Transaxle/ Transmission

NOTE : Overhaul procedures for manual transaxle and automatic transaxle are given in spearate manual.

GENERAL

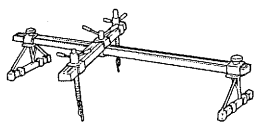
SPECIFICATIONS(M/T) EMNB0010

Model	M5BF2	
Type	Forward 5 speed, reverse 1 speed	
Gear ratio	1.6 DOHC	1.8 DOHC
First	3.615	3.615
Second	2.053	2.053
Third	1.393	1.393
Fourth	1.061	1.061
Fifth	0.837	0.837
Reverse	3.250	3.250
Final gear ratio	4.294	4.056

SERVICE SPECIFICATIONS(M/T) EMNB0020

Item	End play
Input shaft rear bearing end play	0.01L - 0.09L
Output shaft bearing end play	0.05T - 0.10T
Differential bearing end play	0.15T - 0.20T
Differential pinion end play	0.025L - 0.15L
Input shaft front bearing end play	0.01L - 0.12L

SPECIAL TOOLS(M/T) EMAB0050

Tool (Number and Name)	Illustration	Use
09200-38001 Engine support fixture	 D0038001	Removal and installation of transaxle assembly

TROUBLESHOOTING(M/T) EMAC0060

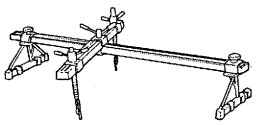
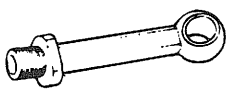
Symptom	Probable cause	Remedy
Vibration, noise	Loose or damaged transaxle and engine mounts Inadequate shaft end play Worn or damaged gears Inadequate grade of oil Low oil level Inadequate engine idle speed	Tighten or replace mounts Correct end play Replace gears Replace with specified oil Replenish Adjust idle speed
Oil leakage	Broken or damaged, oil seal or O-ring	Replace oil seal or O-ring

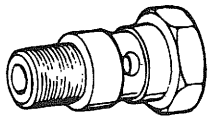
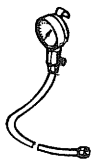
Symptom	Probable cause	Remedy
Hard shift	Faulty control cable Poor contact or wear of synchronizer ring and gear cone Weakened synchronizer spring Inadequate grade of oil	Replace control cable Correct or replace Replace synchronizer spring Replace with specified oil
Jumps out of gear	Worn gear shift fork or broken poppet spring Synchronizer hub-to-sleeve spline clearance too large	Replace shift fork or poppet spring Replace synchronizer hub and sleeve

SPECIFICATIONS(A/T) EKNB0010

Item	A4AF3	A4BF2
Torque converter type	3-element, 1-stage, 2-phase type	
Transaxle type	4-speed forward, 1-speed reverse	
Engine displacement	1.6 D	1.8 D
Gear ratio 1st 2nd 3rd 4th	 2.846 1.581 1.000 0.685	 ← ← ← ←
Reverse	2.176	←
Final gear ratio	4.381	4.345
End play (mm) Front clutch snap ring Rear clutch snap ring End clutch snap ring Low and reverse brake snap ring	 0.5 ± 0.1 0.8 ± 0.1 0.5 ± 0.1 0.675 - 0.987	 0.7 ± 0.1 1.0 ± 0.1 0.7 ± 0.1 0.975 - 1.287

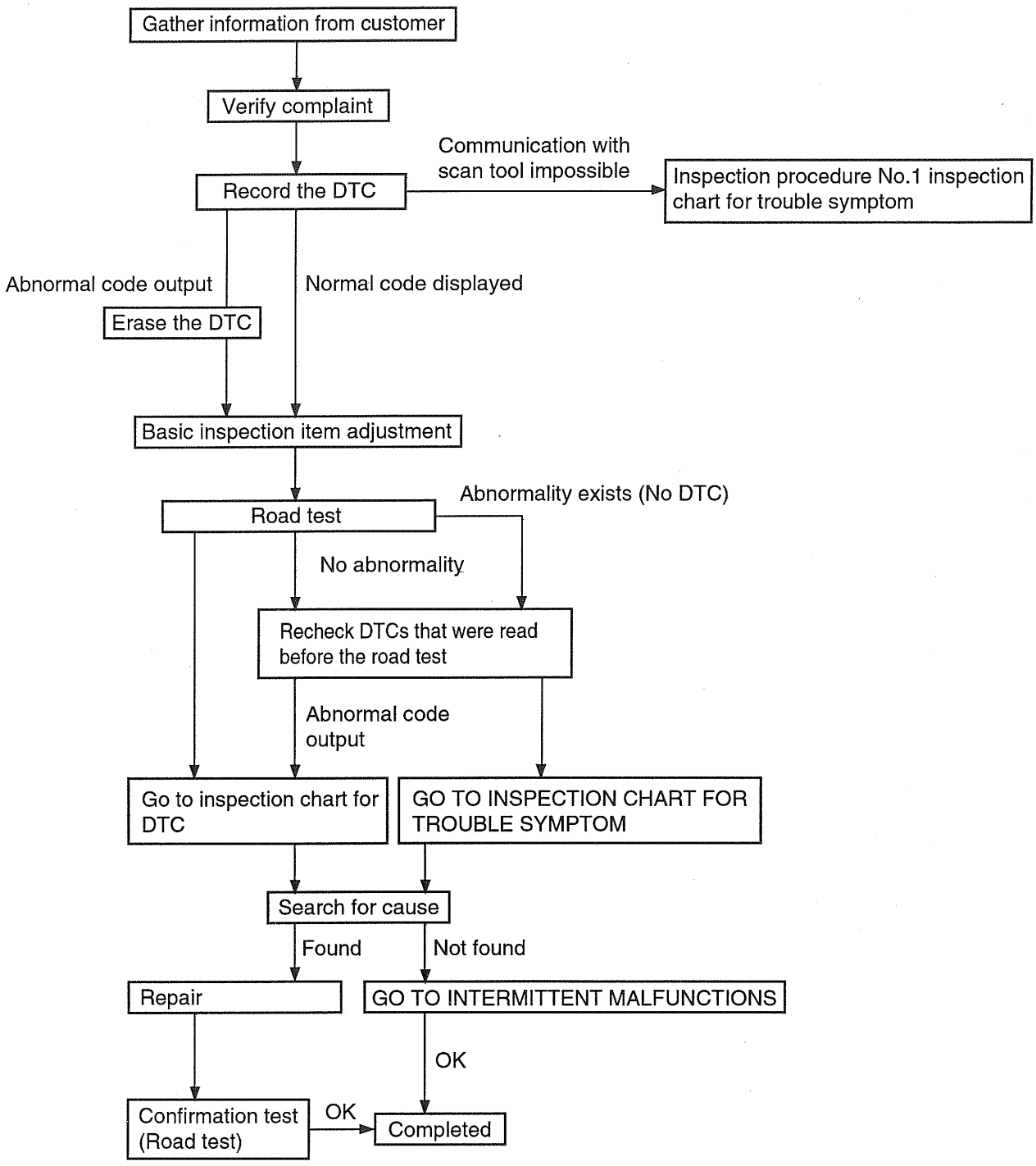
SPECIAL TOOLS(A/T) EKAB0060

Tool (Number and name)	Illustration	Use
09200-38001 Engine support fixture	 D0038001	Removal and installation of transaxle
09452-21001 Oil pressure gauge adapter	 EKAA006A	Measurement of the oil pressure. (use with 09452-21500 and 09452-21002)

Tool (Number and name)	Illustration	Use
09452-21002 Oil pressure gauge adapter	 EKAA006B	Measurement of the oil pressure. (use with 09452-21500 and 09452-21001)
09452-21500 Oil pressure gauge	 EKAA006C	Measurement of the oil pressure. (use with 09452-21002 and 09452-21002)

AUTOMATIC TRANSAXLE SYSTEM

TROUBLESHOOTING(A/T) EKNB0020



EKFA102A

ROAD TEST EKKB1030

Procedure	Conditions	Operation	Judgement value	Inspection item	Inspection procedure if there is an abnormality
1	Ignition switch : ON Engine stopped	Overdrive switch 1. ON 2. OFF	1. OD 2. OD-OFF	Overdrive switch	Overdrive switch system
2	Ignition switch : ST Engine : Stopped	Starting test with lever in P or N range	Starting should be possible	Starting possible or impossible	Starting impossible (will not crank)
3	Warming up	Drive for 15 minutes or more so that the automatic transmision fluid temperature becomes 70-110°C	Gradually rises to 70-110°C	Oil temperature sensor	Codes - P0712, P0713 Oil temperature sensor system
4	Engine : Idling Selector lever : N	Accelerator pedal 1. Fully closed 2. Depressed 3. Fully open (for at least 2 seconds)	1. 2-18% 2. Gradually rises from (1) 3. 80-100%	TPS	Code - P1703 TPS system
		Selector lever operation 1. N⇒D shift 2. N⇒D shift	Should be no abnormal shifting shocks Time lag should be within 2 seconds	Malfunction when starting	Engine stalling during shifting
					Shocks when changing from N to D and long lag time
					Shocks when changing from N to R and long lag time
					Shocks when changing from N to D, N to R and long lag time
	Engine : Idling (Vehicle stopped) Selector lever position : D	Selector lever operation 1. N⇒D 2. N⇒R shift	Should be no abnormal shifting shocks Time lag should be within 2 seconds	Driving impossible	Does not move forward
					Does not move (forward or reverse)

Procedure	Conditions	Operation	Judgement value	Inspection item	Inspection procedure if there is an abnormality
5	Engine : Idling (Vehicle stopped) Selector lever position : D	Accelerator pedal 1. Fully closed 2. Depressed [Driving at 5km/h (3.1 mph)]	1. 75-90% 2. 100%	Pressure control solenoid valve (PCSV) - A,B	Code P0745, P0765 - Pressure control solenoid valve system
		Accelerator pedal 1. Fully closed 2. Depressed	1. C 2. 1	Shift control solenoid valve A (SCSV-A)	Code P0750 - Shift control solenoid valve A system
				Shift control solenoid valve B (SCSV-B)	Code P0755 - Shift control solenoid valve B system
				Shift control solenoid valve C (SCSV-C)	Code P0760 - Shift control solenoid valve C system
			1. 600-900 rpm	Ignition signal	Code P0727 - Engine speed signal system

Procedure	Conditions	Operation	Judgement value	Inspection item	Inspection procedure if there is an abnormality
6	Selector lever position : D Overdrive : OFF	Engine 1. Idling (vehicle stopped) 2. Driving at 10 km/h 3. Driving at constant speed of 50 km/h (31 mph) (20 seconds or more) 4. Driving at constant speed of 40 km/h (25 mph) with selector lever in 2 range 5. Driving at constant speed of 70 km/h (43 mph) with selector lever in D range	1. C 2. 1 3. 3 4. 2	Shift control solenoid valve A (SCSV-A)	Code - P0750 Shift control solenoid valve A system
				Shift control solenoid valve B (SCSV-B)	Code - P0755 Shift control solenoid valve B system
				Shift control solenoid valve C (SCSV-C)	Code P0760 - Shift control solenoid valve C system
			1. OFF 2. ON 3. ON 4. OFF	Kickdown servo switch	Code P1709 -Kickdown servo switch system
			1. 0 km/h 2. 10 km/h 3. 50 km/h 4. 40 km/h	Vehicle speed sensor	Vehicle speed sensor system
			(3) 1,500-2,000 rpm	Pulse generator A (PG-A)	Code P0717-Pulse generator A system
			(3) 1,500-2,000 rpm	Pulse generator B (PG-B)	Code P0722-Pulse generator B system
			(3) 100-300 rpm (5) 0-10 rpm	Torque converter clutch solenoid	Code P0743-Torque converter clutch solenoid
			(5) TCCS Duty : 40-85	Torque converter clutch solenoid	Code P0743-Torque converter clutch solenoid
			For (3) and (5), acceleration should be smooth with no abnormal vibration	Malfunction while driving	Poor acceleration
					Vibration
7	Selector lever position : D Overdrive : ON	Engine (1) Driving at constant speed of 50 km/h (31 mph) (20 seconds or more)	(1) 3 speed gear (1) 1,500-2,000 rpm	Shift control solenoid valve A (SCSV-A)	Code P0750-Shift control solenoid valve A system
				Shift control solenoid valve B (SCSV-B)	Code P0755-Shift control solenoid valve B system
				Shift control solenoid valve C (SCSV-C)	Code P0760 - Shift control solenoid valve C system
				Pulse generator A (PG-A)	Code P0717-Pulse generator A system
				Pulse generator B (PG-B)	Code P0722-Pulse generator B system

Procedure	Conditions	Operation	Judgement value	Inspection item	Inspection procedure if there is an abnormality
8	Selector lever position : D Overdrive : ON	1. Accelerate to 4th gear at TPS output of 1.5V (opening angle 30%) 2. Slowly decelerate to a standstill. 3. Accelerate to 4th gea at TPS output of 2.5V (opening angle 50%). 4. At 50 km/h (31 mph) in 4th gear, turn overdrive OFF. 5. At 50 km/h (31 mph) in 3rd gear, move selector lever to 2 range. 6. At 20 km/h (12 mph) in 2 range, move selector lever to L range.	For (1),(2) and (3) should match the specified output shaft speed (vehicle speed), and there should be no abnormal shocks. For (4),(5) and (6), down shifting should be made immediately after operation.	Malfunction when shifting	Shocks and flare shifts
				Displaced shifting points	All points
				Does not shift	No fail-safe codes
					Code P0717-Pulse generator A system
					Code P0722-Pulse generator B system
					Code P0750-Shift control solenoid valve A system
					Code P0755-Shift control solenoid valve B system
					Code P0760 - Shift control solenoid valve C system
					Code P0745, P0765-Pressure control solenoid valve system
					Code P0731-1st gear incorrect ratio.
					Code P0732-2nd gear incorrect ratio.
					Code P0733-3rd gear incorrect ratio.
					Code P0734-4th gear incorrect ratio.

INSPECTION CHART FOR DIAGNOSTIC TROUBLE CODES EKNB1040

DTC NO	Diagnosis items	Trouble area (Remedy)	MIL
P1703	Throttle position sensor	• Check the throttle sensor connector • Check throttle position sensor itself • Check the throttle position sensor wiring harness • Check the wiring between ECM and throttle position sensor • Adjust throttle position sensor	O
P0712	Fluid temperature sensor -short circuit-	• Fluid temperature sensor connector inspection • Fluid temperature sensor inspection • Fluid temperature sensor wiring harness inspection	O
P0713	Fluid temperature sensor -open circuit-		
P1709	Kickdown servo switch -open circuit-	• Check the kicdown servo switch connector • Check the kicdown servo switch • Check the kicdown servo switch wiring harness	X
	Kickdown servo switch -short circuit-		
P0727	Engine speed signal -open circuit-	• Check the ignition pulse signal line • Check the wiring between ECM and ignition system	O
P0717	Pulse generator A -open circuit-	• Check the pulse generator A and pulse generator B • Check the vehicle speed reed switch (for chattering) • Check the pulse generator A and B wiring harness	O
P0722	Pulse generator B -open circuit-		
P0750	Shift control solenoid valve A	• Check the solenoid valve connector • Check the shift control solenoid valve A • Check the shift control solenoid valve A wiring harness	O
P0755	Shift control solenoid valve B	• Check the solenoid valve connector • Check the shift control solenoid valve B • Check the shift control solenoid valve A wiring harness	O
P0760	Shift control solenoid valve C	• Check the solenoid valve connector • Check the shift control solenoid valve C • Check the shift control solenoid valve A wiring harness	O
P0707	Transaxle range switch -open circuit-	• Check the transaxle range switch connector and harness	O
P0708	Transaxle range switch -short circuit-		
P0745	Pressure control solenoid-A valve open circuit	• Check the pressure control solenoid valve • Check the pressure control solenoid valve wiring harness	O
P0765	Pressure control solenoid-B valve short circuit		

DTC NO	Diagnosis items	Trouble area (Remedy)	MIL
P0743	Damper clutch control solenoid	• Inspectiond of solenoid valve connector • Individual inspection of damper clutch control solenoid valve • Check the damper clutch control solenoid valve wiring harness • Check the TCM • Inspection of damper clutch hydraulic system	X
P1744	Damper clutch -Abnormal vibration		X
P0731	First gear system -Malfunction-	• Check the pulse generator A and pulse generator B connector • Check the one way clutch or rear clutch • Check the pulse generator wiring harness	O
P0732	Second gear system -Malfunction-		
P0733	Third gear system -Malfunction-	• Check the rear clutch or control system • Check the pulse generator A and pulse generator B connector • Check the front clutch slippage or control system • Check the pulse generator wiring harness • Check the rear clutch slippage or control system	O
P0734	Fourth gear system -Malfunction-	• Check the pulse generator A and pulse generator B connector • Kickdown brake slippage • Check the end clutch or control system • Check the pulse generator wiring harness	O

FAIL-SAFE ITEM

DTC NO	Description	Fail-safe	Note (Relation to diagnostic trouble code)
P0717	Open-circuited pulse generator A	Locked in third (D) or second (2, L) gear	When code P0717 is generated fourth time
P0722	Open-circuited pulse generator B	Locked in third (D) or second (2,L) gear	When code P0722 is generated fourth time
P0750	Open-circuited or shorted shift control solenoid valve A	Lock in third gear	When code P0750 is generated fourth time
P0755	Open-circuited or shorted shift control solenoid valve B	Lock in third gear	When code P0755 is generated fourth time
P0760	Open-circuited or shorted shift control solenoid valve C	Lock in third gear	When code P0760 is generated fourth time
P0745 P0765	Open-circuited shorted pressure control solenoid valve	Lock in third (D) or second (2,L)	When codes P0745 or P0765 are generated fourth time
P0731 P0732 P0733 P0734	Gear shifting does not match the engine speed	Lock in third (D) or second (2,L)	When either codes P0731, P0732, P0733 or P0734 are generated fourth time

INSPECTION PROCEDURES FOR DIAGNOSTIC TROUBLE CODES EKDA0050

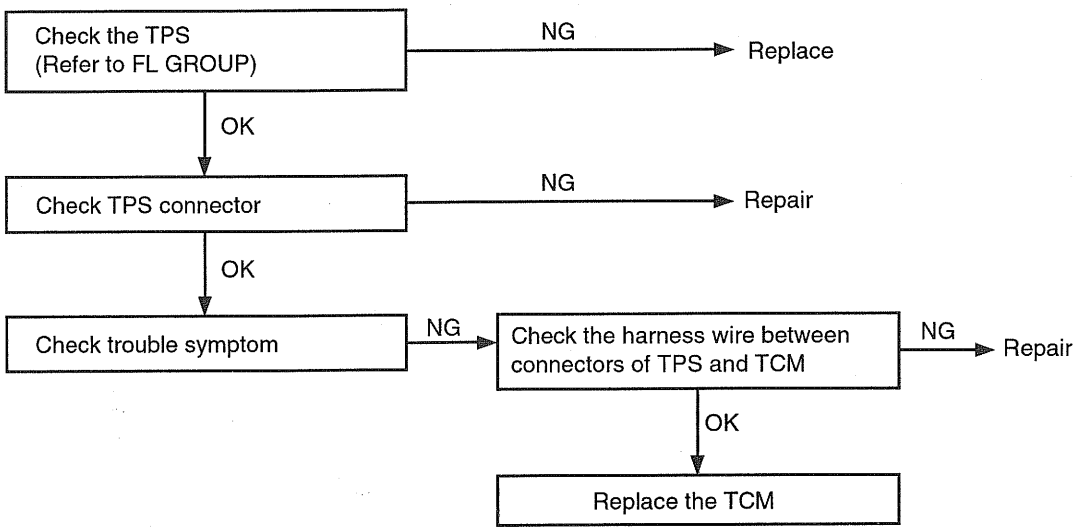
P1703

DTC NO	DIAGNOSTIC ITEM
P1703	THROTTLE POSITION SENSOR

DESCRIPTION

- Shift timing
- Detect operating area of damper clutch
- Detect throttle position to control fluid pressure during a shift

TROUBLESHOOTING FLOW



EKDA005A

DIAGNOSTIC ITEM EKKB1060

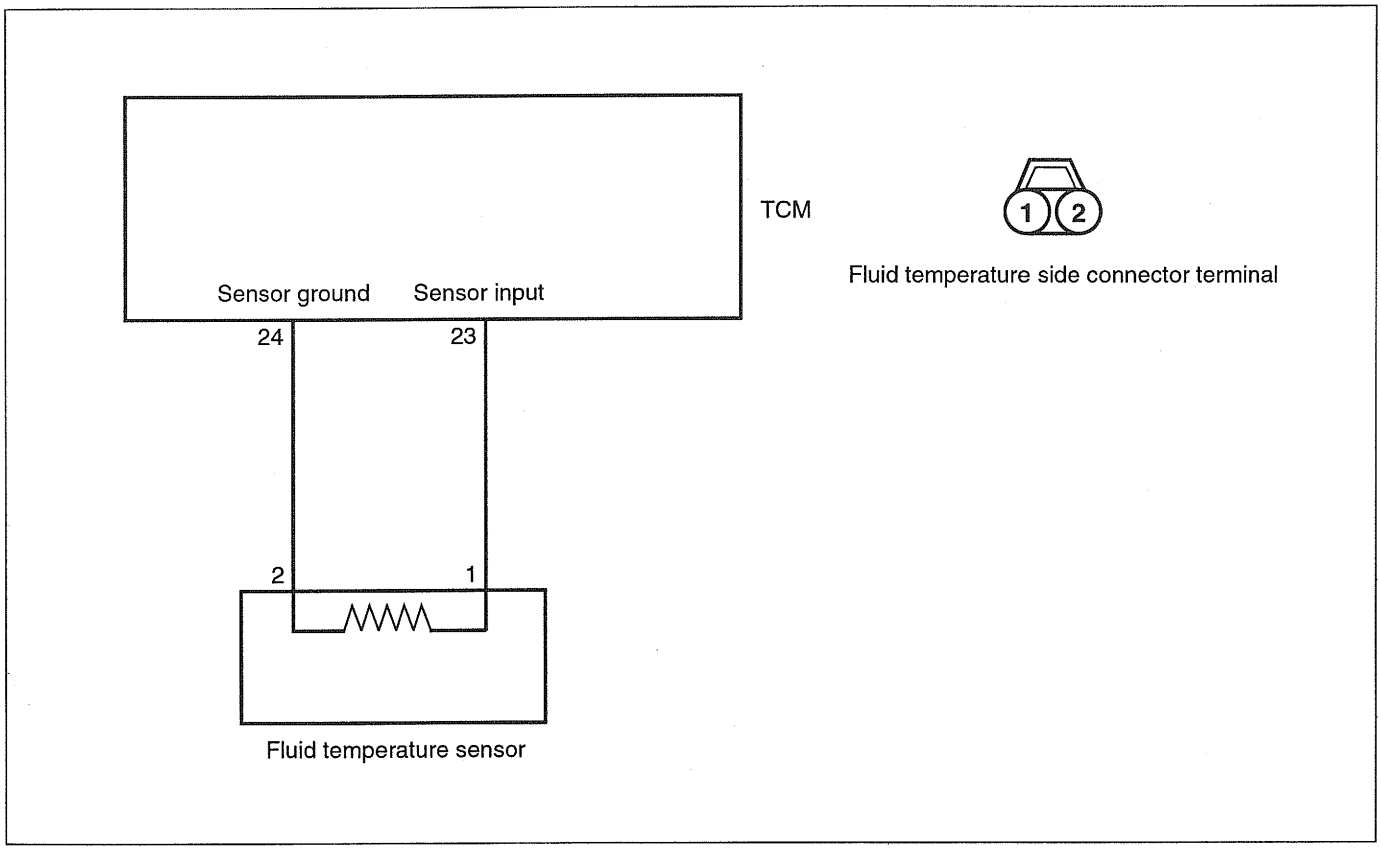
P0712/P0713

DTC NO	DIAGNOSTIC ITEM	
P0712	FLUID (OIL) TEMPERATURE SENSOR SYSTEM	Short to ground side
P0713	FLUID (OIL) TEMPERATURE SENSOR SYSTEM	Open

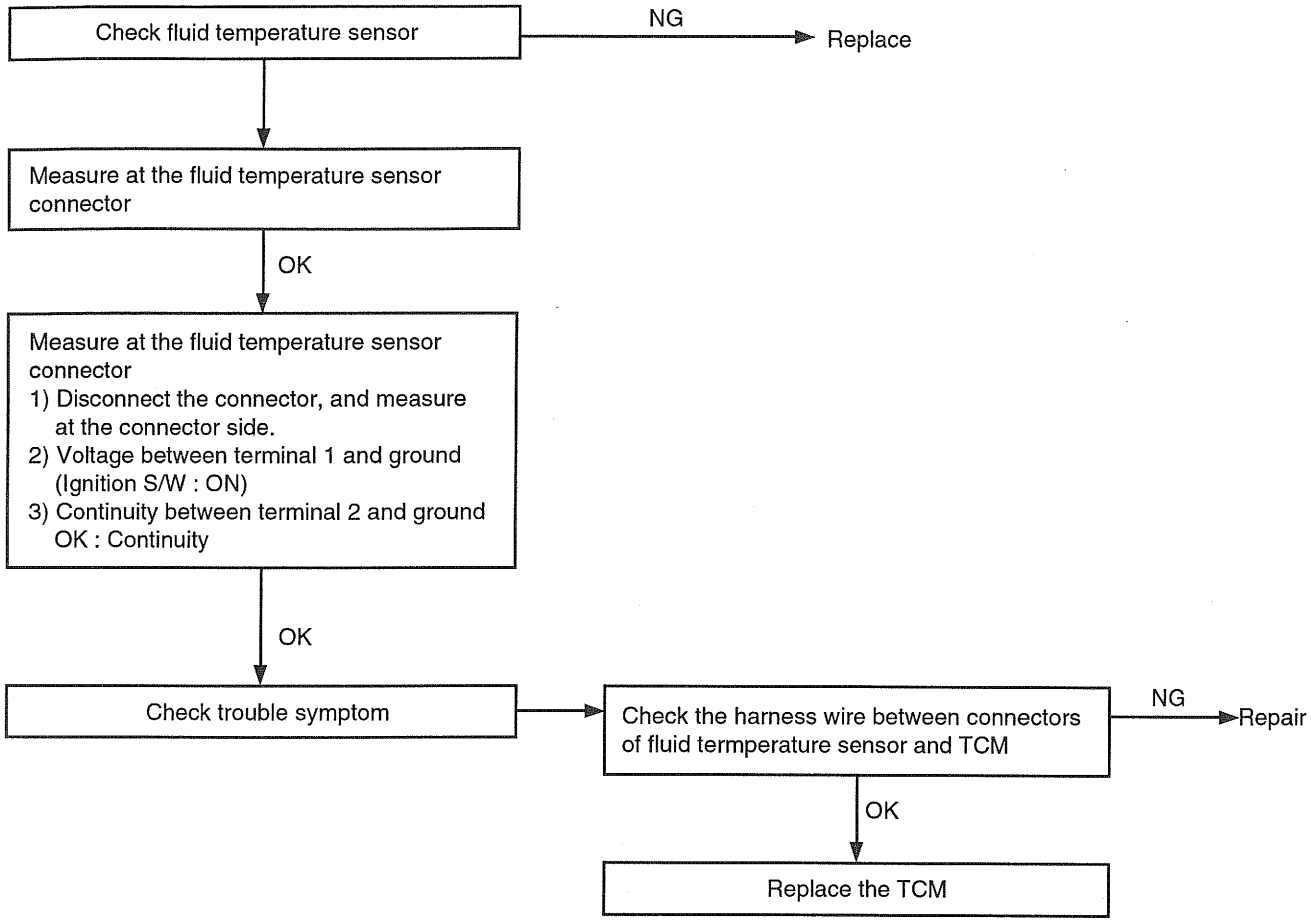
TROUBLESHOOTING GUIDE

Detection condition	Possible cause	Check item
• 10 minutes after engine speed > 1000 rpm • 10 minutes after pulse generator B > 1000 rpm • Low temperature side output voltage > 4.3 V <SYMPTOM> • Shift shock • Power shift pattern will not be available	Malfunction : • Fluid temperature sensor • TCM	• Fluid temperature sensor • Harness & connector

CIRCUIT DIAGRAM



EKFA106A


Check fluid temperature sensor
NG
Replace
Measure at the fluid temperature sensor connector
OK
Measure at the fluid temperature sensor connector
1) Disconnect the connector, and measure at the connector side.
2) Voltage between terminal 1 and ground (Ignition S/W : ON)
3) Continuity between terminal 2 and ground OK : Continuity
OK
Check trouble symptom
Check the harness wire between connectors of fluid termperature sensor and TCM
NG
Repair
OK
Replace the TCM

EKDA006B

DIAGNOSTIC ITEM EKNB0070

P1709

DTC NO	DIAGNOSTIC ITEM	
P1709	KICK DOWN SERVO SWITCH	- Open, short circuit -

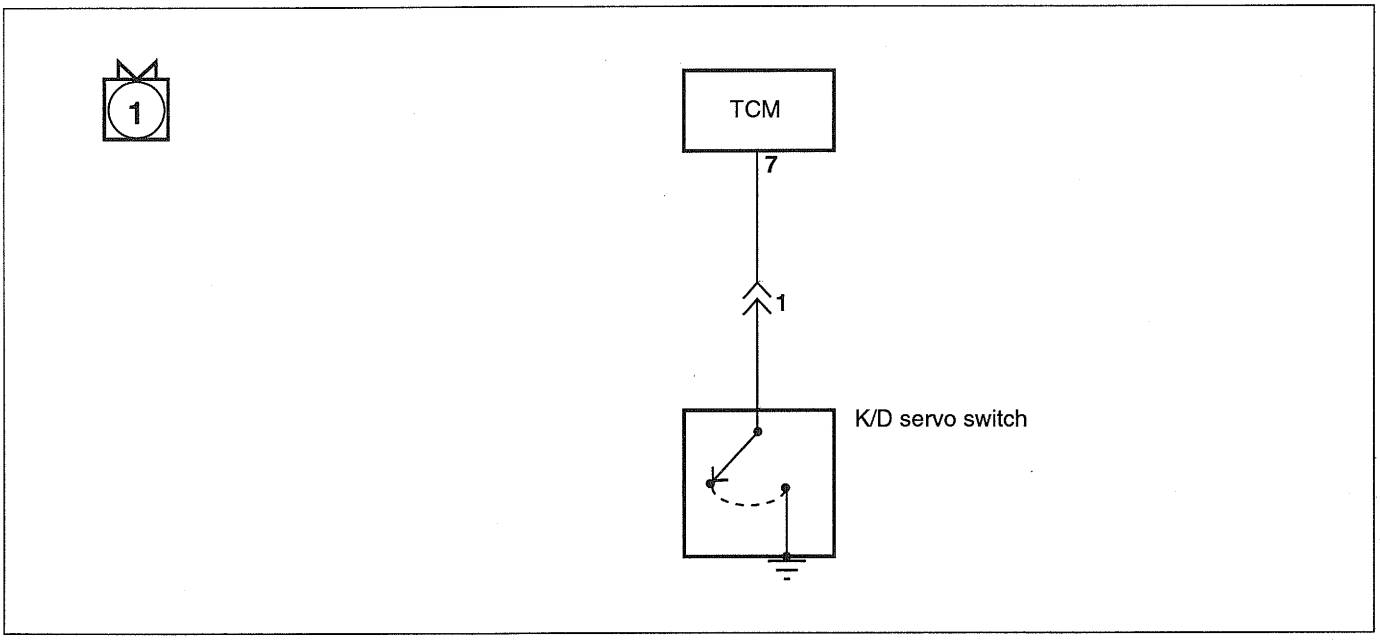
DESCRIPTION

- Detects the point of time when K/D band starts operation to control fluid pressure when K/D band operates.

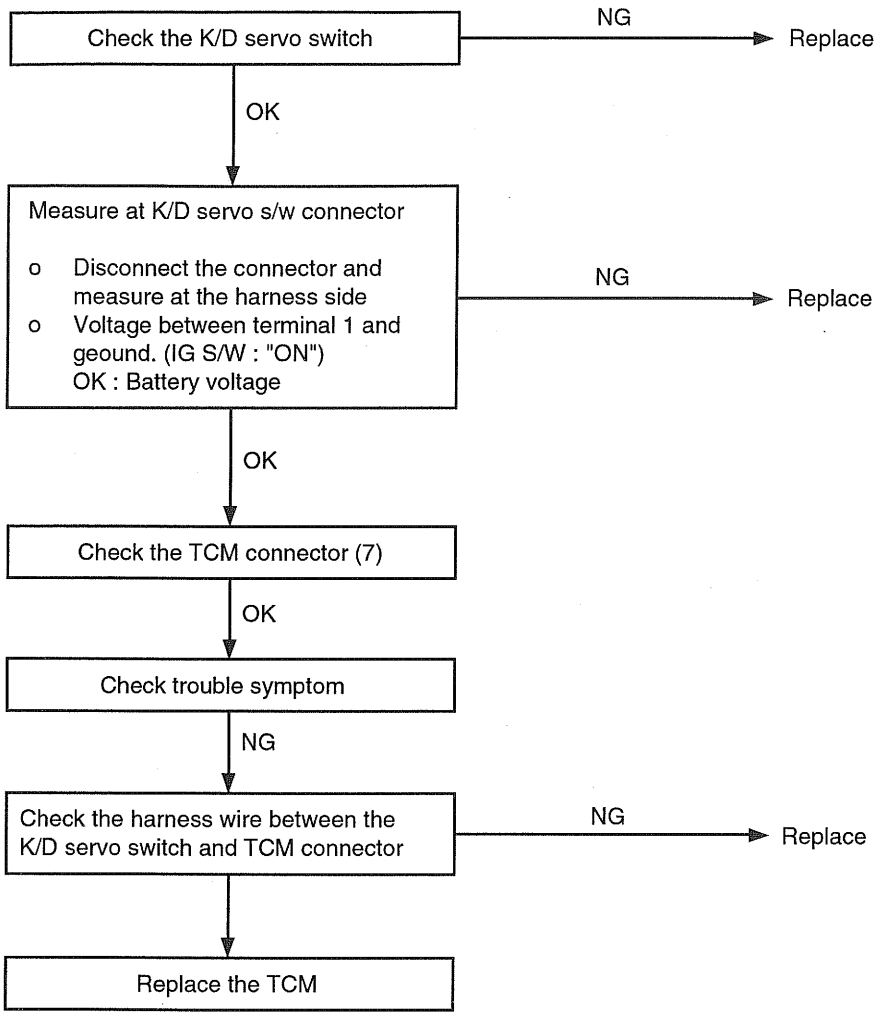
TROUBLESHOOTING GUIDE

Detection condition	Possible cause	Check item
• 1st or 3rd gear signal is present for more than 5 sec. • Transfer shaft speed is greater than 900rpm • Fluid temperature is above 60°C • TCM receives an "OFF" signal from K/D servo s/w	• Malfunction of K/D servo s/w • Malfunction of connector • Malfunction of TCM	• Harness & connnector • K/D servo s/w • K/D servo assembly
«SYMPTOM» • Shift shock is experienced as transaxle shifts into 2nd and 4th gears.		

CIRCUIT DIAGRAM



EKNB007A


Check the K/D servo switch
NG
Replace
OK
Measure at K/D servo s/w connector
o Disconnect the connector and measure at the harness side
o Voltage between terminal 1 and geound. (IG S/W : "ON")
OK : Battery voltage
NG
Replace
OK
Check the TCM connector (7)
OK
Check trouble symptom
NG
Check the harness wire between the K/D servo switch and TCM connector
NG
Replace
Replace the TCM

EKDA007B

DIAGNOSTIC ITEM EKDA0080

P0727

DTC NO	DIAGNOSTIC ITEM	
P0727	ENGINE SPEED SIGNAL	- Open, short circuit -

DESCRIPTION

- Calculates damper clutch slip.
- Detects engine speed to control fluid pressure during a shift.

TROUBLESHOOTING GUIDE

Detection condition	Possible cause	Check item
• Engine speed > 1,500 rpm • Transaxle range : D, 2 or L • TCM does not receive an ignition pulse	• Malfunction of ECM • Malfunction of connector • Malfunction of TCM	• Harness & connector • ECM
«SYMPTOM» • Abnormal operation of the damper clutch system • Excessive fuel consumption		

DIAGNOSTIC ITEM EKNB0090

P0717

DTC NO	DIAGNOSTIC ITEM	
P0717	PULSE GENERATOR A	- Open, short circuit -

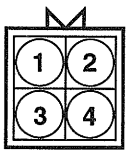
DESCRIPTION

- Detects non-operating area of damper clutch
- Detects turbine RPM for control of fluid pressure during a shift

TROUBLESHOOTING FLOW

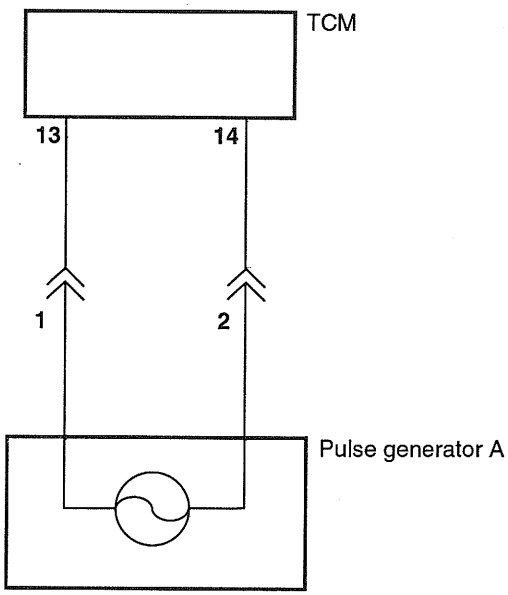
Detection condition	Possible cause	Check item
• Vehicle speed sensor speed > 30 km/h • Transaxle range : D, 2 or L • Engine speed > 3,000 rpm • Shift position ; 2nd, 3rd or 4th gear	• Malfunction of PG-A • Malfunction of connector • Malfunction of TCM • Malfunction of end clutch retainer	• Harness & connector
«SYMPTOM» • Shift shock during 2nd and 4th gear shifting • When code P0717 is generated, automatic transaxle hold in 3rd gear ("D" range) or 2nd gear ("2", "L" range). • Codes P0731, P0732, P0733 and P0734 may also be set.		

