

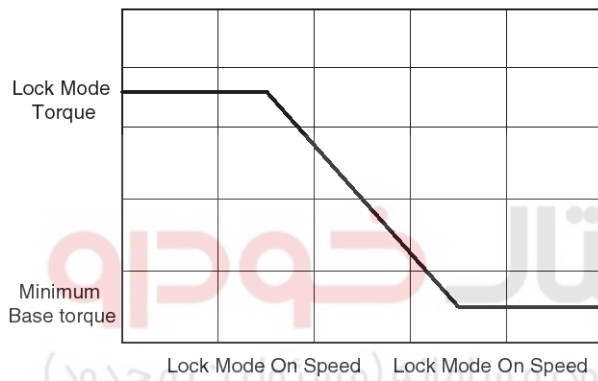
WD-2

Transfer System

Transfer Case Assembly

Description

- Based on a driver request for lock mode, the system will supply a fixed torque to the ITM-I clutch.
- When the vehicle exceeds 30KPH the system will begin to disable lock mode by ramping down the ITM clutch torque. When the vehicle exceeds 40 KPH the ITM clutch is reduced to its minimum torque value. Lock mode is re-enabled following the same speed-to-torque map.
- Lock mode is activated based on part number.



ELQE501I

- Lock mode will override all other system requests except for during an ABS event. During an ABS event the ITM clutch is turned off.
- If there is a speed sensor signal fault, the speeds are no longer considered reliable and lock mode will be disabled.

Power Flow Mechanism

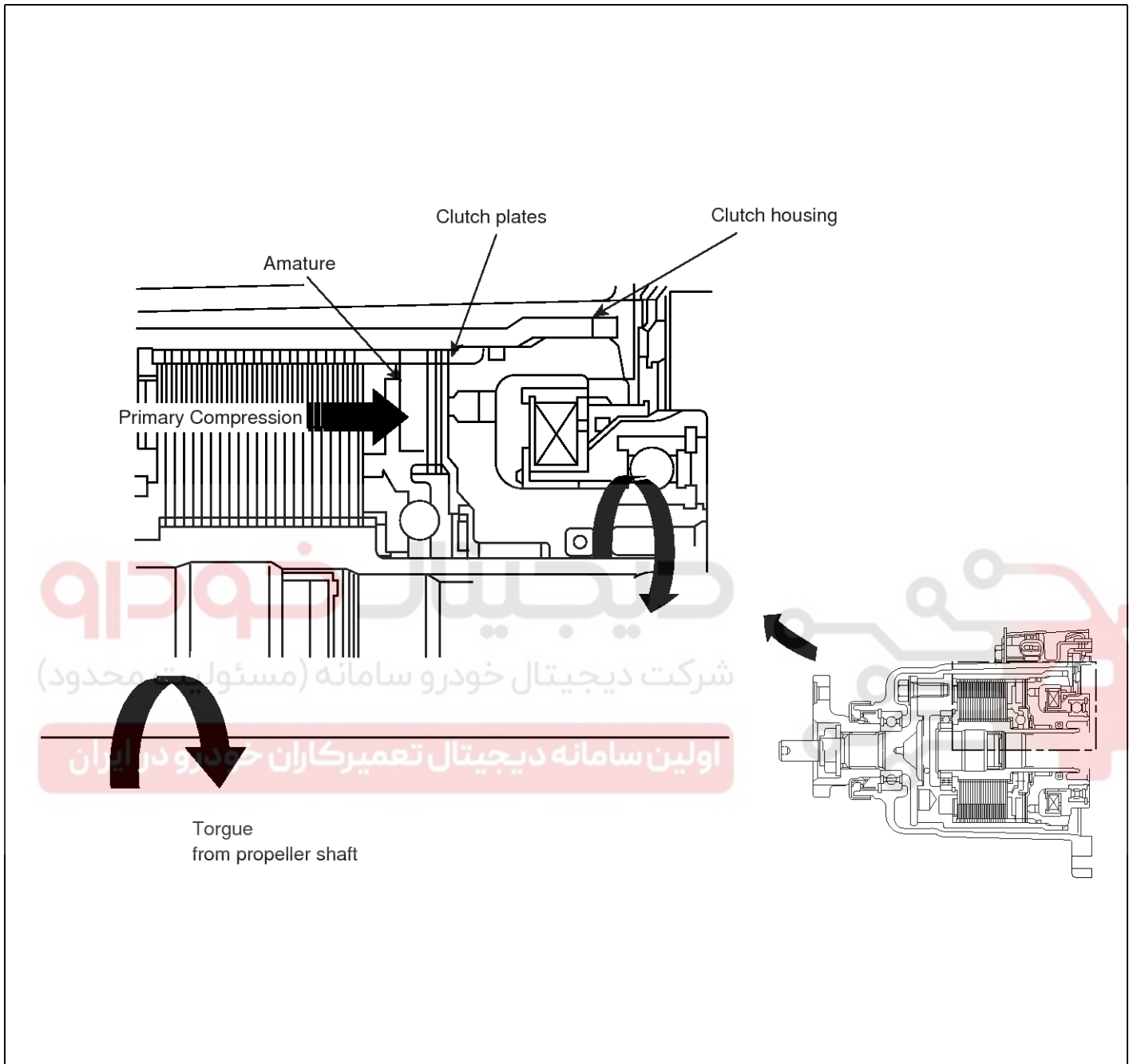
- Normal driving situation: 2WD base driving
 - 4WD driving in driving situations (rapid activation, cornering etc.)
- Input the information from each sensor in vehicle
 - Input torque (Throttle position sensor)
 - Cornering situation (Steering angle sensor)
 - Vehicle speed and different wheel speed front & rear (Wheel speed sensor)
 - Braking situation (Brake signal and ABS signal)
 - Distributed the required driving force after 4WD ECU operates.



Transfer Case Assembly

WD-3

3. EMC (Electric Magnetic Clutch) operates the primary clutch.

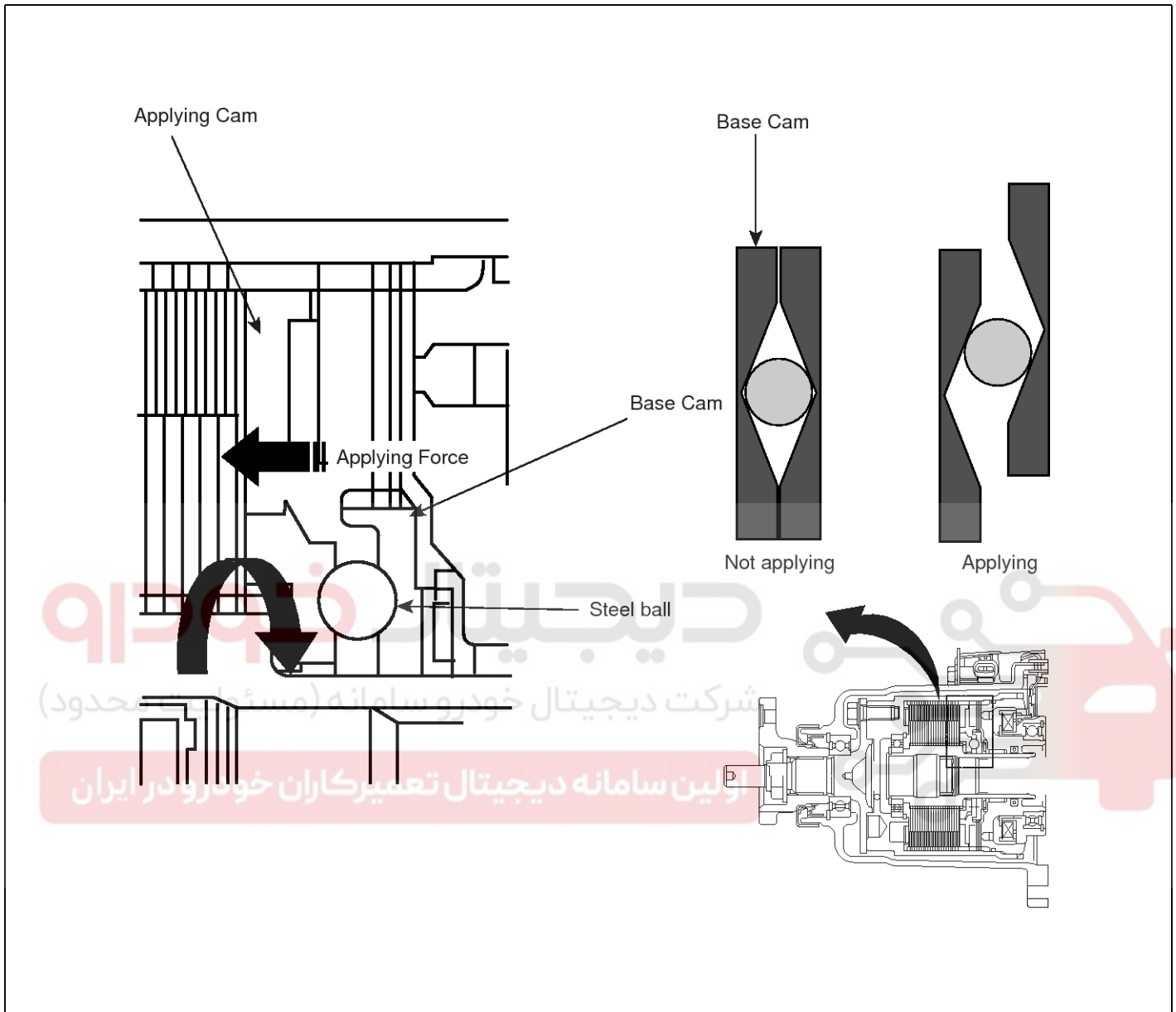


SENMT7000L

WD-4

Transfer System

4. Control the cam's opening gap by operation of primary clutch.



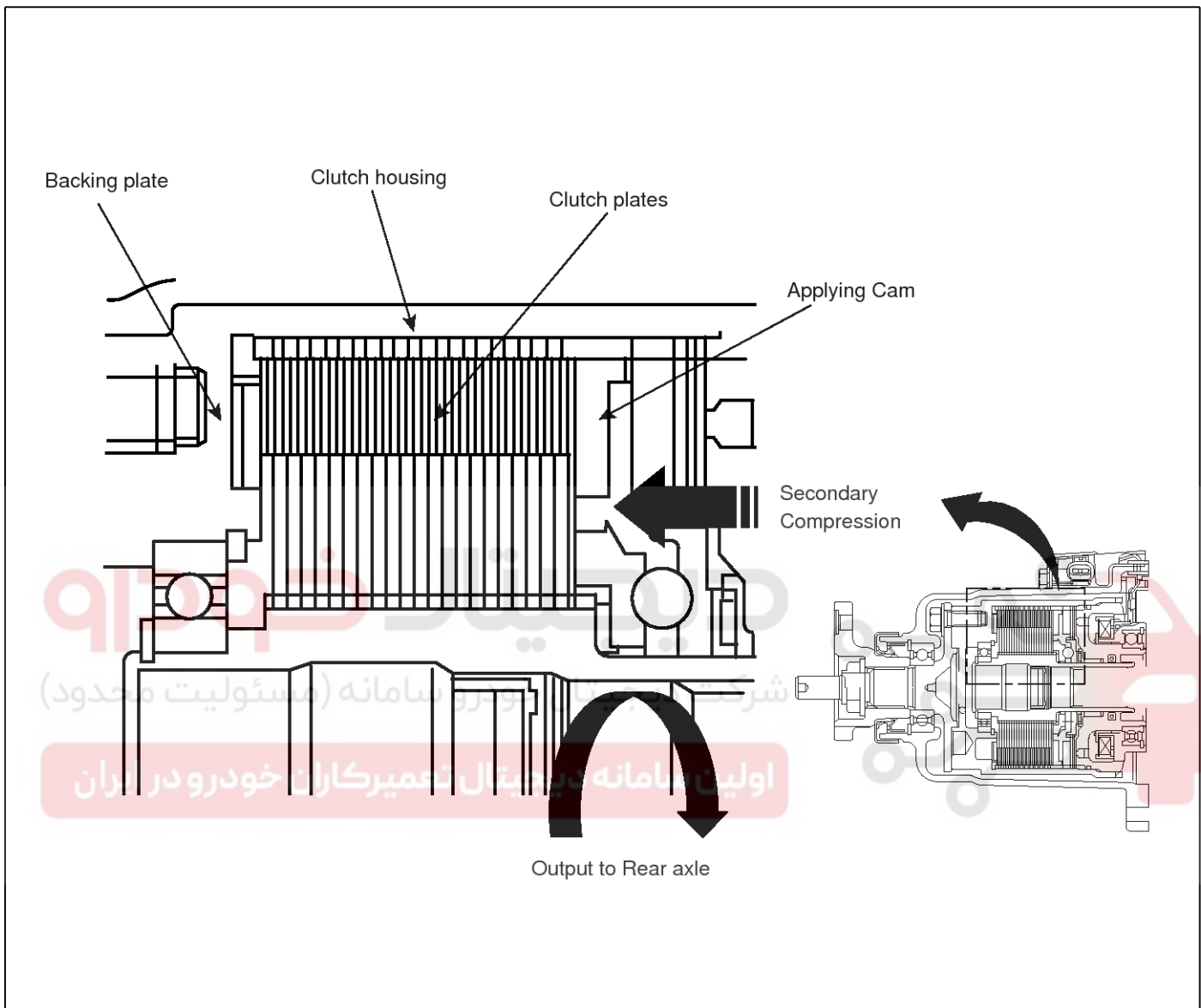
SENMT7001L

Transfer Case Assembly

WD-5

5. Control the slip of inner & outer plate.

Control variably the driving force distribution to optimize front & rear driving force.



