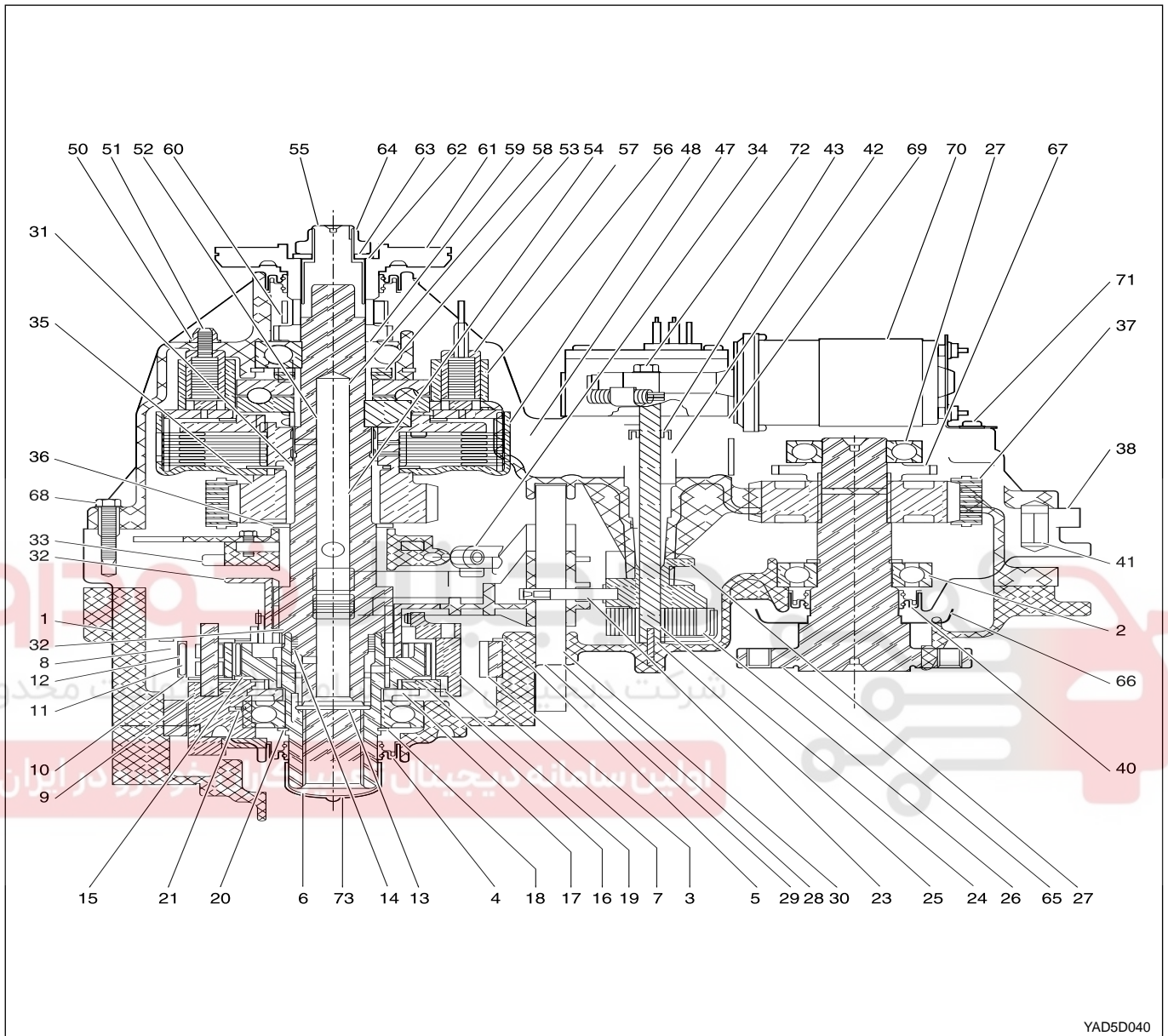
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COMPONENT LOCATOR

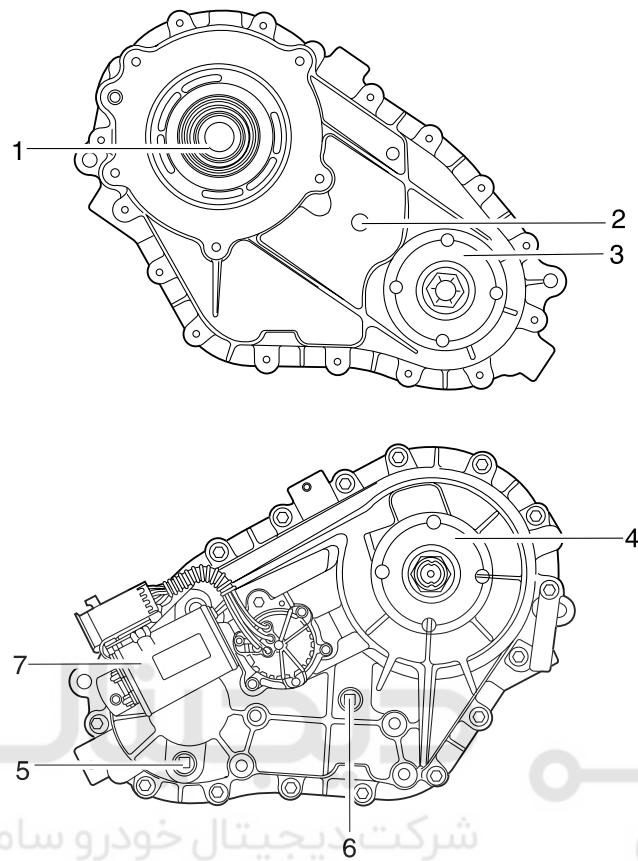
TRANSFER CASE CROSS SECTIONAL VIEW



1 Case	37 Chain
2 Bearing	38 Cover
3 Ring Gear	39 Bearing
4 Oil Seal	40 Oil Seal
5 Retaining Ring	41 Dowel Pin
6 Input Shaft	42 Bearing Sleeve
7 Carrier	43 Seal
8 Pinion Gear	44 Snap Ring
9 Pinion Shaft	45 Center Bearing Support
10 Thrust Washer	46 Ball Bearing
11 Needle Roller	47 Dowel Pin
12 Spacer	48 Viscous Coupling
13 Bearing	49 Pinion Gear
14 Bushing	50 Thrust Washer
15 Sun Gear	51 Pinion Shaft
16 Thrust Plate	52 Thrust Washer
17 Hub	53 Thrust Washer
18 Bearing	54 Bushing
19 Snap Ring	55 Output Shaft
20 Snap Ring	56 Ring Gear
21 Snap Ring	57 Retaining Ring
22 Hub Reduction	58 Needle Bearing
23 Shift Fork	59 Ball Bearing
24 Spacer	60 Speed Gear
25 Shaft Shift	61 Flange
26 Spring	62 Oil Seal
27 Cam	63 Washer
28 Breather Hose	64 Nut
29 Breather Plug	65 Flange
30 Shift Rail	66 Dust Deflector
31 Intermediate Shaft	67 Tone Wheel
32 Thrust Washer	68 Bolt
33 Pump	69 Motor
34 Clamp Hose	70 Bolt
35 Upper Sprocket	71 Cap Screw
36 Thrust Washer	



TRANSFER CASE ASSEMBLY



YAD5D050

1 Input Shaft

2 Air Control Cap

3 Front Companion Flange

4 Rear Companion Flange

5 Drain Plug

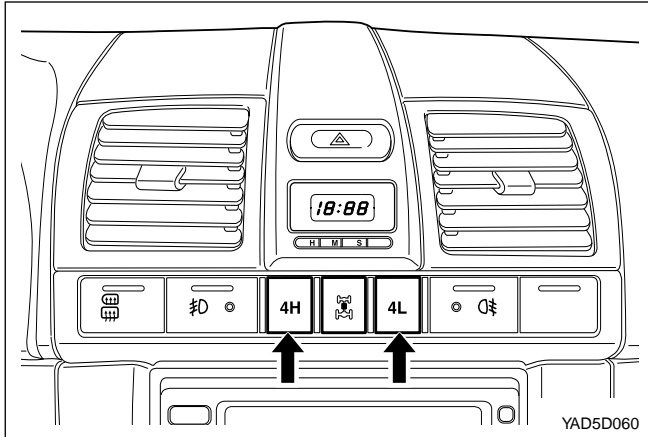
6 Filler Plug

7 Shift Cam Driving Motor

FUNCTION DESCRIPTION

TOD SYSTEM SELECT MODE

4H is the mode when drive normally of which gear ratio is 1 : 1 and 4L mode distributes power to front and rear wheels 50 : 50 of which gear ratio is 2.48 : 1.



TOD system controls clutch mechanism to comply with rotation in front and rear propeller shaft and if its difference exceeds the permissible range, corresponding power is distributed into front wheel through EMC (Electro-Magnetic Clutch). Hall effect sensor signals speed on front and rear propeller shafts going through with TOD control unit.

Transfer case clutch coil is activated by variable current on exceeding difference of speed in front and rear propeller shafts.

Select 4L Mode

When select 4L mode, EMC is locked to apply maximum torque into front and rear propeller shafts. Shift motor rotates also 4L position by rotation of cam thus propeller shaft torque changes from 1 : 1 to 2.48 : 1 by planetary gear set.

Deselect 4L Mode

When select 4H mode, the 4WD mode is deselected and returns the 4WD - high speed mode.

- "4H" switch : Slef-return Type
- "4L" switch : Push Lock Type

COMPONENT FUNCTION

Shift Motor

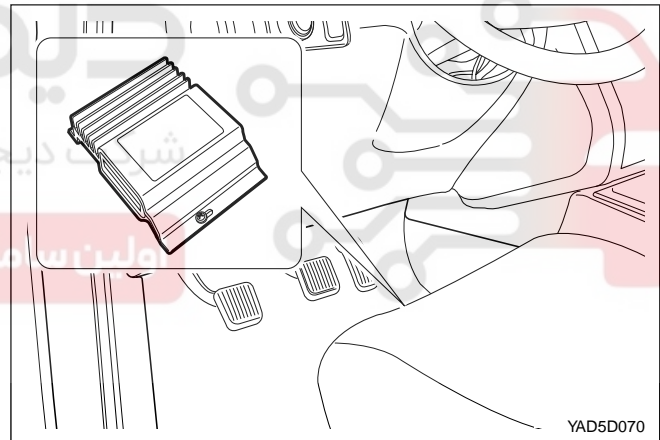
It locates backside transfer case, which drives rotary helical cam. When mode select switch changes to 4L, shift fork is on position for 2.48:1 by rotation of helical cam.

Transfer Case

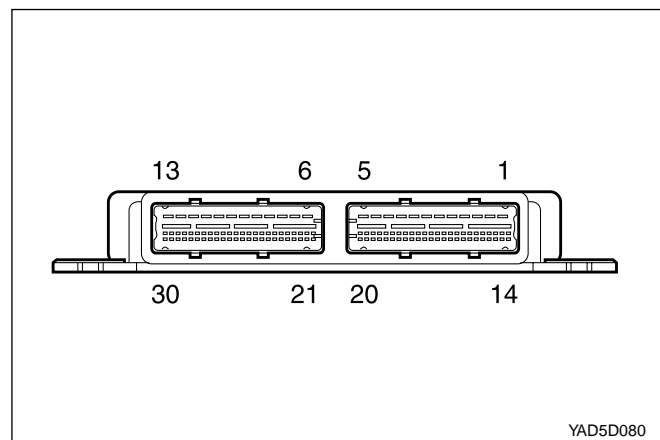
TOD transfer case distributes power into front and rear axle by operation of 4H/4L switch and shift motor. Shifting 4H to 4L, is performed towards reducing HI-LO collar by means for connection HI-LO shift fork with output shaft in order to join with planetary gear. Torque transmits input shaft then sun gear rotating front planetary gear. Front planetary gear join with output shaft and drives LO position.

TOD Control Unit

TOD control unit is located on the floor under the driver seat.



Shape and function of TOD Control Unit

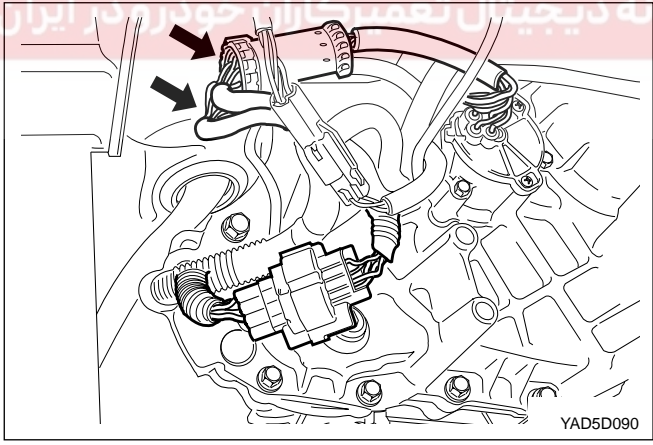


Pin	Function	Pin	Function
1	Motor HI-LO	16	Speed Reference
2	Motor LO-HI	17	Ground
3	EMC	18	Ground
4	Battery (+)	19	Battery (+)
5	Ignition	20	K-LINE
6	Position Return	21	4L Illumination
7	Diagnosis Display	22	CAN-H
8	-	23	CAN-L
9	HI / LO Switch	24	Auto T/M, Neutral
10	Position 2	25	ABS Input
11	Front Speed	26	Brake Switch
12	TPS Supply (Diesel)	27	Position 1
13	Speed/TPS Return	28	Position 3
14	Motor HI-LO	29	Rear Speed
15	Motor LO-HI	30	Position 4

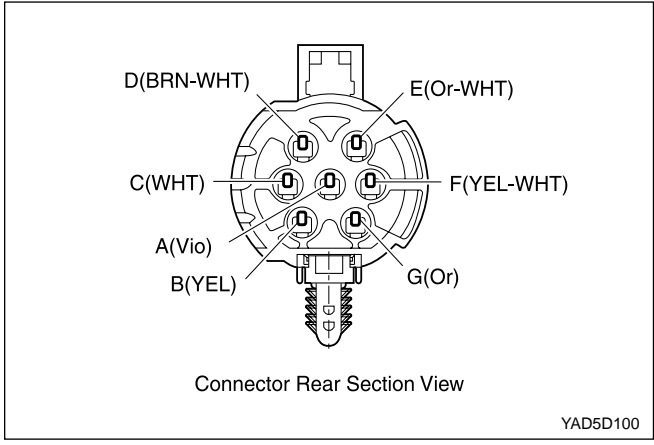
Speed Sensor, Clutch Coil, Motor Connector

Speed Sensor, Clutch Coil and Motor Connector are located at the upper & rear side of the transfer case (upper shift motor) as shown.

- Shift Motor Connector : Black (upper arrow as shown)
- Speed Sensor and Clutch Coil Connector : White (lower arrow as shown)

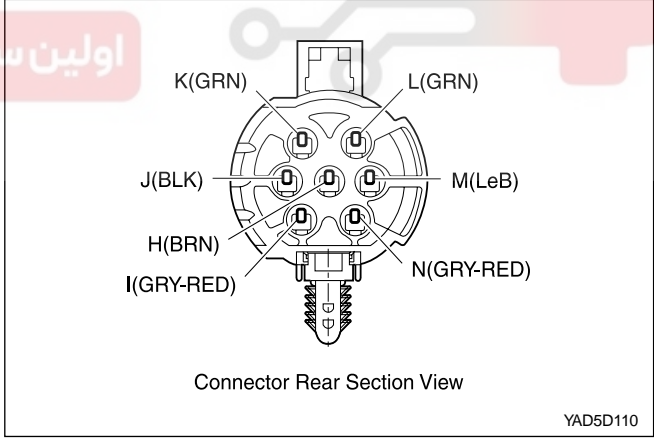


Shift Motor Connector



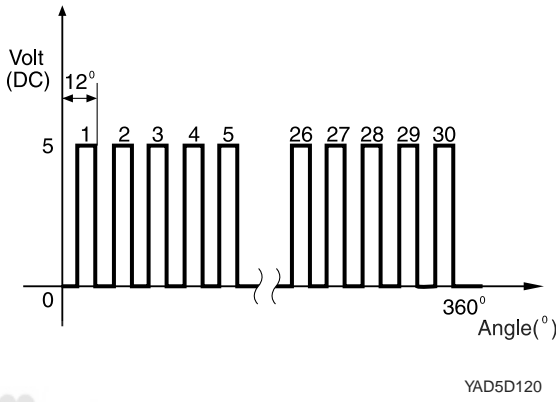
Pin	Function
A	Motor HI-LO (clockwise)
B	Motor HI-LO (counter-clockwise)
C	Position Return
D	Position 1
E	Position 2
F	Position 3
G	Position 4

Speed sensor, clutch coil connector



Pin	Function
H	Clutch Coil
I	Front Speed Return
J	Front Speed
K	Front Speed Sensor Voltage Supply
L	Rear Speed Sensor Voltage Supply
M	Rear Speed
N	Rear Speed Return

DEFINITION OF TERMINOLOGY

Definitions	Description
Rear Speed Sensor	<p>A Hall Effect speed sensor which produces a square wave. 0-5Vdc signal in response to a rotating 30 tooth wheel coupled to the rear propeller shaft inside the Transfer Case.</p> <p>Each rotation of the rear propeller shaft will result in 30 speed sensor pulse.</p> 
Front Speed Sensor	<p>A Hall Effect speed sensor which produces a square wave. 0-5Vdc signal in response to a rotating 30 tooth wheel coupled to the front propeller shaft inside the Transfer Case.</p>
EMC (Electromagnetic Clutch)	<p>Each rotation of the front propeller shaft will result in 30 speed sensor pulse.</p> <p>An Electromagnetic clutch used to control the amount of torque applied to the front propeller shaft.</p>
TOD	TOD is an abbreviation of Torque On Demand and means that the torque is transferred according to the operating condition.
TPS (Throttle Position Sensor)	TPS is an abbreviation of Throttle Position Sensor. For MSE engine, the potentiometer in the throttle actuator acts as TPS.
PWM	PWM is an abbreviation of Pulse Width Modulation and is a type of output value control by adjusting pulse width.
Duty Cycle	Duty Cycle is the time the EMC is on divided by the period in which it is being modulated.
Touch-off	A minimum amount of duty cycle applied to the EMC.
Front Overrun	A condition where the front propeller shaft is turning at a rate which is faster than the rear propeller shaft.
Rear Overrun	A condition where the rear propeller shaft is turning at a rate which is faster than the front propeller shaft.
High Range	The highest (numerically lowest = 1 : 1) gear ratio between the input and outputs of the Transfer Case.
Low Range	The lowest (numerically highest = 2.48 : 1) gear ratio between the input and outputs of the Transfer Case.

Definitions	Description
4H/4L Switch	A switch which selects the desired gear ratio. Electric motor which changes the Transfer Case range.
Shift Motor	A set of 4 Gray code switches which provide feedback to the TOD indicating the position of the Shift Motor.
Position Encoder	A switch on vehicles equipped with a manual transmission which indicates that the clutch pedal is depressed.
Neutral Safety Switch	A switch on vehicles equipped with an automatic transmission which indicates that the transmission is in neutral.
Shift Inhibit Speed	The vehicle speed above which Transfer Case shifts are disallowed. Vehicle speed is indicated by propeller shaft speed measurement.

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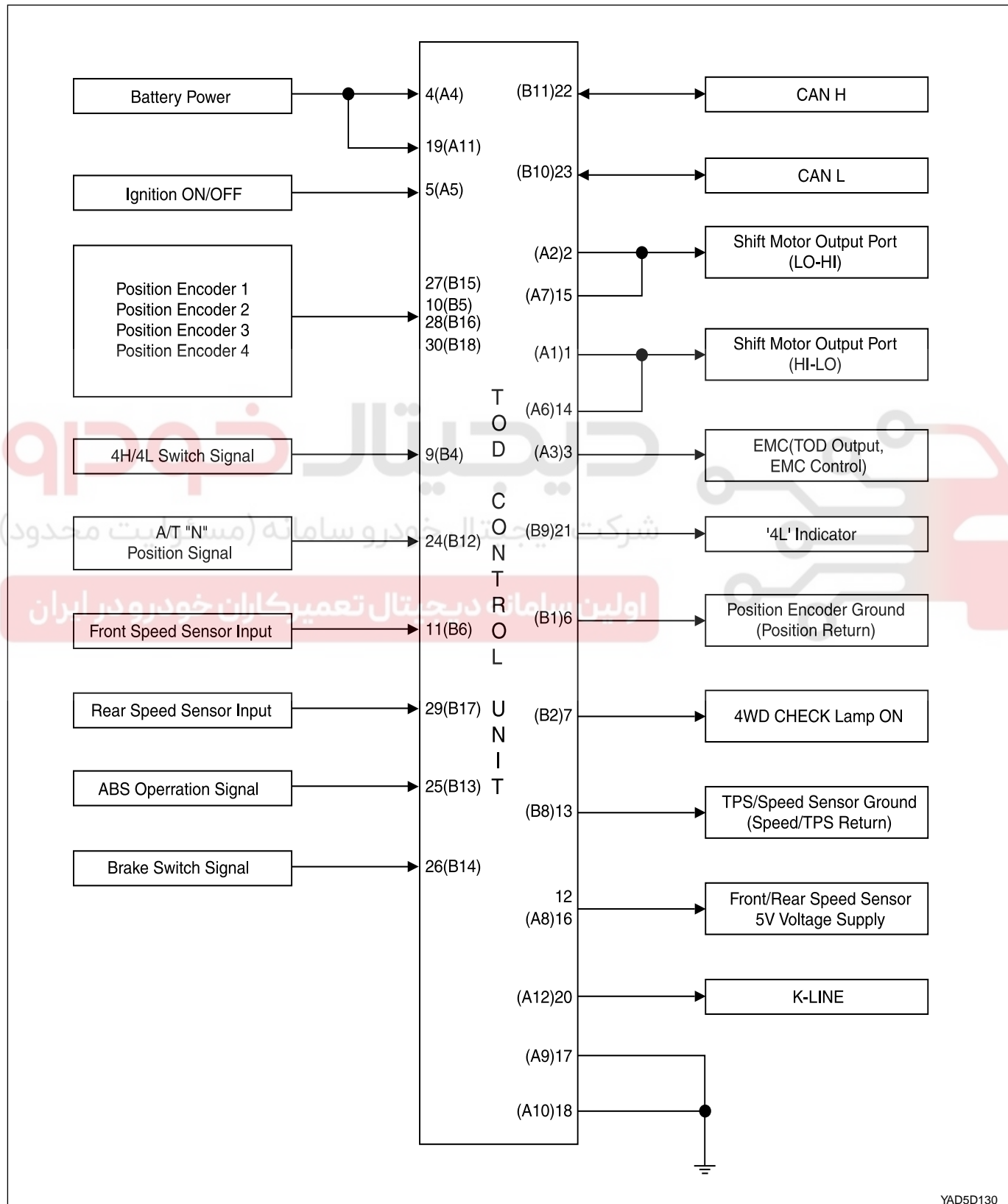
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CONTROL UNIT

Input/Output diagram

TOD control unit and main wiring harness is linked by 30 pin connector. Each pin joins with switch and actuator whose details refer to the below diagram.



YAD5D130

Classification	Pin No.	Pin Name	Description
Power Supply	17,18	Ground	TOD control unit ground
	4,19	Input	TOD control unit battery supply : (Fuse No 13,20A)
Signal Input	5	Ignition	Ignition ON / OFF
	27	Position 1	Position encoder 1 : check of shift motor position
	10	Position 2	Position encoder 2 : check of shift motor position
	28	Position 3	Position encoder 3 : check of shift motor position
	30	Position 4	Position encoder 4 : check of shift motor position
	9	4H/4L Switch	Transfer case mode input
	24	Auto T/M Neutral	Check of neutral gear position in Auto T/M
	12, 16	Speed Voltage Supply	5V supply (TPS / speed sensor)
	11	Front Speed	Front speed sensor signal input
	29	Rear Speed	Rear speed sensor signal input
	25	ABS Operation	ABS ON / OFF
	26	Brake Switch	Brake Switch ON/OFF Signal Input
	22	CAN-L	CAN bus low line
	23	CAN-H	CAN bus high line
	20	K-LINE (1)	Connect to Diagnostic Connector No. 15
Signal Output		Motor LO-HI	Motor output port - LO to HI : join with battery - HI to LO (or motor brake) : join with ground
		Motor HI-LO	Motor output port - HI to LO : join with battery - LO to HI (or motor brake) : join with ground
	3	EMC	TOD Output
	21	4L Illumination	When the transfer case is in "4L" mode, illuminates "4L" indicator.
	6	Position Return	Position encoder ground
	7	Self Diagnosis Display	Illuminates "4L" indicator "4WD check lamp" turns ON Upon defect ; Ground circuit
	13	Speed	Ground for speed sensor / TPS

(1) K-LINE : It means that Communication line for coding and diagnosis with diagnostic scanning tool.

SYSTEM OPERATION

Initial Operation of TOD Control Unit

When ignition "ON", "4L" and "4WD check" lamps illuminates for 0.6 second to check bulb in instrument panel, then perform diagnosis of system (See 3F-19 Self-Diagnosis Condition).

Position Encoder

The Position Encoder is used by the TOD to determine the position of the Shift Motor. Each motor position is identified by a position code below.

Notice:

- All other position codes are invalid
- Position
Input Open Circuit ($> 4.5V$) = 1
- Position Input shorted to Speed/Position Return ($< 0.5V$) = 0

Position Code 1/2/3/4	Motor Position	Position Code 1/2/3/4	Motor Position
1110	Left Stop	1001	Neutral
1010	Left of High	0001	Zone 2
0010	High	0101	Low
0000	Right of High	0100	Right Stop
1110	Zone 1	-	-

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Position Sensor Interpretation

When the module powers up, it will read the position sensor and the 4H/4L switch input and respond to the possible codes as follows.

4H/4L Switch Input	Motor Position	System Response (Action)
4H	Left Stop	No action required. 4L bulb off.
4H	Left of High	No action required. 4L bulb off.
4H	High	No action required. 4L bulb off.
4H	Right of High	Blink 4L bulb. After the shift conditions are met, attempt a shift to 4H under conditions of below 87 rpm in front and rear propeller shaft and "Neutral" position. After successfully shifting into 4H, stop blinking 4L bulb.
4H	Zone 1	Same as above
4H	Neutral	Same as above
4H	Zone 2	Same as above
4H	Low	Blink 4L bulb. After the shift conditions are met, attempt a shift to 4L. After successfully shifting into 4L, stop blinking 4L bulb.
4H	Right Stop	Same as above
4L	Left Stop	Blink 4L bulb. After the shift conditions are met, attempt a shift to 4L. After successfully shifting into 4L, stop blinking 4L bulb.
4L	Left of High	Same as above
4L	High	Same as above
4L	Right of High	Same as above
4L	Zone 1	Same as above
4L	Neutral	Same as above
4L	Zone 2	Same as above
4L	Low	No action required. 4L bulb on.
4L	Right Stop	No action required. 4L bulb on.

A command to shift will only be acted upon if the TOD is reading a valid code at the time the command to shift is made.

After a shift has started, the TOD will power the shift motor until the code for the requested position is read. If an invalid code is read, the TOD will go into a default mode.

During a shift attempt, the shift motor will be energized for a maximum of 5 seconds.

Electric Shift System Operation

The Electric Shift System is responsible for changing the Transfer Case gear ratio by controlling the electric shift motor. The TOD monitors the 4H/4L switch, neutral switch, speed sensors, position encoder, and ignition switch.

A range change is initiated when ;

1. The 4H/4L Switch is changed from 4H to 4L or from 4L to 4H.
2. The motor position (as indicated by the position encoder) does not match the 4H/4L Switch immediately after the ignition is turned on.

Shift criteria

When a range change is initiated a Diagnostic Test will be completed on the motor, speed sensors, and position encoder. If the Diagnostic Test fails, the shift will not be attempted. If all components are operating properly, the TOD will attempt a range change after the following shift criteria are met:

1. The transmission is in neutral for 2 seconds after the shift is requested.
2. Both propeller shaft speeds are below 87 rpm (2580 pulses/minute).

If the transmission is taken out of neutral before 2 seconds has elapsed, or either propeller shaft speed increases above the limit, the shift will be suspended and the 4L Indicator will continue to blink until the criteria are met again or the 4H/4L Switch is returned to the original position.

Range change

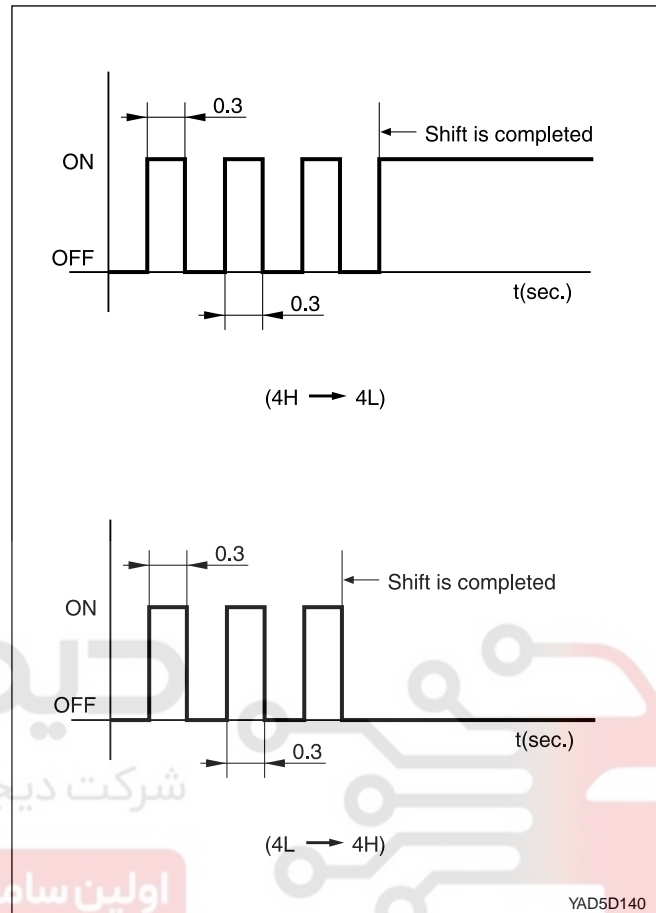
When the shift criteria are met, the motor is rotated in the appropriate direction (as determined by the selector switch) until one of the following occurs:

1. The motor reaches its destination.
2. The motor is on for 5 seconds without reaching its destination. The shift has failed and the TOD will respond as default mode.
3. A fault occurs with either the motor or position encoder. Refer to the diagnosis requirement.

When the motor is energized, the Ignition, 4H/4L Switch, propeller shaft speeds, and transmission neutral inputs are ignored.

Indicator function on shifting

Once a range change has been initiated the 4L Indicator will begin to blink at a rate of 0.3 seconds on, 0.3 seconds off until the shift is completed or canceled.



If a successful shift has been completed, the 4L Indicator will be illuminated if the motor is in Low and it will be turned off if the motor is in High.

4L Indicator illuminates as below figure.

Electric shift default mode

If the motor fails to reach its destination, the TOD will attempt the following (in order):

1. The TOD will wait 3 seconds then attempt the shift again.
2. If the second attempt to reach the destination fails the TOD will wait 3 seconds then attempt to rotate the motor back to the original position. If successful, all future shifts will be inhibited until the Ignition is cycled.
3. If the attempt to return to the original position fails, the TOD will wait 3 seconds then attempt to rotate the motor to the original position again. If the second attempt to return to the original position is successful, the 4WD CHECK lamp will be illuminated, and all future shifts will be inhibited until the Ignition is cycled.

4. If the second attempt to return to the original position fails the motor will be turned off, the "4WD CHECK" lamp will be illuminated, and all future shifts will be inhibited until the Ignition is cycled.

TOD TM System operation

The TODTM System is responsible for distributing torque between the front and rear axles. The TOD monitors the propeller shaft speeds, operating range (High/Low), and ABS activity and then applies a calculated amount of torque to the front axle by Pulse Width Modulating the current applied to the EMC.

1. Touch-off Torque

The minimum EMC Duty Cycle is based on the vehicle speed and throttle position.

The TOD receives the TPS signal from the following sources:

On vehicles equipped with CAN, the TOD receives the TPS signal from the CAN bus.

2. When Slip Detection

The TOD continuously monitors the front and rear propeller shaft speeds to detect wheel slip.

3. Wheel Slip Control

When wheel slip is detected the TOD controls the EMC duty cycle as necessary until the wheel slip is reduced below the allowable limit. The EMC Duty Cycle will then be reduced to the Touch-Off value.

4. Brake/ABS Strategy

When the ABS System is active, the EMC Duty Cycle is set to a fixed duty cycle (30 %) to aid in braking without counteracting the ABS System.

5. 4L Strategy

When the system is operating in 4L, the TOD continues TODTM (operation provided that the propeller shaft speed is below 175 rpm (5220 pulses/minute)). When the speed increases above 175 rpm, the EMC Duty Cycle is set to the maximum value (88 %) which applies the maximum available torque to the front axle.



DIAGNOSIS

While the TOD is active it periodically monitors its inputs and outputs. If a fault is detected the "4WD CHECK" lamp is illuminated and a fault code is stored in the TOD memory.

When requested, fault codes are downloaded to a diagnostic connector (K-line) serial communications using SCAN-100.

DIAGNOSTIC TESTS

TOD Internal Function

When the Ignition is turned on the TOD tests its ROM and RAM. If there is a fault, the TOD immediately resets itself and re-tests the ROM and RAM. If the fault persists the TOD continues to reset and re-test until the fault is corrected or the ignition is turned off. All TOD functions are inhibited until the fault is corrected. The 4WD CHECK lamp is not illuminated if there is a ROM or RAM fault.

If the ROM/RAM passes the EEPROM memory is tested. If there is a fault the 4WD CHECK lamp is illuminated and the TOD continues to operate using the default calibration data stored in ROM. Fault codes are not stored when there is an EEPROM fault.

An EEPROM fault can only be cleared by cycling ignition off-on.

Shift Motor Assembly Test

If the TOD detects a shift motor or position encoder fault continuously for one second the "4WD CHECK" lamp is turned on and the appropriate fault code is stored in memory.

1. A shift motor fault when the motor is off is defined as follows:
 - Motor H-L shorted to Ground
 - Motor L-H shorted to Ground
 - Motor open circuit
2. A shift motor fault when the motor is energized is defined as follows:
 - Motor H-L shorted to Ground
 - Motor L-H shorted to Ground
 - Motor H-L shorted to Motor L-H
 - Motor open circuit
3. A position encoder fault is defined as follows:
 - Any position code which does not correspond to the valid 9 codes.
 - A short to ground on any of the encoder lines.
4. If no shifts are in progress when a failure occurs the TOD will not respond to any shift commands.

5. If a shift command has been received, but not acted upon when a failure occurs the TOD will cancel the command and not respond to any subsequent shift commands.
6. If a shift command is in progress when an invalid position code is confirmed it will be halted and the TOD will turn the motor toward the high position. Afterwards the TOD will not respond to any shift commands.
7. If the shift motor/position encoder assembly failure (other than a motor failure which occurs when the motor is energized) recovers continuously for one second the TOD will function normally. The "4WD CHECK" lamp is turned off but the fault code will remain in memory.
8. A motor failure (i.e. open or short circuit) which occurs when the motor is energized can only be cleared by cycling the ignition off-on.

Front Speed Sensor Test

If a Front Speed Sensor fault is detected continuously for 0.5 second the 4WD CHECK lamp is illuminated. The TOD then responds as follows:

1. If the system is in High Range the TOD uses the Rear Speed Sensor to determine the EMC Touch Off level and wheel slip control is suspended.
2. If the system is in Low Range, the EMC Duty Cycle is set to maximum (independent of vehicle speed) until the system is shifted out of 4L.
3. All Electric Shift activity is halted until the Ignition is cycled. If a shift is in progress it will be completed.

If the Front Speed Sensor recovers continuously for 0.5 second the TOD will function normally. The 4WD CHECK lamp is turned off but the fault code will remain in memory.

Rear Speed Sensor Test

If a Rear Speed Sensor fault is detected continuously for 0.5 second the 4WD CHECK lamp is illuminated. The TOD then responds as follows:

1. If the system is in High Range the TOD uses the Front Speed Sensor to determine the EMC Touch Off level and wheel slip control is suspended.
2. If the system is in Low Range, the EMC Duty Cycle is set to maximum (independent of vehicle speed) until the system is shifted out of 4L.
3. All Electric Shift activity is halted until the Ignition is cycled. If a shift is in progress it will be completed.

If the Rear Speed Sensor recovers continuously for 0.5 second the TOD will function normally. The "4WD CHECK" lamp is turned off but the fault code will remain in memory.

Both Speed Sensor Faulty

If both the Front and Rear Speed Sensors are faulty continuously for 0.5 seconds the "4WD CHECK" lamp is illuminated. The TOD then responds as follows:

1. If the system is in High Range the TOD sets the EMC Touch off level based on a vehicle speed of 0 and wheel slip control is suspended.
2. If the system is in Low Range, the EMC Duty Cycle is set to maximum until the system is shifted out of 4L.
3. All Electric Shift activity is halted until the Ignition is cycled. If a shift is in progress it will be completed.

If both Speed Sensors recover continuously for 0.5 second the TOD will function normally. The "4WD CHECK" lamp is turned off but the fault code will remain in memory.

EMC Test

The EMC is tested for open circuit or short circuit to ground. If a fault is detected continuously for 0.8 second the "4WD CHECK" lamp is turned on and all TODTM activity is halted.

If the EMC recovers continuously for 0.8 second the TOD will function normally. The "4WD CHECK" lamp is turned off but the fault code will remain in memory.

CODING ON TOD

Connection of Coding Tool

Construct SCANNER into diagnosis connector (20 pins) near fuse box in engine room as below figure.

1. Diagnosis Connector
2. SCANNER

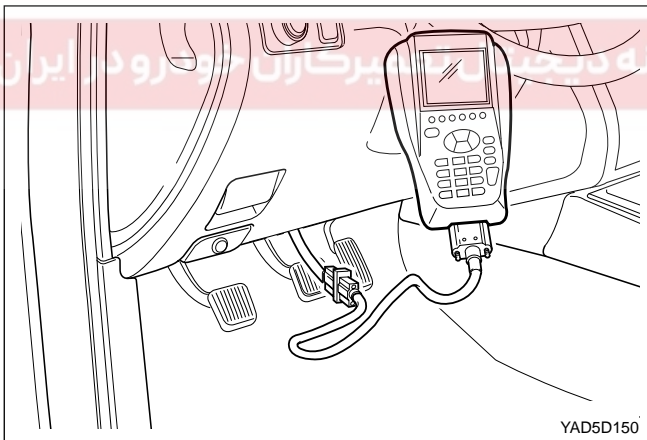
Notice: Coding ; An input activity of data for the proper performance by matching specification, devices and system with control unit.