TROUBLESHOOTING GUIDE



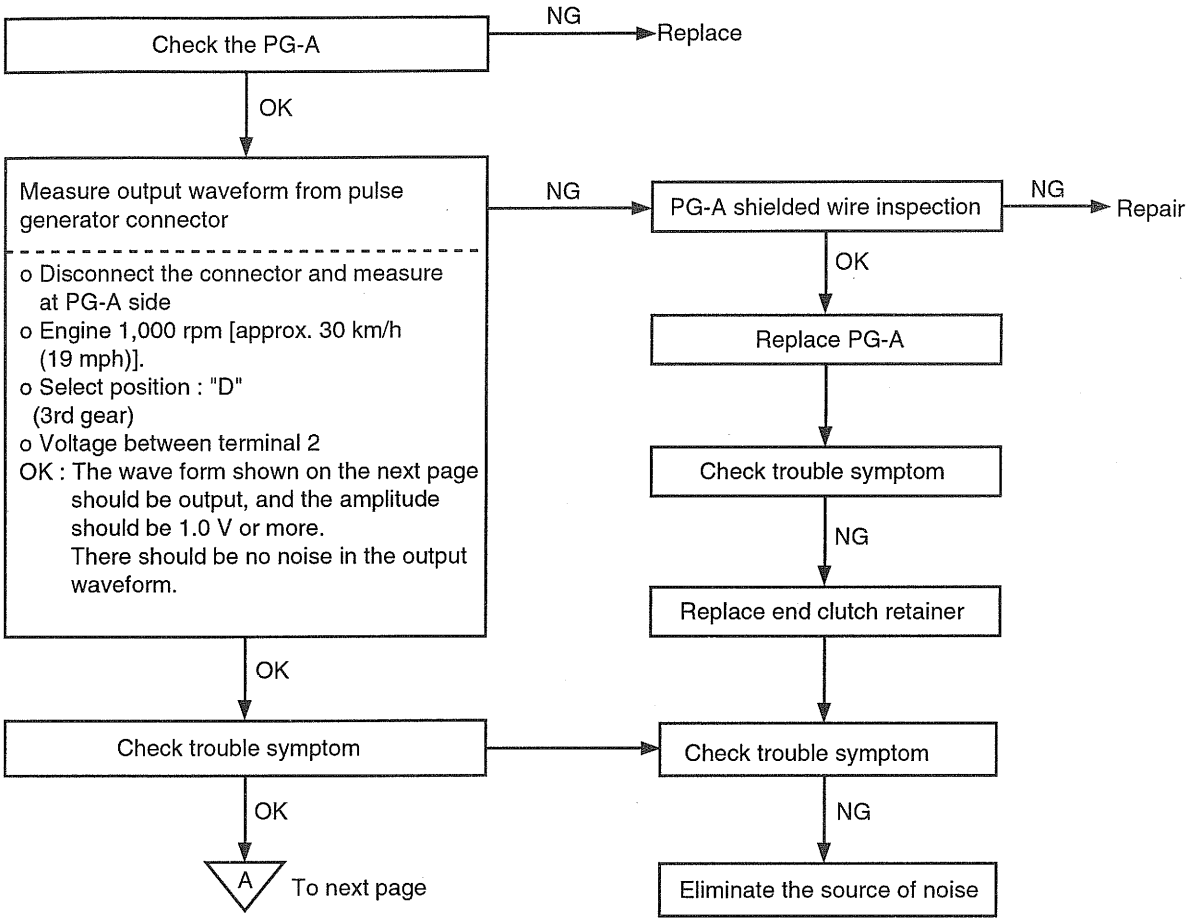
Pulse generator side connector terminals

1-2 : PG-A
3-4 : PG-B

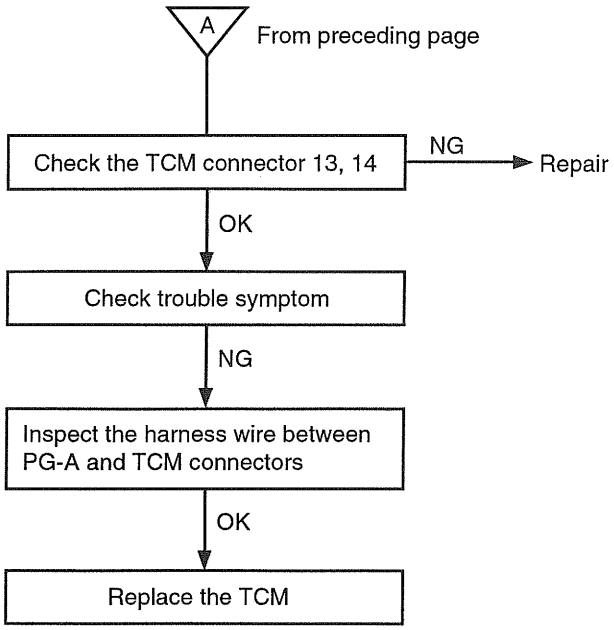


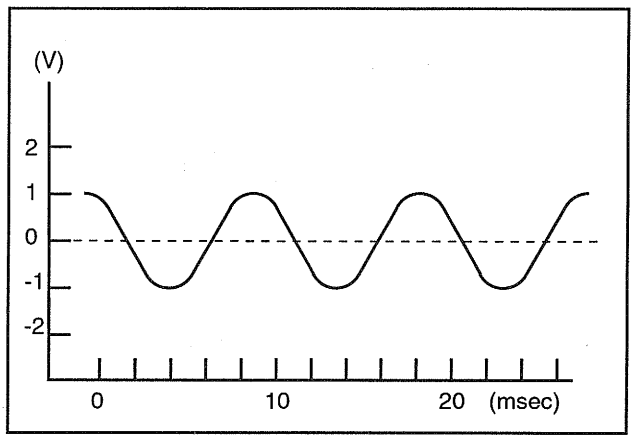
EKNB009A

TROUBLESHOOTING FLOW



EKDA009B


A
From preceding page
Check the TCM connector 13, 14
NG
Repair
OK
Check trouble symptom
NG
Inspect the harness wire between PG-A and TCM connectors
OK
Replace the TCM


(V)
2
1
0
-1
-2
0
10
20
(msec)

EKNB009B

DIAGNOSTIC ITEM EKNB1100

P0722

DTC NO	DIAGNOSTIC ITEM	
P0722	PULSE GENERATOR B	- Open, short-

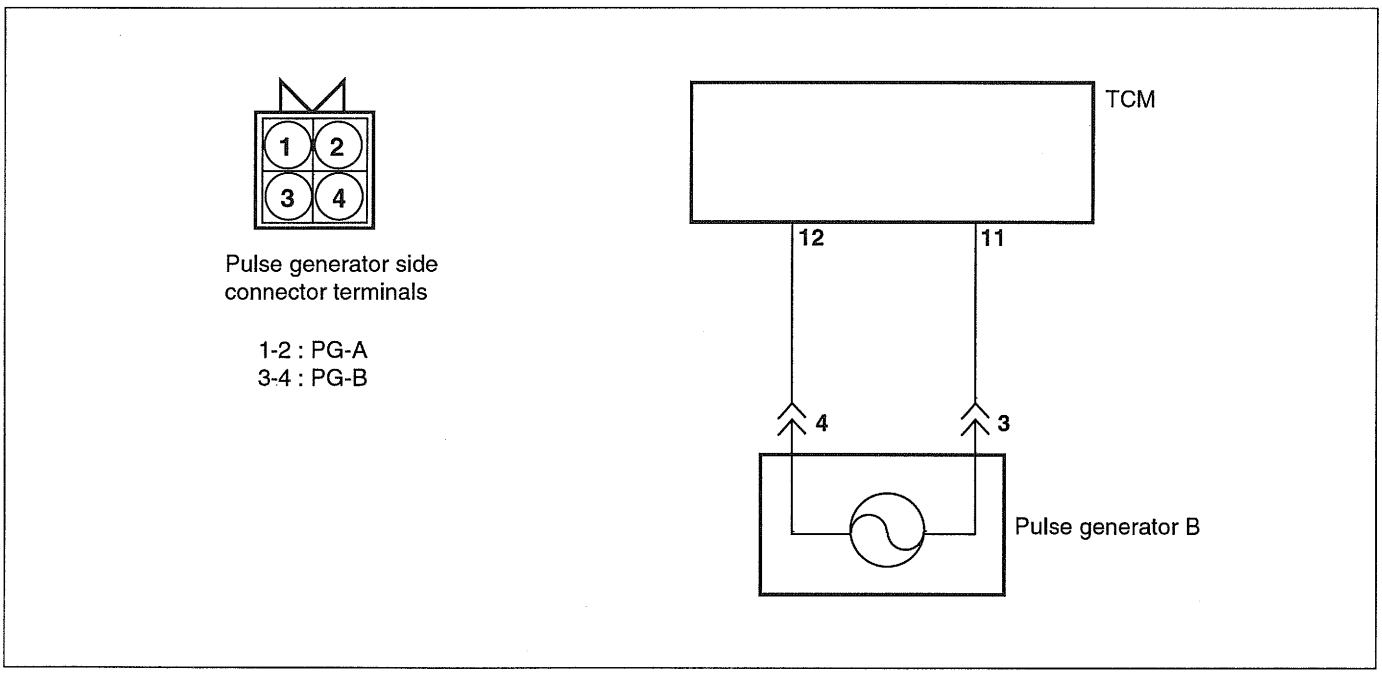
DESCRIPTION

- Detects number of revolutions of the transfer driven gear to monitor vehicle speed.

TROUBLESHOOTING FLOW

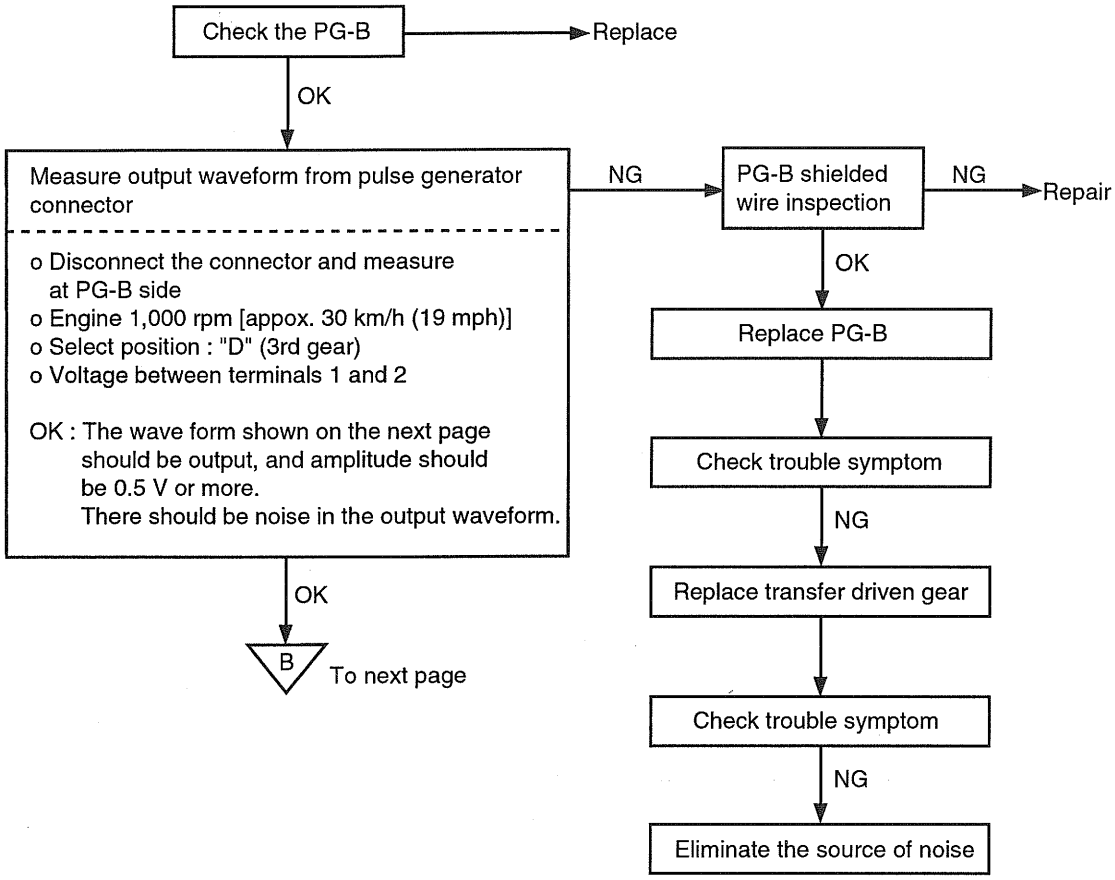
Detection condition	Possible cause	Check item
• Vehicle speed sensor speed > 30 km/h • Engine speed > 3,000 rpm • Shift position ; 2nd, 3rd or 4th gear	• Malfunction of PG-B • Malfunction of connector • Malfunction of TCM • Malfunction of transfer driven gear	• Open in PG-B circuit • Malfunction of PG-B • Noise in signal (Poor or defective shielding) • Chattering of vehicle speed sensor
«SYMPTOM» • Shift shock during 2nd and 4th gear shifting • When fail -safe code P0722 is generated, automatic transaxle will hold in 3rd gear (D) or 2nd gear (2,L) • Codes P0731, P0732, P0733 and P0734 may also be set		

CIRCUIT DIAGRAM

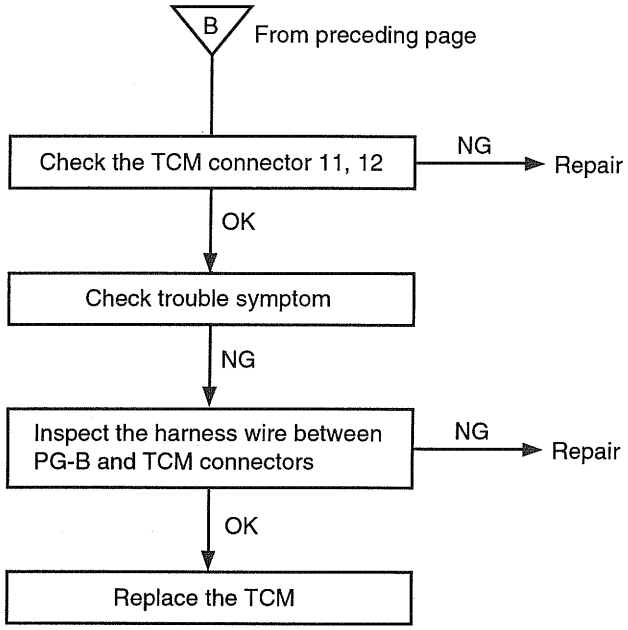


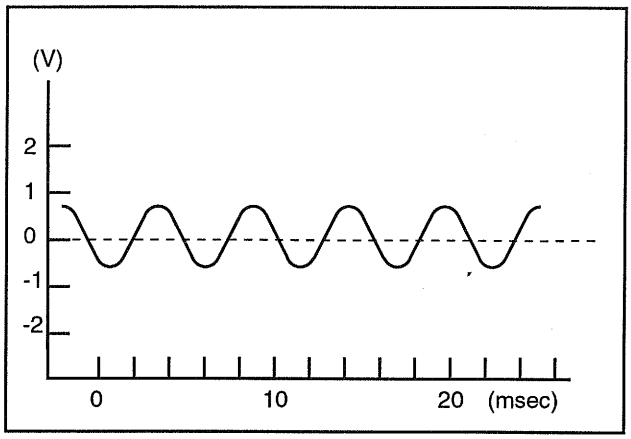
EKFA110A

TROUBLESHOOTING FLOW



EKDA010B


B
From preceding page
Check the TCM connector 11, 12
NG
Repair
OK
Check trouble symptom
NG
Inspect the harness wire between PG-B and TCM connectors
NG
Repair
OK
Replace the TCM


(V)
2
1
0
-1
-2
0
10
20
(msec)

EKFA110C

DIAGNOSTIC ITEM EKNB0110

P0750

DTC NO	DIAGNOSTIC ITEM	
P0750	SHIFT CONTROL SOLENOID VALVE A	- Open -, - Short circuit -

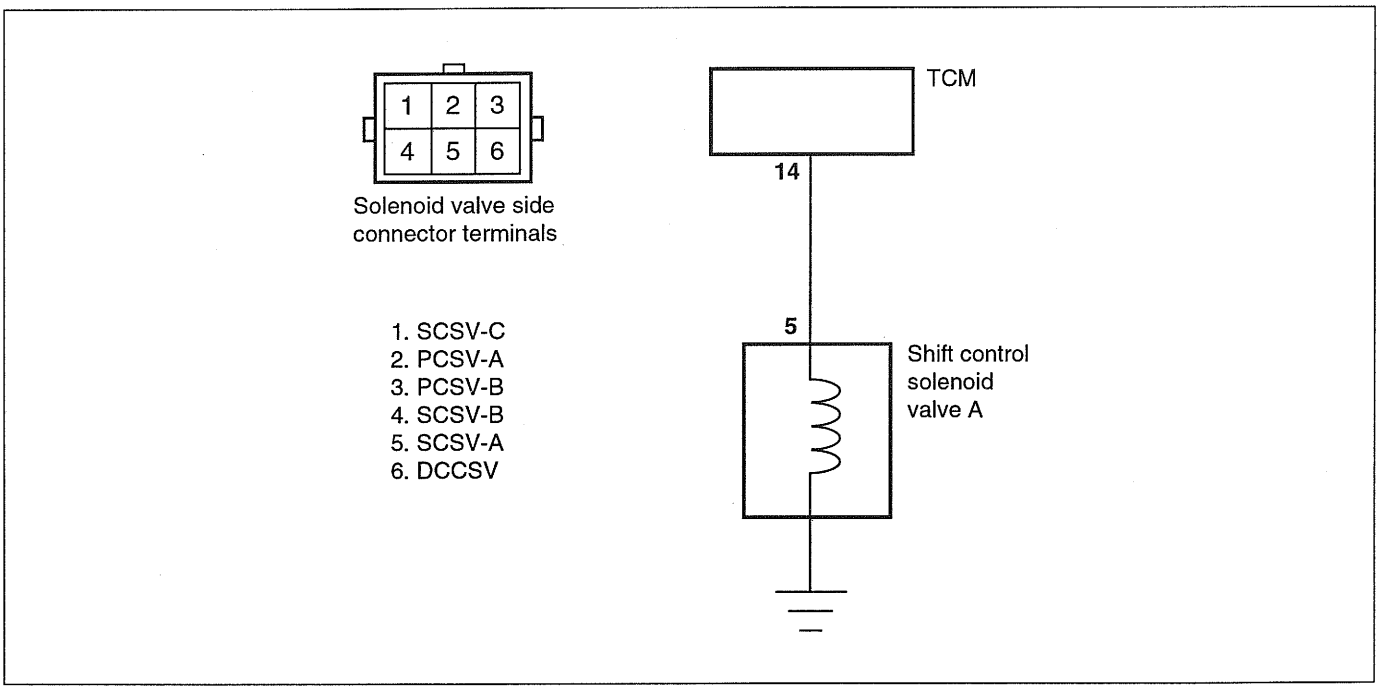
DESCRIPTION

- Control fluid pressure that is acting on the shift control valve (SCV) through ON/OFF signals from the TCM to control shifting.

TROUBLESHOOTING FLOW

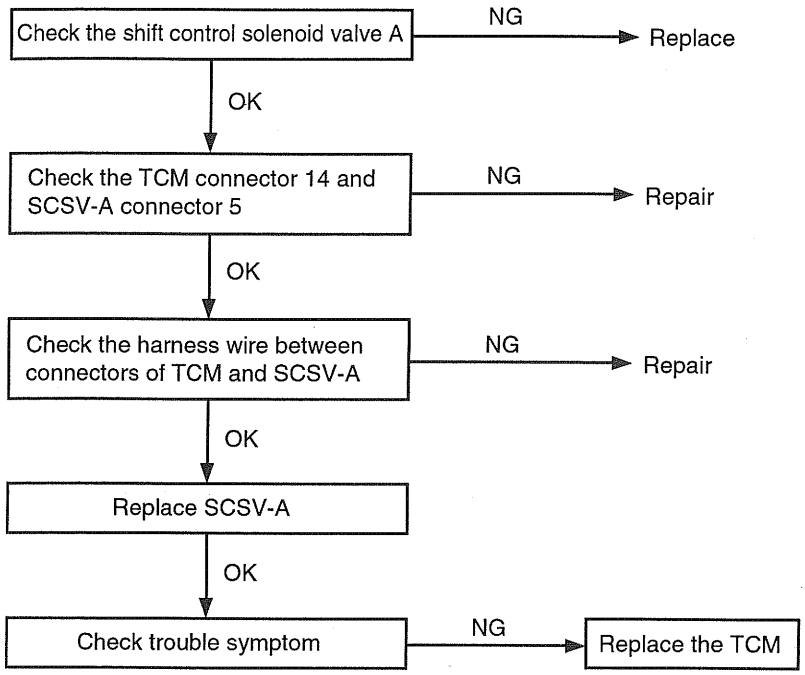
Detection condition	Possible cause	Check item
• IG S/W "ON" or start release • TCM senses an open/short in the SCSV-A	• Malfunction of PG-A • Malfunction of connector • Malfunction of TCM	• Open/short in SCSV-A circuit • Malfunction of SCSV-A
«SYMPTOM» • Automatic transaxle will hold 3rd gear when code P0750 is generated.		

TROUBLESHOOTING FLOW



EKNB011A

TROUBLESHOOTING FLOW



EKNB011B

DIAGNOSTIC ITEM EKNB0120

P0755

DTC NO	DIAGNOSTIC ITEM	
P0755	SHIFT CONTROL SOLENOID VALVE B	- Open -, - Short circuit -

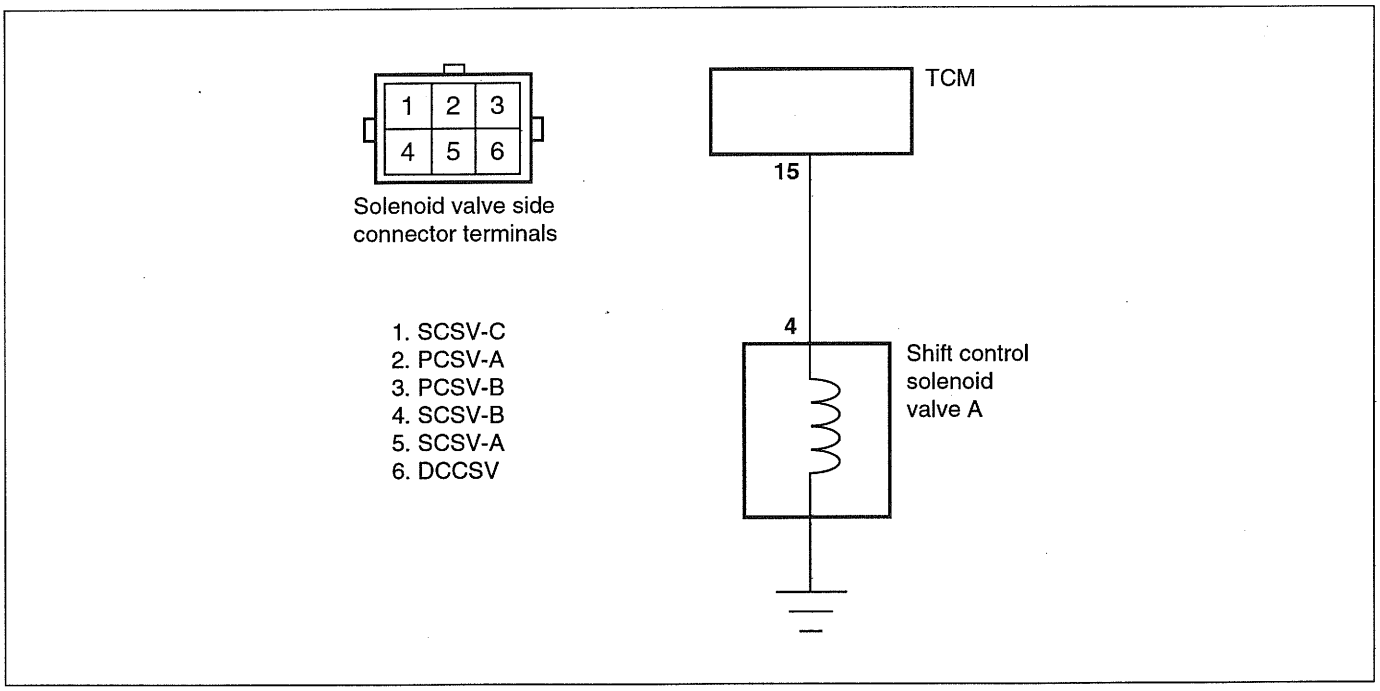
DESCRIPTION

- Controls fluid pressure that is acting on the shift control valve (SCV) through ON/OFF signals from the TCM to control shifting.
- If resistance value of SCSV-B is too high or low, P0755 is output. (open or short circuit).

TROUBLESHOOTING FLOW

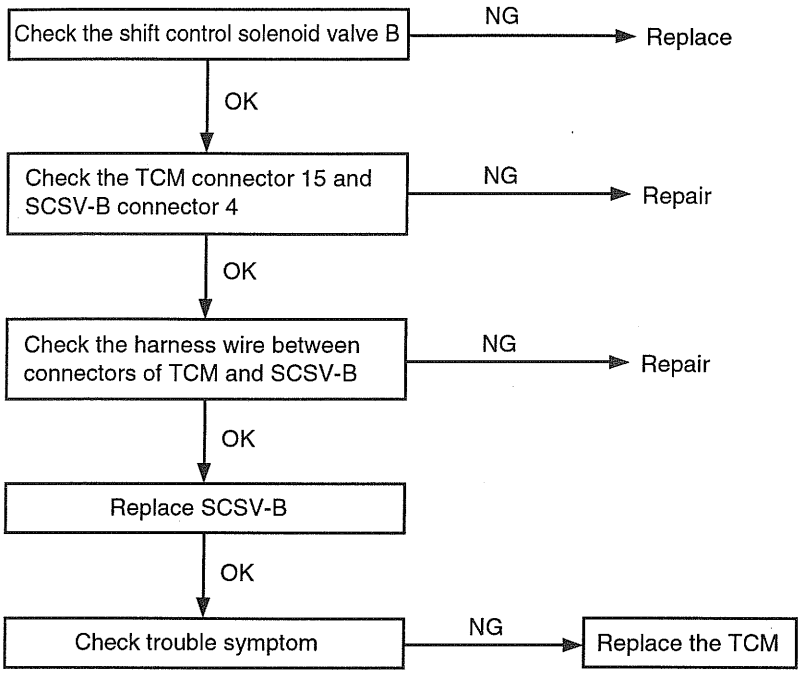
Detection condition	Possible cause	Check item
• IG S/W "ON" or start release • TCM senses an open/short in the SCSV-B	• Malfunction of SCSV-B • Malfunction of connector • Malfunction of TCM	• Open/short in SCSV-B circuit • Malfunction of SCSV-B
«SYMPTOM» • Automatic transaxle will hold 3rd gear when code P0755 is generated.		

CIRCUIT DIAGRAM



EKNB012A

TROUBLESHOOTING FLOW



EKNB012B

DIAGNOSTIC ITEM EKNB0130

P0760

DTC NO	DIAGNOSTIC ITEM	
P0760	SHIFT CONTROL SOLENOID VALVE C	- Open -, - Short circuit -

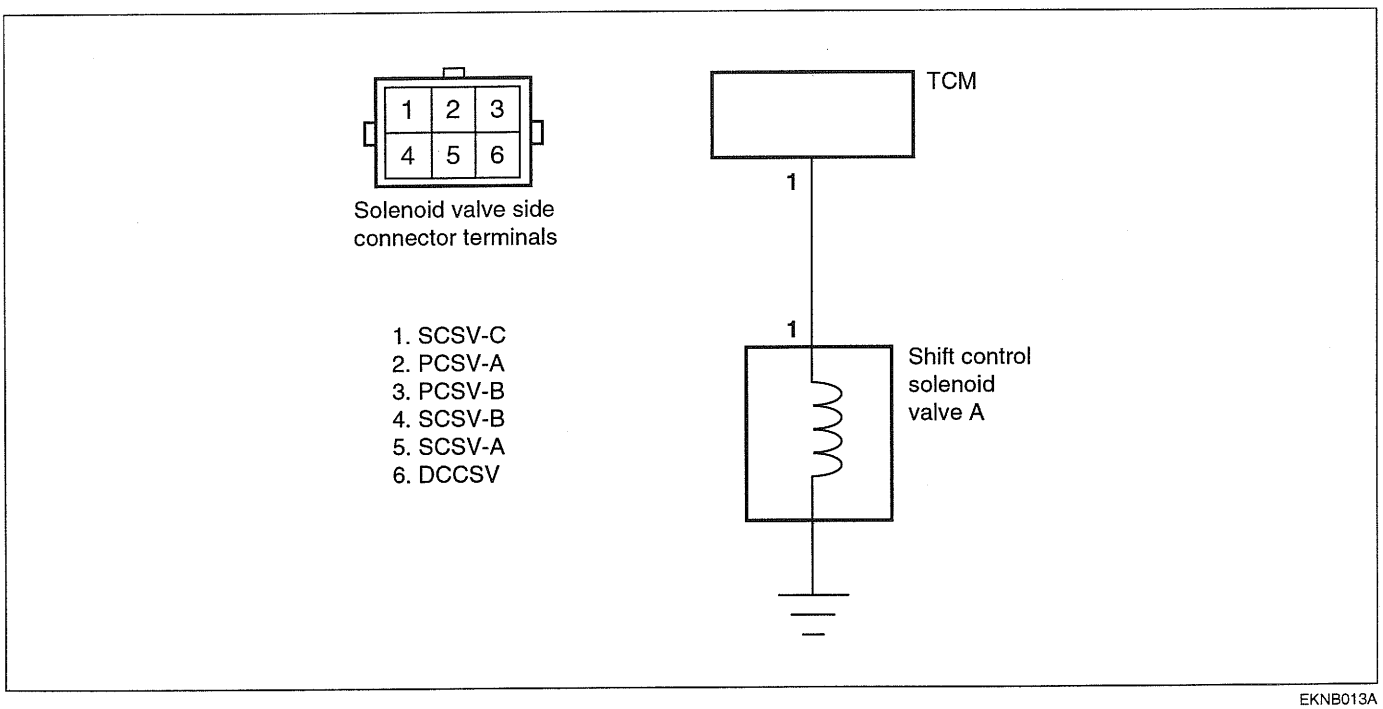
DESCRIPTION

- Controls fluid pressure that is acting on the control switch valve (CSV) through ON/OFF signals from the TCM to control shifting.
- If resistance value of SCSV-C is high, P0760 is output. (open circuit).

TROUBLESHOOTING FLOW

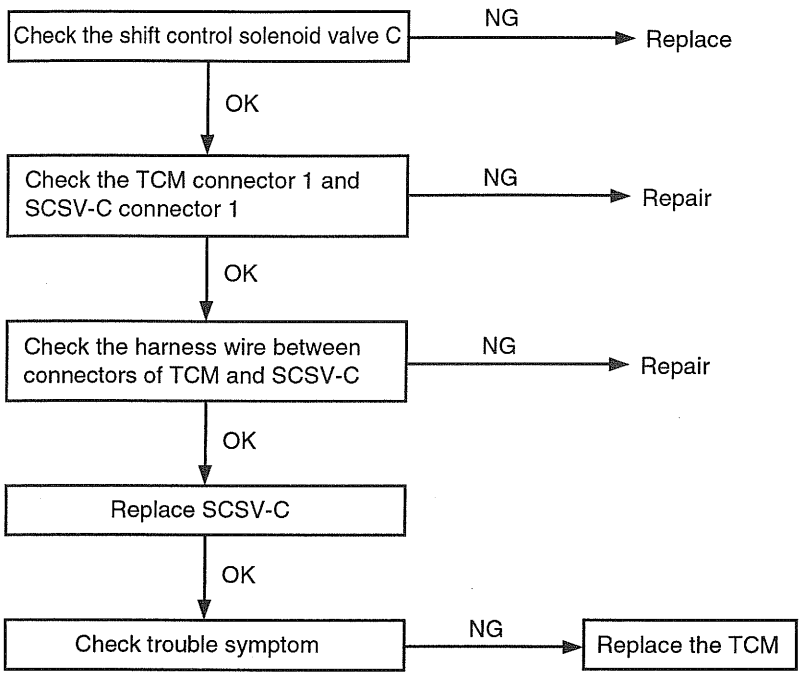
Detection condition	Possible cause	Check item
• IG S/W "ON" or start release • TCM senses an open/short in the SCSV-C	• Malfunction of SCSV-C • Malfunction of connector • Malfunction of TCM	• Open/short in SCSV-C circuit • Malfunction of SCSV-C
«SYMPTOM» • Automatic transaxle will hold 3rd gear when code P0760 generated		

CIRCUIT DIAGRAM



EKNB013A

TROUBLESHOOTING FLOW



EKNB013B

DIAGNOSTIC ITEM EKNB0140

P0745

DTC NO	DIAGNOSTIC ITEM	
P0745	PRESSURE CONTROL SOLENOID VALVE -A	- Open -, - Short circuit -

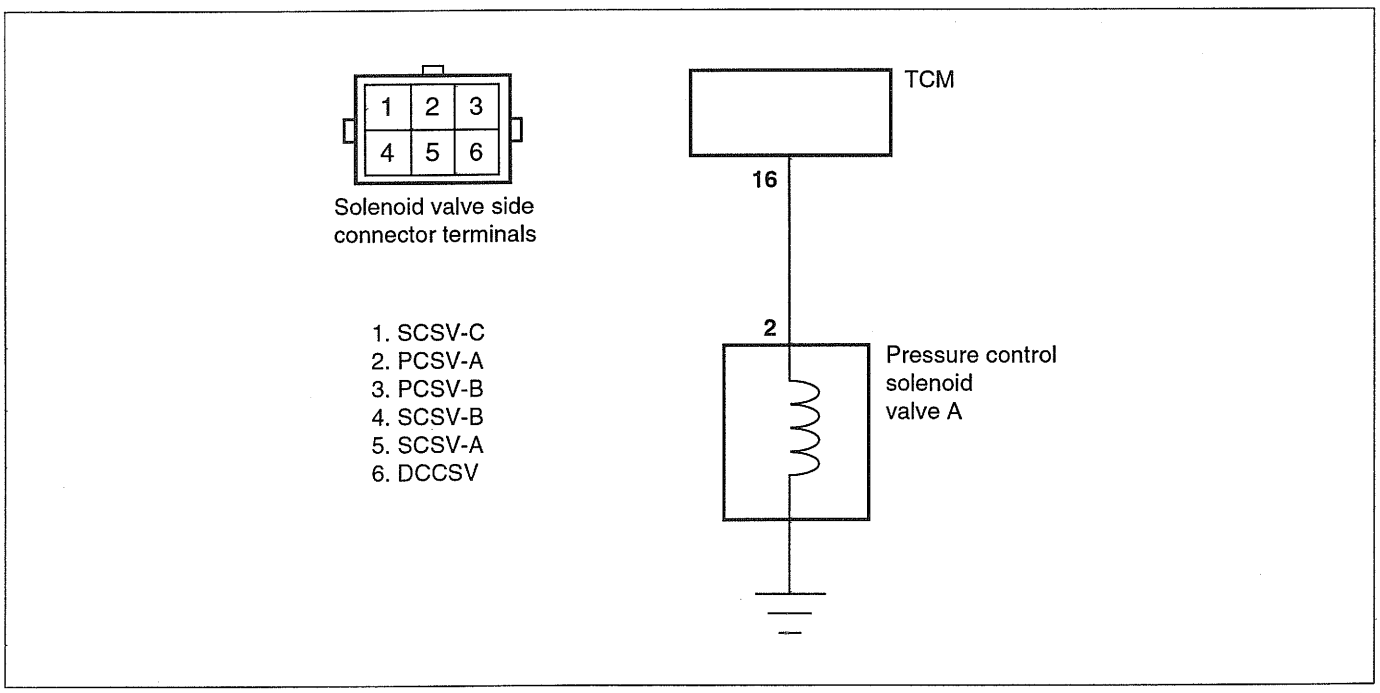
DESCRIPTION

- Controls fluid pressure that is acting on the pressure control valve-A (PCV-A) through Pulse Width Modulation signals from the TCM to control pressure during a shift.

TROUBLESHOOTING FLOW

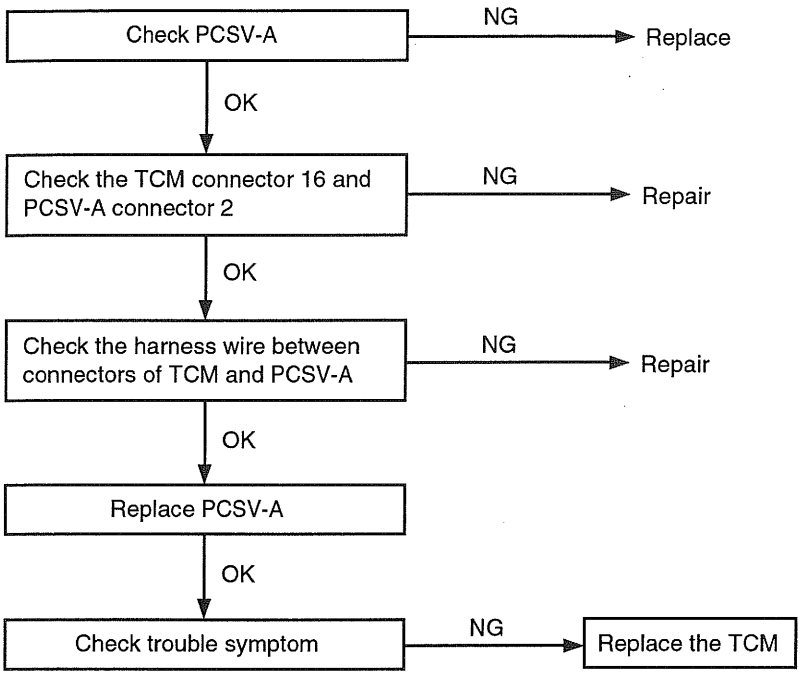
Detection condition	Possible cause	Check item
• IG S/W "ON" or start release • TCM senses an open • Short in the PCSV-A circuit	• Malfunction of PCSV-A • Malfunction of connector • Malfunction of TCM	• Open/short in PCSV-A circuit • Malfunction of PCSV-A
«SYMPTOM» • Shock felt as transaxle is engaged • Shift shock is felt as transaxle shifts through gears • Abrupt increase of engine rpm • When code P0745 is generated for the 4th time, automatic transaxle will hold 3rd gear (D) or 2nd gear (2,L)		

CIRCUIT DIAGRAM



EKNB014A

TROUBLESHOOTING FLOW



EKNB014B

DIAGNOSTIC ITEM EKKB1150

P0765

DTC NO	DIAGNOSTIC ITEM	
P0765	PRESSURE CONTROL SOLENOID VALVE-B	- Open -, - Short circuit -

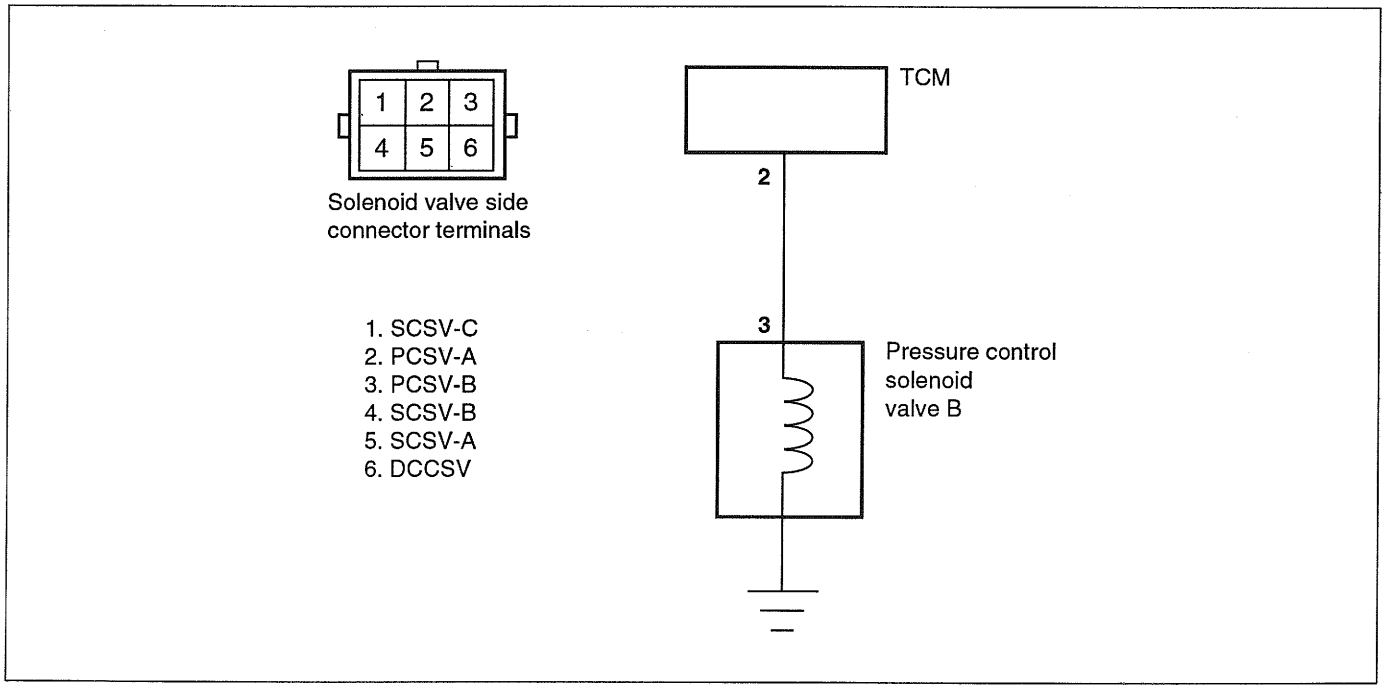
DESCRIPTION

- Controls fluid pressure that is acting on the pressure control valve-B (PCV-B) through Pulse Width Modulation signals from the TCM to control pressure during a shift.