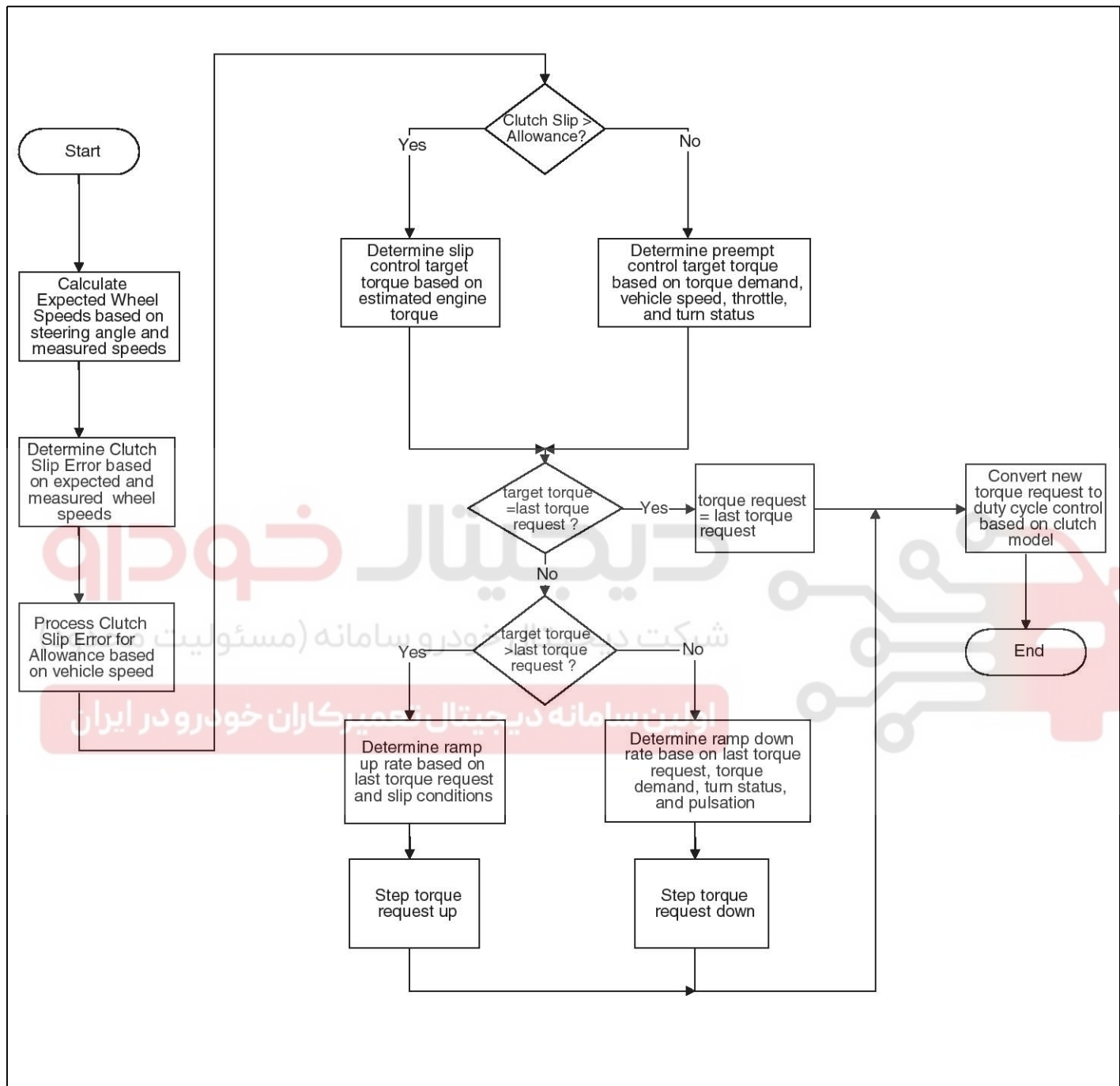
SENMT7002L

WD-6

Transfer System

Control Algorithm Flow Chart

The base control algorithm of the ITM ECM is defined by the following flowchart:

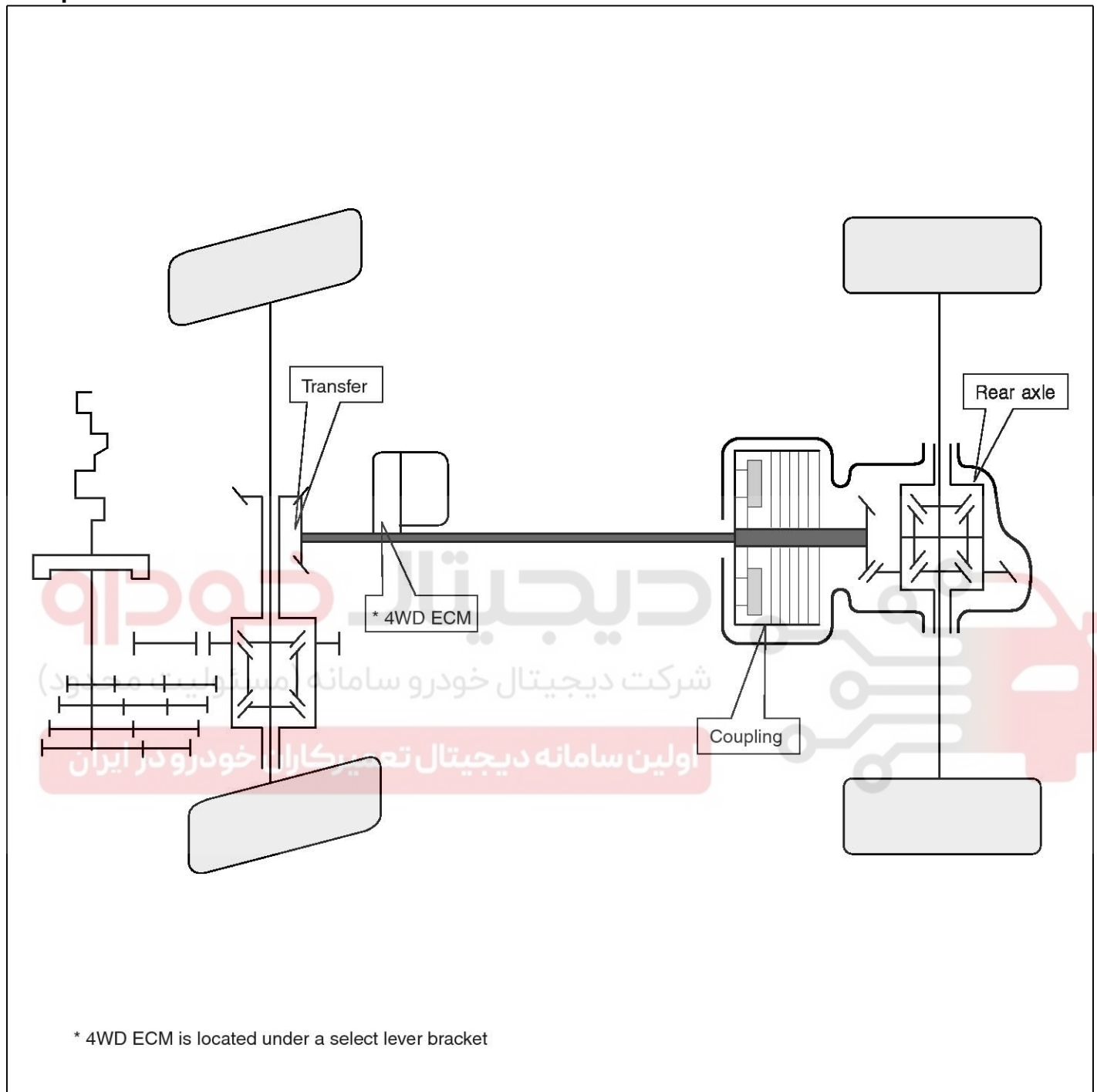


ELQE214A

Transfer Case Assembly

WD-7

Component Location



EKQE001C

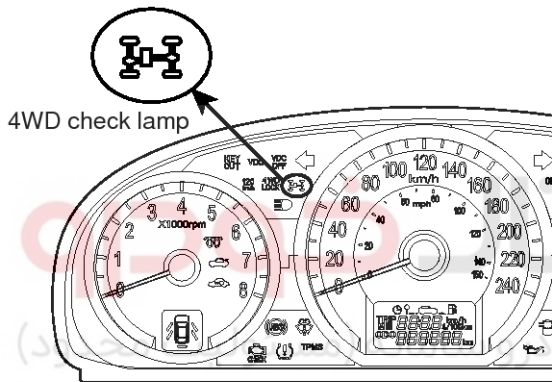
WD-8

Transfer System

DTC Troubleshooting

4WD ECM DTC Index

No	DTC	Description	4WD MIL
1	P0605	Internal Control Module Read Only Memory(ROM) Error	●
2	P1755	EMC Over Current	●
3	P1756	EMC Internal Error	●
4	P1757	EMC PWM Out of Range	●
5	U0001	CAN Communication Malfunction	●
6	U0100	Accelerator Pedal Position Signal Error	●
7	U0121	Wheel Speed Siganl Error (ABS)	●
8	U0122	Wheel Speed Siganl Error (ESP)	●



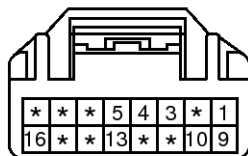
SENMT7003L

Transfer Case Assembly

WD-9

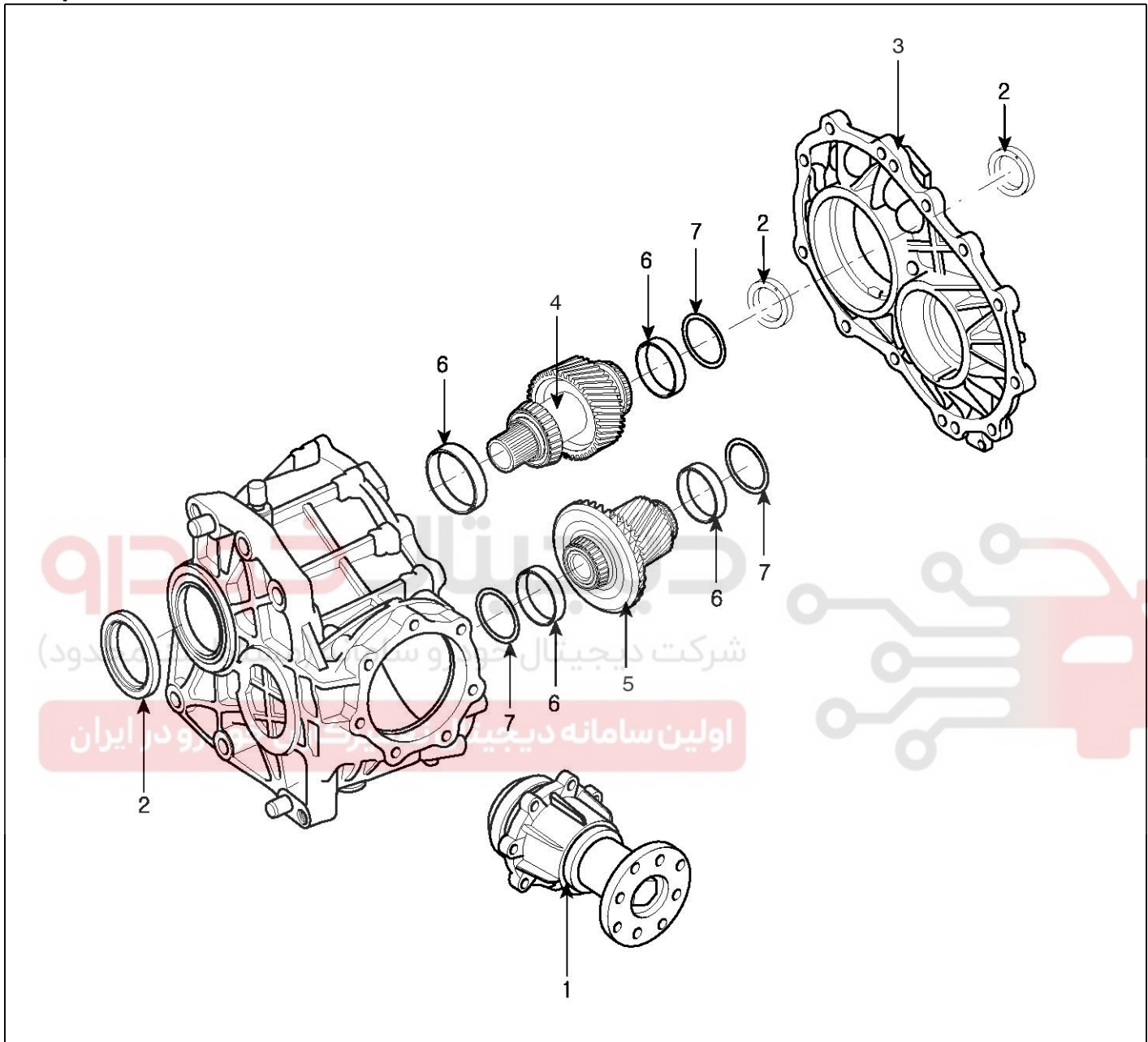
4WD ECM PIn Description

F01



EENS7527BD

Terminal Number	Description	Remark
1	EMC (+)	
2	-	
3	Battery	
4	ON / START	
5	CAN HIGH	
6	-	
7	-	
8	-	
9	EMC (-)	
10	Ground	
11	-	
12	-	
13	CAN LOW	
14	-	
15	-	
16	Lock mode switch	