Coding required

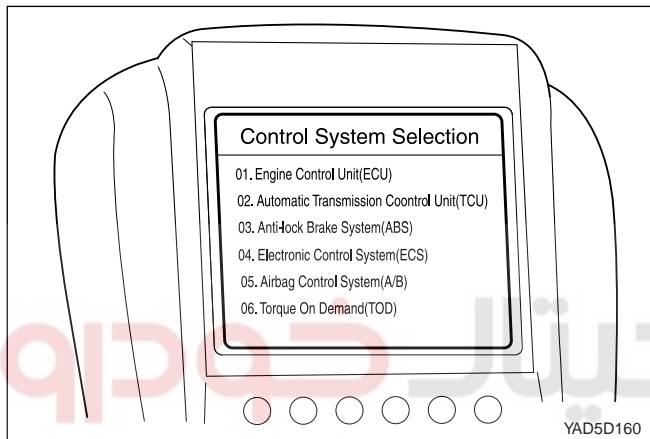
1. Replacement of TOD control unit.
2. Adjustment by input error.
3. Change of tire specification.

Coding method

1. Check and record engine type, axle ratio and tire size.
2. Ignition "OFF".
3. Connect SCANNER with diagnosis connector in engine room.
4. Ignition "ON".
5. Read the current memorized specification in TOD control unit.



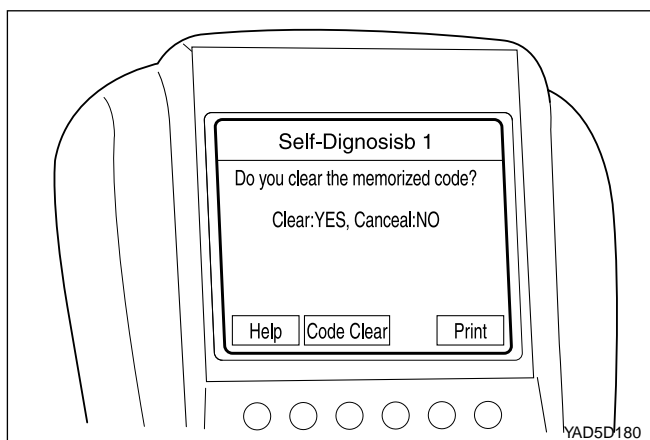
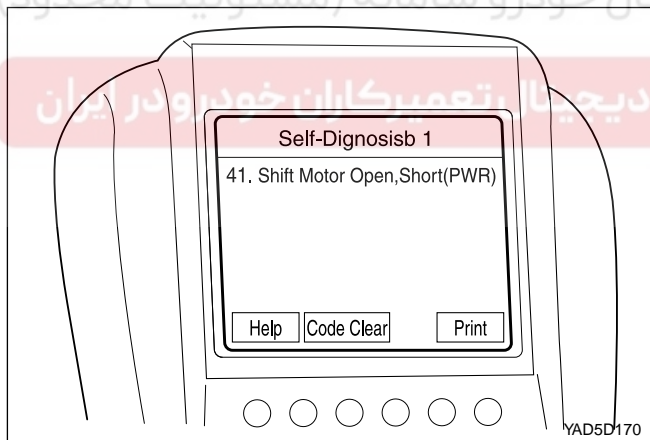
6. Compare memorized specification with the checked record. If not matched, perform a coding.
7. Read again memorized coding specification in TOD control unit for confirmation of coding.
8. Check coding specification whether it matches with vehicle or not. If not, perform a coding again.



Eliminate the Memorized Fault Code

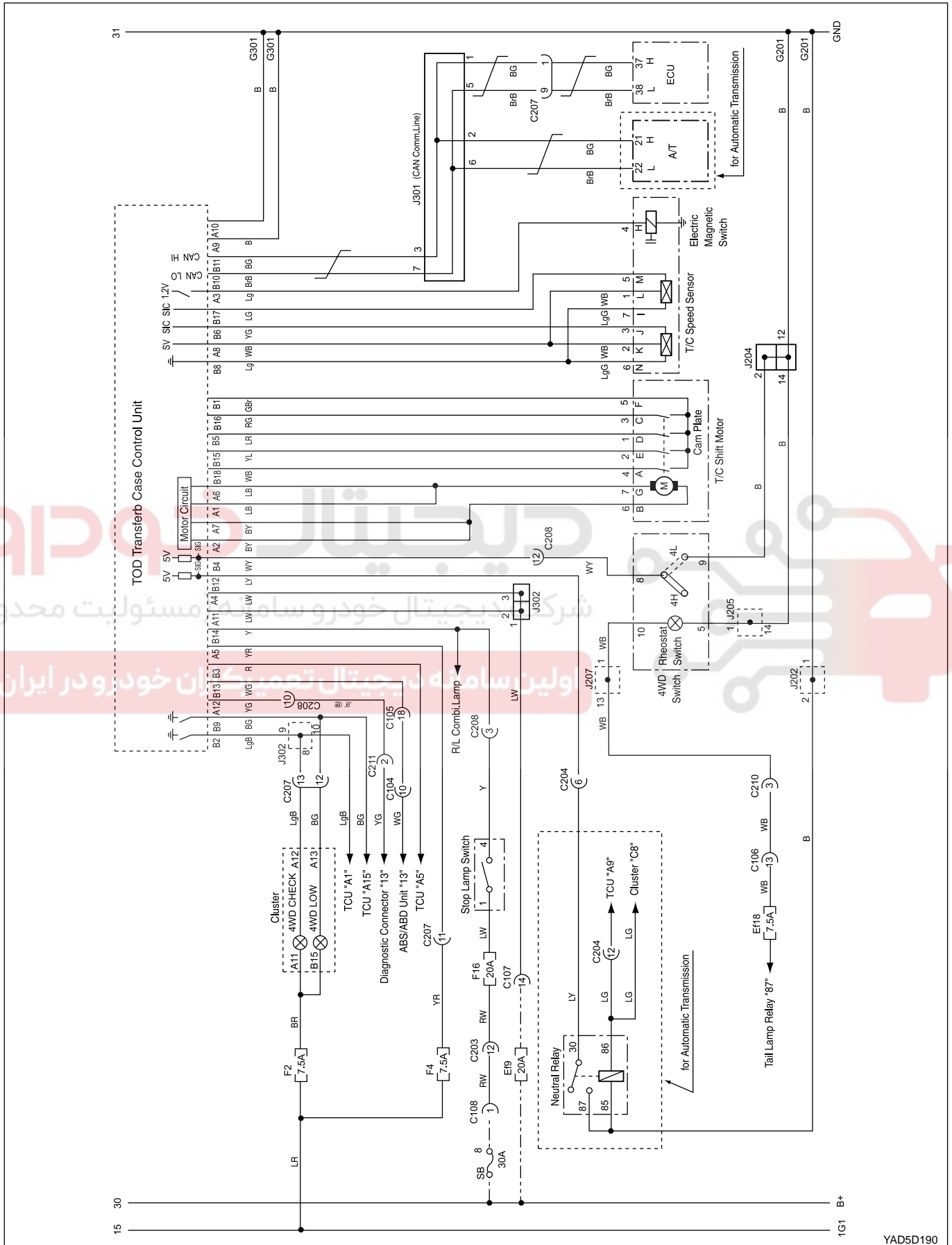
When diagnose by SCANNER, it is required that you make adequate service on defects against all fault codes. And then you should delete the memorized fault codes in TOD control unit using SCANNER as follows;

1. Connect SCANNER with diagnosis connector.
2. Ignition turns "ON".
3. Select "Vehicle Type" and press "ENTER" key.
4. Select "Model Type" and press "ENTER" key.
5. Select "Control System" and then select "06 Transfer Case (TOD)". Press "ENTER" key.
6. When system confirmation screen displays, press "ENTER" key.
7. If there is any fault in the system, it displays as shown.



8. Press the function key "F2".
9. Press "Yes".
10. If the memorized fault code is cleared successfully, it appears on the screen as following; "Self Diagnosis Result is Normal".

SCHEMATIC WIRING DIAGRAM



YAD5D190

TOD CONTROL UNIT DIAGNOSTIC SYSTEM CHECK

Circuit Description

The diagnostic system check is an organized approach to identifying a problem created by a transfer case control unit (TOD) malfunction. It must be starting point for any derivability complaint diagnosis because it directs the technician to the next logical step in diagnosing the complaint. Understanding the table and using it correctly will reduce diagnostic time and prevent the unnecessary replacement of parts.

Step	Action	Value	Yes	NO
1	Verify the customer's complaint. Does it verify the customer's complaint?	-	Go To Step 2	-
2	Turn the ignition ON. Does "4WD CHECK" lamp turns on continuously?	-	Go To Step 4	Go To Step 3
3	Jump between the terminal A2 of the TOD and ground. Does "4WD CHECK" lamp turns on? 1. Turn the ignition OFF.	-	Go To Step 4	Repair the bulb and circuit
4	2. Connect the data diagnosis connector to scan tool and follow the manual instruction. 3. Turn the ignition ON. Does the scan tool communicate with TOD?	-	Go To Step 9	Go To Step 5
5	Check whether the scan tool communicates with other control units. Does the scan tool communicate with other control units?	-	Go To Step 6	Go To Step 7
6	Repair the diagnostic line between the TOD terminal A12 and DLC connector 13. Is the repair complete?	-	Go To Step 4	-
7	Change the scan tool. Does the scan tool communicate with other control units?	-	Go To Step 4	Go To Step 8
8	1. Replace the TOD. 2. Connect the data diagnosis connector to scan tool. 3. Request the DTC. Does any DTC display?	-	Go To Step 11	Go To Step 10
9	Request the DTC with the scan tool. Does any DTC display?	-	Go To Step 11	Go To Step 10
10	1. Perform the road test. 2. Recheck any DTC. Does any DTC display?	-	Go To Step 11	System OK
11	Refer to applicable DTC table. Start the lowest DTC and move another DTC. Does the DTC identify as a valid DTC?	-	Go To the applicable DTC table	-

DIAGNOSTIC TROUBLE CODES (DTC's)**Diagnostic Trouble Code Retention**

The first time a fault is detected a DTC is stored in the TOD's Non-Volatile memory. This DTC will remain in memory until the TOD is instructed to erase DTC's by SCAN-100. DTC's will not be erased by disconnecting power to the TOD.

Diagnostic Trouble Code Assignments

Classification	Fault Code	Description
TOD	1714	EEPROM Checksum Fault
	1715	TPS Loss of Signal
	1716	TPS Out of Range
EMC	1721	EMC Open / Short to Battery
	1722	EMC Short to ground
Speed Sensor	1731	Front Speed Sensor Voltage Low
	1732	Front Speed Sensor Voltage High
	1733	Rear Speed Sensor Voltage Low
	1734	Rear Speed Sensor Voltage High
	1735	Speed Sensor Reference Voltage Low
	1736	Speed Sensor Reference Voltage High
Shift Motor	1741	Motor Open / Shorted to Battery
	1742	Motor Output Shorted to Ground
	1743	Shift System Timeout
Position Encoder	1750	General Position Encoder Fault (Invalid Code)
	1751	Position 1 Shorted to Ground
	1752	Position 2 Shorted to Ground
	1753	Position 3 Shorted to Ground
	1754	Position 4 Shorted to Ground

4WD CHECK INDICATOR STAYS ON WITH IGNITION SWITCH ON

Circuit Description

When the ignition switch turns to ON the transfer case control unit (TOD) illuminates 4WD CHECK and 4WD LOW indicator to check bulb operation and turns off after 0.6 seconds. Then TOD starts self-diagnosis and illuminate 4WD CHECK indicator when TOD detects any fault.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

- This step, along with step 4, checks the short to ground condition of the wire or terminals.

Diagnostic Aids

- If the 4WD CHECK indicator illuminates steadily the TOD may detect some fault. TOD should be checked by scan tool to solve the problem.
- The 4WD CHECK indicator also illuminates steadily if the terminal B2 of TOD connector is shorted to ground. The shorted wire or terminals should be repaired.

Step	Action	Value	Yes	No
1	1. Turn the ignition switch to OFF. 2. Connect the scan tool to the data link connector (DLC). 3. Turn the ignition switch to ON and request the DTC. Does the scan tool display any DTC?	-	Go to the specific DTC diagnostic table	Go to Step 2
2	1. Turn the ignition switch to OFF. 2. Disconnect the 18-pin connector from transfer case control unit (TOD). 3. Turn the ignition switch to ON and check the 4WD CHECK bulb operation. Does the 4WD CHECK indicator come on steadily?	-	Go to Step 3	Go to Step 4
3	Repair any short to ground circuit between terminal A2 of TOD connector and terminal 31 of cluster. Is the repair complete?	-	System OK	-
4	1. Turn the ignition OFF. 2. Check the pin or terminals for damage or improper connection. 3. Reconnect all the connectors. 4. Turn the ignition ON. Does the 4WD CHECK indicator come on steadily?	-	Go to Step 5	System OK
5	Replace the TOD. Is the repair complete?	-	System OK	-

4WD LOW INDICATOR STAYS ON WITH IGNITION SWITCH ON**Circuit Description**

When the ignition switch turns to ON the transfer case control unit (TOD) illuminates 4WD CHECK and 4WD LOW indicator to check bulb operation and turns off after 0.6 seconds. Then TOD starts self-diagnosis and illuminate 4WD CHECK indicator when TOD detects any fault.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

- This step checks for the normal bulb operation.

Diagnostic Aids

- If the 4WD LOW indicator illuminates steadily the transfer case in 4WD low range and 4H/4L switch set to 4L. It is normal condition.
- The 4WD LOW indicator also illuminates steadily if the terminal B9 of TOD connector is shorted to ground. The shorted wire or terminals should be repaired.

Step	Action	Value	Yes	No
1	Check the position of 4H/4L switch. Does the 4H/4L switch set on 4L?	-	Go to Step 2	Go to Step 3
2	1. Turn the ignition switch to ON. 2. Set the shift lever to N (neutral). 3. Turn the 4H/4L switch to 4H. Does the 4WD LOW indicator go off?	-	System OK	-
3	1. Turn the ignition switch to ON. 2. Set the shift lever to N (neutral). 3. Turn the 4H/4L switch to 4L. Does the 4WD LOW indicator go off?	-	Go to Step 4	Go to Step 5
4	The wiring of 4H/4L switch is reversed. Repair the wiring. Is the repair complete?	-	System OK	-
5	1. Turn the ignition OFF. 2. Check the pin or terminals for damage or improper connection. 3. Reconnect all the connectors. 4. Turn the ignition ON. Does the 4WD LOW indicator come on steadily?	-	Go to Step 6	System OK
6	Repair any short to ground circuit between terminal B9 of TOD connector and terminal A13 of cluster. Is the repair complete?	-	System OK	Go to Step 7
7	Replace the TOD. Is the repair complete?	-	System OK	-

NO 4WD CHECK OR 4WD LOW INDICATOR WITH IGNITION SWITCH ON

Circuit Description

When the ignition switch turns to ON the transfer case control unit (TOD) illuminates 4WD CHECK and 4WD LOW indicator to check bulb operation and turns off after 0.6 seconds. Then TOD starts self-diagnosis and illuminate 4WD CHECK indicator when TOD detects any fault.

Diagnostic Aids

If the both of the 4WD CHECK and 4WD LOW indicator were not illuminating there would be some problems with fuse, power supply line, improper connection of connector or transfer case control unit (TOD).

If one of the indicators illuminates, the fuse and power supply line is good and the connector or TOD may be the cause of problems.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

1. This step checks for the normal bulb operation.
5. This step checks voltage supply condition.

Step	Action	Value	Yes	No
1	Check the bulb operation when the ignition switch turns to ON. Does the only 4WD LOW indicator come on and goes after 0.6 seconds?	-	Go to Step 2	Go to Step 5
2	1. Turn the ignition switch to OFF. 2. Disconnect 18-pin connector from the transfer case control unit (TOD). 3. Using test lamp check the continuity between terminal B2 of TOD and ground. Does the test lamp come on?	-	Go to Step 3	Go to Step 4
3	1. Turn the ignition OFF. 2. Check the pin or terminals for damage or improper connection. 3. Reconnect all the connectors. 4. Turn the ignition ON. Do the two indicators come on go after 0.6 seconds?	-	System OK	Go to Step 7
4	Repair or replace of following components: • 4WD CHECK indicator bulb. • Open circuit between terminal A12 of cluster and terminal B2 of TOD connector. Is the repair complete?	-	System OK	Go to Step 7
5	1. Check the fuse F2 and indicator bulbs. 2. Check the continuity for following terminals: • Fuse F2 to B2 (TOD) • A2 (Cluster) to B2 (TOD) • B15 (Cluster) to B9 (TOD) Are there any problems?	-	Go to Step 6	Go to Step 7
6	Repair open circuit or replace damaged parts. Is the repair complete?	-	System OK	Go to Step 7
7	Replace the TOD. Is the repair complete?	-	System OK	-

4WD LOW INDICATOR BLINK STEADILY**Circuit Description**

When the 4H/4L switch turned from 4H (4L) to 4L (4H) electric shift starts and 4WD LOW indicator begin to blink until the shifting is completed or canceled. If 4H to 4L shifting is completed the 4WD LOW indicator will illuminated and 4L to 4H shifting is completed it will be turned off.

If shifting fails the 4WD LOW indicator will blink steadily until the shifting is completed or canceled.

Diagnostic Aids

The 4WD LOW indicator shows that the transfer case is operating in low range. And the indicator will blink while shifting from low to high range or high to low range. If the indicator blinks steadily it warns the shifting command and real position of the shift motor or position encoder are not matched.

Step	Action	Value	Yes	No
1	1. Stop the vehicle. 2. Turn the 4H/4L switch to original position. Does the 4WD LOW indicator stop blinking?	-	Go to Step 2	Go to Step 3
2	1. Make sure the vehicle stopped completely. 2. Set the shift lever to N (neutral) and wait more than 2 seconds. 3. Turn the 4H/4L switch. Does the 4WD LOW indicator blink and stop after complete shifting? • 4H → 4L: 4WD LOW indicator illuminates. • 4L → 4H: 4WD LOW Indicator turns off.	-	System OK	Go to Step 3
3	1. Starts TOD Diagnostic System Check. 2. If there were no trouble code, replace TOD. Is the repair complete?	-	System OK	-

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DIAGNOSTIC TROUBLE CODE (DTC) 1714

EEPROM Checksum Fault

Circuit Description

When the ignition is turned on the transfer case control unit (TOD) receives battery voltage and ignition voltage and illuminates the 4WD CHECK and 4WD LOW indicators for 0.6 seconds. Then it starts self diagnosis to check itself.

Conditions for Setting the DTC

DTC 1714 is an indication of a potential internal transfer case control unit (TOD) malfunction. It will set if any of following conditions is detected.

- The calculated checksum for internal memory does not match the stored value.
- The permanent memory storage area is malfunctioning.

Action Taken When the DTC Sets

The TOD will illuminate 4WD CHECK indicator and DTC is stored in TOD.

Diagnostic Aids

- Check for poor connections, fuse and power supply wiring.
- Check for ground condition.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

2. This step checks the battery supply voltage.
4. This step checks the ground condition.
6. This step checks the connection status.

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-	Go to Step 2	Go To "TOD Control Unit Diagnostic System Check"
2	<ol style="list-style-type: none"> 1. Turn the ignition switch OFF. 2. Disconnect the 12-pin connector from transfer case control unit (TOD). 3. Turn the ignition switch to ON. 4. Connect a digital voltmeter between each of the following TOD connector terminal and ground. <ul style="list-style-type: none"> • A4 (Battery supply) • A11 (Battery supply) • A5 (Battery supply) <p>Does the voltage of the all circuits measure within the value specified?</p>	11 ~ 14 V	Go to Step 4	Go to Step 3
3	<ol style="list-style-type: none"> 1. Check the fuse EF9 and voltage supply circuit. 2. Repair or replace any open or damaged circuit or fuse. <p>Is the repair complete?</p>	-	Go to Step 4	-
4	<p>Connect a digital ohmmeter between each of the following TOD connector terminal and ground.</p> <ul style="list-style-type: none"> • B9 (Ground). • B2 (Ground). <p>Does the resistance of the all circuits measure within the value specified?</p>	0 Ω	Go to Step 6	Go to Step 5
5	<p>Repair or replace any open or damaged circuit.</p> <p>Is the repair complete?</p>	-	Go to Step 6	-

Step	Action	Value	Yes	No
6	1. Check the terminals for damages and loose connection. 2. Replace or repair the faulty connector, wire, or terminals. 3. Connect the TOD connector. 4. Connect the scan tool to data link connector (DLC) and follow the directions given in the scan tool manual. 5. Turn the ignition switch to ON. 6. Delete and request DTC with scan tool. Is DTC 1714 still present?	-	Go to Step 7	System OK
7	1. Replace the TOD. 2. Turn the ignition switch to OFF. 3. Connect the scan tool to data link connector (DLC) and follow the directions given in the scan tool manual. 4. Turn the ignition switch to ON. 5. Delete DTC with scan tool. Is the repair complete?	-	System OK	-

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DIAGNOSTIC TROUBLE CODE (DTC) 1715

TP Sensor Loss of Signal

Circuit Description

The transfer case control unit (TOD) receives throttle position (TP) sensor signals from engine control module (ECM) through CAN bus line.

Conditions for Setting the DTC

The transfer case control unit (TOD) can not receive throttle position (TP) sensor signal from engine control module (ECM). There is a bad communication between TOD and ECM.

- TOD is malfunction.
- ECM is malfunction.

Action Taken When the DTC Sets

The TOD will illuminate 4WD CHECK indicator and DTC is stored in TOD.

Diagnostic Aids

- Check for poor connections of CAN bus line.
- Check for ECM and TP sensor.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

2. This step decides the causal parts of the problem.
4. This step checks the ground condition.
6. This step checks the connection status.

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-	Go to Step 2	Go to "TOD Diagnostic System Check"
2	1. Turn the ignition switch to OFF. 2. Connect the scan tool to data link connector (DLC) and follow the directions given in the scan tool manual. 3. Turn the ignition switch to ON and request engine DTC. Are there any engine DTC related throttle position (TP) sensor?	-	Go to "TOD Diagnostic System Check" Refer to Section Engine	Go to Step 3
3	1. Turn the ignition switch to OFF. 2. Disconnect the 18-pin connector from the transfer case control unit (TOD). 3. Disconnect the gray connector from engine control module (ECM). 4. Connect a digital ohmmeter between the following TOD connector terminal and gray ECM connector terminal. <ul style="list-style-type: none"> • B11 (TOD) and 37 (ECM) • B10 (TOD) and 38 (ECM) • B11 (TOD) and 24 (ECM) • B10 (TOD) and 23 (ECM) Does the resistance of the all circuits measure within the value specified?	0 Ω	Go to Step 5	Go to Step 4
4	Repair or replace any open wires, faulty connector, or terminal. Is the repair complete?	-	System OK	-

Step	Action	Value	Yes	No
5	1. Replace the TOD. 2. Connect all connectors. 3. Request DTC with scan tool. Is the repair complete?	-	System OK	Go to Step 6
6	Replace the ECU. Is the repair complete?	-	System OK	-

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DIAGNOSTIC TROUBLE CODE (DTC) 1716

TP Sensor Out of Range

Circuit Description

The transfer case control unit (TOD) receives throttle position (TP) sensor signals from engine control module (ECM) through CAN bus line.

Conditions for Setting the DTC

D The transfer case control unit (TOD) receives throttle position (TP) sensor signal from engine control module (ECM), but the signal is out of the range.

There is a bad communication between TOD and ECU.

- TOD is malfunction.
- ECU is malfunction.

Action taken When the DTC Sets

The TOD will illuminate 4WD CHECK indicator and DTC is stored in TOD.

Diagnostic Aids

Check for poor connections of CAN bus line.

Check for ECU and TP sensor.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

2. This step decides the causal parts of the problem.
4. This step checks the ground condition.
6. This step checks the connection status.

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-		Go to "TOD Diagnostic System Check"
2	1. Turn the ignition switch to OFF. 2. Connect the scan tool to data link connector (DLC) and follow the directions given in the scan tool manual. 3. Turn the ignition switch to ON and request engine DTC. Are there any engine DTC related throttle position (TP) sensor?	-	Go to Step 2 Go to "TOD Diagnostic System Check" Go to specific engine DTC diagnosis.	Go to Step 2
3	1. Turn the ignition switch to OFF. 2. Disconnect the 18-pin connector from the transfer case control unit (TOD). 3. Disconnect the gray connector from engine control module (ECU). 4. Connect a digital ohmmeter between the following TOD connector terminal and gray ECU connector terminal. <ul style="list-style-type: none"> • B11 (TOD) and 38 (ECU) • B10 (TOD) and 37 (ECU) • B11 (TOD) and A24 • B10 (TOD) and A23 • B11 (TOD) and ground • B10 (TOD) and ground Does the resistance of the all circuits measure within the value specified?	0 Ω	Go to Step 4	Go to Step 5
4	Repair or replace any short wires, faulty connector, or terminal. Is the repair complete?	-	System OK	-

Step	Action	Value	Yes	No
5	1. Replace the TOD. 2. Connect all connectors. 3. Request DTC with scan tool. Is the repair complete?	-	System OK	Go to Step 6
6	Replace the ECU. Is the repair complete?	-	System OK	-

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DIAGNOSTIC TROUBLE CODE (DTC) 1721

Electromagnetic Clutch Open / Short to Battery

Circuit Description

To control the distribution of the torque to front propeller shaft, the transfer case control unit (TOD) sends a signal to the electromagnetic clutch (EMC). Then the clutch disc is compressed or released by the EMC.

Conditions for Setting the DTC

Even the TOD send signal for controlling the EMC, it receives uncontrolled propeller shaft speed signal.

- The wiring circuit to EMC opened.
- The wiring circuit is shorted to battery.

Action Taken When the DTC Sets

The TOD will illuminates 4WD CHECK indicator and DTC is stored in TOD.

Diagnostic Aids

- Check for poor connections of the circuit.
- Check for EMC.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

2. This step checks poor connection or damage on the pin.
3. This step, along with step 4, checks the voltage supply condition.
5. This step checks the ground condition.
7. This step checks the continuity of the wire and short to battery condition.

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-	Go to Step 2	Go to "TOD Diagnostic System Check"
2	<ol style="list-style-type: none"> 1. Turn the ignition switch to OFF. 2. Disconnect two connectors of the transfer case control unit (TOD) and white 7-pin connector, for propeller shaft speed sensor and clutch coil, located under the body. 3. Inspect the terminals for damage or improper connection. 4. Repair any damaged pins or terminals on the wiring harness and TOD. 5. Reconnect the connectors and make sure it is seated properly. 6. Connect a scan tool to the data link connector (DLC). 7. Turn the ignition ON. 8. Request the DTC with scan tool. Is the DTC still current?	-	Go to Step 3	System OK
3	<ol style="list-style-type: none"> 1. Turn the ignition switch to OFF. 2. Disconnect the 12-pin connector from transfer case control unit (TOD). 3. Turn the ignition switch to ON. 4. Connect a digital voltmeter between each of the following TOD connector terminal and ground. <ul style="list-style-type: none"> • A4 (Battery supply). • A11 (Battery supply). Does the voltage of the all circuits measure within the value specified?	11 ~ 14 V	Go to Step 5	Go to Step 4

Step	Action	Value	Yes	No
4	1. Check the fuse EF9, F10 and voltage supply circuit. 2. Repair or replace any open or damaged circuit or fuse. Is the repair complete?	-	Go to Step 5	-
5	Connect a digital ohmmeter between each of the following TOD connector terminal and ground. • A9 (Ground) • A10 (Ground) Does the resistance of the all circuits measure within the value specified?	0 Ω	Go to Step 7	Go to Step 6
6	Repair or replace any open or damaged circuit. Is the repair complete?	-	Go to Step 7	-
7	1. Disconnect the 7-pin connector under the body. 2. Measure the voltage between terminal 4 and ground. Is the resistance within the value specified?	12	Go to Step 9	Go to Step 8
8	Repair open or short to battery circuit. Is the repair complete?	-	System OK	-
9	Measure the resistance between the clutch coil terminal H and ground. Is the measurement within the value specified?	2.2 ~ 2.8 Ω	Go to Step 11	Go to Step 10
10	1. Replace EMC (Electronic Magnetic Clutch). 2. Connect all the connectors. 3. Connect a scan tool to the DLC. 4. Turn the ignition switch to ON. 5. Delete and request DTC. Is the repair complete?	-	System OK	-
11	Replace TOD. Is the repair complete?	-	System OK	-

DIAGNOSTIC TROUBLE CODE (DTC) 1722

Electromagnetic Clutch Short to Ground

Circuit Description

To control the distribution of the torque to front propeller shaft, the transfer case control unit (TOD) sends a signal to the electromagnetic clutch (EMC). Then the clutch disc is compressed or released by the EMC.

Conditions for Setting the DTC

Even the TOD send signal for controlling the EMC, it receives uncontrolled propeller shaft speed signal.

- The wiring circuit to EMC is shorted to ground.

Action Taken When the DTC Sets

The TOD will illuminate 4WD CHECK indicator and DTC is stored in TOD.

Diagnostic Aids

- Check for poor connections of the circuit.
- Check for EMC.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

- This step checks poor connection or damage on the pin.
- This step, along with step 4, checks the voltage supply condition.
- This step checks the ground condition.
- This step checks the continuity of the wire and short to battery condition.

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-	Go to Step 2	Go to "TOD Diagnostic System Check"
2	<ol style="list-style-type: none"> Turn the ignition switch to OFF. Disconnect two connectors of the transfer case control unit (TOD) and white 7-pin connector, for propeller shaft speed sensor and clutch coil, located under the body. Inspect the terminals for damage or improper connection. Repair any damaged pins or terminals on the wiring harness and TOD. Reconnect the connectors and make sure it is seated properly. Connect a scan tool to the data link connector (DLC). Turn the ignition ON. Request the DTC with scan tool. Is the DTC still current?	-	Go to Step 3	System OK
3	<ol style="list-style-type: none"> Turn the ignition switch to OFF. Disconnect the 12-pin connector from transfer case control unit (TOD). Turn the ignition switch to ON. Connect a digital voltmeter between each of the following TOD connector terminal and ground. <ul style="list-style-type: none"> A4 (Battery supply). A11 (Battery supply). Does the voltage of the all circuits measure within the value specified?	11 ~ 14 V	Go to Step 5	Go to Step 4
4	<ol style="list-style-type: none"> Check the fuse EF9, F10 and voltage supply circuit. Repair or replace any open or damaged circuit or fuse. Is the repair complete?	-	Go to Step 5	-

Step	Action	Value	Yes	No
5	Connect a digital ohmmeter between each of the following TOD connector terminal and ground. <ul style="list-style-type: none"> A9 (Ground) A10 (Ground) Does the resistance of the all circuits measure within the value specified?	0 Ω	Go to Step 7	Go to Step 6
6	Repair or replace any open or damaged circuit. Is the repair complete?	-	Go to Step 7	-
7	1. Disconnect the 7-pin connector under the body. 2. Measure the voltage between terminal 4 and ground. Is the resistance within the value specified?	0 Ω	Go to Step 9	Go to Step 8
8	Repair open or short to battery circuit. Is the repair complete?	-	System OK	-
9	Measure the resistance between the clutch coil terminal H and ground. Is the measurement within the value specified?	2.2 ~ 2.8 Ω	Go to Step 11	Go to Step 10
10	1. Replace EMC (Electronic Magnetic Clutch). 2. Connect all the connectors. 3. Connect a scan tool to the DLC. 4. Turn the ignition switch to ON. 5. Delete and request DTC. Is the repair complete?	-	System OK	-
11	Replace TOD. Is the repair complete?	-	System OK	-

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Step	Action	Value	Yes	No
4	1. Repair any damaged pins, terminals, open or short to ground circuit. 2. Reconnect the connectors and make sure it is seated properly. 3. Connect a scan tool to the data link connector (DLC). 4. Turn the ignition ON. 5. Request the DTC with scan tool. Is the DTC still current?	-	Go to Step 5	System OK
5	Measure the resistance between terminals of the male white 7-pin connector. Is the measurement within specified range? <ul style="list-style-type: none"> Terminal 6 and terminal 3 Terminal 6 and terminal 2 Terminal 3 and terminal 2 	5 ~ 6 MΩ 5 ~ 6 MΩ 9 ~ 10 MΩ	Go to Step 7	Go to Step 6
6	Replace front propeller shaft speed sensor. Is the repair complete?	-	System OK	-
7	1. Replace the TOD. 2. Turn the ignition switch to OFF. 3. Connect the scan tool to data link connector (DLC) and follow the directions given in the scan tool manual. 4. Turn the ignition switch to ON. 5. Delete and request DTC with scan tool. Is the repair complete?	-	System OK	-

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

DIAGNOSTIC TROUBLE CODE (DTC) 1732

Front Speed Sensor Voltage High

Circuit Description

The transfer case control unit (TOD) supplies 5 volts reference voltage to the front speed sensor and receives speed signals generated by Hall effect speed sensor.

Conditions for Setting the DTC

- The wiring circuit for speed sensor shorted to voltage.
- The reference voltage circuit is shorted to voltage.

Action Taken When the DTC Sets

The TOD will illuminate 4WD CHECK indicator and DTC is stored in TOD.

The TOD then responds as follows:

- If the system is in high range the TOD uses the rear speed sensor to determine the EMC touch off level and wheel slip control is suspended.
- If the system is in low range, the EMC duty cycle is set to maximum, independent of vehicle speed, until the system is shifted out of low range.
- All electric shift activity is halted until the Ignition is cycled. If a shift is in progress it will be completed.

Diagnostic Aids

- Check for short to ground or open circuit.
- Check for front propeller speed sensor.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

3. This step checks the continuity.
5. This step checks the speed sensor.

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-	Go to Step 2	Go to "TOD Diagnostic System Check"
2	1. Turn the ignition switch to OFF. 2. Connect a scan tool to the data link connector (DLC) and follow the directions given in the scan tool manual. 3. Turn the ignition switch to ON. 4. Request DTC with scan tool. Is the DTC 1736 also shown?	-	Go to "DTC 1736 – Speed Sensor Reference Voltage High"	Go to Step 3
3	1. Turn the ignition switch to OFF. 2. Disconnect 18-pin connectors of the transfer case control unit (TOD) and white 7-pin connector, for propeller shaft speed sensor and clutch coil, located under the body. 3. Measure the voltage between terminals B6 and ground. Is measured value below the specified value?	0 Ω	Go to Step 5	Go to Step 4

Step	Action	Value	Yes	No
4	1. Repair any damaged pins, terminals, short to battery circuit. 2. Reconnect the connectors and make sure it is seated properly. 3. Connect a scan tool to the data link connector (DLC). 4. Turn the ignition ON. 5. Request the DTC with scan tool. Is the DTC still current?	-	Go to Step 5	System OK
5	Measure the resistance between terminals of the male white 7-pin connector. Is the measurement within specified range? <ul style="list-style-type: none"> Terminal B and terminal C Terminal B and terminal D Terminal C and terminal D 	5 ~ 6 MΩ 5 ~ 6 MΩ 9 ~ 10 kΩ	Go to Step 7	Go to Step 6
6	Replace front propeller shaft speed sensor. Is the repair complete?	-	System OK	-
7	1. Replace the TOD. 2. Turn the ignition switch to OFF. 3. Connect the scan tool to data link connector (DLC) and follow the directions given in the scan tool manual. 4. Turn the ignition switch to ON. 5. Delete and request DTC with scan tool. Is the repair complete?	-	System OK	-

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

DIAGNOSTIC TROUBLE CODE (DTC) 1733

Rear Speed Sensor Voltage Low

Circuit Description

The transfer case control unit (TOD) supplies 5 volts reference voltage to the front and rear speed sensor and receives speed signals generated by Hall effect speed sensor.

Conditions for Setting the DTC

- The wiring circuit for speed sensor shorted to ground or opened.
- The reference voltage circuit is shorted to ground or opened.

Action Taken When the DTC Sets

The TOD will illuminate 4WD CHECK indicator and DTC is stored in TOD.

The TOD then responds as follows:

- If the system is in high range the TOD uses the front speed sensor to determine the EMC touch off level and wheel slip control is suspended.
- If the system is in low range, the EMC duty cycle is set to maximum independent of vehicle speed until the system is shifted out of low range.
- All electric shift activity is halted until the Ignition is cycled. If a shift is in progress it will be completed.

Diagnostic Aids

- Check for short to ground or open circuit.
- Check for front propeller speed sensor.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

3. This step checks the continuity.
5. This step checks the speed sensor.

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-	Go to Step 2	Go to "TOD Diagnostic System Check"
2	1. Turn the ignition switch to OFF. 2. Connect a scan tool to the data link connector (DLC) and follow the directions given in the scan tool manual. 3. Turn the ignition switch to ON. 4. Request DTC with scan tool. Is the DTC 1736 also shown?	-	Go to "DTC 1735 – Speed Sensor Reference Voltage Low"	Go to Step 3
3	1. Turn the ignition switch to OFF. 2. Disconnect 18-pin connectors of the transfer case control unit (TOD) and white 7-pin connector, for propeller shaft speed sensor and clutch coil, located under the body. 3. Measure the resistance between terminals 17 of TOD and terminals in female white 7-pin connector. Is measured value equal to specified range? 4. Measure the resistance between terminals B17 of TOD and ground. Is measured value equal to specified range?	0 Ω ∞	Go to Step 5	Go to Step 4

Step	Action	Value	Yes	No
4	1. Repair any damaged pins, terminals, open or short to ground circuit. 2. Reconnect the connectors and make sure it is seated properly. 3. Connect a scan tool to the data link connector (DLC). 4. Turn the ignition ON. 5. Request the DTC with scan tool. Is the DTC still current?	-	Go to Step 5	System OK
5	Measure the resistance between terminals of the male white 7-pin connector. Is the measurement within specified range? <ul style="list-style-type: none"> Terminal 7 and terminal 5 Terminal 7 and terminal 1 Terminal 5 and terminal 1 	5 ~ 6 MΩ 5 ~ 6 MΩ 9 ~ 10 kΩ	Go to Step 7	Go to Step 6
6	Replace rear propeller shaft speed sensor. Is the repair complete?	-	System OK	-
7	1. Replace the TOD. 2. Turn the ignition switch to OFF. 3. Connect the scan tool to data link connector (DLC) and follow the directions given in the scan tool manual. 4. Turn the ignition switch to ON. 5. Delete and request DTC with scan tool. Is the repair complete?	-	System OK	-

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

DIAGNOSTIC TROUBLE CODE (DTC) 1734

Rear Speed Sensor Voltage High

Circuit Description

The transfer case control unit (TOD) supplies 5 volts reference voltage to the front speed sensor and receives speed signals generated by Hall effect speed sensor.

Conditions for Setting the DTC

- The wiring circuit for speed sensor shorted to voltage.
- The reference voltage circuit is shorted to voltage.

Action Taken When the DTC Sets

The TOD will illuminate 4WD CHECK indicator and DTC is stored in TOD.

The TOD then responds as follows:

- If the system is in high range the TOD uses the front speed sensor to determine the EMC touch off level and wheel slip control is suspended.
- If the system is in low range, the EMC duty cycle is set to maximum independent of vehicle speed until the system is shifted out of low range.
- All electric shift activity is halted until the Ignition is cycled. If a shift is in progress it will be completed.