TROUBLESHOOTING FLOW

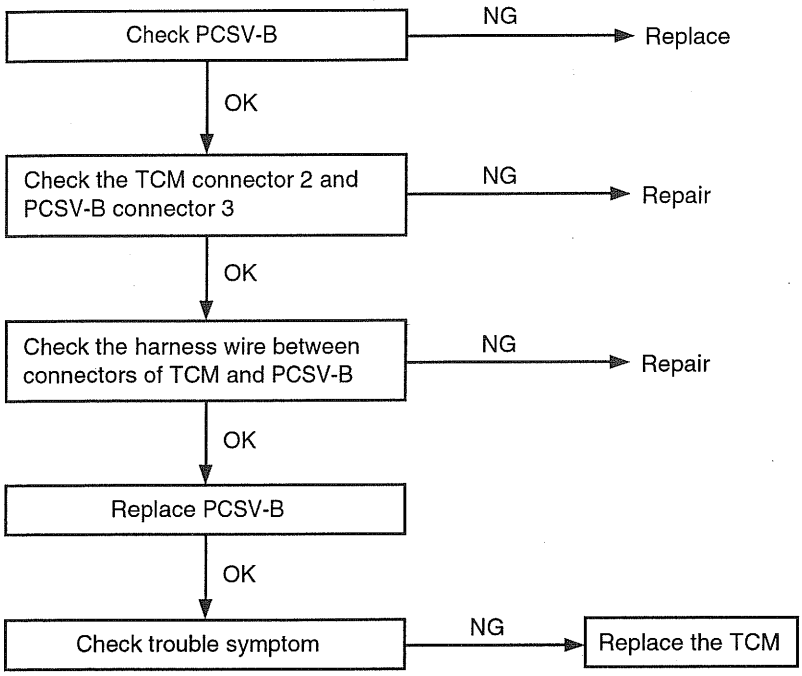
Detection condition	Possible cause	Check item
• IG S/W "ON" or start release • TCM senses an open • Short in the PCSV-B circuit	• Malfunction of PCSV-B • Malfunction of connector • Malfunction of TCM	• Open/short in PCSV-B circuit • Malfunction of PCSV-B
«SYMPTOM» • Shock felt as transaxle is engaged • Shift shock is felt as transaxle shifts through gears • Abrupt increase of engine rpm • When code P0765 is generated for the 4th time, automatic transaxle will hold 3rd gear (D) or 2nd gear (2,L)		

CIRCUIT DIAGRAM



EKNB115A

TROUBLESHOOTING FLOW



EKNB115B

DIAGNOSTIC ITEM EKNB0160

P0743/P0740

DTC NO	DIAGNOSTIC ITEM	
P0743	DAMPER CLUTCH CONTROL SOLENOID VALVE	- Open, short circuit -
P0740	DAMPER CLUTCH SYSTEM	- Stuck on -

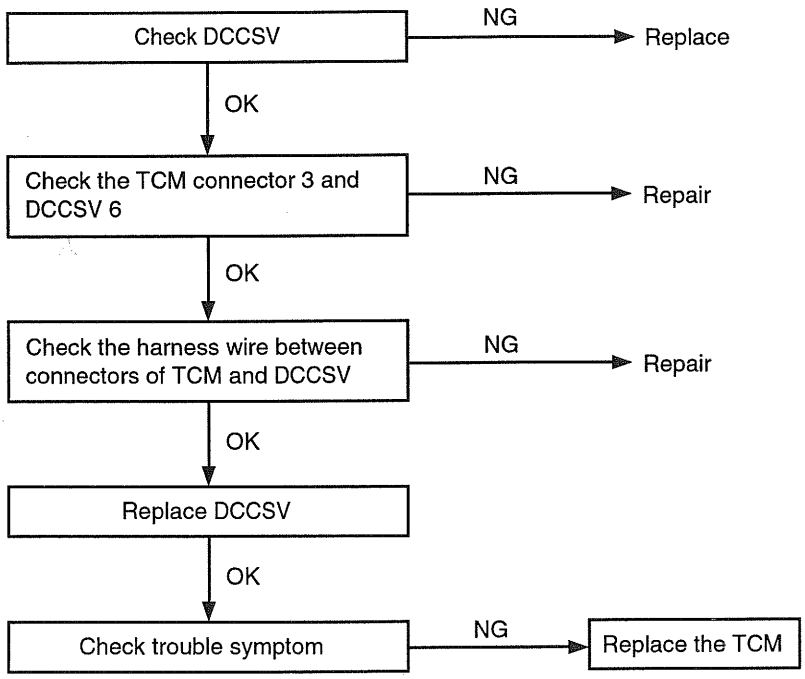
DESCRIPTION

- Controls fluid pressure that is acting on the damper clutch control valve through Pulse Width Modulation signals from the TCM to control the operation of the damper clutch.
- If damper clutch solenoid drive duty continues at 100% for 4 sec. or more, there is an abnormality in the damper clutch control system at DTC P0740 is output.

TROUBLESHOOTING FLOW

Detection condition	Possible cause	Check item
• IG S/W "ON" or start release • TCM senses an open • Short in DCCSV circuit	• Malfunction of DCCSV • Malfunction of connector • Malfunction of TCM	• Open/short in DCCSV circuit • Malfunction of DCCSV
«SYMPTOM» • Excessive fuel consumption • Poor performance		

TROUBLESHOOTING FLOW



EKNB016A

DIAGNOSTIC ITEM EKNB1170

P0731

DTC NO	DIAGNOSTIC ITEM	
P0731	FIRST GEAR INCORRECT RATIO	- MALFUNCTION -

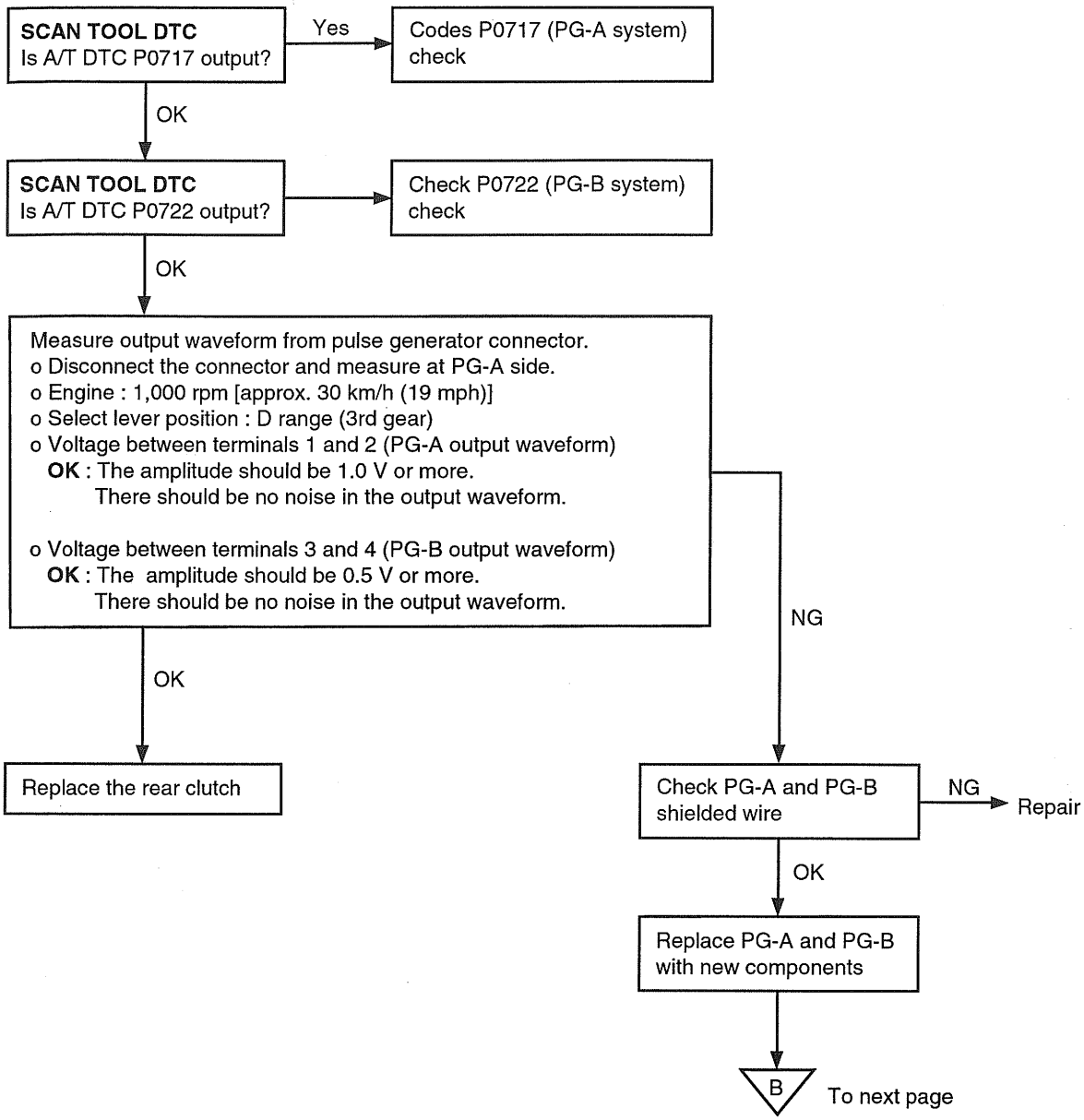
DESCRIPTION

- If the value resulting from driving the PG-A output (input shaft rotation speed) by the 1st gear ratio does not match the PG-B output (output shaft rotation speed) after 1st gear is engaged, DTC P0731 is output.

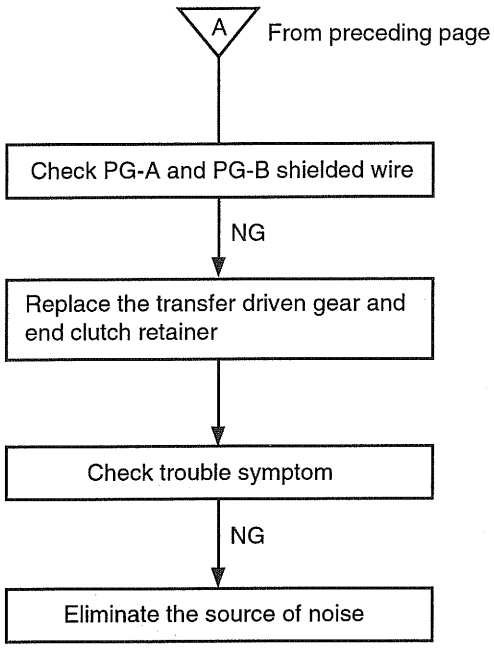
TROUBLESHOOTING FLOW

Detection condition	Possible cause	Check item
• Engine speed > 400 rpm • Transfer shaft speed > 900 rpm • Fluid temperature > 60°C • TCM senses a signal that does not fall into the preprogrammed parameters	Malfunction ; • PG-A or PG-B • Transfer driven gear • Rear clutch • One-way clutch	• Malfunction of pulse generator circuit • Rear clutch slippage • One-way clutch slippage
«SYMPTOM» • Automatic transaxle will hold 3rd gear (D) or 2nd gear (2,L) • Code P0717 or P0722 may also be set (pulse generator codes)		

TROUBLESHOOTING FLOW



EKDA017A


A
From preceding page
Check PG-A and PG-B shielded wire
NG
Replace the transfer driven gear and end clutch retainer
Check trouble symptom
NG
Eliminate the source of noise

EKDA017B

DIAGNOSTIC ITEM EKNB1180

P0732

DTC NO	DIAGNOSTIC ITEM	
P0732	SECOND GEAR SYSTEM	MALFUNCTION

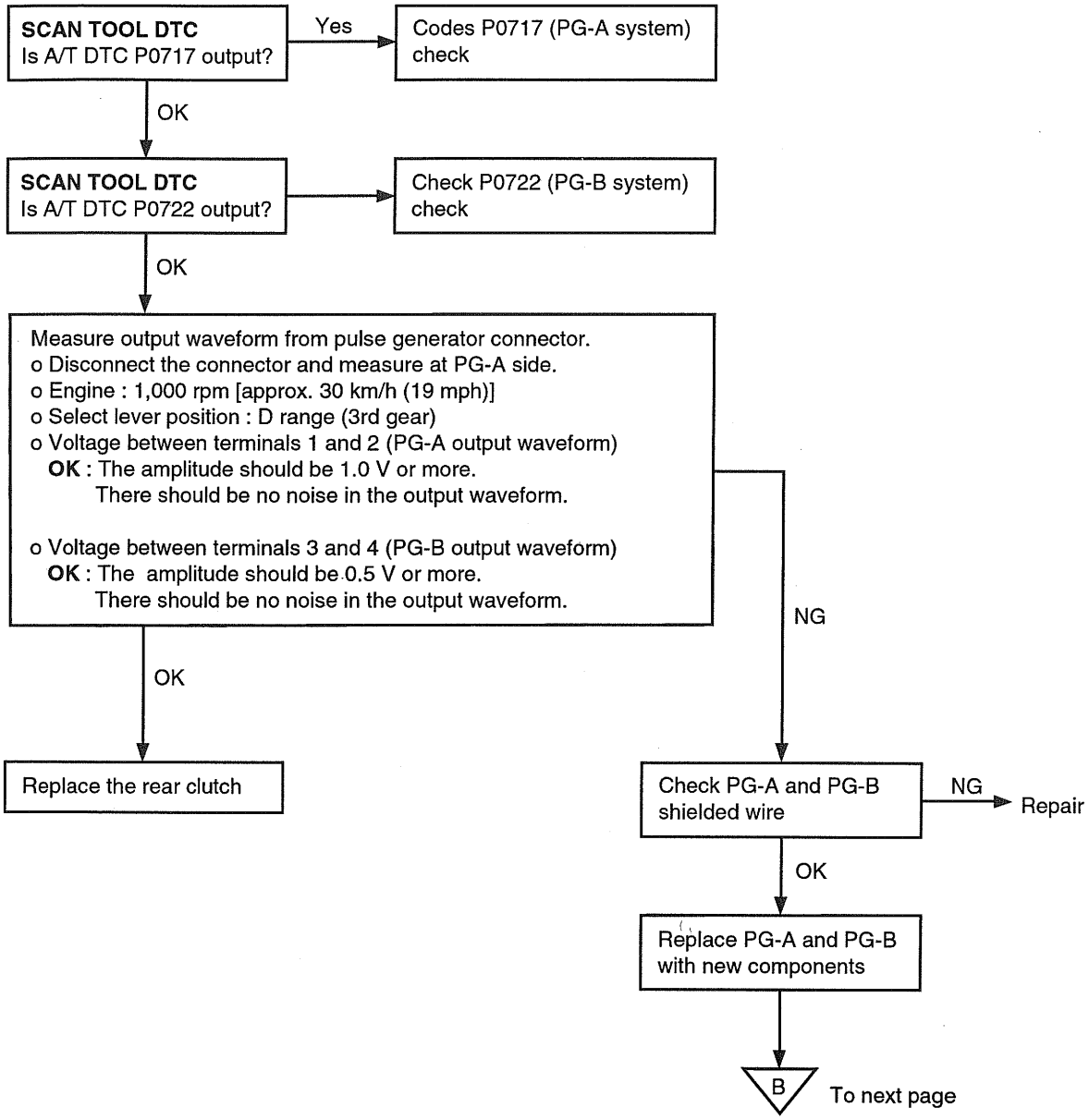
DESCRIPTION

- If the value resulting from driving the PG-A output (input shaft rotation speed) by the 2nd gear ratio does not match the PG-B output (output shaft rotation speed) after 2nd gear is engaged, DTC P0732 is output.

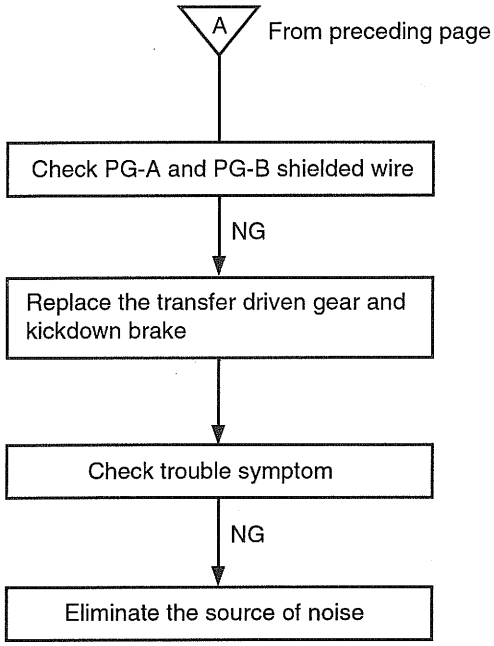
TROUBLESHOOTING GUIDE

Detection condition	Possible cause	Check item
• If the value resulting from driving the PG-A output (input shaft rotation speed) by the 2nd gear ratio does not match the PG-B output (output shaft rotation speed) after 2nd gear is engaged, DTC P0732 is output	Malfunction ; • PG-A or PG-B • Transfer driven gear • Rear clutch • Kickdown brake	• Malfunction of pulse generator circuit • Rear clutch slippage • Kickdown brake slippage
«SYMPTOM» • Automatic transaxle will hold in 3rd gear (D) or 2nd gear (2,L)		

TROUBLESHOOTING FLOW



EKDA017A


A
From preceding page
Check PG-A and PG-B shielded wire
NG
Replace the transfer driven gear and kickdown brake
Check trouble symptom
NG
Eliminate the source of noise

EKNB118A

DIAGNOSTIC ITEM EKNB1190

P0733

DTC NO	DIAGNOSTIC ITEM	
P0733	THIRD GEAR SYSTEM	- MALFUNCTION -

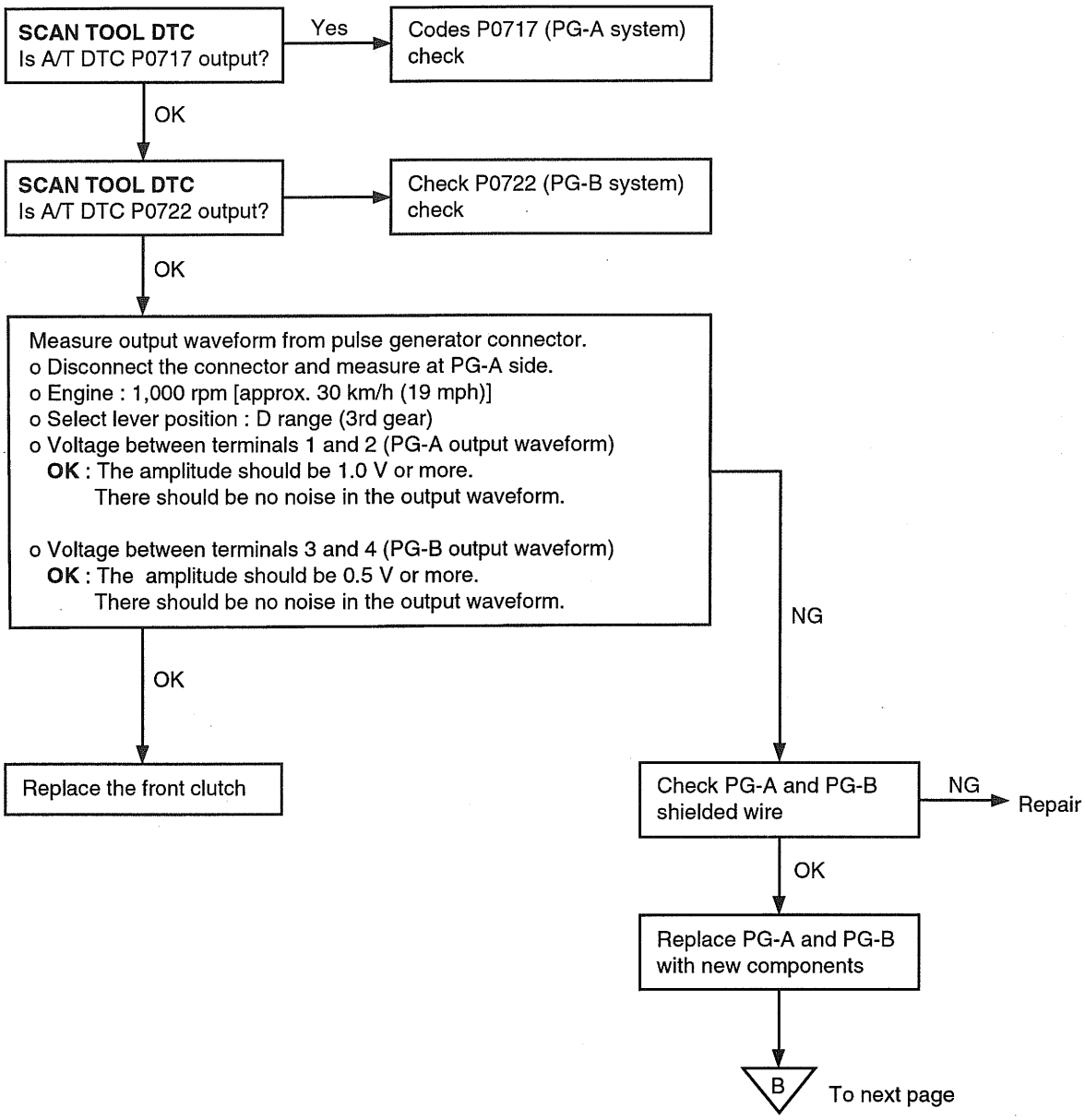
DESCRIPTION

- If the value resulting from driving the PG-A output (input shaft rotation speed) by the 3rd gear ratio does not match the PG-B output (output shaft rotation speed) after 3rd gear is engaged, DTC P0733 is output.

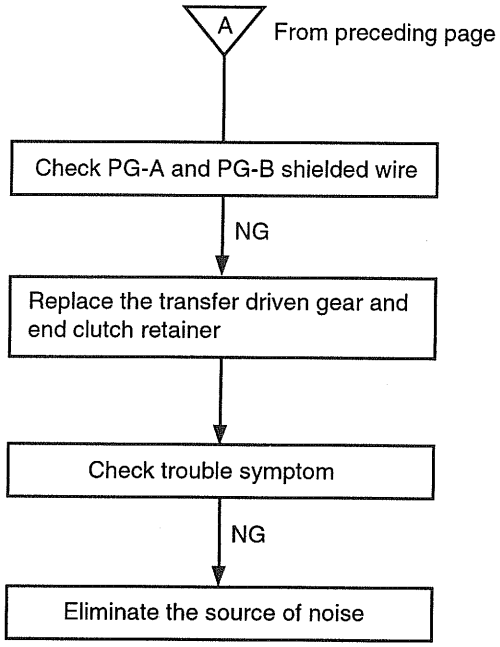
TROUBLESHOOTING GUIDE

Detection condition	Possible cause	Check item
• Engine speed > 400 rpm • Transfer shaft speed > 900 rpm • Fluid temperature > 60°C • TCM senses a signal that does not fall into the preprogrammed parameters	Malfunction : • PG-A or PG-B • Transfer driven gear • End clutch retainer • Front clutch	• Malfunction of pulse generator circuit • Rear clutch slippage • Front clutch slippage
«SYMPTOM» • Automatic transaxle will hold 3rd gear (D) or 2nd gear (2,L) when code P0731, P0732, P0733,P0734 is output • Code P0717 or P0722 may also be set (pulse generator codes)		

TROUBLESHOOTING FLOW



EKNB119A


A
From preceding page
Check PG-A and PG-B shielded wire
NG
Replace the transfer driven gear and end clutch retainer
Check trouble symptom
NG
Eliminate the source of noise

EKDA017B

DIAGNOSTIC ITEM EKNB1200

P0734

DTC NO	DIAGNOSTIC ITEM	
P0734	FOURTH GEAR SYSTEM	- MALFUNCTION -

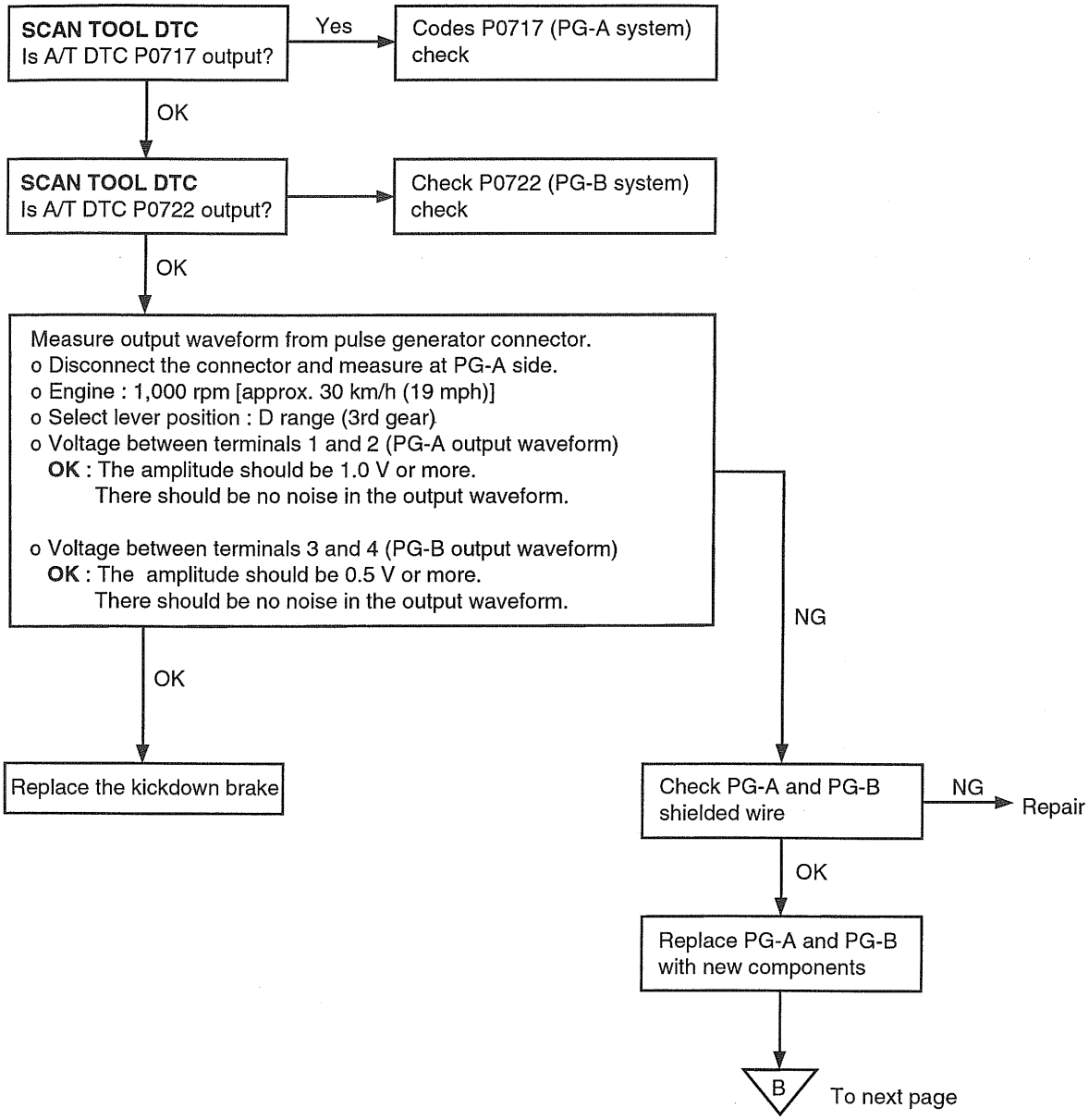
DESCRIPTION

- If the value resulting from driving the PG-A output (input shaft rotation speed) by the 4th gear ratio does not match the PG-B output (output shaft rotation speed) after 4th gear is engaged, DTC P0734 is output.

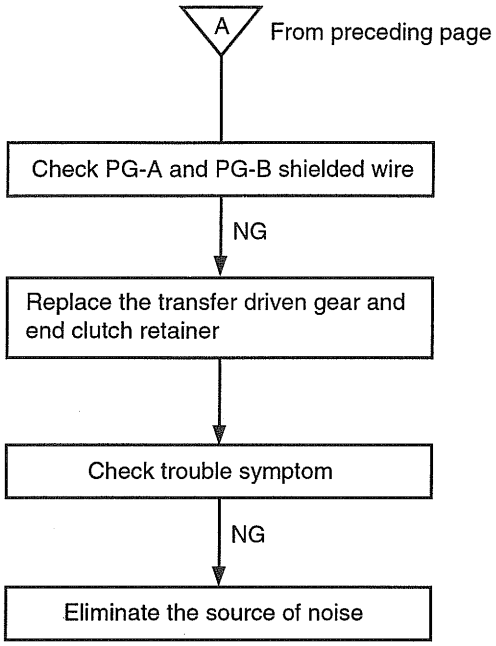
TROUBLESHOOTING GUIDE

Detection condition	Possible cause	Check item
• Engine speed > 400 rpm • Transfer shaft speed > 900 rpm • Fluid temperture > 60°C • TCM senses a signal that does not fall into the preprogrammed parameters.	Malfunction : • PG-B • Transfer driven gear • End clutch retainer • Kickdown brake • End clutch	• Malfunction of pulse generator circuit • Kickdown brake slippage
«SYMPTOM» • Automatic transaxle will hold in 3rd gear (D) or 2nd gear (2,L) when code P0731, P0732, P0733, P0734 is output. • Code P0717 or P0722 may also be set (pulse generator codes).		

TROUBLESHOOTING FLOW



EKNB121A


A
From preceding page
Check PG-A and PG-B shielded wire
NG
Replace the transfer driven gear and end clutch retainer
Check trouble symptom
NG
Eliminate the source of noise

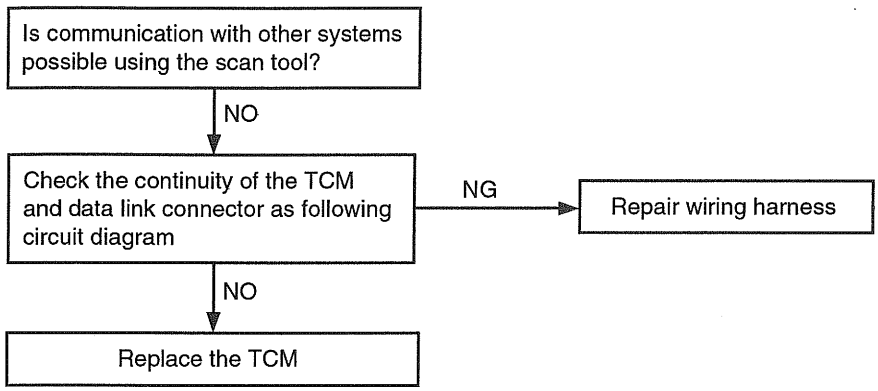
EKDA017B

INSPECTION CHART FOR TROUBLE SYMPTOMS EKNB1210

Trouble symptom		Inspection procedure No.	Reference page
Communication with scan tool is not possible		1	
Driving impossible	Starting impossible (will not crank)	2	
	Does not move forward	3	
	Does not back-up	4	
	Does not move (forward or reverse)	5	
Malfunction when starting	Engine stalling during shifting	6	
	Shocks when shifting from N to D and long lag time	7	
	Shocks when shifting from N to R and long lag time	8	
	Shocks when shifting from N to D,N to R and long lag	9	
Malfunction when shifting	Shocks when shifting from N to R and long lag time	10	
Early, late shift points	Shocks when shifting from N to D, N to R and long lag	11	
	Shocks and flare shift	12	
Does not shift	All points	13	
Malfunction while driving	Some points (poor acceleration)	14	
	Vibration	15	
	Poor acceleration	16	

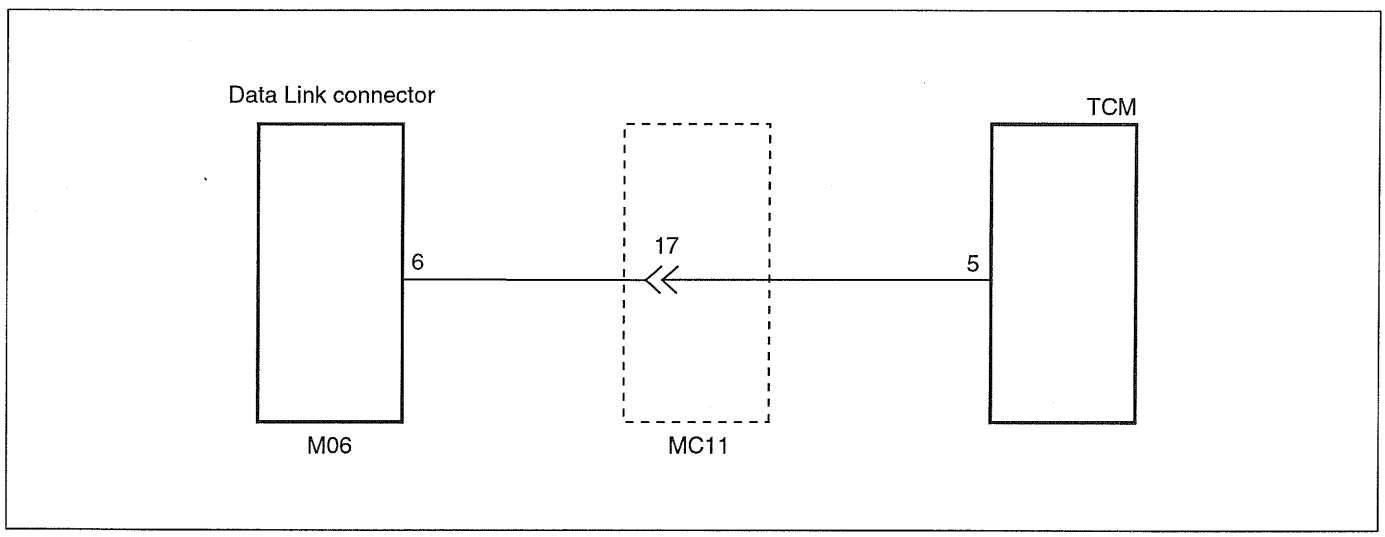
INSPECTION PROCEDURE 1

Communication with scan tool is not possible	Possible cause
If communiction with the scan tool is not possible, the cause may be a defective diagnosis line or TCM is not functioning	• Malfunction of diagnosis line • Malfunction of TCM power supply circuit • Malfunction of TCM ground circuit • Malfunction of TCM



EKDA021A

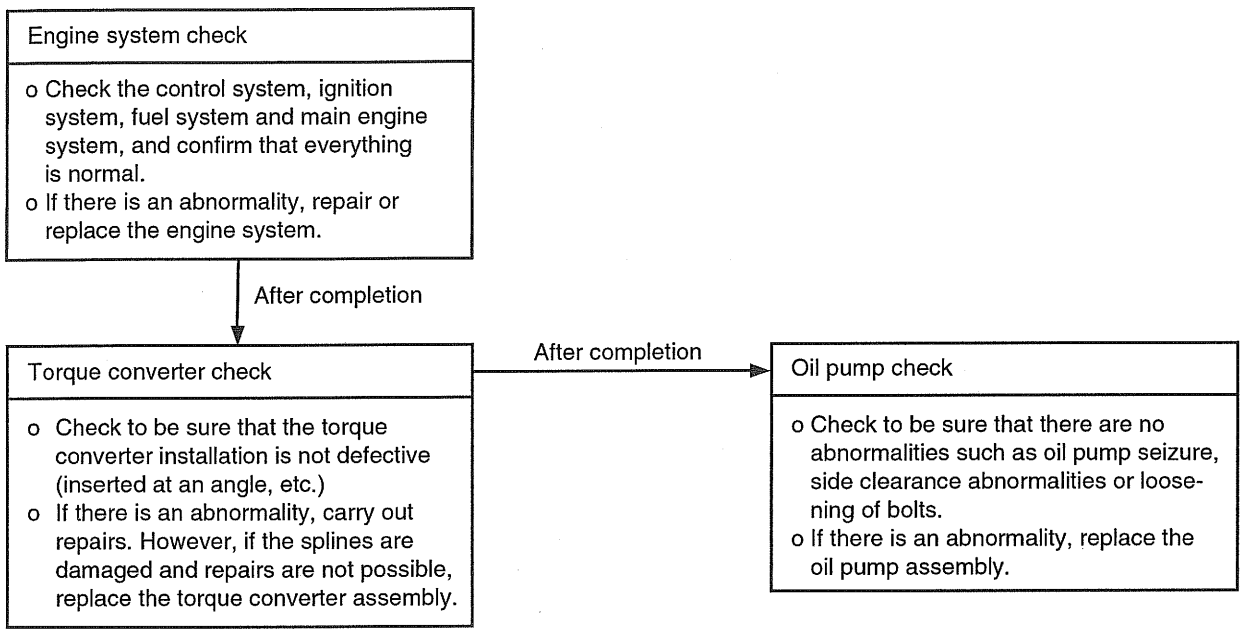
CIRCUIT DIAGRAM



EKNB121B

INSPECTION PROCEDURE 2

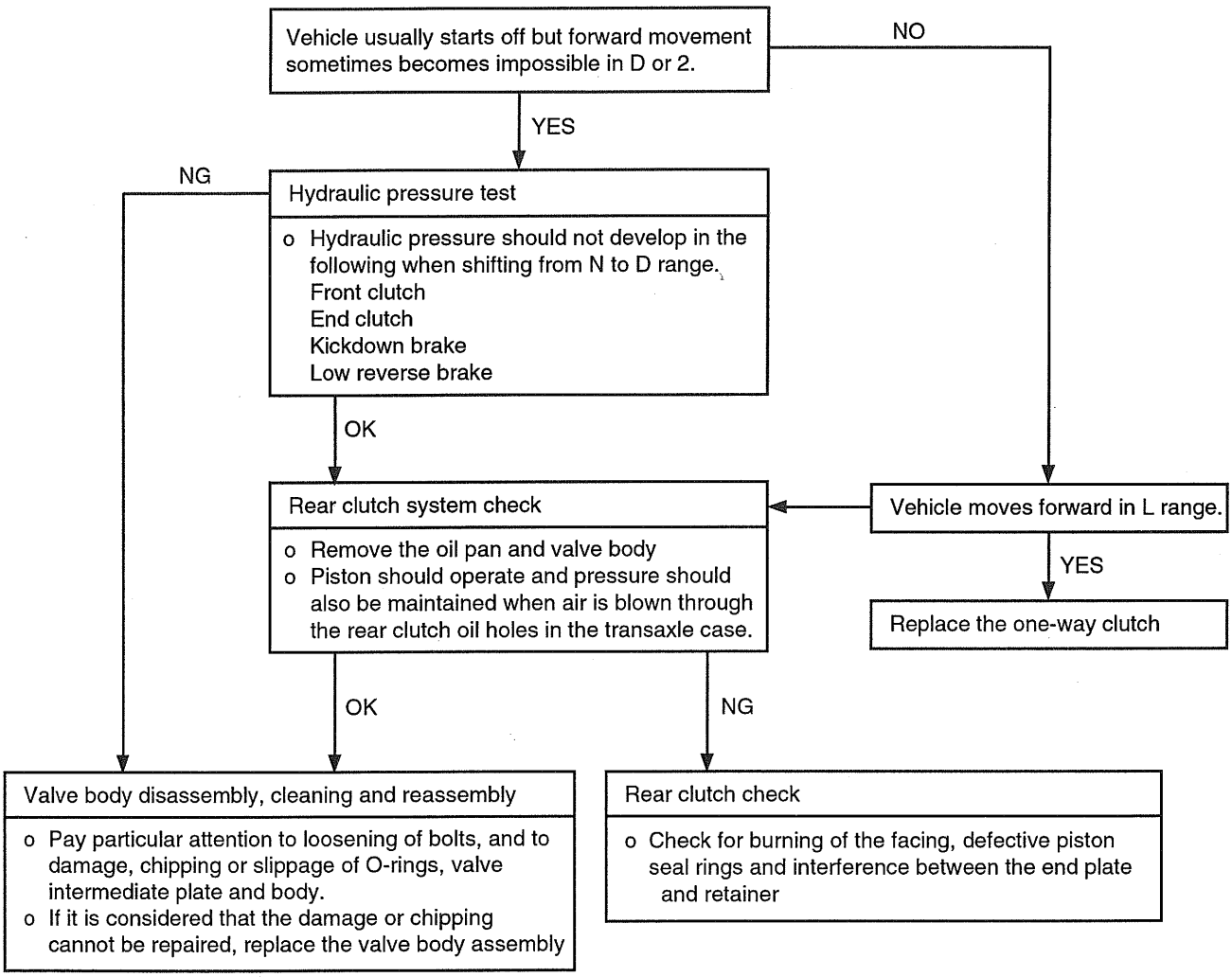
Starting Impossible (will not crank)	Possible cause
Starting is not possible when the selector lever is in P or N range. In such cases, the cause may be a defective engine system, torque converter or oil pump	• Malfunction of the engine system • Malfunction of the oil pump • Malfunction of the torque converter