WD-10**Transfer System****Transfer Case****Components**

SENTS9001N

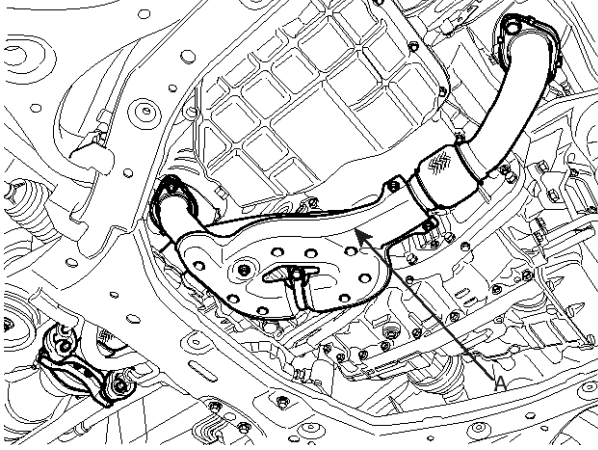
- | | |
|--------------------|---------------------------------|
| 1. Pinion assembly | 4. Transfer drive gear assembly |
| 2. Oil seal | 5. Hypoid gear shaft assembly |
| 3. Transfer cover | 6. Bearing outer race |
| | 7. Spacer |

Transfer Case Assembly

WD-11

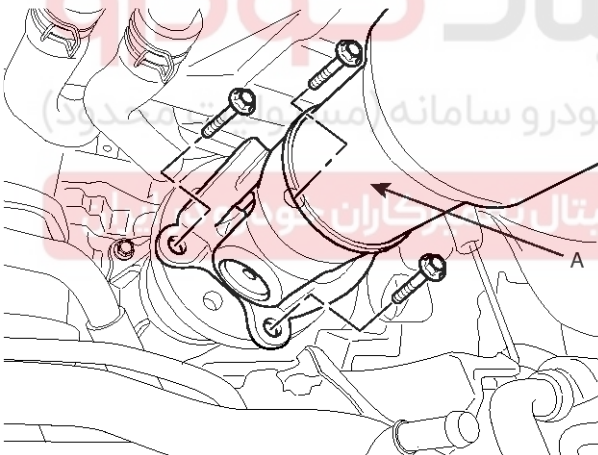
Removal

1. Disconnect the (-) terminal from the battery.
2. Lift up the vehicle.
3. Remove the front muffler (A). (refer to Intake And Exhaust System in EM group)



SENMT7202D

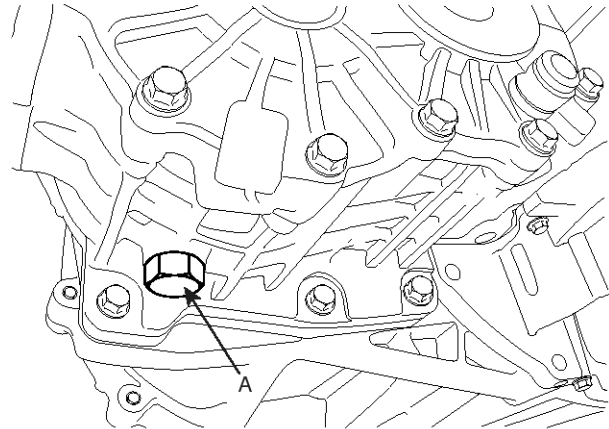
4. Disconnect the propeller shaft (A) by removing the three bolts.



SENMT7203D

5. Disconnect the right driveshaft from the transfer case. (refer to Drive shaft in DS group)

6. Drain the fluid by removing the oil drain plug (A).



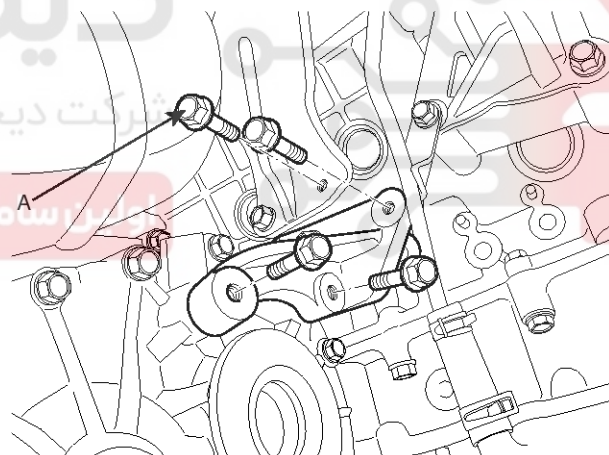
SCMMT6062D

7. After completing draining the fluid, install the oil drain plug.

Tightening torque :

40-60 Nm (4.0-6.0 kgf.m, 28.9-43.4 lb-ft)

8. Remove the four mounting bolts (A) of transfer case bracket.

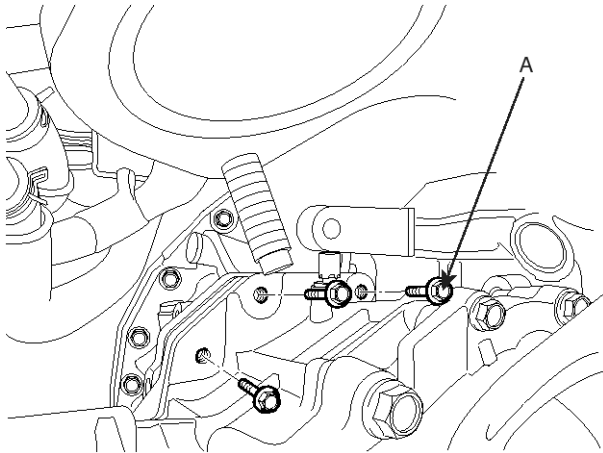


SENMT7204D

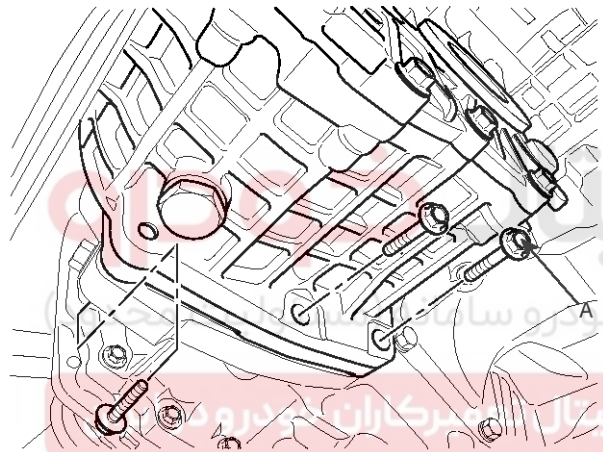
WD-12

Transfer System

9. Remove the transfer case assembly by removing the six mounting bolts (A).



SENMT7205D



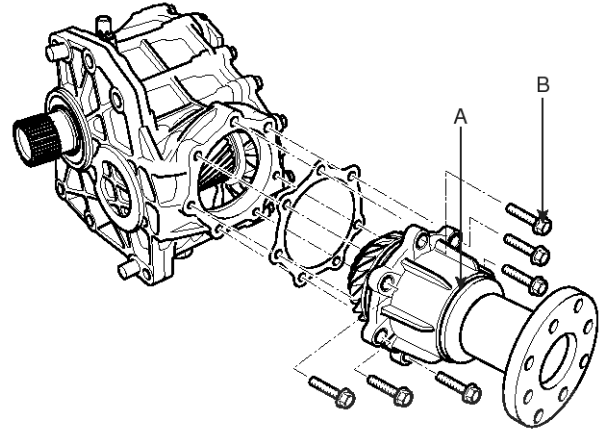
SENMT7211D

Disassembly

1. Drain the transfer oil through drain plug hole.
2. Remove the pinion assembly mounting bolts (7EA) and then remove the pinion assembly(A).

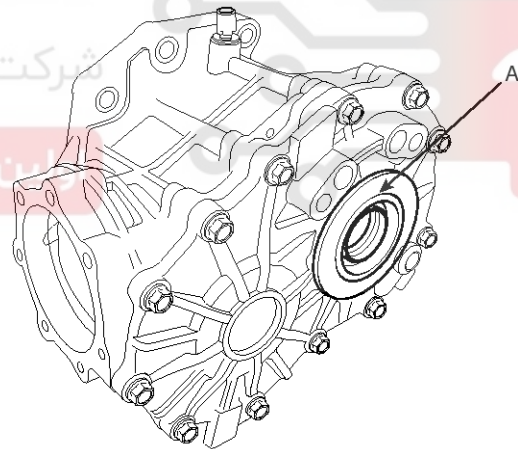
NOTICE

This assembly can be removed with a propeller shaft assembly in 'REMOVAL' step.



SCMMT6070D

3. Remove the dust cover(A).

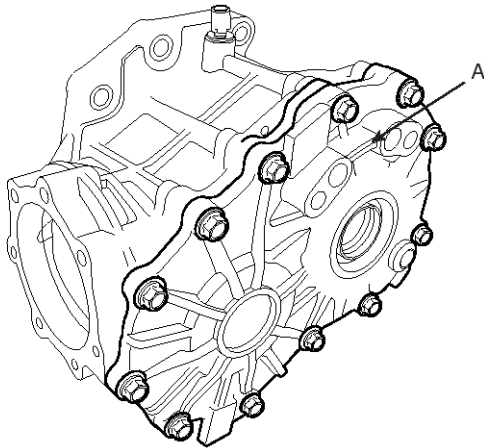


SCMMT6071D

Transfer Case Assembly

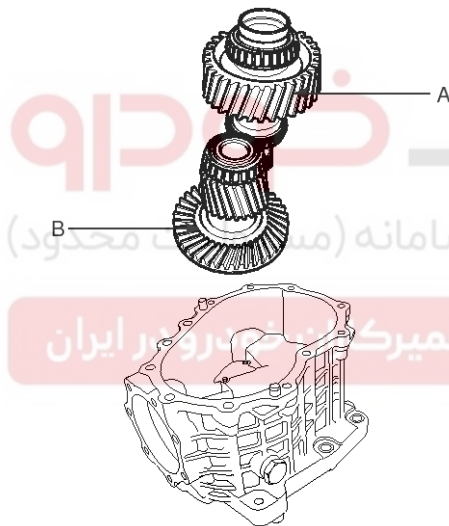
WD-13

4. Remove the transfer cover(A).



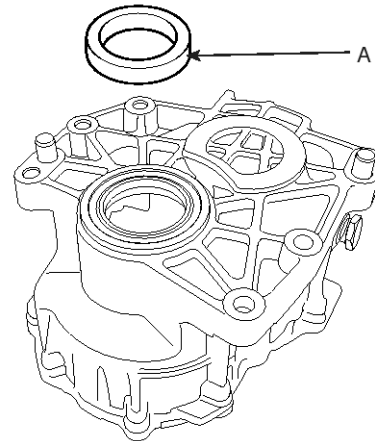
SCMMT6077D

5. Remove the transfer drive gear assembly(A) and the hypoid gear shaft assembly(B) from the transfer housing.



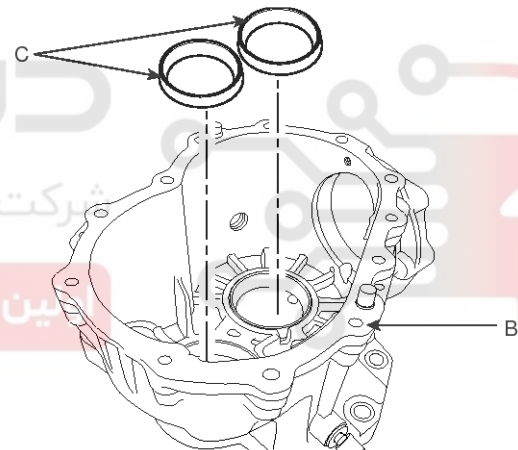
SCMMT6072D

6. Remove the oil seal(A)(transfer drive gear left hand side).

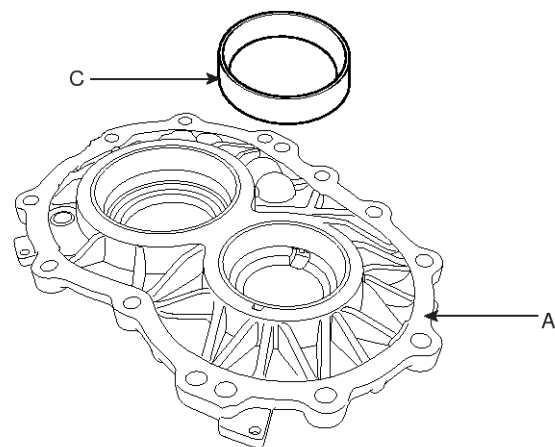


SCMMT6073D

7. Using a sliding hammer, remove the taper roller bearing outer races(C) from the transfer cover(A) and housing(B).



SCMMT6074D

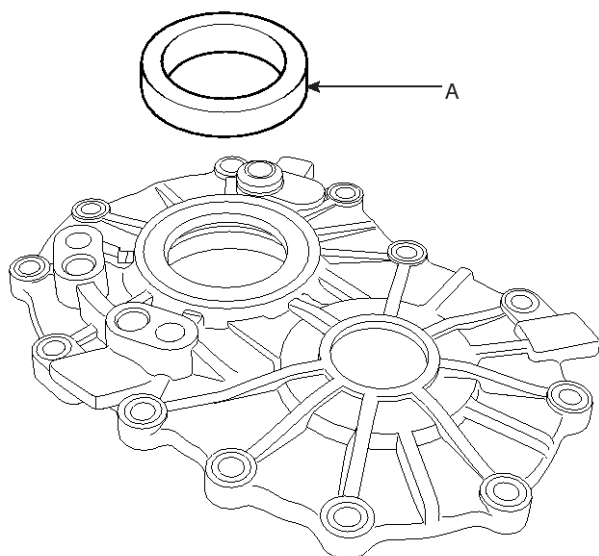


SCMMT6075D

WD-14

Transfer System

8. Remove the oil seal(A) from the transfer cover.



SCMMT6076D

Replacement

Transfer Oil Replacement

1. Replace the oil every 120,000km(74,564miles) in a general condition and every 45,000km(27,962miles) in severe usage conditions.