Diagnostic Aids

- Check for short to ground or open circuit.
- Check for front propeller speed sensor.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

3. This step checks the continuity.
5. This step checks the speed sensor.

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-	Go to Step 2	Go to "TOD Diagnostic System Check"
2	1. Turn the ignition switch to OFF. 2. Connect a scan tool to the data link connector (DLC) and follow the directions given in the scan tool manual. 3. Turn the ignition switch to ON. 4. Request DTC with scan tool. Is the DTC 1736 also shown?	-	Go to "DTC 1736 - Speed Sensor Reference Voltage High"	Go to Step 3
3	1. Turn the ignition switch to OFF. 2. Disconnect 18-pin connectors of the transfer case control unit (TOD) and white 7-pin connector, for propeller shaft speed sensor and clutch coil, located under the body. 3. Measure the voltage between terminals B17 of TOD and ground. Is measured value below the specified value?	0 Ω	Go to Step 5	Go to Step 4

Step	Action	Value	Yes	No
4	1. Repair any damaged pins, terminals, open or short to ground circuit. 2. Reconnect the connectors and make sure it is seated properly. 3. Connect a scan tool to the data link connector (DLC). 4. Turn the ignition ON. 5. Request the DTC with scan tool. Is the DTC still current?	-	Go to Step 5	System OK
5	Measure the resistance between terminals of the male white 7-pin connector. Is the measurement within specified range? <ul style="list-style-type: none"> Terminal 7 and terminal 5 Terminal 7 and terminal 1 Terminal 5 and terminal 1 	5 ~ 6 MΩ 5 ~ 6 MΩ 9 ~ 10 kΩ	Go to Step 7	Go to Step 6
6	Replace rear propeller shaft speed sensor. Is the repair complete?	-	System OK	
7	1. Replace the TOD. 2. Turn the ignition switch to OFF. 3. Connect the scan tool to data link connector (DLC) and follow the directions given in the scan tool manual. 4. Turn the ignition switch to ON. 5. Delete and request DTC with scan tool. Is the repair complete?	-	System OK	-

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-	Go to Step 2	Go to "TOD Diagnostic System Check"
2	1. Disconnect white 7-pin connector, for propeller shaft speed sensor and clutch coil, located under the body. 2. Turn the ignition switch to ON. 3. Measure the voltage between following terminals of male white 7-pin connector: Terminal D/E and terminal B/G Is measured value within the specified range?	4.5 ~ 5.5 V	Go to Step 7	Go to Step 3
3	Measure the resistance between terminal A8 and terminals B8 of transfer case control unit (TOD). Is measured value within the specified range?	4.5 ~ 5.5 V	Go to Step 5	Go to Step 4
4	1. Turn the ignition switch to OFF. 2. Check two connectors of the TOD and white 7-pin connector. 3. Repair any damaged pins, connector or wires. 4. Reconnect all the connectors and make sure it is seated properly. 5. Connect a scan tool to the data link connector (DLC). 6. Turn the ignition switch to ON. 7. Request DTC Is the DTC still current?	-	Go to Step 5	System OK
5	1. Turn the ignition switch to OFF. 2. Disconnect two connectors of the TOD and white 7-pin connector under the body. 3. Measure the resistance between following terminals: <ul style="list-style-type: none"> • A8 (TOD) and 1/2 (7-pin connector) • B8 (TOD) and 6/7 (7-pin connector) Is the resistance equal to specified value? 4. Measure the resistance between A8 and B8 of TOD connector and ground Is the resistance equal to specified value?	0 Ω ∞	Go to Step 7	Go to Step 6
6	Repair any open or short to ground circuit. Is the repair complete?	-	System OK	Go to Step 7

Step	Action	Value	Yes	No
7	Measure the resistance between terminals of the male white 7-pin connector. <ul style="list-style-type: none"> Terminal 6 and terminal 3 Terminal 6 and terminal 2 Terminal 3 and terminal 2 Terminal 7 and terminal 5 Terminal 7 and terminal 1 Terminal 5 and terminal 1 Is the measurement within specified range?	5 ~ 6 MΩ 5 ~ 6 MΩ 9 ~ 10 kΩ 5 ~ 6 MΩ 5 ~ 6 MΩ 9 ~ 10 kΩ	Go to Step 9	Go to Step 8
8	Replace front or rear propeller shaft speed sensor. Is the repair complete?	-	System OK	-
9	1. Replace the TOD. 2. Turn the ignition switch to OFF. 3. Connect the scan tool to data link connector (DLC) and follow the directions given in the scan tool manual. 4. Turn the ignition switch to ON. 5. Delete and request DTC with scan tool. Is the repair complete?	-	System OK	-

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شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



DIAGNOSTIC TROUBLE CODE (DTC) 1736

Speed Sensor Reference Voltage High

Circuit Description

The transfer case control unit (TOD) provides reference voltage to front and rear propeller-shaft speed sensor.

Conditions for Setting the DTC

If the reference voltage supply line is shorted to battery, then the 4WD CHECK indicator will illuminated and the diagnostic trouble code (DTC) will stored to the TOD.

- If the system is in high range the TOD sets the EMC touch off level based on a vehicle speed of 0 and wheel slip control is suspended.
- If the system is in low range, the EMC duty cycle is set to maximum until the system is shifted out of low range.

Diagnostic Aids

- Check for short to ground or open circuit.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

2. This step, along with step 3, checks the voltage supply condition.
5. This step checks the continuity of ground line.
7. This step checks the speed sensors.

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-	Go to Step 2	Go to "TOD Diagnostic System Check"
2	<ol style="list-style-type: none"> 1. Disconnect white 7-pin connector, for propeller shaft speed sensor and clutch coil, located under the body. 2. Turn the ignition switch to ON. 3. Measure the voltage between following terminals of male white 7-pin connector: <ul style="list-style-type: none"> • Terminal D/E and terminal B/G Is measured value within the specified range?	4.5 ~ 5.5 V	Go to Step 7	Go to Step 3
3	Measure the resistance between terminal A8 and terminals B8 of transfer case control unit (TOD). Is measured value within the specified range?	4.5 ~ 5.5 V	Go to Step 5	Go to Step 4
4	<ol style="list-style-type: none"> 1. Turn the ignition switch to OFF. 2. Check two connectors of the TOD and white 7-pin connector. 3. Repair any damaged pins, connector or wires. 4. Reconnect all the connectors and make sure it is seated properly. 5. Connect a scan tool to the data link connector (DLC). 6. Turn the ignition switch to ON. 7. Request DTC. Is the DTC still current?	-	Go to Step 5	System OK

Step	Action	Value	Yes	No
5	1. Turn the ignition switch to OFF. 2. Disconnect two connectors of the TOD and 7-pin connector under the body. 3. Measure the resistance between following terminals: <ul style="list-style-type: none"> • A8 (TOD) and 1/2 (7-pin connector) • B8 (TOD) and 6/7 (7-pin connector) Is the resistance equal to specified value? 4. Measure the voltage between A8 and B8 of TOD connector and ground. Is the resistance below the specified value?	 0 Ω ∞	 Go to Step 7	 Go to Step 6
6	Repair any short to circuit. Is the repair complete?	-	System OK	Go to Step 7
7	Measure the resistance between terminals of the male white 7-pin connector. <ul style="list-style-type: none"> • Terminal 6 and terminal 3 • Terminal 6 and terminal 2 • Terminal 3 and terminal 2 • Terminal 7 and terminal 5 • Terminal 7 and terminal 1 • Terminal 5 and terminal 1 Is the measurement within specified range?	 5 ~ 6 MΩ 5 ~ 6 MΩ 9 ~ 10 kΩ 5 ~ 6 MΩ 5 ~ 6 MΩ 9 ~ 10 kΩ	 Go to Step 9	 Go to Step 8
8	Replace front or rear propeller shaft speed sensor. Is the repair complete?	-	System OK	-
9	1. Replace the TOD. 2. Turn the ignition switch to OFF. 3. Connect the scan tool to data link connector (DLC) and follow the directions given in the scan tool manual. 4. Turn the ignition switch to ON. 5. Delete and request DTC with scan tool. Is the repair complete?	-	System OK	-

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-	Go to Step 2	Go to "TOD Diagnostic System Check"
2	1. Turn the ignition switch to OFF. 2. Disconnect two connectors of the transfer case control unit (TOD) and 7-pin connector under the body. 3. Inspect the terminals for damage or improper connection. 4. Repair any damaged pins or terminals on the wiring harness and TOD. 5. Reconnect the connectors and make sure it is seated properly. 6. Connect a scan tool to the data link connector (DLC). 7. Turn the ignition ON. 8. Request the DTC with scan tool. Is the DTC still current?	-	Go to Step 3	System OK
3	1. Disconnect the black 7-pin connector for shift motor under the body. 2. Turn the ignition switch to ON. 3. Position shift lever to N (neutral). 4. Connect the voltmeter between terminal 7 of female 7-pin connector and ground. 5. Measure the voltage while switching the 4L/4H switch from 4H to 4L. Is the voltage within the specified value? 6. Connect the voltmeter between terminal 6 of female 7-pin connector and ground. 7. Measure the voltage while switching the 4L/4H switch from 4L to 4H. Is the voltage within the specified value?	11 ~ 14 V 11 ~ 14 V	Go to Step 7	Go to Step 4

Step	Action	Value	Yes	No
4	1. Connect terminal A1/A6 and terminal A9/A10 with digital voltmeter. 2. Measure the voltage while switching the 4L/4H switch from 4H to 4L. Is the voltage within the specified value?	11 ~ 14 V		
	3. Connect terminal A2/A7 between terminals A9/A10 with digital voltmeter. 4. Measure the voltage while switching the 4L/4H switch from 4L to 4H. Is the voltage within specified range?	11 ~ 14 V	Go to Step 5	Go to Step 9
5	1. Disconnect 12-pin connector from transfer case control unit (TOD) and black 7-pin connector. 2. Measure the resistance between following terminals. • A2 (TOD) and 6 (7-pin connector) • A7 (TOD) and 6 (7-pin connector) • A1 (TOD) and 7 (7-pin connector) • A6 (TOD) and 7 (7-pin connector) Is the resistance equal to specified value?	0 Ω		
	3. Measure the voltage between following terminals: • A2/A7 (TOD) and ground • A1/A6 (TOD) and ground Is the voltage below specified value?	1 V	Go to Step 7	Go to Step 6
6	Repair any open or short to battery circuit. Is the repair complete?	-	System OK	Go to Step 7
7	1. Turn the ignition switch to OFF. 2. Disconnect the black 7-pin connector, for shift motor, under the body. 3. Measure the resistance between terminal G and terminal B. Is the resistance within the specified value?	1 ~ 250 Ω	Go to Step 9	Go to Step 8
8	Replace the shift motor. Is the repair complete?	-	System OK	-
9	Replace the TOD. Is the repair complete?	-	System OK	Go to Step 7

[illegible]

Step	Action	Value	Yes	No
4	1. Connect terminal A1/A6 and terminal A9/A10 with digital voltmeter. 2. Measure the voltage while switching the 4L/4H switch from 4H to 4L. Is the voltage within the specified value?	11 ~ 4 V		
	3. Connect terminal A2/A7 between terminals A9/A10 with digital voltmeter. 4. Measure the voltage while switching the 4L/4H switch from 4L to 4H. Is the voltage within specified range?	11 ~ 4 V	Go to Step 5	Go to Step 9
5	1. Disconnect 12-pin connector from transfer case control unit (TOD) and 7-pin connector. 2. Measure the resistance between following terminals. • A2/A7 (TOD) and 6 (7-pin connector) • A1/A6 (TOD) and 7 (7-pin connector) • A1/A6 (TOD) and ground. • A2/A7 (TOD) and ground. Is the resistance equal to specified value?	0 Ω	Go to Step 6	System OK
	6 Repair any short to ground or short between circuit. Is the repair complete?	-	System OK	Go to Step 7
7	1. Turn the ignition switch to OFF. 2. Disconnect the black 7-pin connector, for shift motor, under the body. 3. Measure the resistance between terminal G and terminal B. Is the resistance within the specified value?	1 ~ 205 Ω	Go to Step 9	Go to Step 8
	8 Replace the shift motor. Is the repair complete?	-	System OK	-
9	Replace the TOD. Is the repair complete?	-	System OK	-

DIAGNOSTIC TROUBLE CODE (DTC) 1743

Shift System Timeout

Circuit Description

The transfer case control unit (TOD) sends current to move the shift motor upon the position of the 4H/4L switch.

Conditions for Setting the DTC

- Shifting to other drive range is failed within specified range.

Diagnostic Aids

- Check for short to ground circuit.
- Check for the shift motor.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

- This step checks the connector and connection status.
- This step checks the shift motor.

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-	Go to Step 2	Go to "TOD Diagnostic System Check"
2	1. Turn the ignition switch to OFF. 2. Connect a scan tool to the data link connector (DLC) and follow the directions given in the scan tool manual. 3. Turn the ignition switch to ON. 4. Request DTC with scan tool. Is the DTC 1741 or 1742 also shown?	-	Go to Applicable DTC Table	Go to Step 3
3	1. Turn the ignition switch to OFF. 2. Disconnect two connectors of the transfer case control unit (TOD) and black 7-pin connector under the body. 3. Inspect the terminals for damage or improper connection. 4. Repair any damaged pins or terminals on the wiring harness and TOD. 5. Reconnect the connectors and make sure it is seated properly. 6. Connect a scan tool to the data link connector (DLC). 7. Turn the ignition ON. 8. Request the DTC with scan tool. Is the DTC still current?	-	Go to Step 4	System OK
4	1. Remove the shift motor. 2. Connect the black 7-pin connector to shift motor. 3. Check the motor operation by turning the 4H/4L switch. Is the motor run?	-	Go to Step 5	Replace shift motor and Go to Step 3
5	Replace the TOD. Is the repair complete?	-	System OK	Go to Step 6
6	Repair any problems in transfer case assembly. Is the repair complete?	-	System OK	-

DIAGNOSTIC TROUBLE CODE (DTC) 1750**General Position Encoder Fault (Invalid Code)****Circuit Description**

The transfer case control unit (TOD) receives position encoder signals from position encoder.

Conditions for Setting the DTC

If the TOD detects a shift motor fault continuously for one second, the 4WD CHECK indicator will illuminated and the diagnostic trouble code (DTC) will stored to the TOD.

- Any position code which does not correspond to the valid 9 codes.
- A short to ground on any of the encoder lines.

Diagnostic Aids

- Check for short to ground circuit.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

- This step checks the continuity of the position encoder line.
- This step checks the connector and connection status.

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-	Go to Step 2	Go to "TOD Diagnostic System Check"
2	1. Turn the ignition switch to OFF. 2. Connect a scan tool to the data link connector (DLC) and follow the directions given in the scan tool manual. 3. Turn the ignition switch to ON. 4. Request DTC with scan tool. Is the DTC 1751, 1752, 1753, or 1754 also shown?	-	Go to Step 3	Go to Step 5
3	1. Disconnect 18-pin connector from the transfer case control unit (TOD). 2. Measure the resistance between following terminals: <ul style="list-style-type: none"> B15 (TOD) and ground B5 (TOD) and ground B16 (TOD) and ground B18 (TOD) and ground Is any of the resistance equal to specified value?	0 Ω	Go to Step 4	Go to Step 5
4	Repair all of the short to ground circuit. Is the repair complete?	-	System OK	-
5	1. Turn the ignition switch to OFF. 2. Disconnect two connectors of the transfer case control unit (TOD) and 7-pin connector under the body. 3. Inspect the terminals for damage or improper connection. 4. Repair any damaged pins or terminals on the wiring harness and TOD. 5. Reconnect the connectors and make sure it is seated properly. 6. Connect a scan tool to the data link connector (DLC). 7. Turn the ignition ON. 8. Request the DTC with scan tool. Is the DTC still current?	-	Go to Step 6	System OK

Step	Action	Value	Yes	No
6	Replace the shift motor with position encoder. Is the repair complete?	-	System OK	Go to Step 7
7	Replace the TOD. Is the repair complete?	-	System OK	-

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



DIAGNOSTIC TROUBLE CODE (DTC) 1751

Position 1 Shorted to Ground

Circuit Description

The transfer case control unit (TOD) receives position encoder signals from position encoder.

Conditions for Setting the DTC

- Position 2 code does not correspond to the specific codes.
- A short to ground on any of the encoder lines.

Diagnostic Aids

- Check for short to ground circuit.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

- This step checks the continuity of the position encoder line.
- This step checks the connector and connection status.

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-	Go to Step 2	Go to "TOD Diagnostic System Check"
2	1. Turn the ignition switch to OFF. 2. Connect a scan tool to the data link connector (DLC) and follow the directions given in the scan tool manual. 3. Turn the ignition switch to ON. 4. Request DTC with scan tool. Is the DTC 1751 only current trouble code?	-	Go to Step 3	Go to "DTC 1750 General Position Encoder Fault (Invalid Code)"
3	1. Turn the ignition switch to OFF. 2. Disconnect 18-pin connector from the transfer case control unit (TOD). 3. Measure the resistance between terminal A15 of TOD connector and ground. Is the resistance equal to specified value?	0 Ω	Go to Step 4	Go to Step 5
4	Repair short to ground circuit. Is the repair complete?	-	System OK	-
5	1. Turn the ignition switch to OFF. 2. Disconnect two connectors of the transfer case control unit (TOD) and 7-pin connector under the body. 3. Inspect the terminals for damage or improper connection. 4. Repair any damaged pins or terminals on the wiring harness and TOD. 5. Reconnect the connectors and make sure it is seated properly. 6. Connect a scan tool to the data link connector (DLC). 7. Turn the ignition ON. 8. Request the DTC with scan tool. Is the DTC still current?	-	Go to Step 6	System OK
6	Replace the shift motor. Is the repair complete?	-	System OK	Go to Step 7
7	Replace the TOD. Is the repair complete?	-	System OK	-

DIAGNOSTIC TROUBLE CODE (DTC) 1752

Position 2 Shorted to Ground

Circuit Description

The transfer case control unit (TOD) receives position encoder signals from position encoder.

Conditions for Setting the DTC

- Position 2 code does not correspond to the specific codes.
- A short to ground on any of the encoder lines.

Diagnostic Aids

- Check for short to ground circuit.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

- This step checks the continuity of the position encoder line.
- This step checks the connector and connection status.

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-	Go to Step 2	Go to "TOD Diagnostic System Check"
2	1. Turn the ignition switch to OFF. 2. Connect a scan tool to the data link connector (DLC) and follow the directions given in the scan tool manual. 3. Turn the ignition switch to ON. 4. Request DTC with scan tool. Is the DTC 1752 only current trouble code?	-	Go to Step 3	Go to "DTC 1750 General Position Encoder Fault (Invalid Code)"
3	1. Turn the ignition switch to OFF. 2. Disconnect 18-pin connector from the transfer case control unit (TOD). 3. Measure the resistance between terminal A10 of TOD connector and ground. Is the resistance equal to specified value?	0 Ω	Go to Step 4	Go to Step 5
4	Repair short to ground circuit. Is the repair complete?	-	System OK	-
5	1. Turn the ignition switch to OFF. 2. Disconnect two connectors of the TOD and black 7-pin connector under the body. 3. Inspect the terminals for damage or improper connection. 4. Repair any damaged pins or terminals on the wiring harness and TOD. 5. Reconnect the connectors and make sure it is seated properly. 6. Connect a scan tool to the data link connector (DLC). 7. Turn the ignition ON. 8. Request the DTC with scan tool. Is the DTC still current?	-	Go to Step 6	System OK
6	Replace the shift motor. Is the repair complete?	-	System OK	Go to Step 7
7	Replace the TOD. Is the repair complete?	-	System OK	-

DIAGNOSTIC TROUBLE CODE (DTC) 1753**Position 3 Shorted to Ground****Circuit Description**

The transfer case control unit (TOD) receives position encoder signals from position encoder.

Conditions for Setting the DTC

- Position 3 code does not correspond to the specific codes.
- A short to ground on any of the encoder lines.

Diagnostic Aids

- Check for short to ground circuit.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

- This step checks the continuity of the position encoder line.
- This step checks the connector and connection status.

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-	Go to Step 2	Go to "TOD Diagnostic System Check"
2	1. Turn the ignition switch to OFF. 2. Connect a scan tool to the data link connector (DLC) and follow the directions given in the scan tool manual. 3. Turn the ignition switch to ON. 4. Request DTC with scan tool. Is the DTC 1753 only current trouble code?	-	Go to Step 3	Go to "DTC 1750 General Position Encoder Fault(Invalid Code)"
3	1. Turn the ignition switch to OFF. 2. Disconnect 18-pin connector from the transfer case control unit (TOD). 3. Measure the resistance between terminal A28 of TOD connector and ground. Is the resistance equal to specified value?	0 Ω	Go to Step 4	Go to Step 5
4	Repair short to ground circuit. Is the repair complete?	-	System OK	-
5	1. Turn the ignition switch to OFF. 2. Disconnect two connectors of the TOD and black 7-pin connector under the body. 3. Inspect the terminals for damage or improper connection. 4. Repair any damaged pins or terminals on the wiring harness and TOD. 5. Reconnect the connectors and make sure it is seated properly. 6. Connect a scan tool to the data link connector (DLC). 7. Turn the ignition ON. 8. Request the DTC with scan tool. Is the DTC still current?	-	Go to Step 6	System OK
6	Replace the shift motor. Is the repair complete?	-	System OK	Go to Step 7
7	Replace the TOD. Is the repair complete?	-	System OK	-

DIAGNOSTIC TROUBLE CODE (DTC) 1754

Position 4 Shorted to Ground

Circuit Description

The transfer case control unit (TOD) receives position encoder signals from position encoder.

Conditions for Setting the DTC

- Position 4 code does not correspond to the specific codes.
- A short to ground on any of the encoder lines.

Diagnostic Aids

- Check for short to ground circuit.

Test Description

The number(s) below refer to step(s) on the diagnostic table.

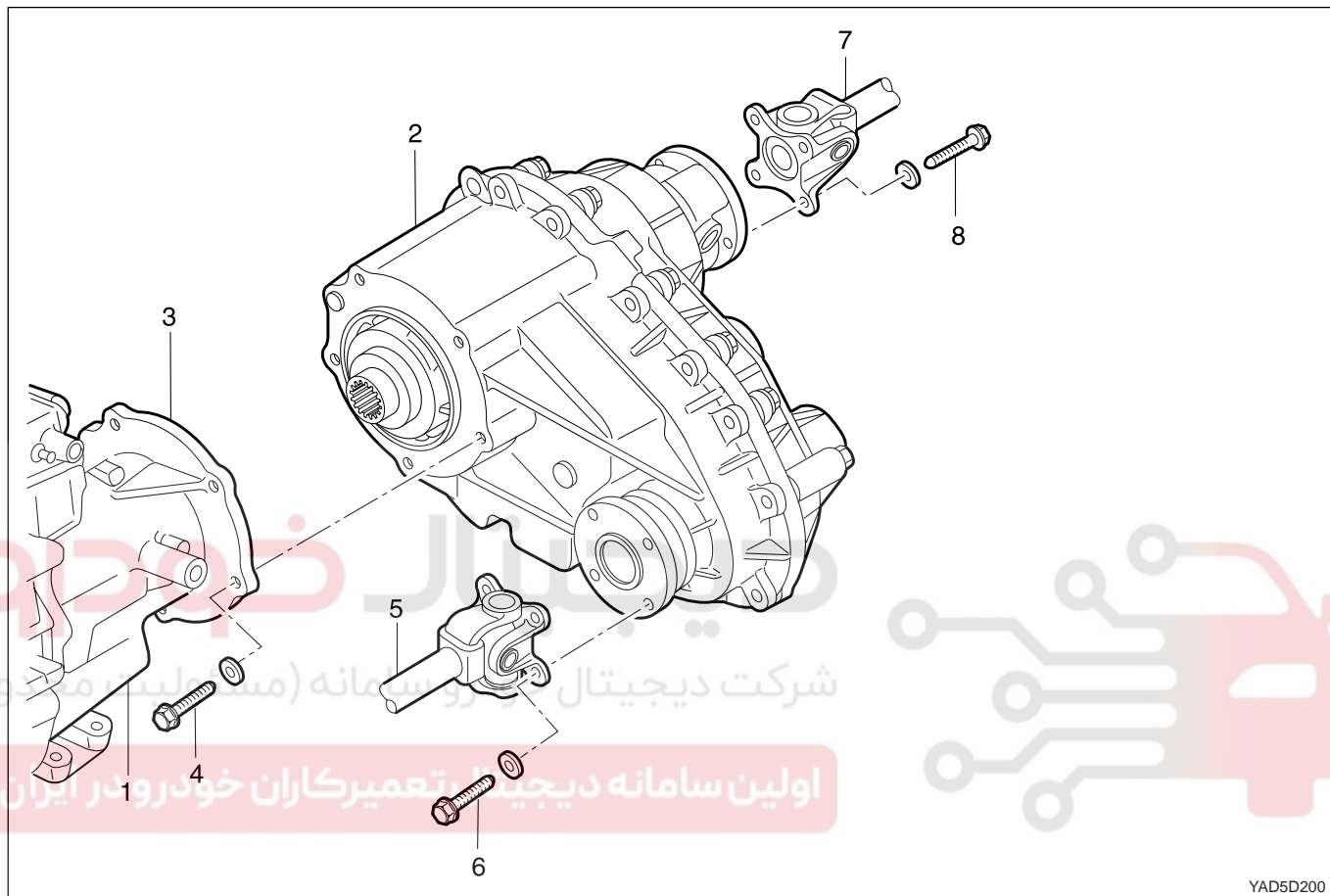
- This step checks the continuity of the position encoder line.
- This step checks the connector and connection status.

Step	Action	Value	Yes	No
1	Was the TOD Diagnostic System Check performed?	-	Go to Step 2	Go to "TOD Diagnostic System Check"
2	1. Turn the ignition switch to OFF. 2. Connect a scan tool to the data link connector (DLC) and follow the directions given in the scan tool manual. 3. Turn the ignition switch to ON. 4. Request DTC with scan tool. Is the DTC 1754 only current trouble code?	-	Go to Step 3	Go to "DTC 1750 General Position Encoder Fault(Invalid Code)"
3	1. Turn the ignition switch to OFF. 2. Disconnect 18-pin connector from the transfer case control unit (TOD). 3. Measure the resistance between terminal A30 of TOD connector and ground. Is the resistance equal to specified value?	0 Ω	Go to Step 4	Go to Step 5
4	Repair short to ground circuit. Is the repair complete?	-	System OK	-
5	1. Turn the ignition switch to OFF. 2. Disconnect two connectors of the TOD and black 7-pin connector under the body. 3. Inspect the terminals for damage or improper connection. 4. Repair any damaged pins or terminals on the wiring harness and TOD. 5. Reconnect the connectors and make sure it is seated properly. 6. Connect a scan tool to the data link connector (DLC). 7. Turn the ignition ON. 8. Request the DTC with scan tool. Is the DTC still current?	-	Go to Step 6	System OK
6	Replace the shift motor. Is the repair complete?	-	System OK	Go to Step 7
7	Replace the TOD. Is the repair complete?	-	System OK	-

MAINTENANCE AND REPAIR

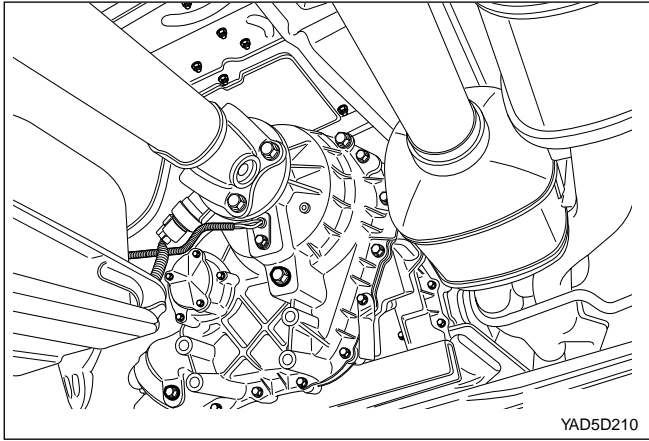
ON-VEHICLE SERVICE

TRANSFER CASE (TOD) COMPONENT LOCATOR



YAD5D200

- | | |
|-------------------------|-----------------------------------|
| 1 Transmission (A/T) | 5 Front Propeller Shaft |
| 2 TOD Transfer Case | 6 Bolt (M14, 4) 81 - 89 N•m |
| 3 Extension Housing | 7 Rear Propeller Shaft |
| 4 Bolt..... 35 - 60 N•m | 8 Bolt (M14, 4) 81 - 89 N•m |



Removal & Installation Procedure

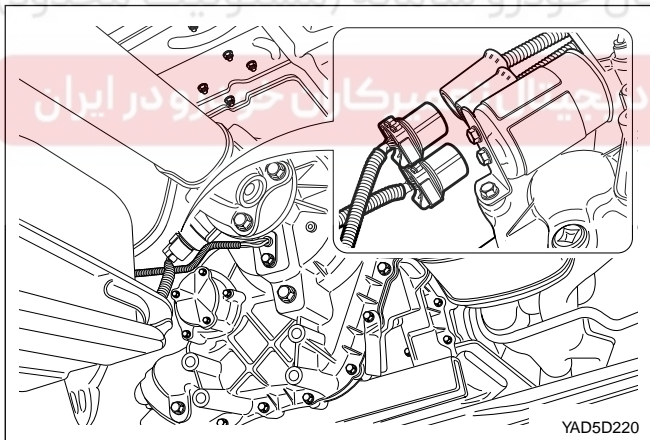
1. Disconnect (-) cable from battery.
2. Lift on vehicle and make sure on safety.

Notice: Be careful for catalytic converter due to high temperature after driving or engine running.

3. Prepare a vessel to drain transfer case and manual transmission oil.
4. Release drain plug and drain transfer case and manual transmission oil.

If planar damper is installed, unscrew 4 bolts and remove the planar damper.

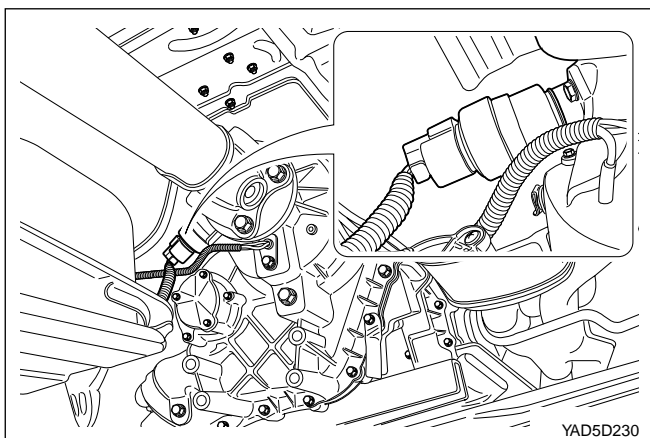
Notice: Oil drain should be along with whole transfer case disassembly and assembly.



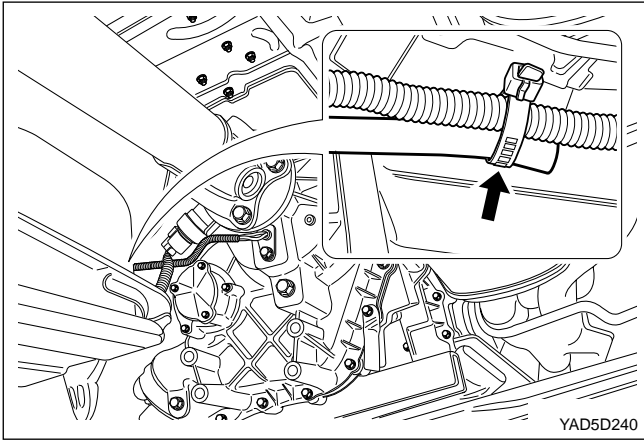
5. Disconnect transmission extension wiring connector back side transfer case.

Notice: When disconnect connector, make sure on direction of locking tab towards inside.

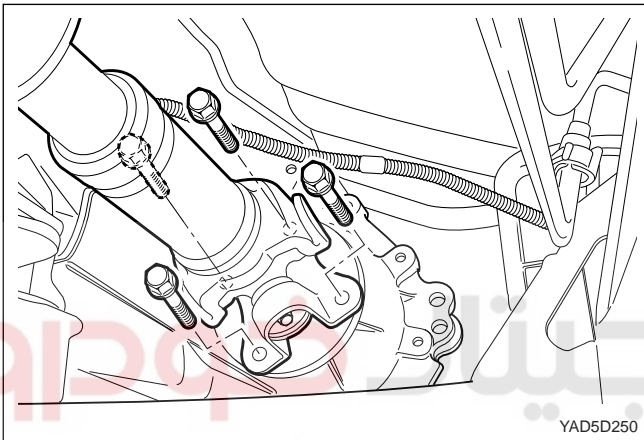
6. Disconnect shift motor/clutch coil connect (Black 7 pin) connector upper backside.
7. Disconnect front and rear speed sensor connector (white 7 pin).



8. Disconnect speedometer sensor connector right upper side.



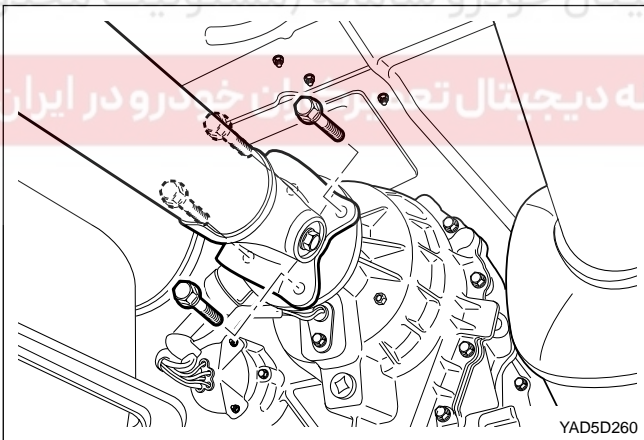
9. Disconnect breather tube front upper side transfer case (Upper connecting point of transfer case and front propeller).
10. Prepare hydraulic jack and support transfer case assembly.



11. Unscrew 4 units of M12 bolts from case flange then disconnect front propeller shaft from transfer case.

Installation Notice

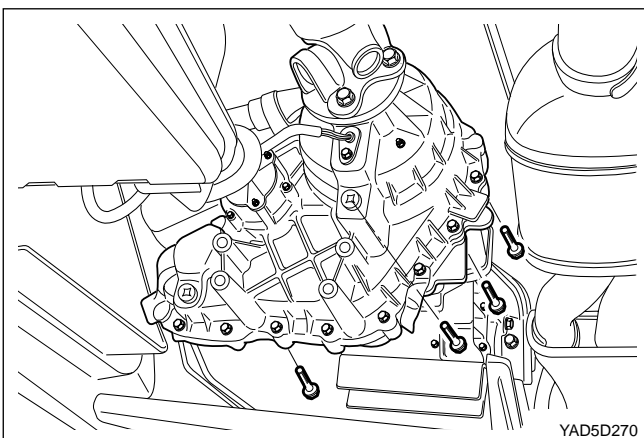
Tightening Torque	81 - 89 N•m (60 - 66 lb-ft)
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12. Unscrew 4 units of M12 bolts from case flange then disconnect rear propeller shaft from transfer case.

Installation Notice

Tightening Torque	81 - 89 N•m (60 - 66 lb-ft)
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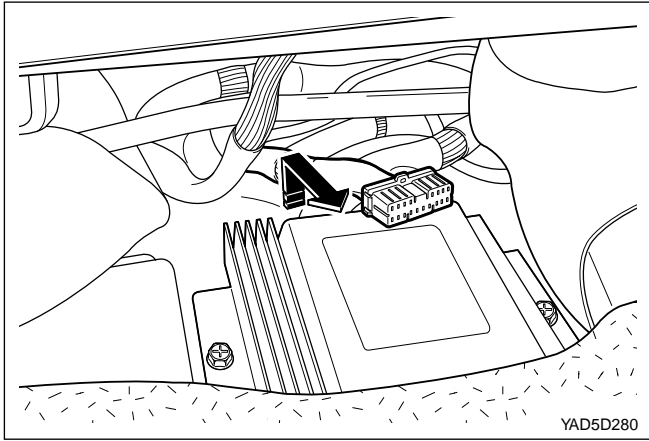
13. Unscrew 5 units of mounting bolt (M12) from extension housing in transmission.

Installation Notice

Tightening Torque	35 - 60 N•m (26 - 44 lb-ft)
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Notice: Make sure the connecting surface is clean. Applying long-life grease spline inside transfer case input shaft.

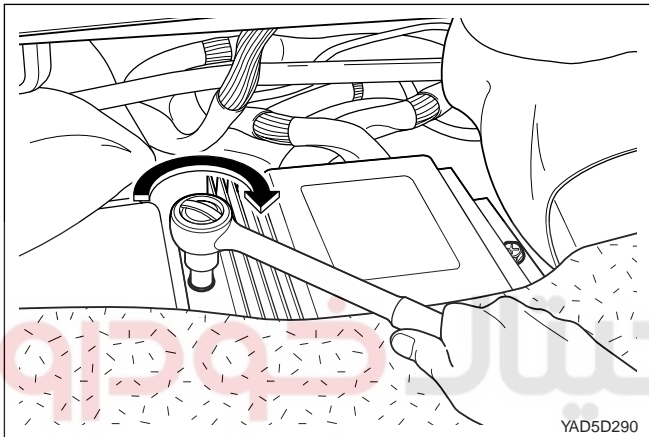
14. Installation should follow the removal procedure in the reverse order.



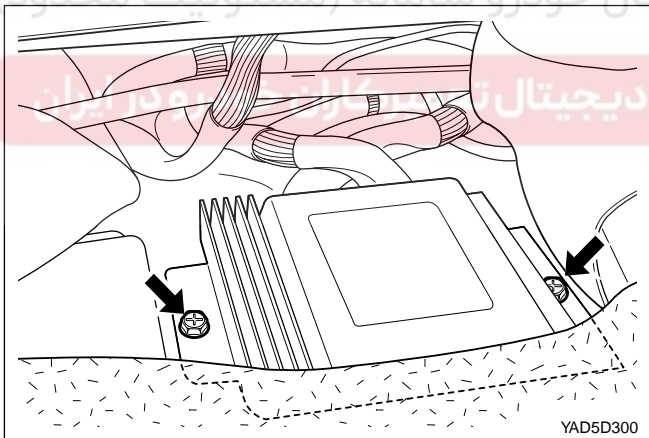
TOD CONTROL UNIT

Removal & Installation Procedure

1. Disconnect (-) cable from battery.
2. Pull toward the driver seat and disconnect the 30 pin connector from TOD control unit.



3. Unscrew 2 bolts.

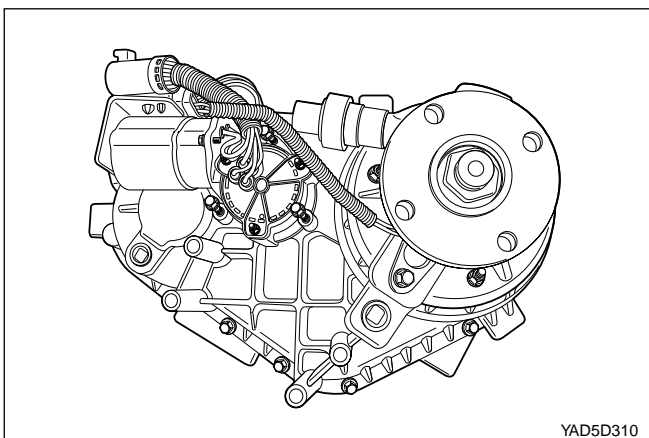


4. Installation should follow the removal procedure in the reverse order.

Notice: When replace TOD control unit, it is required to make a coding correspondent with vehicle specification.