EKDA021C

INSPECTION PROCEDURE 3

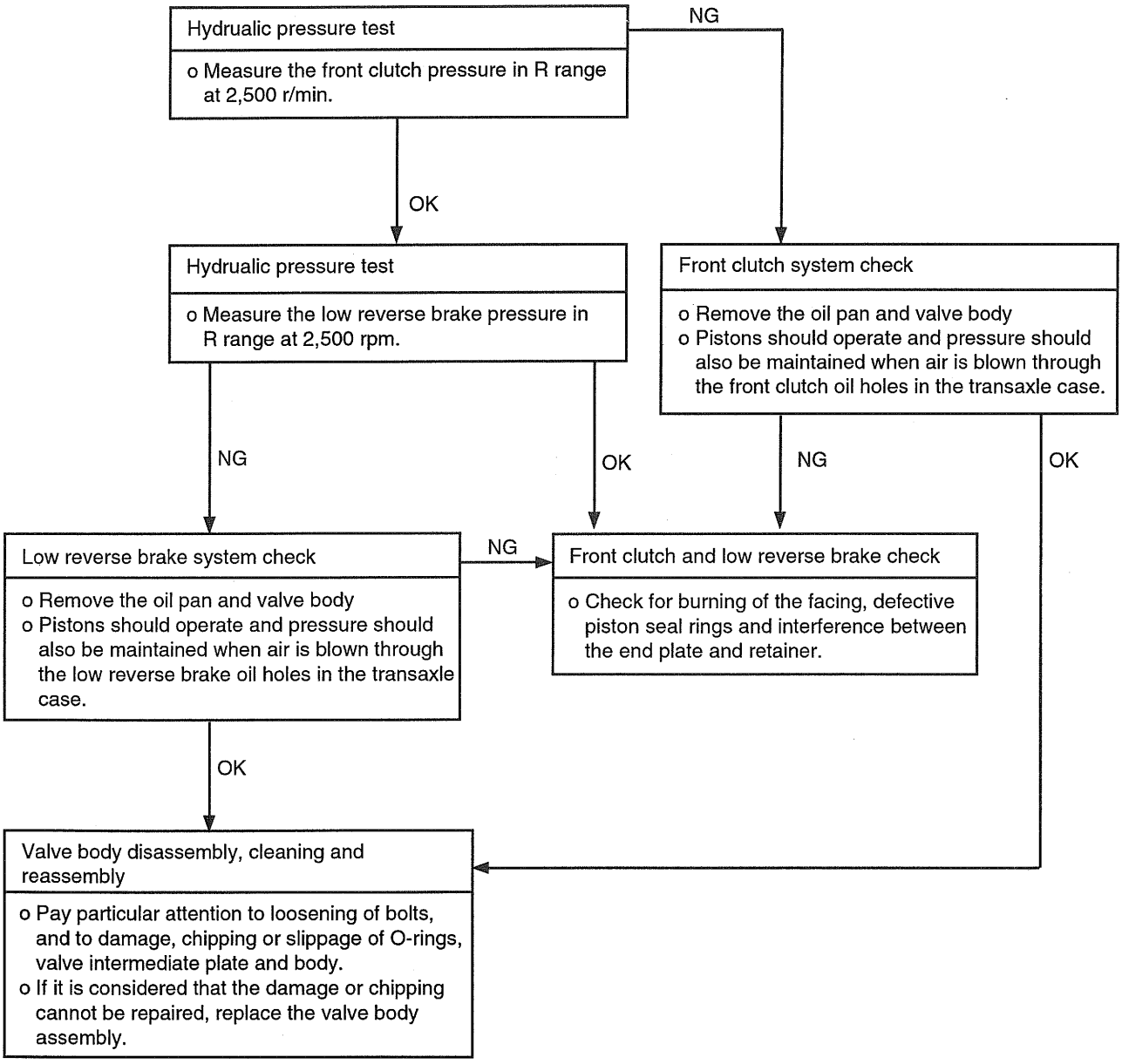
Does not move forward	Possible cause
When the engine is idling, the vehicle does not move forward even if the selector lever is shifted from N to D, 2 or L range. In such cases, the cause may be abnormal line pressure, or a defective rear clutch or one-way clutch.	• Abnormal line pressure • Malfunction of rear clutch • Malfunction of one-way clutch • Malfunction of valve body



EKDA021D

INSPECTION PROCEDURE 4

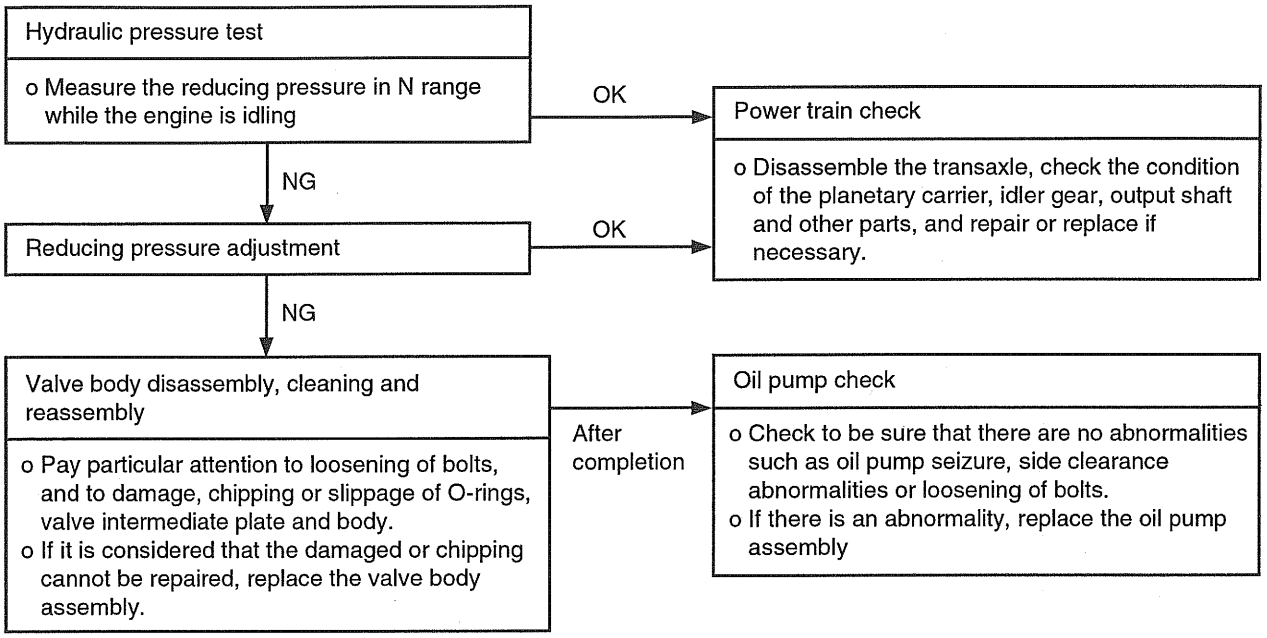
Does not move back-up	Possible cause
When the engine is idling, the vehicle does not back-up even if the selector lever is shifted from N to R range. In such cases, the cause may be abnormal pressure in the low reverse brake or front clutch, or a defective low reverse brake or front clutch.	• Abnormal low reverse brake pressure • Abnormal front clutch pressure • Malfunction of front clutch • Malfunction of low reverse brake • Malfunction of valve body



EKFA121E

INSPECTION PROCEDURE 5

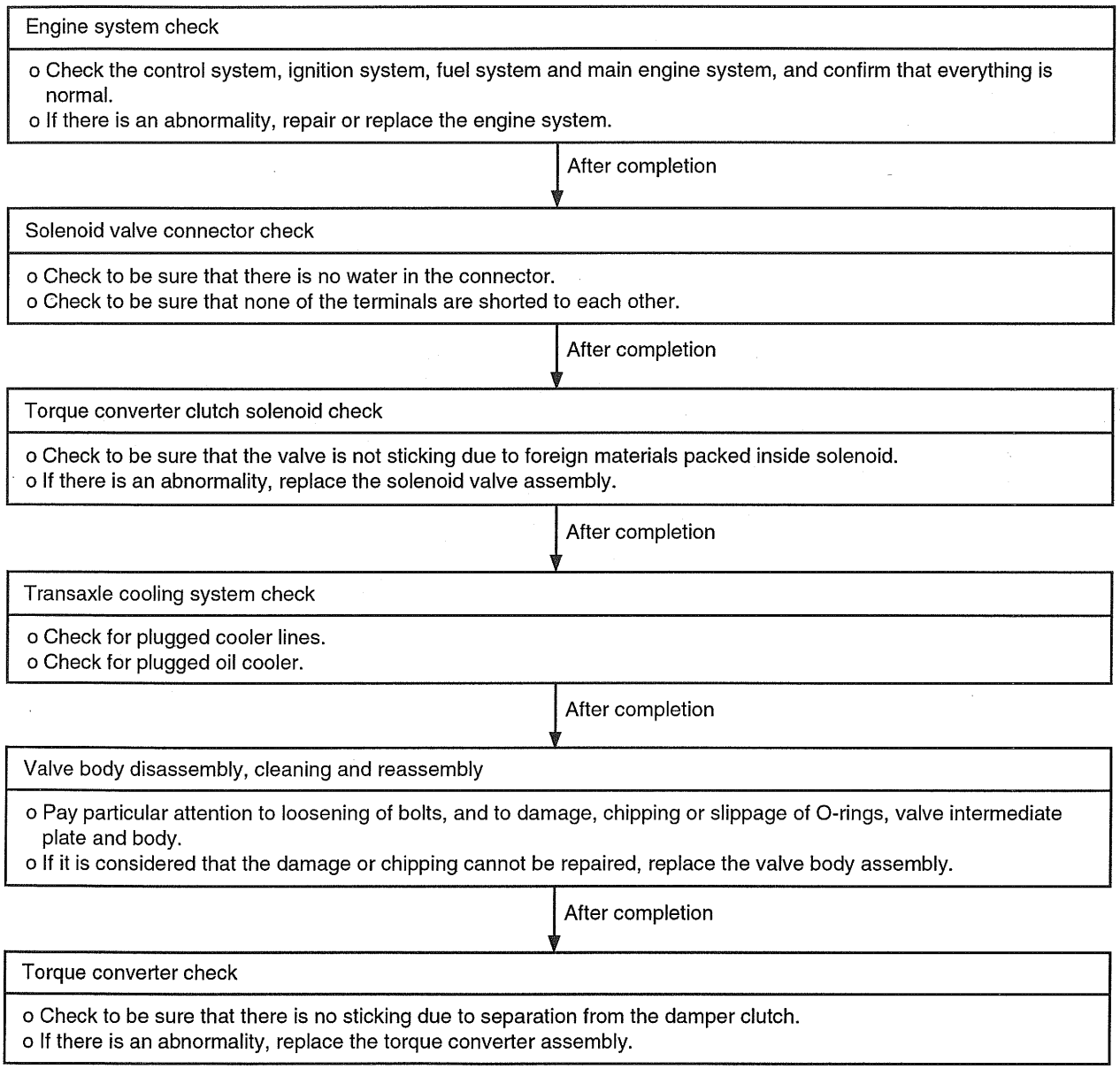
Does not move (forward or reverse)	Possible cause
When the engine is idling, the vehicle does not move forward or reverse even if the selector lever is shifted from N to D, 2, L or R range. In such cases, the cause may be abnormal reducing pressure, or a defective oil pump or power train.	• Abnormal reducing pressure • Malfunction of power train • Malfunctin of oil pump • Malfunction of valve body



EKFA121F

INSPECTION PROCEDURE 6

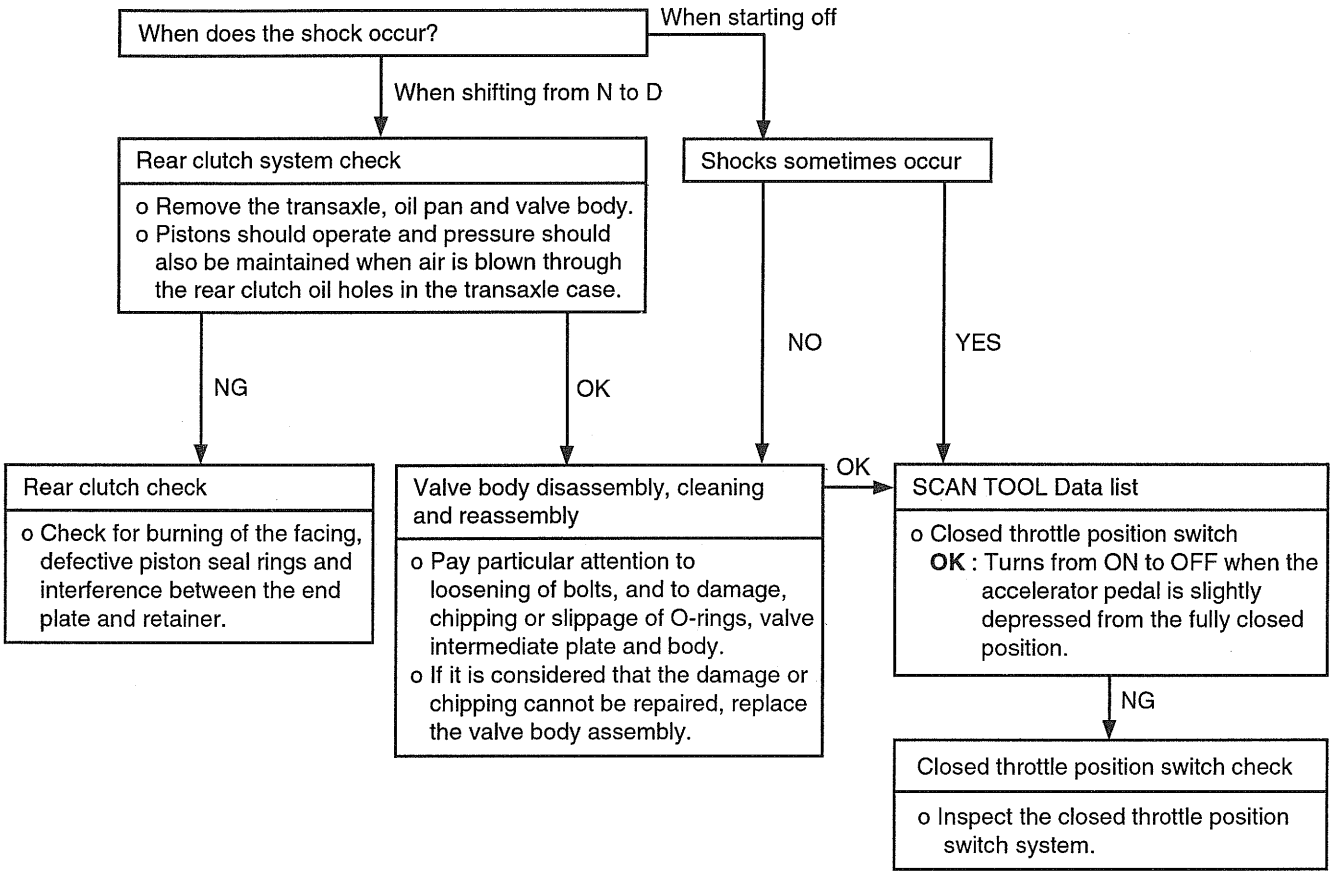
Engine stalling during shifting	Possible cause
When the engine is idling, the engine stalls when the selector lever is shifted from N to D, 2, L or R range. In such cases, the cause may be a defective engine system or damper clutch control solenoid valve	• Malfunction of engine system • Malfunction of torque converter clutch solenoid • Malfunction of valve body • Malfunction of torque converter



EKDA021G

INSPECTION PROCEDURE 7

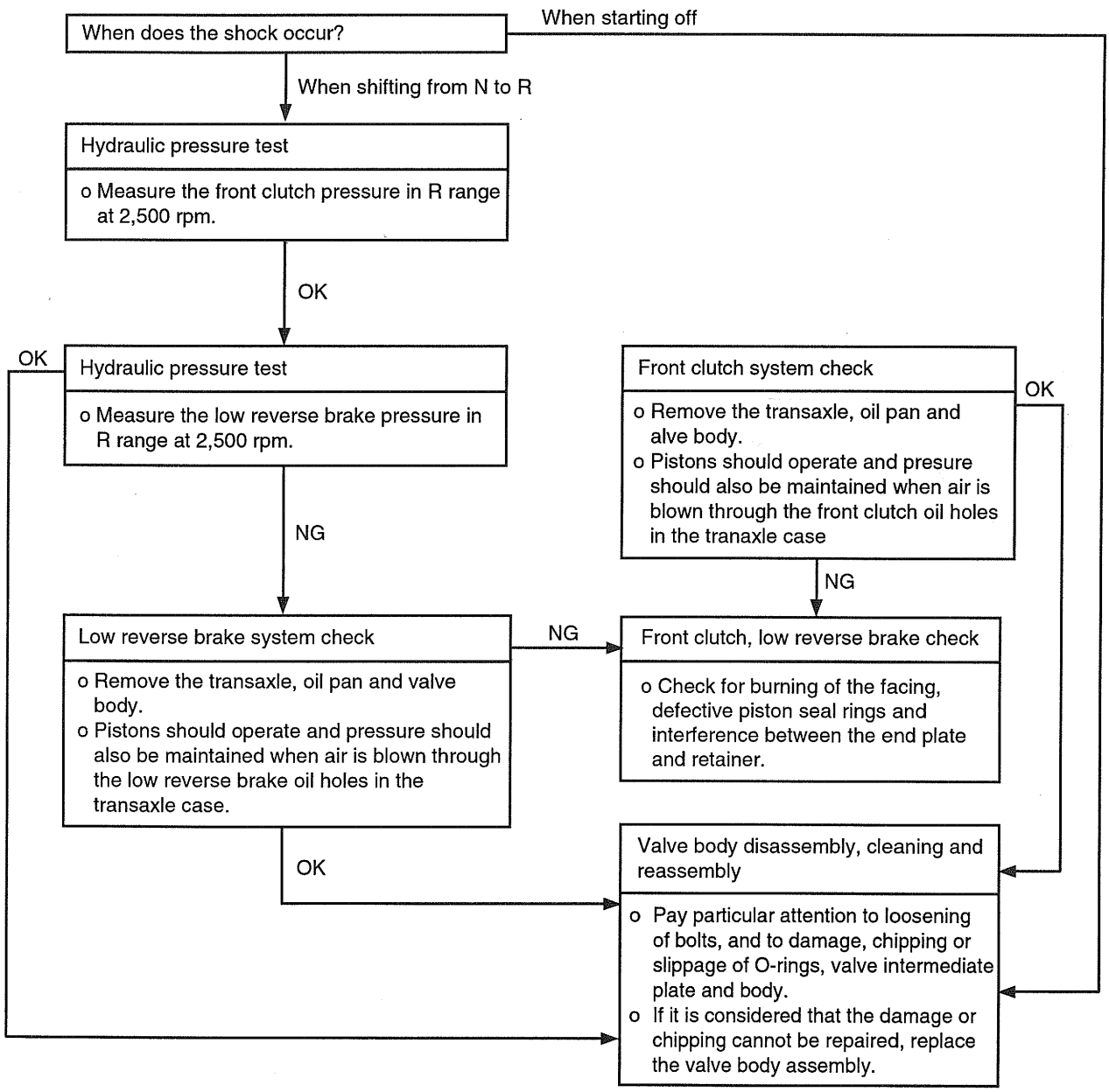
Shocks when shifting from N to D and long lag time	Possible cause
When the engine is idling, abnormal shocks or a lag time of 2 seconds or more occur when the selector lever is shifted from N to D range. In such case, the cause may be a defective rear clutch or valve body	• Malfunction of rear clutch • Malfunction of valve body • Malfunction of closed throttle position switch



EKNB121C

INSPECTION PROCEDURE 8

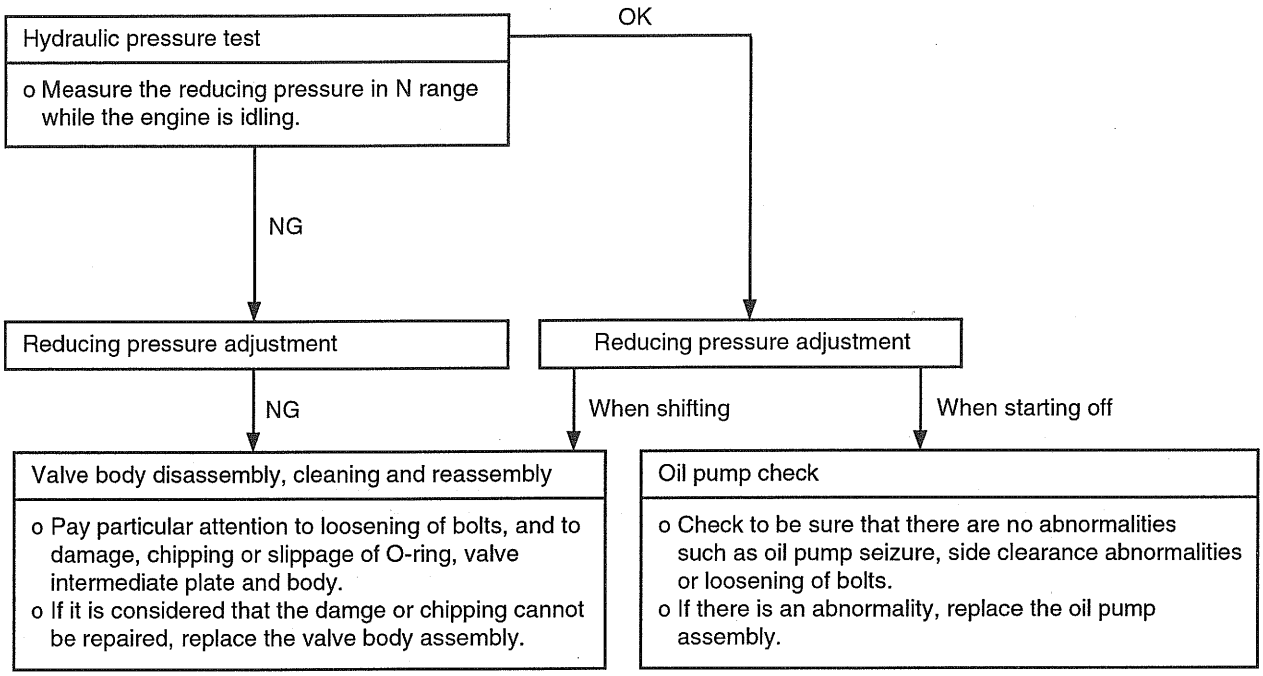
Shocks when shifting from N to R and long lag time	Possible cause
When the engine is idling, abnormal shocks or a lag time of 2 seconds or more occurs when the selector lever is shifted from N to R range. In such cases, the cause may be abnormal low reverse brake or front clutch pressure, or a defective low reverse brake or front clutch.	• Abnormal front clutch pressure • Abnormal low reverse brake pressure • Malfunction of front clutch • Malfunction of low reverse brake • Malfuntion of valve body



EKFA121I

INSPECTION PROCEDURE 9

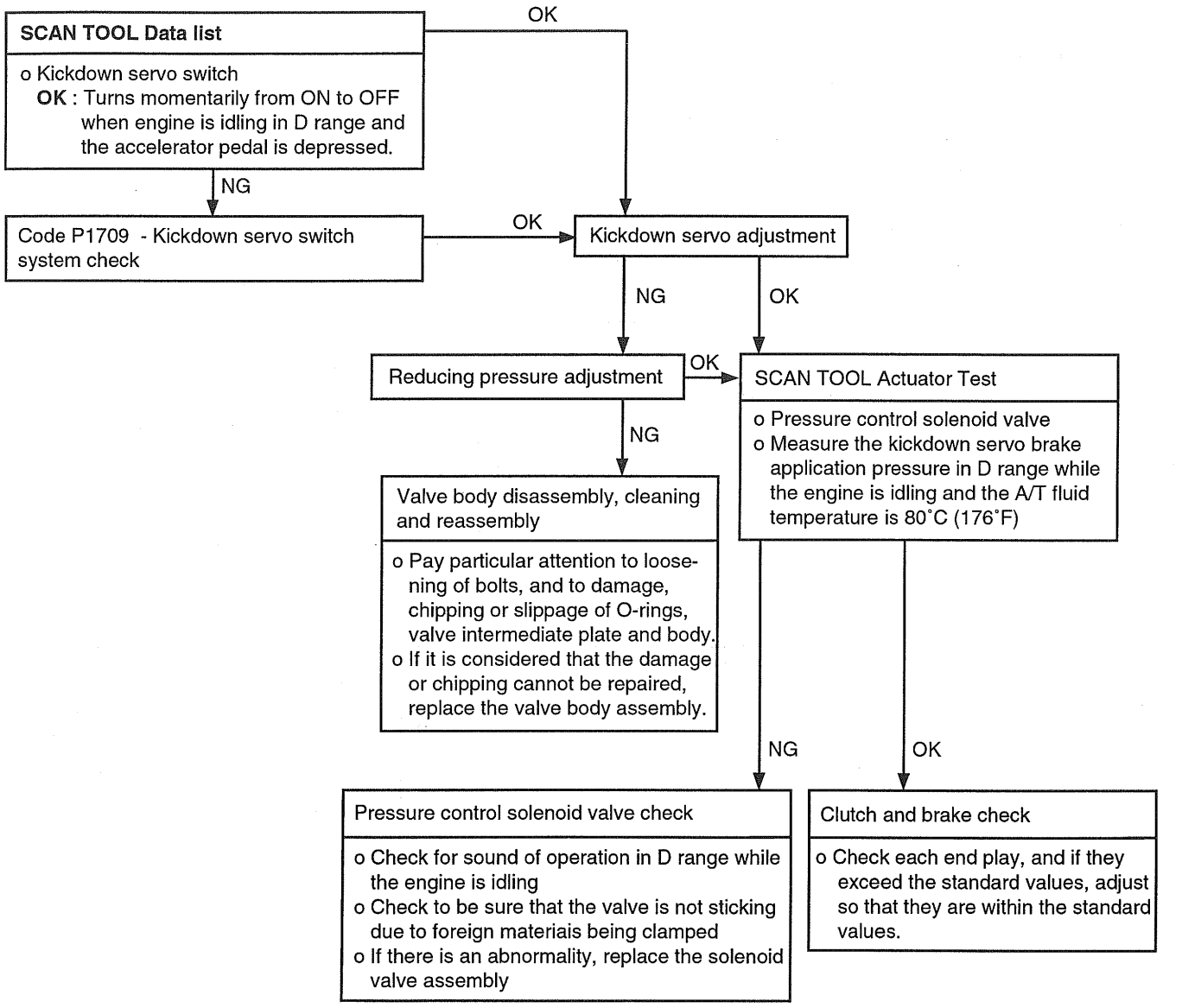
Shocks when shifting from N to D,N to R and long lag time	Possible cause
When the engine is idling, abnormal shocks or a lag time of 2 seconds or more occur when the selector lever is shifted from N to D range and s from N to R range. In such cases, the cause may be abnormal reducing pressure or a defective oil pump.	• Abnormal reducing pressure • Malfunction of oil pump • Malfunction of valve body



EKFA121J

INSPECTION PROCEDURE 10

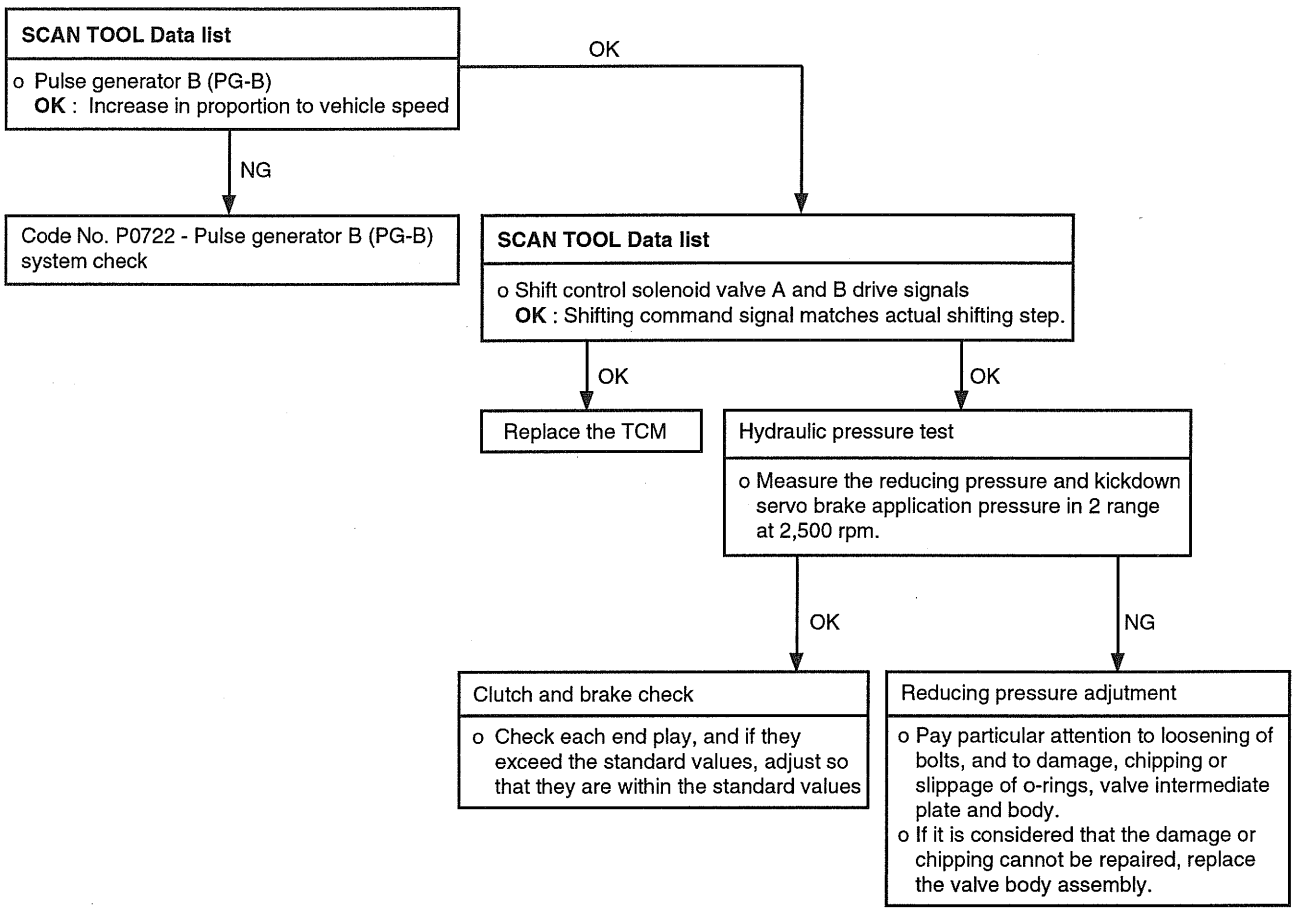
Shocks and flare shifts	Probable cause
Shocks occur when driving due to upshifting or downshifting. In addition, the engine speed during shifting increases abnormally in comparison to normal shifting. In such cases, the cause is probably abnormal reducing pressure or a defective kickdown servo switch.	• Malfunction of kickdown servo switch • Abnormal reducing pressure Malfunction of valve body • Malfunction of closed throttle position switch • Malfunction of pressure control solenoid valve • Malfunction of clutches and brakes



EKKB121B

INSPECTION PROCEDURE 11

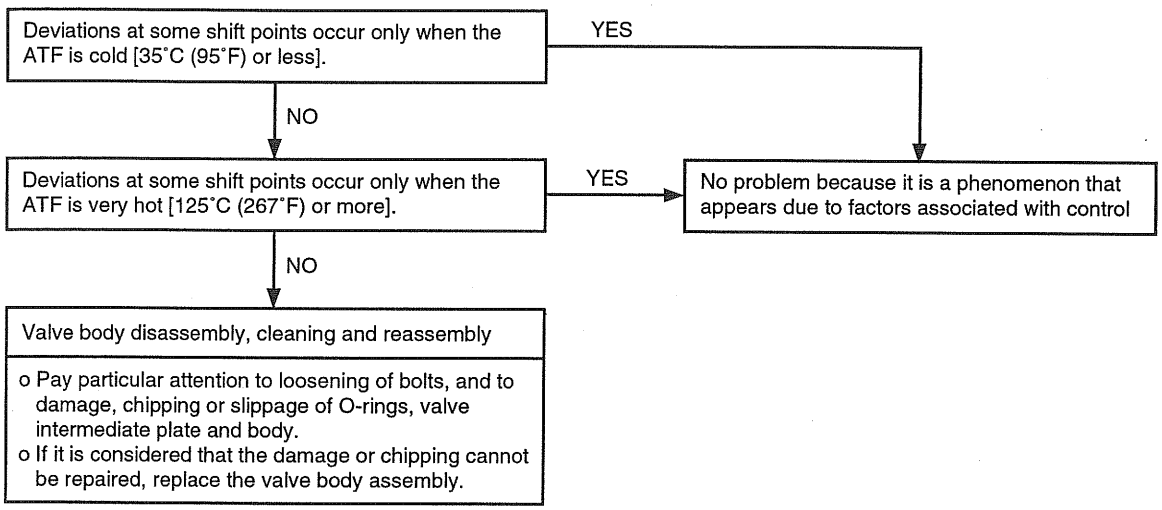
All points (Early, late shifting points)	Possible cause
All shift points occurs early, late while driving. In such cases, the cause may be a defective pulse generator B (PG-B) or shift control solenoid valve A or B (SCSV-A, B).	• Malfunction of pulse generator B (PG-B) • Malfunction of shift control solenoid valve A or B (SCSV-A, B) • Malfunction of TCM • Abnormal reducing pressure or kickdown servo brake application pressure • Malfunction of clutches and brake



EKFA121L

INSPECTION PROCEDURE 12

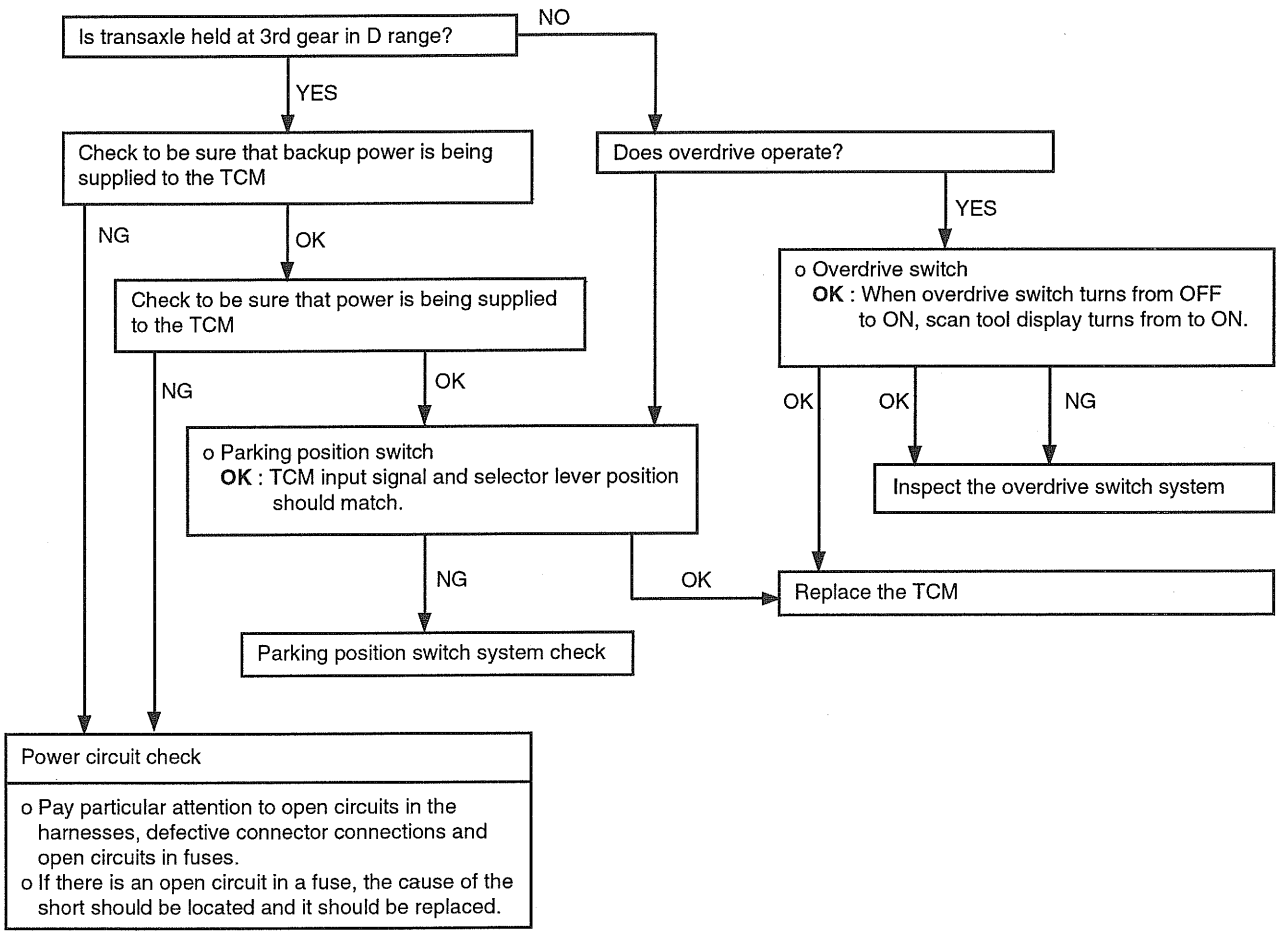
Some points (Early, late shifting points)	Possible cause
Some shift points occurs early, late while driving. In such cases, the cause may be a defective valve body, or it is phenomenon related to control and is not an abnormality.	• Malfunction of valve body



EKDA021M

INSPECTION PROCEDURE 13

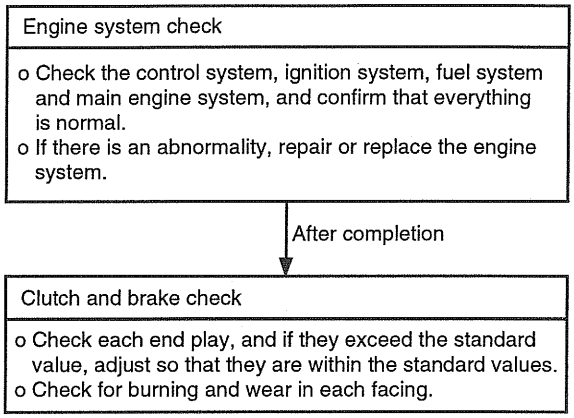
Does not shift	Possible cause
Shifting does not occur while driving, and no fail-safe codes are output. In such cases, the cause may be a defective overdrive switch or parking switch.	• Malfunction of overdrive switch • Malfunction of parking position switch • Malfunction of power supply circuit • Malfunction of TCM



EKNB121D

INSPECTION PROCEDURE 14

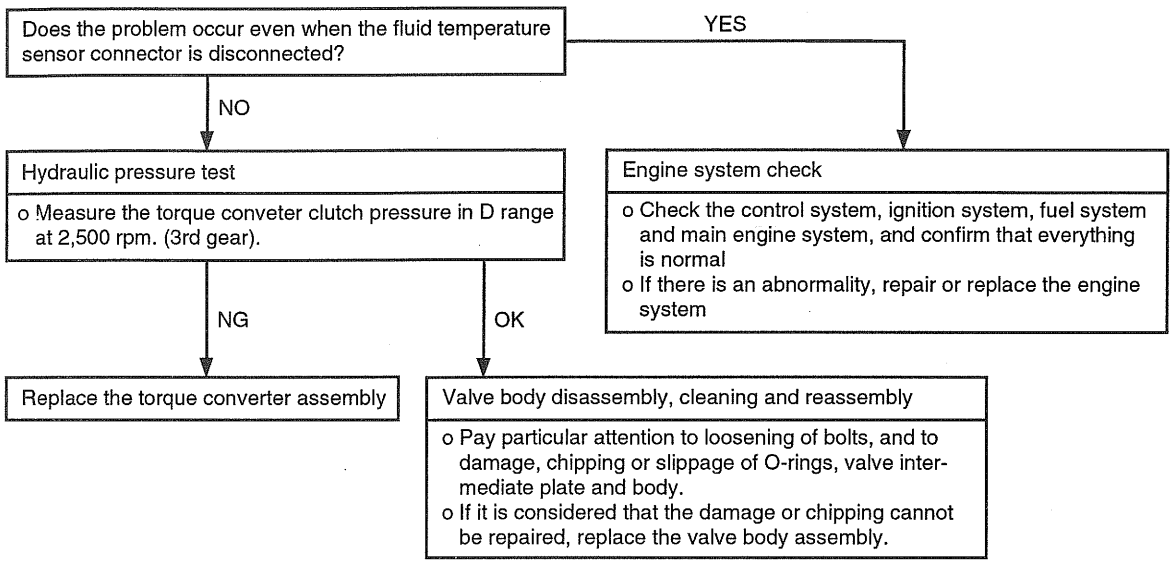
Poor acceleration	Possible cause
While driving, acceleration is poor even if downshifting is performed. In such cases, the cause may be a defective clutch or brake, or a defective engine system.	• Malfunction of clutch and brakes • Malfunction of engine system



EKDA021O

INSPECTION PROCEDURE 15

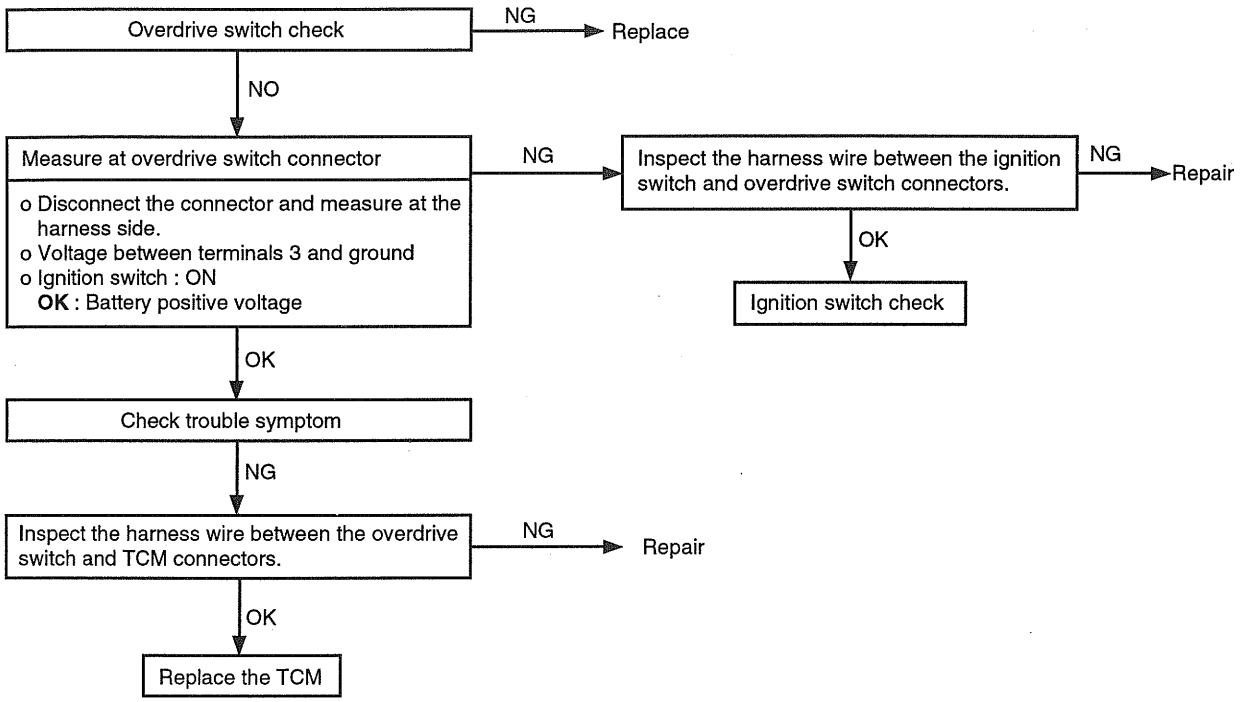
Vibration	Possible cause
Vibration occurs when driving at constant speed or when accelerating in top range. In such case, the cause may be abnormal torque converter clutch pressure or a defective torque converter.	• Abnormal torque converter clutch pressure • Malfunction of engine system • Malfunction of torque converter • Malfunction of valve body



EKFA121P

INSPECTION PROCEDURE 16

Overdrive switch system	Possible cause
In cases such as the above, the cause may be a defective overdrive switch circuit or defective ignition switch circuit.	• Malfunction of overdrive switch • Malfunction of connector • Malfunction of ignition switch • Malfunction of TCM



EKDA021Q

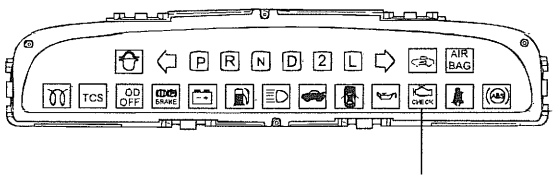
OBTAINING DIAGNOSTIC TROUBLE CODES EKNB0220

[USING HI-SCAN PRO]

1. Turn the ignition switch OFF.
2. Connect the Hi-Scan Pro to the data link connector on the coin box.
3. Turn the ignition switch ON.
4. Use the Hi-Scan Pro to check the diagnostic trouble code.
5. Repair the faulty part from the diagnosis chart.
6. Erase the diagnostic trouble code.
7. Disconnect the Hi-Scan Pro.