NOTICE

Severe usage is defined as

- Frequent driving on rough road (Bumpy road, gravel road, snowy road, unpaved road . Etc.)
- Frequent driving on mountain road, ascent/descent.
- Police, taxi, commercial type operation or trailer towing. Etc.)

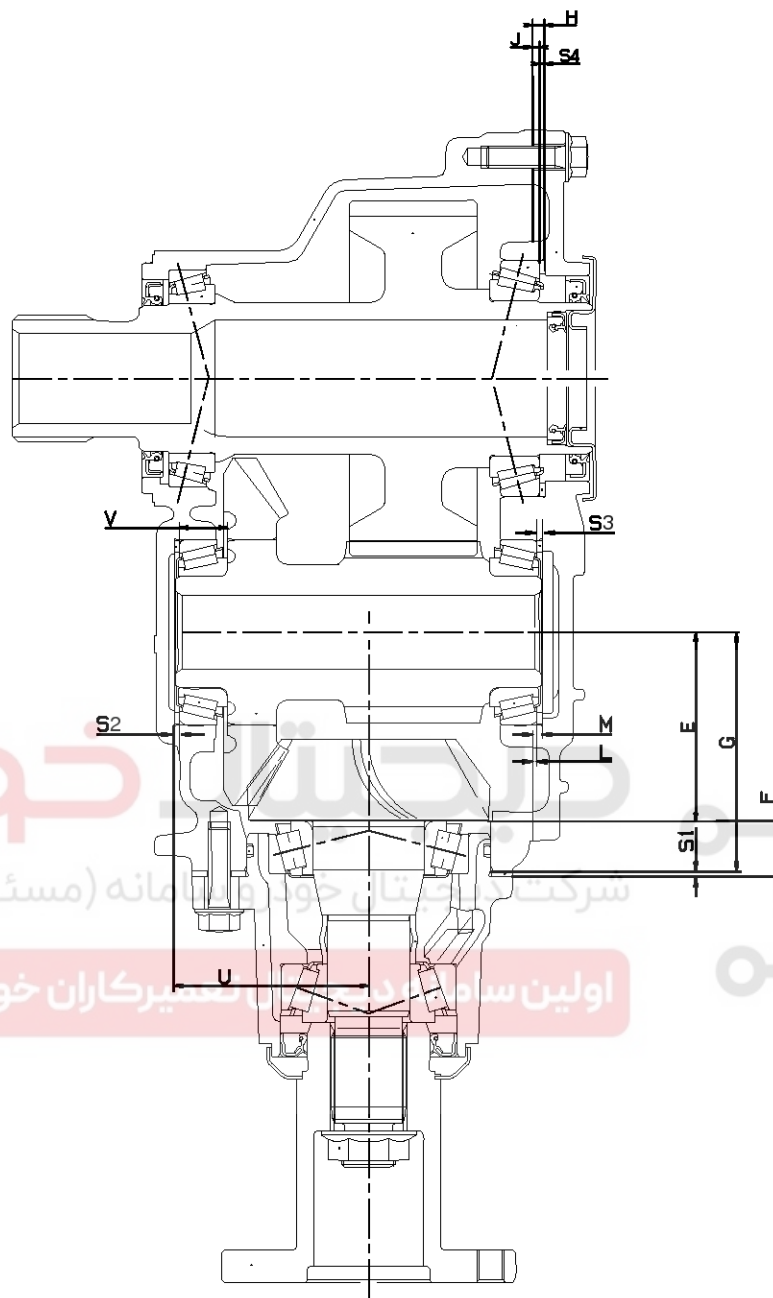
Reassembly

NOTICE

- Clean all parts except the taper roller bearings. Be careful about the direction of seals.
- Oil bearings with hypoid gear oil API GL5.
- Smear involute splines all covering with high pressure grease "Klueber microlube GNY202".
- Measuring temperature: $20^{\circ} \pm 5^{\circ}\text{C}$.
- O-ring has to be dipped into hypoid gear oil API GL5. Allow excess oil to drain.
- Contact surface of the transfer housing to be coated with "SEALANT 732" or equivalent (silicon type sealing agent) prior to mounting. Coating thickness: 0.1mm MIN. Prior to coating, mating surfaces must be clean and free from oil and grease.
- Transfer oil specification : Hypoid gear oil "API GL5, SAE 75W/90 SHELL SPIRAX X EQUIVALENT". Filled up to lower filler plug thread level(Approx. 0.8L)
- The hypoid gear set must be managed as a pair. Whenever installing or replacing a hypoid gear shaft assembly(47308-24000/24010) or a pinion shaft(47311-39300/39310). Make sure to install or replace as a pair.
- In reassembling, refer to the two figures below.

Transfer Case Assembly

WD-15



SCMMT6042D

1. Install the transfer drive gear with the taper roller bearings(47366-39000 and 47465-39000) into transfer housing.
2. Applying the preload(100 to 200N) to bearings, measure the dimension J.
3. Measure the dimension H on transfer cover(47314-39200).

WD-16

Transfer System

4. Select the spacer thickness from the chart below.
Thickness $S_4 = H - J + K$. (K: Bearing preload = 0.07 to 0.11mm.)

Corresponding preload torque(measured without seals) : 120 to 180Ncm.

Part number	Spacer thickness(mm)
47383-39152	1.520-1.539
47383-39154	1.540-1.559
47383-39156	1.560-1.579
47383-39158	1.580-1.599
47383-39160	1.600-1.619
47383-39162	1.620-1.639
47383-39164	1.640-1.659
47383-39166	1.660-1.679
47383-39168	1.680-1.699
47383-39170	1.700-1.719
47383-39172	1.720-1.739
47383-39174	1.740-1.759
47383-39176	1.760-1.779
47383-39178	1.780-1.779
47383-39180	1.800-1.819
47383-39182	1.820-1.839
47383-39185	1.85-1.88
47383-39189	1.89-1.92
47383-39193	1.93-1.96
47383-39197	1.97-2.00
47383-39201	2.01-2.04
47383-39205	2.05-2.08
47383-39209	2.09-2.12
47383-39213	2.13-2.16
47383-39217	2.17-2.20
47383-39221	2.21-2.24
47383-39225	2.25-2.28
47383-39229	2.29-2.32
47383-39233	2.33-2.36

5. Reassemble the selected spacer above.

6. Measure the dimension U and V.

U.... Finished dimension of transfer housing.

V.... Distance from back of the hypoid gear to bearing measured under 100 to 200N preload.

7. Select the spacer thickness from the chart below.
Thickness $S_2 = U - (V + \text{mounting distance } 52.0 \text{ mm})$.

Part number	Spacer thickness(mm)
47384-39130	1.300-1.319
47384-39134	1.340-1.359
47384-39138	1.380-1.399
47384-39142	1.420-1.439
47384-39146	1.460-1.479
47384-39148	1.480-1.499
47384-39150	1.500-1.519
47384-39152	1.520-1.539
47384-39154	1.540-1.559
47384-39156	1.560-1.579
47384-39158	1.580-1.599
47384-39160	1.600-1.619
47384-39162	1.620-1.639
47384-39164	1.640-1.659
47384-39166	1.660-1.679
47384-39168	1.680-1.699
47384-39170	1.700-1.719
47384-39174	1.740-1.759
47384-39178	1.780-1.799
47384-39182	1.820-1.839
47384-39186	1.860-1.879
47384-39190	1.900-1.919
47384-39194	1.940-1.959
47384-39198	1.980-1.999
47384-39200	2.000-2.019
47384-39202	2.020-2.039
47384-39204	2.040-2.059
47384-39206	2.060-2.079
47384-39208	2.080-2.099
47384-39210	2.100-2.119

Transfer Case Assembly

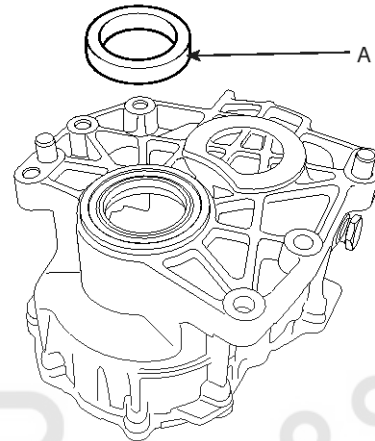
WD-17

8. Install the spacer selected above, the taper roller bearings and the hypoid gear shaft assembly (47308-24000/24010). And preload the assembly without the spacer(Hypoid gear shaft assembly-Transfer cover side) with 100 to 200N.
9. Measure the dimension L after 10 rotations.
10. Measure the dimension M on transfer cover (47314-24000).
11. Select the spacer thickness from the chart below.
Thickness $S3 = M - L + (0.09 \text{ to } 0.12 \text{ mm})$ preload.

Part number	Spacer thickness(mm)
47388-24130	1.300-1.319
47388-24132	1.320-1.339
47388-24134	1.340-1.359
47388-24136	1.360-1.379
47388-24138	1.380-1.399
47388-24140	1.400-1.419
47388-24142	1.420-1.439
47388-24144	1.440-1.459
47388-24146	1.460-1.479
47388-24148	1.480-1.499
47388-24150	1.500-1.519
47388-24152	1.520-1.539
47388-24154	1.540-1.559
47388-24156	1.560-1.579
47388-24158	1.580-1.599
47388-24160	1.600-1.619
47388-24162	1.620-1.639
47388-24164	1.640-1.659
47388-24166	1.660-1.679
47388-24168	1.680-1.699
47388-24170	1.700-1.719
47388-24172	1.720-1.739
47388-24174	1.740-1.759
47388-24176	1.760-1.779
47388-24178	1.780-2.799
47388-24180	1.800-2.819
47388-24182	1.820-2.839

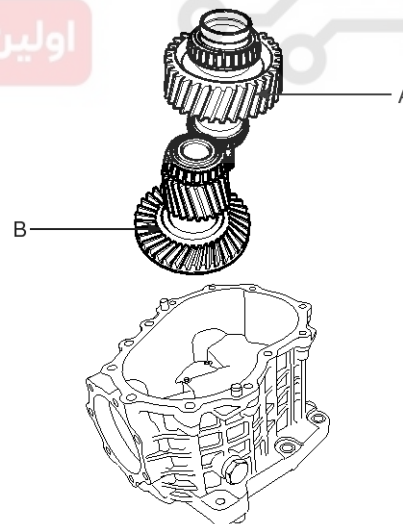
Part number	Spacer thickness(mm)
47388-24184	1.840-2.859
47388-24186	1.860-2.879
47388-24250	2.50-2.53

12. Install the spacer selected above.
13. Install the taper roller bearing outer races to the transfer housing and cover.
14. Install a new oil seal(A) in the transfer housing.



SCMMT6073D

15. Install the transfer drive gear shaft assembly(A) and the hypoid gear assembly(B) in the transfer housing.



SCMMT6072D

WD-18

Transfer System

16. Measure the dimension F.

F.... Assembled dimension of pinion assembly.

G.... Finished dimension of transfer housing.(=88.0mm)

E.... Mounting distance(=69.500 ± deviation).

17. Select the spacer thickness from the chart below.
Thickness $S1 = E + F - G$

NOTICE

If it is not possible to reach the exact mounting distance, select the next thinner spacer S1.