Installation Notice

Tightening Torque	10 N•m (89 lb-in)
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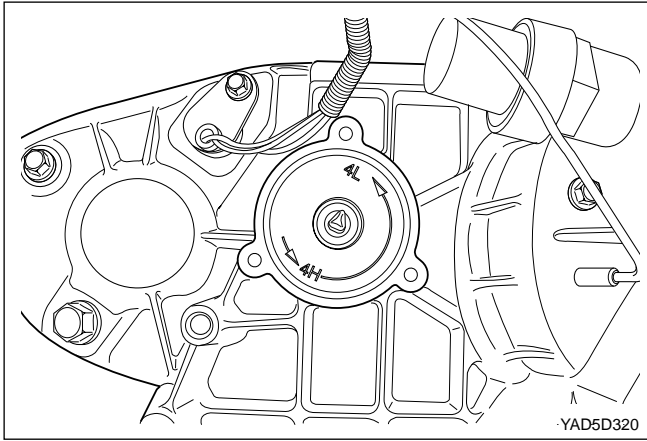


SHIFT MOTOR

Removal & Installation Procedure

1. Disconnect (-) cable from battery.
2. Disconnect shift motor/magnetic clutch coil connector (black pin7) upper backside.
3. Unscrew 3 shift motor mounting bolts (M10).
4. Unscrew a bracket mounting bolt (M10).

Notice: When disconnecting shift motor and mounting bracket, it is required to unscrew 2 units of adjusting bolts (M10) form motor and bracket.



5. Keep shift motor even then pull rearward.
6. Clean connection surface of transfer case and shift motor.
7. If necessary, make a test by SCANNER with shift motor assembly.

Notice: Do not disassemble shift motor. If necessary, replace by shift motor assembly unit.

8. Applying sealant into connecting surface for new shift motor.
9. Installation should follow the removal procedure in the reverse order. Before installation, make sure that motor position match with mode of 4H/4L switch.

Notice: When accord position of motor with 4H/4L switch and transfer case match position of the disconnected motor and new one.

دیجیتال خودرو

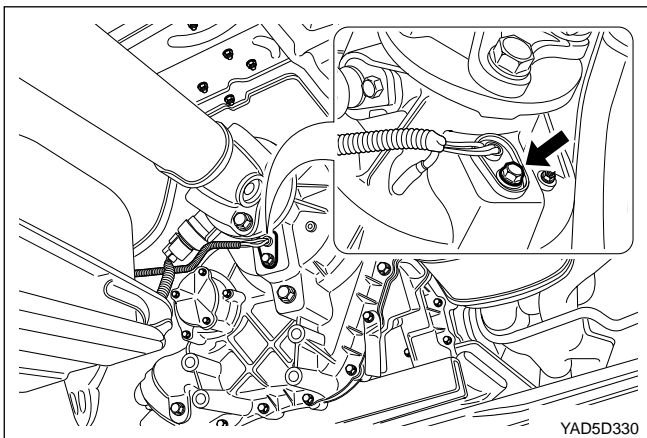
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

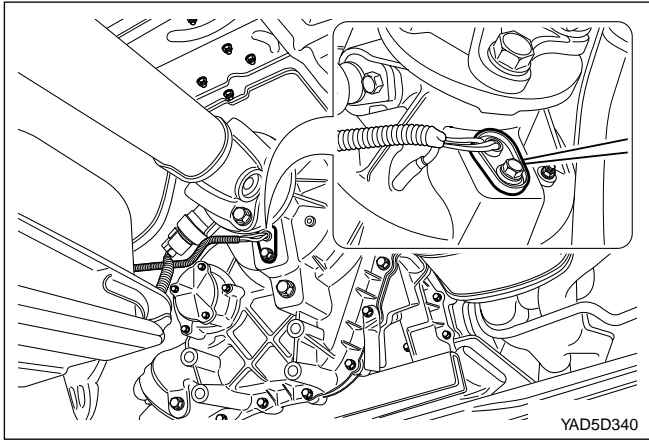
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

SPEED SENSOR IN FRONT AND REAR PROPELLER SHAFT

Replacement Procedure

1. Disconnect (-) cable from battery.
2. Detach shift motor assembly.
3. Disconnect front and rear speed sensor connector (white 3 pin) upper backside transfer case.
4. Disconnect speed sensor connect from locking sleeve by pushing.
5. Disconnect wire stick cap from the detached connector.
6. Unscrew rear speed sensor mounting bolt (M10) from upper side of rear case flange.

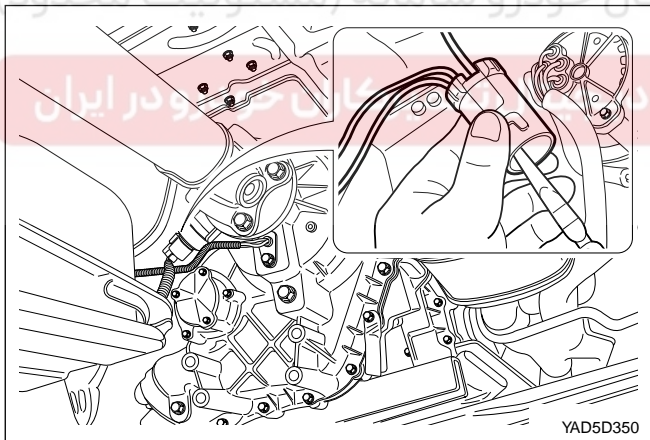




7. Detach sensor from transfer case by lifting up using tool.

Notice: When disconnect sensor, make sure on adequate pressure due to sensitiveness with shock.

8. Disconnect taping from both protection tube ends that wrap 3 wires of speed sensor and 1 wire of clutch coil.
9. Disconnect tube.



10. Disconnect pin and wire from speed sensor connector by pulling sticking long-nose plier into "L" pin in connector.
11. On the same way, disconnect pin and wire "M" and "N" from connector.

Notice: Do not touch the wires related with EMC.

12. Prepare new speed sensor.
13. Connect 3 pins with wires of speed sensor to coincide with each connection position.
14. Using long-nose plier, connect tightly by pulling pins.
15. Apply rubber cap into connector using long-nose plier not to detach.
16. Connect protection tube with wire.
17. Tape both ends of tube.
18. Putting rear speed sensor into hole, connect exactly pushing both ends.
19. Screw 1 unit of bolt (M10).

Installation Notice

Tightening Torque	3 - 6 N•m (27 - 53 lb-in)
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20. Connect speed sensor connector, then locking sleeve.

Notice: Front propeller shaft should be premised by removal of shift motor.

After disconnecting shift motor, procedure of replacement on sensor assembly of accords with one of rear speed sensor.

دیجیتال خودرو

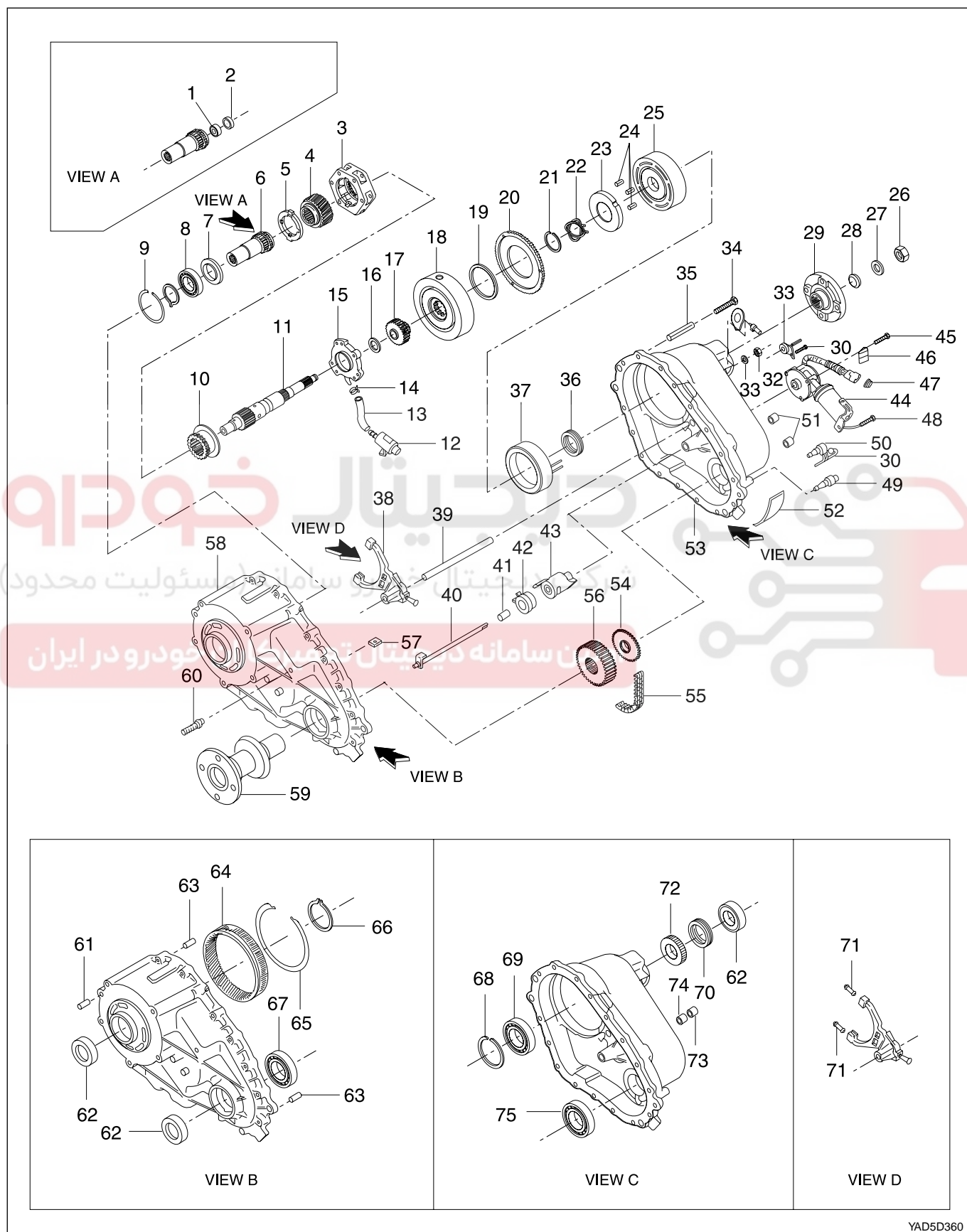
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



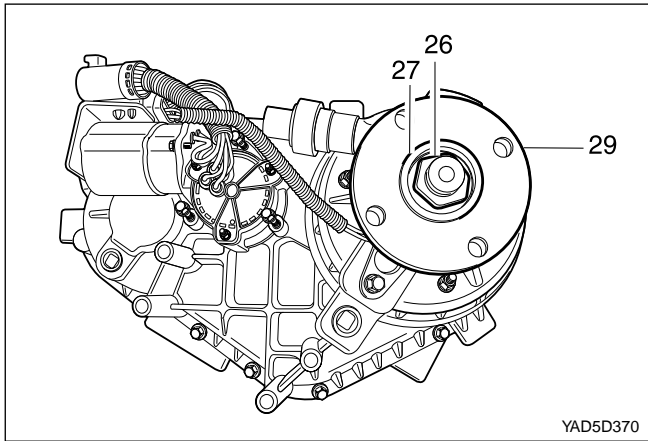
UNIT REPAIR

TRANSFER CASE, DISASSEMBLED VIEW



YAD5D360

1	Bearing	39	Shift Rail
2	Bushing	40	Shaft, Shift
3	Carrier Assembly	41	Spacer
4	Sun Gear	42	Torsion Spring
5	Thrust Plate	43	Electric Shift Cam
6	Input Shaft	44	Transfer Case Shift Motor
7	Output Shaft Thrust Washer	45	Bolt
8	Bearing	46	J-clip
9	Snap Ring	47	Connector Retainer
10	High-low Collar	48	Bolt
11	Rear Output Shaft	49	Support Stud
12	Oil Strainer	50	Lower Speed Sensor (Front)
13	Coupling Hose	51	Plug
14	Hose Clamp	52	Identification Decal
15	Pump Assembly	53	Cover
16	Thrust Washer	54	Tone Wheel, Lower
17	Sprocket, Drive (24T)	55	Chain, Drive
18	Clutch Pack Assembly	56	Sprocket, Driven (24T)
19	Insulator Washer	57	Magnet, Oil Pan
20	Armature	58	Case
21	Snap Ring	59	Case Flange and Output Shaft
22	Wave Washer	59	Case Assembly
23	Apply Cam	60	Breather Bar
24	Ball	61	Spiral Pin
25	Cam and Coil Assembly	62	Oil Seal
26	Nut (2)	63	Pin, Dowel
27	Output Shaft Yoke Washer	64	Ring Gear
28	Oil Seal	65	Retaining Ring
29	Case Flange	66	Snap Ring
30	Bolt	67	Bearing
31	Upper Speed Sensor (Rear)	68	Snap Ring
32	Nut	69	Bearing
33	Washer	70	Speedometer Drive Gear
34	Bolt (M10 X 105 X 30)	71	Facing, Shift Fork
35	Tag, Identification	72	Upper Tone Wheel
36	Thrust Bearing	73	Oil Seal
37	Clutch Coil Assembly	74	Bearing Sleeve
38	Fork, Reduction Shift	75	Bearing

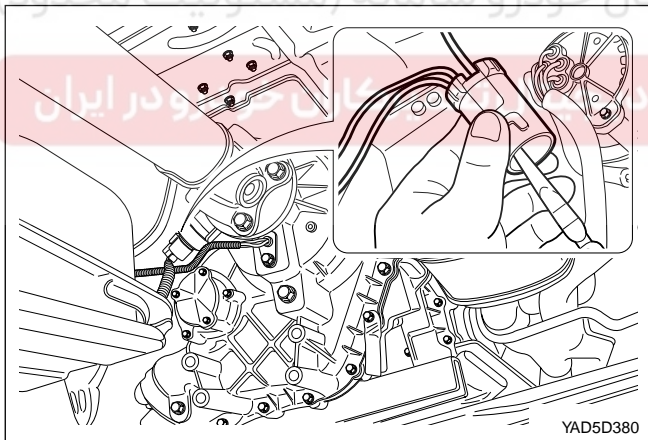


DISASSEMBLY PROCEDURE

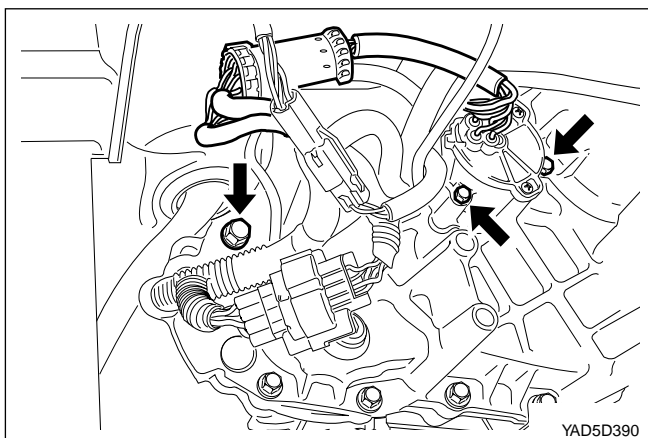
1. Disconnect transfer case from vehicle
2. Using a 30 mm thin-wall socket, first remove the rear output nut, output shaft yoke washer, oil seal then the case flange.
3. Disconnect shift motor/clutch coil connector and speed sensor connector from upper bracket of transfer case.

Notice: When disconnect connector, pull forwards grasping connector housing.

4. Remove outer tube on speed sensor connector.
5. Remove wire supporting cape back side of speed sensor connector.

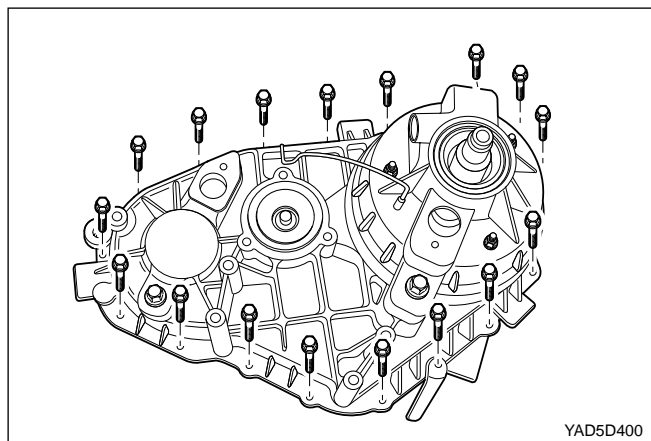


6. Disconnect pin of clutch coil wire (yellow) from speed sensor connector (7 pin) using long-nose plier.

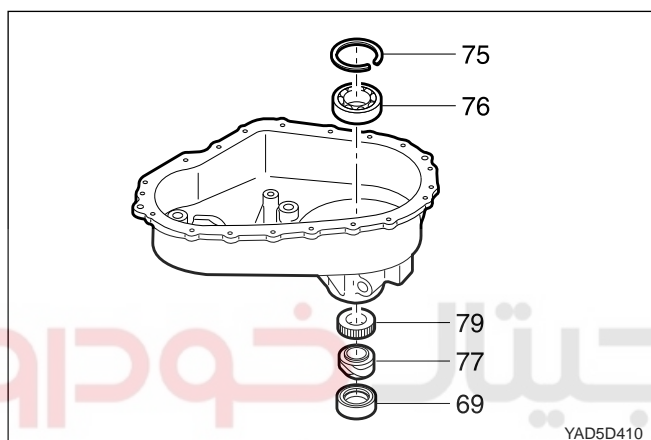


7. Remove shift motor.

Notice: When remove shift motor, pay attention to the location of triangular slot and shaft in transfer case inside motor.



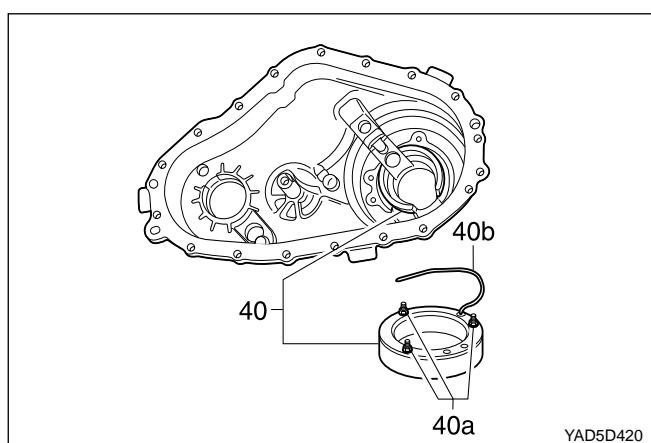
8. Disconnect front and rear speed sensor as needed.
9. Remove the 17 bolts that retain the front case to the rear case.



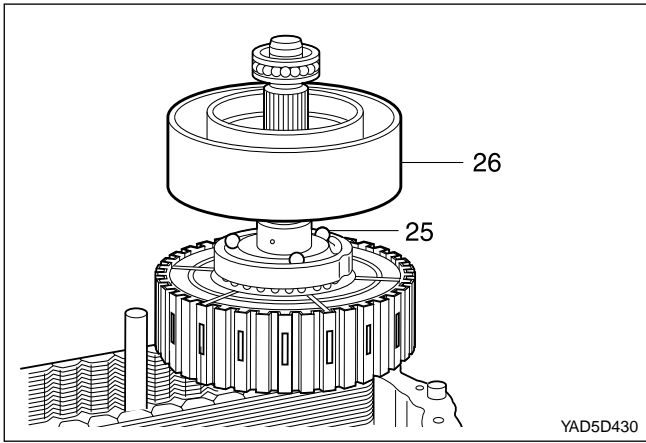
10. Make sure that the front case is facing downward so that the rear cover is facing upwards.
11. Remove the rear front case from the rear case.
12. Remove all traces of gasket sealant from the mating surfaces of the front case and rear case.
13. If the speedometer drive gear is to be replaced, first remove the flange seal by prying and pulling the curved-up lip of the flange seal.

Notice: Be careful not to damage the bearing, bearing cage or case. Remove and discard the flange seal.

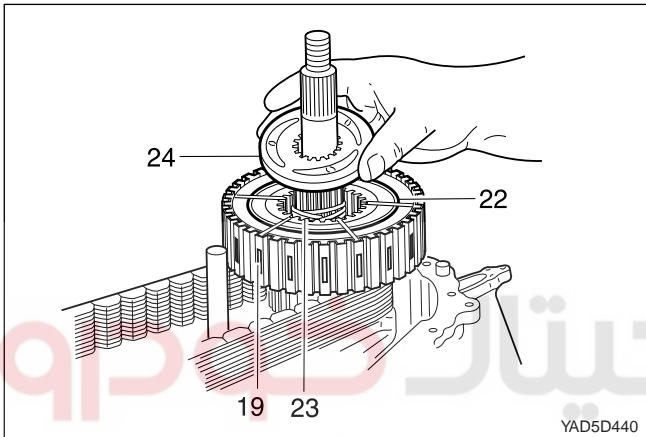
14. Remove the speedometer drive gear and upper tone wheel.
15. If the rear output shaft bearing requires replacing, remove the internal snap ring that retains the bearing in the bore.
16. From the outside of the case, drive out the bearing using the driver.



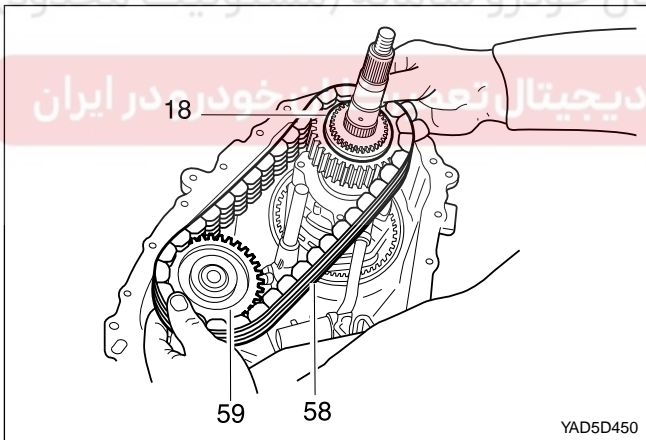
17. Remove the three nuts and washers retaining the clutch coil assembly to the rear case.
18. Pull the assembly, along with the O-ring and wire, from the case.



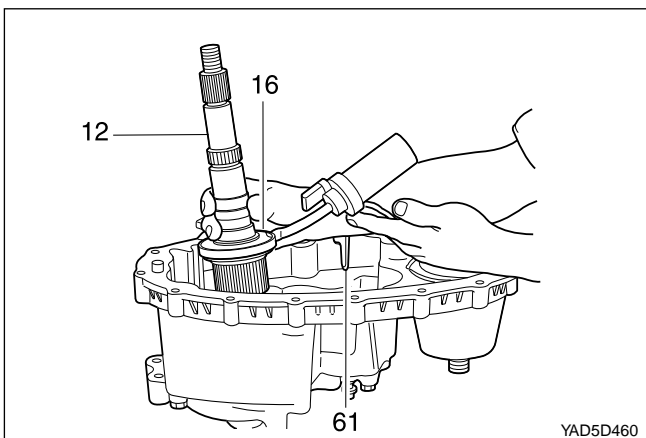
19. Remove bearing assembly from output shaft.
20. Remove the clutch housing from the output shaft.



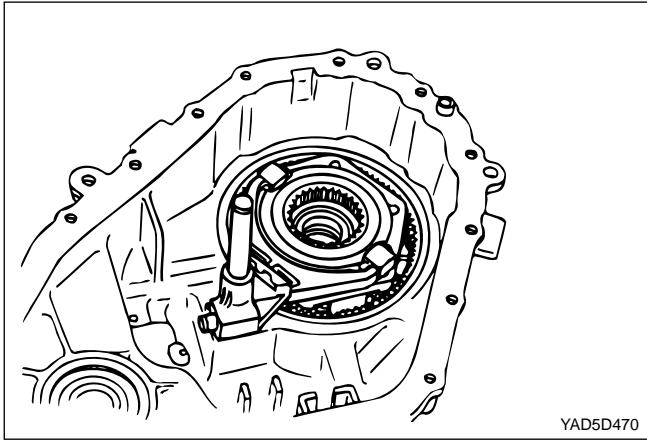
21. Remove the balls and apply cam and wave washer from the output shaft.
22. Remove snap ring from output shaft.
23. Remove clutch pack assembly from output shaft.



24. Remove the chain, driven sprocket and drive sprocket as an assembly.
25. Remove thrust washer from output shaft.



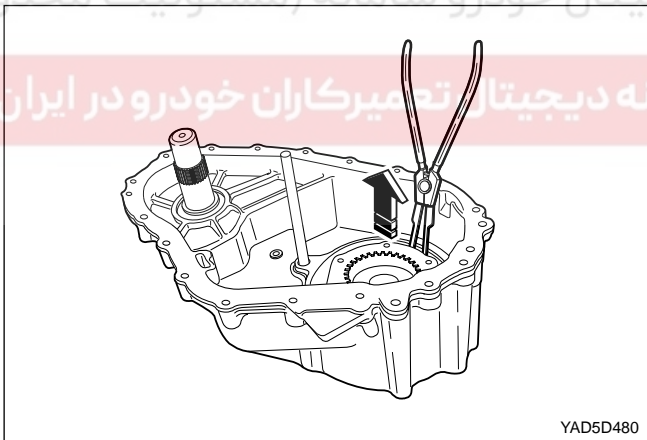
26. Remove the magnet from the slot in the front of the case bottom.
27. Remove the output shaft and oil pump as an assembly.
28. If required, to remove the pump from the output shaft, rotate the pump to align.
29. Pull out the shift rail.
30. Remove the helical cam from the front case.
31. If required, remove the helical cam, torsion spring and sleeve from the shaft.



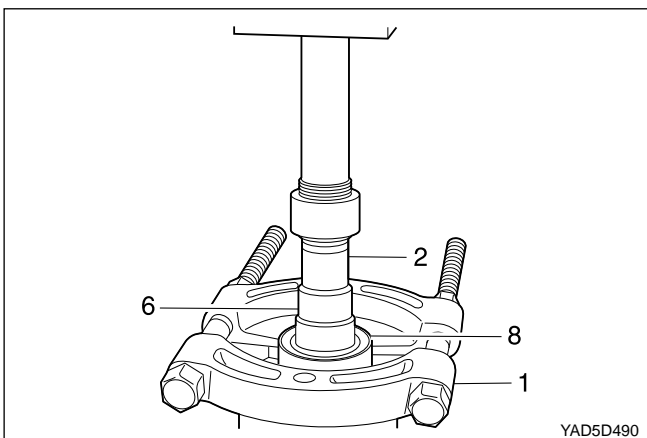
32. Remove the high-low range shift fork and collar as an assembly.
33. Expand the tangs of the large snap ring in the case.
34. With the input shaft against a bench, push the case down and slide the main drive gear bearing retainer off the bearing.
35. Lift the input shaft and front planet from the case.
36. If required, remove the oil seal from the case by prying and pulling on the curved-up lip of the oil seal.

Notice: Be careful not to damage the bearing, bearing cage or case.

37. Remove the internal snap ring from the planetary carrier.
38. Separate the front planet from the input shaft.
39. Remove the external snap ring from the input shaft.

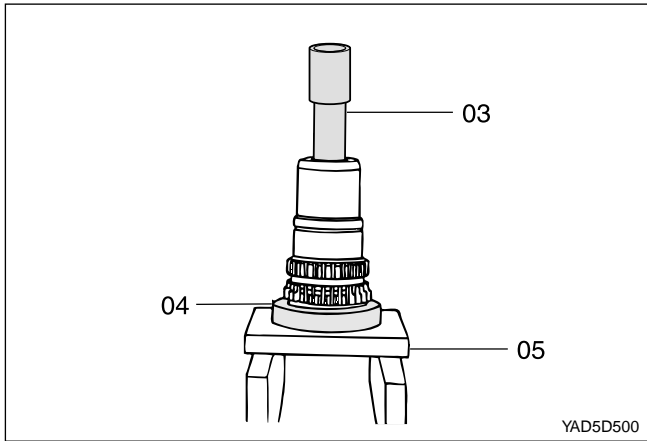


40. Place the input shaft in a vise and remove the bearing.
41. Remove the thrust washer, thrust plate and the sun gear off the input shaft.



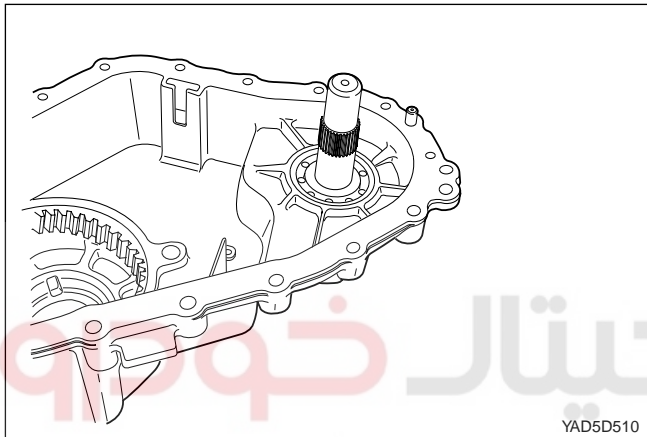
42. Inspect the bushing and needle bearing in the end of the input shaft for wear or damage.

Notice: Under normal use, the needle bearing and bushing should not require replacement. If replacement is required, the bushing and needle bearing must be replaced as a set.



43. If replacement of the needle bearing and bushing is required, press the bearing and bushing out as follows:

- Position the input shaft on Axle Bearing/Seal plate, and using Pinion Bearing Cone Replacer as a spacer.
- Insert Input Shaft Bearing Remover into the input shaft so it is resting on top of the bearing cage.
- Tighten the actuator pin until it stops, then press the bearing and bushing out together.



44. If required, remove the front yoke to flange seal by prying and pulling on the curved-up lip of the yoke to flange seal.

Notice: Be careful not to damage the bearing, bearing cage or case.

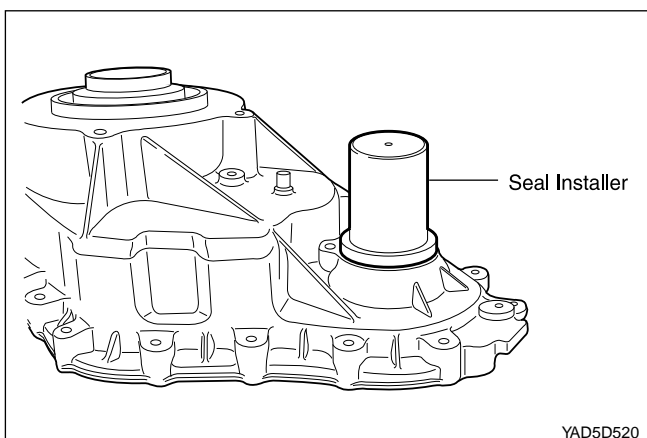
45. If required, remove the internal snap ring retaining the front output shaft ball bearing and remove the bearing.

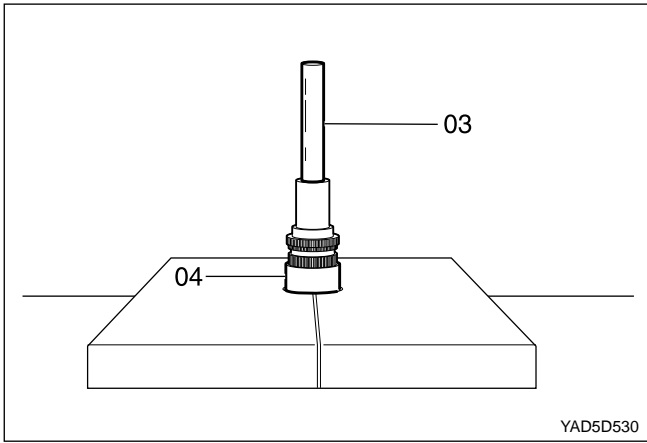
Assembly Procedure

1. Before assembly, lubricate all parts with Automatic Transmission Fluid or equivalent.
2. If removed, drive the bearing into the front output case bore.

Notice: Drive the bearing in straight, making sure it is not cocked in the bore.

3. Install the internal snap ring that retains the bearing to the front case.
4. If removed, install the front yoke to flange seal in the front case bore.
5. If removed, install the yoke to flange seal into the mounting adapter bore.

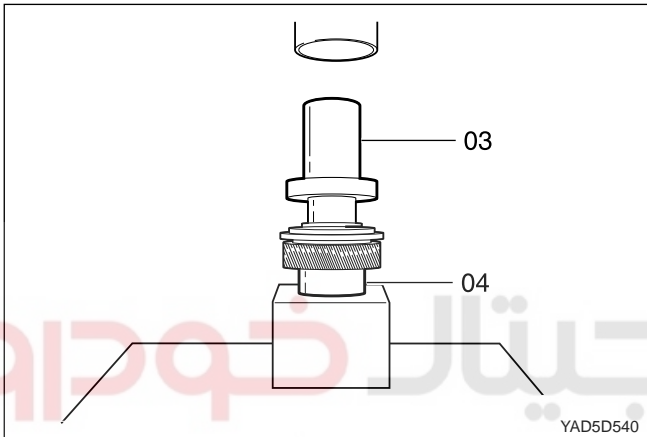




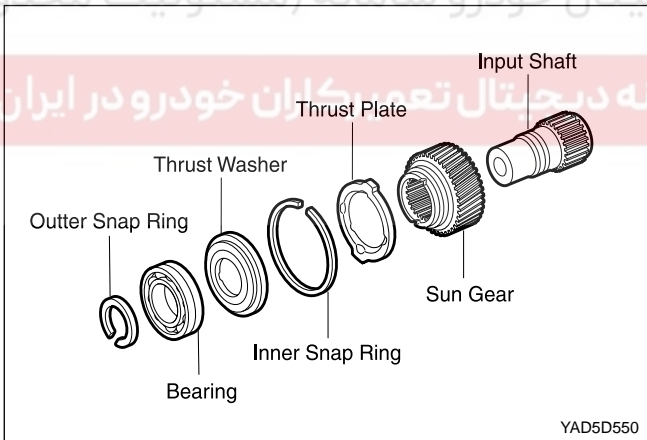
6. If the input shaft needle bearing and bushing were removed, install a new bearing and bushing as detailed in the following steps:

Press a new needle bearing, then a new bushing in the input shaft as follows:

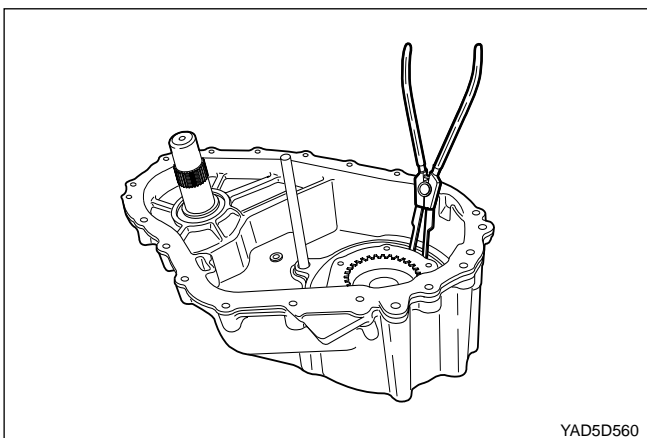
- Position the input shaft on Axle Bearing/Seal Plate or equivalent, and Pinion Bearing Cone Replacer as a spacer.
- Press a new needle bearing into the end of the input shaft until it seats in the input shaft.



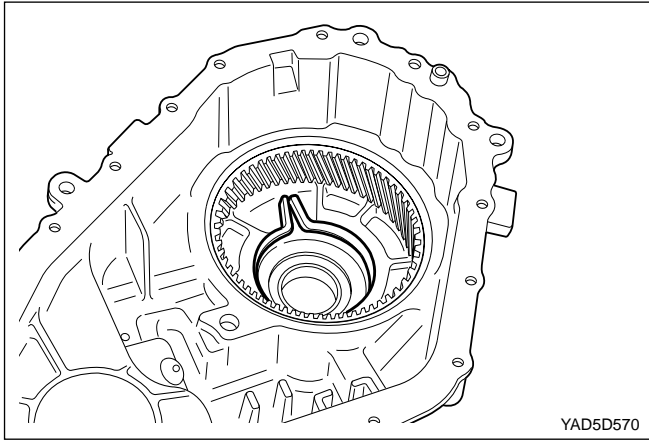
- Press in a new bushing.



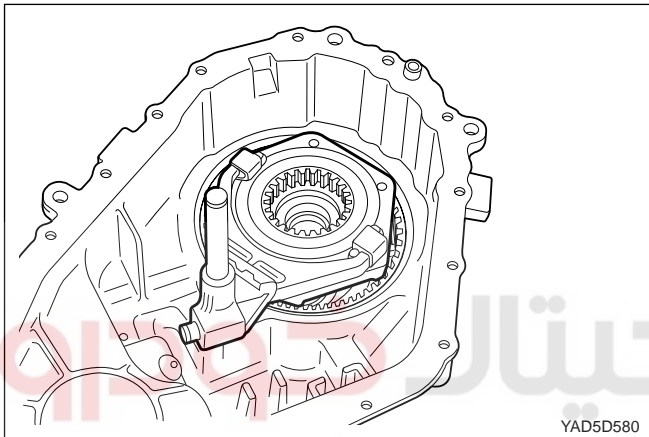
7. The recessed face of the sun gear and the snap ring groove on the bearing outer race should be toward the rear of the transfer case.
8. The stepped face of the thrust washer should face toward the bearing.
9. Slide the sun gear, thrust plate and thrust washer into position on the input shaft.
10. Press the bearing over the input shaft.
11. Install the external snap ring to the input shaft.



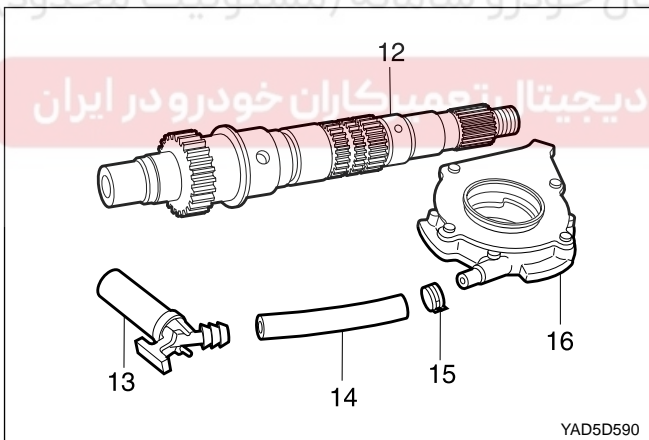
12. Install the front planet to the sun gear and input shaft.
13. Install the internal snap ring to the planetary carrier.