MALFUNCTION INDICATOR LIGHT (MIL)

An on-board diagnostic light comes on to notify the driver that there is problems in the vehicle. However, when an irregular state returns to normal, the malfunction indicator light will go out automatically after 3 driving cycles that have no same fault. Immediately after the ignition switch is turned on, the malfunction indicator light operates normally. (See FL-section)



Malfunction indicator lamp

EKNB022A

THE FOLLOWING ITEMS WILL BE INDICATED BY THE MIL.

- Fluid temperature sensor
- Pulse generator A (PG-A)
- Pulse generator B (PG-B)
- Shift control solenoid valve A (SCSV-A)
- Shift control solenoid valve B (SCSV-B)
- Shift control solenoid valve C (SCSV-C)
- Pressure control solenoid valve (PCSV-A)
- Pressure control solenoid valve B (PCSV-B)
- Damper clutch solenoid valve (DCCSV)
- Shift stage synchronize
- Ignition pulse
- Throttle position sensor
- Transaxle range switch
- Engine torque down permission line

SERVICE DATA (WHEN A HI-SCAN PRO IS USED) EKNB0230

Diagnosis items	Checking procedures		Checking items (Remedy)
	Check conditions	Normal value	
Throttle position sensor (TPS)	Accelerator pedal fully released	2-18%	• TPS or circuit harness if no change occurs • TPS or accelerator pedal cable if gradual change is not noted
	Press accelerator pedal slowly	Varies with accelerator opening	
	Accelerator pedal pressed to floor	80-100%	
Fluid temperature sensor	Cold engine (before starting)	Equivalent to outside air temperature	• Fluid temperature sensor or circuit harness
	While warming up engine	Gradual increase	
	After warming up engine	70-110°C	
Kickdown servo switch	L range : Idling	ON	• Kickdown servo misadjusted • Kickdown servo switch or circuit harness • Kickdown servo
	D range : First or third gear	ON	
	D range : Second or fourth gear	OFF	
Engine speed	P range : Idling Accelerator pedal : Fully closed	600-900 rpm	• Ignition system • Ignition signal pick-up circuit harness
	P range : Idling Accelerator pedal : depressed	Gradually rised from the value	
Air conditioning relay signals	P range : Idle, air conditioning ON	ON	• Air conditioning power relay circuit harness
	P range : Idle, air conditioning OFF	OFF	
Shift position	1st speed : 10km/h	First	• TCM • Transaxle range switch system • TPS system
	2nd speed : 30km/h	Second	
	3rd speed : 50km/h	Third	
	4th speed : 80km/h	Fourth	
Pulse generator A	D range (OD OFF) : driving at 50 km/h (31 mph) in third gear	1,500-2,000 rpm	• Pulse generator A or circuit harness • Pulse generator A shielded wire • Incoming noise from outside
	D range (OD ON) : driving at 80 km/h (50 mph) in fourth gear	1,700-2,000 rpm	
Pulse generator B	D range (OD OFF) : driving at 50 km/h (31 mph) in third gear	1,500-2,000 rpm	• Pulse generator B or circuit harness • Pulse generator B shielded wire • Incoming noise from outside
	D range (OD ON) : driving at 80 km/h (50 mph) in fourth gear	1,500-2,000 rpm	

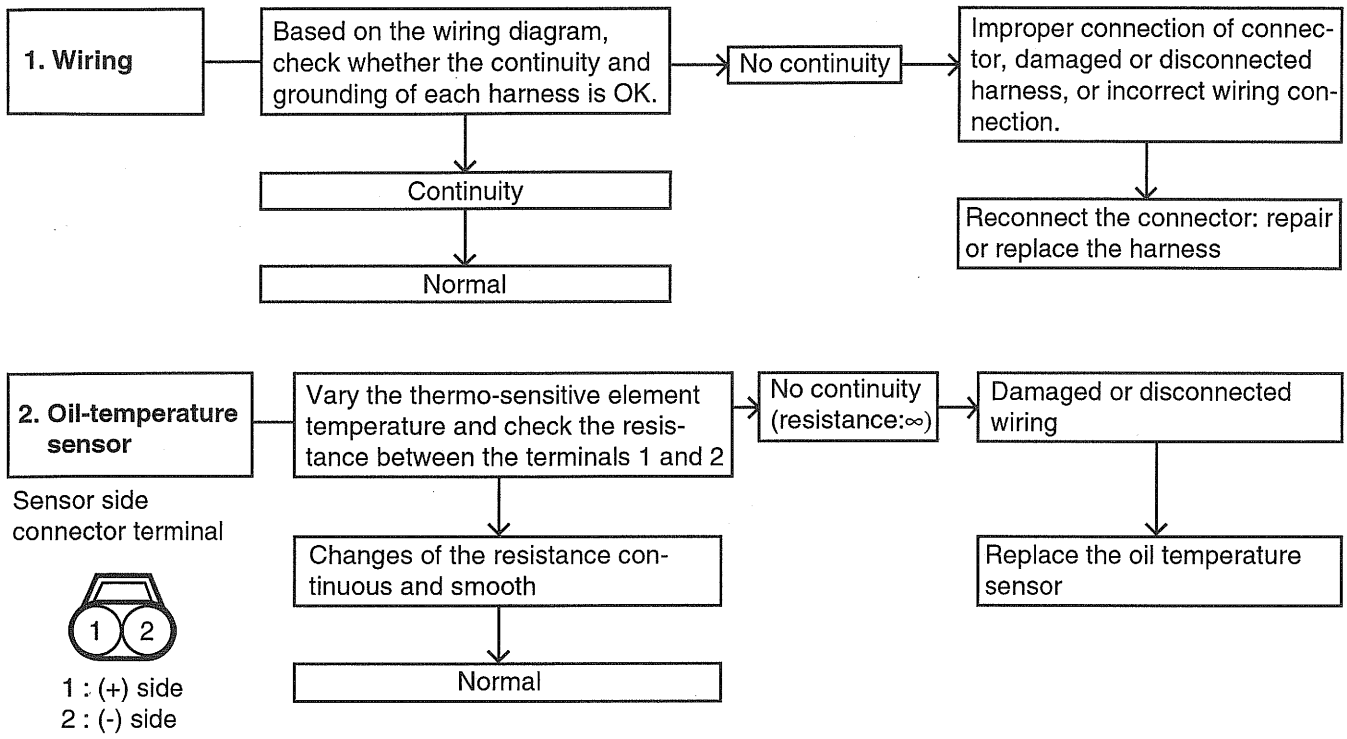
Diagnosis items	Checking procedures		Checking items (Remedy)
	Check conditions	Normal value	
Overdrive switch	• Ignition switch : ON • Engine : stopped • Overdrive switch is turned ON	OD-ON	• Overdrive switch or circuit harness
	• Ignition switch : ON • Engine : stopped • Overdrive switch is turned OFF	OD-OFF	
Transaxle range switch	Shift selector lever to P range	P	• Transaxle range switch misadjusted • Transaxle range switch or circuit harness • Manual control cable • If selector lever is inoperative, check shift lock mechanism
	Shift selector lever to R range	R	
	Shift selector lever to N range	N	
	Shift selector lever to D range	D	
	Shift selector lever to 2 range	2	
	Shift selector lever to L range	L	
Vehicle speed sensor	Keep vehicle stopped	0 km/h	• Vehicle speed sensor if high speed signal is delivered while vehicle is stopping • In other cases, vehicle speed sensor or circuit harness
	Driving at 40 km/h (25 mph) in 2 range	40 km/h (25 mph)	
	Driving at 50 km/h (31 mph) in D range, OD OFF	50 km/h (31 mph)	
PCSV-A duty	D range : Idling	75-90%	• When accelerator pedal is slightly pressed while idling in D range, duty should become 100% • TCM • TPS system
	D range : first gear	100 %	
PCSV-B duty	D range : Idling	0%	• TCM • TPS system
	D range : first gear	0%	
Torque converter slip amount	D range : third gear, 70km/h, OD OFF	0-50 rpm	• Torque converter • Ignition signal wire or pulse generator A system • Inappropriate transaxle fluid pressure • Torque converter control solenoid valve
DCCSV duty	D range : third gear, 70km/h, OD OFF	40-85%	• TCM • TPS system • Pulse generator A system • Torque converter control solenoid valve

ELEMENTS IN USE IN EACH GEAR EKKB0240

Select or lever position	Overdrive control switch	Shifting gear	Engine start	Parking Mechanism	Clutch				Brake	
					C1	C2	C3	OWC	B1	B2
P	-	Neutral	Possible	O						
R	-	Reverse	-		O					O
N	-	Neutral	Possible							
D	ON	First				O		O		
		Second				O			O	
		Third			O	O	O			
		Fourth					O		O	
D	OFF	First				O		O		
		Second				O			O	
		Third			O	O	O			
2	-	First				O		O		
		Second				O			O	
L	-	First				O				O

C1 : Front clutch
C2 : Rear clutch
C3 : End clutch
OWC : One way clutch
B1 : Kickdown brake
B2 : Low & reverse brake

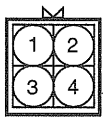
INSPECTION OF ELECTRONIC CONTROL SYSTEM COMPONENTS EKNB0250



EKFA125A

3. Pulse generator A or B

1-2 : Pulse generator A
3-4 : Pulse generator B

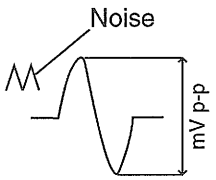


Check the resistance between terminals 1 and 2, 3 and 4.

- Resistance : very low or very high → Short-circuit, or damaged or disconnected wiring → Replace the pulse generator.
- 215-275 Ω/20°C (68°F) → Normal

4. Pulse generator A or B (check by using an oscillscope)

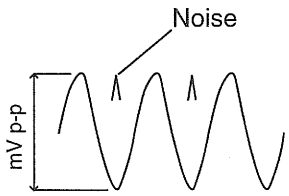
Oscilloscope wave form



Connect the pulse generator and body harness, and connect an oscilloscope. Check on a chassis dynamoter or with the front wheels raised.

With the selector lever at the "L" position and the engine running at 1,000 rpm, check the voltage waveform between terminals 1 and 2.

- Very low voltage → Incorrect installation of the pulse generator, or malfunction of the pulse generator. → Correct the installation condition, or replace the pulse generator.
- Noise in the waveform → Improper grounding of the pulse generator circuit's shielded wiring → Replace the pulse generator.
- 1,000 mVp-p or higher



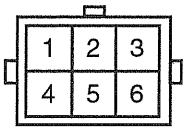
With the selector lever at the "L" position and the engine running at 1,000 rpm, check the voltage waveform between terminals 3 and 4.

- Very low voltage → Incorrect installation of the pulse generator, or malfunction of the pulse generator. → Correct the installation condition, or replace the pulse generator.
- Noise in the waveform → Incorrect grounding of the pulse generator circuit's shielded wiring → Replace the pulse generator.
- 500 mVp-p or higher → Normal

EKFA125B

5. Pressure control solenoid valve (PCSV-A,B)

Solenoid valve side connector terminal



1. SCSV-C
2. PCSV-A
3. PCSV-B
4. SCSV-B
5. SCSV-A
6. DCCSV

Check the resistance between terminal 2, 3 of the solenoid valve connector and the transaxle case.

→ Resistance : too low or too high → Short-circuit, or damaged or disconnected wiring → Replace the PCSV-A,B

2.9 ± 0.3 Ω/20˚C (68˚F)

Connect 12V between the transaxle case and terminal 2, 3; switch ON and OFF and check for operation noise.

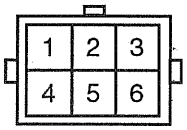
→ No operation noise. (Stroke : 0.3 mm (0.012 in.) or less) → Foreign materiall caught between the valve and guide → Replace the PCSV-A,B

Noise exists

Normal

6. Shift-control solenoid valve (SCSV) A, B, C

Solenoid valve side connector terminal



1. SCSV-C
2. PCSV-A
3. PCSV-B
4. SCSV-B
5. SCSV-A
6. DCCSV

Check the resistance between terminal 1, 4 or 5 of the solenoid valve connector and transaxle case.

→ Resistance : too low or too high → Short-circuit, of damaged or disconnected wiring → Replace the SCSV.

22.3 ± 1.5 Ω/20˚C (68˚F)

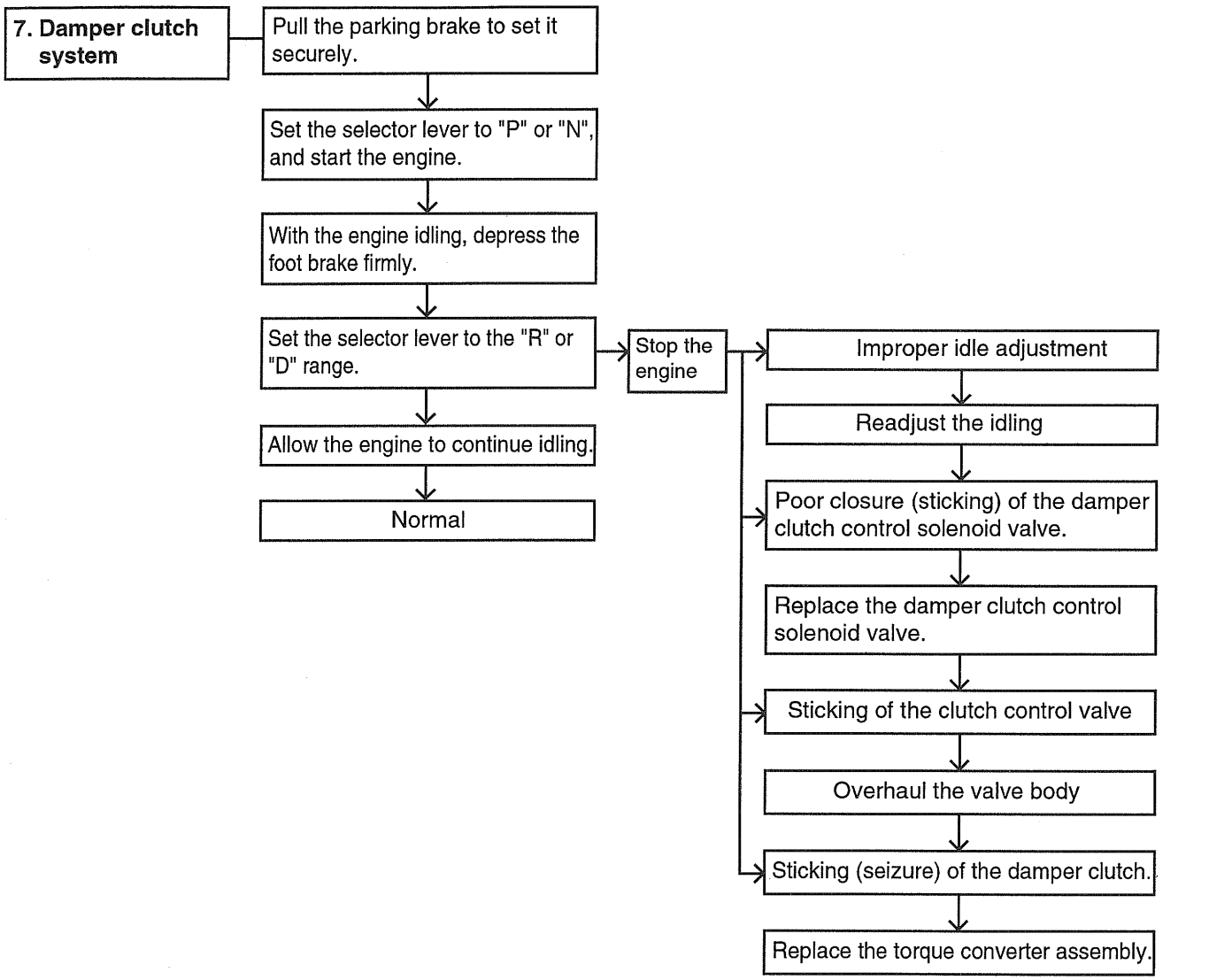
Connect 12V between the trans axle case and terminal 1, 4 or 5; switch ON and OFF and check for operation noise of the solenoid valve, and check the valve stroke.

→ No operation noise. (stroke : 0.25 mm (0.010 in. or less) → Residue accumulated in valve and core. → Replace the SCSV.

Noise exists

Normal

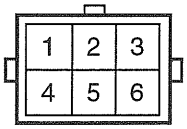
EKNB025A


7. Damper clutch system
Pull the parking brake to set it securely.
Set the selector lever to "P" or "N", and start the engine.
With the engine idling, depress the foot brake firmly.
Set the selector lever to the "R" or "D" range.
Allow the engine to continue idling.
Normal
Stop the engine
Improper idle adjustment
Readjust the idling
Poor closure (sticking) of the damper clutch control solenoid valve.
Replace the damper clutch control solenoid valve.
Sticking of the clutch control valve
Overhaul the valve body
Sticking (seizure) of the damper clutch.
Replace the torque converter assembly.

EKDA025D

8. Damper clutch control solenoid valve (DCCSV)

Solenoid valve side connector terminal



1. SCSV-C
2. PCSV-A
3. PCSV-B
4. SCSV-B
5. SCSV-A
6. DCCSV

Check the resistance between terminal 6 of the solenoid valve connector and the transaxle case.

→ Resistance ; too low or too high → Short-circuit, damaged or disconnected wiring → Replace the DCCSV

↓

Standard value : 3Ω/20˚C

↓

Connect 12V between the transaxle case and terminal 6 ; switch ON and OFF and check for operation noise.

→ No operation noise. Check for sticking. * (Valve stroke : 0.3 mm (0.012 in. or less) → Short-circuit, damaged or disconnected wiring. → Replace the DCCSV

*Sticking is usually at the release side.

↓

Noise exists

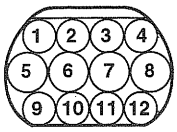
↓

Normal

EKNB025B

9. Transaxle range switch

Switch side connector terminal



In the "P" range, check for continuity between teminals 8 and 7, and terminals 6 and 9.

Continuity exists

In the "R" range, check for continuity between terminals 6 and 10, and terminals 3 and 5.

Continuity exists

In the "N" range, check for between terminals 7 and 8, and terminals 6 and 12.

Continuity exists

In the "D' range, check for continuity between terminals 6 and 11.

Continuity exists

In the "2" range, check for continuity between terminals 6 and 4.

Continuity exists

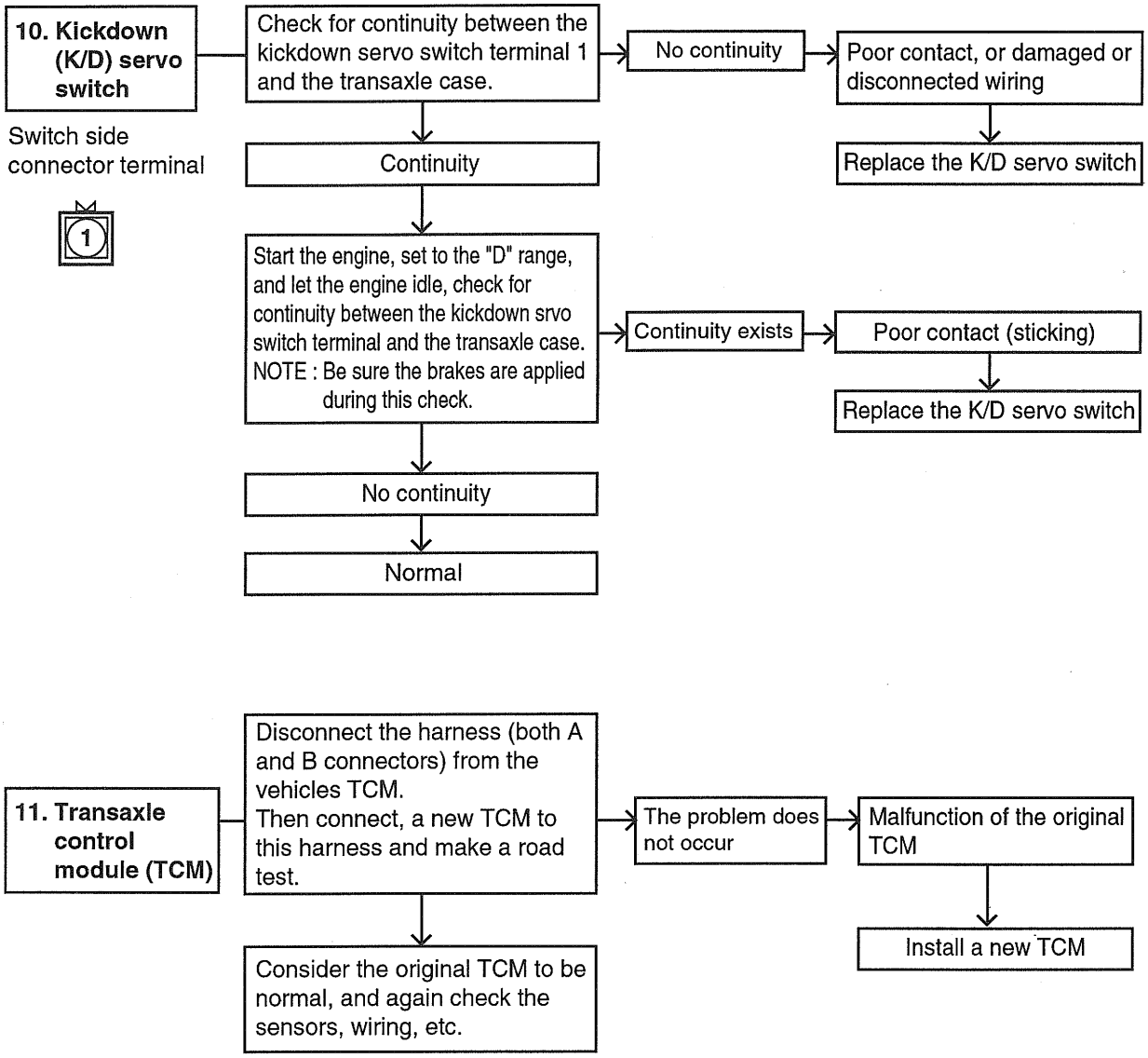
In the "L" range, check for continuity between terminal 2 and 6.

Continuity exists

Normal

No continuity → Poor contact, damaged or disconnected wiring → Replace the transaxle range switch

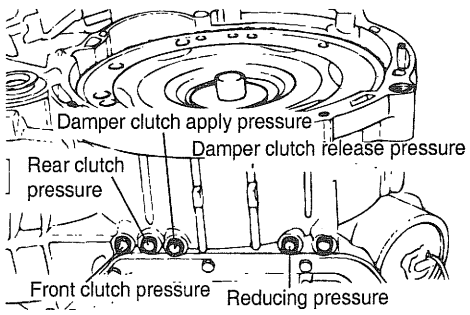
EKFA125F


10. Kickdown (K/D) servo switch
Switch side connector terminal
1
Check for continuity between the kickdown servo switch terminal 1 and the transaxle case.
No continuity
Poor contact, or damaged or disconnected wiring
Replace the K/D servo switch
Continuity
Start the engine, set to the "D" range, and let the engine idle, check for continuity between the kickdown srvo switch terminal and the transaxle case.
NOTE : Be sure the brakes are applied during this check.
Continuity exists
Poor contact (sticking)
Replace the K/D servo switch
No continuity
Normal
11. Transaxle control module (TCM)
Disconnect the harness (both A and B connectors) from the vehicles TCM.
Then connect, a new TCM to this harness and make a road test.
The problem does not occur
Malfunction of the original TCM
Install a new TCM
Consider the original TCM to be normal, and again check the sensors, wiring, etc.

EKDA025G

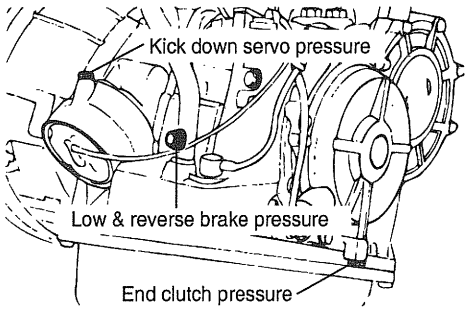
OIL PRESSURE TESTS EKNB0260

1. Completely warm up the transaxle.
2. Raise the front of the vehicle so that the front wheels can be rotated.
3. Connect an engine tachometer and place it in a position where it's easy to see.
4. Attach the special oil-pressure gauge (09452-21500) and the adapter (09452-21002) to each oil-pressure outlet port.
   When the reverse pressure is to be tested, the 3,000 kpa (400 psi) type of gauge should be used.



EKDA026A

5. Measure the oil pressure under various conditions. check to be sure that the measured results are within the standard value range shown in the "Standard oil pressure table" below. If the oil pressure is not within the specified range, check and repair as described in the section "Preliminary Steps if oil Pressure Is Not Normal" on the next page.



EKDA026B

STANDARD OIL PRESSURE TABLE

No.	Conditions				Standard oil pressure kPa (psi)							
	Selector lever position	(Reference) vehicle speed km/h (mph)	Engine speed rpm	Shift position	1 Reducing pressure	2 Kickdown brake pressure	3 Front Clutch pressure	4 End clutch pressure	5 Low-reverse brake pressure	6 Damper clutch pressure (Apply)	7 Damper clutch release pressure (Release)	8 Rear clutch pressure
1	N	0 (0)	Idling	Neutral	400-440 (58-63)	-	-	-	-	-	-	-
2	D	0 (0)	Idling	2nd gear	↑	58-147 (8-21)	-	-	-	-	-	-
3	D (SW-ON)	110 (68)	2,500 Approx	4th gear	↑	637-695 (92-100)	-	650-710 (94-102)	-	637-793 (92-114)	-	833-911 (120-132)
4	D (SW-OFF)	75 (47)	2,500 Approx	3rd gear	↑	840-900 (122-130)	813-872 (117-126)	833-911 (120-132)	-	↑	-	833-911 (120-132)
5	2	50 (31)	2,500 Approx	2nd gear	↑	840-900 (122-130)	-	-	-	↑	-	833-911 (120-132)
6	L	0 (0)	2,500 Approx	1st gear	↑	-	-	-	235-294 (34-42)	245-400 (35-58)	510-610 (74-88)	833-911 (120-132)
7	R	35 (22)	2,500 Approx	Reverse	420-480 (60-69)	-	1,666-2,058 (241-298)	-	1,666-2,058 (241-298)	254-450 (36-65)	450-646 (65-93)	-

EKNB026A

NOTE

Must be 19.6 kPa (2.8 psi) or less.

PRELIMINARY STEPS IF OIL PRESSURE IS NOT NORMAL

Trouble symptom	Probable cause	Remedy
*Line pressures are all low (or high). *"Line pressure" refers to oil pressures 2, 3, 4, 5, 6, 7 and 8 in the "Standard oil pressure table" on the previous page.	1. Obstructed oil filter 2. Improper adjustment of oil pressure (line pressure) regulator valve 3. Sticking of regulator valve 4. Looseness of valve body tightening part 5. Improper oil pump discharge pressure	1. Visually inspect the oil filter; replace the oil filter if it is restricted. 2. Measure line pressure 2 (kickdown brake pressure); if the pressure is not the standard value, readjust the line pressure, or if necessary, replace the valve body assembly. 3. Check the operation of the regulator valve; repair if necessary, or replace the valve body assembly. 4. Tighten the valve body tightening bolt and installation bolt. 5. Check the side clearance of the oil pump gear; replace the oil pump assembly if necessary.
Improper reducing pressure	1. Improper line pressure 2. Clogging of the filter (L-shaped type) of the reducing-pressure circuit 3. Improper adjustment of the reducing pressure 4. Improper adjustment of the reducing pressure 5. Sticking of the reducing valve 6. Looseness of valve body tightening part	1. Check the 2 kickdown brake pressure (line pressure); if the line pressure is not the standard value, check as described in item 1 above. 2. Disassemble the valve body assembly and check the filter; replace the filter if it is restricted. 3. Measure the 1 reducing pressure; if it is not the standard value, readjust, or replace the valve body assembly. 4. Check the operation of the reducing valve; if necessary, repair it, or replace the valve body assembly. 5. Tighten the valve body tightening bolt and installation bolt.
Improper kickdown brake pressure	1. Malfunction of the D-ring or seal ring or the sleeve or kickdown servo piston. 2. Looseness of valve body tightening part. 3. Functional malfunction of the valve body assembly.	1. Disassemble the kickdown servo and check whether the seal ring or D-ring is damaged. If it is cut or has scratches, replace the seal ring or D-ring. 2. Tighten the valve body tightening bolt and installation bolt. 3. Replace the valve body assembly.
Improper front clutch pressure	1. Malfunction of the D-ring of the sleeve or kickdown servo piston. 2. Looseness of valve body tightening part 3. Malfunction of the valve body assembly. 4. Wear of the front clutch piston or retainer, or malfunction of the D-ring. (Refer to the figure on the next page.) 5. Oil pump gasket or seal ring (2) damaged.	1. Disassemble the kickdown servo and check whether the seal ring is damaged. If it is cut or has scratches, replace the seal ring or D-ring. 2. Tighten the valve body tightening bolt and installation bolt. 3. Replace the valve body assembly. 4. Disassemble the transaxle itself and check whether or not there is wear of the front clutch piston and retainer inner circumference, or damage of the D-ring. If there is any wear or damage, replace the piston, retainer, D-ring and or seal ring.

Trouble symptom	Probable cause	Remedy
Improper end clutch pressure	1. Malfunction of a D-ring , seal ring of the end clutch or O-ring of the pipe (Refer to the figure on the next page.) 2. Looseness of valve body tightening part. 3. Malfunction of the valve body assembly	1. Disassemble the end clutch and check the seal ring, D-ring of the pisition, seal ring of the retainer, etc.; replace if there are cuts, scars, scratcher or damage. 2. Tighten the valve body tightening bolt and installation bolt. 3. Replace the valve body assembly.
Improper low-reverse brake pressure	1. O-ring between valve body and transaxle damaged or missing 2. Looseness of valve body tightening part 3. Malfunction of the valve body assembly 4. Malfunction of the O-ring of the low-reverse brake piston or the O-ring of the retainer (Refer to the figure on the next page.)	1. Remove the valve body assembly and check to be sure that the O-ring at the upper surface of the upper valve body is not missing or damaged; install or replace the O-ring if necessary. 2. Tighten the valve body tightening bolt and installation bolt. 3. Replace the valve body assembly. 4. Disassemble the transaxle itself and check the O-ring for damage; replace if there are cuts, scars, scratches or damage.
Improper torque converter pressure	1. Sticking of the damper clutch control solenoid valve (DCCSV) or the damper clutch control valve. 2. Clogging or leaking of the oil cooler and/or lines. 3. Damaged seal ring of the input shaft (Refer to the figure on the next page.) 4. Malfunction of the torque converter.	1. Check the operation of the damper clutch system and the DCCSV. 2. Repair or replace, as necessary, the cooler and/or lines. 3. Disassemble the transaxle itself and check for damage of the seal ring; replace the seal ring if there is damage. 4. Replace the torque converter.
Improper rear clutch pressure	1. Malfunction of the D-ring or seal ring of the rear clutch. 2. Looseness of valve body tightening part. 3. Functional malfunction of the valve body assembly	1. Disassemble the end clutch and check the seal ting, D-ring of the piston, seal ring of the retainer, etc.; replace if there are cut, scars, scratches or damage. 2. Tighten the value body tightening bolt and installation bolt. 3. Replace the valve body assembly.
Improper damper clutch release pressure	Same as the probable cause of damper clutch release pressure	Same as the remedy of damper clutch release pressure

CONVERTER STALL TEST EKNB0270

A stall test determines the maximum engine speed obtained at full throttle in "D" and "R" range. This test checks the torque converter stator overrunning clutch operation, and the holding ability of the transaxle clutches and the low-reverse brake.

WARNING

During this test, make sure that nobody stands in front of or behind the vehicle.

1. Check transaxle fluid level. Fluid should be at normal operating temperature [80-90°C (176-194°F)]. Engine coolant should also be at normal operating temperature [80-90°C (176-194°F)].
2. Apply chocks to both rear wheels.
3. Attach an engine tachometer.
4. Apply the parking and service brakes fully.
5. Start the engine.
6. With the selector lever in the "D" position, depress the accelerator pedal fully to read maximum engine rpm. Do not hold the throttle wide open any longer than is necessary to obtain maximum engine rpm reading, and never longer than 5 seconds at a time. If more than one stall test is required, operate the engine at approximately 1,000 rpm in neutral for 2 minutes to cool the transaxle fluid between tests.

Stall speed :
2,600-3,000 rpm (A4AF3)
2,300-2,700 rpm (A4BF2)

7. Place the selector lever in the "R" position and perform the stall test by the same procedure as previously described.

STALL SPEED ABOVE SPECIFICATION IN "D"

If stall speed is higher than specification, the rear clutch or overrunning clutch of the transaxle is slipping. In this case, perform a hydraulic test to locate the cause of slippage.

STALL SPEED ABOVE SPECIFICATION IN "R"

If the stall speed is higher than specification, the front clutch of the transaxle or low-reverse brake is slipping. In this case, perform a hydraulic test to locate the cause of slippage.

STALL SPEED BELOW SPECIFICATION IN "D" ND "R"

If the stall speed is lower than specification, insufficient engine output or a faulty torque converter is suspected. Check for engine misfiring, improper ignition timing, or valve clearance etc. If these are good, the torque converter is faulty.

SERVICE ADJUSTMENT PROCEDURES EKNB1280

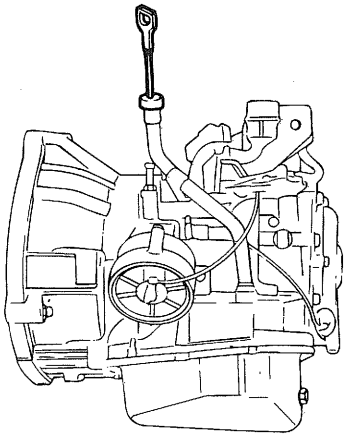
TRANSAXLE FLUID LEVEL INSPECTION

1. Drive the vehicle until the fluid reaches normal operating temperature [80-90°C (176-194°F)].
2. Place the vehicle on a level surface.
3. Move the selector lever through all gear position. This will fill the torque converter and hydraulic system with fluid, then place lever in "N" (Neutral) position.
4. Before removing the dipstick, wipe all contaminants from around the dipstick. Then take out the dipstick and check the condition of the fluid. The transaxle should be overhauled under the following conditions.
   - If there is a ""burning" door.
   - If the fluid color has become noticeably blacker.
   - If there is a noticeably excessive amount of metal particles in the fluid.
5. Check to see if the fluid level is in the "HOT" range on dipstick. If fluid level is low, add automatic transaxle fluid until the level reaches the "HOT" range.

Transaxle fluid : GENUINE DIAMOND ATF SP-III

Low fluid level can cause a variety of abnormal conditions because it allows the pump to take in air along with fluid. Air trapped in the hydraulic system forms bubbles which are compressable. Therefore, pressures will be erratic, causing delayed shifting, sliping clutches and brakes, etc. Improper filling can also raise fluid level too high. When the transaxle has too much fluid, gears churn up foam and cause the same conditions which occur with low fluid level, resulting in accelerated deterioration of automatic transaxle fluid. In either case, air bubbles can cause overheating, and fluid oxidation, which can interfere with normal valve, clutch, and servo operation. Foaming can also result in fluid escaping from the transaxle vent where it may be mistaken for a leak.

6. Be sure to examine the fluid on the dipstick closely.



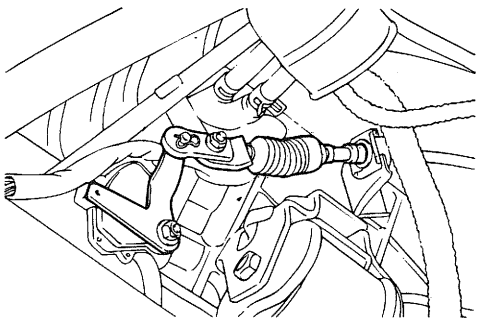
EKDA028A

SELECTOR LEVER OPERATION CHECK

1. Shift the selector lever to each range and check to see that the lever moves smoothly and is controlled. Check to see that the position indicator is correct.
2. Check to be sure that the selector lever can be shifted to each position.
3. Start the engine and check to see if the vehicle moves forward when the selector lever is shifted from "N" to "D" and moves backward when shifted to "R".
4. When the shift lever malfunctions, adjust the control cable and the selector lever sleeve. Check for worn shift lever assembly sliding parts.

TRANSAXLE RANGE SWITCH ADJUSTMENT

1. Place selector lever in "N" (Neutral) position.
2. Loosen the manual control lever lock nut to seperate the cable and lever.