Part number	Spacer thickness(mm)
47386-39125	1.25-1.28
47386-39129	1.29-1.32
47386-39133	1.33-1.36
47386-39137	1.37-1.40
47386-39141	1.41-1.44
47386-39145	1.45-1.48
47386-39149	1.49-1.52
47386-39153	1.53-1.56
47386-39157	1.57-1.60
47386-39161	1.61-1.64
47386-39165	1.65-1.68
47386-39169	1.69-1.72
47386-39172	1.720-1.739
47386-39174	1.740-1.759
47386-39176	1.760-1.779
47386-39178	1.780-1.799
47386-39180	1.800-1.819
47386-39182	1.820-1.839
47386-39184	1.840-1.859
47386-39186	1.860-1.879
47386-39188	1.880-1.899
47386-39190	1.900-1.919
47386-39192	1.920-1.939
47386-39194	1.940-1.959
47386-39196	1.960-1.979
47386-39198	1.980-1.999
47386-39200	2.000-2.019

Part number	Spacer thickness(mm)
47386-39202	2.020-2.039
47386-39204	2.040-2.059
47386-39233	2.33-2.36

18. Install the pinion assembly with the selected spacer above and measure the circumference backlash on pinion.

(Measuring diameter, backlash and permissible deviations for measurement on pinion, see table below).

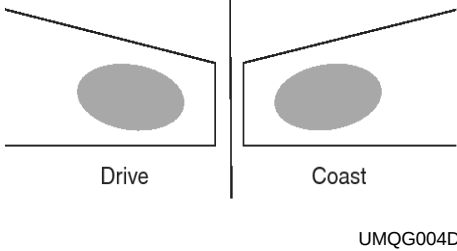
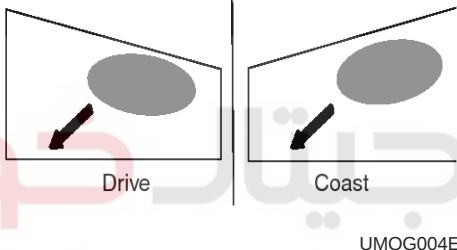
If the result is out of permissible range, change the spacer thickness S2, then start again with the step 8~12).

Transfer Case Assembly

WD-19

Tips for spacer adjustment for hypoid gear backlash and contact pattern

Item	Symptom	Remedy
Backlash	When more than the standard value (0.16 ~ 0.21mm)	Adjust backlash by installing the spacer S1 using a thinner one and gradually installing a thicker one.
	When less than the standard value (0.16 ~ 0.21mm)	Adjust backlash by installing the spacer S1 using a thicker one and gradually installing a thinner one.

Item	Symptom	Remedy
Hypoid gear tooth contact pattern		- Normal state - Standard tooth pattern - Both drive and coast surfaces are in center in lateral direction and slightly incline to TOE side in vertical direction - If the pattern deviates from the standard, adjust it by following procedure
		- Abnormal state - The drive surface inclines to TOE and TOP and the coast surface inclines to HEEL and TOP The tooth contact pattern can be moved to the arrow direction by installing the spacer S2 using a thinner one and gradually installing a thicker one.

19. Remove the pinion assembly. With the spacer S3 and transfer cover mounted, combined preload torque for the hypoid gear shaft assembly and transfer gear (measured on transfer gear) should be 2.7 to 3.8Nm. The spacer S3 has to be changed, if the preload torque is not within the permissible range.

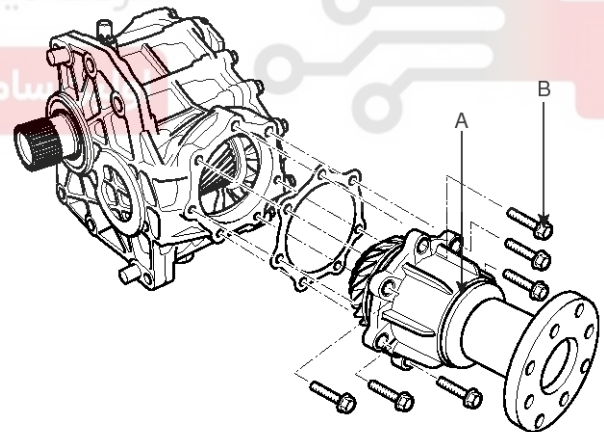
20. Tighten the pinion assembly mounting bolts (B-7EA) to install the pinion assembly(A).

Tightening torque :

37~40 Nm(3.7~4.0 kgf.m, 14.5~21.7 lb-ft)

NOTICE

- Before installing the pinion assembly, check the pinion O-ring and apply the oil to the O-ring.
- To make the installation of the pinion to the transfer easier, tap the pinion using a plastic hammer after aligning the bolt holes.



SCMMT6070D

WD-20

Transfer System

Installation

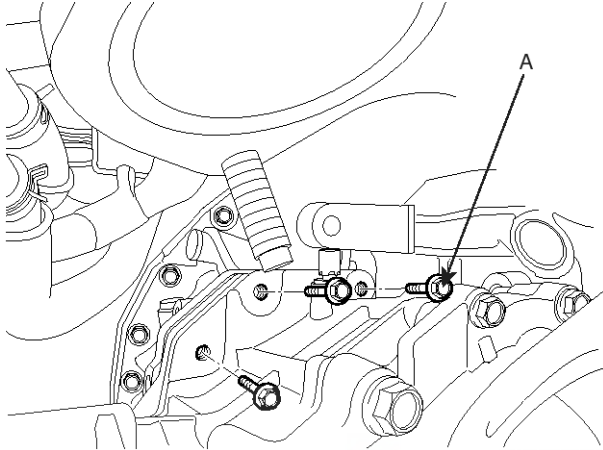
⚠ CAUTION

Must use a new O-ring (47354-39300).

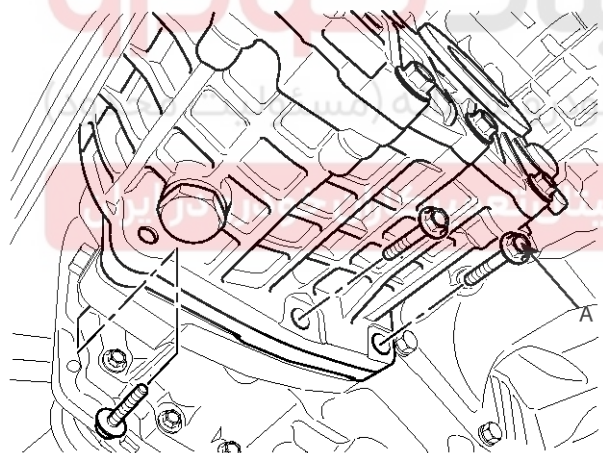
1. Temporarily install the transfer case assembly to the transaxle and then tighten the six mounting bolts (A).

Tightening torque :

62-67 Nm (6.2-6.7 kgf.m, 44.8-48.5 lb-ft)



SENMT7205D

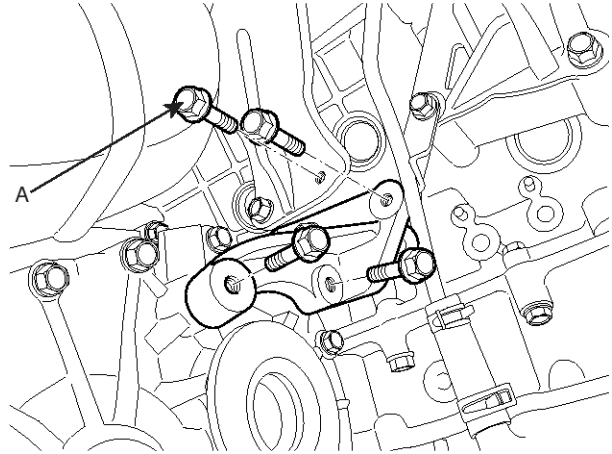


SENMT7211D

2. Install the four mounting bolts (A) of the transfer case bracket.

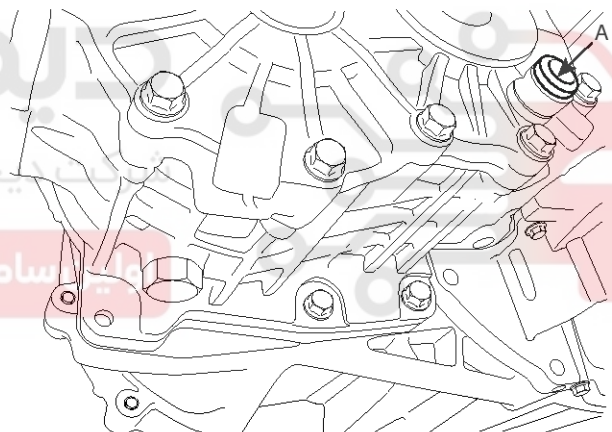
Tightening torque :

47-51 Nm (4.7-5.1 kgf.m, 34.0-36.9 lb-ft)



SENMT7204D

3. Remove the filler plug (A).



SENMT7207D

4. After refilling the fluid amount of the specified, tighten the filler plug.

Specification : API GL-5, SAE 75W/90

Quantity : Approx 0.8L

5. Install the right driveshaft to the transfer case. (refer to Drive shaft in DS group)

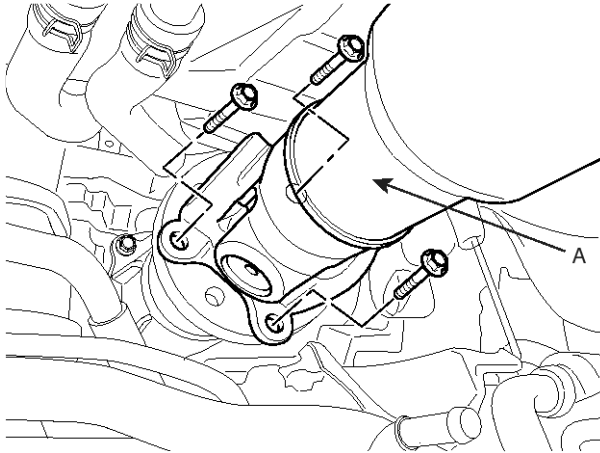
Transfer Case Assembly

WD-21

6. Install the propeller shaft (A) to the transfer case.

Tightening torque :

50-70 Nm (5.0-7.0 kgf.m, 36.2-50.6 lb-ft)

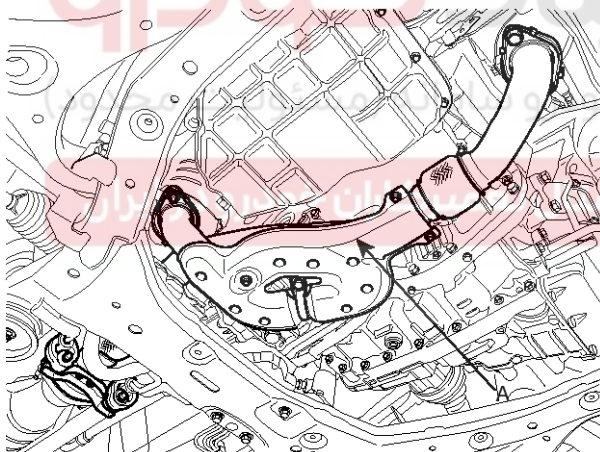


SENMT7203D

7. Install the front muffler (A). (refer to Intake And Exhaust System in EM group)

Tightening torque :

40-60 Nm (4.0-6.0 kgf.m, 28.9-43.4 lb-ft)



SENMT7202D

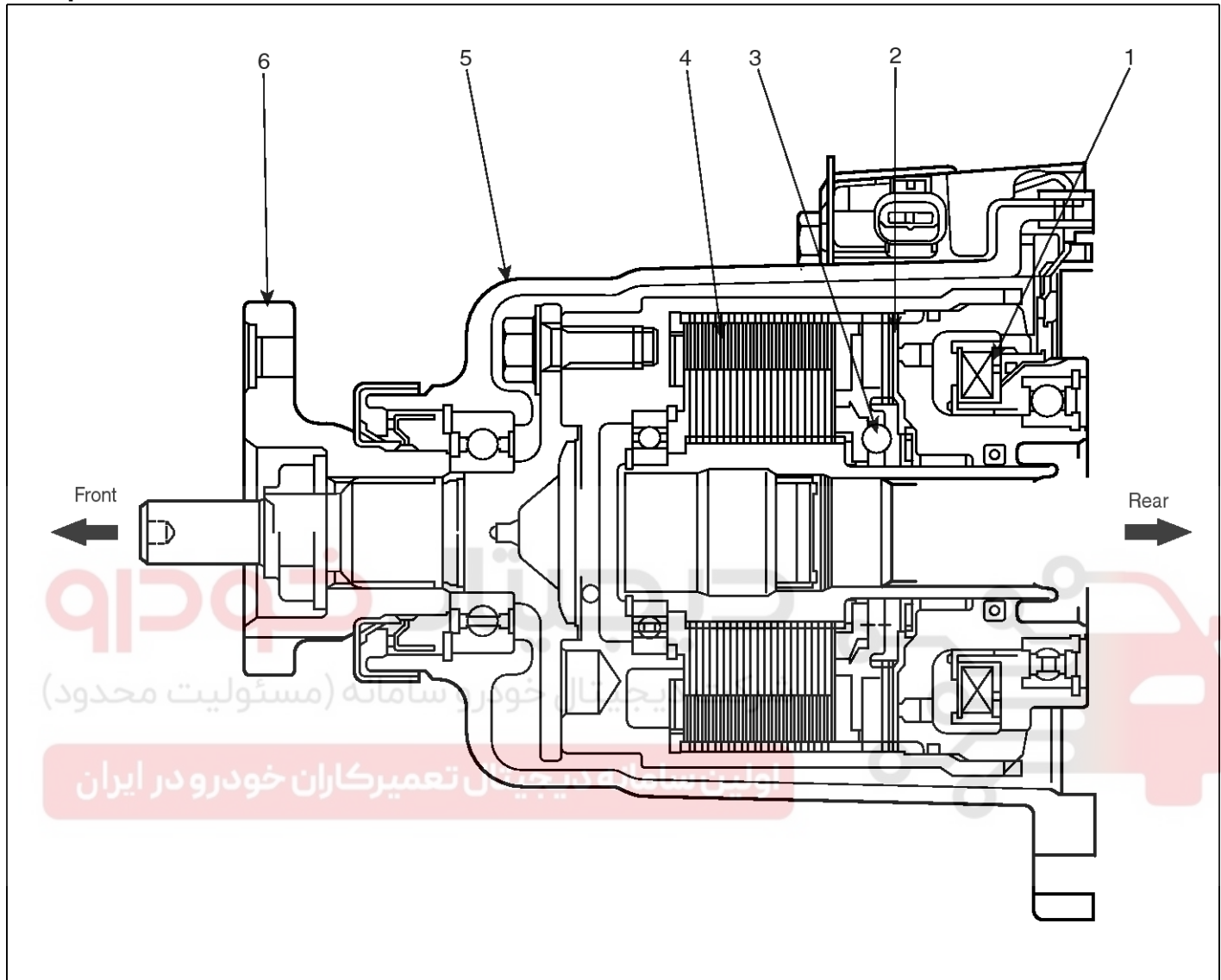
8. Connect the (-) terminal to the battery.