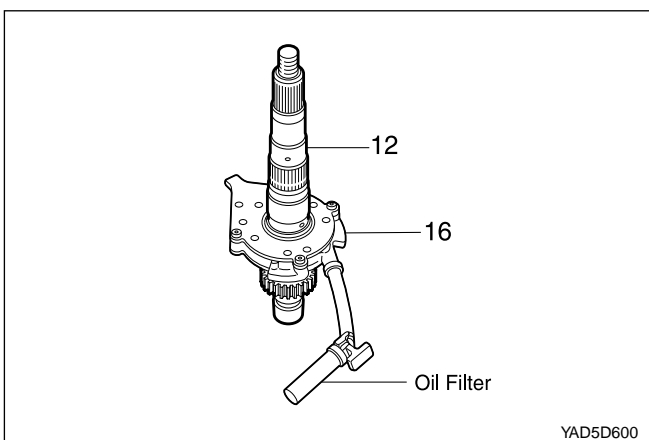
14. Place the tangled snap ring in the case. Expand snap ring with snap ring pliers and install planetary carrier assembly. Check installation by holding the case and carefully tapping the face of the input shaft against a wooden block to make sure the snap ring is installed.
15. Remove all traces of gasket sealant from the front case and mounting adapter mating surfaces. Install a bead of gasket sealant on the surface of the front case.



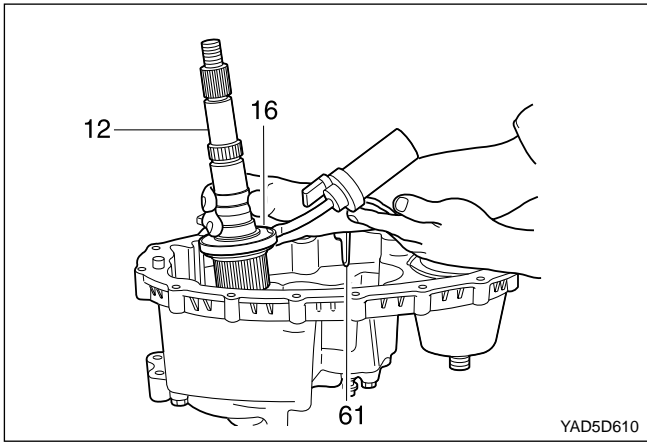
16. Install the high-low shift fork and high-low collar as an assembly into the front planet.
17. If new pump is used, align the flat of the output shaft and the flat of the pump. Slide the pump onto the output shaft.



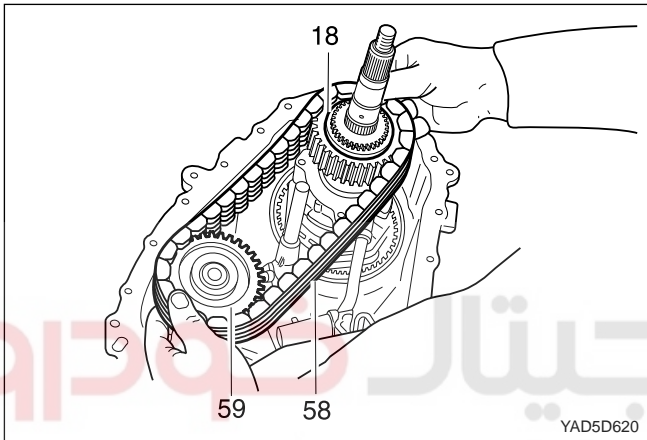
18. Inspect the outside surfaces and bore of the oil pump.



19. Install the output shaft and oil pump in the input shaft.
Make sure that the internal splines of the output shaft engage the internal splines of the high-low shift collar.
Make sure that the oil pump retainer arm and oil filter leg are in the groove and slot of the front case.



20. Install the magnet in the slot in the front case just above the oil filter leg.
21. Install the front output shaft in the front case.
22. Install the thrust washer on the rear output shaft.

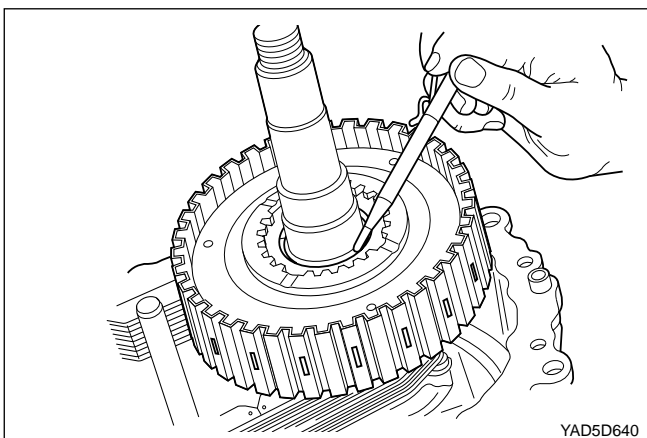


23. Install the chain, drive sprocket and driven sprocket as an assembly over the output shaft.

Notice: The driven sprocket (on the front output shaft) must be installed with the marking REAR facing toward the rear case, if so marked. Drive sprocket has a bushing pressed into it.

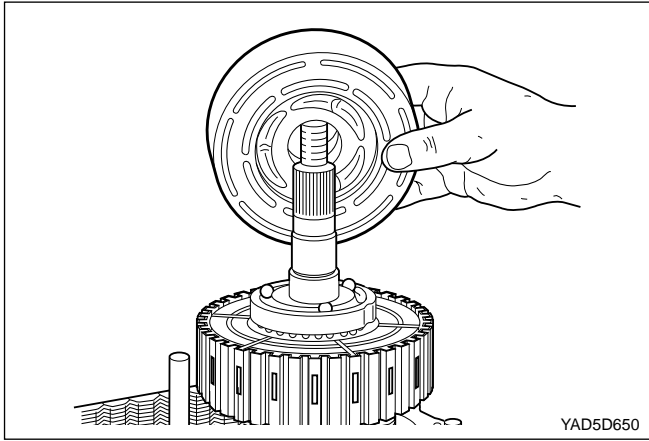


24. Install tone wheel onto the front output shaft. Make sure the spline on the tone wheel engages the spline on the front output shaft.
25. Install clutch pack assembly onto the rear output shaft. Make sure the spline of the clutch pack engages to the spline of the sprocket.

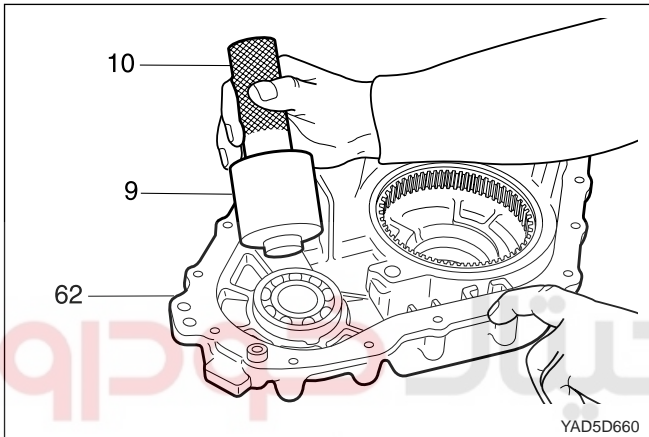


26. Install snap ring onto the rear output shaft. Start the snap ring over the spline and use the wave spring to seat the snap ring in the snap ring groove.
If the snap ring will not install, the thrust washer inside the clutch pack may not be seated properly.
27. Install wave spring, insulator washer and armature. (Three offset slots must align with housing to be installed)

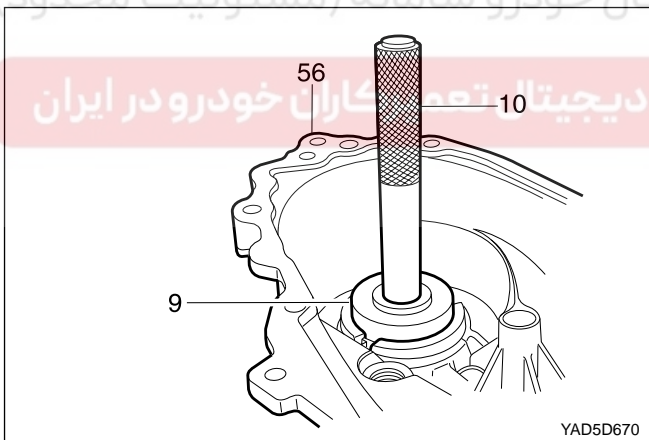
Notice: Three slots on the thrust washer must be aligned with the three tabs on the clutch pack housing.



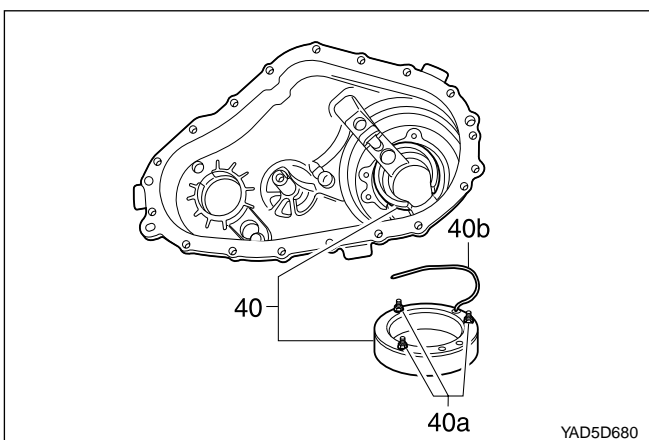
28. Install apply cam onto the rear output shaft,
29. Install three balls into the apply cam.
30. Install cam and coil housing assembly onto rear output shaft.
31. Install thrust bearing assembly onto output shaft.



32. If removed, drive the front output shaft ball bearing into the rear cover bore with Front Shaft Needle Bearing Replacer and Driver Handle.



33. If removed, install the rear output bearing in the rear case bore. Drive the bearing into the rear case bore with Output Shaft Bearing Replacer and Driver Handle. Make sure that the bearing is not cocked in the bore.
34. Install the internal snap ring that retains the bearing to the rear case.



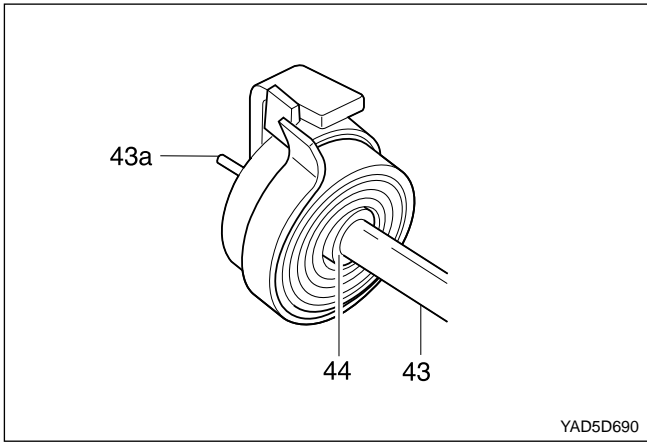
35. Install the clutch coil from inside the rear case until the wire and studs extend through the cover.

Notice: Do not kink or trap the wire while seating the clutch coil to the case.

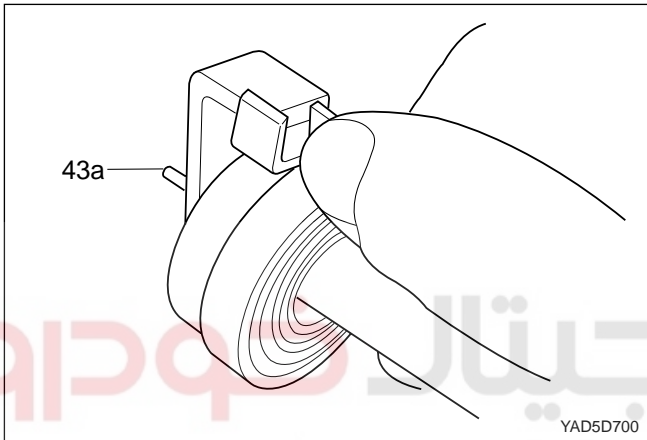
36. Install the washers and nuts and tighten.

Installation Notice

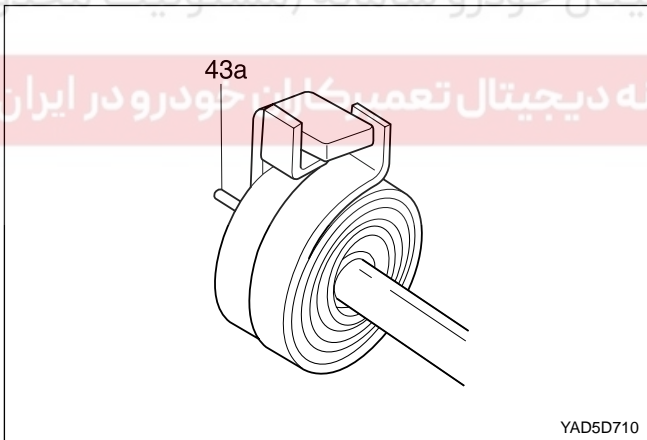
Tightening Torque	8 - 11 N•m (71 - 97 lb-in)
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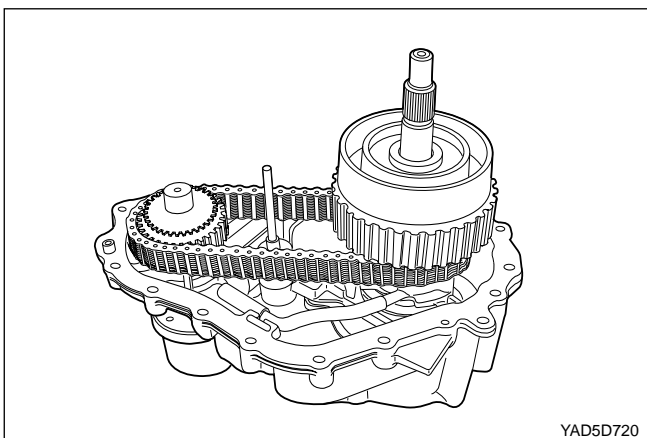
37. Slide the spring spacer on the camshaft and position it beneath the drive tang.
38. Place the torsion spring on the camshaft. Position the first spring tang to the left of the camshaft drive tang.



39. Rotate the second spring tang clockwise past the drive tang.



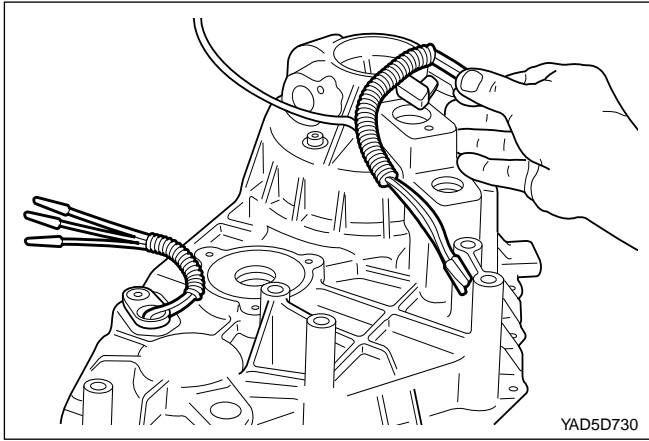
40. Push the torsion spring and sleeve in as far as it will go.
41. Install the helical cam and slide the drive tang between the torsion spring tangs as far as it will go.



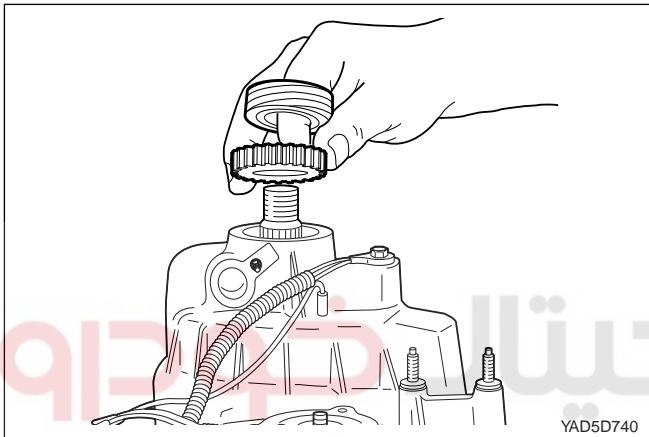
42. Install the pin on the tang end of the helical cam into the hole in the front case. Position the torsion spring tangs so that they are pointing toward the top side of the transfer case and just touching the high-low shift fork.

Notice: Do not bend the helical cam during installation to the front case because of possible damage to the pin at the tang end of the motor shaft.

43. Install the shift rail through the high-low shift fork and make sure that the reverse gear shift rail is seated in the front case bore.



44. Install upper and lower speed sensors into the cover. Feed the coil wire through the upper speed sensor wire shield.

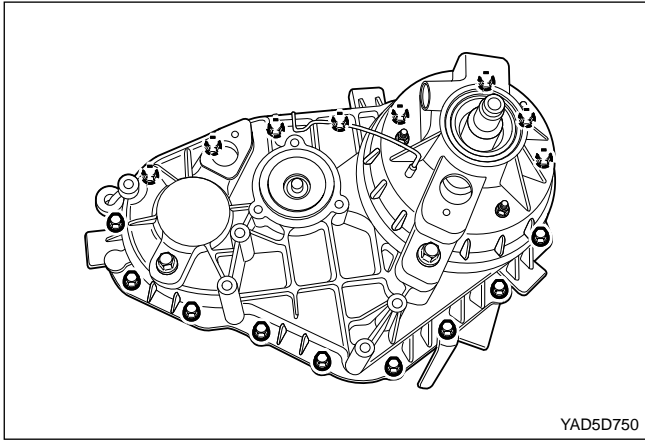


45. Install upper tone wheel, speedometer gear and rear output seal. Use Output Shaft Seal Replacer and Driver or equivalent to install seal.

46. Coat the mating surface of the front case with a bead of Black Non-Acid Cure Silicone Rubber or equivalent.

47. The following procedure must be followed prior to installing the rear case onto the front case half:

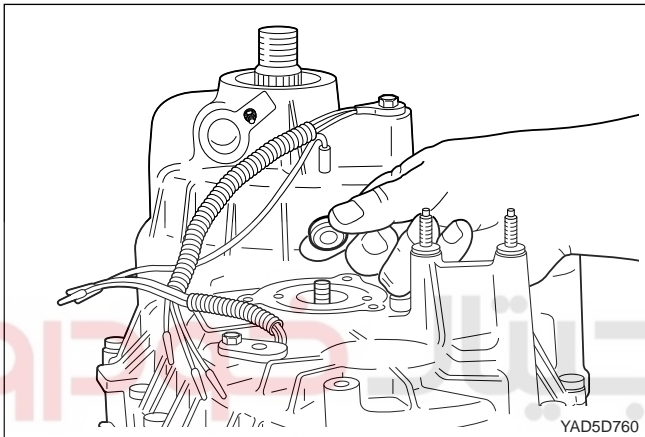
- Align the output shaft with the rear case output shaft bore.
- Align the helical cam with the rear case motor bore.
- If difficulty is encountered with seating the rear case, tap the rear output shaft with a sharp blow using a rubber mallet in a direction away from the triangular shaft while pushing down on the rear case.



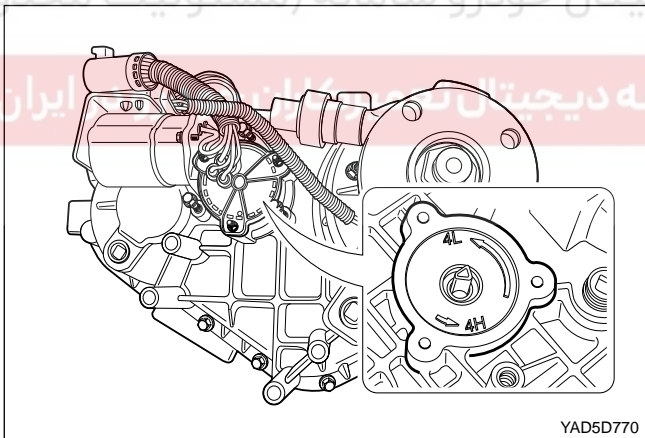
48. Install the bolts retaining the case halves and tighten.

Installation Notice

Tightening Torque	25 - 37 N•m (8 - 27 lb-ft)
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49. Install shift shaft oil seal if it is not installed.



50. Using pliers equipped with soft jaws, rotate the triangular shaft so it is aligned with the triangular slot in the transfer case shift motor.

Notice: If triangular shaft will not rotate, rotate the rear output shaft.

51. Tighten manually the two nuts that attach the slotted support bracket to the end of the motor house.
52. Apply Black Non-Acid Cure Silicone Rubber or equivalent to motor housing base and install on transfer case.
53. Install the transfer case shift motor and three bolts along with speed sensor wire harness bracket and tighten.

Installation Notice

Tightening Torque	8 - 11 N•m (71 - 97 lb-in)
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54. Holding the slotted support bracket tight against the motor housing end, secure the bracket to the transfer case, tightening the bolt with lock washer.

Installation Notice

Tightening Torque	8 - 11 N•m (71 - 97 lb-in)
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55. Retighten the two nuts that attach the slotted support bracket to the end of the motor.

Installation Notice

Tightening Torque	3 - 6 N•m (27 - 53 lb-in)
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56. Install the clutch coil wire terminal(brown) and other shift motor wires to the 7-pin connector(black).
57. Install the connector retainer at the connector end.
58. Connect the front and rear speed sensors wiring to the 7-pin connector(white).
59. Install the rear case flange on the output shaft.
60. Install the rubber seal, output shaft yoke washer and nut. Tighten the nut.

Installation Notice

Tightening Torque	137 - 196 N•m
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61. Install the drain plug and tighten.

Tightening Torque	19 - 30 N•m (14 - 22 lb-ft)
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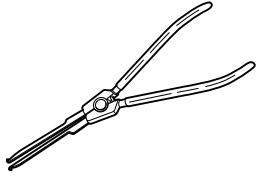
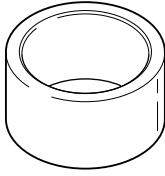
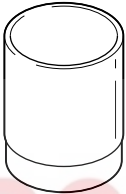
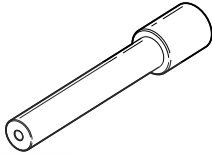
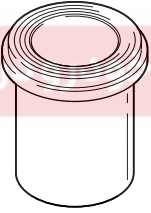
62. Fill the transfer case with 1.4 liters of Automatic Transmission Fluid or equivalent.
63. Install the fill plug and tighten.

Installation Notice

Tightening Torque	19 - 30 N•m (14 - 22 lb-ft)
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64. Install the transfer case as outlined in removal and Installation.

SPECIAL TOOLS AND EQUIPMENT**SPECIAL TOOLS TABLE**

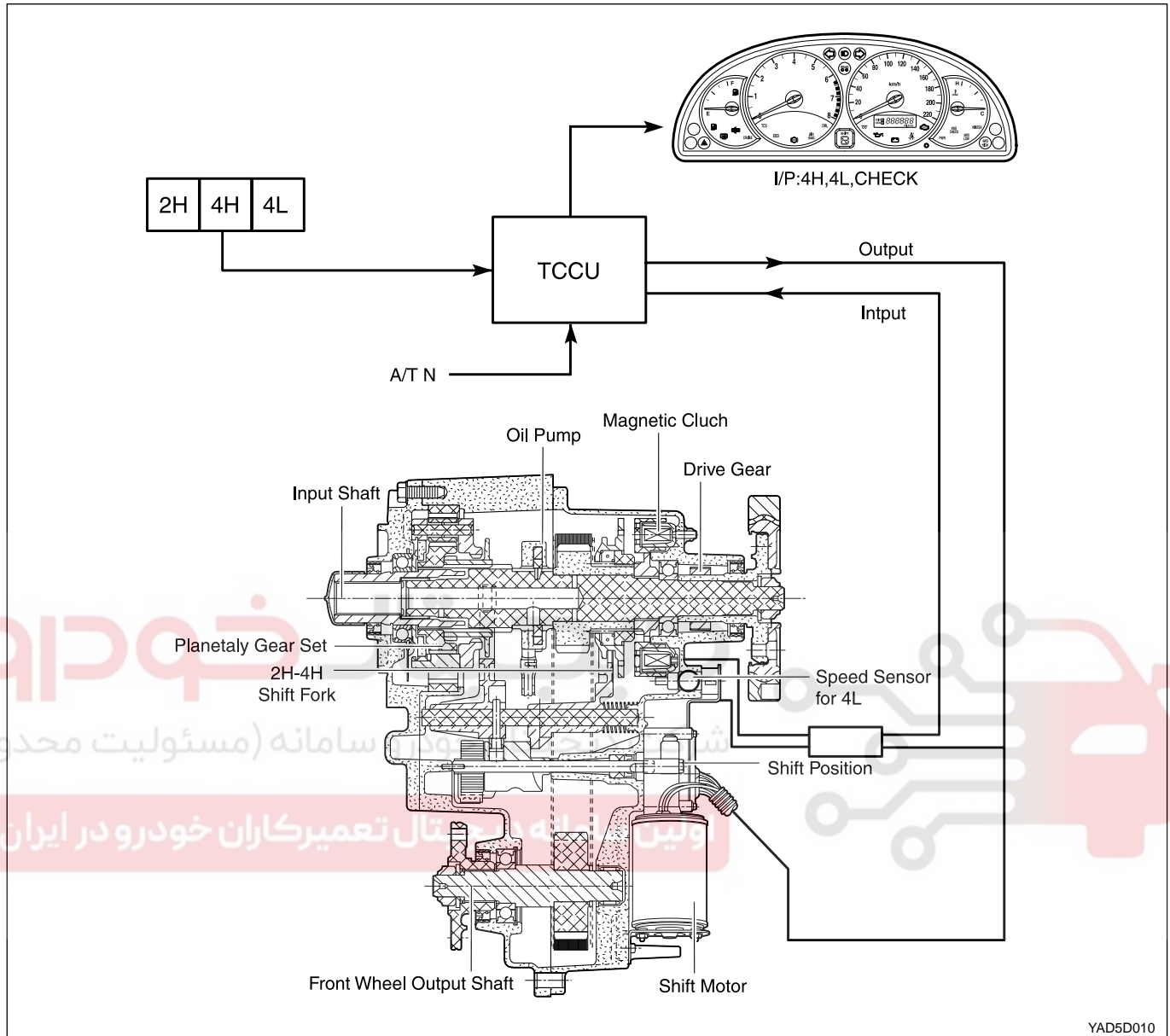
 <p>YAD5D780</p>	<p>Snap Ring Plier</p>	 <p>YAD5D790</p>	<p>Input Shaft Support</p>
 <p>YAD5D800</p>	<p>Bearing Installer</p>	 <p>YAD5D810</p>	<p>Bearing Removal/ Installer</p>
 <p>YAD5D820</p>	<p>Seal Installer</p>		

GENERAL INFORMATION AND OPERATION

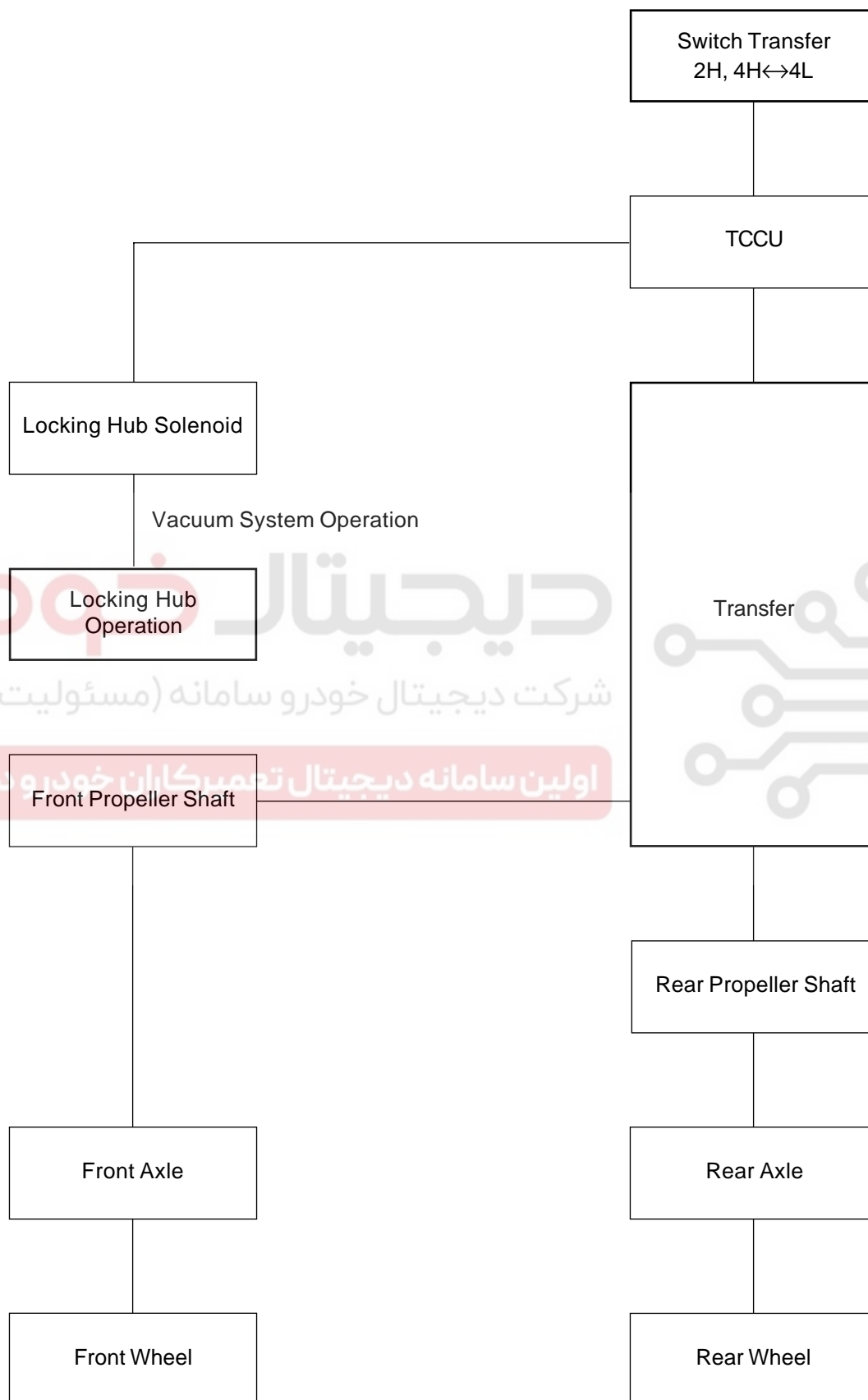
4WD OPERATION OVERVIEW

Application	Mode Position		Operation Condition
Driving Type	2H	2WD Drive(Rear Wheel Drive)	<ul style="list-style-type: none"> Normal Driving on the normal road or highway, or high speed driving
	4H	4WD Drive(High Speed)	<ul style="list-style-type: none"> Slipped road such as snow, rainy, sand, mud etc.
	4L	4WD Drive(Low Speed)	<ul style="list-style-type: none"> Max driving force requiring 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.
Transferring	2H ↔ 4H	2WD Drive ↔ 4WD Drive(High Speed)	<ul style="list-style-type: none"> 2WD ↔ 4WD transfer is possible below 70 km without operating the clutch.
	2H, 4H ↔ 4L	2WD Drive, 4WD Drive(High Speed) ↔ 4WD Drive(Low Speed)	<ul style="list-style-type: none"> Manual Transmission Transfer starts after the vehicle stops and the clutch is applied Automatic Transmission Transfer starts after the vehicle stops and the shift lever is shifted [N] position. <p>Notice: After the vehicle stops and the mode switch is selected with applying the brake pedal, shifting [N-R-N] makes the mode transfer easier.</p>

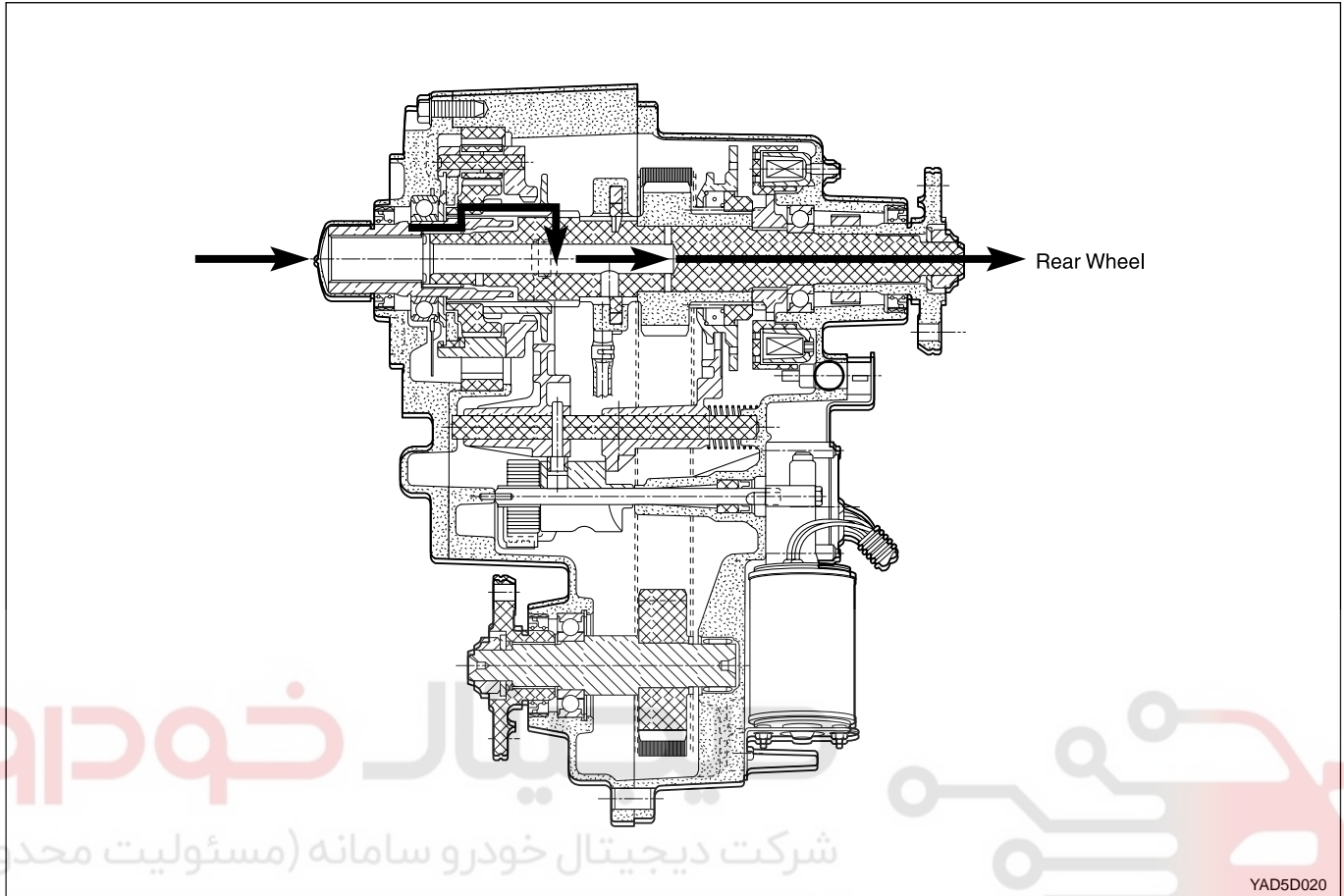
SYSTEM STRUCTURE



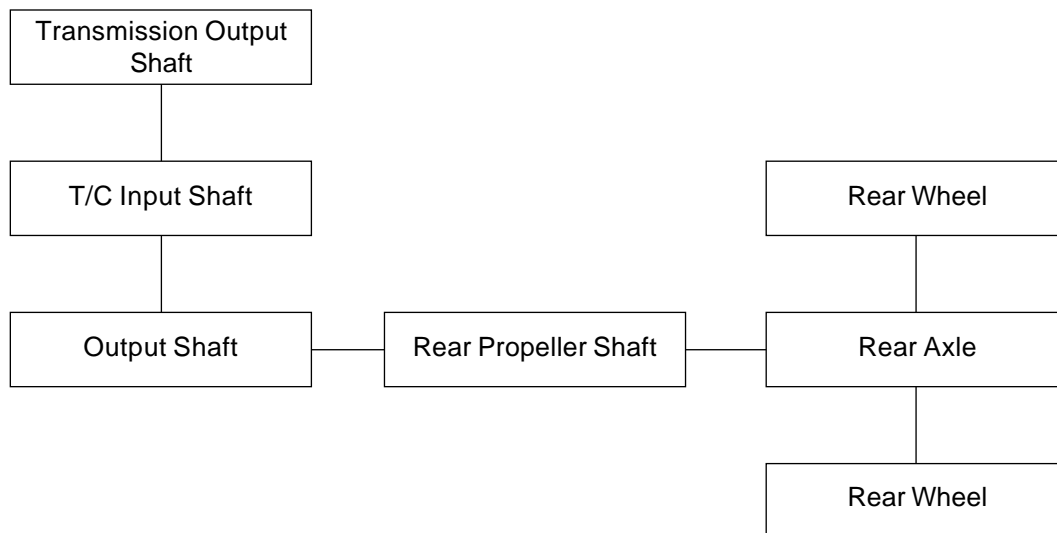
Power Flow



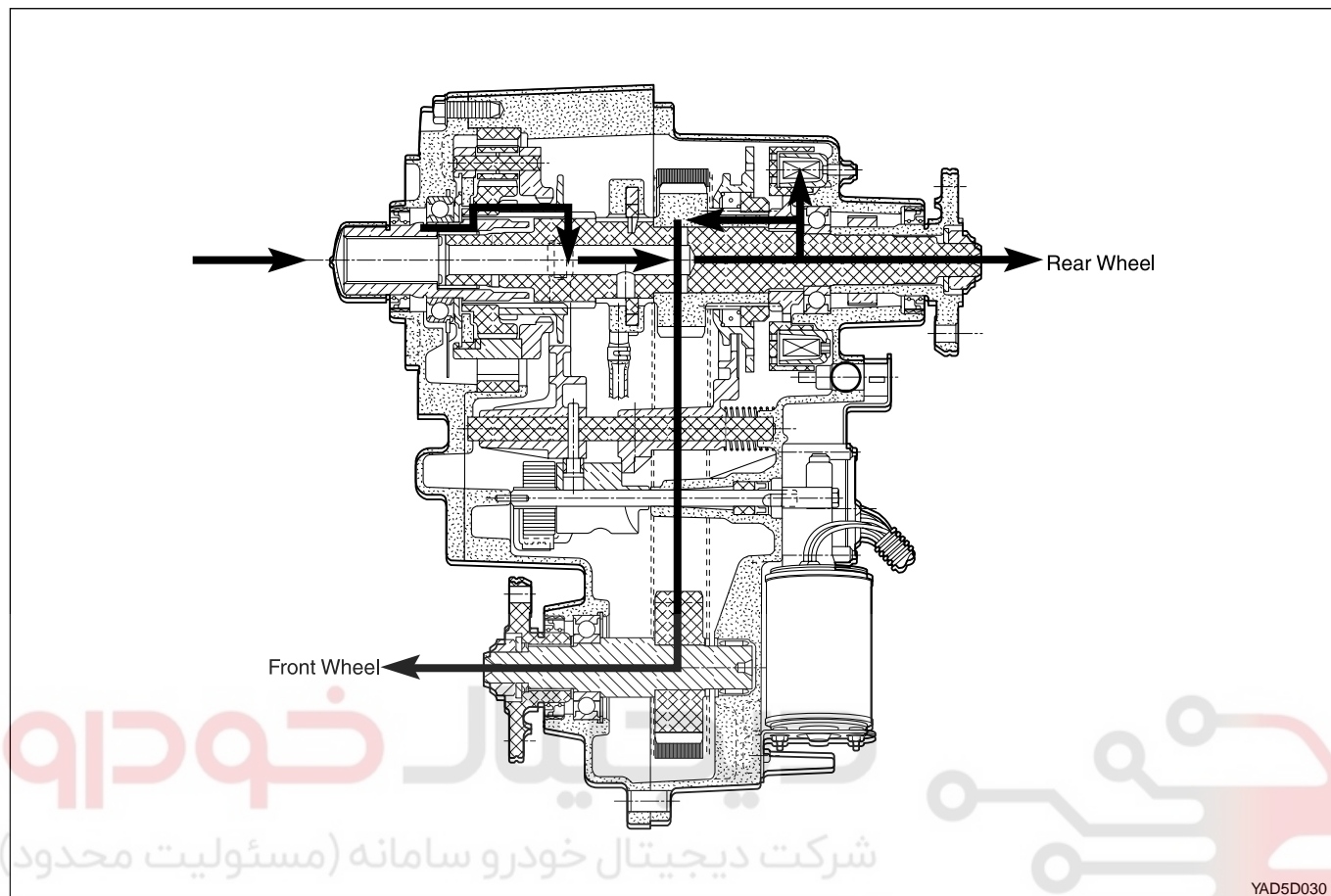
2H MODE(REAR WHEEL DRIVE)



اولین سامانه دیجیتال تعمیرکاران خودرو در ایران
Power Flow

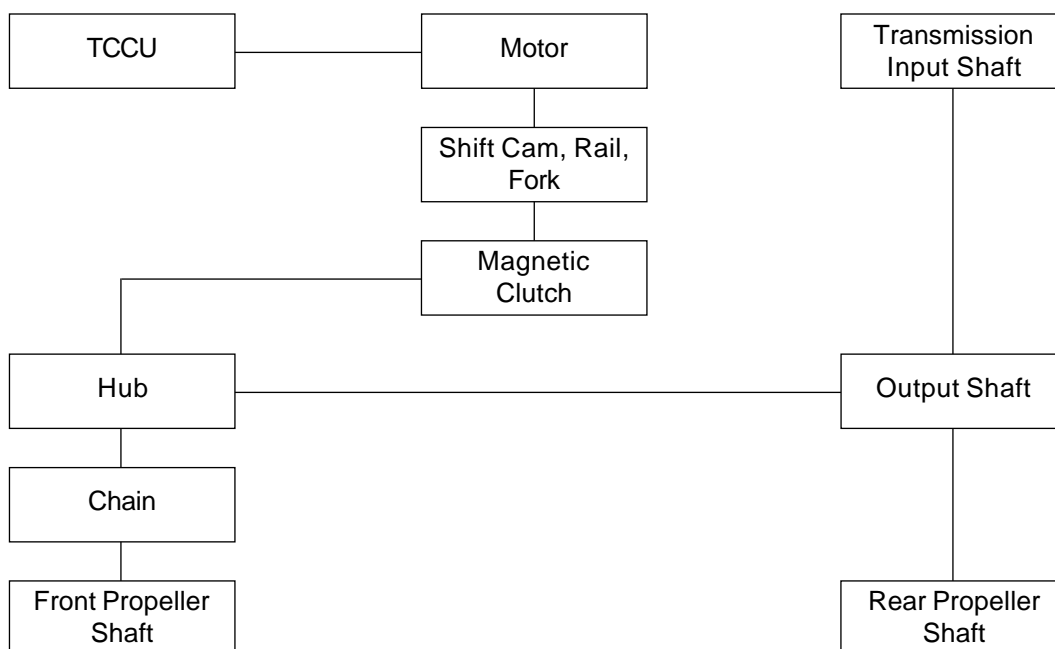


4H MODE(4WD DRIVE - HIGH SPEED)

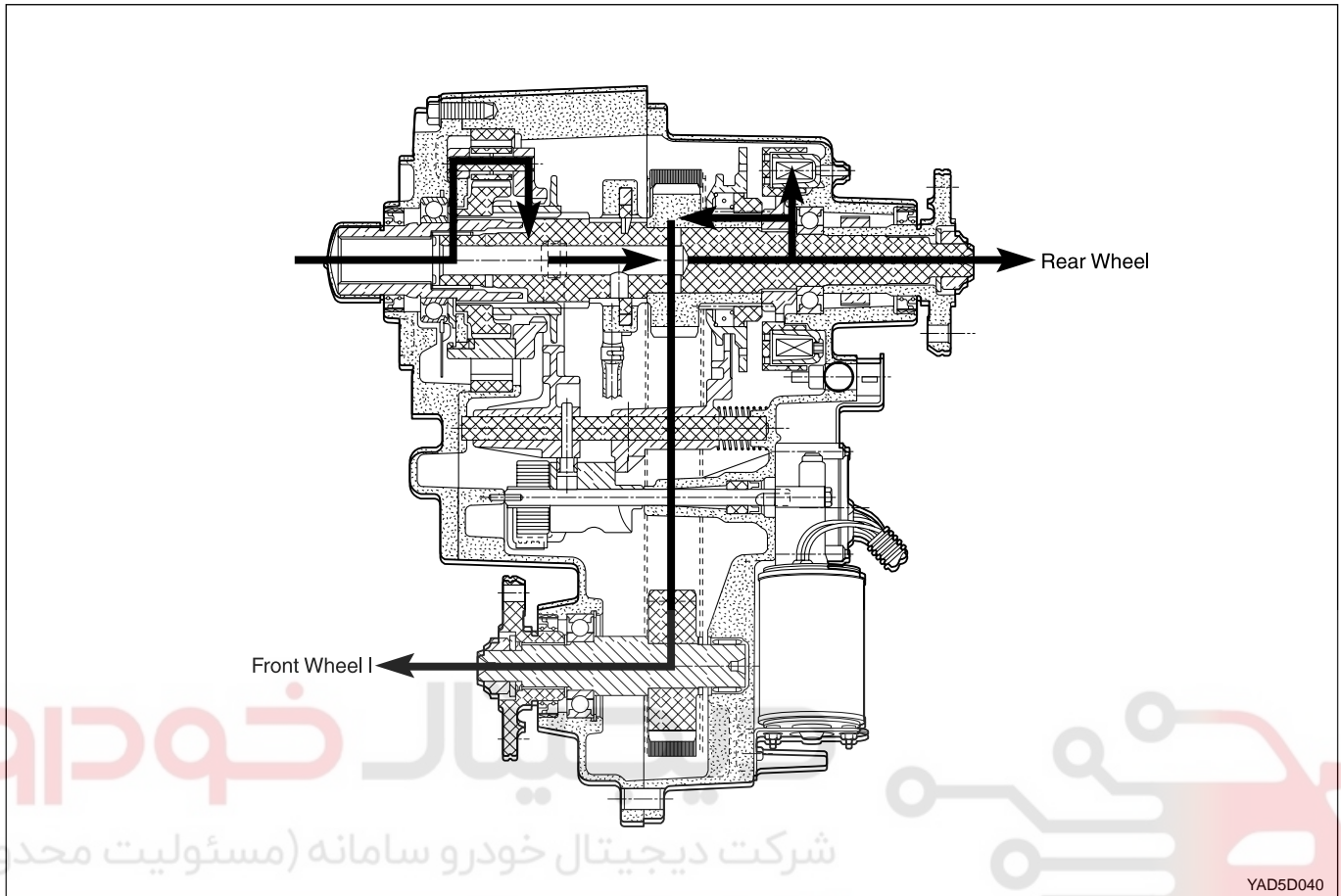


اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Power Flow



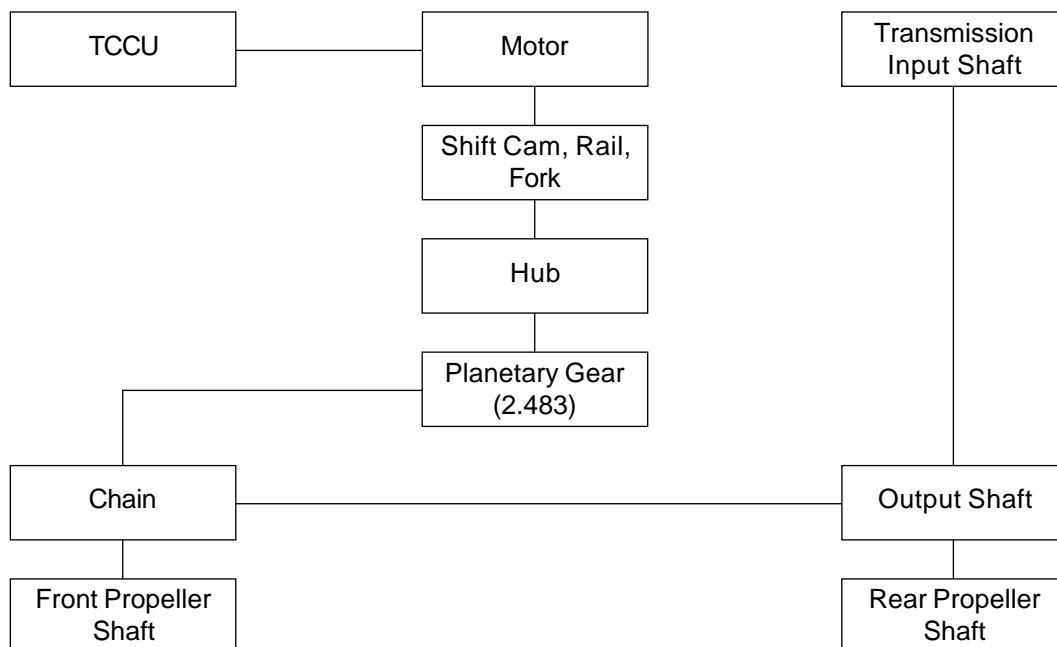
4L MODE(4WD DRIVE - LOW SPEED)

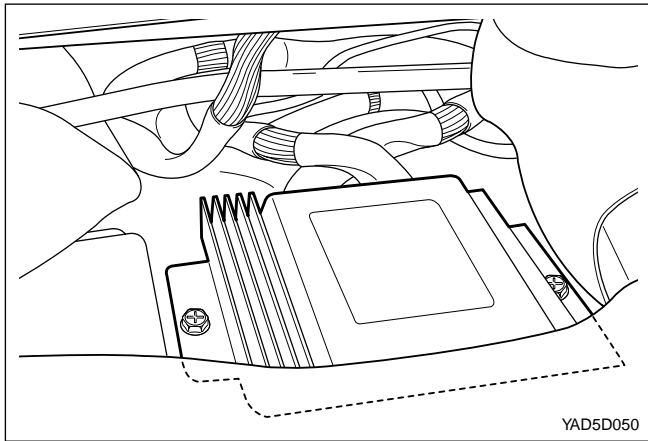


YAD5D040

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Power Flow

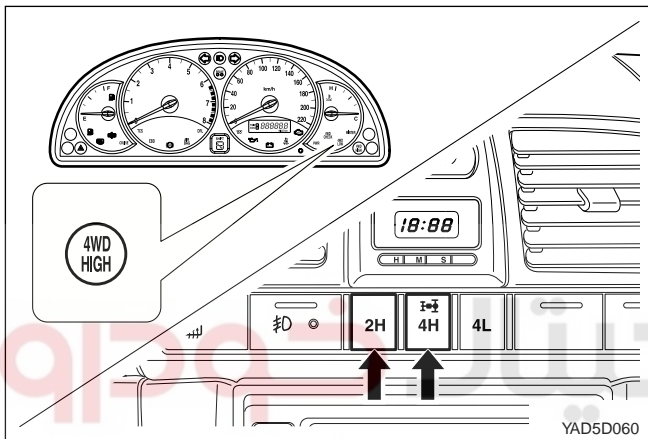




SYSTEM DESCRIPTION

Transfer Case Control Unit (TCCU)

TCCU is located under the front left handed 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. Shifting from 2H to 4H

- Position the transfer case switch from '2H' to '4H'.
- Shifting is possible during driving.
- '4WD HI' indicator light will turn on.

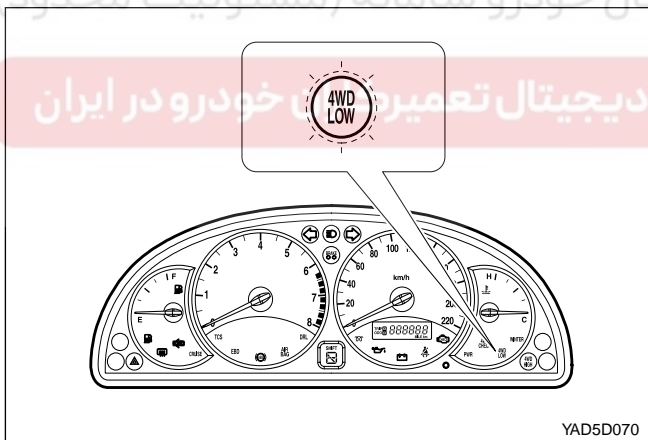
2. Shifting from 4H to 2H

- Position the transfer case switch from '4H' to '2H'.
- Shifting is possible during driving.
- 4WD HI' indicator light will turn off.

3. Shifting between 4H and 4L

- Shifting is possible when the vehicle is almost stopped (below approx. 2 km/h), so it would be better stop the vehicle.
- In case of manual transmission equipped vehicle, apply clutch pedal.
- In case of auto transmission equipped vehicle, put the lever position into 'N'.
- Position the transfer case switch '4H' to '4L' or '4L' to '4H'.
- According to the shifted position, indicator light will turn on.

Notice: If there are malfunctions during shifting, '4H' or '4L' indicator light will blink.



SPECIFICATIONS

Model	Part-Time 4408 (E)	
Type	E.S.O.F. Type	
Gear Ratio	High	1 : 1
	Low	2.48 : 1
Oil	Specification	ATF S-3, S-4 or DEXRON II, III
	Capacity	1.2 L
	Lubrication	Check : Every 15,000 km
		Replace : Every 50,000 km
Manufacturer	Borg Warner	
Weight	30 kg	

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

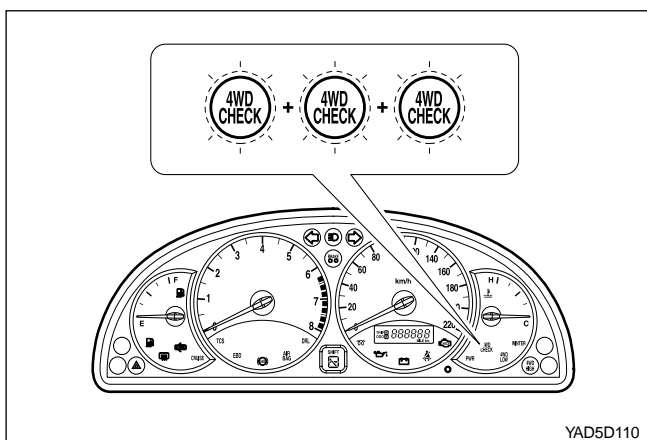
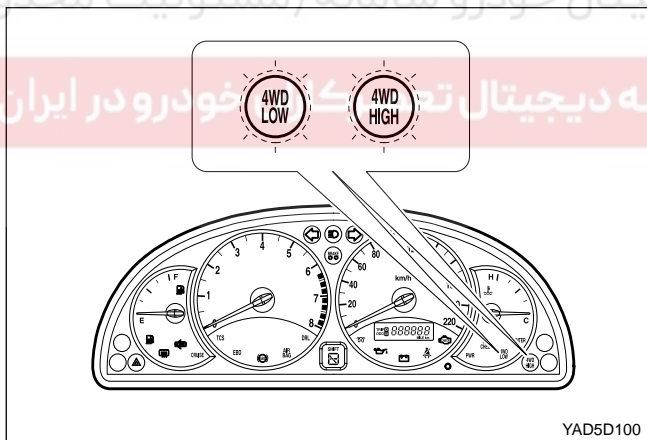
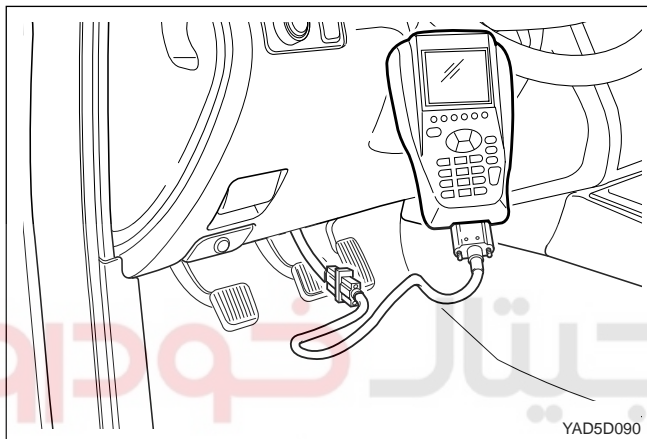
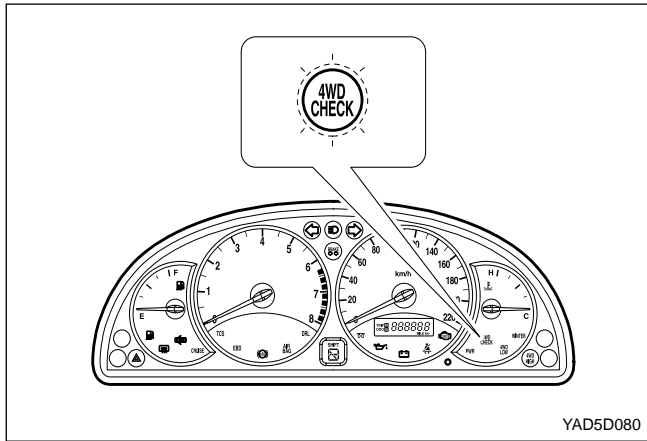
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



DIAGNOSTIC INFORMATION AND PROCEDURES

GENERAL DIAGNOSIS

Symptoms	Check	Action
Electric shift problems	<ul style="list-style-type: none"> Faulty or damaged TCCU, speed sensor, motor, clutch or internal wirings Damaged or worn shift cam, hub, fork and rail shift 	<ul style="list-style-type: none"> Overhaul and check, replace if necessary. Overhaul and check for wear and damage.
	<ul style="list-style-type: none"> Binding shift fork, hub collar or gear 	<ul style="list-style-type: none"> Replace if necessary.
Cannot front wheel drive when shifted 4H,4L	<ul style="list-style-type: none"> Broken drive chain 	<ul style="list-style-type: none"> Check sliding parts, replace if necessary.
Noise in 4WD operation	<ul style="list-style-type: none"> Improper or low oil Loosened bolts or mounted parts Noisy T/C bearing 	<ul style="list-style-type: none"> Drain and replace with specified oil. Retighten as specified. Disassemble bearings and parts and check for wear or damage. Replace if necessary.
	<ul style="list-style-type: none"> Gear abnormal noise 	<ul style="list-style-type: none"> Check for wear and damage including speedometer gear, replace if necessary.
Noise in 4H or 4L	<ul style="list-style-type: none"> Worn or damaged sprockets or drive chain Incorrect tire pressure 	<ul style="list-style-type: none"> Disassemble and check for wear and damage, replace if necessary. Adjust tire pressure.
Transfer case oil leakage	<ul style="list-style-type: none"> Cracked transfer case 	<ul style="list-style-type: none"> Replace the case.
	<ul style="list-style-type: none"> Leakage from other parts 	<ul style="list-style-type: none"> Clean case and parts and check for leakage.
	<ul style="list-style-type: none"> Breather clogging 	<ul style="list-style-type: none"> Remove breather hose and clean, replace if necessary.
	<ul style="list-style-type: none"> Improper or too much oil 	<ul style="list-style-type: none"> Use specified oil and adjust oil level.
	<ul style="list-style-type: none"> Loosened sealing bolts 	<ul style="list-style-type: none"> Retighten
	<ul style="list-style-type: none"> Improperly applied sealant 	<ul style="list-style-type: none"> Use specified sealant and retighten.
	<ul style="list-style-type: none"> Worn or damaged oil seal 	<ul style="list-style-type: none"> Replace



SELF-DIAGNOSIS TEST

System Description

1. TCCU detects transfer case system malfunctions and indicates malfunctioning part(s) through flashing 4H,4L indicator lights.

Using a service connector, connect it to the diagnosis box in the engine room and read the flashing of the "4WD CHECK" indicator light.

The flashing indicator light will show you defective code(s).

2. Identify 7 defective codes after reading the flashing indicator light.

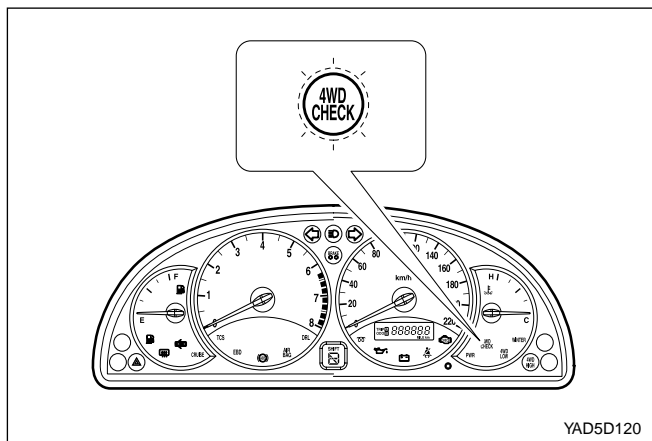
- TCCU
- Shift motor
- Magnetic synchronizer clutch
- Speed sensor
- Hub solenoid
- Selector switch
- Motor position sensor

3. Transfer case system is malfunctioning when:

- 4H, 4L indicator lights are remain on after 0.6 second when turning the ignition switch ON
- 4H, 4L indicator lights are continuously come on during driving.

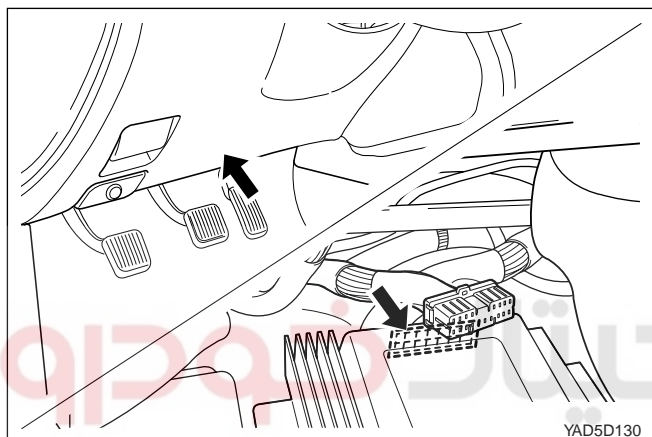
4. If only 1 part is malfunctioning, 4WD CHECK indicator light will display defective code 3 times continuously.
5. If more then 2 part is malfunctioning, the first malfunctioning part will be displayed 3 times and following malfunctioning parts will be displayed .
6. To read defective code, connect the service connector and turn the ignition switch 'ON'.
7. After repairing, eliminate the defective code stored in the TCCU.

Notice: Before replacing the malfunction parts with defective code, check the wires and connectors for proper condition.



Defective Code Reading

1. Position the ignition switch to OFF
2. Using a service connector, connect the No.2 pin (Ignition) and No.13 pin (TCCU) of the diagnosis socket in the engine room.
3. Position the ignition switch to ON.
4. Read the flashing 4WD CHECK indicator light and identify the malfunctioning part(See Diagnosis Table).



How to Clear the Fault Code

1. Position the ignition switch to OFF.
2. Using a service connector, connect the No.2 pin (GND) and No.13 pin (TCCU) of the diagnosis socket in the engine room.
3. Position the ignition switch to ON over 5 seconds.
4. Do defective code reading and make sure that all defective codes are eliminated.

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



Diagnostic Table

Connect a service connector. If turn the ignition switch "ON" "4WD CHECK" indicator light will come on for 0.6 second and turn off for 3 seconds and then display a defective code 3 times continuously.

No.	Defective Code	Malfunctioning Part
1	<p>YAD5D140</p>	TCCU
2	<p>YAD5D150</p>	Shift Motor
3	<p>YAD5D160</p>	Synchronizer Clutch
4	<p>YAD5D170</p>	Speed Sensor
5	<p>YAD5D180</p>	Locking Hub Solenoid

No.	Defective Code	Malfunctioning Part
6	<p>YAD5D190</p>	Selector Switch
7	<p>YAD5D200</p>	Motor Position Sensor

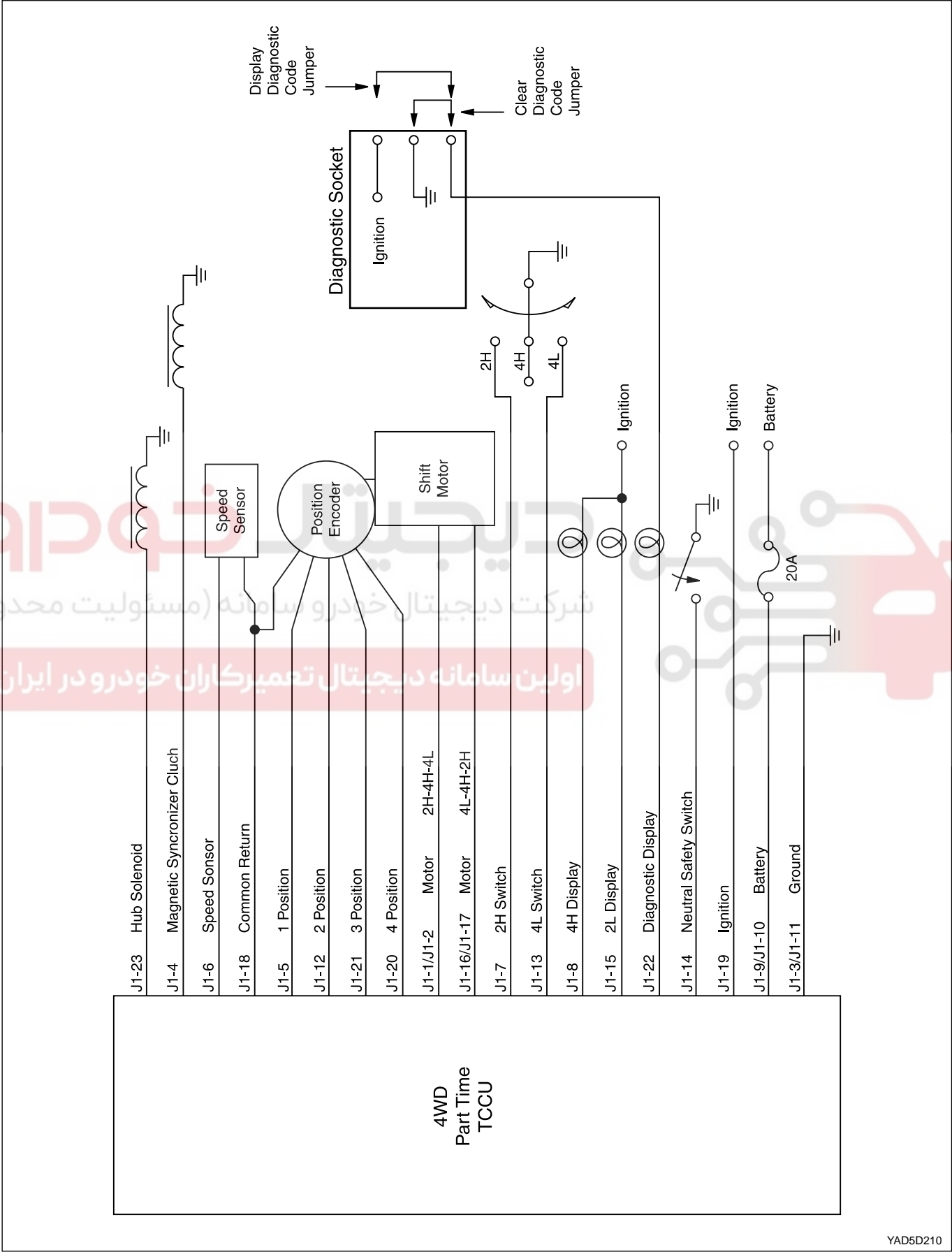
دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

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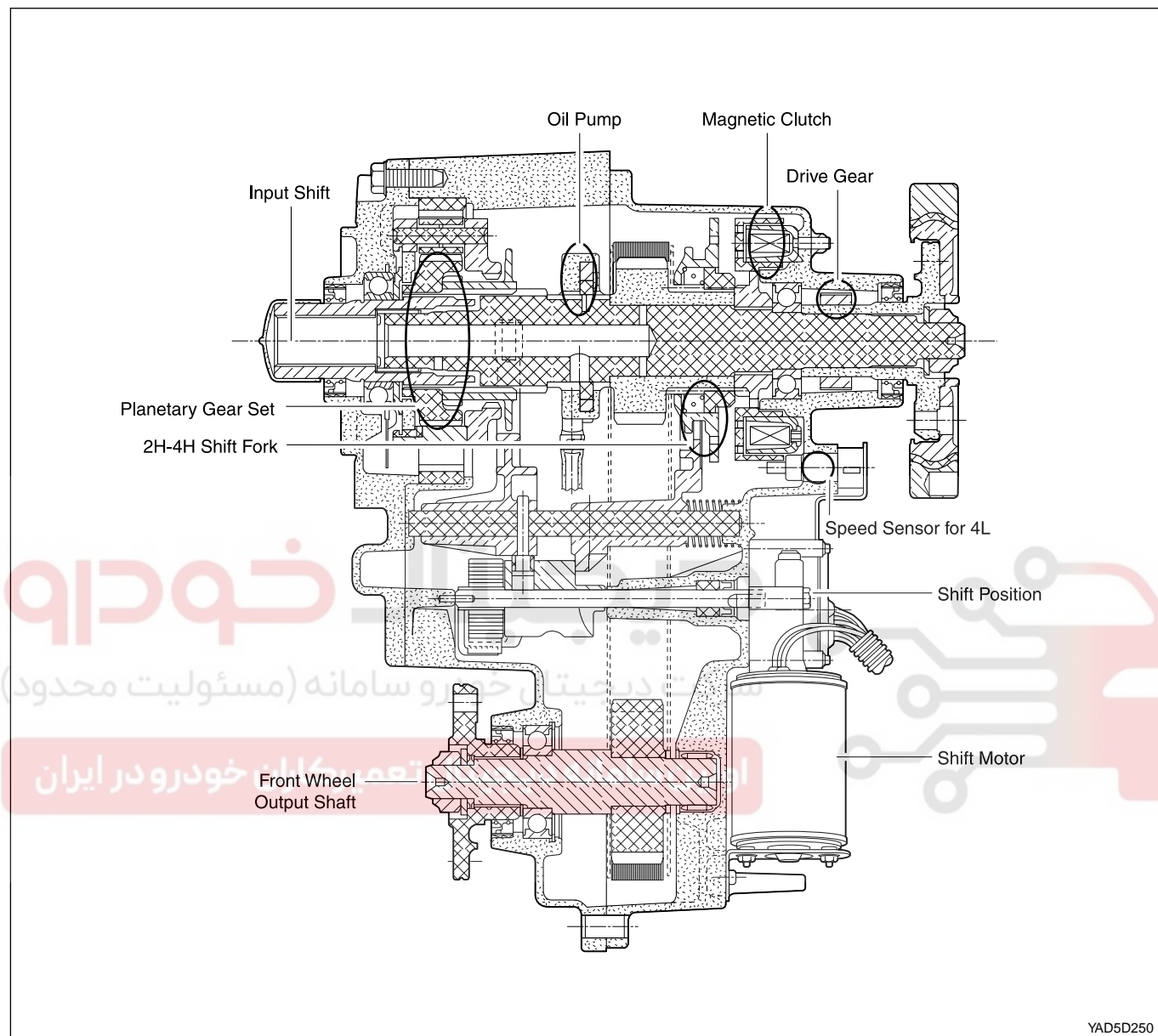
DIAGNOSTIC DIAGRAM



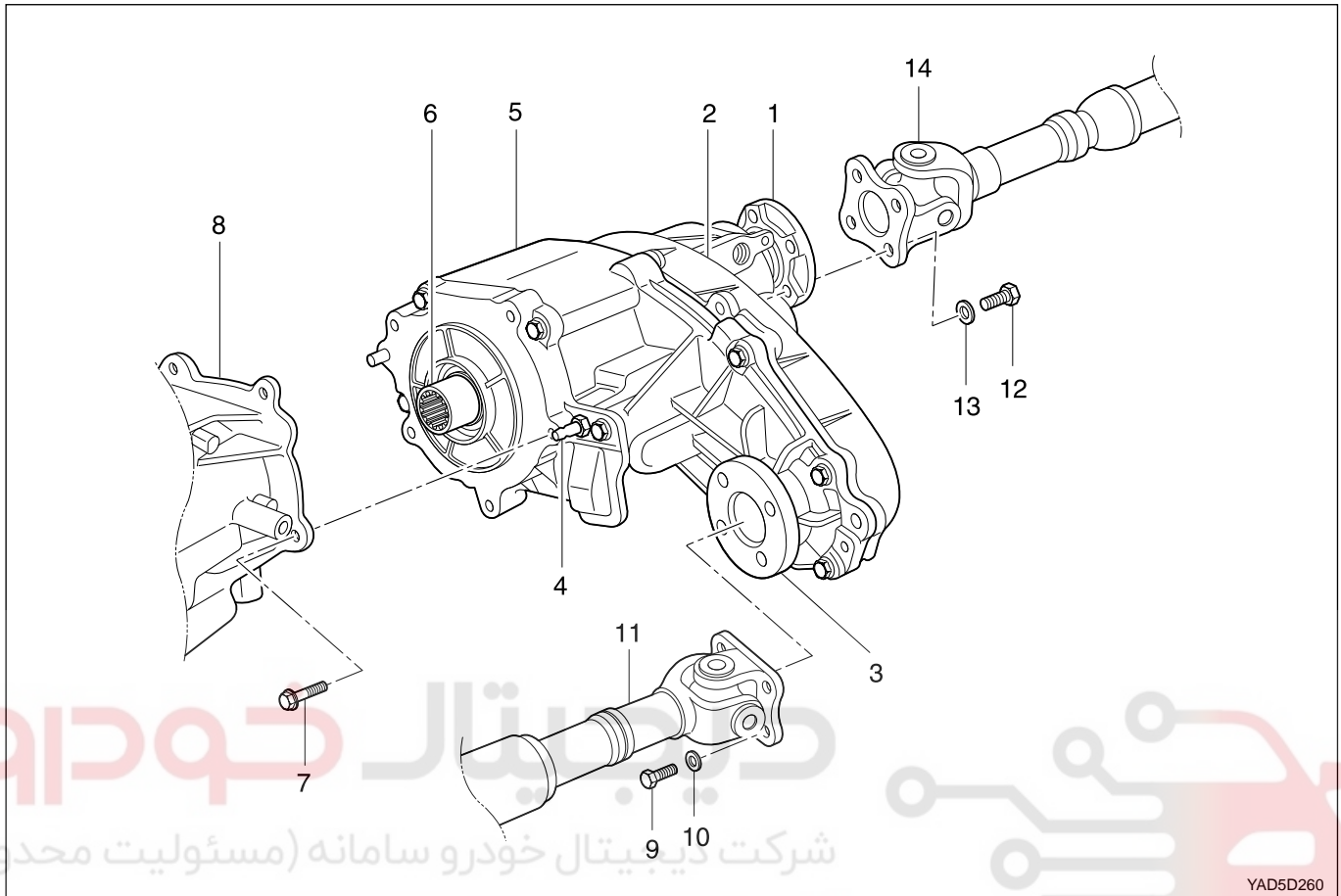
YAD5D210

COMTONENT LOCATOR

CROSS SECTIONAL VIEW



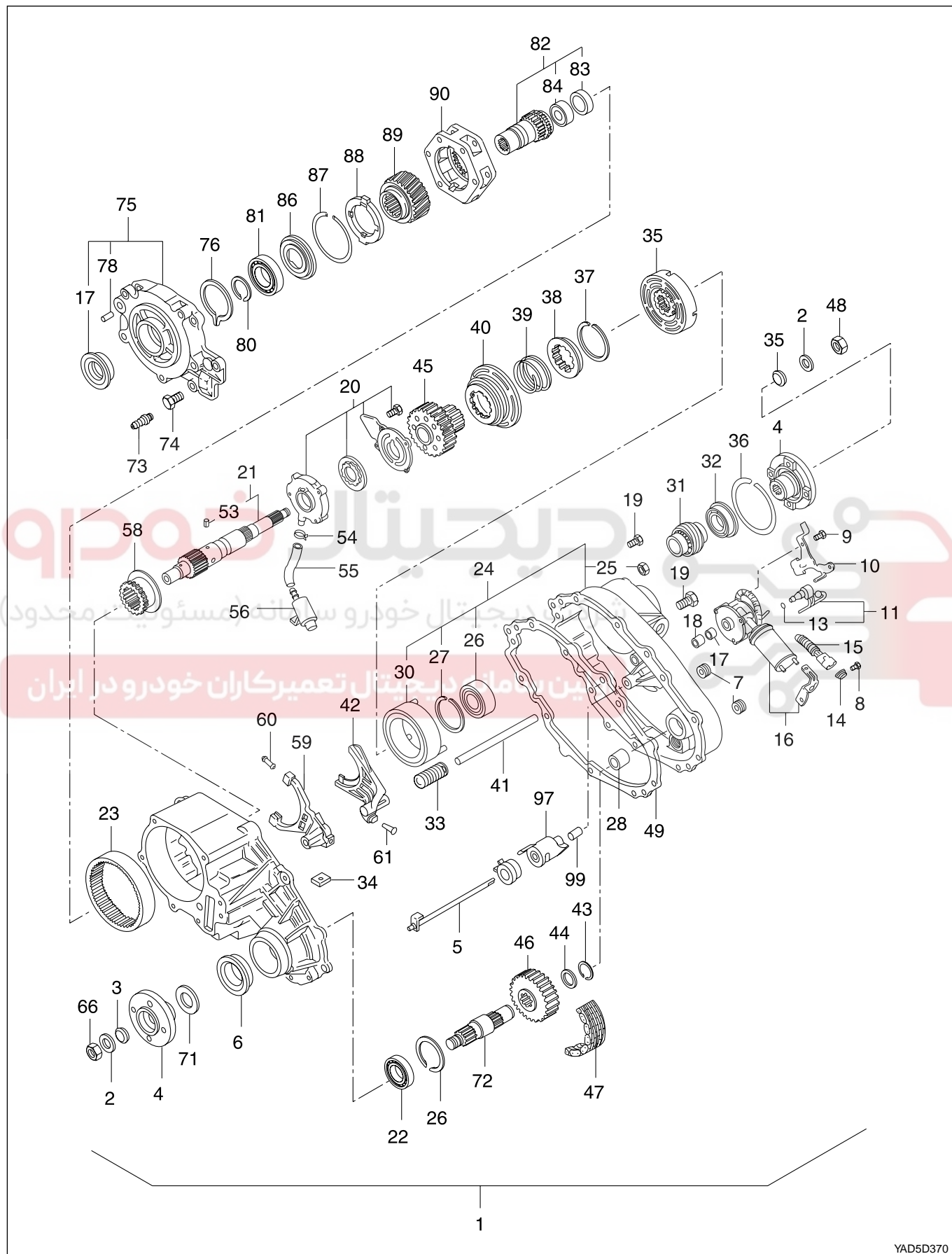
TRANSFER CASE ASSEMBLY



YAD5D260

- | | |
|--------------------------|----------------------------------|
| 1 Rear Companion Flange | 8 Transmission Extension Housing |
| 2 Case Cover | 9 Bolt |
| 3 Front Companion Flange | 10 Washer |
| 4 Breather Plug | 11 Front Propeller Shaft |
| 5 Transfer Case | 12 Bolt |
| 6 Input Shaft | 13 Washer |
| 7 Mounting Bolt | 14 Rear Propeller Shaft |

DISASSEMBLY AND ASSEMBLY



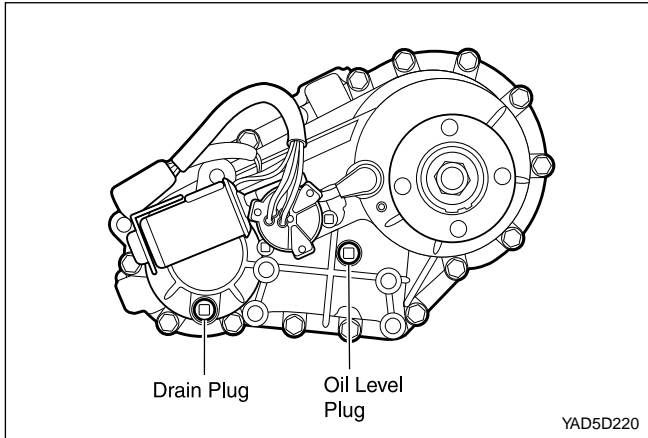
YAD5D370

1 Transfer Case	41 Rail Shaft
2 Spring Washer	42 Lock-up Fork
3 Oil Seal	43 Snap ring
4 Companion Flange	44 Spacer
5 Shift shaft	45 Driven Sprocket
6 Oil Seal	46 Driving Sprocket
7 Pipe Plug	47 Drive Chain
8 Screw	48 Nut
9 Bolt	49 Gasket
10 Speed Sensor and Harness Bracket	53 Spring Pin
11 Speed Sensor Assembly	54 Hose Clamp
12 Speed Sensor	55 Hose Coupling
13 O-Ring	56 Oil Strainer
14 Locking Clip	58 Reduction Hub
15 Connector	59 Shift Fork Assembly
16 Motor Assembly	60 Shift Fork Facing
17 Oil Seal	61 Roller and Retainer
18 Bearing	66 Nut
19 Bolt	67 Plane Washer
20 Pump Assembly	68 Oil Seal
21 Output Shaft Assembly	71 Spacer
22 Bearing	72 Front Output Assembly
23 Ring Gear	73 Breather
24 Cover Assembly	74 Bolt
25 Nut	75 Front Adapter Assembly
26 Snap Ring	76 Snap Ring
27 Bearing	80 Snap Ring
28 Needle Bearing	81 Bearing
30 Clutch Coil Assembly	82 Input Shaft Assembly
31 Speed Gear	83 Sleeve Assembly
32 Oil Seal	84 Needle Bearing
33 Return Spring	86 Thrust Washer
34 Magnet	87 Retaining Ring
35 Clutch Housing	88 Thrust Plate
36 Snap Ring	89 Sun Gear
37 Snap Ring	90 Gear Carrier Assembly
38 Lock-up Hub	97 Electric Shift Cam
39 Sleeve Return Spring	99 Spacer
40 Lock-up Collar	

MAINTENANCE AND REPAIR

ON-VEHICLE SERVICE

MAINTENANCE OF TRANSFER CASE LUBRICANT

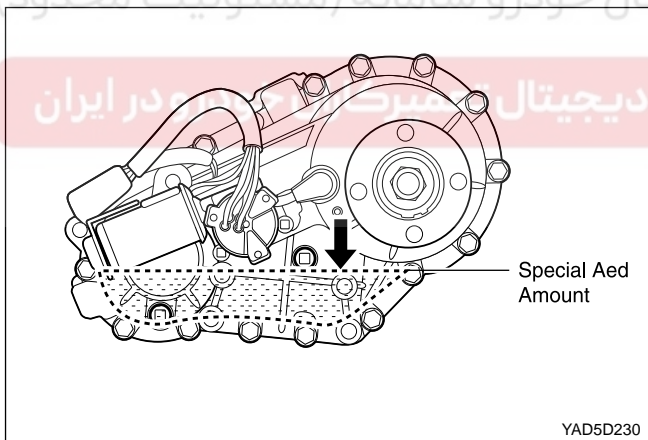


1. Oil Level Check

- Clean the oil level plug and surrounding area.
- Remove the oil level plug and check whether oil is drip out or not.
- Tighten the oil level plug.

Installation Notice

Tightening Torque	20 - 30 N•m (15 - 22 lb-ft)
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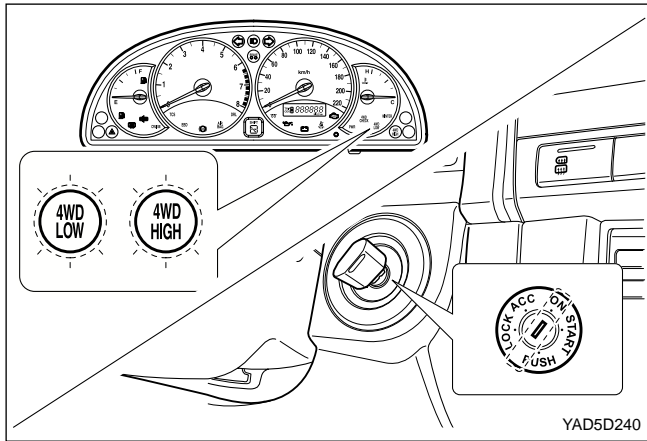


2. Oil Change

- Clean the oil level plug and surrounding area
- Place a suitable container under the transfer case.
- Remove the oil and tighten the drain plug.
- Fill the oil through the oil level plug until oil begins to drip out.
- Tighten the oil level plug.

3. Cautions for oil level check and plugs tightening

- Do not use an impact wrench to remove or tighten the oil level plug or drain plug since this will damage the threads in the transfer case.



4H AND 4L INDICATOR

When the ignition switch turns on, 4H and 4L indicators turn on for 0.6 seconds and turn off.

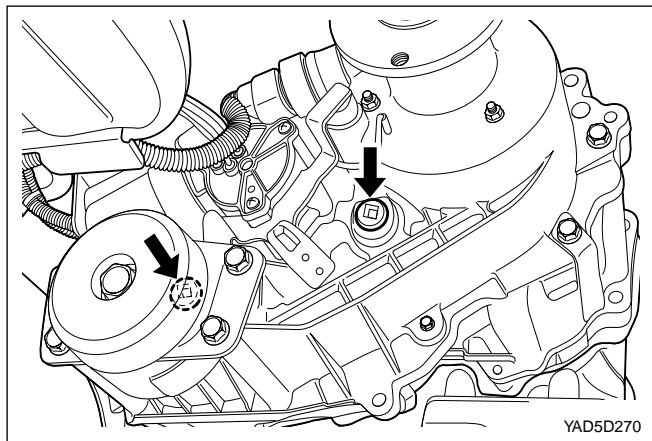
Notice: If 4H and 4L indicators do not turn on, check the related bulb, the wiring harness and TCCU.

TCCU INSPECTION

Pin No.	Operation Condition	Voltage(V)
J1 - 7	4H or 4L	4.75 - 5.35
	2H	0 - 0.50
J1 - 8	4H indicator light ON	< 1.00
	4H indicator light OFF	> 11.00
J1 - 13	2H or 4H	4.75 - 5.35
	4L	0 - 0.50
J1 - 14	Clutch pedal applied	< 0.50
	Clutch pedal released	> 11.00
J1 - 15	4L indicator light ON	< 1.00
	4L indicator light OFF	> 11.00
J1 - 16	Motor OFF	< 1.00
	Motor ON	> 11.00
J1 - 17	Motor OFF	< 1.00
	Motor ON	> 11.00
J1 - 23	Auto locking hub ON	> 11.00
	Auto locking hub OFF	< 1.00

Notice:

- DC 12V for the TCCU operation should be maintained.
- In case of J1-8 and J1-15, indicator light will turn on for 0.6 second when turn the ignition switch ON.
- If 4H and 4L indicator lights remain turned on when turn the ignition switch on or during driving, perform the TCCU diagnosis.



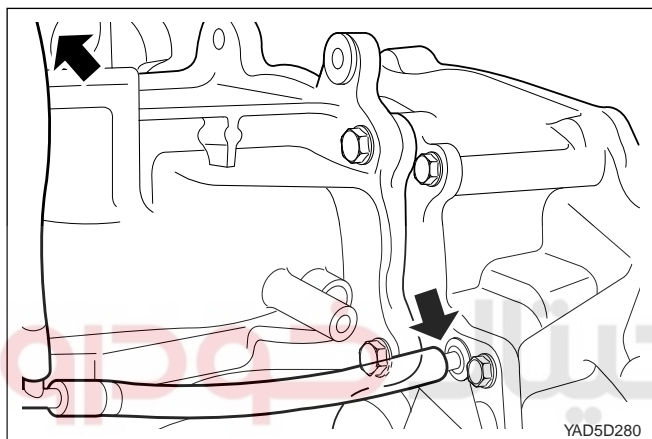
TRANSFER CASE ASSEMBLY

1. Disconnect the negative terminal from the battery.
2. Lift up the vehicle and fix it safely.
3. Remove the damper mounting bolt.
4. Remove the drain plug and drain the oil.

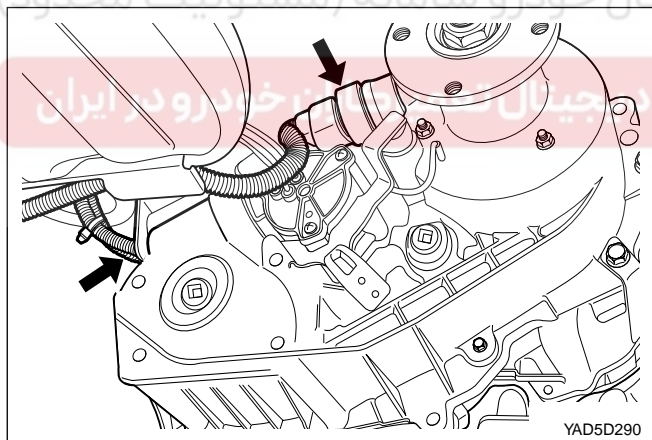
Reinstall the drain plug.

Installation Notice

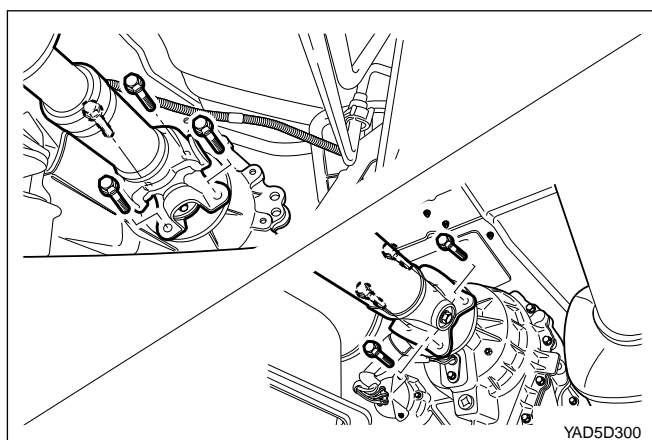
Tightening Torque	19 - 30 N•m (14 - 22 lb-ft)
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5. Remove the breather hose.



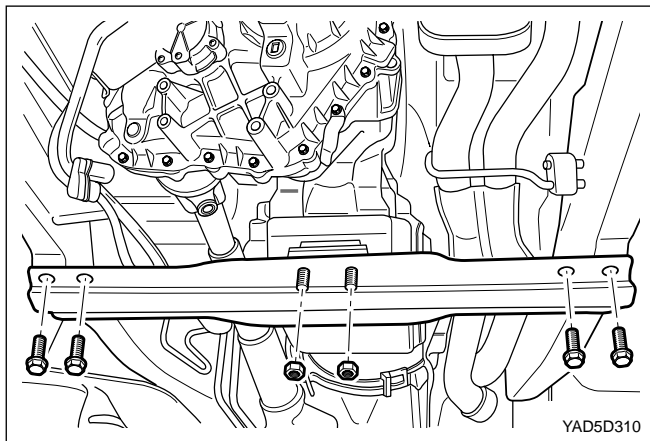
6. Disconnect the speedometer cable connector and other cable connectors and wiring harnesses.



7. Support the transfer case with jack and remove the front and rear propeller shafts from the transfer case.

Installation Notice

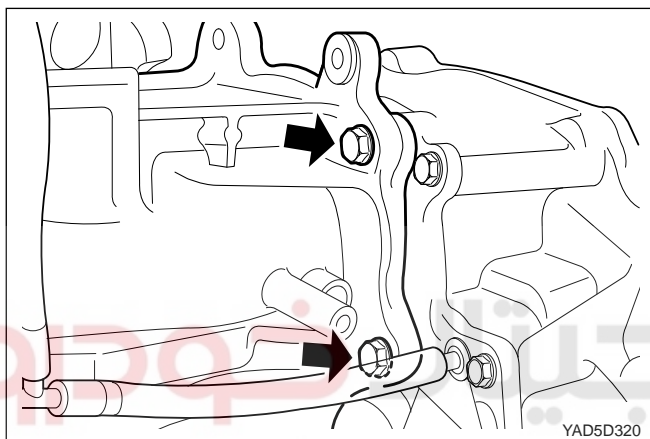
Tightening Torque	Front	81 - 89 N•m (60 - 66 lb-ft)
	Rear	70 - 90 N•m (52 - 66 lb-ft)



8. Remove the center mounting nuts and end sides mounting bolts of the cross member and then remove the cross member.

Installation Notice

Tightening Torque(1)	12 - 23 N•m (9 - 17 lb-ft)
Tightening Torque(2)	6 - 8 N•m (53 - 71 lb-in)



9. Remove the transfer case by removing the bolts attaching the transfer case to the transmission.

Installation Notice

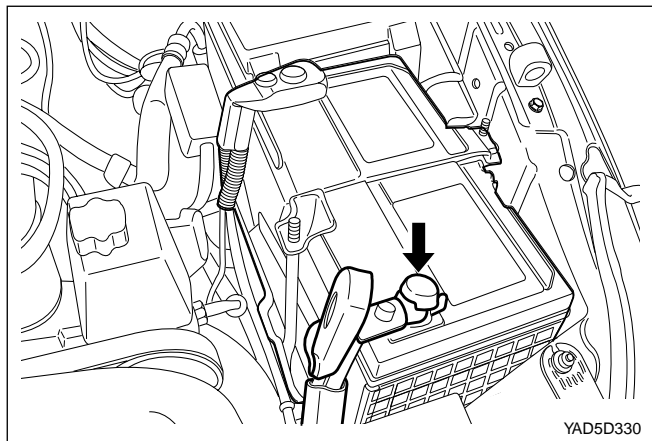
Tightening Torque	35 - 60 N•m (26 - 44 lb-ft)
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Notice: Apply long-term grease to the inner spline of the transfer case input shaft.

10. Installation should follow the removal procedure in the reverse order.

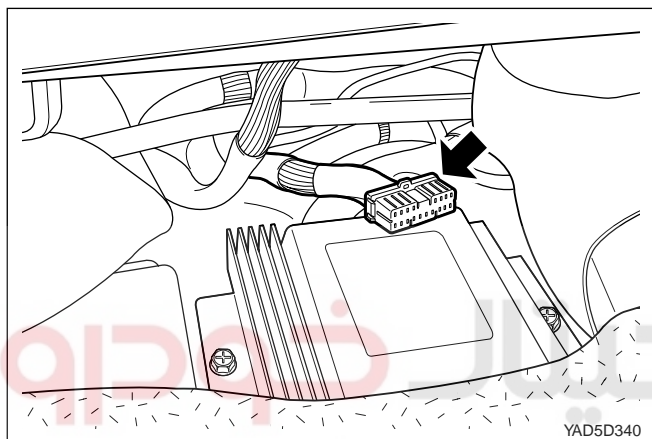
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

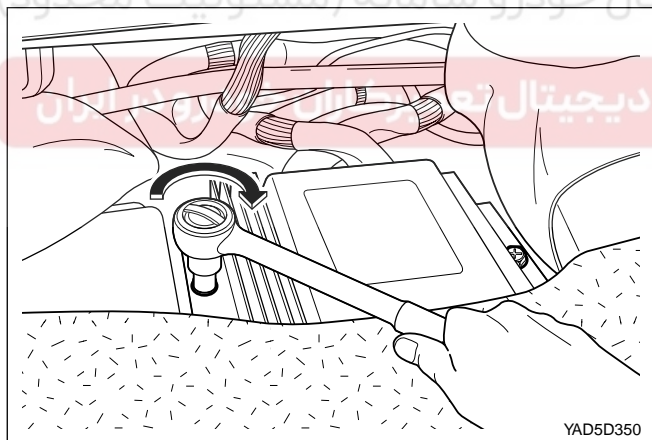


TCCU

1. Disconnect the negative terminal from the battery.

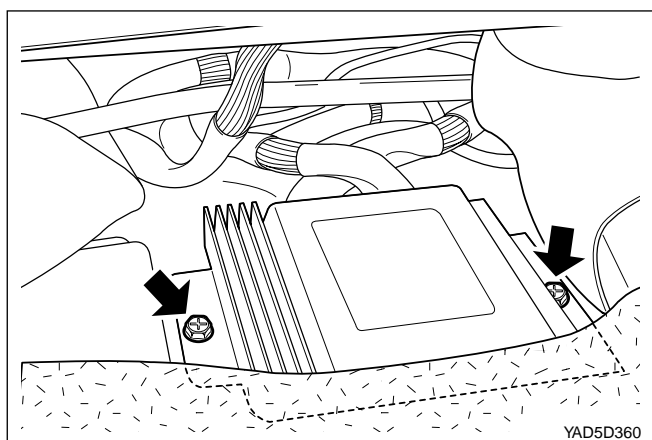


2. Remove the TCCU connector.



3. Remove the TCCU mounting bolt and remove the TCCU.

- TCCU installation position : Under the driver's seat

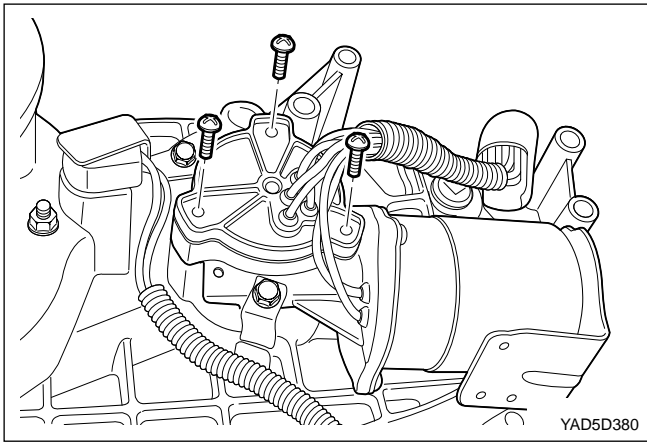


4. Installation should follow the removal procedure in the reverse order.

Notice: Be careful not to give any impact to the TCCU body.

Installation Notice

Tightening Torque	10 N•m (89 lb-ft)
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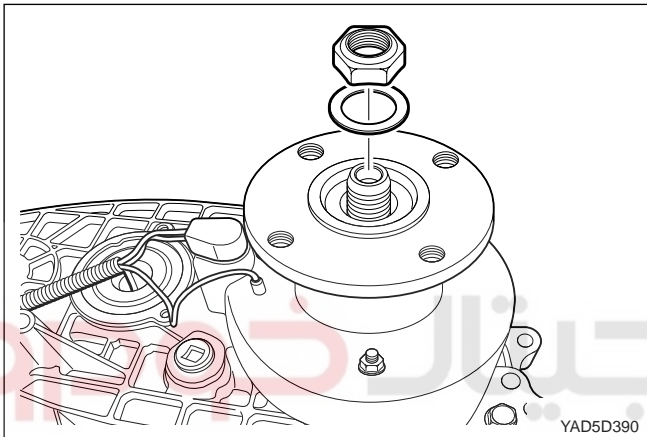


UNIT REPAIR

DISASSEMBLY PROCEDURE

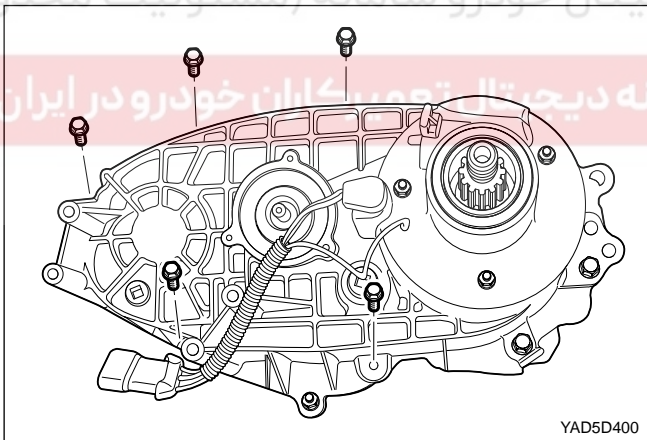
Shift Motor Assembly

1. Separate the harness bracket.
2. Remove the shift motor mounting bolt and remove the shift motor assembly.



Companion Flange

1. Holding the companion flange, remove the nut and washer and then remove the companion flange.
2. Remove the oil seal.
3. Remove the companion flange from the case cover.

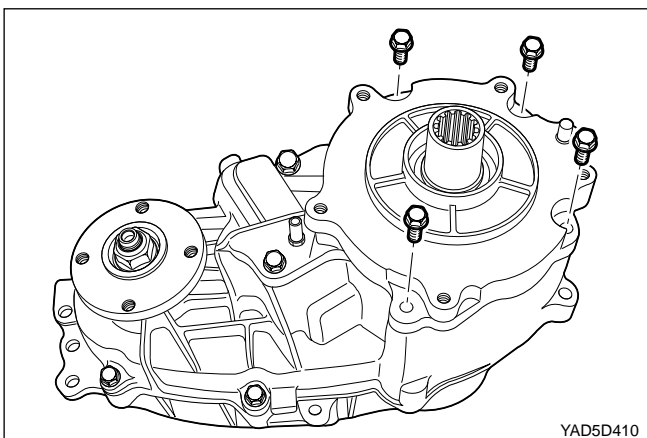


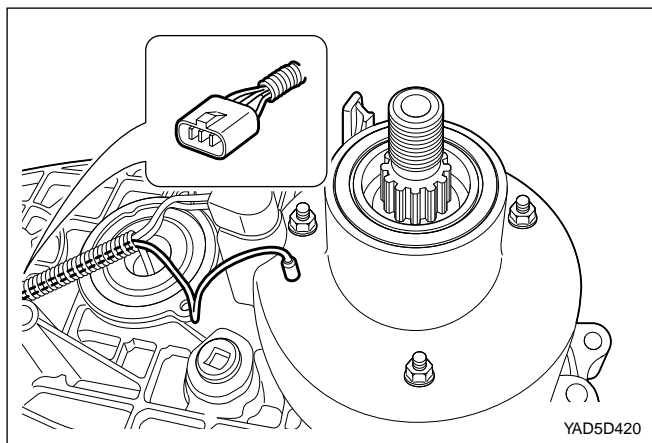
Case Cover Assembly

1. Remove the cover mounting bolts(9), and the case mounting bolts(5).

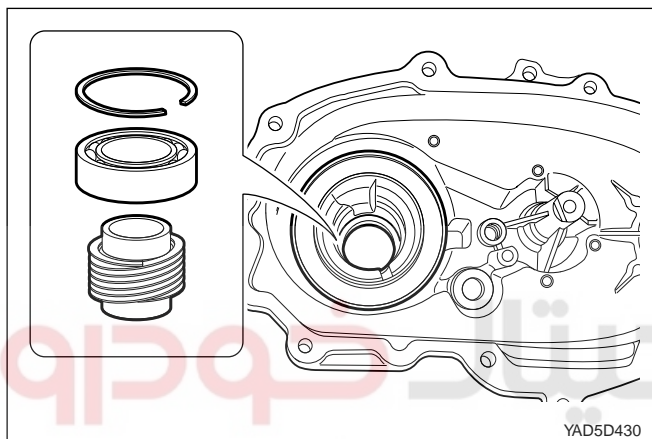
Notice: Identification tag has information required for ordering replacement parts, so be careful not to lose it.

2. Using a driver, pry and disconnect the sealant bond of the cover and required case.

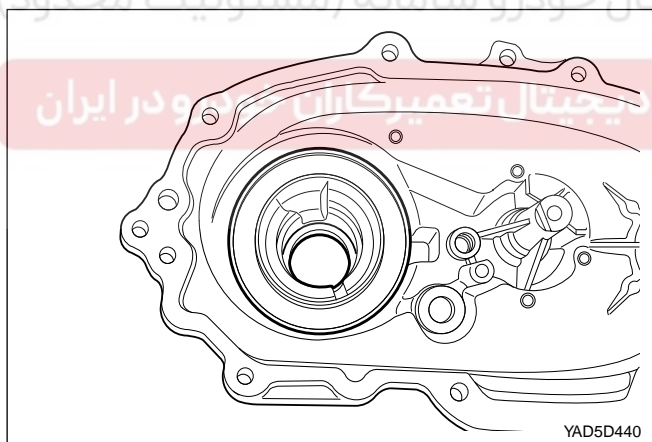




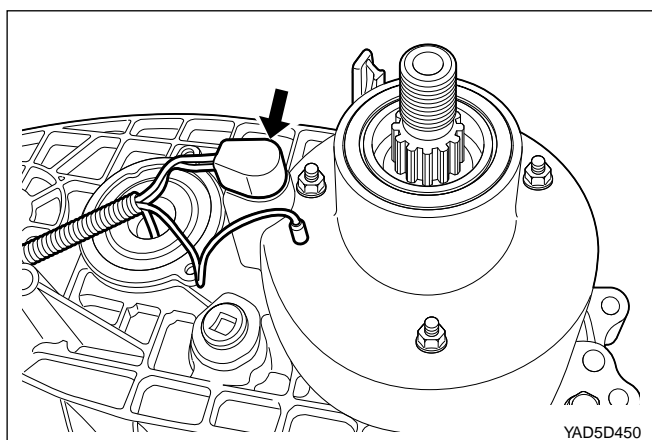
3. Remove the clutch coil wiring from the connector.
4. Remove the clutch coil assembly mounting nut.



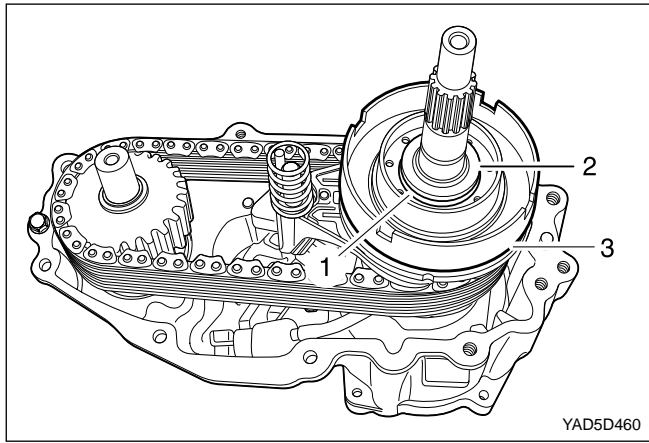
5. Remove the snap ring and pull out the ball bearing from the cover to remove the speed gear.



6. Remove the clutch coil assembly and the oil seal from the cover.

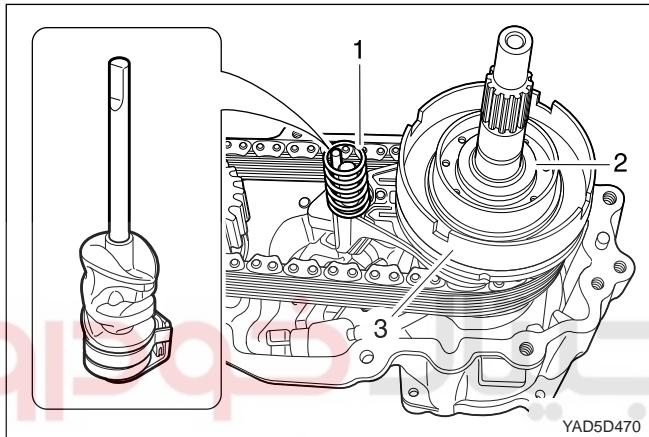


7. Remove the speed sensor and the O-ring from the case cover.



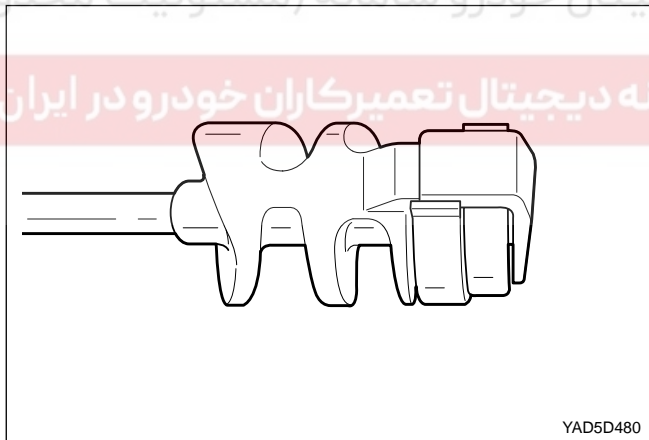
Transfer Case Assembly

1. Separate the shift motor shaft cam assembly and the spring(1).

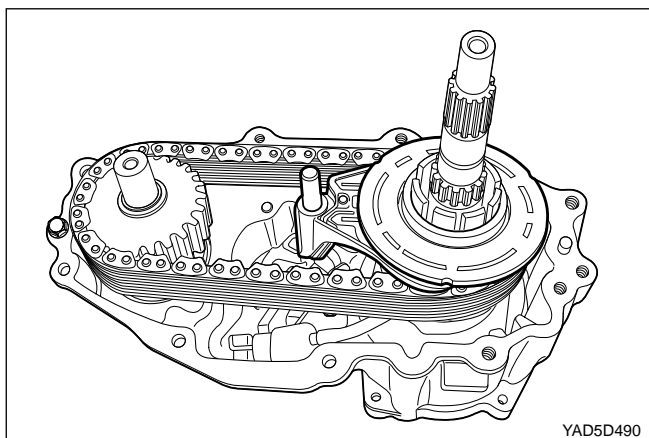


2. Remove the clutch housing assembly from the output shaft.

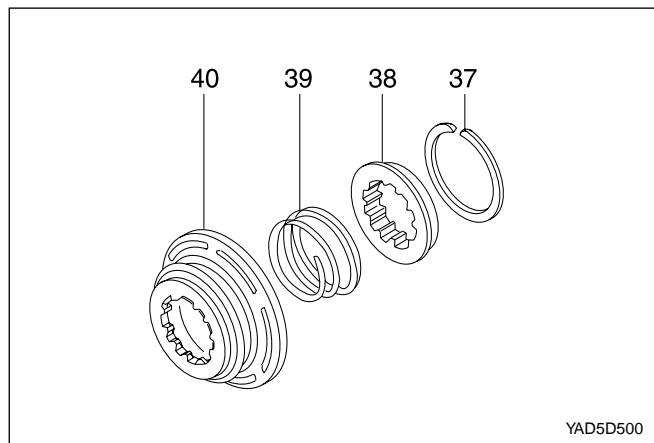
- Clutch Housing Component
 - (1) Retaining Ring
 - (2) Shift collar Hub
 - (3) Clutch Housing



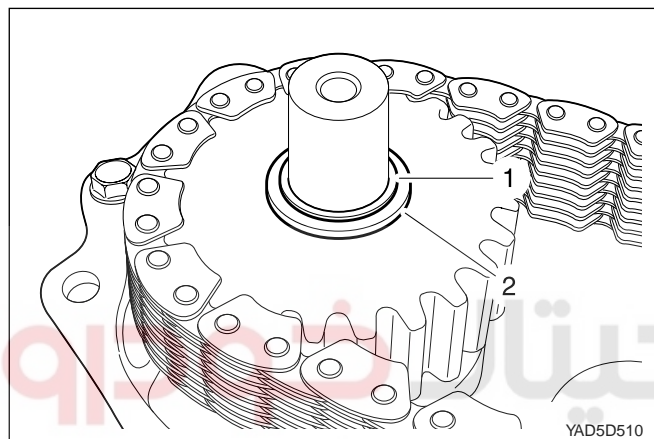
- Remove the shift cam from the shaft.
- Fix the shaft at the vise with the cam removed and remove the torsion bar using a driver.



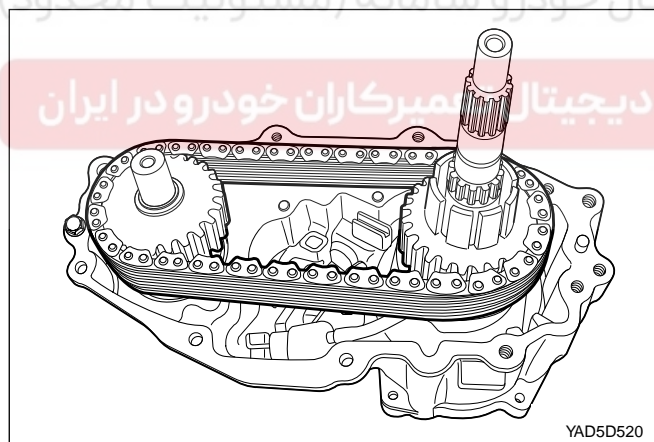
3. Remove the 2WD/4WD lock up assembly, the lock up fork and rail shaft from the output shaft.



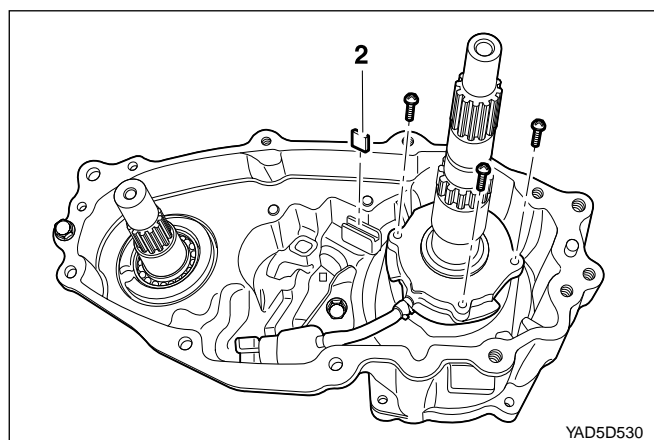
- 2WD/4WD Lock Up Assembly Component
- (37) Snap Ring
- (38) Lock up Hub
- (39) Return Spring
- (40) Lock up Collar



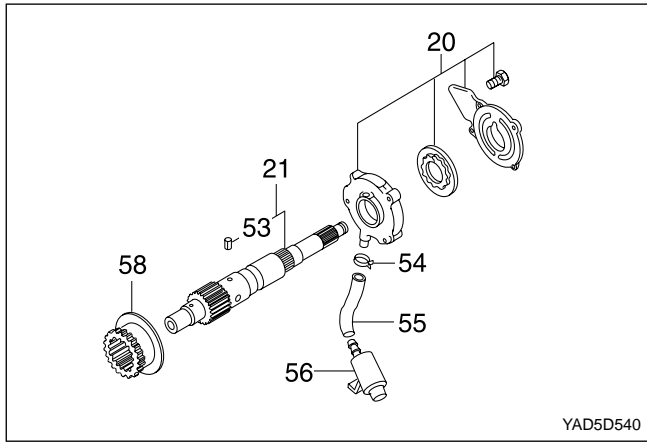
4. Remove the snap ring from the front output driven sprocket and separate the snap ring and the spacer.



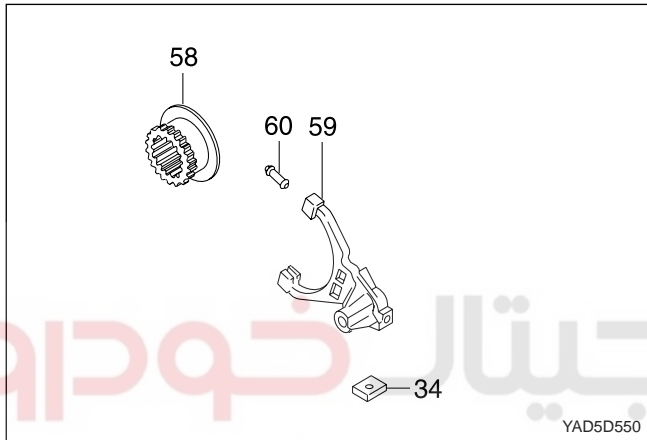
5. Remove the driving sprocket, the driven sprocket and the driving chain from the front/rear output shaft.



6. Remove the oil pump assembly and the magnetic from the output shaft.

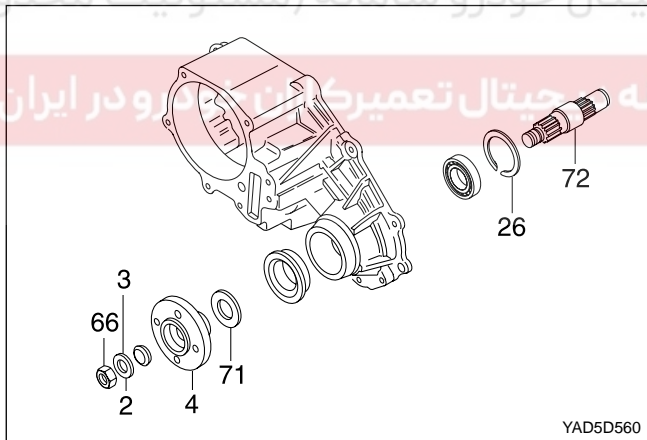


- Remove the bolt and the retainer. Separate the output shaft and rear pump cover.
- Remove the hose clamp and remove the hose coupling cover from the pump housing.
- Remove the hose clamp, the hose coupling and the strainer.
- Remove two pump pins and the spring from the output shaft.
- Separate the front pump and remove the output shaft.



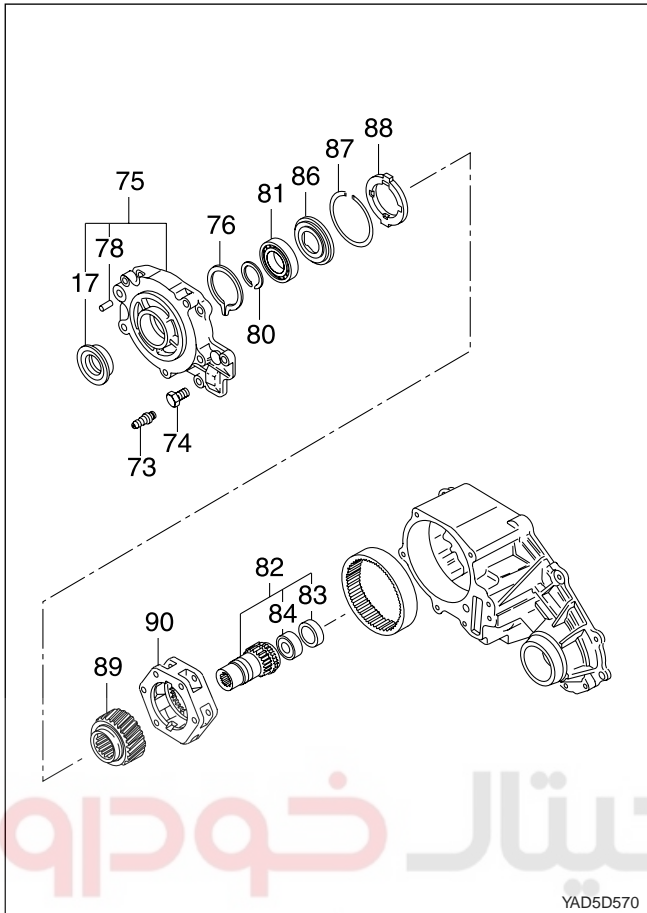
Reduction Shift Parts

1. Remove the reduction hub and reduction shift fork assembly from the case.
2. Remove the 2 shill fork facings from the shift fork assembly.
3. To remove the roller cam and pin, cut elf the plastic retainer when disassembling the fork assembly.



Front Output Assembly

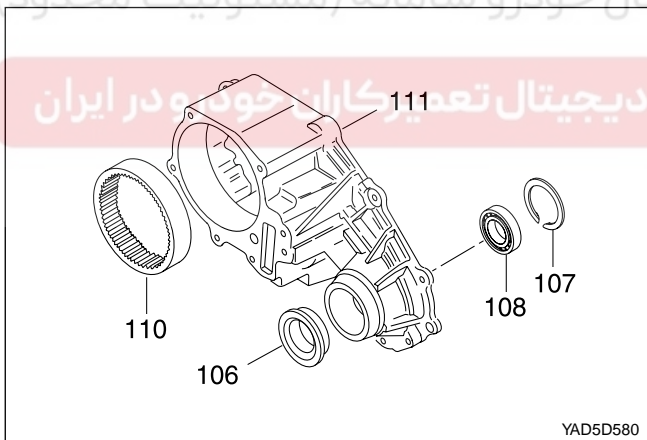
1. Holding the companion flange, remove the nut and washer and then remove the companion flange and oil seal.
2. Remove the output shaft.



Adapter, Input Shaft and Carrier Gear

1. Remove the breather.
2. After removing 6 bolts, remove the front adapter by separating the adapter sealer bond from the case using a screw driver.
3. Remove the adapter assembly, input shaft assembly and carrier gear assembly.
4. Remove the snap ring and oil seal from the front adapter.
5. After removing snap ring, pull out the bearing and thrust washer from the input shaft assembly and separate the input shaft assembly from the carrier gear assembly.
6. Remove the needle bearing and sleeve bearing from the input shaft assembly.
7. Remove the retaining ring, thrust plate and sun gear from the planet carrier assembly.

Notice: Do not disassemble the planet carrier assembly.



Transfer Case Assembly(Front)

1. Remove the oil seal.
2. Remove the retaining ring and the ball bearing.
3. Remove the pin from the transfer case.
4. Remove the ring gear from the case using the press.

Notice: Be careful not to give any damage to the case for removing the pin.

Notice: Replace new part for installation.

Cleaning Procedure

Notice: Before cleaning, check the magnet for the presence of metal particles which indicate internal chipping of the transfer case.

1. Using cleaning solvent, clean the residual oil and dirt deposits.

Notice: During cleaning, be careful not to damage the metal surfaces.

2. After cleaning, dry the parts with low pressure(Max. 20 psi) compressed air.
3. Lubricate the ball bearings and needle bearings with transfer case oil after cleaning.

Notice: Protect the lubricated bearings from dust.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

آمارین سامانه دیجیتال تعمیرکاران خودرو در ایران

Inspection Procedure

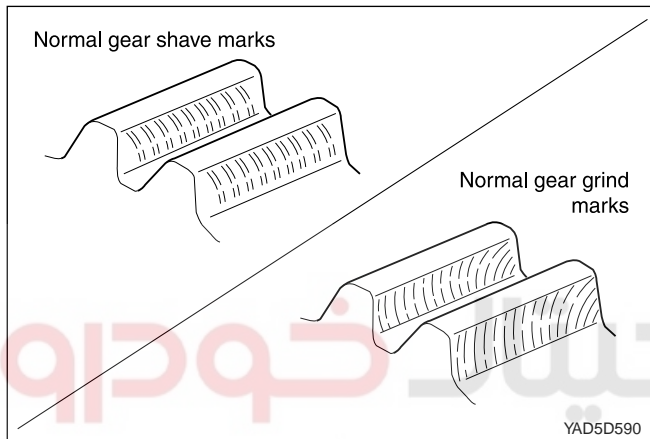
1. Visually check the all removed parts.

Notice: Always replace the hose coupling, O-ring and oil seal with new parts.

2. Inspection Terms

- Burr : Local rise of material forming protruding sharp edge
- Chip : An area from which a small fragment has been broken off or cut
- Crack : Surface break of line nature indicating partial or complete separation of material.
- Excessive wear : Heavy or obvious wear beyond expectations considering conditions of operation.
- Indentation : Displacement of material caused by localized heavy contact.
- Galling : Breakdown of metal surface due to excessive friction between parts. Particles of the softer material are torn loose and welded to the harder material.
- Nick : Local break or notch, usually displacement of material rather than loss.
- Scoring : Tear or break in metal surface from contact under abnormal pressure.

- Step wear : Heavy wear that produces a step that can be seen or felt between adjacent contact and non-contact surfaces.
- Uneven wear : Condition of localized, unevenly distributed wear Includes hollows, shiny spots, uneven polish and other visual indications.



3. Specific Inspection

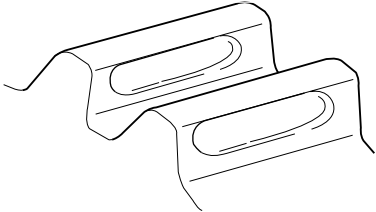
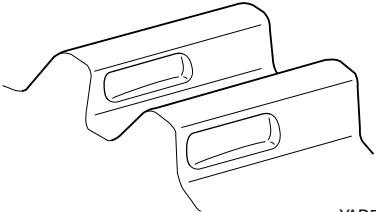
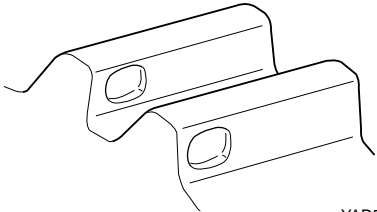
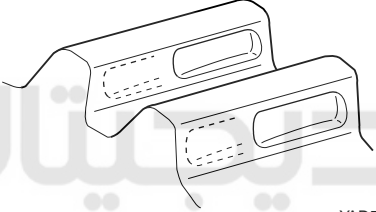
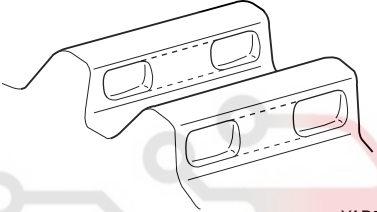
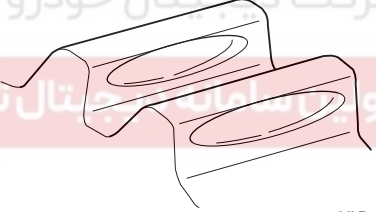
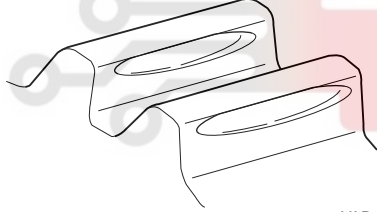
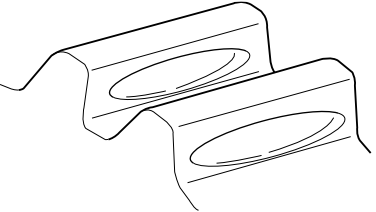
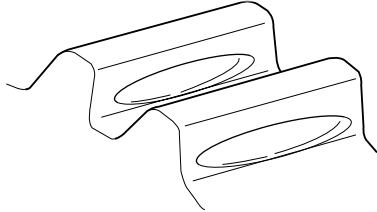
- Referring to normal gear tooth face, specifically inspect the uneven wear and chips of gear tooth. Replace or repair if necessary.



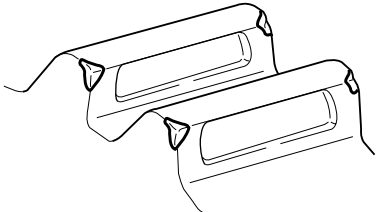
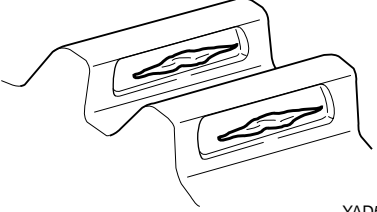
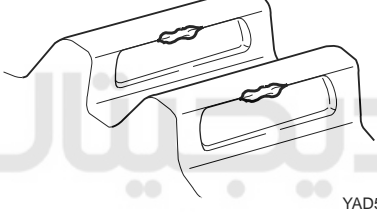
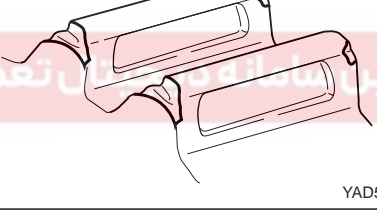
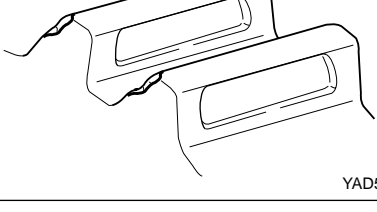
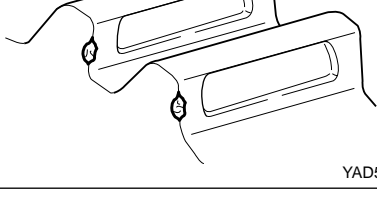
شرکت دیجیتال خودرو (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

4. Inspection of contact patterns

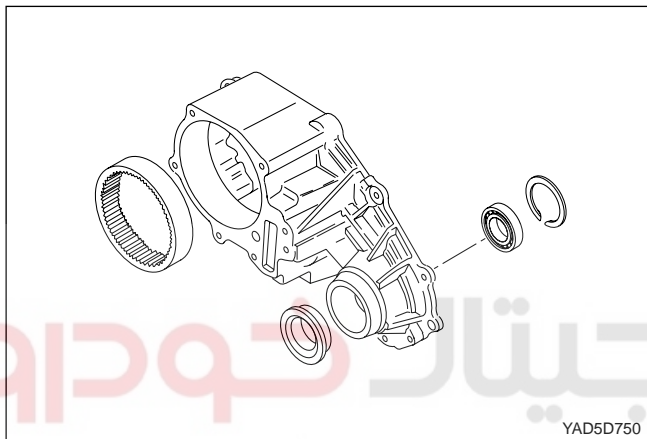
Description	Normal	Abnormal
Normal Wear	 YAD5D600	
End Face Wear	 YAD5D610	 YAD5D620
Traveling Face Wear	 YAD5D630	 YAD5D640
Upper Face Wear	 YAD5D650	 YAD5D660
Lower Face Wear	 YAD5D670	 YAD5D680

5. Chip pattern of the gear face

Description	Patterns	Action
Corner chip at drive face	 YAD5D690	Repair
Edge chip at drive face	 YAD5D700	Repair
Corner chip at coast face	 YAD5D710	Repair
Chip within contact pattern	 YAD5D720	Replace
Chip completely through tooth	 YAD5D730	Replace
Side edge chip at drive face	 YAD5D740	Replace

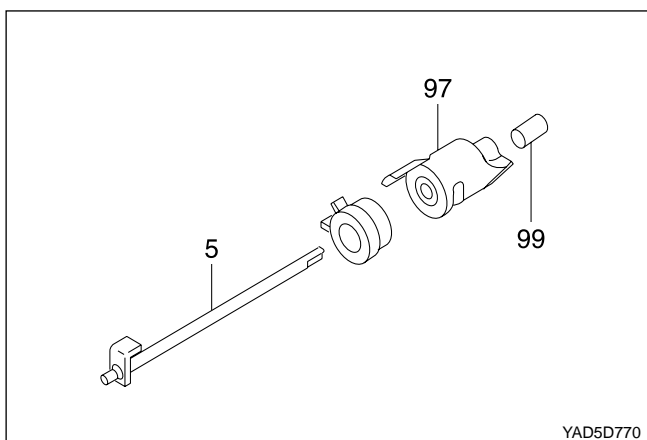
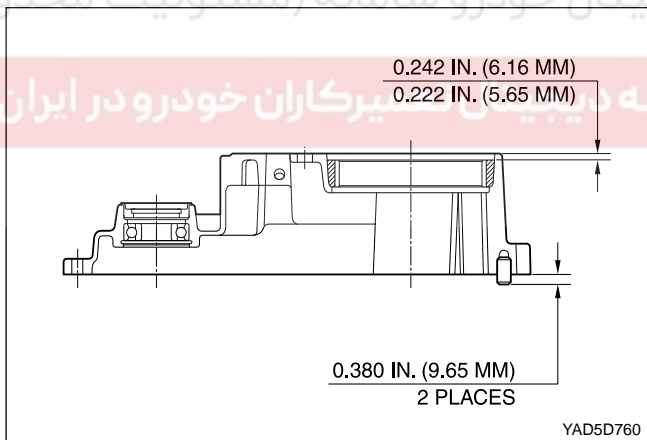
ASSEMBLY PROCEDURE

- Use special tools during assembly of oil seals and bearings.
- Lubricate bearings, oil seals and bushings before assembly.



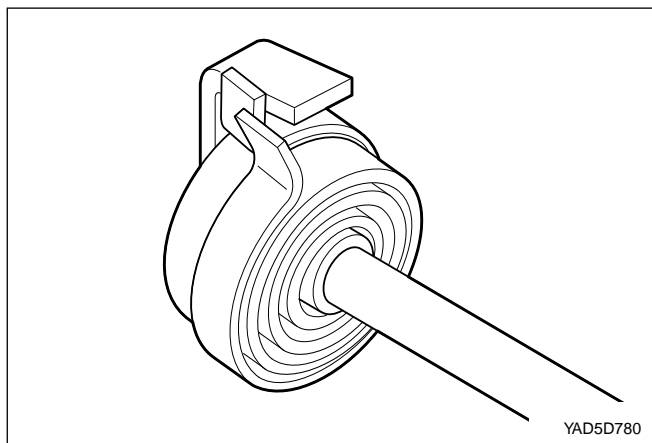
Transfer Case Assembly

1. If the ring gear was removed, align the outer diameter of the new replaced ring gear with transfer case and assemble it.
2. Insert the pin.
3. Insert the ball bearing to the case and install the retaining ring.
4. Install the new oil seal by pressing into the case.
5. Make sure that all parts are correctly and firmly installed into the case.

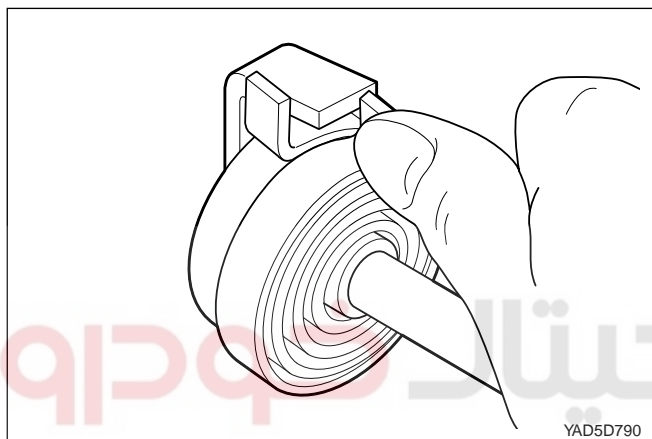


Electric Shift Cam Parts

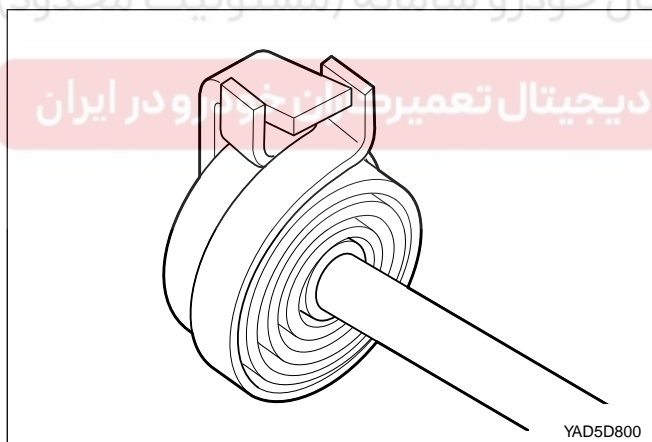
1. Insert the spacer into torsion spring.
2. Insert the end of the shift shaft into the spacer smoothly.



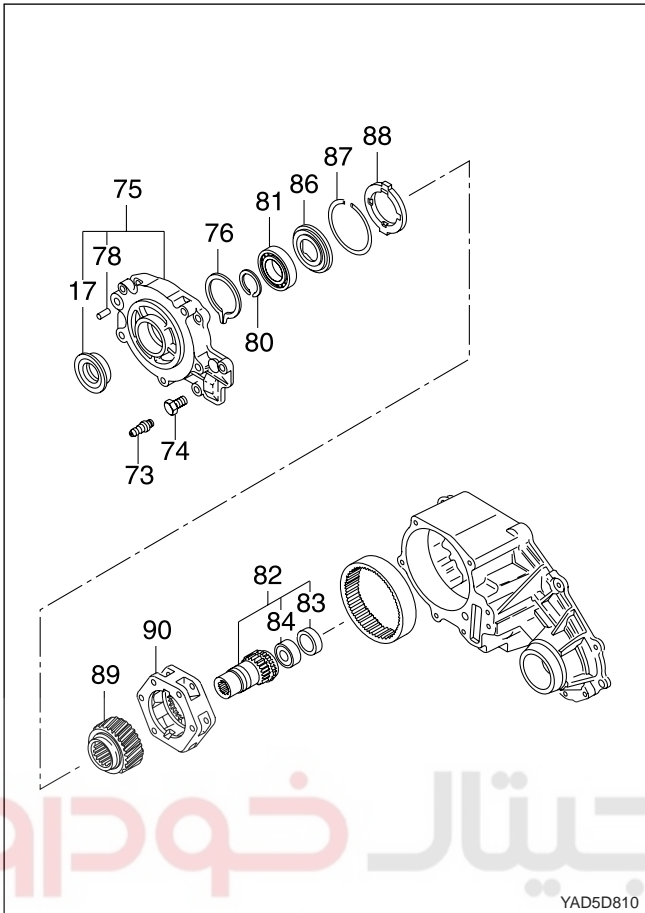
3. Slide the torsion spring and spacer to the left of the shift shaft and position the end of the first spring to fix on the drive tang.



4. Push the end of the second spring to right and fix it on the drive tang.



5. Push the torsion spring and spacer together back them completely.
6. Slide the electric shift cam onto the shift shaft.
7. Install the electric shift cam assembly into the transfer case after installation of the shift fork.



Adapter, Input Shaft and Carrier

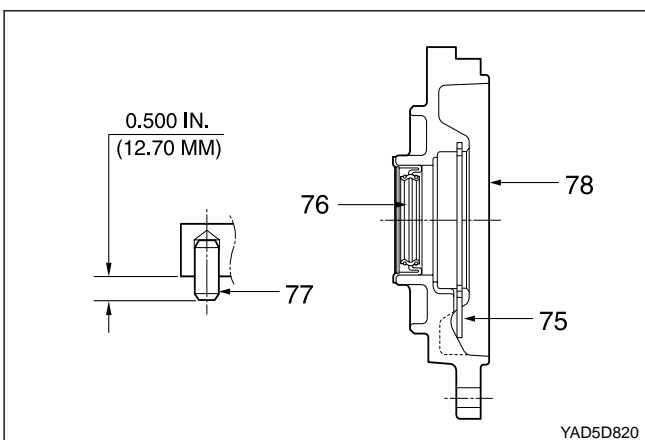
1. Place the planet carrier assembly on work bench to be the retaining ring mounting groove upward.
2. Install the sun gear with the hub end up into the planet carrier assembly and rotate the sun gear to make sure that gears are fully engaged.
3. Align the tabs and install the thrust plate into the planet carrier assembly.
4. Install the retaining ring to the planet carrier assembly.
5. Press the needle bearing into the input shaft and press the new sleeve bearing into the input shaft assembly.
6. Install the planet carrier assembly onto the input shaft and install the thrust washer. Press the bearing over input shaft.
7. After pressing the bearing, install the retaining ring.
8. Press the pin into the front adapter.
9. Slowly press the oil seal into the front adapter.
10. Install the front adapter assembly.

Notice: After installation, make sure that snap ring is correctly installed into the groove.

11. Position the input shaft assembly over front cover and engage into the bearing groove by expanding the ends of snap ring.
12. Apply 1.6mm bead of sealant on the mounting face for the transfer case and tighten the 6 bolts.
13. Install the breather.

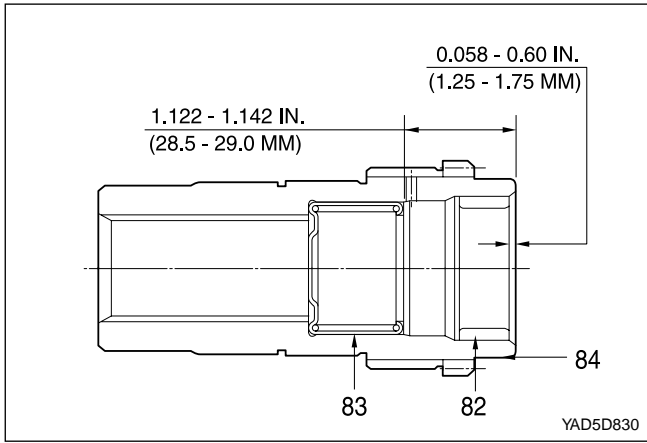
Installation Notice

Item	Tightening Torque
6 Bolts	28 - 48 N•m (21 - 35 lb-ft)
Breather	8 - 15 N•m



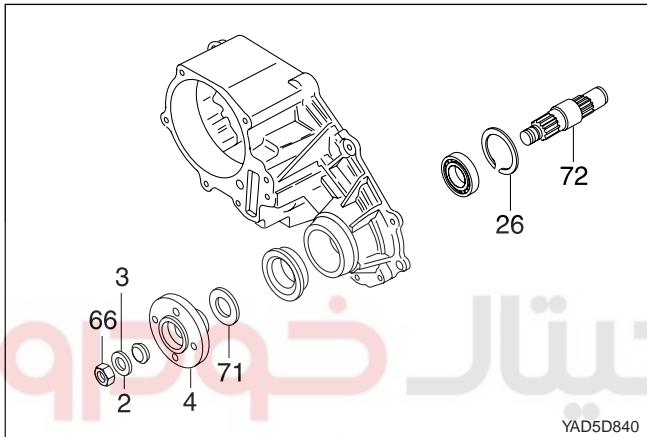
Front Output Shaft

Cross Sectional View



Input Shaft

Cross Sectional View

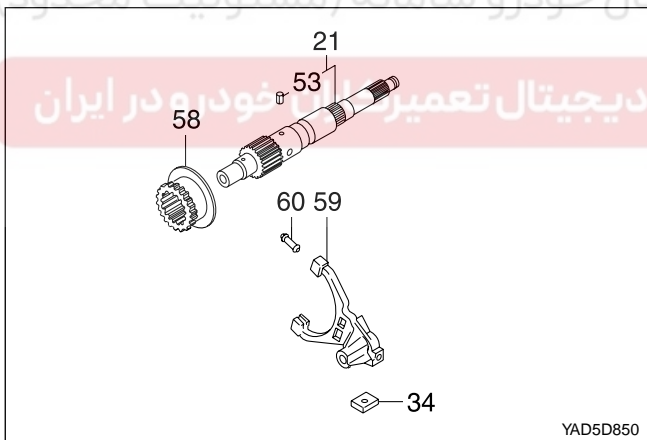


Front Output Shaft

1. Install the deflector on the yoke.
2. Position the output shaft in transfer case and install the companion flange assembly, oil seal, washer and nut.
3. Holding the companion flange, tighten the nut.

Installation Notice

Tightening Torque	346 - 380 N•m
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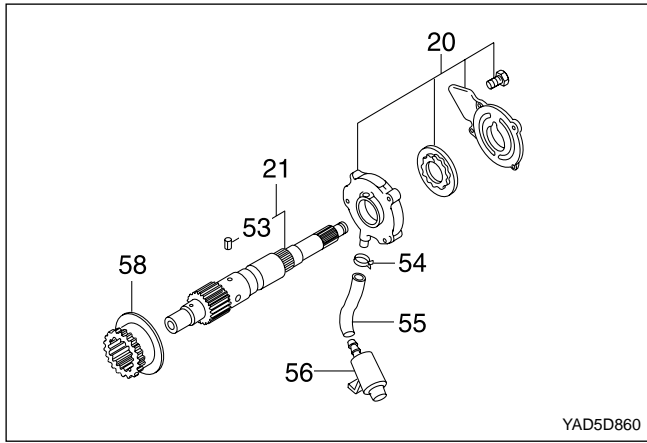
Reduction Shift Parts

1. Install the new pin, roller and retainer into the reduction shift fork.
2. Press the pin, roller and retainer into the reduction split fork bore completely.

Notice: Make sure that the cam roller turns freely.

3. Install the 2 fork facing on the reduction shift fork assembly.
4. Install the reduction shift fork onto the previously installed reduction hub in the transfer case.
5. Install the output shaft spline into the reduction hub and engage the output shaft end with input shaft bearing.

Notice: For installation of the output shaft, assemble the oil pump temporarily.



Oil Pump

1. Install the pump front cover to be the "TOP" mark down and turn the cover to be the "TOP" mark up when installed in vehicle.
2. Install the 2 pump pins and spring to the output shaft.

Notice: Flat surface of the pins must point out and align the center line of pins and spring.

3. Connect the hose coupling to the strainer coupling and install the strainer foot into the transfer case slot.

Notice: The hose coupling must face the pump assembly.

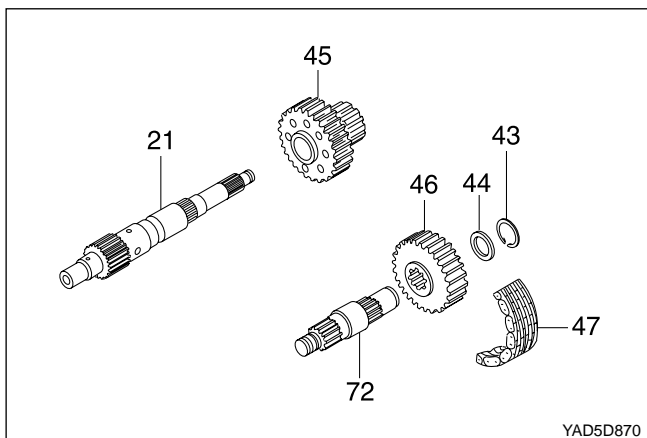
4. Install the pump housing to be the 'REAR' mark up and seat the 2 pump pins inside of the pump housing by moving pump pins inward and compressing the spring.
5. Tighten the hose to pump housing by hose clamp.

6. Position the pump rear cover to be the TOP REAR mark up and located at the top of transfer case when installed in vehicle. Position the pump retainer on the cover so that tab on the retainer is in notch in the transfer case. Apply Loctite to the bolts and tighten the bolts with turning the output shaft by hand to make the pump pins move freely.

Installation Notice

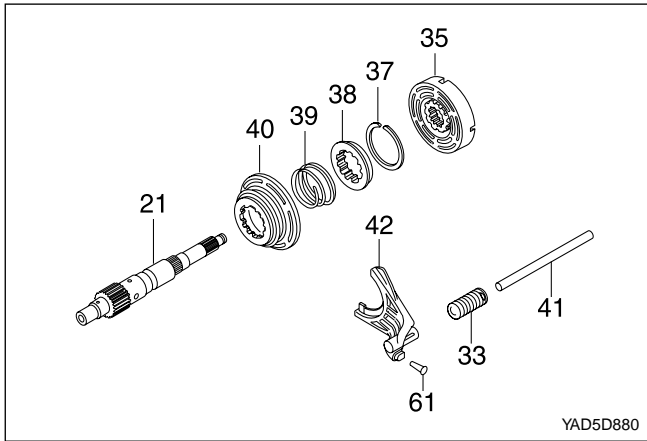
Tightening Torque

4 - 8.5 N•m
(35 - 75.5 lb-in)



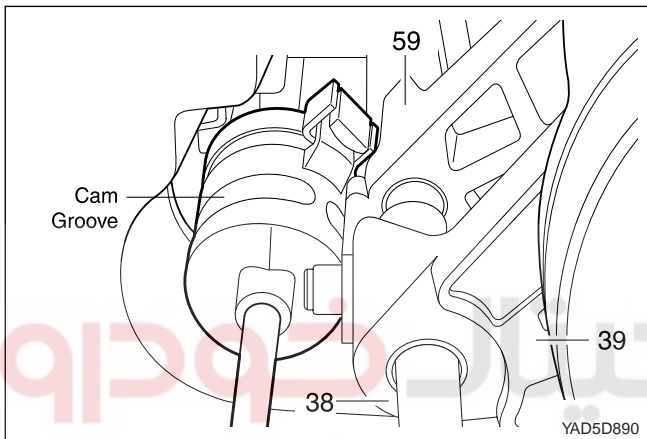
Drive Chain

1. Position the drive sprocket to the rear output shaft end and driven sprocket to the front output shaft end.
2. Install the drive chain onto the sprocket.
3. Holding each sprocket to be the drive chain tight and parallel with transfer case, install the drive chain assembly to the output shafts.
4. Rotate the driven sprocket slightly to engage splines on the front output shaft.
5. Install the spacer to the front output shaft and insert the snap ring into the shaft groove over spacer.



Lockup Shift

1. Install the lockup hub and return spring to the lockup collar and insert the snap ring.
2. Install the rail shaft through reduction shift fork assembly previously installed and into the blind hole in case.
3. Engage the lockup fork into the 2WD/4WD groove and check operation.
4. Install the shift collar hub to the output shaft spline.



5. Install the previously assembled electric shift cam and assemble the clutch housing as follows.

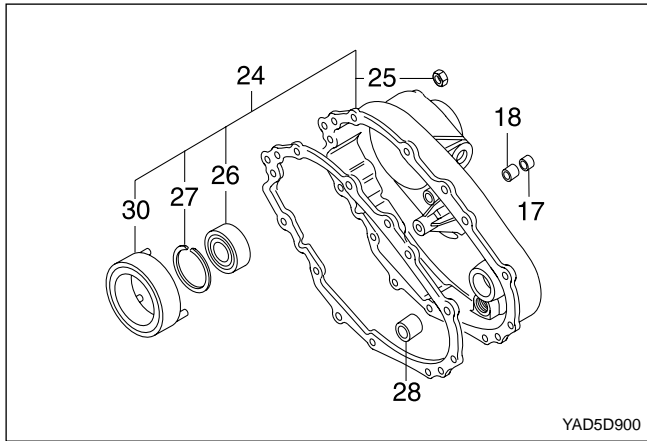
- Rotate the shift cam assembly to right so that the end of the torsion spring contacts with reduction shift fork side.
- Holding the rail shaft, lift up the fork assembly slightly.

Adjust electric shift cam assembly so that the roller on reduction shift fork assembly is in groove in shift cam and button on lockup fork is on cam end.

- Install the clutch housing over shift collar hub and insert the retaining ring into the clutch collar hub groove.

شرکت دیجیتال خودرو (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



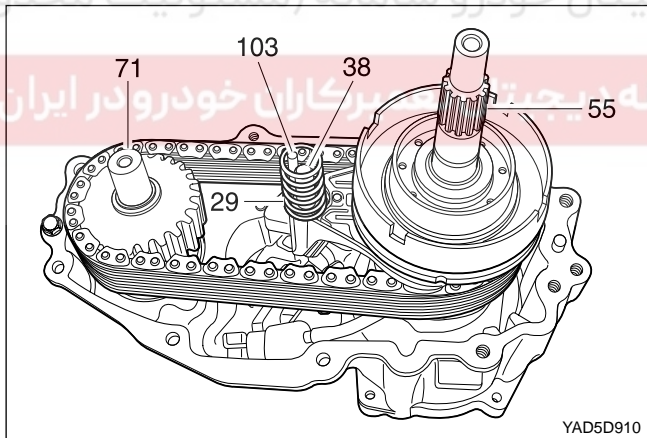
Cover

1. Position the cover to be the open end up on the work table.
2. Position the end of needle bearing to be identification mark up and press into the cover until upper end of bearing is 40.47 - 40.97 mm below cover face that contacts with transfer case.
3. Press the ball bearing into the cover and install the snap ring .
4. Install remaining parts as follows.
 - Install the 4 O-rings on the stud bolts of the clutch coil assembly.
 - Install the clutch coil assembly inside the cover and tighten 3 nuts.

Installation Notice

Tightening Torque	8 - 11 N•m (71 - 97 lb-in)
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- Install the bearing and motor bearing into the cover.

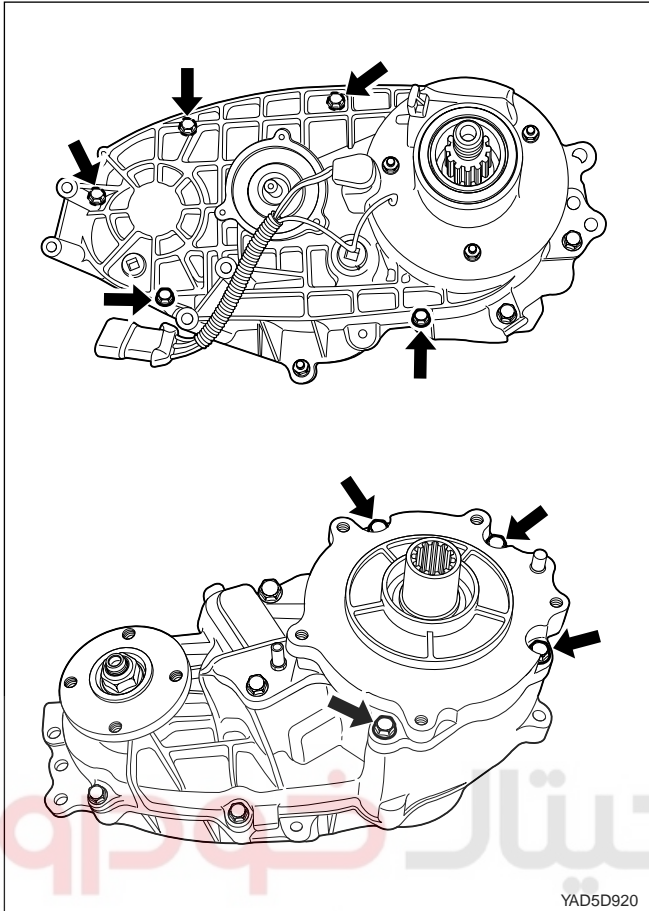


Cover Assembly

1. Install the return spring over rail shaft in the transfer case.
2. Insert the magnet into the transfer case slot.
3. Apply 1.6mm bead of Loctite RTV 598 to the transfer case mounting surface.

Notice: For installation of cover, align the transfer case with cover not to use excessive force.

4. Install the cover onto the transfer case as follows:
 - Align the cover bores with transfer case pins.
 - Align the cover bearings with output shafts.
 - Align the cover blind hole with rail shaft and make sure that return spring is not cocked.

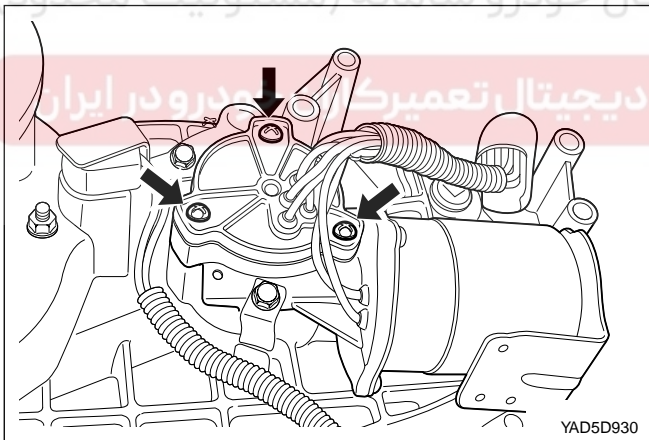


5. Tighten 9 bolts positioning identification tag and wiring clip.

Installation Notice

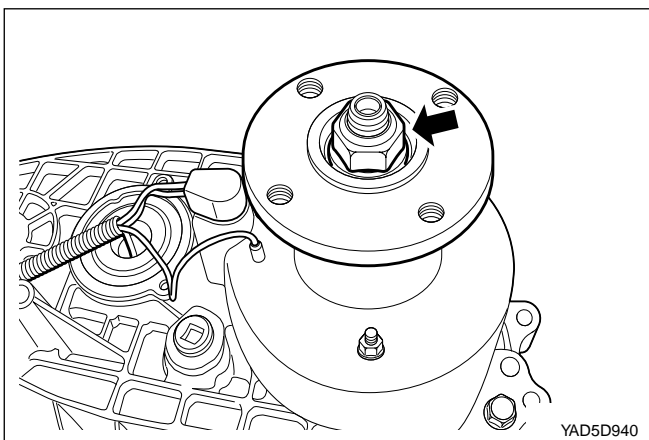
Tightening Torque	28 - 48 N•m (21 - 35 lb-ft)
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6. Install the speed gear over output shaft spline in the cover assembly.
7. Press the new oil seal into the cover assembly.



External Electric Shift

1. Align the motor with shift shaft and position the motor assembly onto the cover.
2. Install the motor to the shift shaft and contact cover and rotate the motor clockwise direction to check correct engagement.



3. Insert the O-ring on the speed sensor assembly to the cover.
4. Install the bracket to the motor assembly and tighten 3 bolts.

Installation Notice

Tightening Torque	8 - 11 N•m (71 - 97 lb-in)
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Companion Flange

1. Install the 2 plugs to the cover.
2. Install the companion flange, oil seal and washer.
3. Holding the companion flange, tighten the nut.

Installation Notice

Tightening Torque	346 - 380 N•m
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Notice: Apply Loctite #262 to nut before installation.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