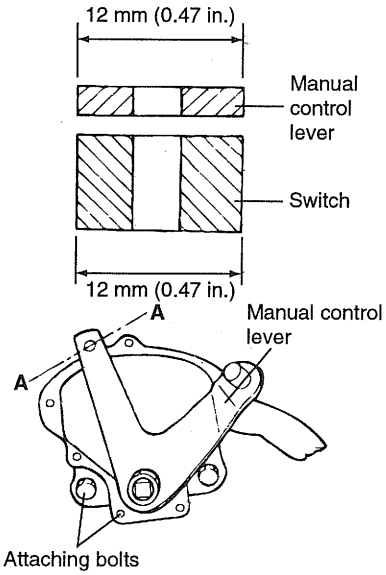
EKDA028C

3. Place the manual control lever in the "N" (Neutral) position.
4. Turn the transaxle range switch body until the 12 mm (.47 in.) wide end of the manual control lever aligns with the switch body flange [12 mm (0.472 in.) wide portion].
5. Tighten the attaching bolts (2 pcs.) to the specified torque.
   Transaxle Range Switch Attaching Bolt: 10-12 Nm (100-120 kg.cm, 7-9 lb.ft)

NOTE

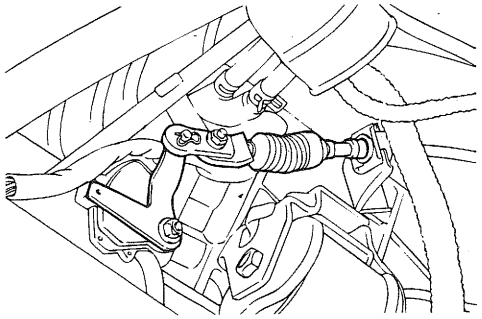
When setting up the switch body, be careful that the O-ring does not drop from the switch body. Tighten the attaching bolts carefully.

Section A-A



EKDA028D

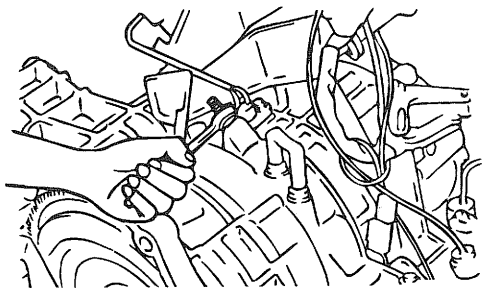
6. Make sure that the selector lever is in the "N" (Neutral) position.
7. Adjust the flange nut so that there is no slack in the control cable and make sure that the selector lever operates smoothly.
8. Run the vehicle and confirm that the transaxle is set in each range when the selector lever is shifted to each position.



EKDA028E

KICKDOWN SERVO ADJUSTMENT

1. Completely remove all dirt and other contaminating materials adhered around the kickdown adjust screw.
2. Loosen the lock nut.
3. Loosen and tighten the adjust screw two times by torque of 5 Nm (3.6 lb.ft)
4. Tighten adjust screw by torque of 5 Nm and then, loosen the adjust screw 3 to 3-1/3 turns.



EKDA028F

5. Tighten the lock nut to the specified torque.

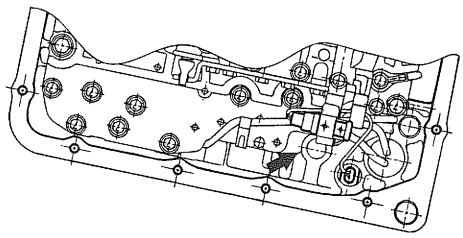
Lock nut :
15-22 Nm (150-220 kg·cm, 11-16 lb·ft)

NOTE

Before assembling, apply sealant (DC780) to the center portion of the adjust screw.

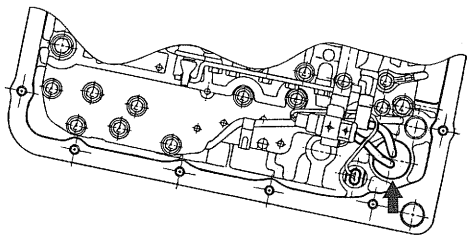
LINE PRESSURE ADJUSTMENT

1. Drain out the automatic transaxle fluid.
2. Remove the oil pan.
3. Remove the oil filter.
4. Remove the oil-temperature sensor.



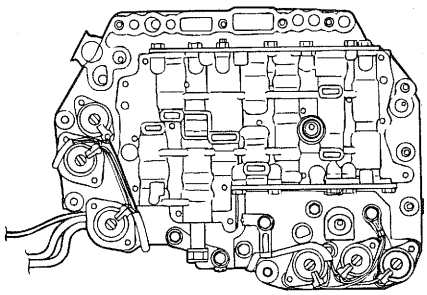
KKNB011A

5. Press the tab of the solenoid valve harness grommet and push in.



KKNB011B

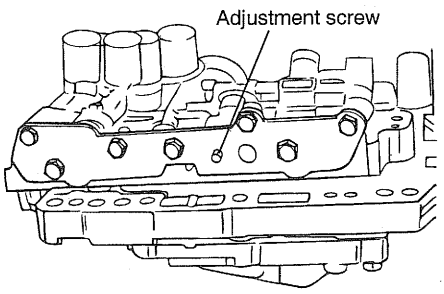
6. Remove the valve body assembly. The manual valve can come out, so be careful not to drop it.



T8AT030H

7. Turn the adjustment screw of the regulator valve and adjust so that the line pressure (kickdown brake pressure) reaches the standard value. When the adjustment screw is turned clockwise, the line pressure becomes lower; when it is turned counter-clockwise, it becomes higher.

Standard value :
860-900 kPa (122-129 psi, 8.77-9.18 kg/cm²)
Oil pressure change for each turn of adjustment screw :
38 kPa (5.4 psi, 0.39 kg/cm²)

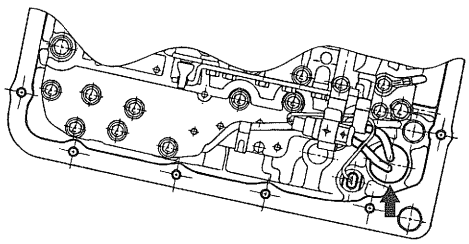


EKDA028J

8. Check to be sure that the O-ring is installed on the upper surface of the valve body at the place.

9. Replace the O-ring of the solenoid valve connector with a new one.

10. Install the valve body assembly to the case and then insert the solenoid valve connector into the case. Be sure, at this time, that the notched part of the connector faces as shown in the figure. Also be careful that the lead wiring isn't caught.



KKNB011B

11. Tighten the valve body assembly mounting bolts to 10-12 Nm (100-120 kg.cm, 7-9 lb.ft).

12. Install the oil filter.

13. Install a new oil pan gasket with the oil pan.

14. Pour in the specified amount of automatic transaxle fluid.

15. Perform the oil pressure test. Readjust if necessary.

REDUCING PRESSURE ADJUSTMENT

If the Scan Tool is not available

1. Remove parts up to the oil filter in the same way as for adjustment of the line pressure. The valve body need not be removed.

2. Turn the adjustment screw of the lower valve body and adjust so that the reducing pressure is the standard value. When the adjustment screw is turned clockwise, the reducing pressure becomes lower; when it is turned counter clockwise, it becomes higher.

NOTE

When adjusting the reducing pressure, aim for the center value (425 kPa, 60 psi) of the standard value allowance.

Standard value :
420 kPa (60 psi, 4.2±0.2 kg/cm)
Oil pressure change for each turn of the adjustment screw :
22 kPa (4.3 psi, 0.22 kg.cm²)

3. Install the oil filter and oil pan in the same way as for adjustment of the line pressure.

4. Peform the oil pressure test. Readjust if necessary.

If the Scan Tool is used

5. Adjust the PC solenoid so that the kickdown brake pressure is the standard value when activated to 50% duty by the Scan Tool.

Standard value :
320±30 kPa (39±1 psi, 3.2±0.3 kg/.cm²)
Oil pressure change for each turn of the adjustment screw :
30 kPa (3 psi, 0.3 kg/cm²)

6. Check to be sure that the reducing pressure (after the adjustment is completed) is within the range of 370-490 kPa (53-70 psi, 3.8-5.0 kg/cm²)

CAUTION

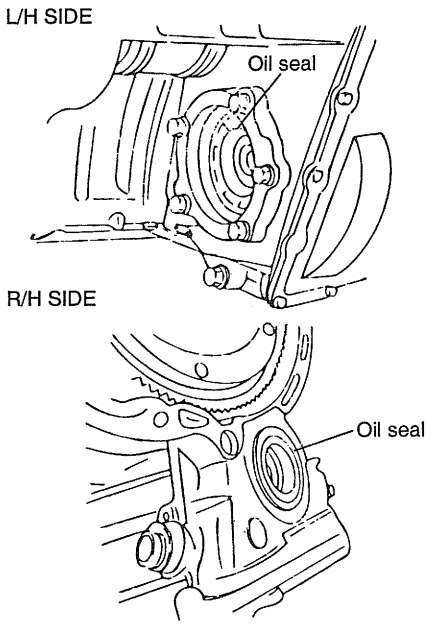
This adjustment should be made with an oil temperature of 80-90°C (176-194°F). If the adjustment is made at a temperature that is too high, the line pressure will drop during idling, with the result that it might not be possible to make the correct adjustment.

THROTTLE POSITION SENSOR INSPECTION

Refer to GROUP FUEL SYSTEM.

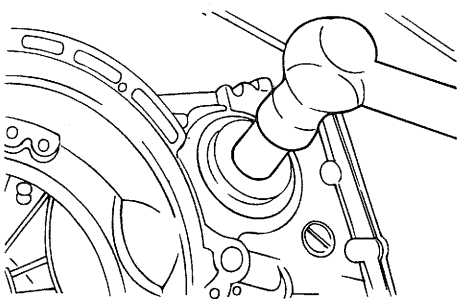
DRIVE SHAFT OIL SEALS REPLACEMENT

1. Disconnect the drive shaft from the transaxle. (Refer to DRIVE SHAFT & FRONT AXLE)
2. Using a flat-tip (-) screwdriver, remove the oil seal.



EKDA028M

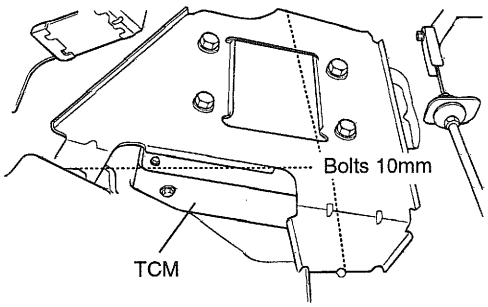
3. Using the special tool (09431-21200), tap the drive shaft oil seal into the transaxle.
4. Apply a coating of the transaxle fluid to the lip of the oil seal.



EKDA028N

TCM REPLACEMENT

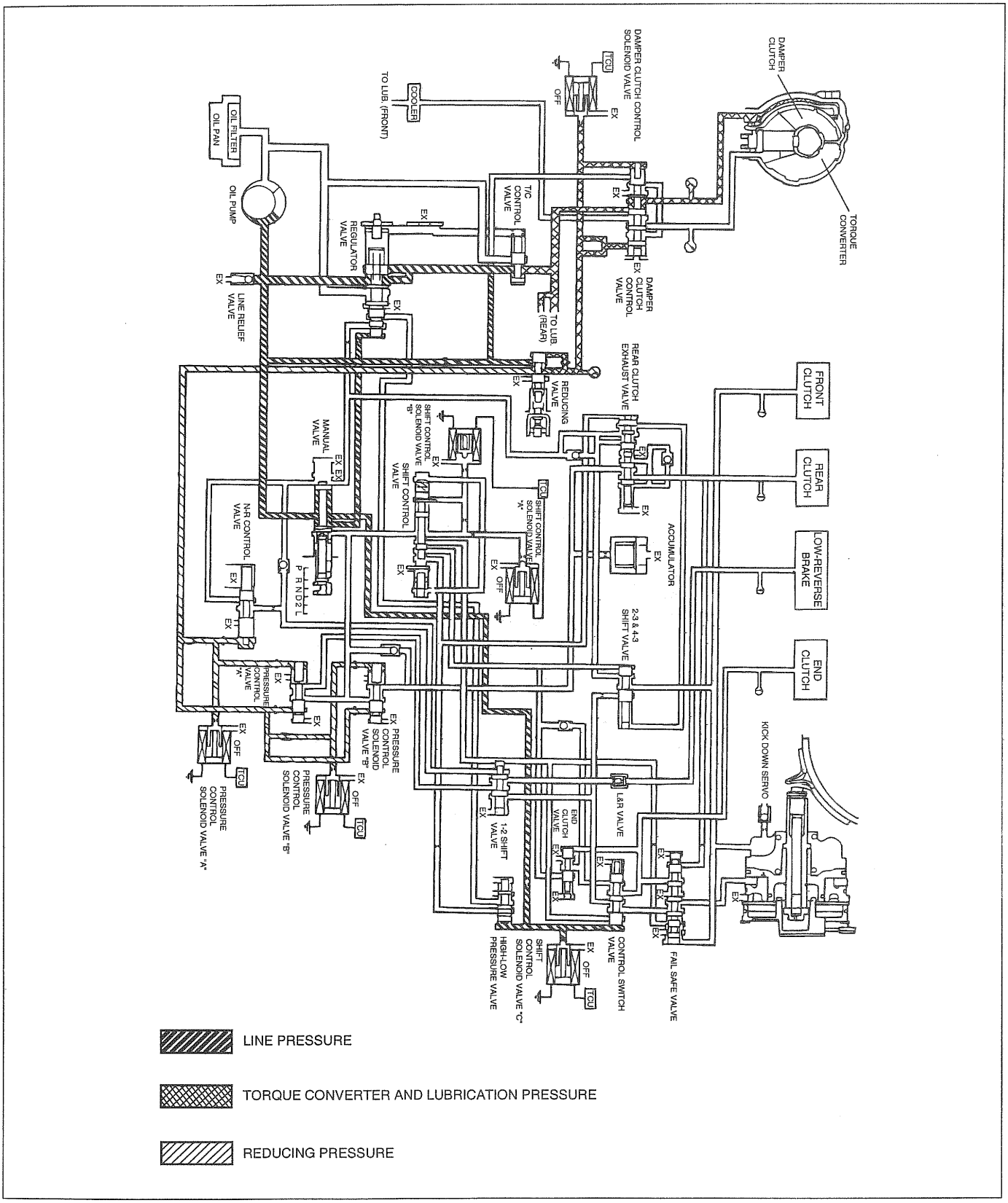
TCM is located at the dash panel of the upper side of brake pedal in the driver side.



EKNB128A

AUTOMATIC TRANSAXLE HYDRAULIC CIRCUIT & PARKING EKKB0390

NEUTRAL & PARK



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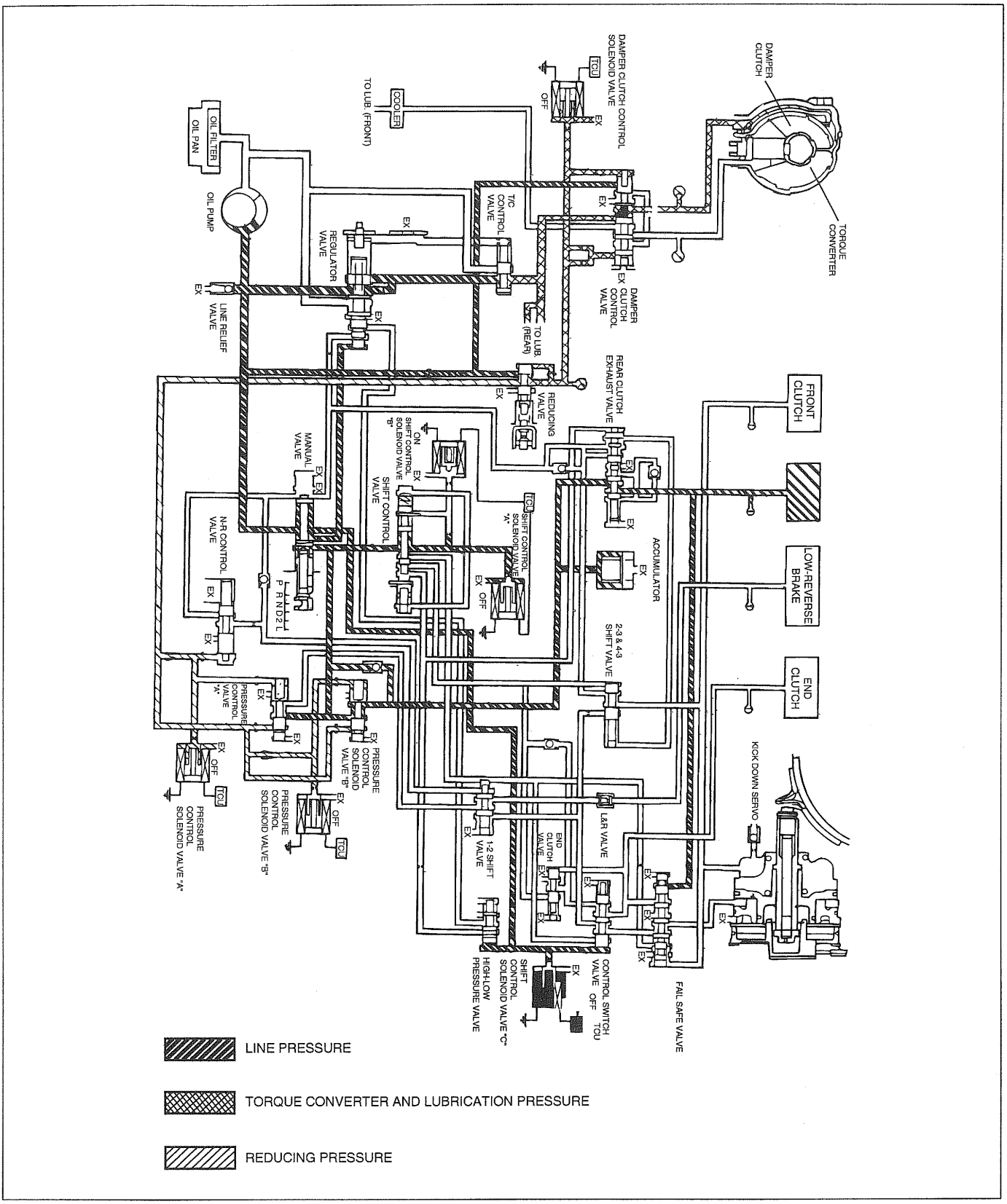
DRIVE (FIRST)



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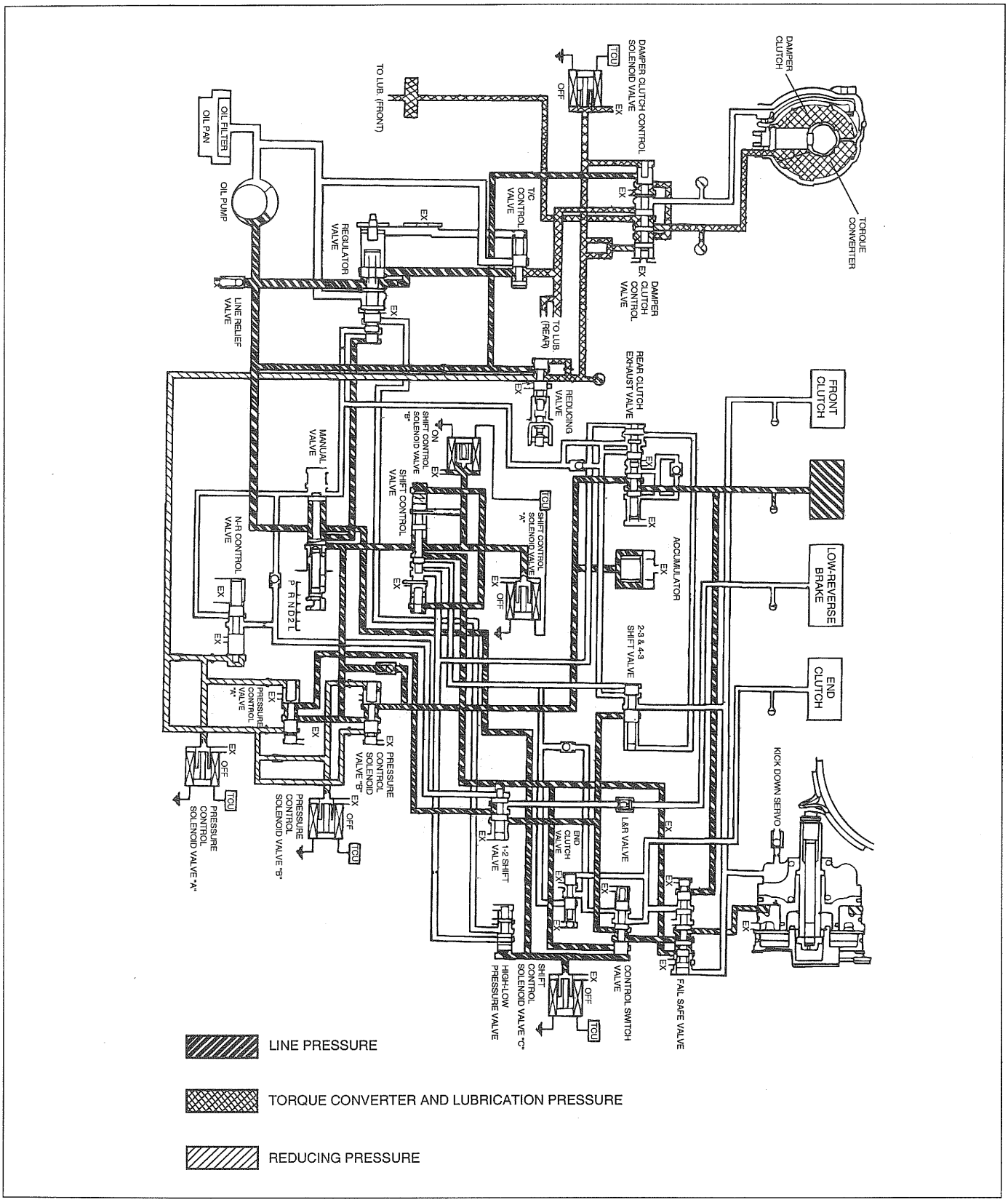
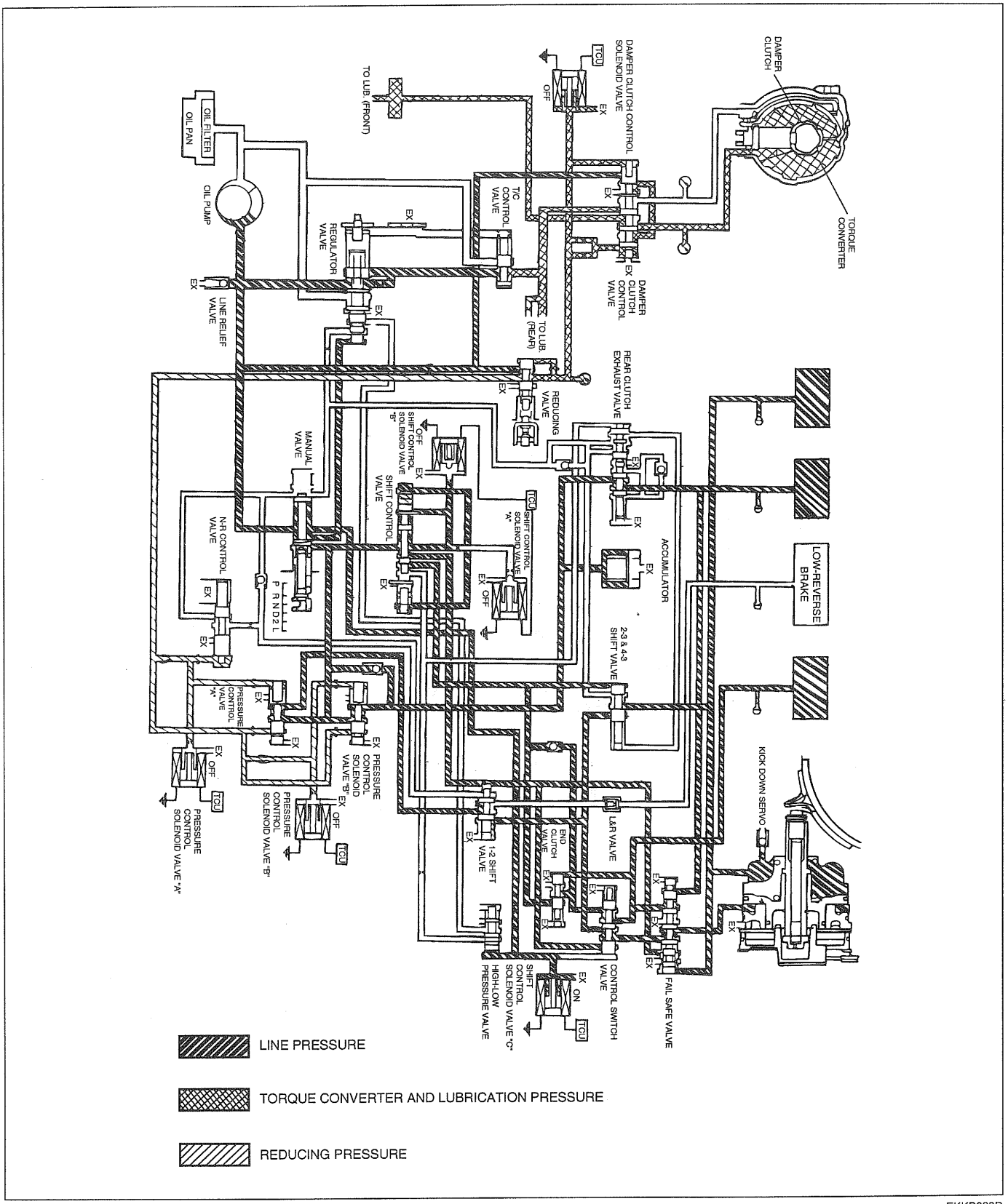
DRIVE (SECOND)



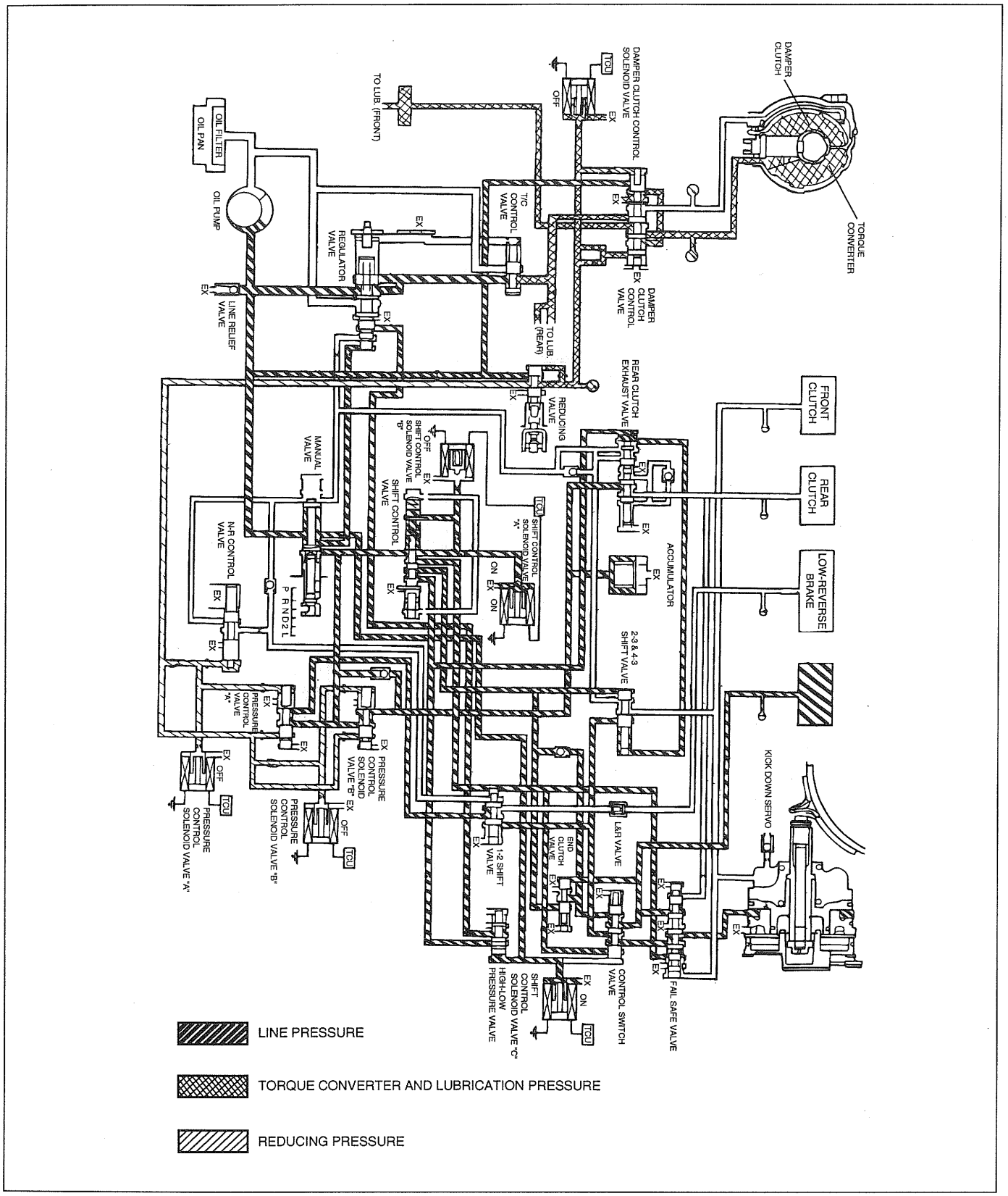
EKKB039C

DRIVE (THIRD)



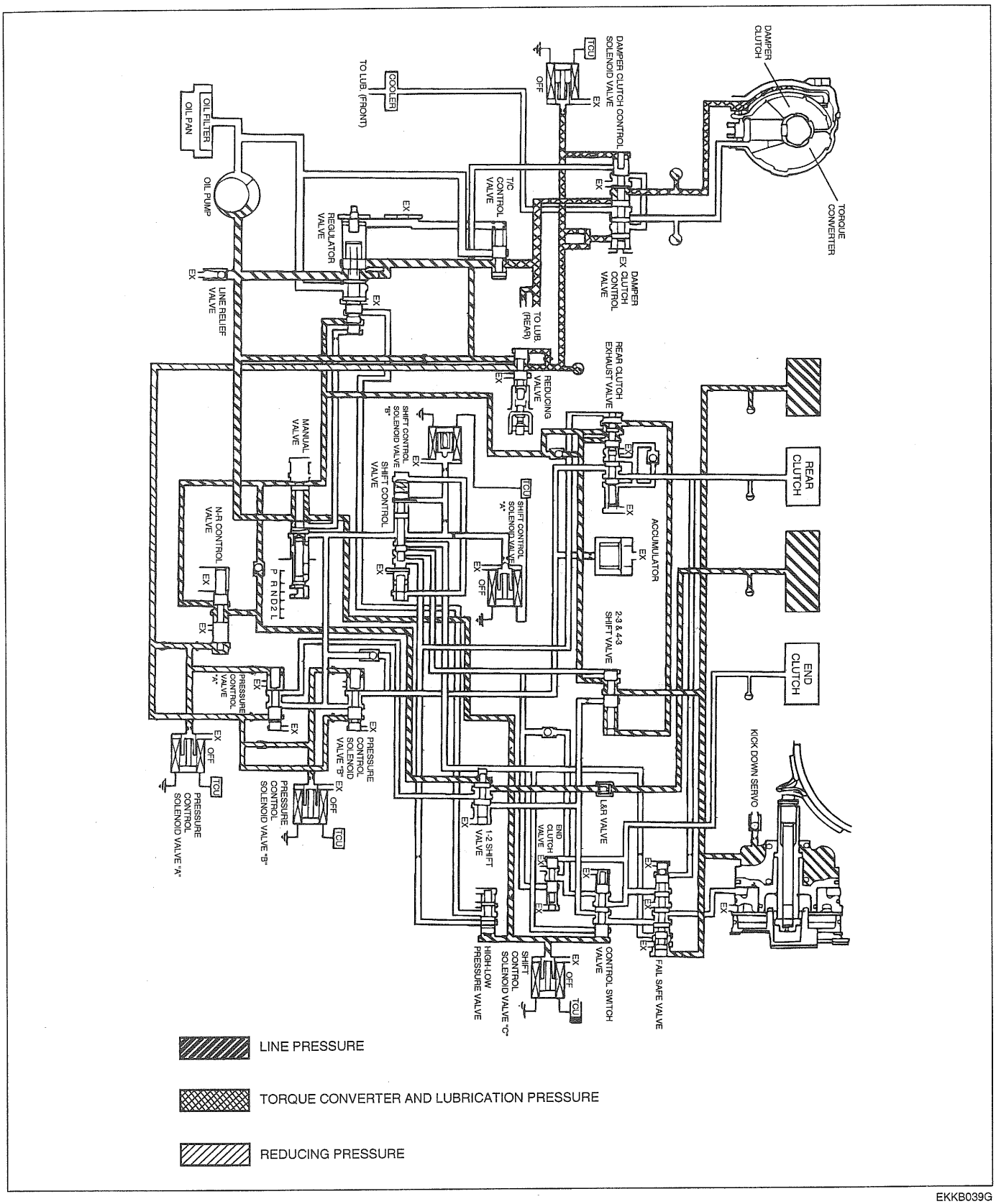
EKKB039D

DRIVE (FOURTH)



EKKB039E

REVERSE



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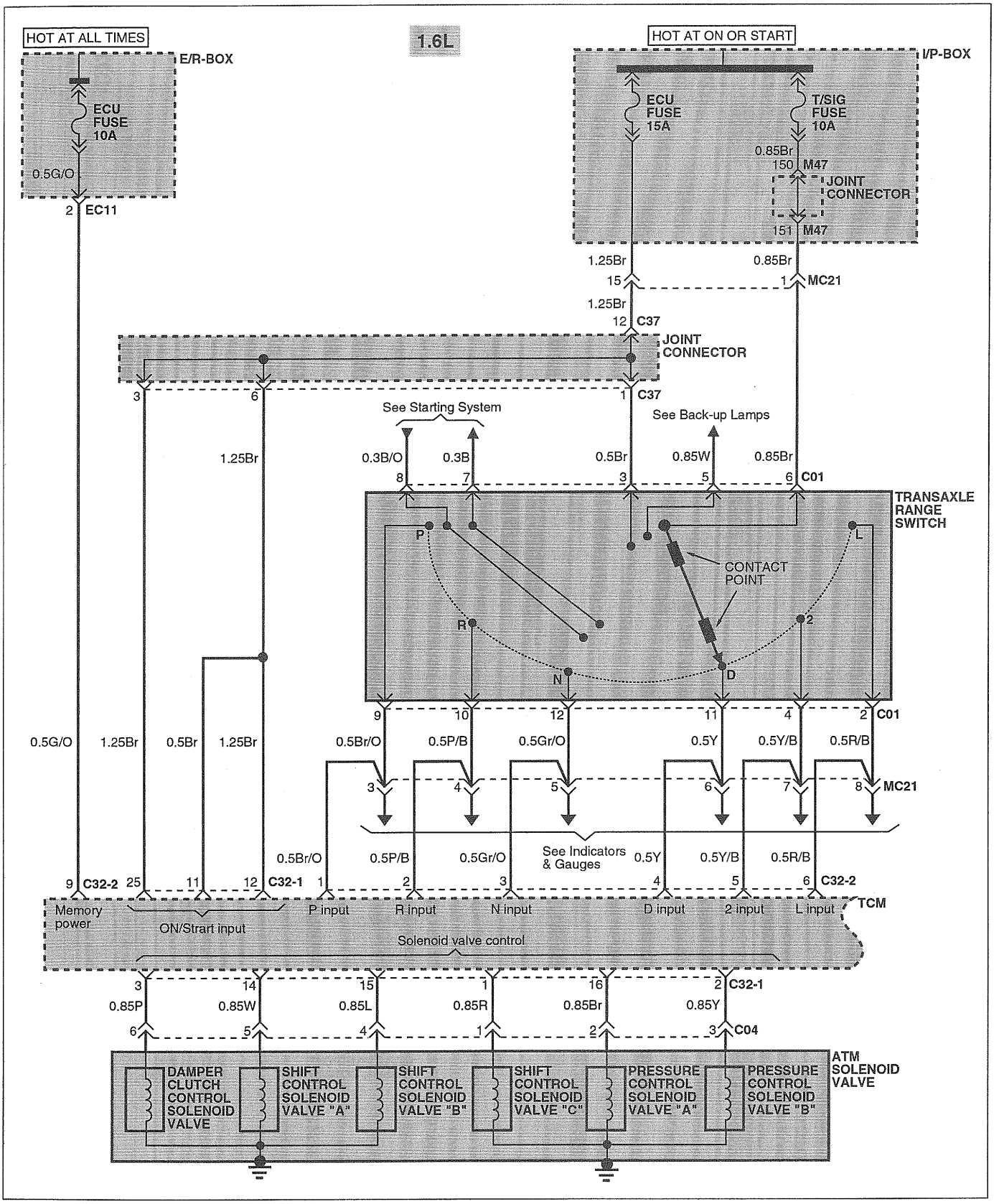
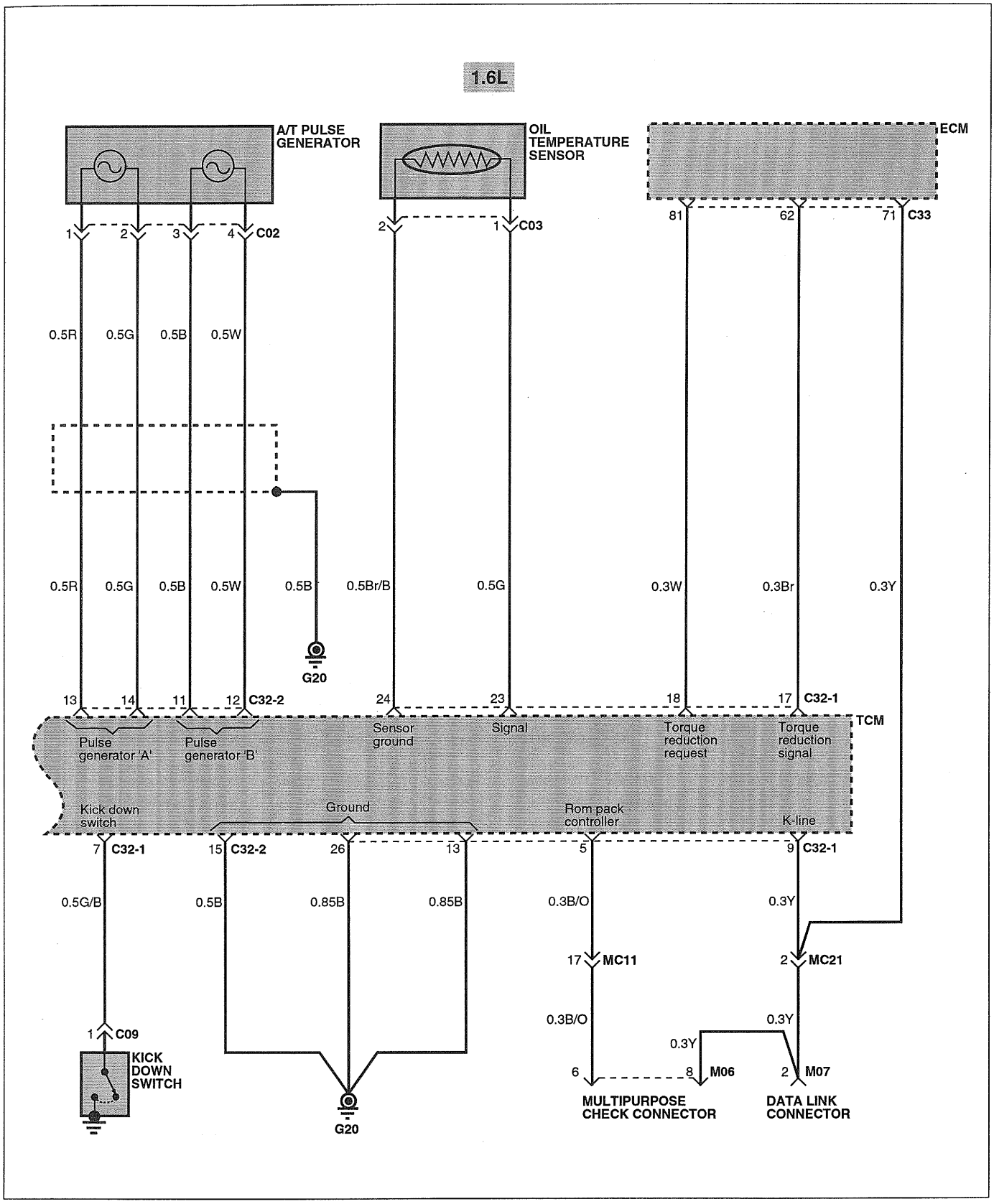
TCM EKNB0580

TCM (1)



EKNB058A

TCM (2)