WD-22

Transfer System

Coupling Assembly

Components



SENTS9002N

- 1. Magnetic Clutch
- 2. Pilot clutch
- 3. Cam

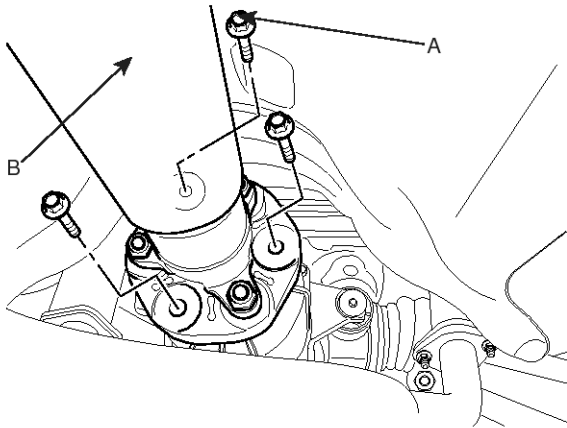
- 4. Main clutch
- 5. Housing
- 6. Flange

Transfer Case Assembly

WD-23

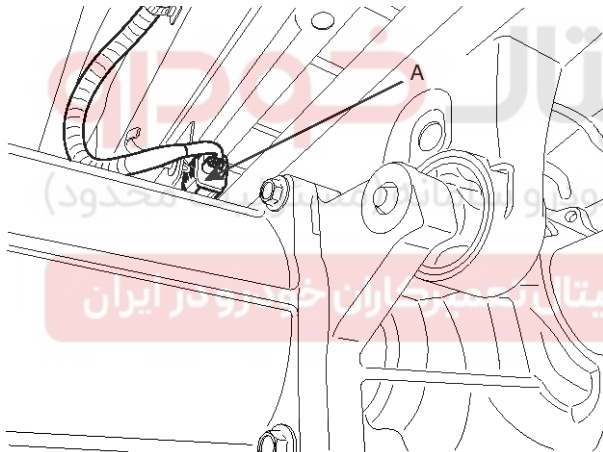
Removal

1. Remove the 4WD coupling assembly bolts (A-3ea) mounted to the rear propellar shaft (B).



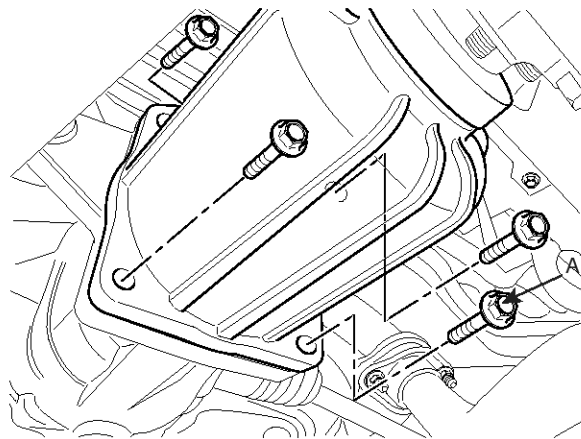
SENMT7206D

2. Using a flat tool, separate the propellar shaft from 4WD coupling assembly.



SENMT7208D

3. Remove the 4WD coupling assembly mounting bolts (A-4ea).



SENMT7209D

4. Using a flat tool, separate the 4WD coupling assembly from the rear differential carrier assembly.

WD-24

Installation

1. Temporarily install the 4WD coupling assembly to the rear differential carrier and then tighten the four mounting bolts (A).

Tightening torque :

60-65 Nm (6.0-6.5 kgf.m, 43.4-47.0 lb-ft)

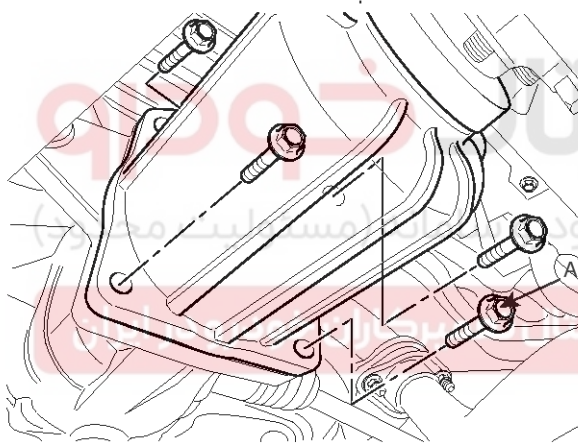
NOTICE

Grease the drive gear of the differential carrier assembly.

High pressure grease : KLUBER MICROLUBE GNY 202 (or equivalent) or GREASE-TRANSMISSION (MS511-55, TMG-2)

After greasing the contacting surface, temporarily install the 4WD coupling assembly to the differential carrier assembly within 3 minutes.

Sealant : FIPG(Formed in Place Gaskets)-B (MS721-40) or equivalent to LT5702



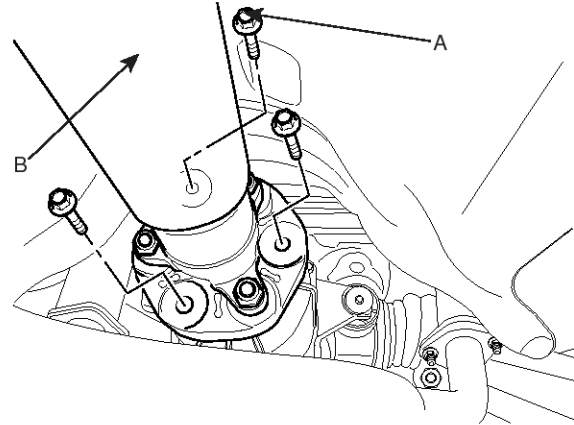
SENMT7209D

Transfer System

2. Install the 4WD coupling assembly to the rear popeller shaft (B) by tightening the three bolts (A).

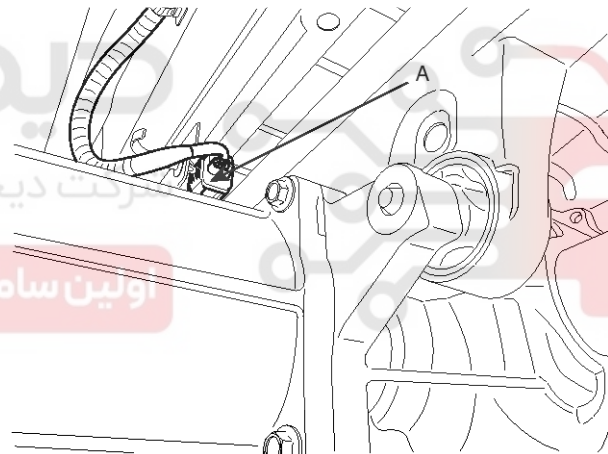
Tightening torque :

50-70 Nm (5.0-7.0 kgf.m, 36.2-50.6 lb-ft)



SENMT7206D

3. Connect the electric magnetic clutch connector (A).



SENMT7208D

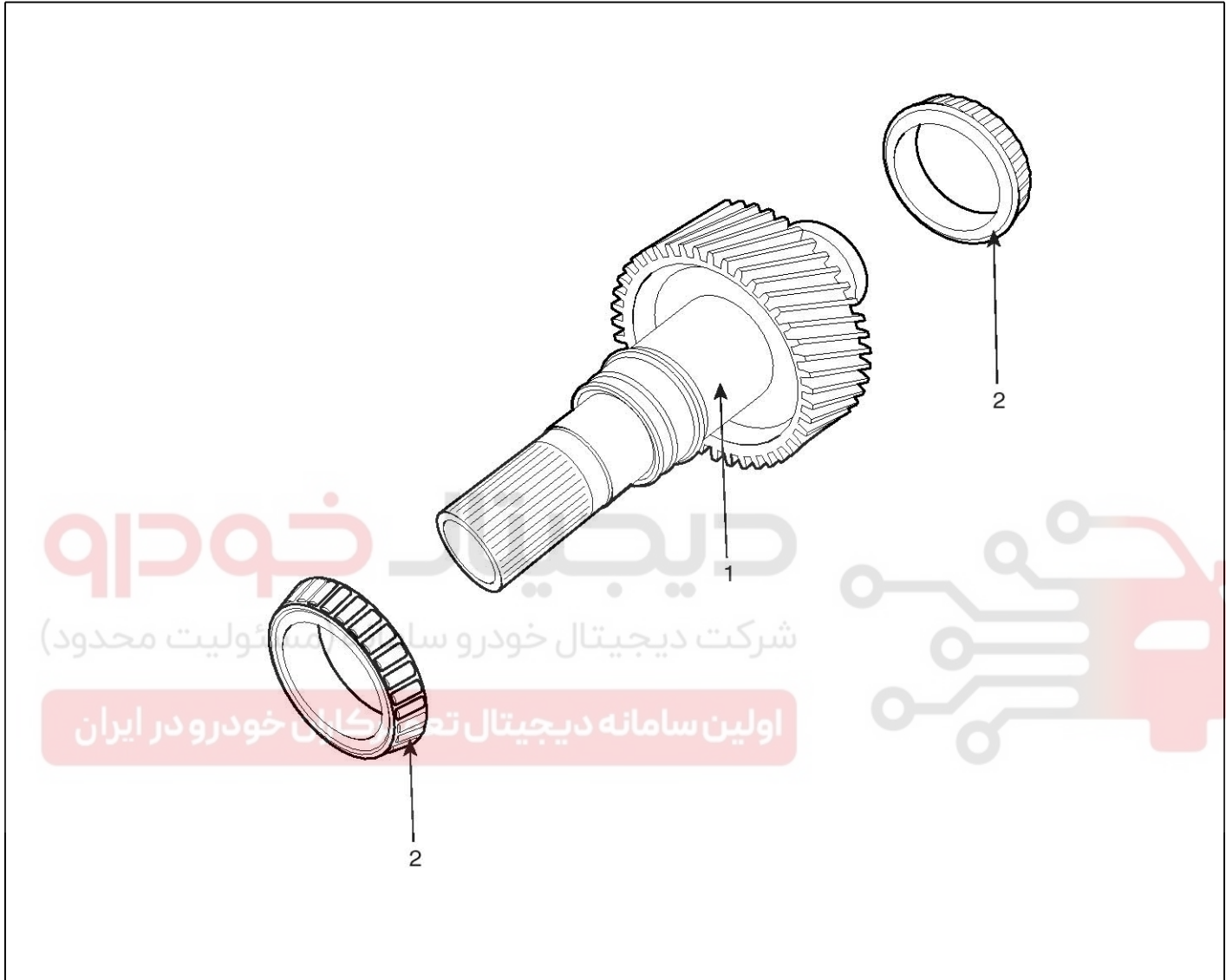
Gear System

WD-25

Gear System

Transfer Drive Gear

Components



SENTS9003N

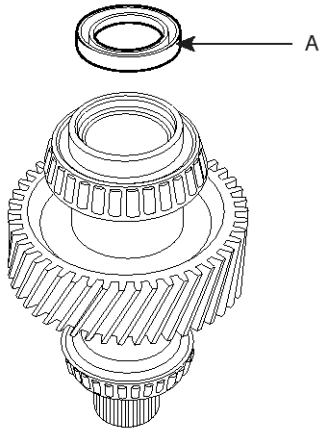
1. Transfer drive gear
2. Taper roller bearing

WD-26

Transfer System

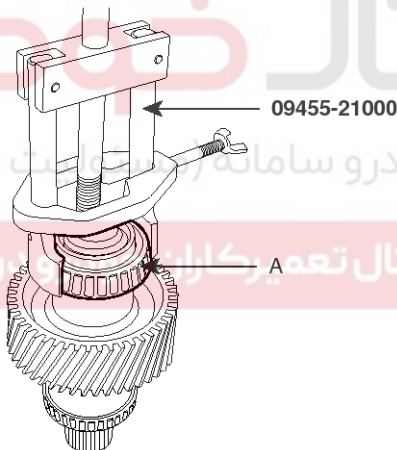
Disassembly

1. Remove the oil seal(A)(47352-39300) from the transfer drive gear.

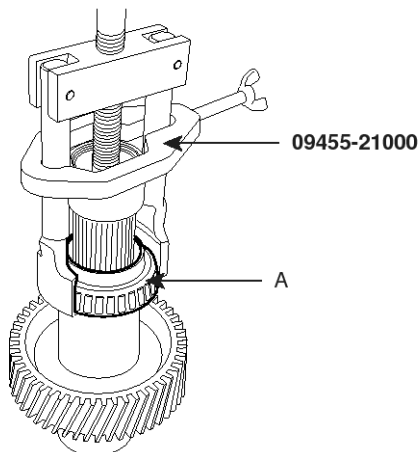


UMQG006B

2. Using the Special tool(09455-21000), remove the taper roller bearings(A) from the both sides of the transfer drive gear assembly.