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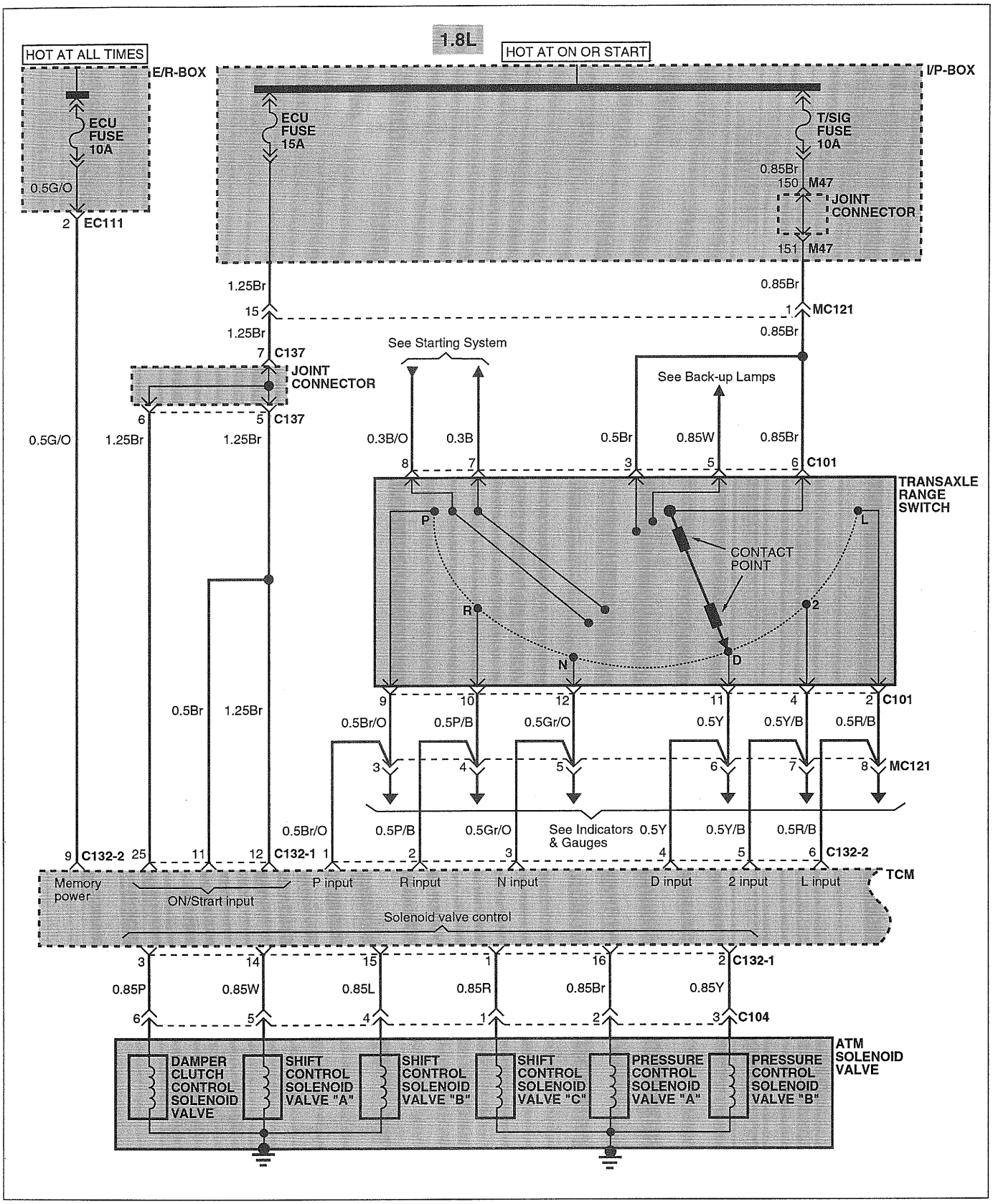
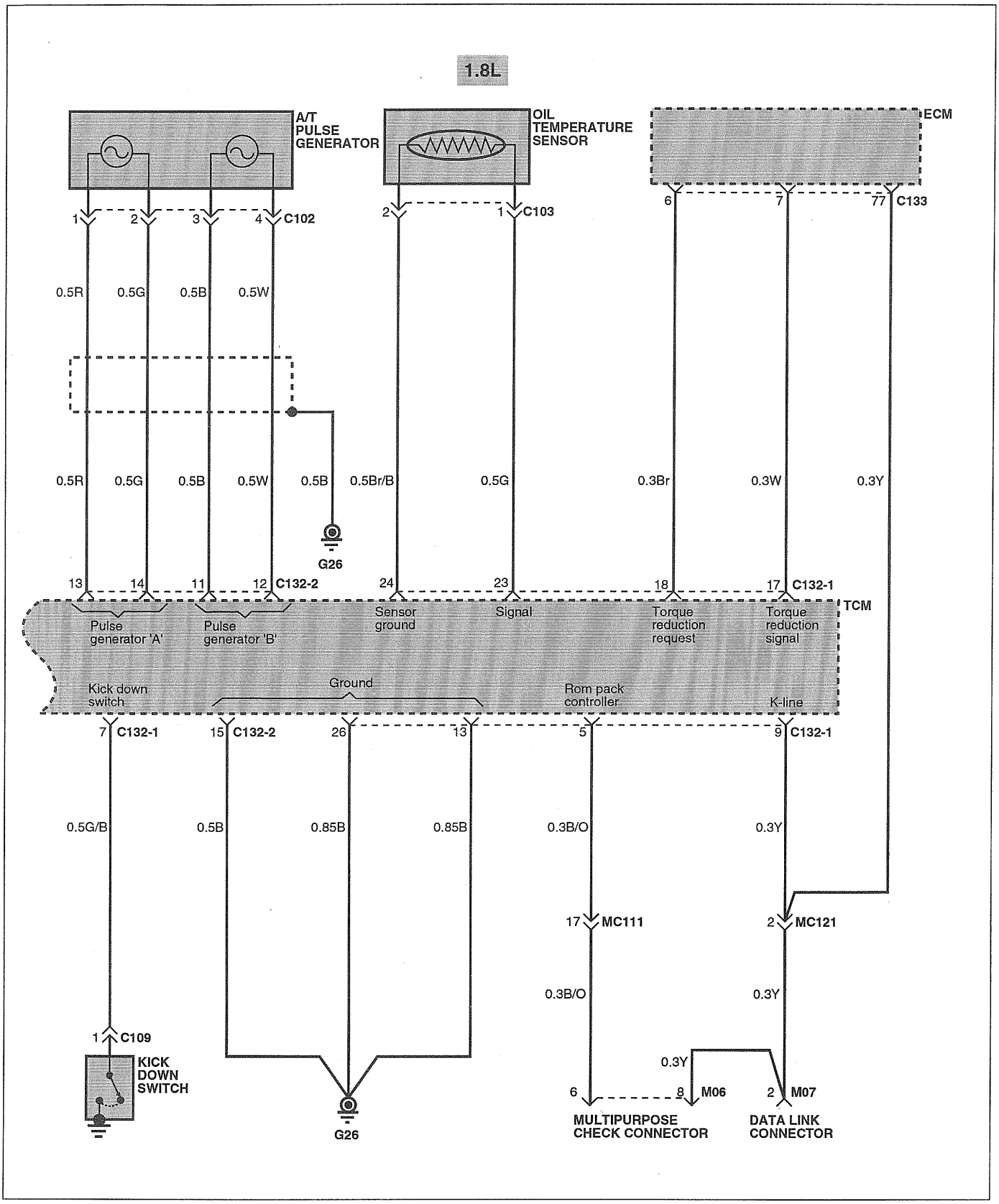
TCM (3)



EKNB058C

TCM (4)



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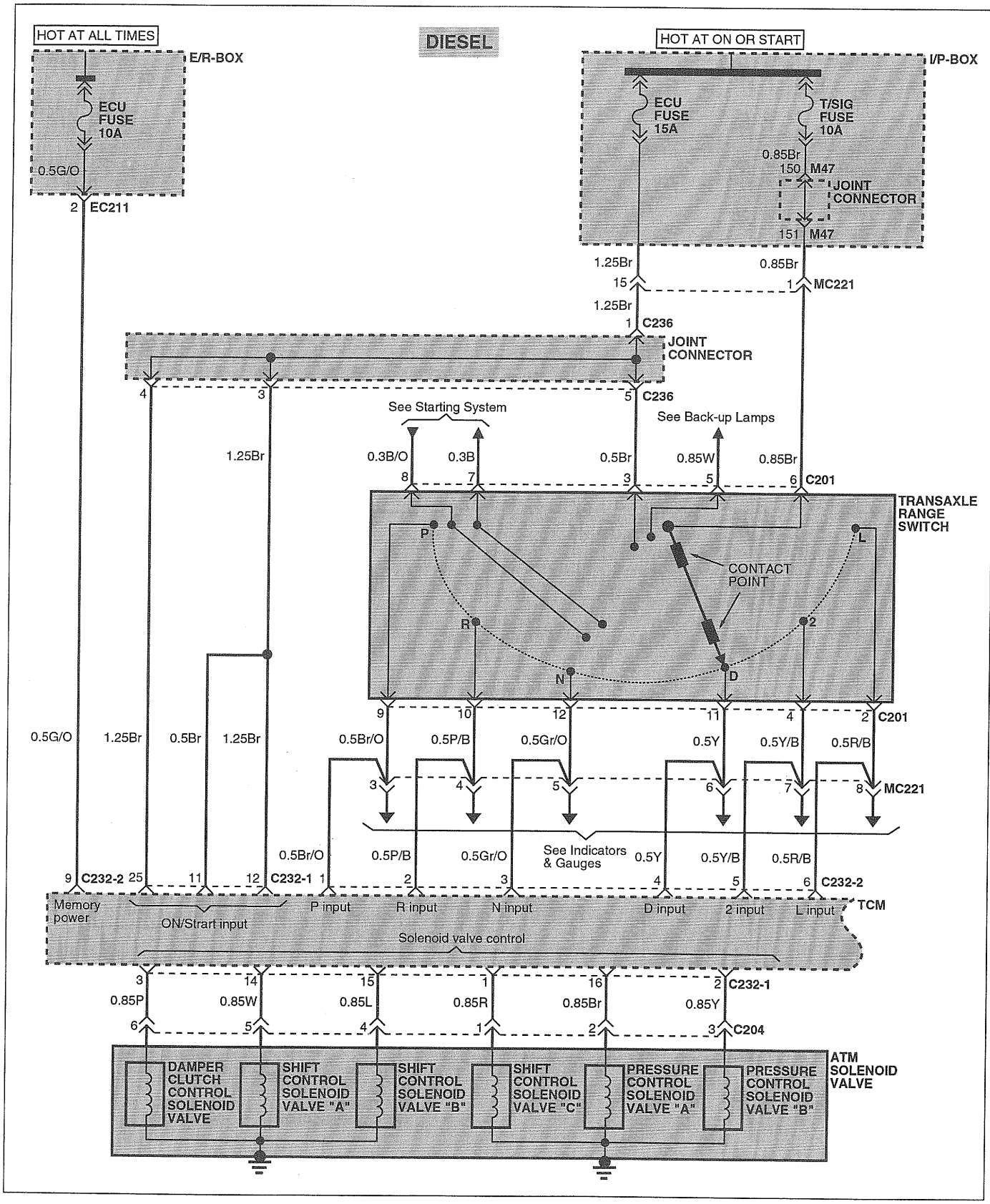
TCM (5)



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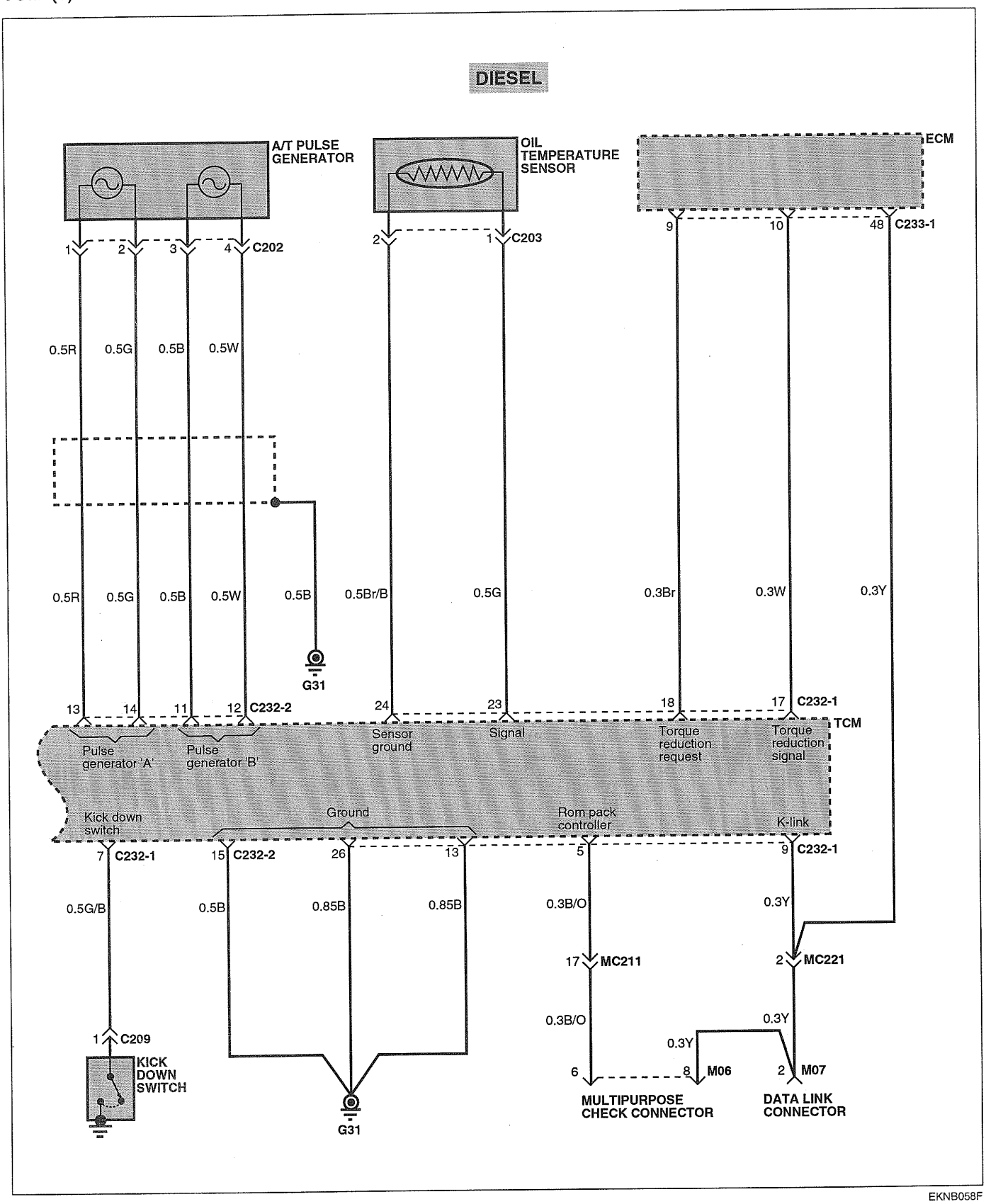
TCM (6)



EKNB058F

TRANSAXLE OVERHAUL (A4AF3, A4BF2) EKNB0650

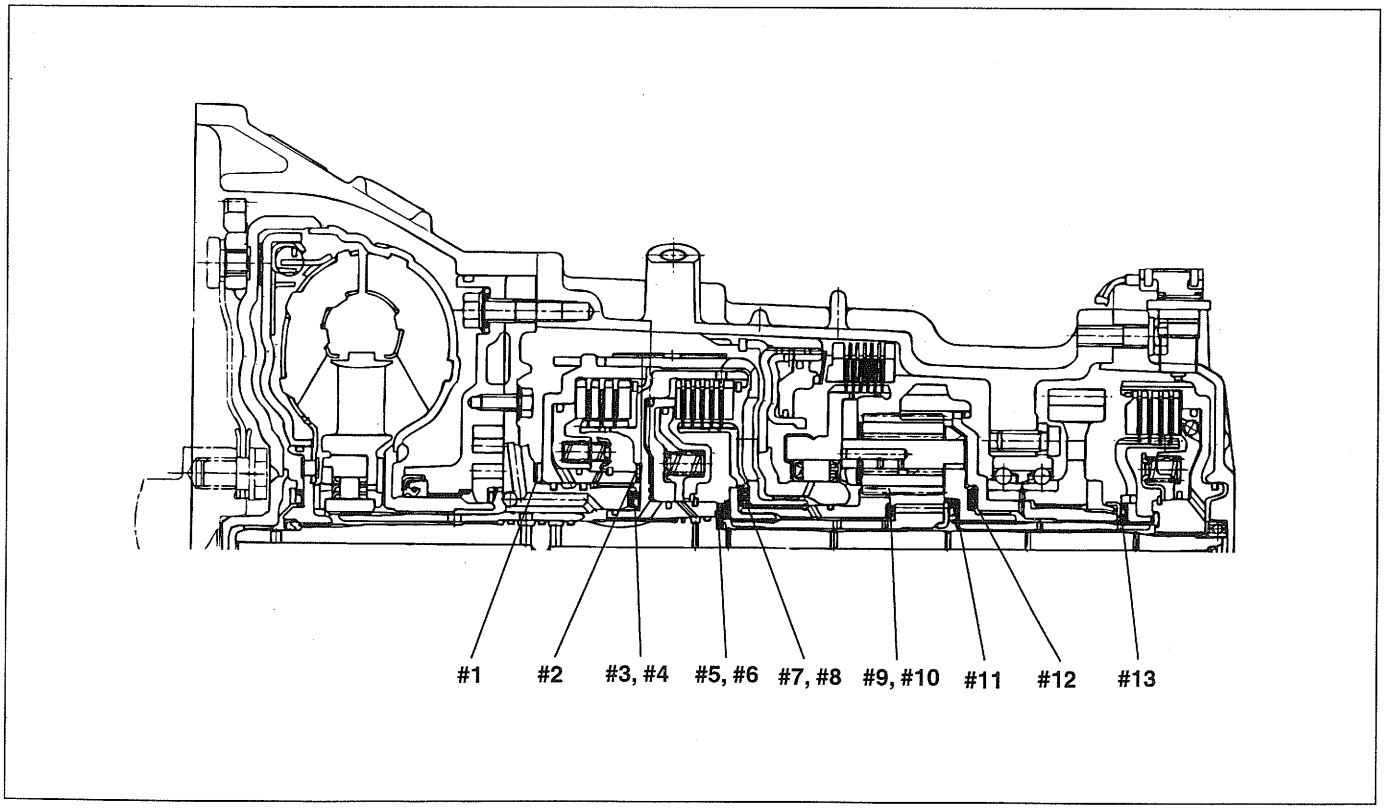
Automatic transaxle overhaul section have been separated from the shop manual.
A4AF3 like a A4BF2 overhaul section were included in the overhaul manual.

A4AF3 and A4BF2 are almost same in the overhaul except the gear ratio etc.
So, we describe the major contents of the A4AF3 and A4BF2 model in overhaul parts.

THRUST BEARING (4,6,8,9,11,12,13), THRUST RACE (3,7,10), THRUST WASHER (1,2,5)

O.D	I.D	Thickness	Code No.	O.D	I.D	Thickness	Code No.
70	55.7	1.4	#1	48.1	34.4	-	#4
70	55.7	1.8		40	21	2.4	#5
70	55.7	2.2		42.6	28	2.5	#6
70	55.7	2.6		54	38.7	1.6	#7
70	55.7	1.8	#2	52	36.4	2.8	#8
48.9	37	1.0	#3	41	28	2.0	#9
48.9	37	1.2		39	28	1.2	#10
48.9	37	1.4		38	22.2	-	#11
48.9	37	1.6		52	36.4	2.8	#12
48.9	37	1.8		58	44	5.0	#13
48.9	37	2.0					
48.9	37	2.2					
48.9	37	2.4					

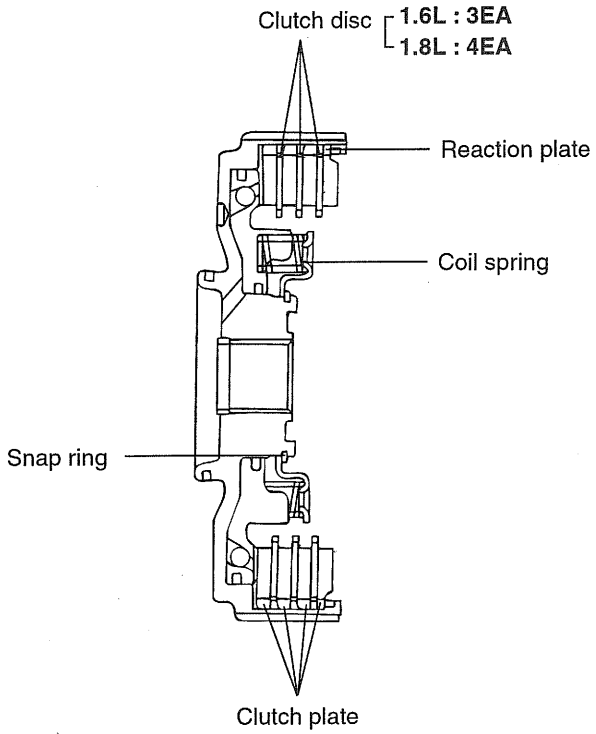
Unit : mm



KKNA019A

END CLUTCH

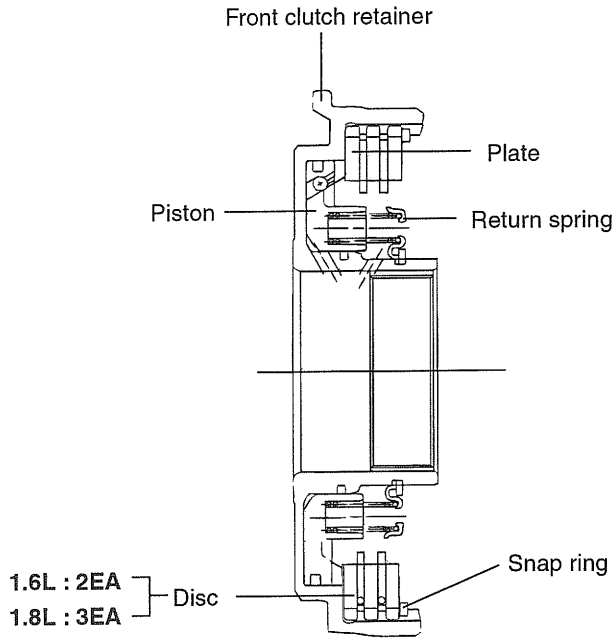
COMPONENTS



EKNB065A

FRONT CLUTCH

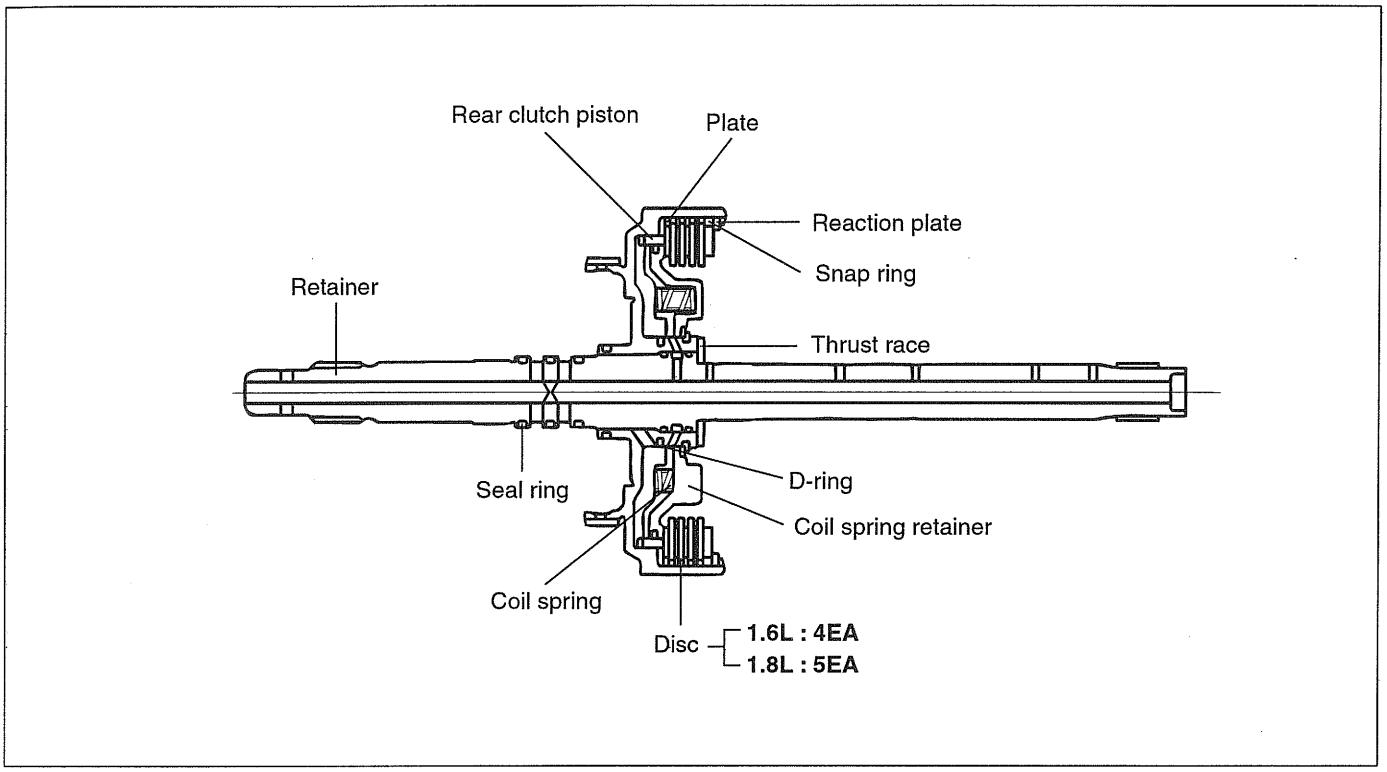
COMPONENTS



EKNB065B

REAR CLUTCH

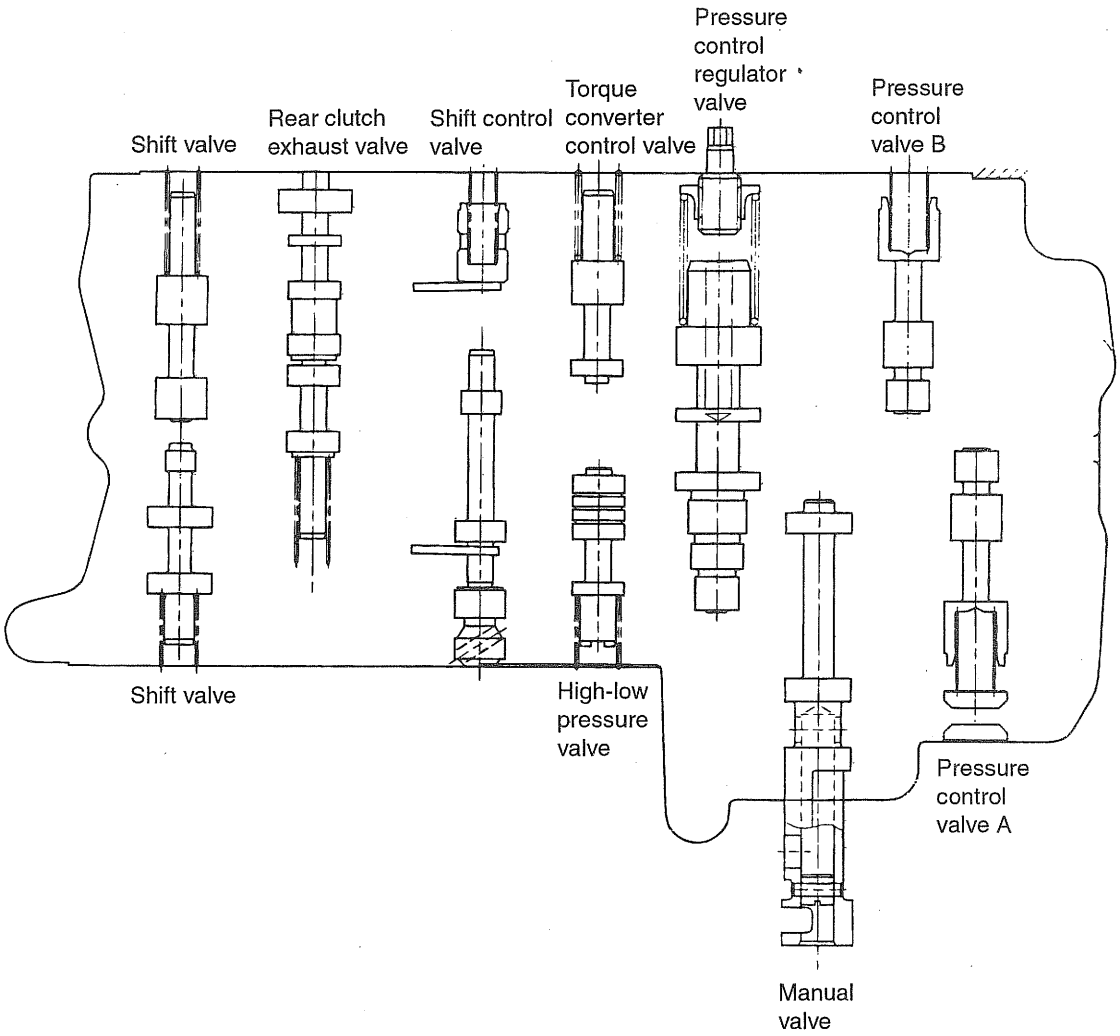
COMPONENTS



EKNB065C

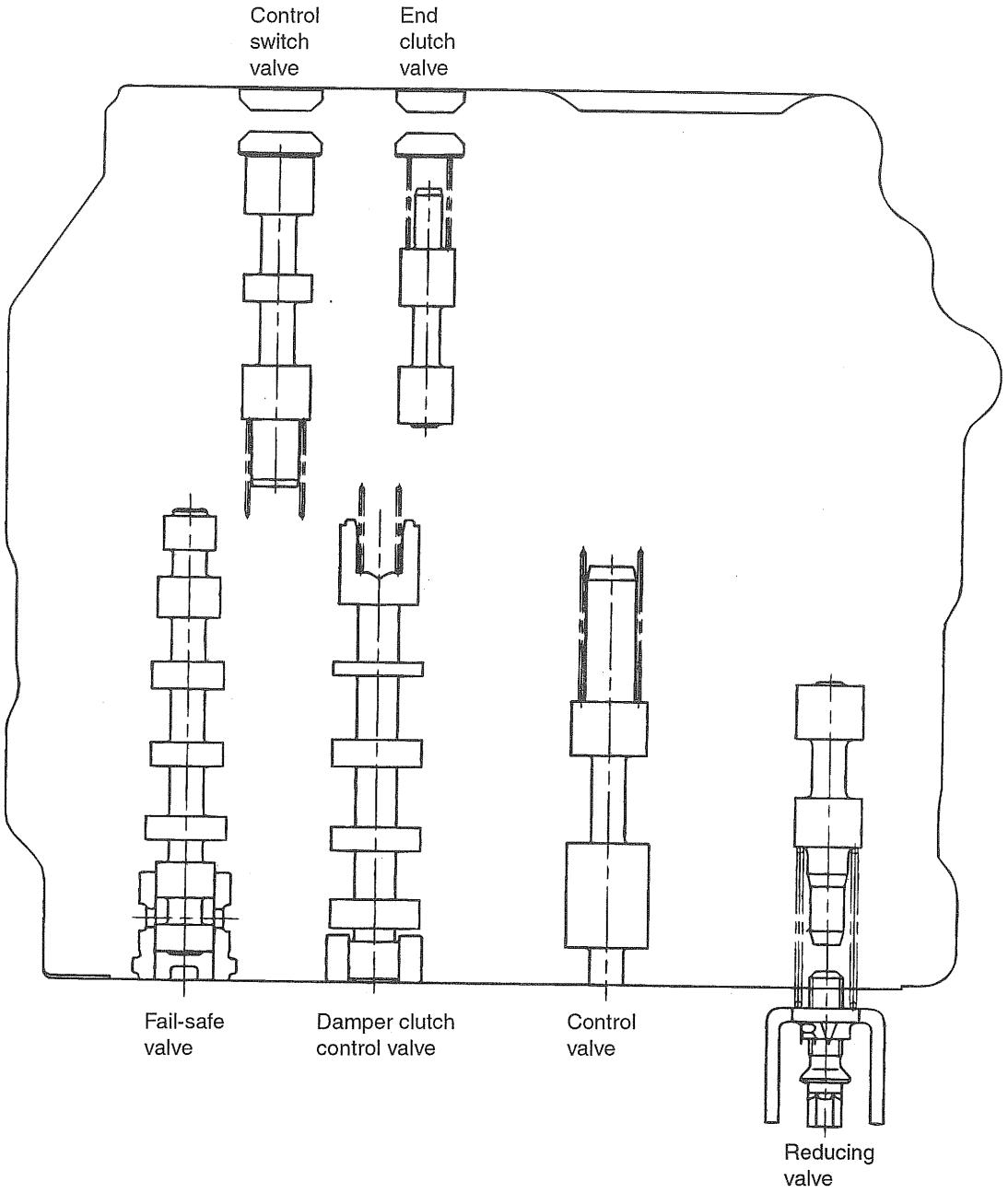
VALVE BODY

Upper Valve Body



EKNB065D

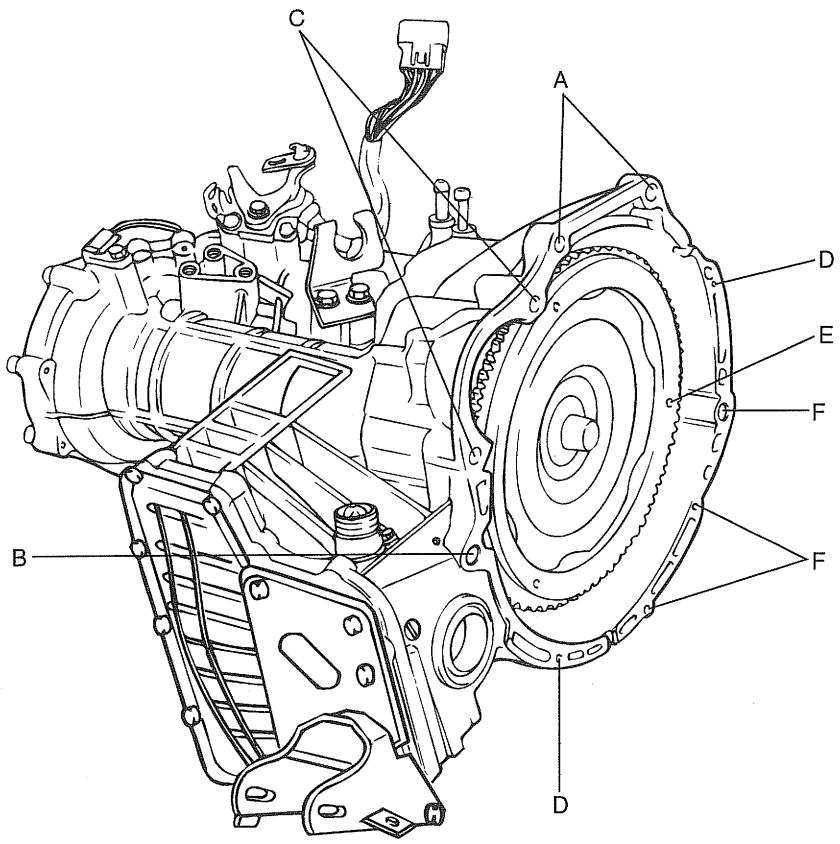
Lower Valve Body



EKNB065E

AUTOMATIC TRANSAXLE

COMPONENTS EKNB0150



KKKA015A

	Torque (kg·m)	O.D x Length (mm)	Identification Mark
A	6~8	[7] 12x40	[7] AxB
B	4.3~5.5	[7] 10x70	
C	2.7~3.4	[7] 10x55	
D	0.8~1.0	[7] 6x10	
E	4.6~5.3	[7] 10x11	

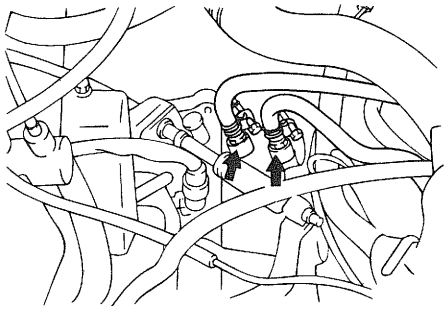
EKNB015A

REMOVAL EKNA0160

1. Disconnect the battery terminal(-) and the connectors.
2. Remove the shift cable.
3. Separate the oil cooler hose for the transaxle.

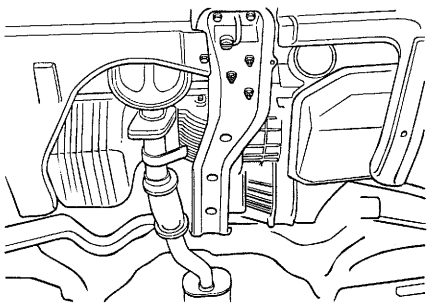
NOTE

To prevent entry of dust or foreign matter, plug the disconnected hoses and tranxaxle fittings.



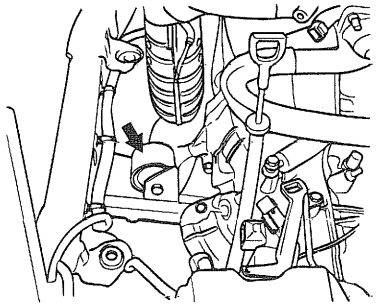
EKDA037B

4. Remove the tire.
5. Separate the front brake caliper.
6. Remove the side cover.
7. Remove the nut of the tie-rod.
8. Remove the knuckle mounting bolt of the front strut.
9. Drain the transaxle oil.
10. Separate the drive shaft.
11. Remove the center member.

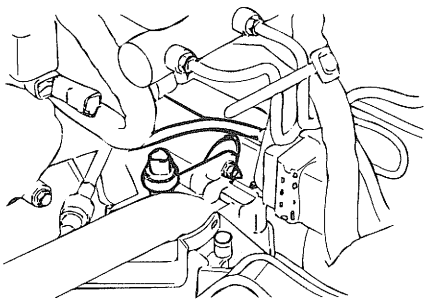


KKNA020A

12. Remove the front and rear mounting bracket.

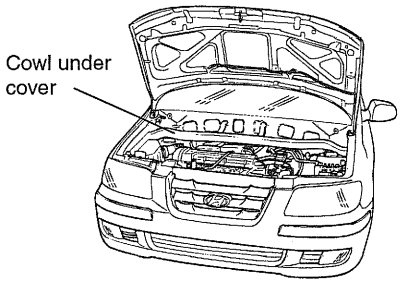


KKNB016B



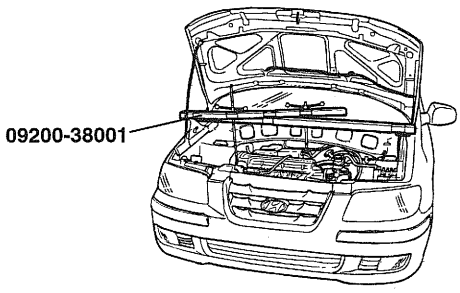
KDNB002D

13. Remove the lower mounting bolt.
14. Remove the cowl under cover.



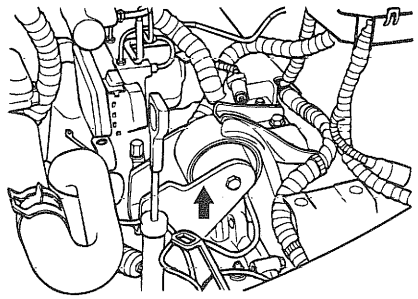
EKNA016A

15. Install the engine fixture.



EKNA016B

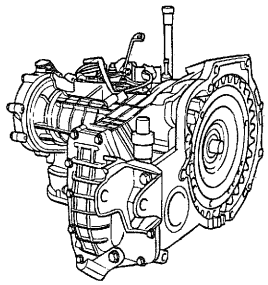
16. Remove the transaxle side mounting bracket insulator.



KKNB016C

17. Remove the transaxle upper mounting bolt.

18. Remove the transaxle assembly.



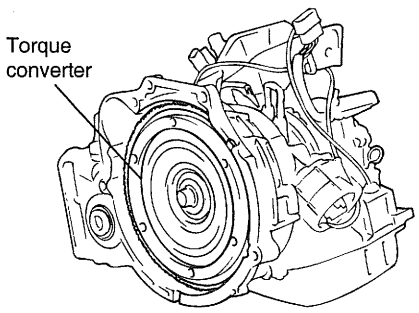
KKNA007A

INSTALLATION EKNB0380

1. Attach the torque converter on the transaxle side and mount the transaxle assembly onto the engine.

⚠ ***CAUTION***

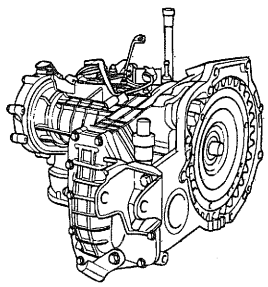
If the torque converter is mounted on the engine first, the oil seal on the trasaxle side may be damaged. Therefore, be sure to first assemble the torque converter to the transaxle.