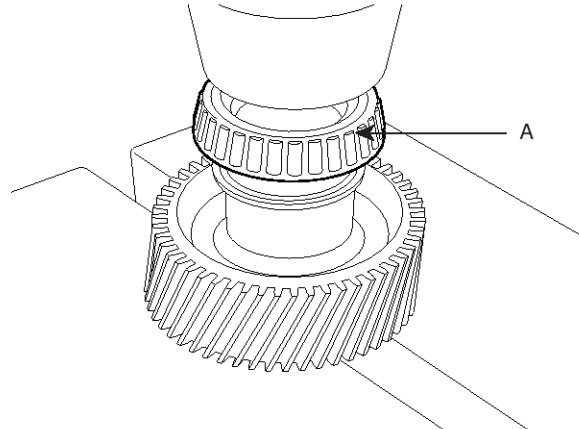
UMQG006C



UMQG006D

Reassembly

1. Using a press machine, install the taper roller bearings(A) to the transfer drive gear.



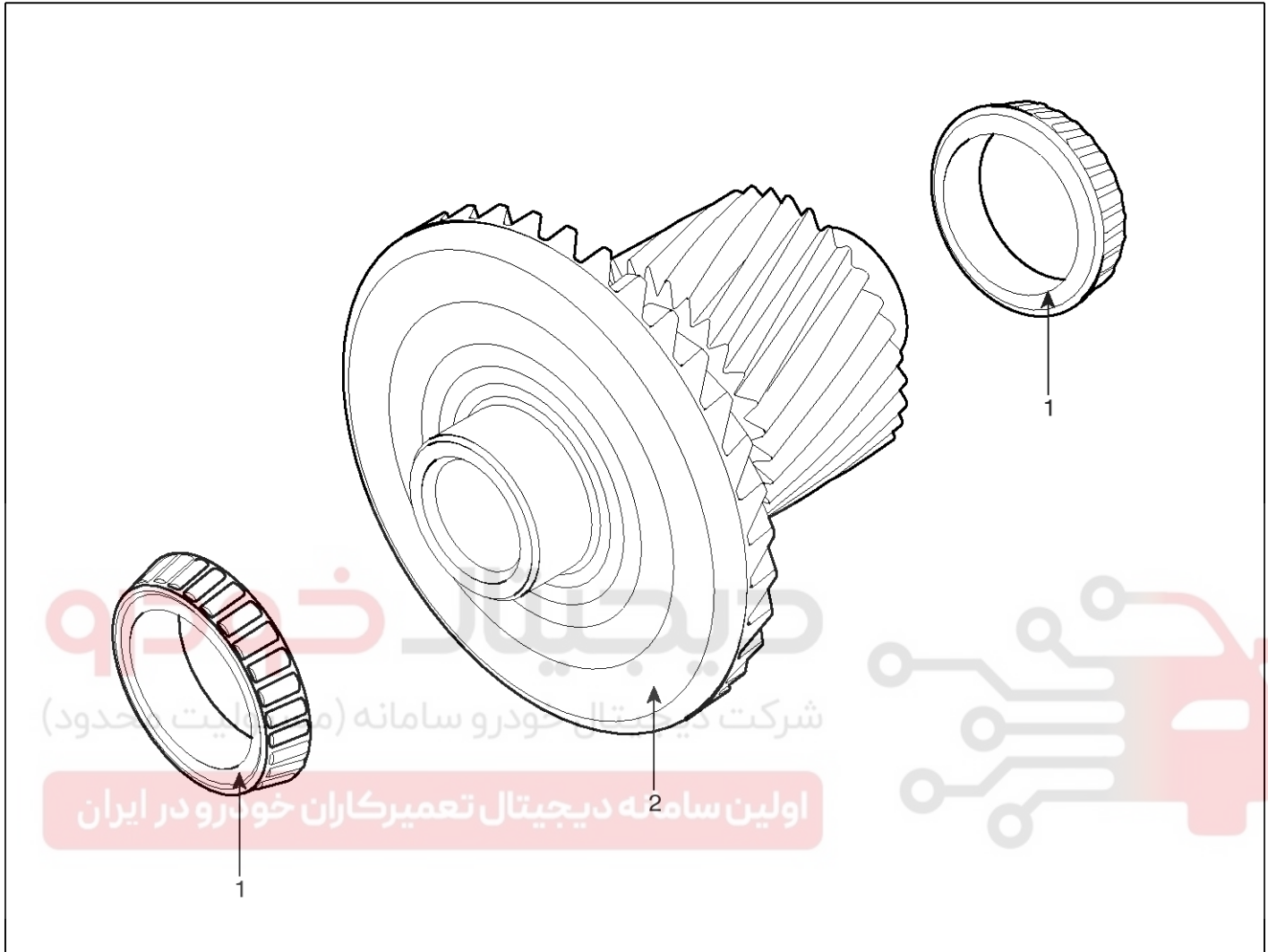
UMQG006F

Gear System

WD-27

Hypoid Gear

Components



SENTS9004N

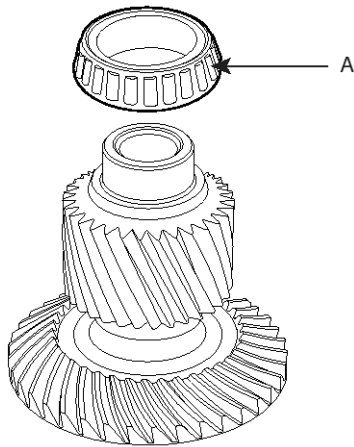
1. Taper roller bearing
2. Hypoid gear

WD-28

Transfer System

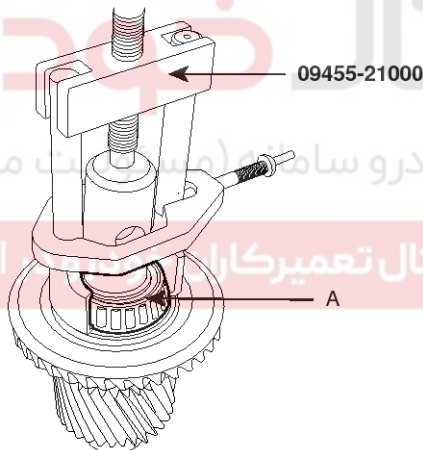
Disassembly

1. Using the SST(09455-21000), remove the taper roller bearing(A) from the hypoid gear shaft assembly.

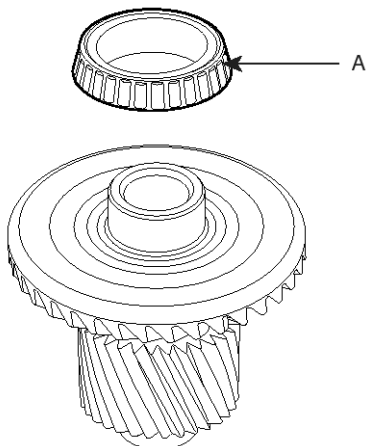


UMQG007C

2. Using the SST(09455-21000), remove the other taper roller bearing(A) from the hypoid gear shaft assembly.



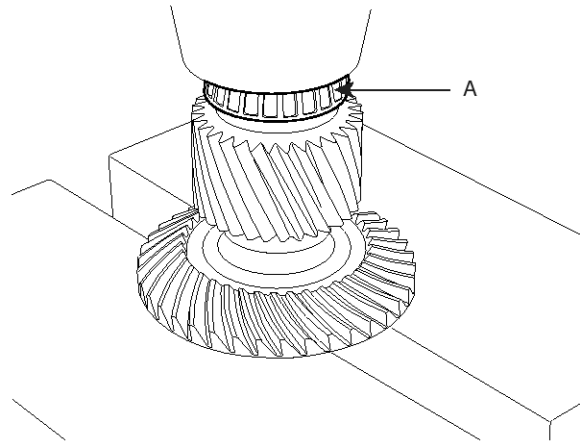
UMQG007D



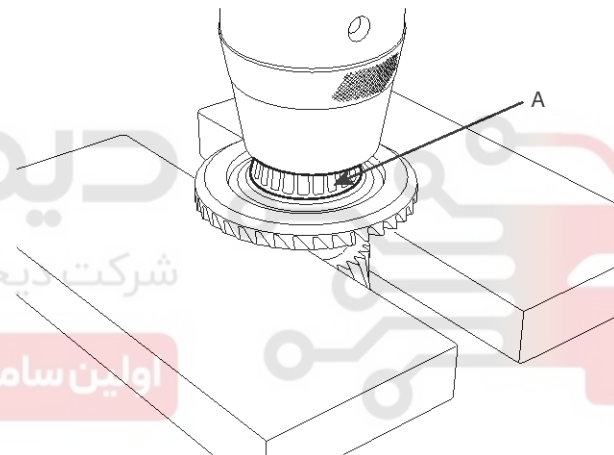
UMQG007E

Reassembly

1. Using a press machine, install the taper roller bearings(A) to the hypoid gear shaft assembly.



UMQG007F



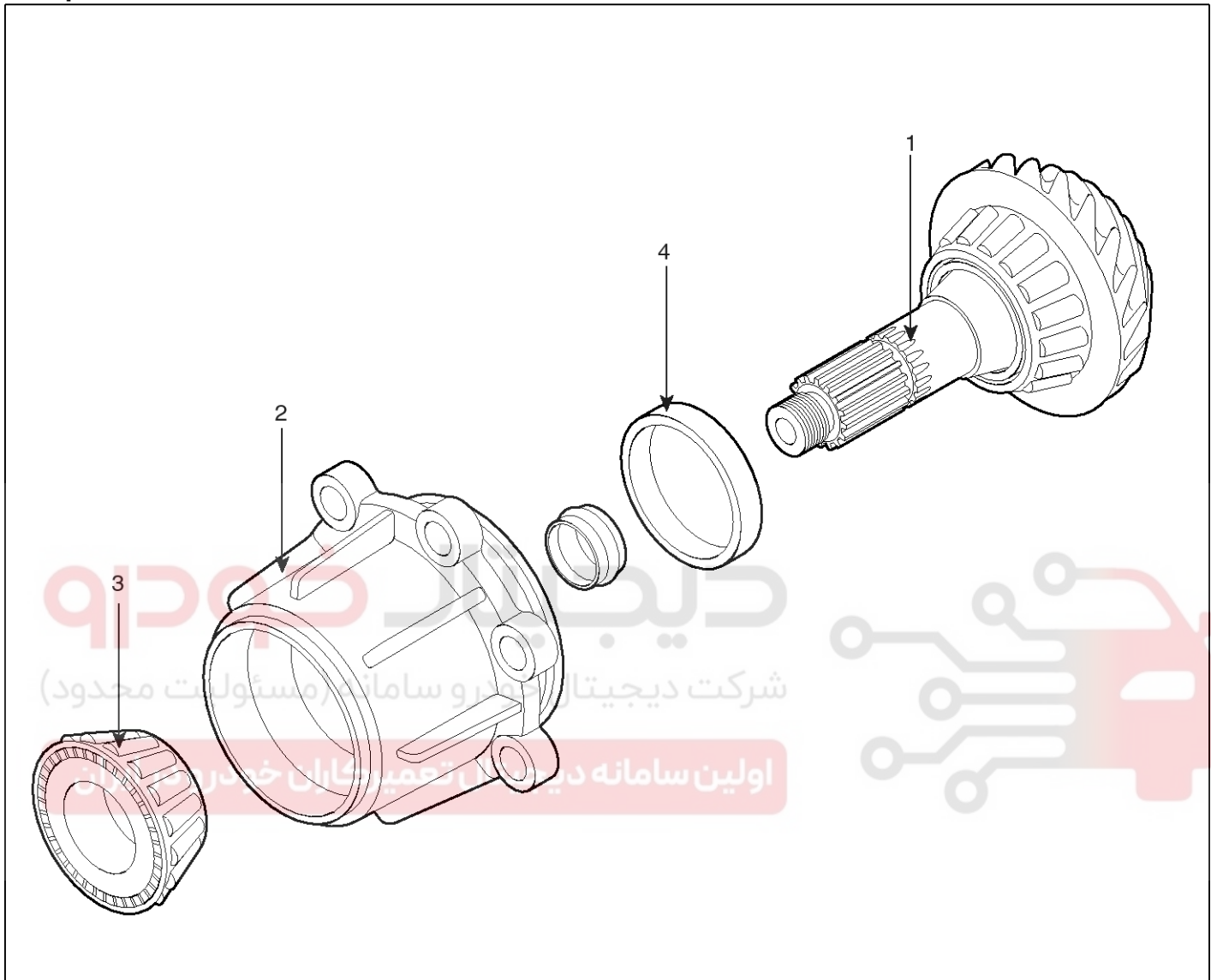
UMQG007G

Gear System

WD-29

Pinion Shaft and Case

Components



SENTS9005N

1. Pinion shaft
2. Pinion case

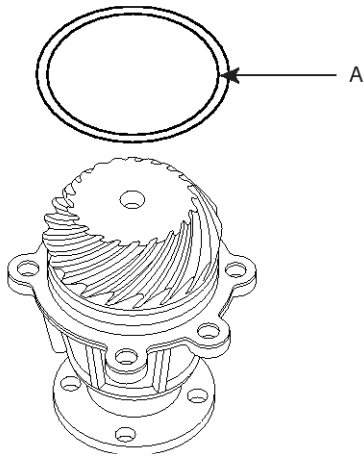
3. Taper roller bearing
4. Taper roller bearing outer race