EKDA038A

⚠ ***CAUTION***

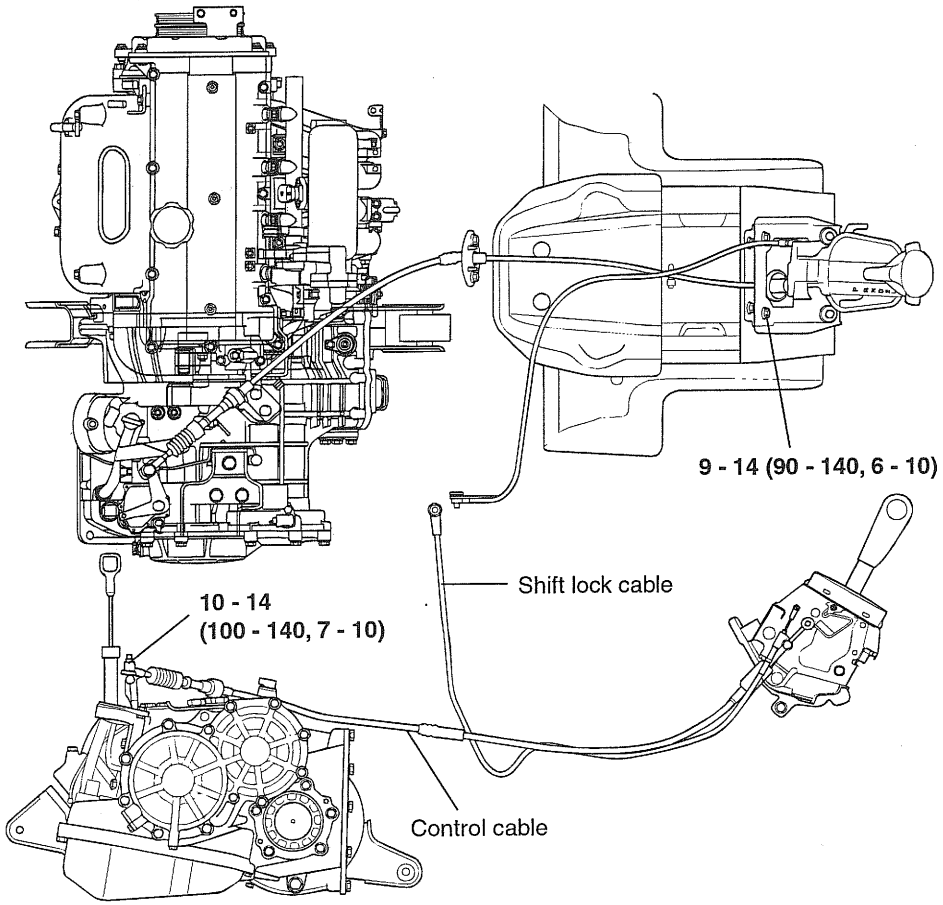
1. ***Engine and transmission mounting insulators should be installed by the specified order.***
2. ***Mounting bracket installation order :***
   1) ***Engine mounting bracket.***
   2) ***T/M mounting bracket.***
   3) ***Rear roll stopper mounting bracket.***
   4) ***Front roll stopper mounting bracket.***
3. ***Especially, when installing the front roll stopper mounting bracket, be careful not to crush the insulator. If crushed, idle vibration may occur.***

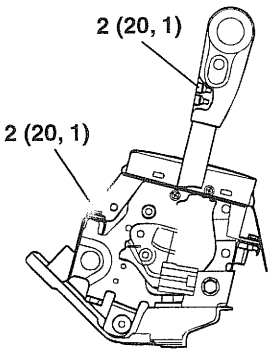


KKNA007A

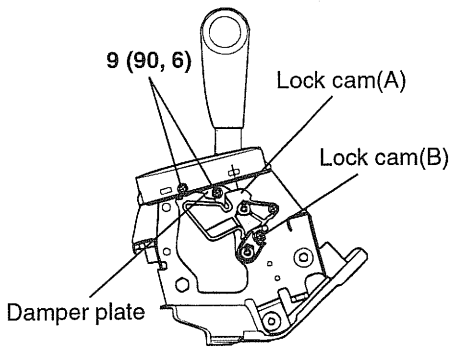
SHIFT LEVER

COMPONENTS EKNA0590





KKNB063A



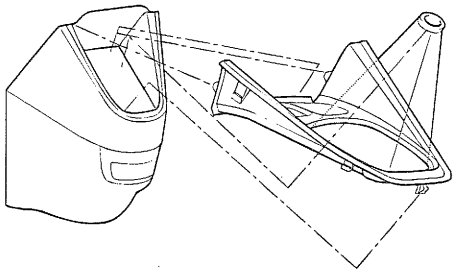
KKNB063B

N·m (kg·cm, lb·ft)

EKNA059A

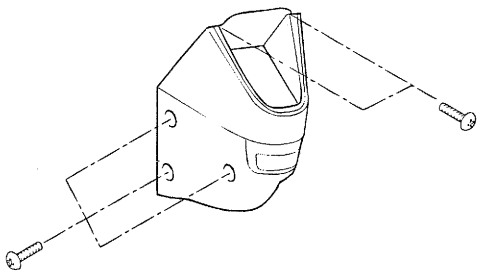
REMOVAL EKNB0600

1. Remove the console upper cover.



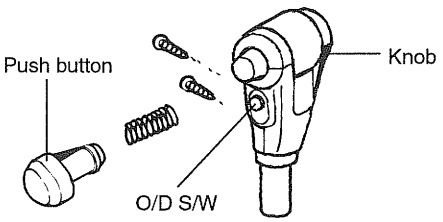
KSNB008G

2. Remove the console assembly.



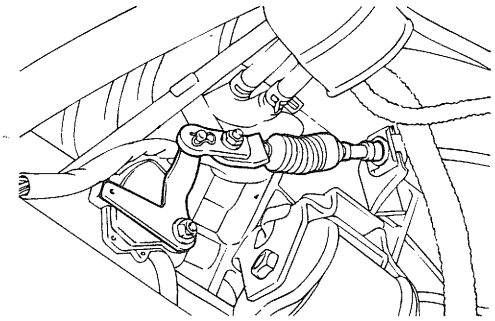
KSNB008H

3. Remove the screw of the knob.
4. Remove the overdrive switch connector and the knob.



EKNB060A

5. Remove the pin.
6. Remove the shift lock and the key lock cable.
7. Remove the transaxle control cable.



EKDA030F

INSPECTION EKNB0310

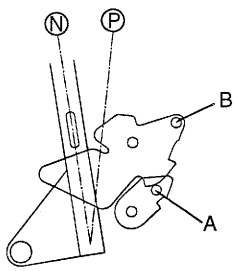
- Check the detent for wear.
- Check the bushing for wear or damage.
- Check the spring for damage or deterioration.
- Check the pin at the end of the rod assembly for wear.

SHIFT LOCK DEVICE INSTALLATION

NOTE

When servicing the shift lock device, follow the service instructions and procedures described below to ensure proper operation.

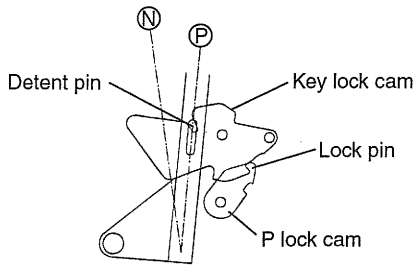
1. **Procedure to install the lock cam.**
   a. Move the P-lock cam to direction "A" and hold it by hand (Refer to figure 1).
   b. Check that the key lock cam is located at "B" by detent pin (Refer to figure 1,2).



<FIG. 1>

EKNB031A

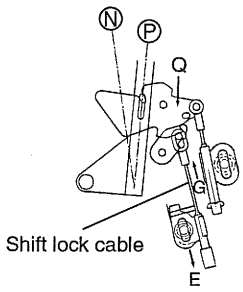
2. **Procedure for adjusting the shift lock and key lock cable.**
   a. Check that each lock cam is located in position as shown in figure 2.



<FIG. 2>

EKNB031B

   b. Install the shift lock cable and key lock cable in position. In this case, the key lock cable must be fixed to the key cylinder and the shift lock cable must be fixed to the brake pedal in position.
   c. Temporarily install each cable to the A/T lever assembly as shown in figure 3. Securely insert the cable into the fixing pin of each cam.



<FIG. 3>

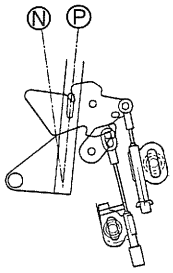
EKNB031C

   d. Keep a gap of 0-0.5mm between the key lock cam and the P-lock cam to eliminate cable slack by pulling the shift lock cable slightly in the direction of "E" (Refer to figure 3).

⚠ ***CAUTION***

If the gap is not maintained between 2 and 4mm, the brake pedal will have to be depressed more than required when operating the push button of the shift lever.

   e. After checking that a portion of the cable end touches cable fixing pin of the P-lock cam, fix the shift lock cable to the A/T lever with the nut and fix the shift lock cable end with the washer and snap pin (Refer to figure 4).
   f. Slightly push the key lock cam in the direction of "Q".
   g. Performing the work of 6, slightly pull the key lock cable in the direction of "G" to stretch the cable tight and then fix it with a nut (Refer to figure 3, 4).
   h. Be sure to check whether the key lock cable is inserted into the fixing pin of the key lock cam, and then fix it with the washer and snap pin. At this time, check if the P-lock cam is fixed to the shift lock cable as shown in the figure 4.



<FIG. 4>

EKNB031D

3. **Procedure for checking for correct shift lock installation.**
   a. When the brake pedal is not depressed the, push button of the shift lever in the "P" position cannot operate (shift lever cannot shift to other positions from "P"). Push button can be operated at other positions, except "P".
   b. When the brake pedal stroke is 15-25mm (with shift lever in the "P" position), push button should operate without catching and the shift lever can shift smoothly out of "P".
   c. When the brake pedal is not depressed, the shift lever should be shift smoothly to the "P" position from other positions.
   d. Brake pedal must operate smoothly without catching in all positions.
   e. When the ignition key is at the "LOCK" position, although brake pedal is depressed, the push button should operate.
   f. Ignition key must not turn to the "LOCK" position, except when in"P" position.
   g. If the shift lever is shifted to the "P" position, the ignition key must be able to turn to the "LOCK" position smoothly.

4. **Caution in service.**
   a. Keep the gap of 0-0.5mm between the key lock cam and p-lock cam by pulling the shift lock cable in the direction of "E" slightly, and then fix the cable with a nut. After this, be sure to check that the gap is within 0-0.5mm.

📖 ***NOTE***

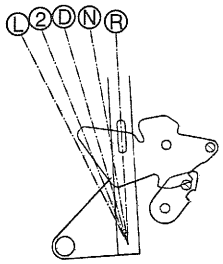
If the gap is not maintained between the brake pedal will have to be depressed more than required in order to shift the lever from "P" to other positions.

b. Be sure that the key lock cable slack is eliminated.

NOTE

If slack in the key lock cable is not eliminated, the ignition key cannot be removed from the key cylinder and the shift lever will be able to shift from "P" to other positions, although the key is in the "LOCK" position.

c. Before and after the relating work, the key lock cam and P-lock cam should not be in the same condition as the figure 5 and 6.



<FIG. 5>

EKNB031E

NOTE

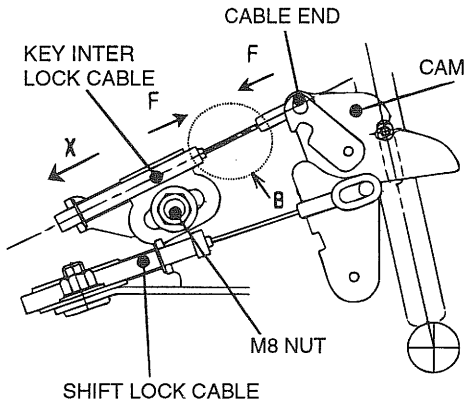
When the key lock cam and P-lock cam are in the same condition as the figure 5, shifting the shift lever from D, 2, L positions to P, R, N by force may cause a malfunction of related parts. Under the condition in figure 5, shift the shift lever from D, 2, L to P, R, N after rotating the P-lock cam in the direction of "A".
Under the condition in figure 6, shift the shift lever from D, 2, L to P, R, N after rotating the P-lock cam in the direction of "A" the depressing the brake pedal.

KEY INTERLOCK DEVICE INSTALLATION

It is expected that the ignition key may not be removed from the key cylinder due to misassembly of the key inter lock cable. To prevent this problem, apply the following installation instructions when servicing.

1. **Assembly of key interlock cable and ignition lock.**
   a. The Ignition lock assembled to the steering column. Set the ignition lock to the lock position.
   b. Assemble the key interlock cable and the ignition lock with the set screw.

2. **Assembly of key interlock cable and shift lever.**
   a. Set the shift lever to the "P" position.
   b. After setting the key interlock cable as shown in the figure 6, temporarily assemble the key inter lock cable with a M8 nut just enough to move the key interlock cable plate by its spring force.



<FIG. 6>

EKNB031F

c. Holding the cable and the key inter lock cable plate, push them into the direction of "F" so as not to create any bending or slack on the "B" point of the key inter lock cable.

NOTE

Do not pull the cable in the direction of "X" to remove the slack. This may cause key not to remove from the key cylinder.

d. Tighten the key inter lock cable with a M8 nut.

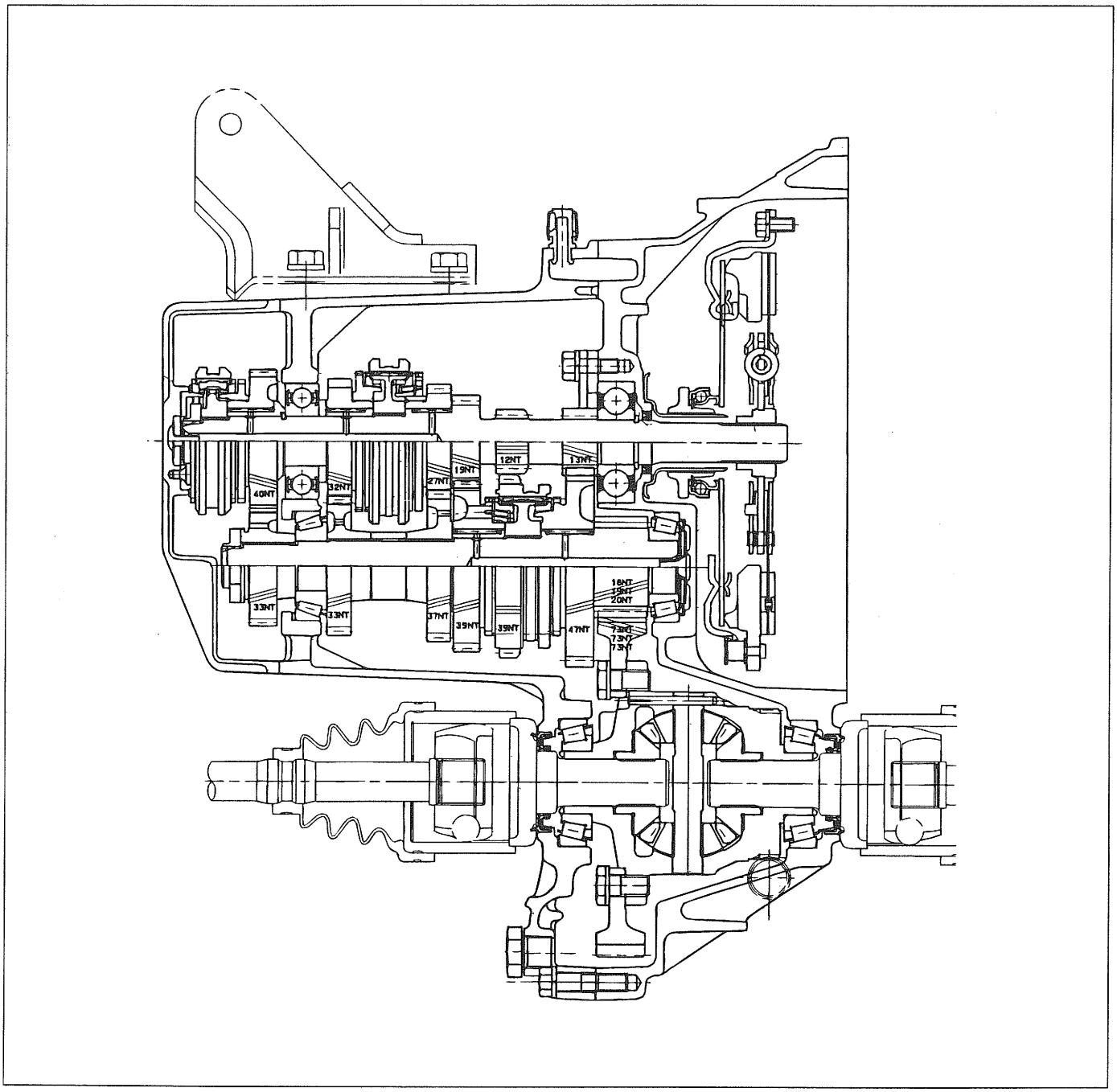
MANUAL TRANSAXLE SYSTEM

TRANSAXLE OVERHAUL (M5BF2) EMNB0680

Manual transaxle overhaul section have been separated from the shop manual.

M5BF1 like a M5BF2 overhaul section were included in the overhaul manual.
M5BF1 and M5BF2 are almost same in the overhaul except the gear ratio etc.
So, we describe the major contents of the M5BF2 model in overhaul parts.

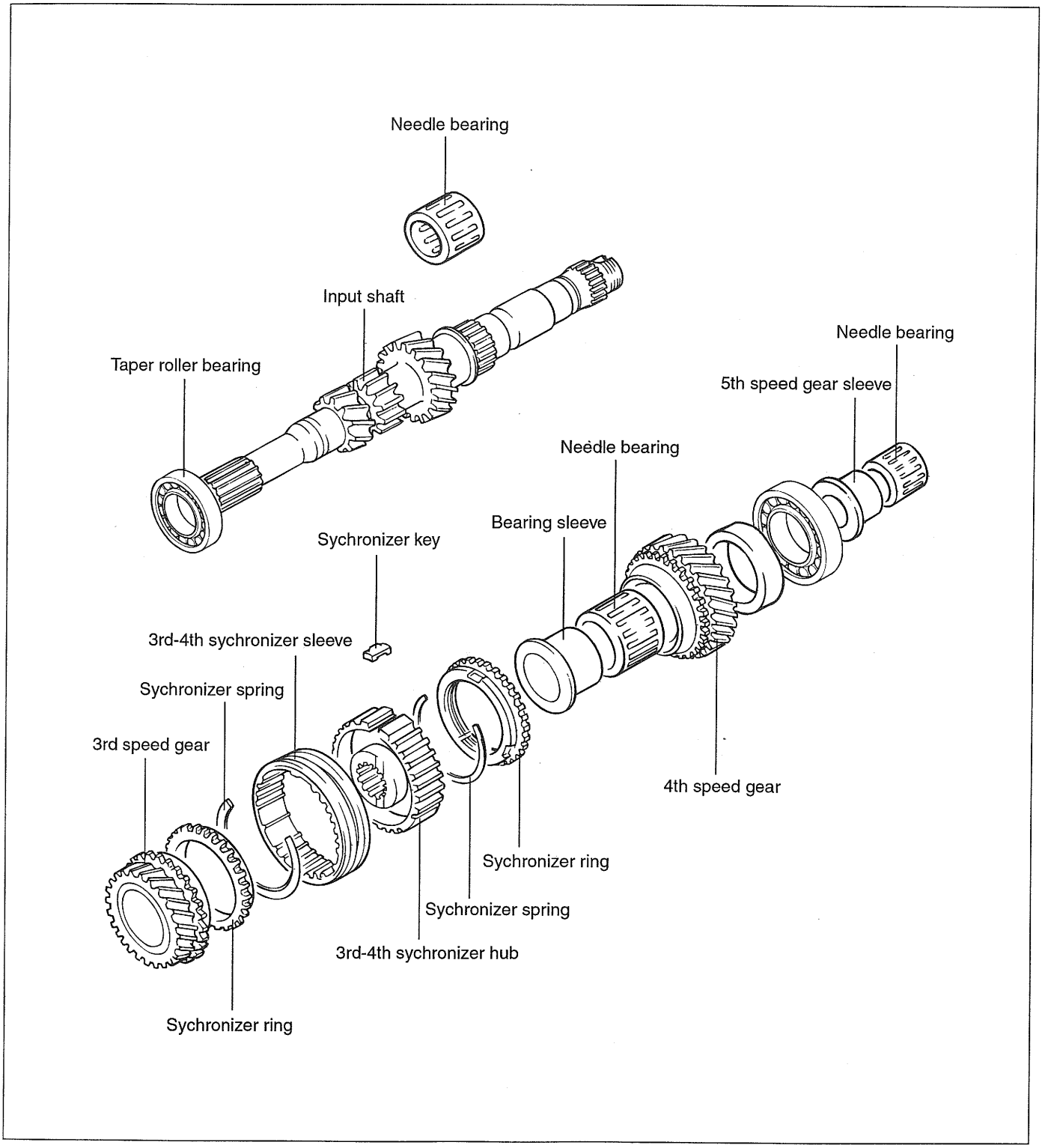
SECTION VIEW



EMKA001A

INPUT SHAFT

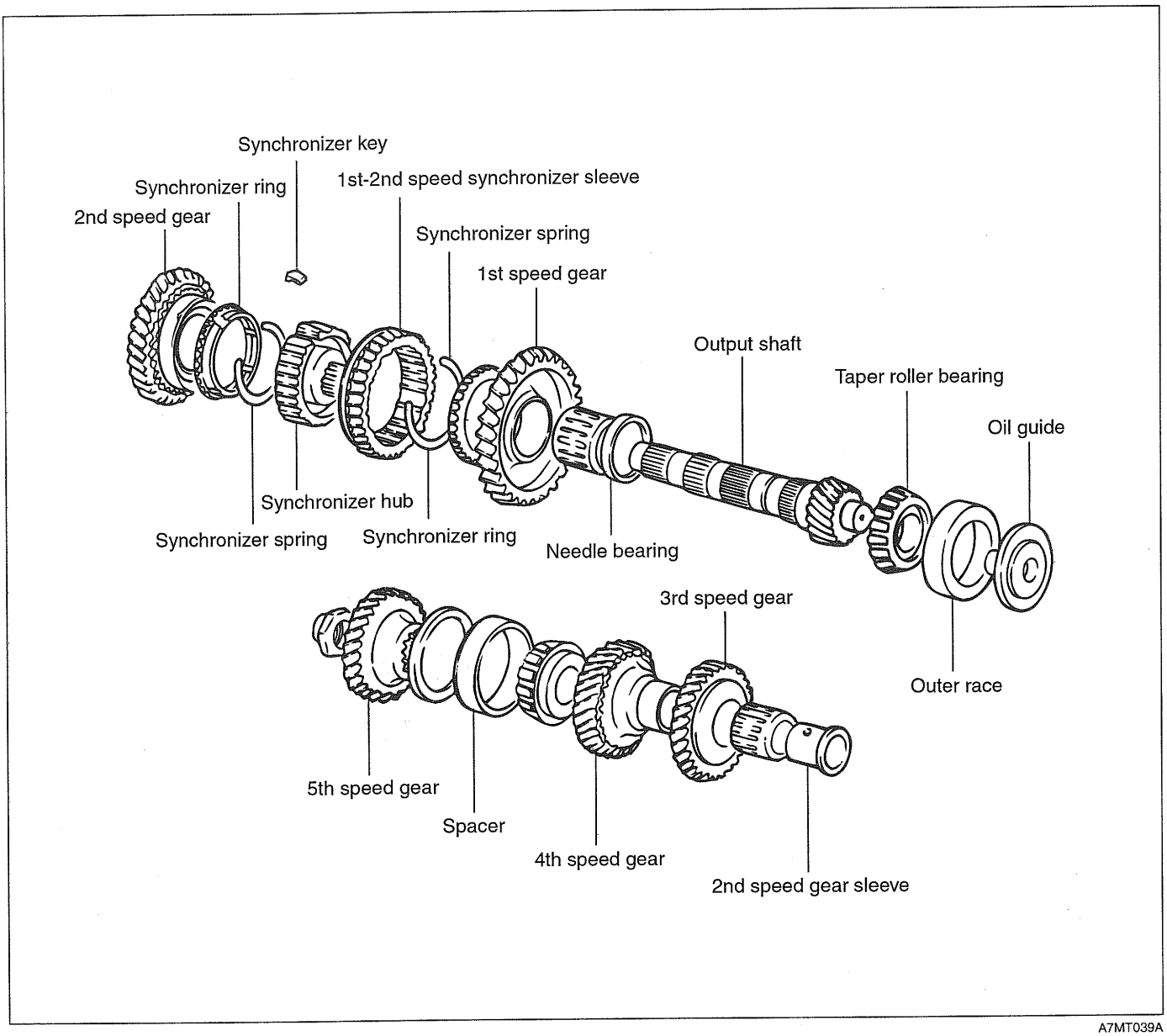
COMPONENTS



EMNB068A

OUTPUT SHAFT

COMPONENTS



A7MT039A

MANUAL TRANSAXLE

SERVICE ADJUSTMENT PROCEDURES

EMNB1030

TRANSAXLE GEAR OIL LEVEL INSPECTION

Inspect transaxle for evidence of leakage. Check the gear oil level by removing the filler plug. If the oil is contaminated, it is necessary to replace it with new oil.

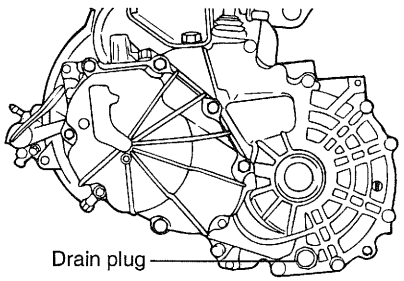
1. Remove oil filter plug and check level with finger.
2. Oil level must be up to the fill hole. If it is below the hole, add oil until it runs out, then reinstall the plug.
3. Replace the oil if the transaxle gear oil is noticeably dirty, or it is not of a suitable viscosity.

REPLACEMENT OF TRANSAXLE GEAR OIL

Use HP Gear Oil SAE 75W/90 (API-GL-4).

1. With the vehicle parked on a level surface, remove the drain plug and drain the transaxle oil.
2. Replace the gasket with a new one and install the drain plug.

Tightening torque:
Drain plug : 30-35 Nm (300-350 kg·cm, 22-25 lb·ft)

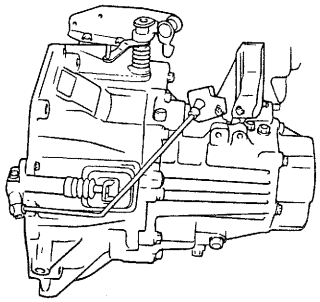


EMDA003A

3. Add new oil the through the filler plug, filling to a level of 5-9mm (0.2-0.4 in.) below the plug opening.

Transaxle oil total capacity :
2.15 liters (2.27 u.s.qts., 1.89 Imp.qts.)

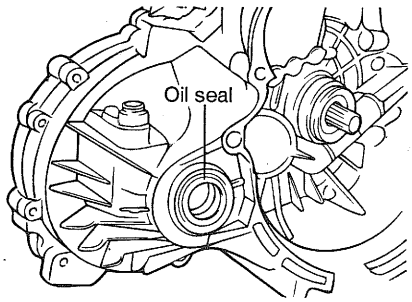
Tightening torque:
Filler plug : 30-35 Nm (300-350 kg·cm, 22-25 lb·ft)



EMDA003B

DRIVE SHAFT OIL SEAL REPLACEMENT

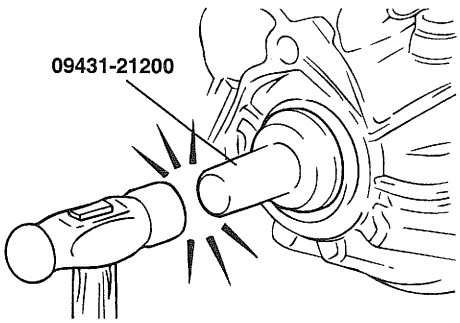
1. Disconnect the drive shaft from the transaxle (Refer to DS GROUP).
2. Using a flat-tip screwdriver, remove the oil seal.



EMDA003C

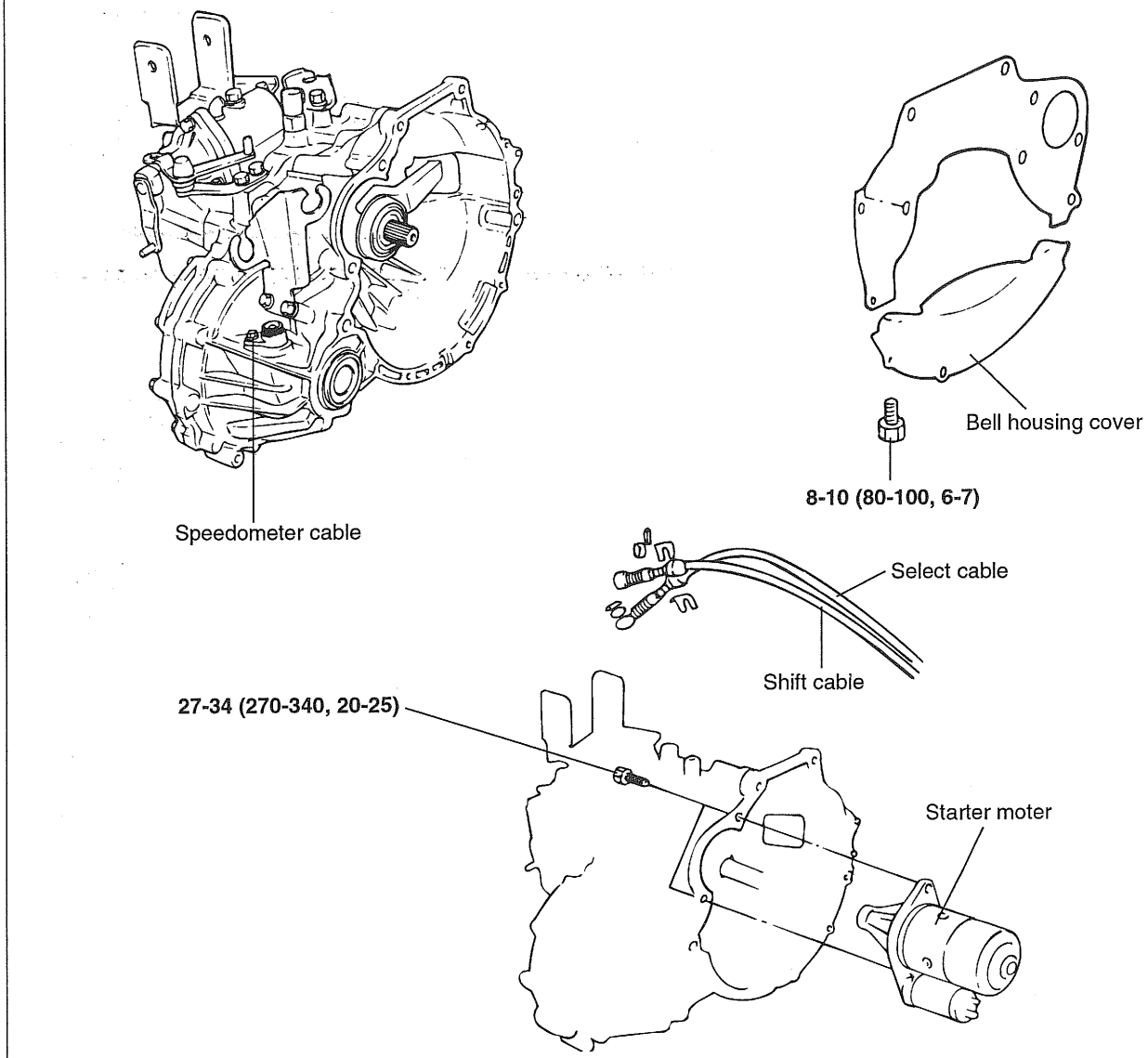
3. Using the special tool (09431-21200) name, tap the drive shaft oil seal into the transaxle.
4. Apply a coating of gear oil to the lip of the oil seal.

Transaxle gear oil :
HYUNDAI GENUINE PARTS MTF 75W/90
conforming to API GL-4 or higher



EMDA003D

COMPONENTS EMDA0110

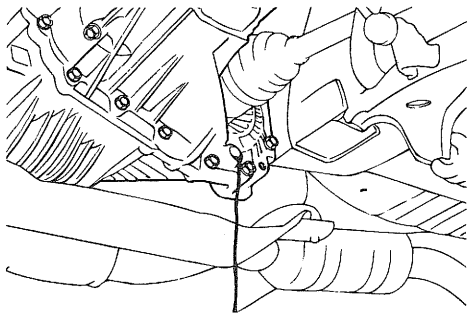


TORQUE : Nm (kg·cm, lb·ft)

EMDA011A

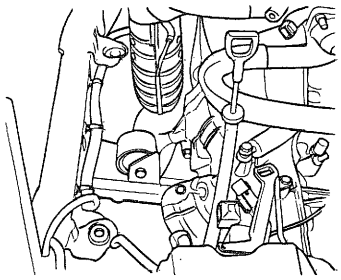
REMOVAL EMNB0160

1. Remove the battery terminal(-) and the connectors.
2. Remove the shift cable and the select cable.
3. Remove the clutch release cylinder.
4. Remove the tire.
5. Separate the front brake caliper.
6. Remove the side cover.
7. Remove the nut of the tie-rod.
8. Remove the front strut knuckle mounting bolt.
9. Drain the transaxle oil.
10. Separate the drive shaft.

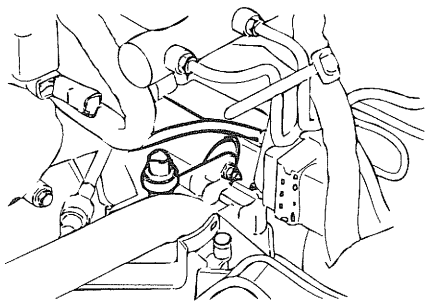


R7MT015C

11. After removing the center member, remove the front and rear mounting bracket of the transaxle.

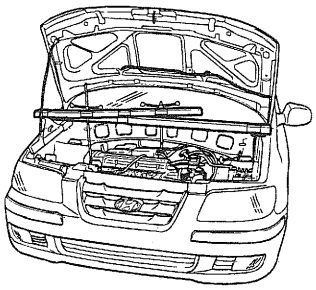


KDNB002C



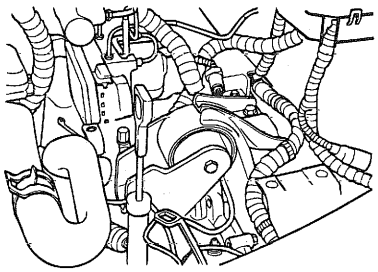
KDNB002D

12. Remove the lower mounting bolt.
13. Install the engine fixture.



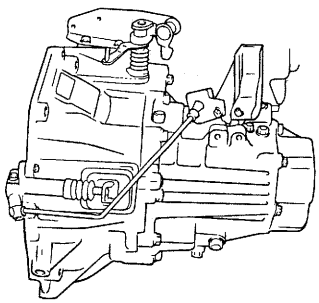
KKNB016A

14. Remove the transaxle side mounting bracket.



KDNB002B

15. Remove the transaxle upper mounting bolt.
16. Remove the transaxle assembly.



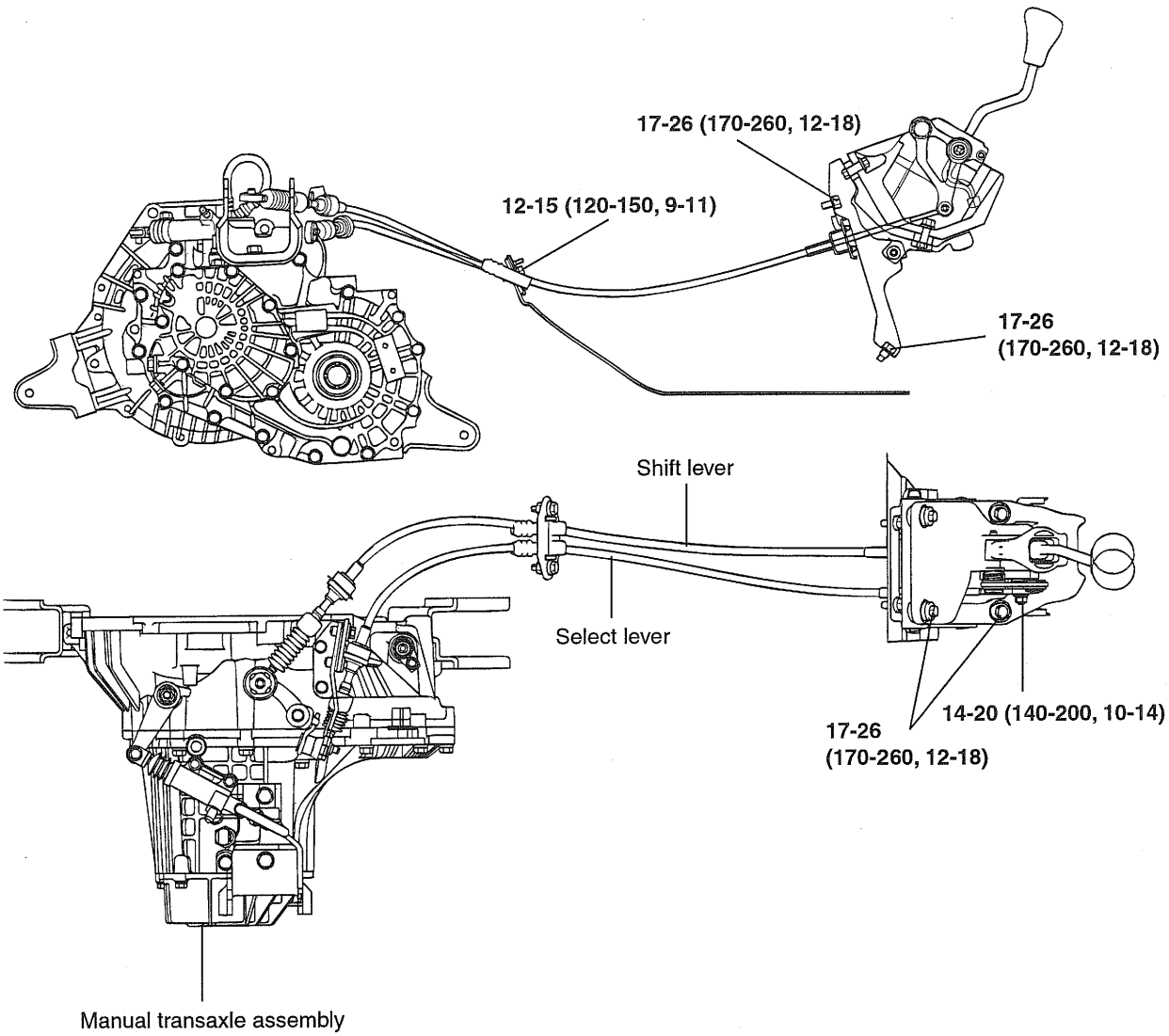
A7CH011A

INSTALLATION EMDA0130

1. Installation is the reverse of removal.

SHIFT LEVER

COMPONENTS EMNB0080

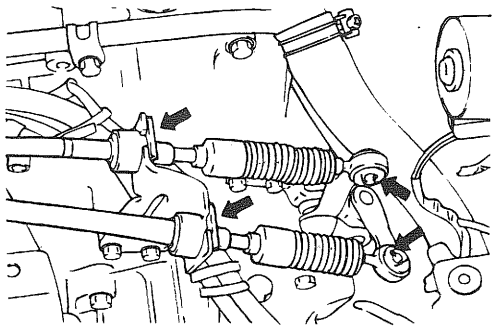


TORQUE : N·m (kg·cm, lb·ft)

EMNB008A

REMOVAL EMDA0050

1. Remove the console assembly (Refer to CONSOLE).
2. Remove the cotter pins and clips (shift lever side).
3. Remove the shift lever assembly.
4. Remove the retainer and bolts.
5. Remove the cotter pins and clips (transaxle side).
6. Remove the shift cable and select cable.



EMDA005A

INSPECTION EMDA0060

1. Check the select cable for proper operation and for damage.
2. Check the shift cable for proper operation and for damage.
3. Check the boot for damage.
4. Check each bushing for wear, abrasion , sticking, restricted movement or damage.
5. Check for a weak or damaged spring.

REASSEMBLY EMDA0070

1. Install the shift lever assembly.
2. Install of shift lever and select cable.