WD-30

Transfer System

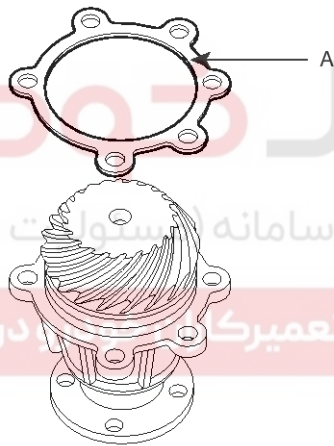
Disassembly

1. Remove the O-ring(A) from the pinion shaft and case assembly.



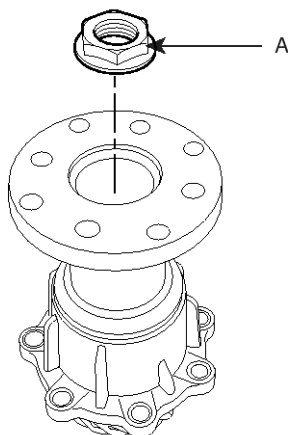
UMQG005B

2. Remove the spacer(A).



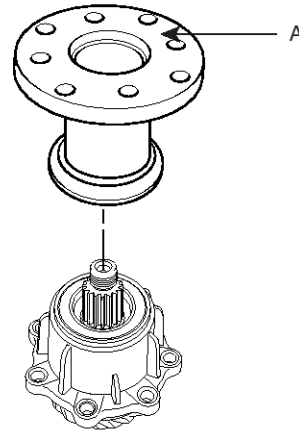
UMQG005C

3. Loosen the HEX lock nut(A).



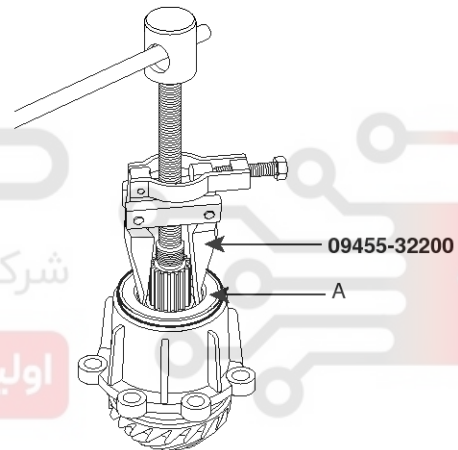
SCMMT6080D

4. Remove the rear flange assembly(A).



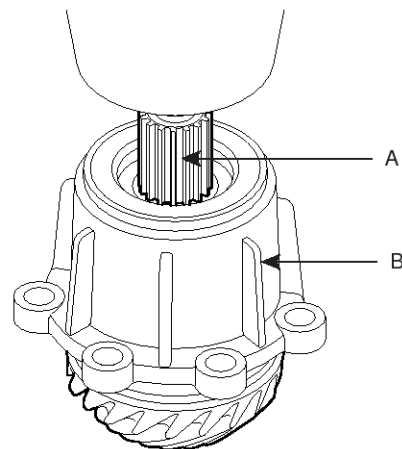
SCMMT6081D

5. Using the SST(09455-32200), remove the oil seal(A) from the pinion case.



UMQG005F

6. Using a press machine, remove the pinion shaft(A) from the pinion case(B).

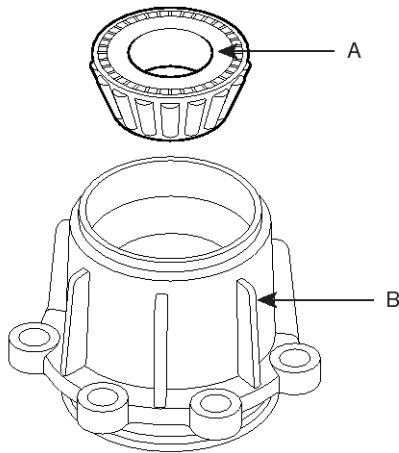


UMQG005G

Gear System

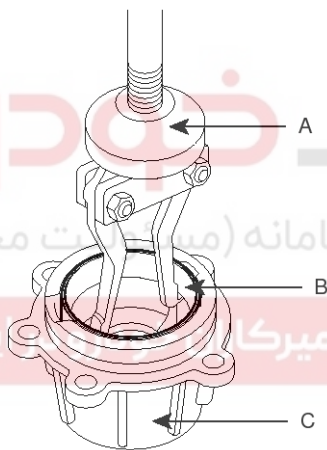
WD-31

7. Take out the taper roller bearing(A) from the pinion case(B).



UMQG005H

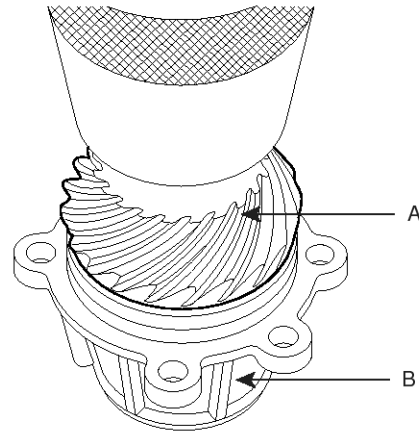
8. Using a sliding hammer(A), remove the taper roller bearing outer race(B) from the pinion case(C).



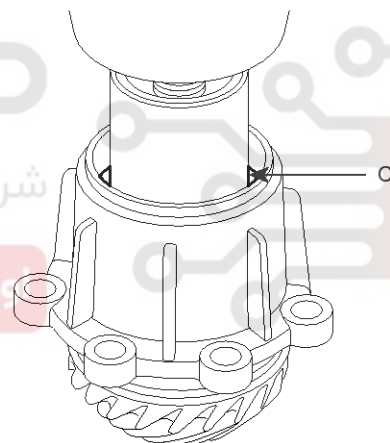
UMQG005I

Reassembly

1. Assemble the taper roller bearing outer races.
2. Using a press machine, install the taper roller bearing (C) and the pinion shaft(A) in the pinion case(B).



UMQG005J

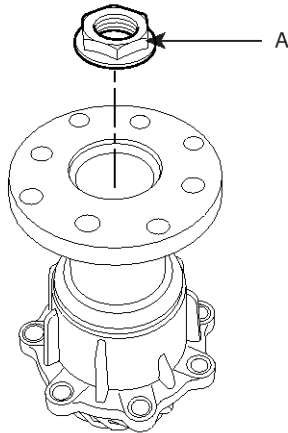


UMQG005K

WD-32

Transfer System

3. Install the oil seal and the rear flange assembly as shown below and screw down the hex lock nut(A) until an axial clearance B of 0.25mm to 0.75mm between pinion and pinion case results.

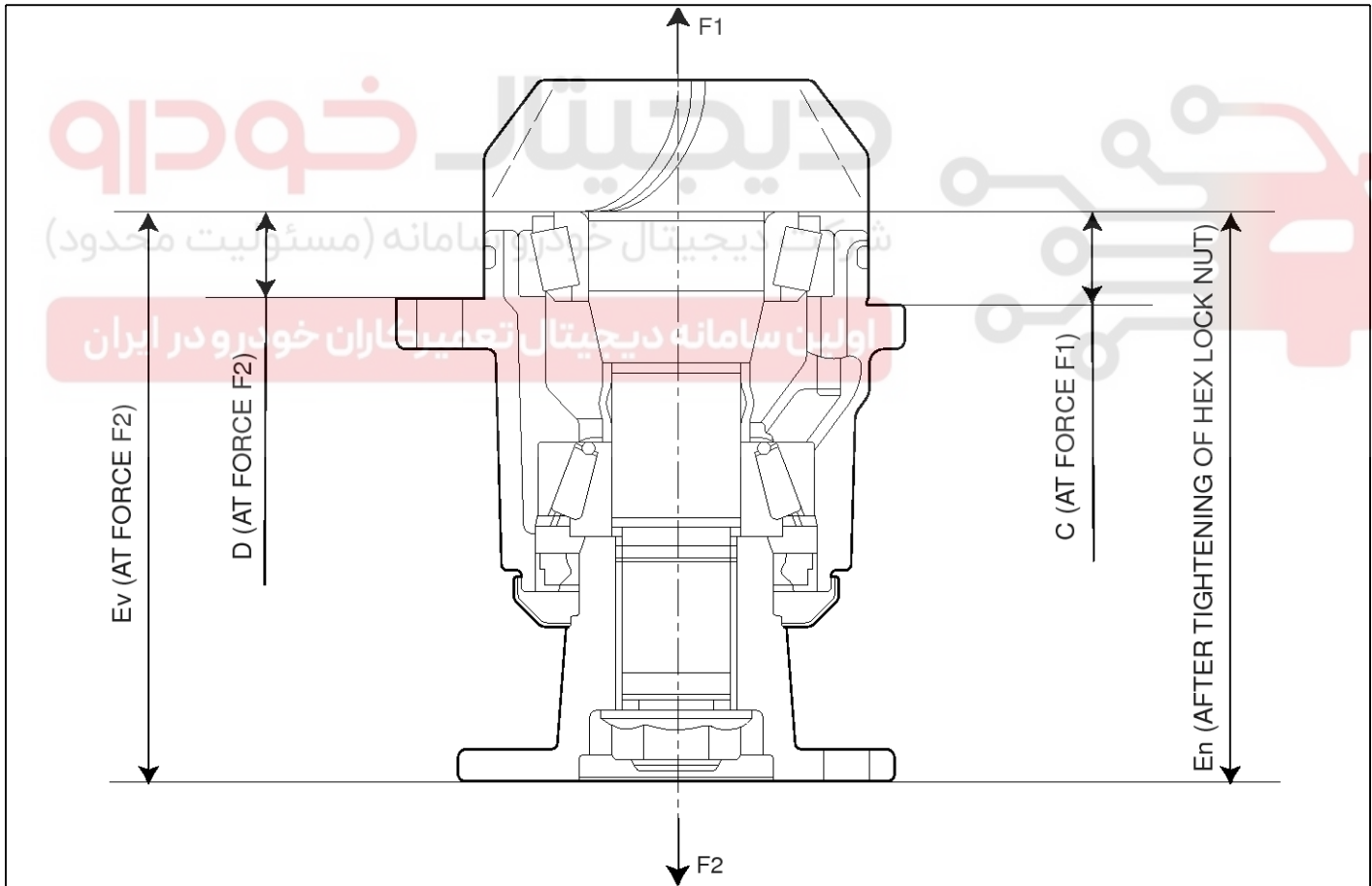


SCMMT6080D

1) Measurement of B

- Apply an additional 200N tension load F1 to the pinion head according to arrangement Y. Rotate the pinion 10 times and measure dimension C.
- Apply a 200N load F2 to the rear flange. Rotate the pinion 10 times and measure dimension D.

$$B = C - D$$



UMQG005L

Gear System

WD-33

- 2) Measure dimension Ev.
- 3) Tighten HEX lock nut.
- 4) Measure the drag torque of the pinion assembly. Target is 180-210Ncm. To achieve the target preload torque, it is permissible to gradually increase the tightening torque.

CAUTION

If the permissible preload torque of 210Ncm is exceeded, it is not allowed to loosen Hex lock nut. Disassemble the whole pinion assembly. Replace the collapsible spacer and repeat the mounting procedure.

- 5) Measure dimension En.
- 6) Check preload. A preload torque of 180 to 210 Ncm corresponds to a bearing preload of 0.12 to 0.16mm.

Ev-En-B=0.12 to 0.16mm

CAUTION

Twice use of collapsible spacer is not permitted(Permanent deformation).

4. Assemble the O-ring and select the proper spacer later when reassembling the transfer case.



دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران