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Distribution range:



CVT19 product knowledge explanation

www.zjwly.com

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AutoLibrary

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1 Summary

1. Development history of CVT
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Continuous Variable Transmission (CVT)

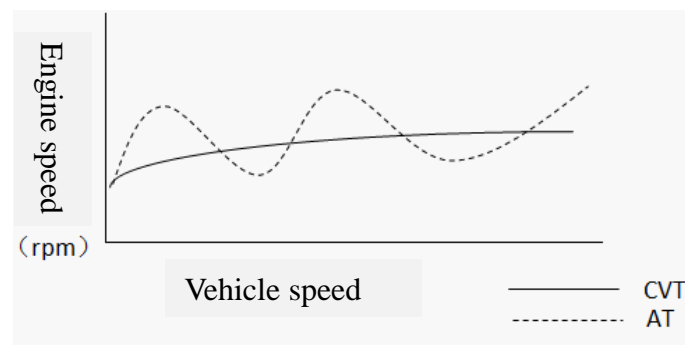
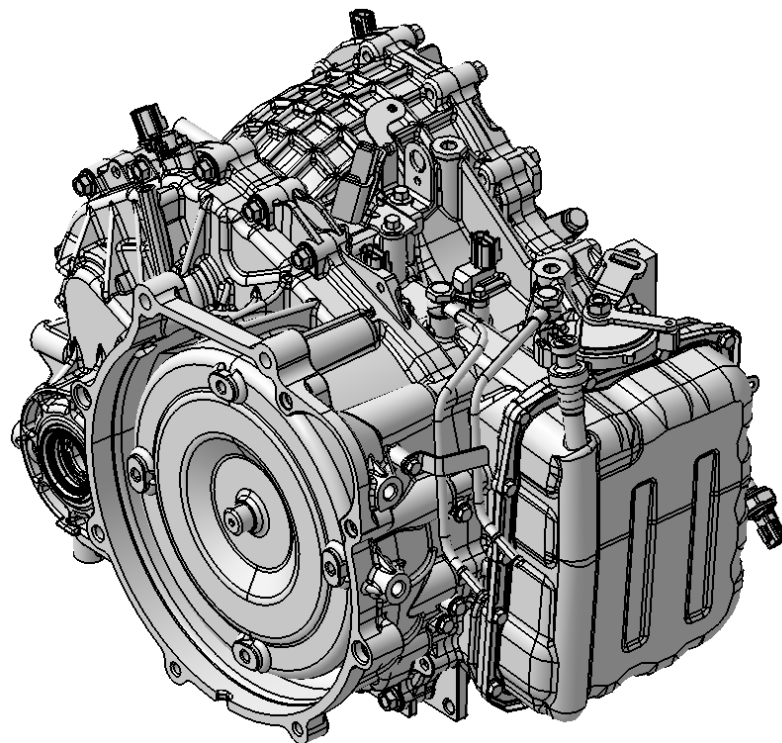
- Continuous Variable Transmission: referred to as CVT (Continuous Variable Transmission), also known as the continuous mechanical automatic transmission.
- The most distinctive difference between this transmission and general gear type automatic transmission is that it eliminates the complicated and cumbersome gear combination variable speed drive, but only uses two groups of pulleys for variable speed transmission. It changes speed by changing the contact radius between the driving wheel and the driven wheel.

Development history of CVT

- CVT has a history of more than 100 years.
 1. CVT with V band appeared in 1886 (German Benz Corp is the originator of using CVT Technology).
 2. In order to improve the transmission performance and integrate the hydraulic converter into the CVT system, the clamping force of the driving wheel and the driven wheel is controlled electronically, the energy saving pumps are used in CVT and traditional rubber belt is replaced by metal belt for the transmission belt.
 3. The above technology is mainly used in micro vehicles, Japan Nissan developed CVT for use on 2.0 L cars in 1997, and since then CVT equipped for 1.0 L and 3.0 L cars has been developed.
 4. In the first half of 1999, the United States Ford Motor and German ZF company cooperated to produce CVT for Ford Motor Co's cars and light trucks.

019CH

- CVT researched and developed independently by Wanliyang
- With manual and automatic mode
- Electronic hydraulic control
- It changes speed automatically and continuously when in D gear, and changes speed through 7 gears manually when in M gear, enabling the customer to experience double driving fun.
- Keep the minimum engine speed at a constant speed
- Reduce vehicle emissions and NVH
- Improve the economy of the whole vehicle and reduce fuel consumption
- The accelerator responds quickly at acceleration, soft and smooth acceleration without impact

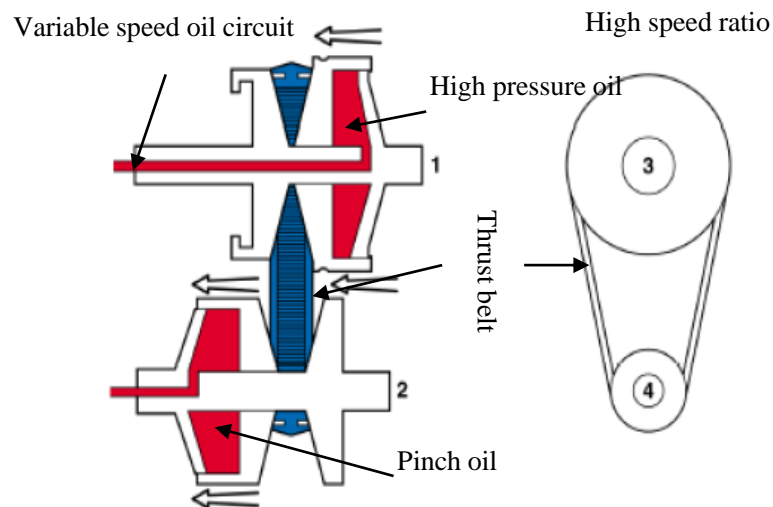
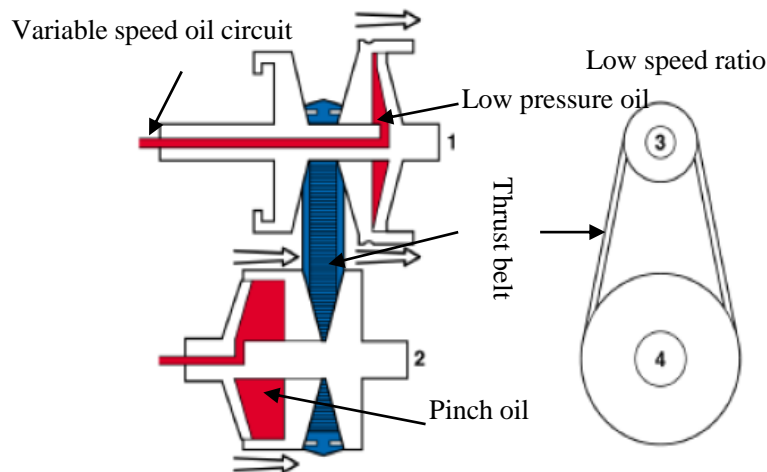


Technical parameters

Item	Parameter
Model	019CHD
Type	Continuous Variable Transmission (CVT)
Arrangement	Transverse FWD
Starting clutch device	Hydraulic converter
Control mode	Electronic hydraulic control
External dimensions (L*W*H)	385 mm×555 mm×405 mm
Weight (No collant oil)	78 Kg
Center distance	204mm
Maximum permissible input torque	190 N·m
Final ratio	5.141
Pulley speed ratio range	0.427-2.465
Oil type	ATF SP-III (Hereinafter referred to as CVTF)
Total oil quantity of transmission	8±0.2 L

1.3 Principle of speed ratio variation

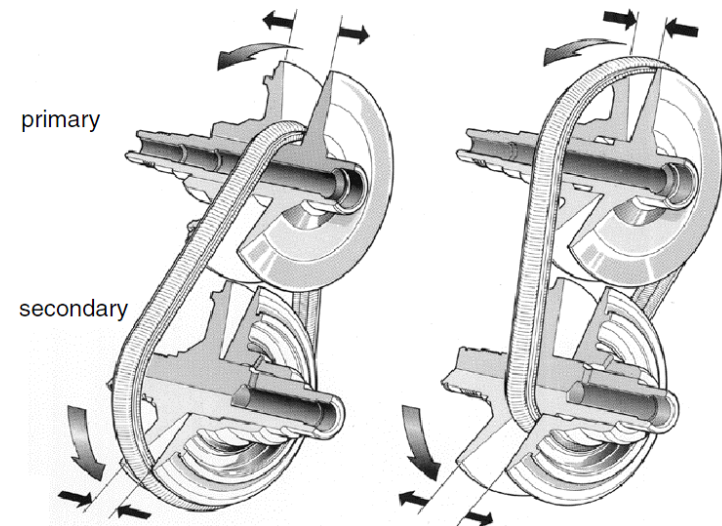
Principle of speed ratio variation



- 1. Input pulley
- 2. Output pulley
- 3. Input pitch circle
- 4. Output pitch circle

1.3 Principle of speed ratio variation

Principle of speed ratio variation



2 Introduction of structure

1. Summary
2. Hydraulic converter
3. Internal structure

Main components of CVT:

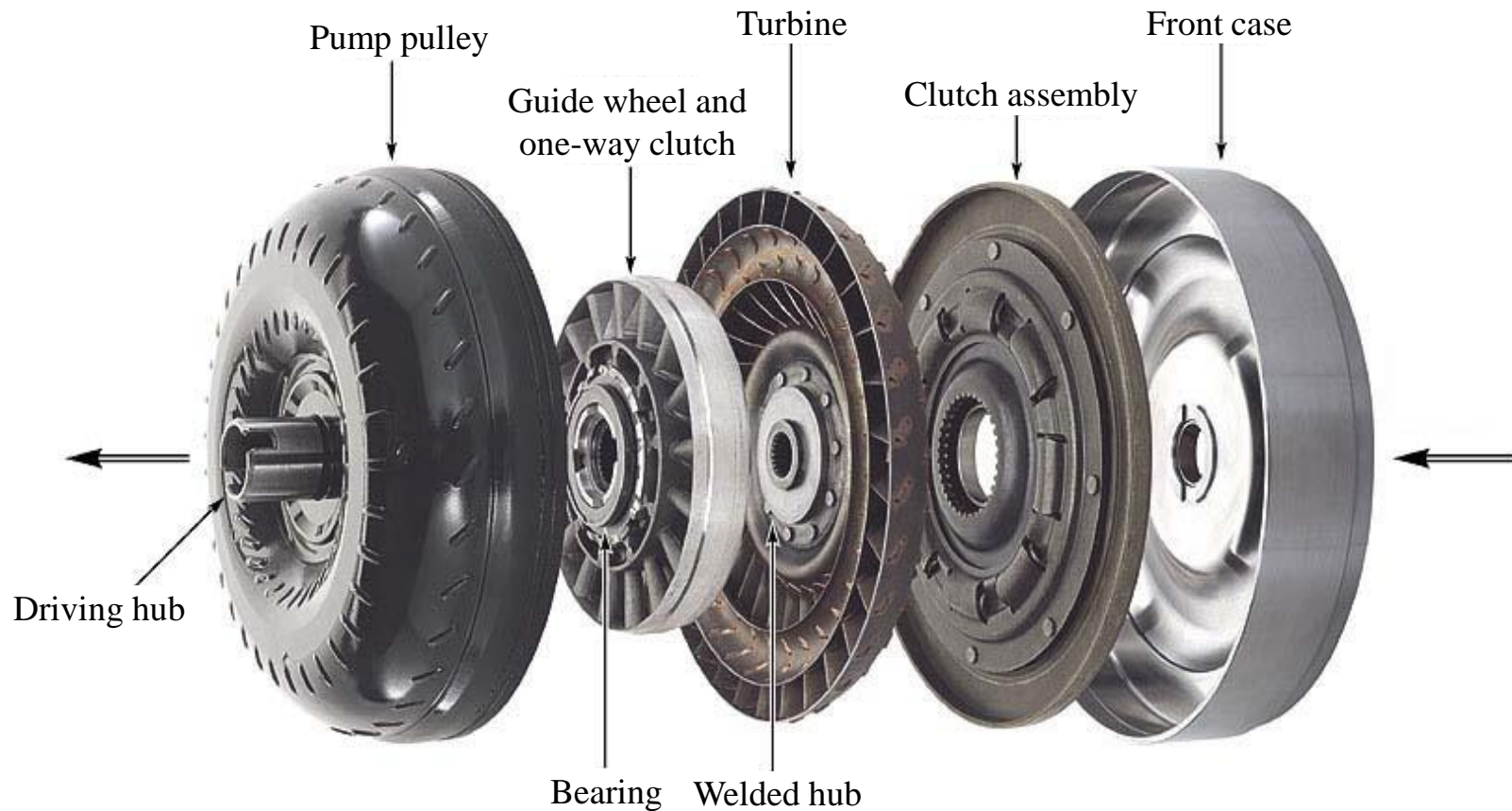
- Hydraulic converter
- Planetary gear train
- Driving, driven pulley system (transmission)
- Metal belt (The metal belt consists of two groups of metal rings and hundreds of pieces of metal)

- Oil pump
- Valve body

- Transmission control unit

Hydraulic converter

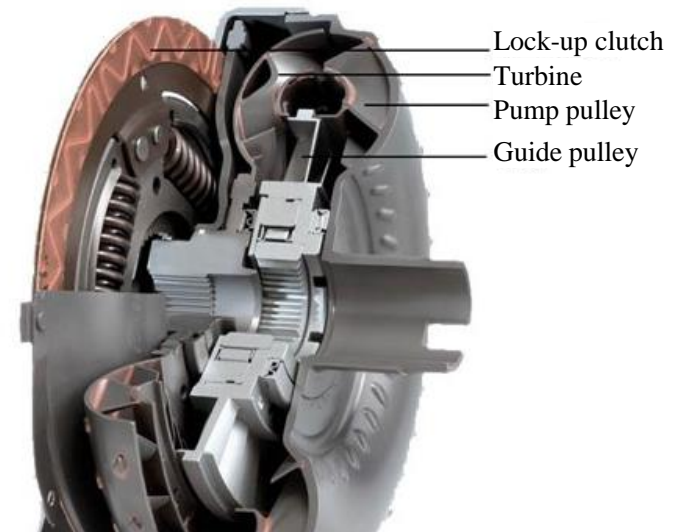
typical hydraulic converter mainly consists of the pump wheel, guide wheel, turbine, lock-up clutch and shock absorber, etc., it mainly plays a role of twisting and buffering in the automobile transmission system



I. Twisting

The input of the torque converter is connected with the crankshaft of the engine, it transforms the mechanical energy transferred by the engine to the hydraulic energy through the pump wheel, and the turbine transforms the hydraulic energy from the pump wheel to the mechanical energy and passes it to the gearbox through the output; The guide wheel is a reaction element between the pump wheel and the turbine, Its function is to change the flow direction of the turbine outlet to the inlet of the pump wheel, so that the pump wheel has higher hydraulic energy and then pass it to the turbine, and in turn, the output torque is increased.

Therefore, it can ensure that the car has good acceleration in the starting stage, and improve the power performance of the car.

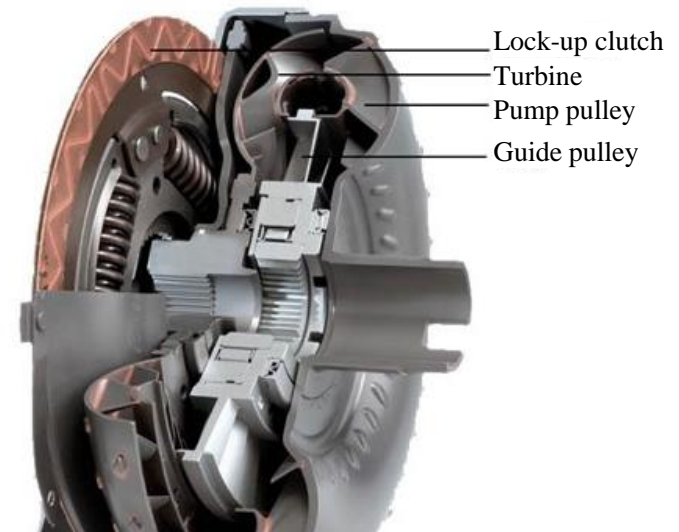


II.Buffer

Replacing the traditional rigid connection, hydraulic converter transforms the mechanical energy into the liquid flow energy, and then into the mechanical energy to transfer the vehicle power, and realizes the flexible connection;

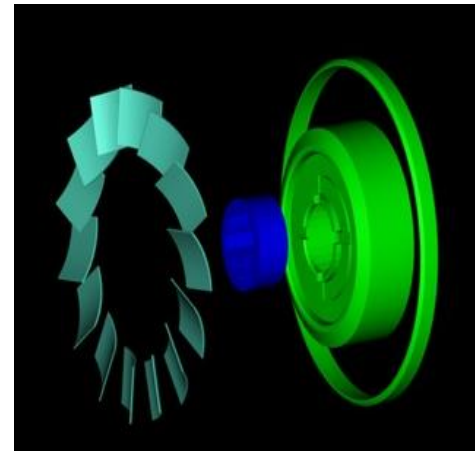
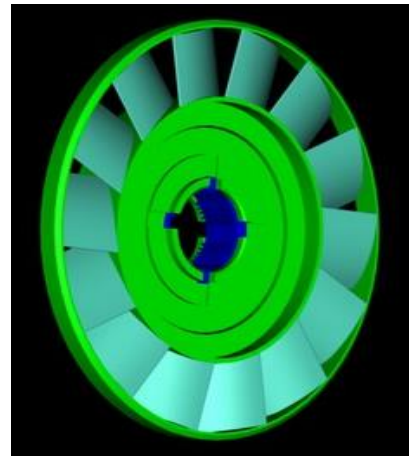
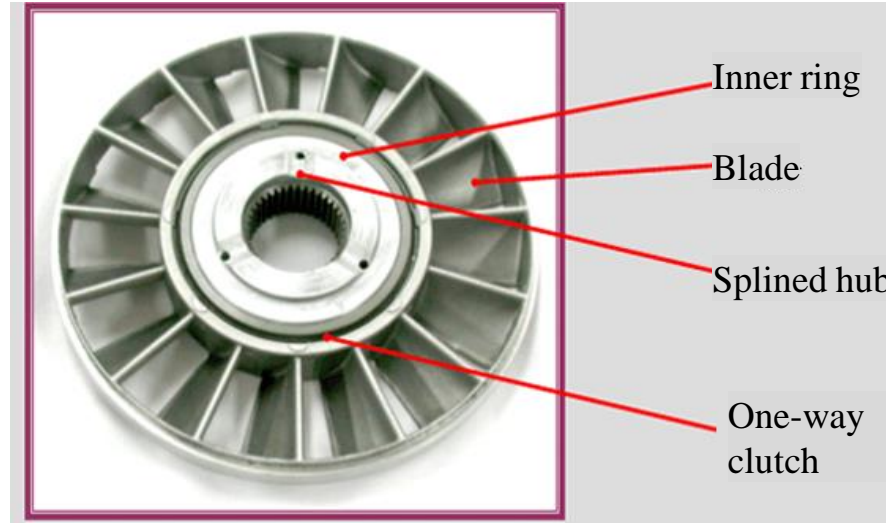
Hydraulic drive ensures that the vehicle starts smoothly and eliminates or reduces the impact and dynamic loads of the transmission system.

Therefore, it not only ensures the comfort of the car, but also prolongs the life of the engine and transmission system parts.



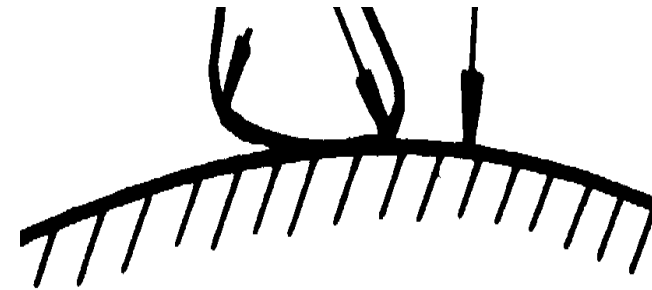
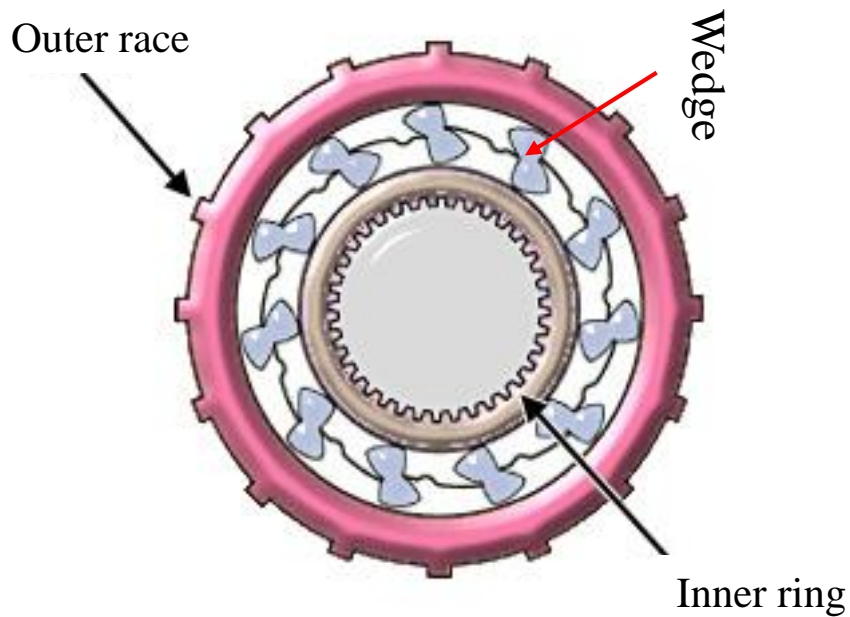
Hydraulic converter

- Guide wheel structure



Hydraulic converter

- One-way clutch

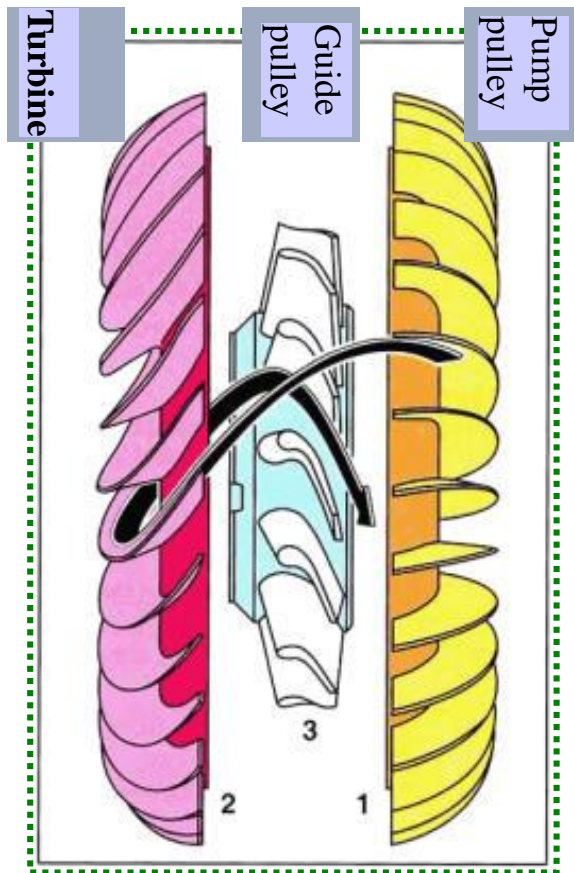


Inner ring (c) Wedge size

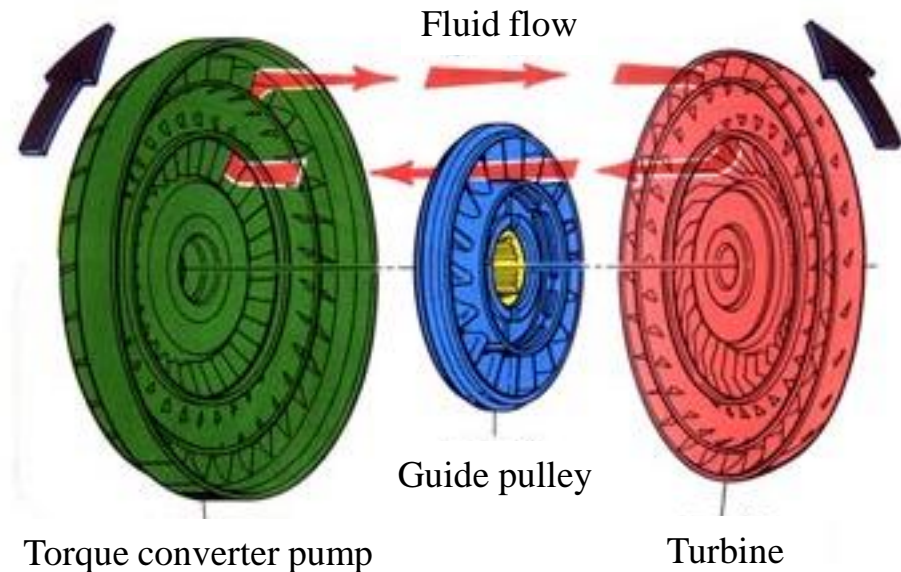
Sprag clutch

Hydraulic converter

- The direction of fluid flow in the torque conv
- ertter



Hydraulic converter

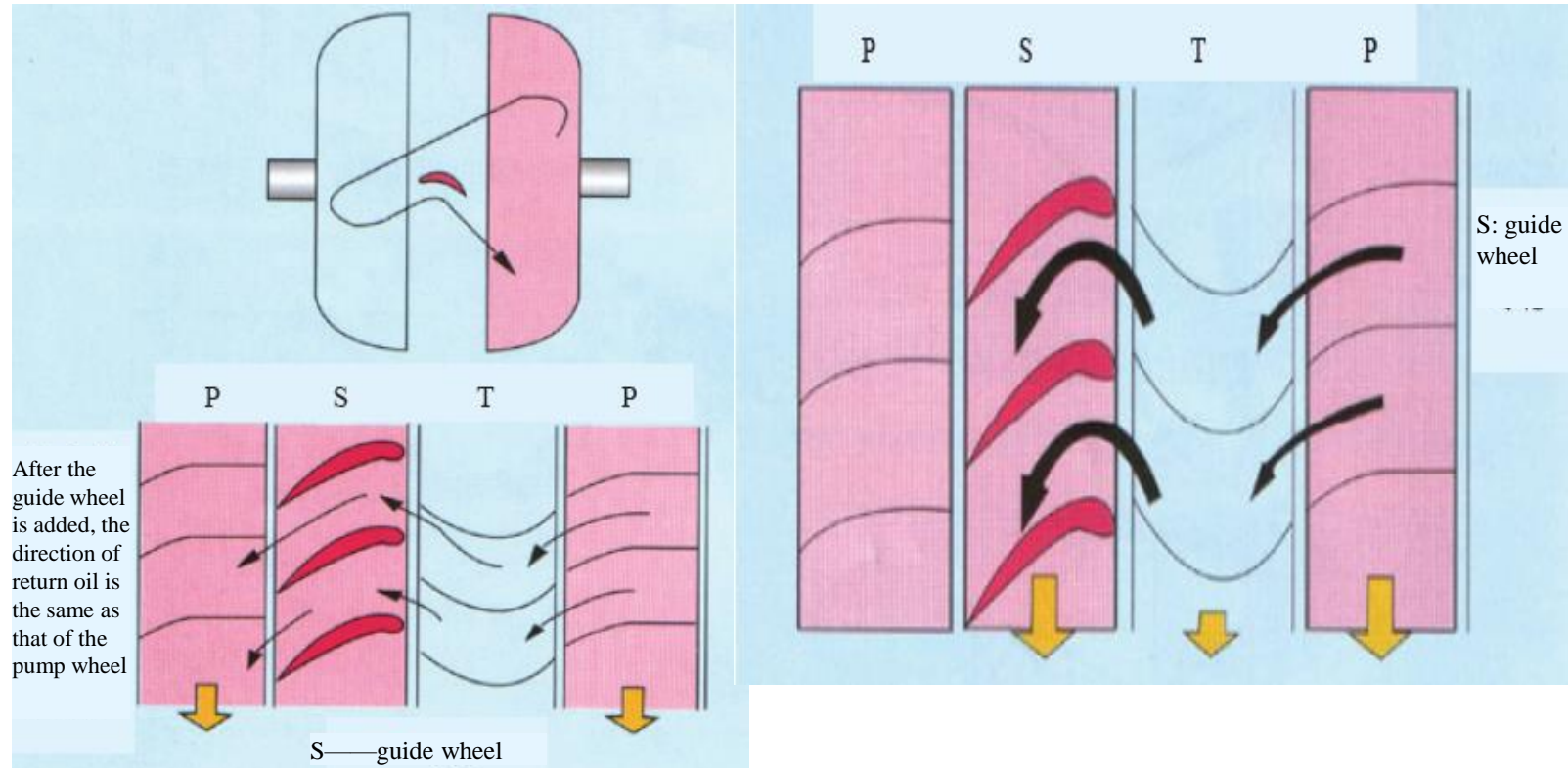


- Turbulence
- Circulation

The twisting action of the guide wheel

Q1: What kind of fault happens when the one-way clutch in the guide wheel is slipping?

Q2: What kind of fault happens when the one-way clutch is jammed in the guide wheel?

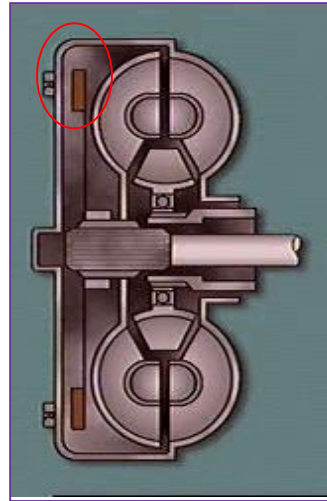
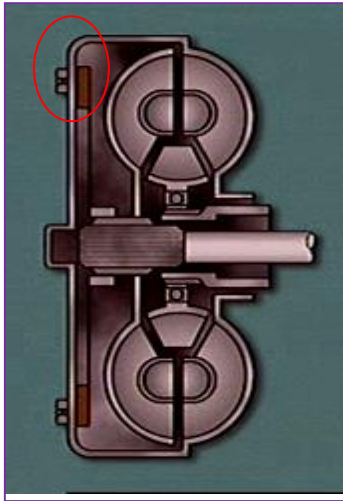


P-Pump pulley T-Turbine

Lock-up clutch

The condition when jointing the lock-up clutch

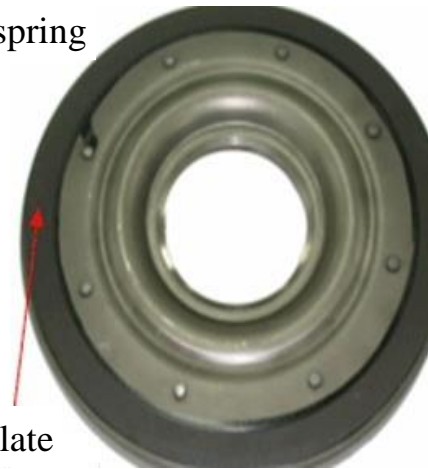
The condition when separating the lock-up clutch



Question: what kind of fault happens when the lock-up clutch is not working properly



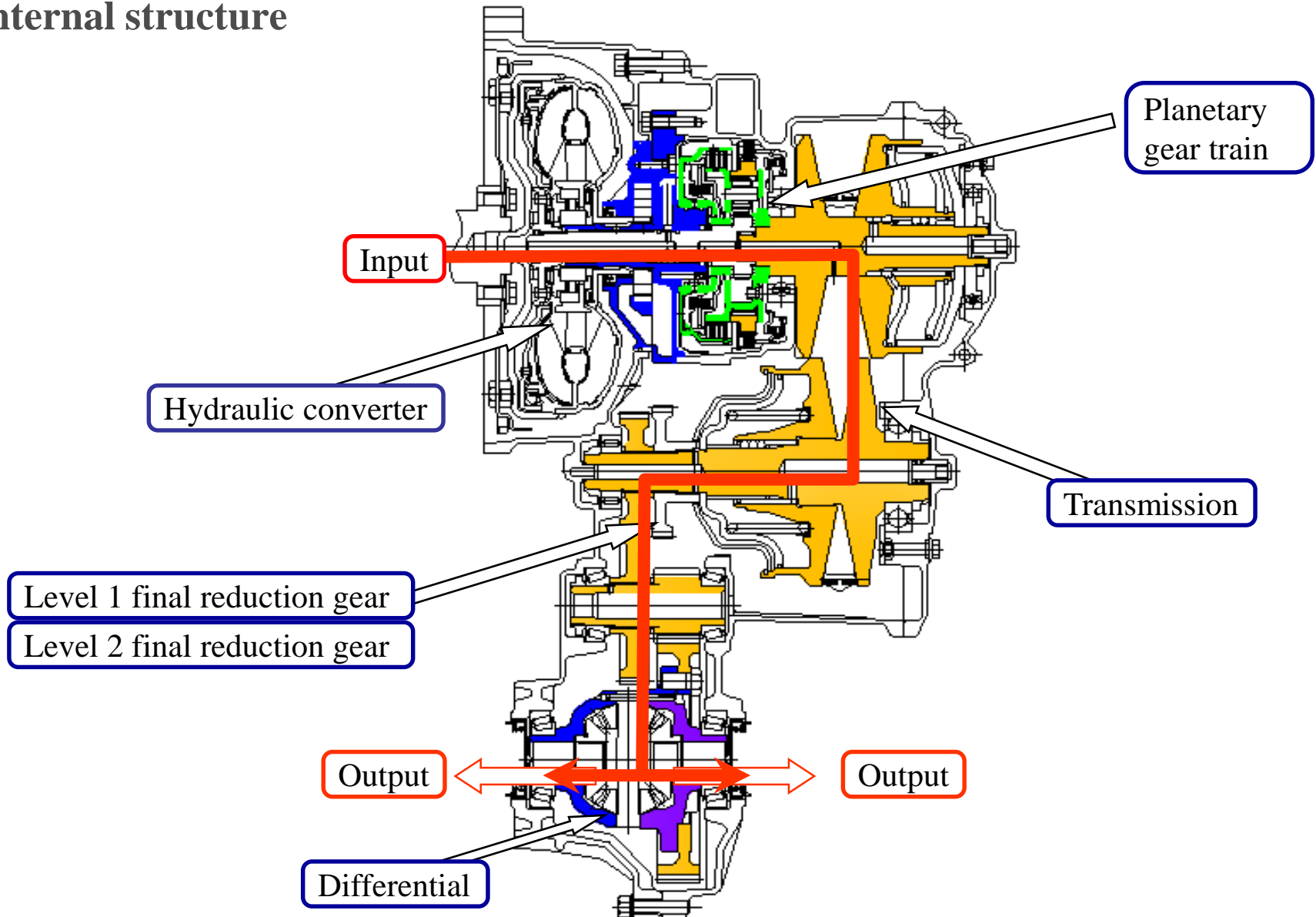
Damping spring



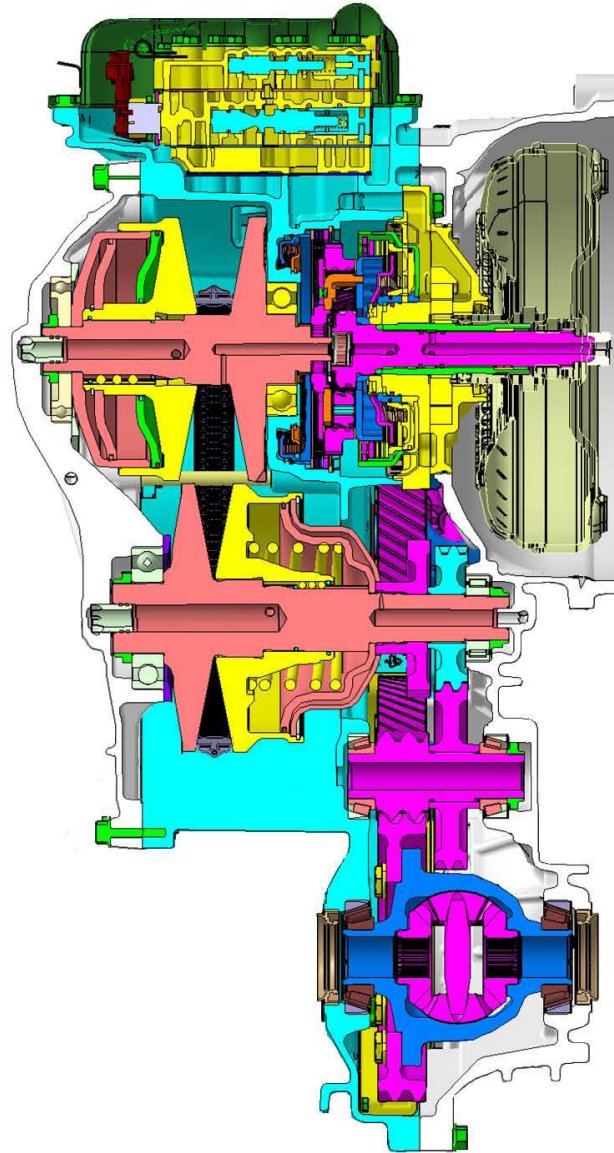
Friction plate

2.3 Internal structure

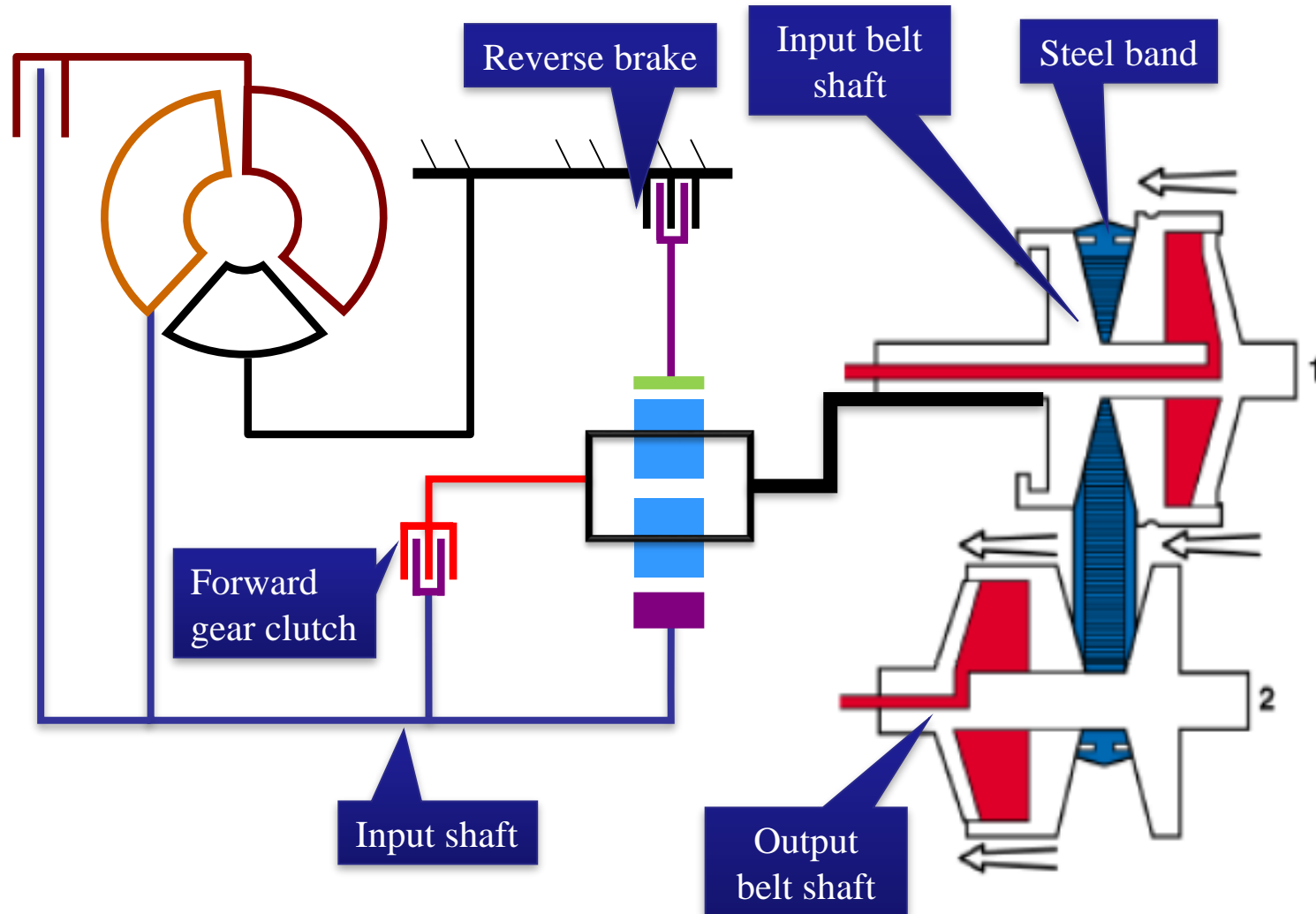
Internal structure



2.3 Internal structure

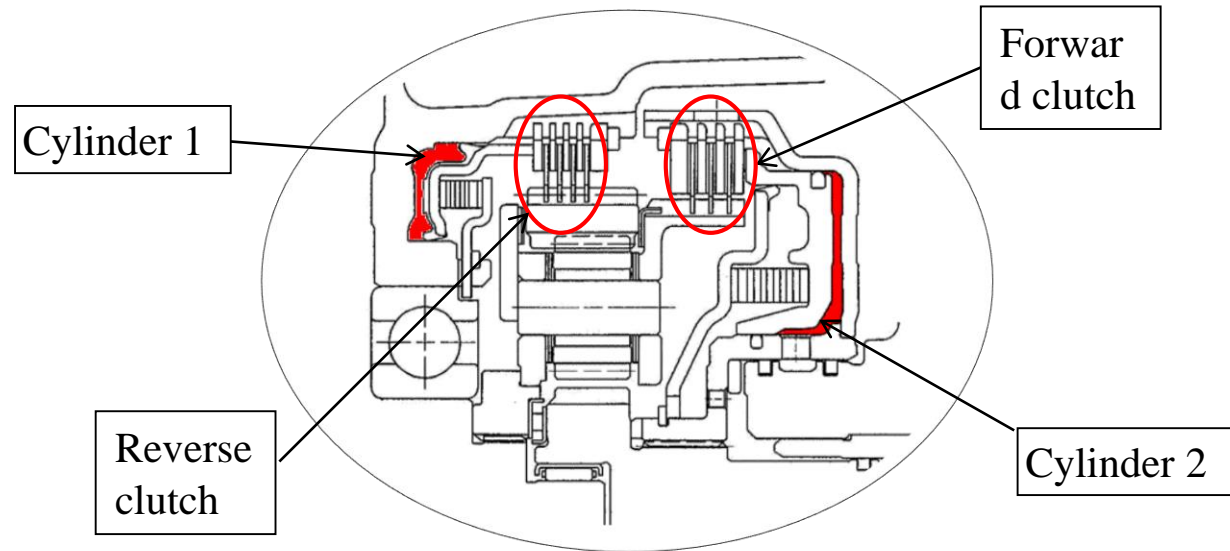
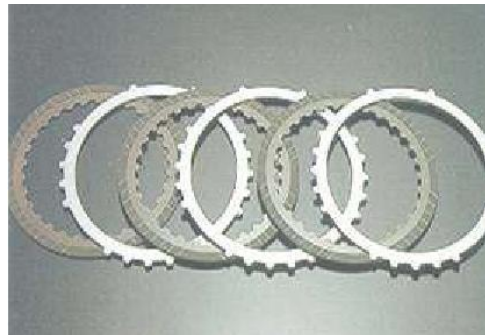


Internal structure



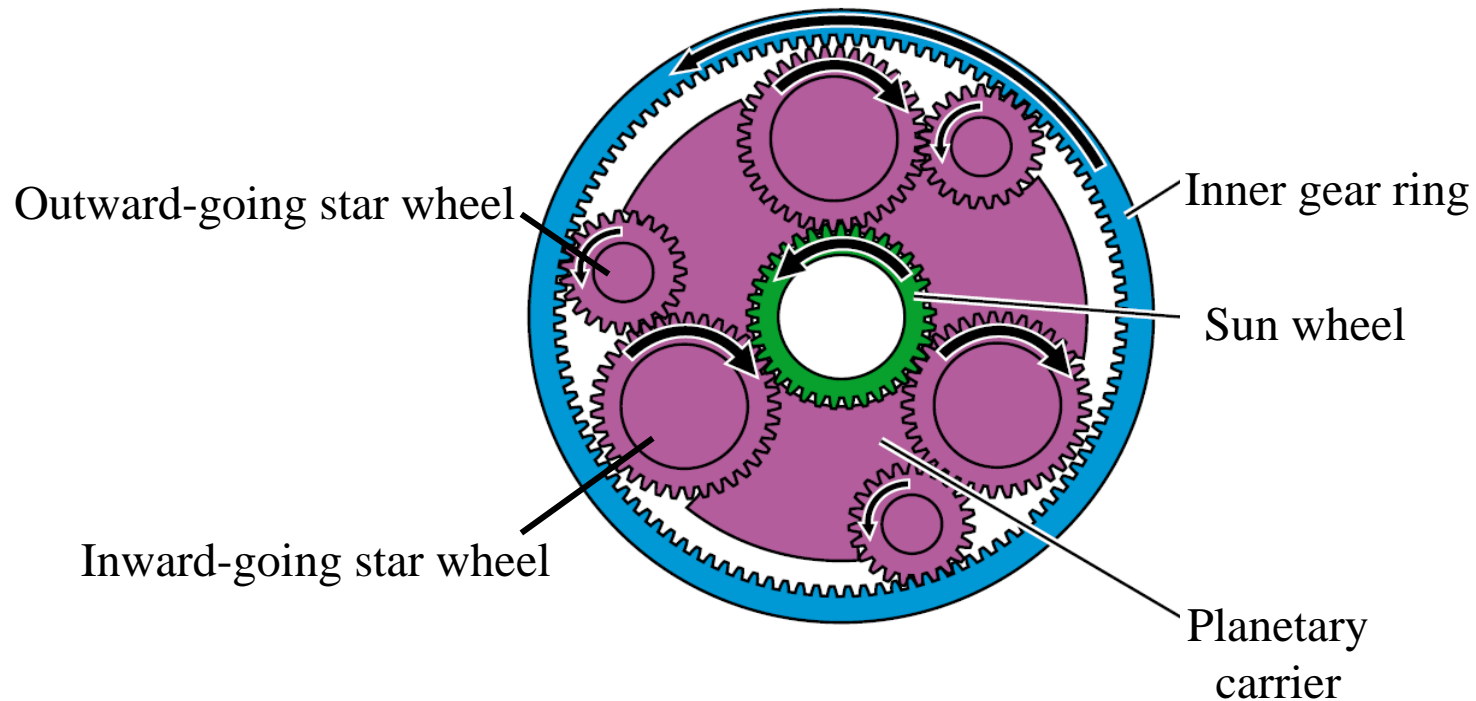
Forward, reverse clutch

- The mainstream multi piece wet clutch in the market is used, the wet clutch friction plate is imported from Japan, which has stable friction characteristics, excellent resistance to high temperature and peeling resistance. The product has good reliability and combines with advanced software control system, offering excellent shift performance.

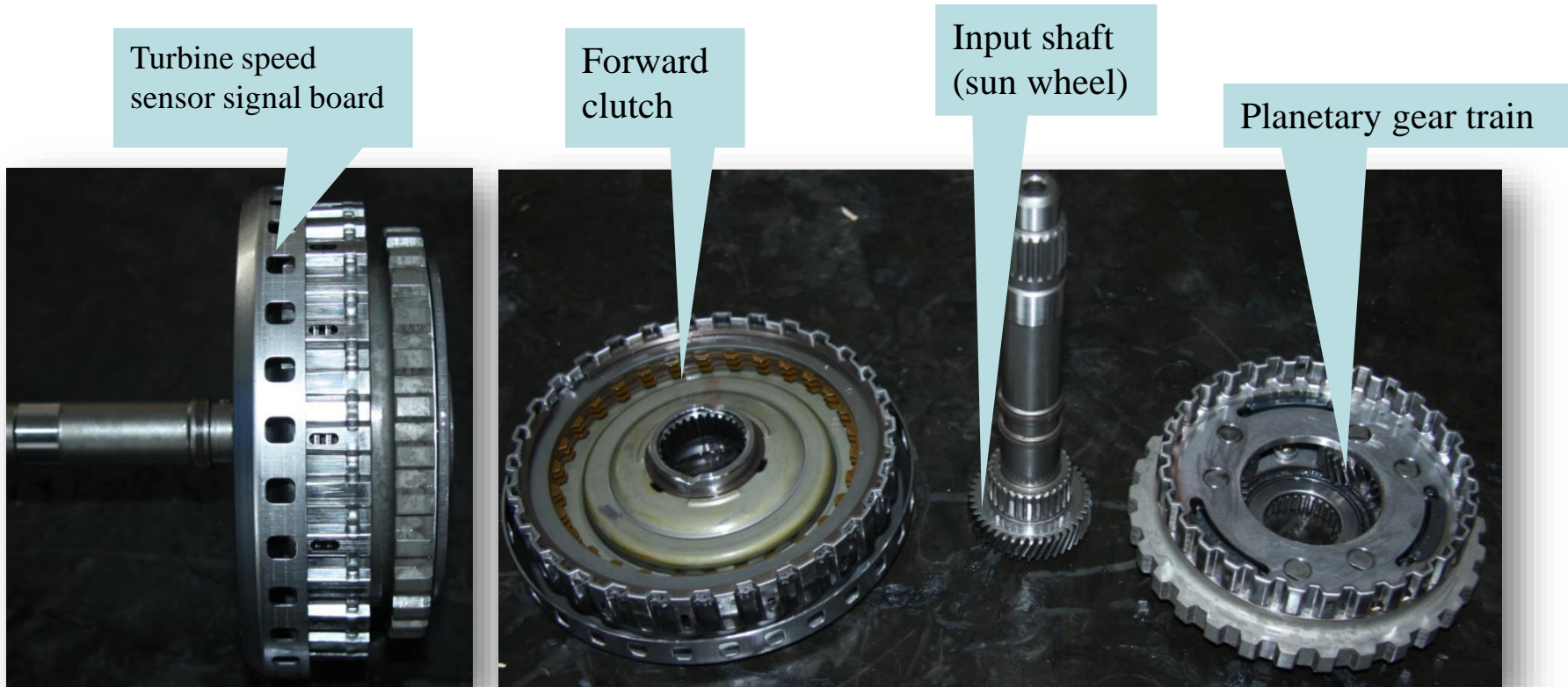


Planetary gear train

- The sun wheel is connected with the input shaft through the spline;
- The planetary carrier transfers torque when jointing the forward clutch (the sun wheel is idling);
- When the reverse brake is jointed, the inner ring is fixed and the planetary carrier decelerates output reversely.



Power transfer unit

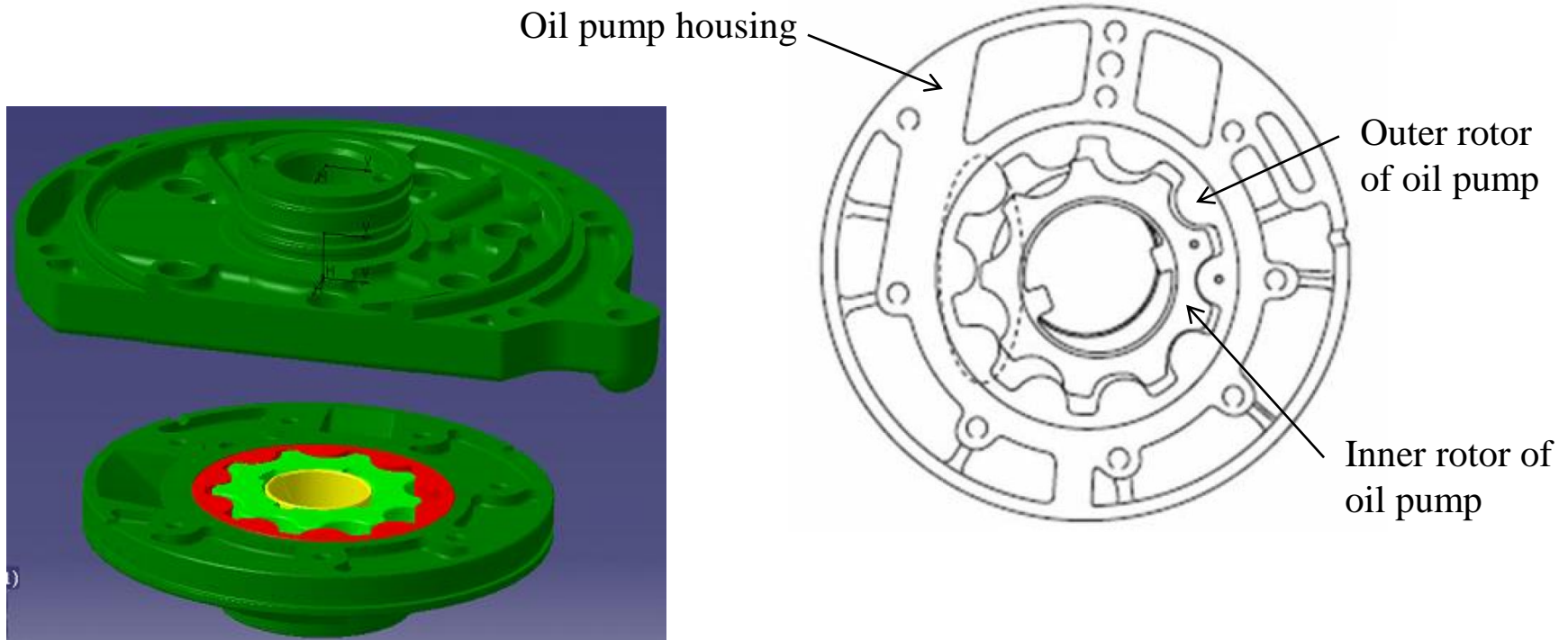


3 Hydraulic system

1. Oil pump
2. Valve body
3. Accumulator
4. Variable speed gear
5. Hydraulic control

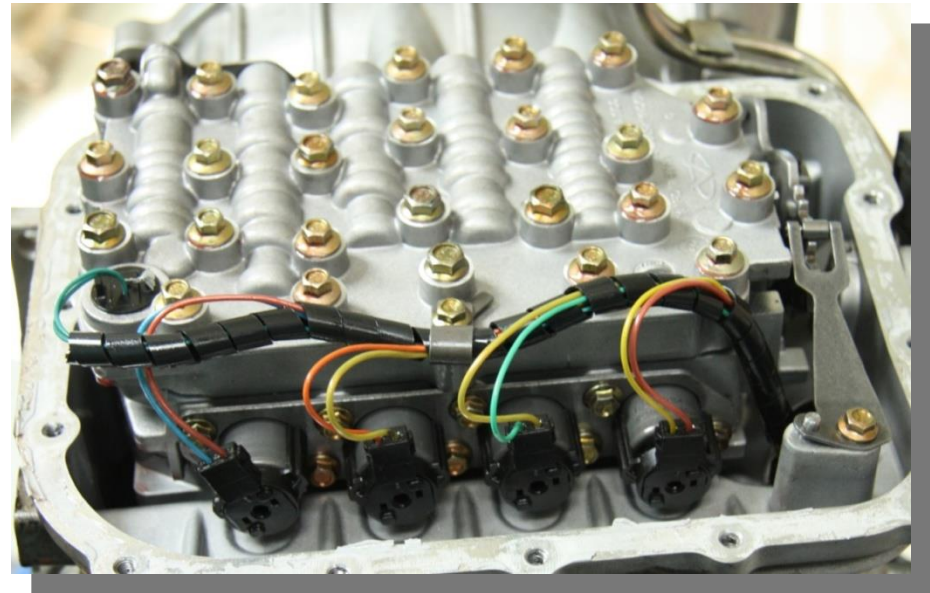
Power oil pump

- Internal meshing rotor pump



Valve body

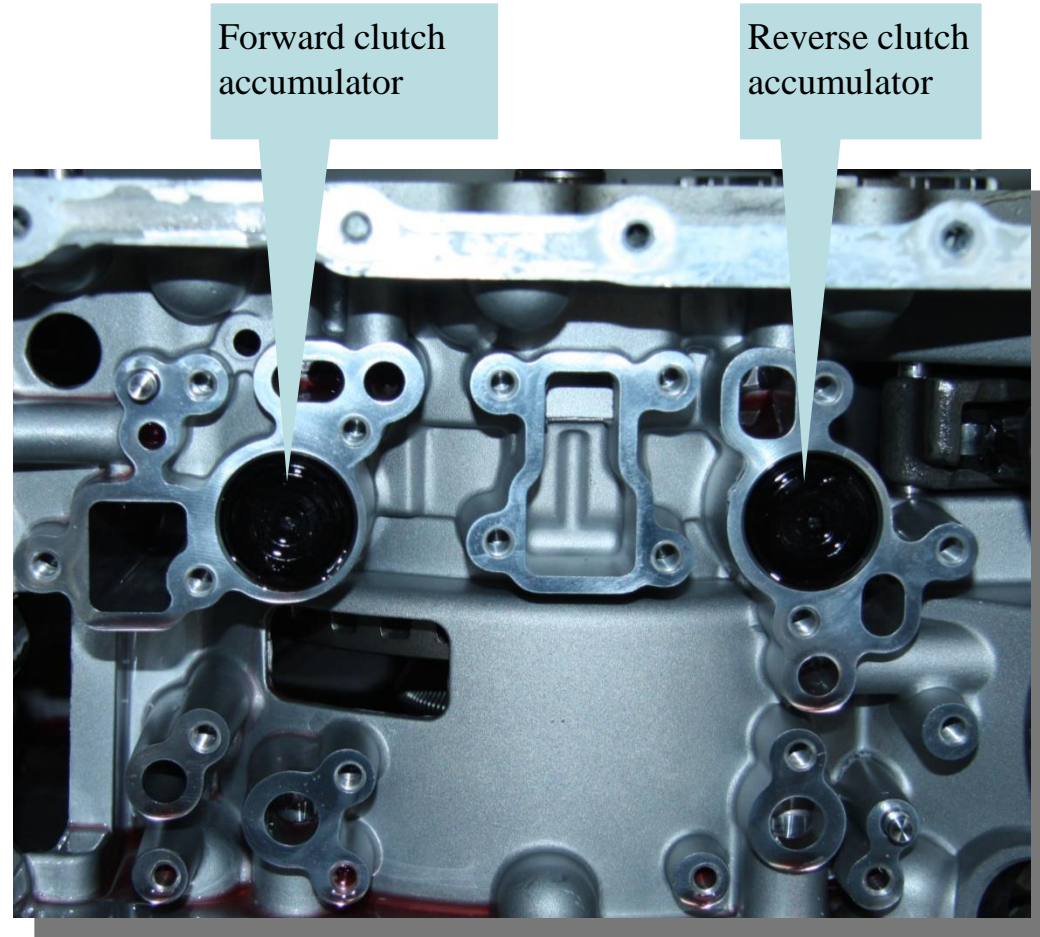
- Function:
 - Control the steel belt clamping oil pressure
 - Control speed
 - Control the clutch joint
 - Combination and release of TCC lock-up clutch
 - Control lubrication, cooling oil pressure



Accumulator

Caution:

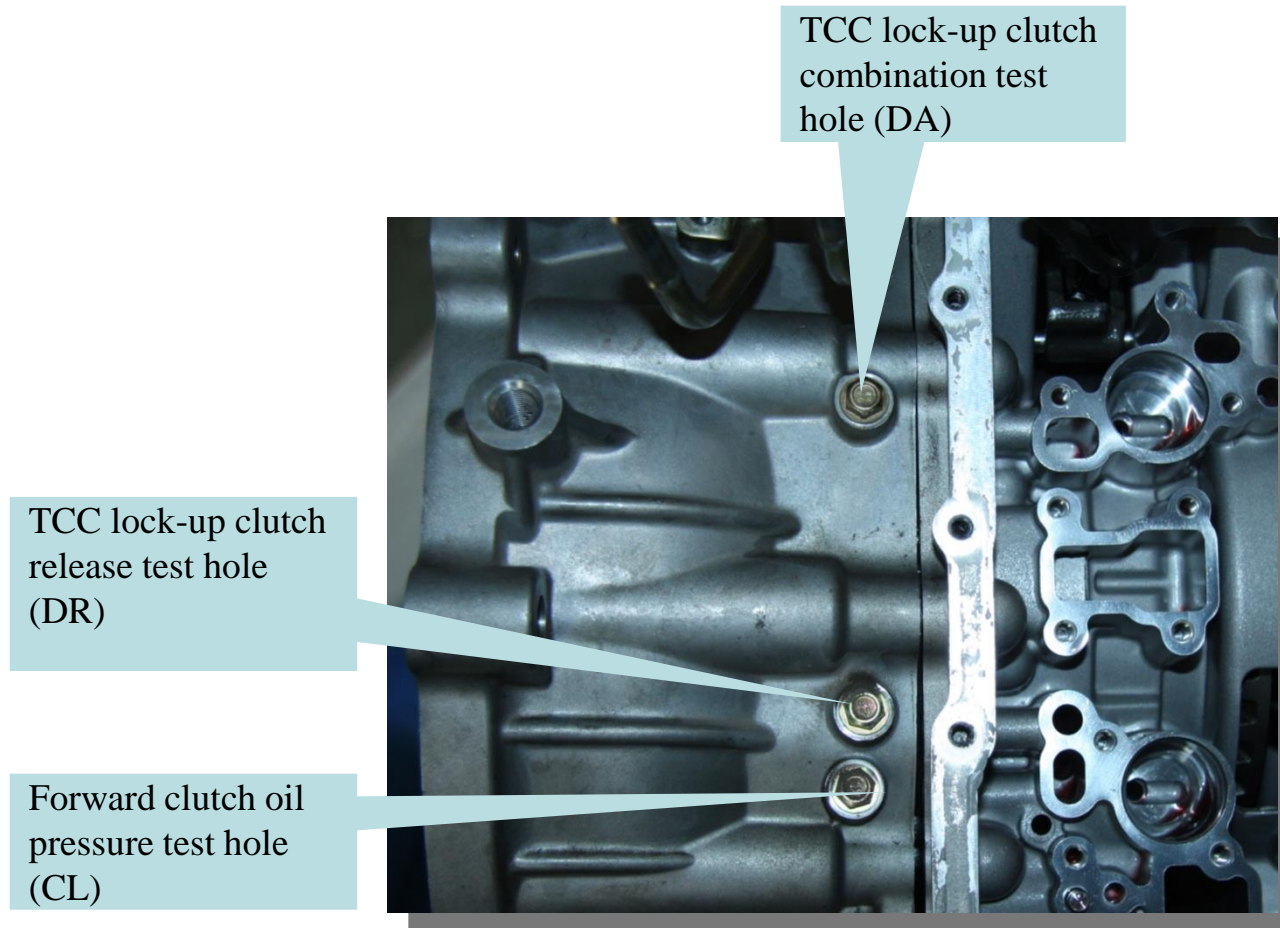
- If there is block of the accumulator of the forward clutch, shock will occur when it is put into the forward gear from neutral;
- If there is block of the accumulator of the reverse clutch, shock will occur when it is put into the R gear from the P gear or the N gear;
- The pressure release of the accumulator will cause insufficient engagement pressure of the clutch or brake and cause slip, and even burn the plate.



Variable speed gear

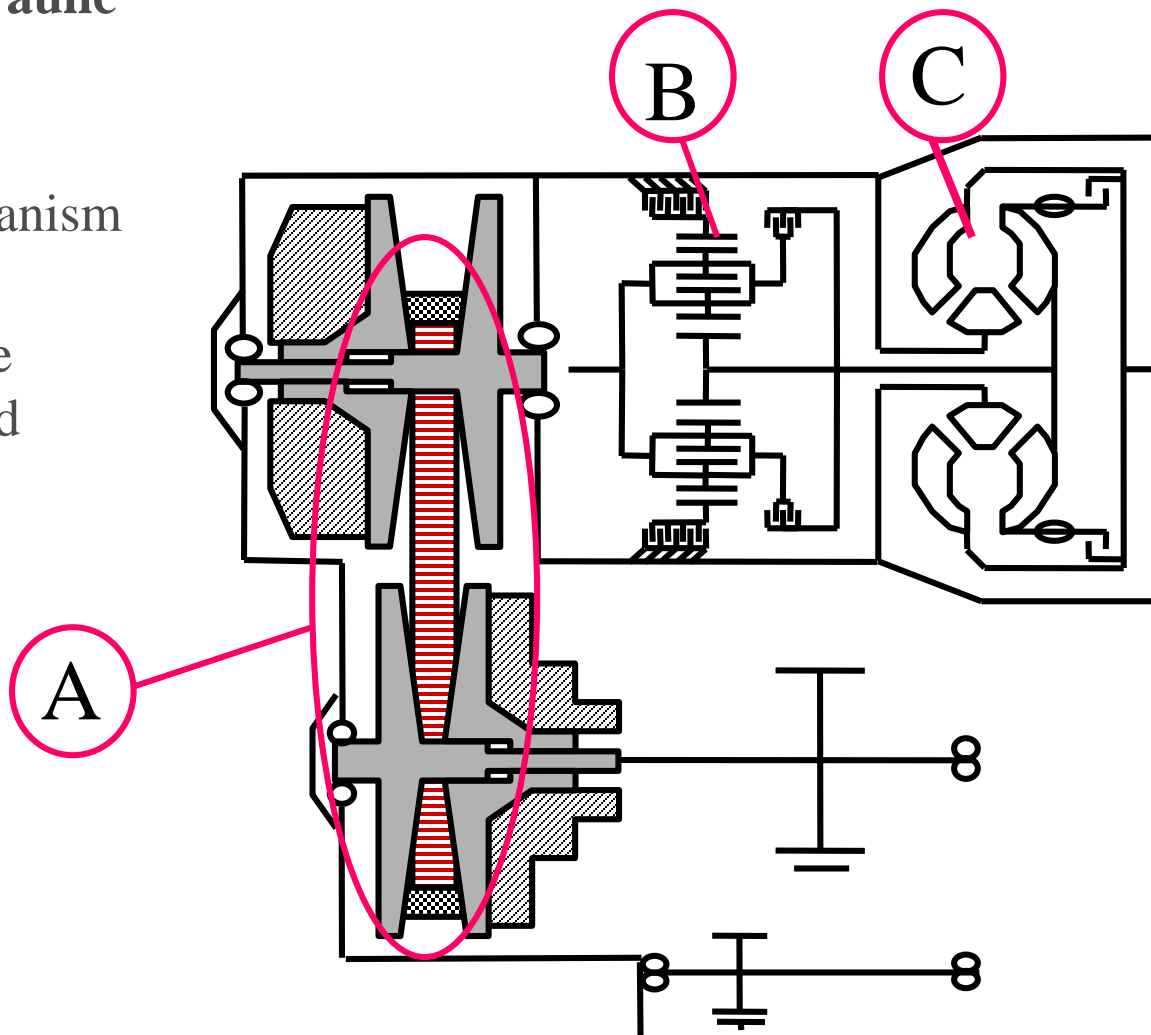


Oil pressure test hole

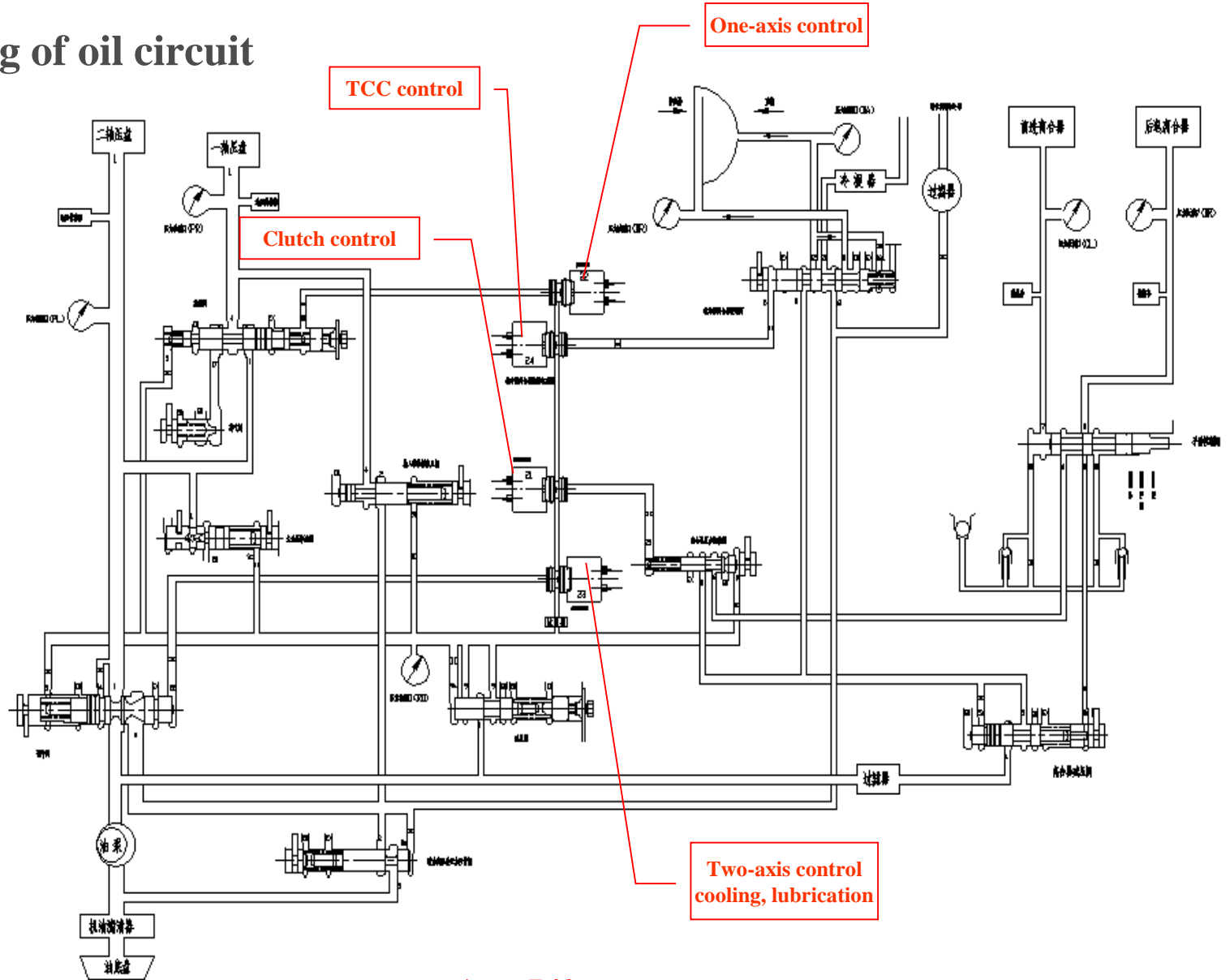


The object of CVT Hydraulic Control

- A Gear shift mechanism
- B Star wheel mechanism: ensure forward / backward switch
- C Hydraulic converter(TC)



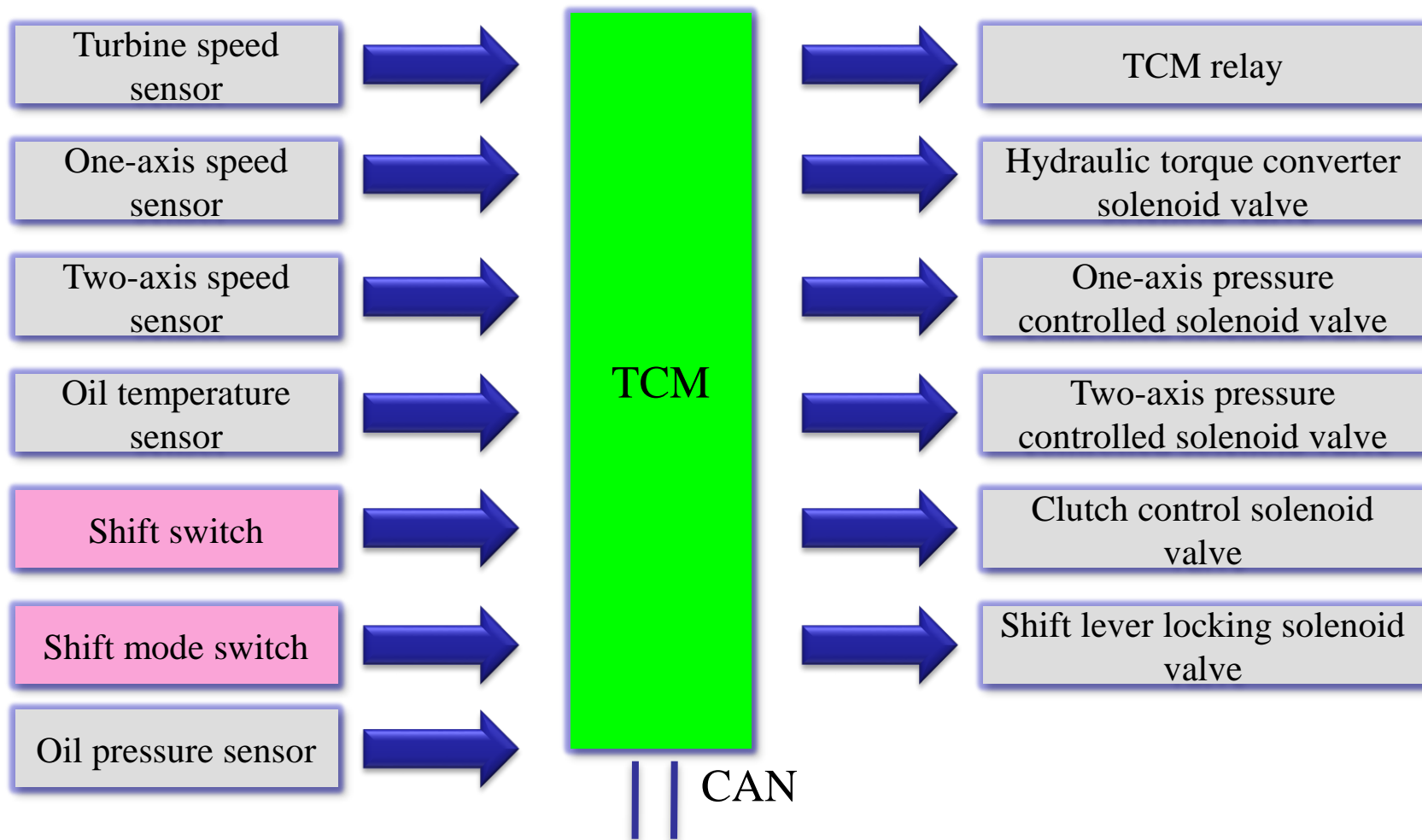
Drawing of oil circuit



4 Electric control system

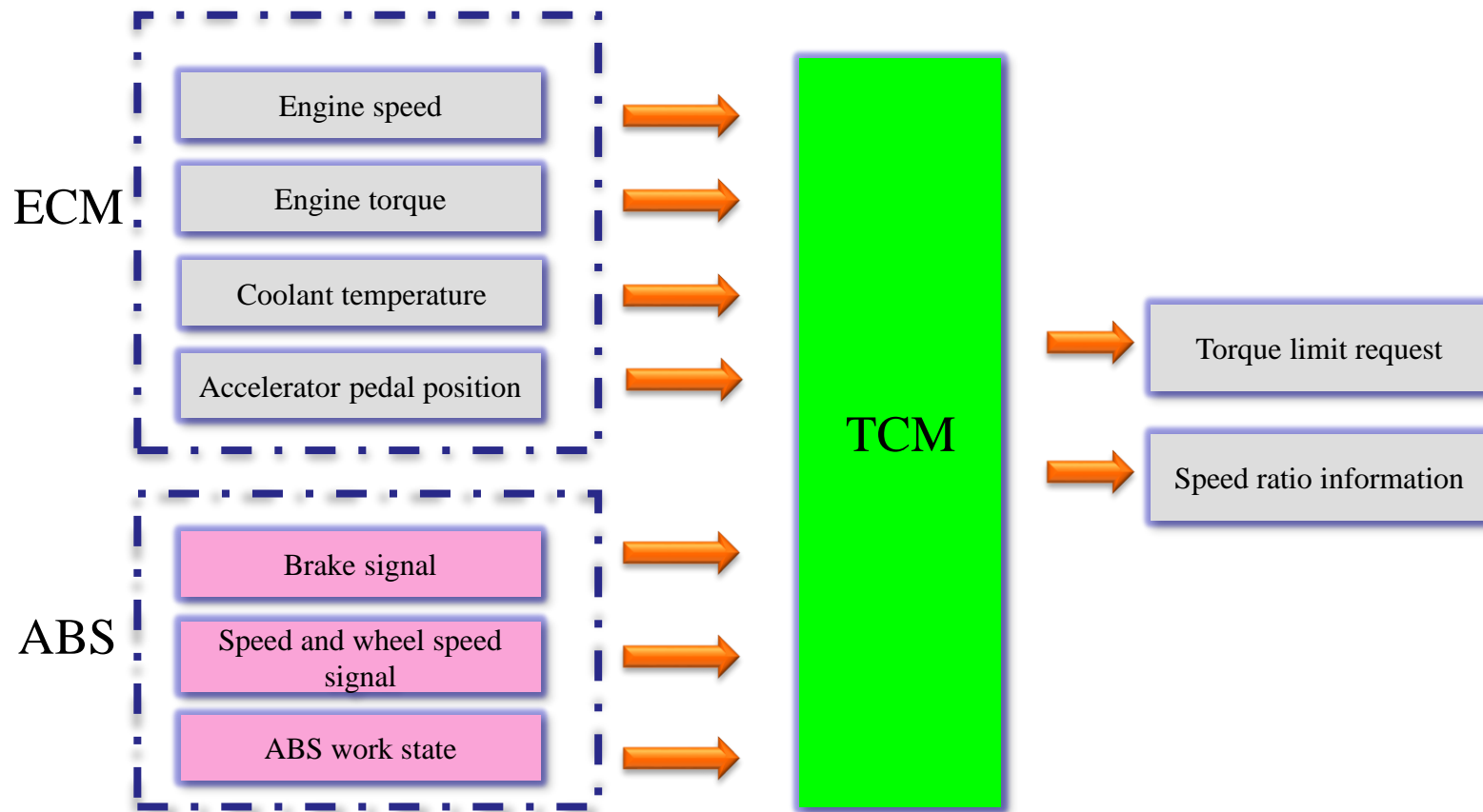
1. Summary
2. Sensor
3. Actuator
4. Control strategy

Block diagram of system principle



CAN bus message

- TCM acquires 4 signals from ECM and 3 signals from ABS through CAN bus.

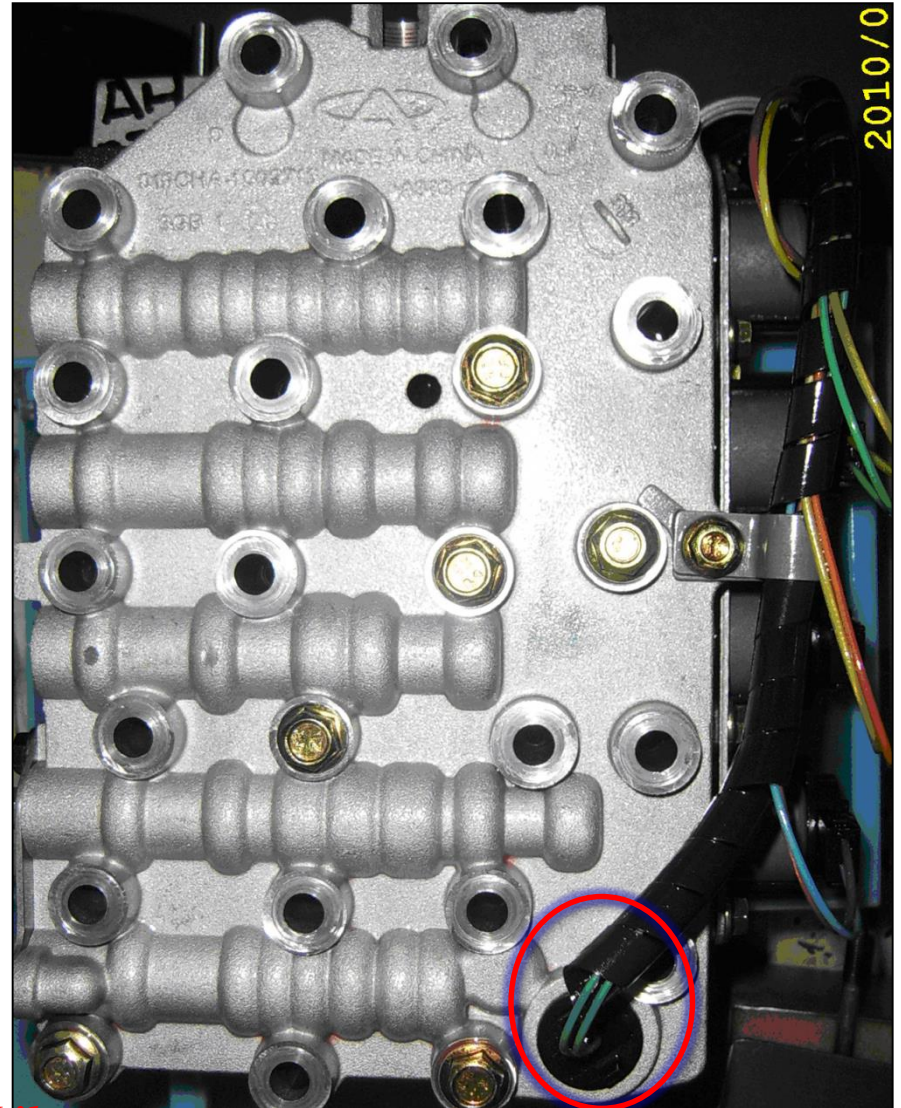


The control system has the following functions:

- Control the clamp force of the pulley and prevent slip according to the engine torque;
- Control the movement of the forward clutch and the reverse brake in the whole running condition of the vehicle;
- Select the best transmission ratio in the whole running condition of the vehicle;
- Control the lubricant and cooling oil required by the transmission;
- Kick down;
- Light up the failure light and enter the emergency mode.

Oil temperature sensor

- Position: inside the control valve body;
- Function: monitor the temperature of the transmission oil;
- Principle: negative temperature coefficient resistance;

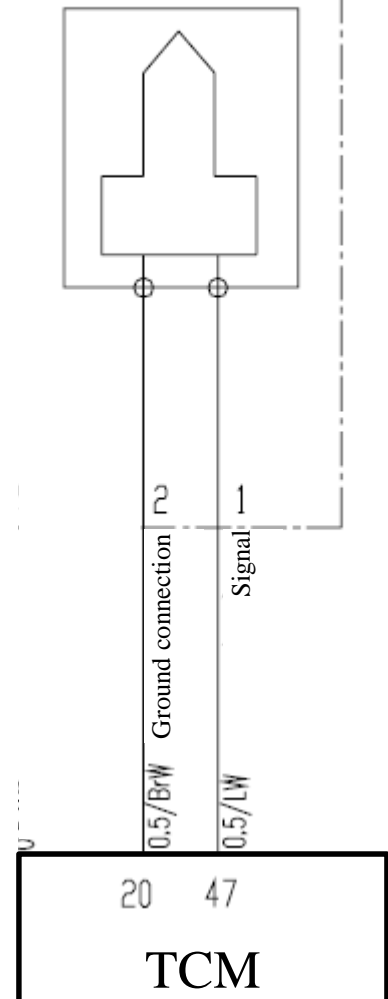


Oil temperature sensor

- Schematic circuit diagram
- Related fault codes:

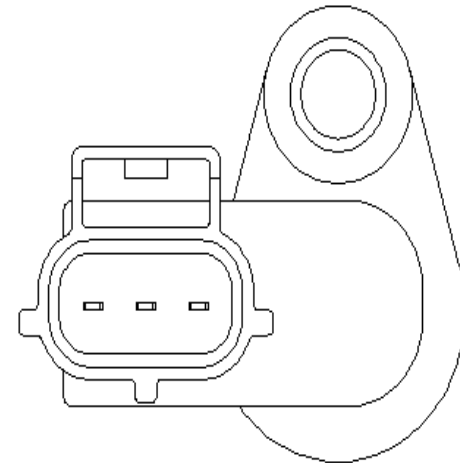
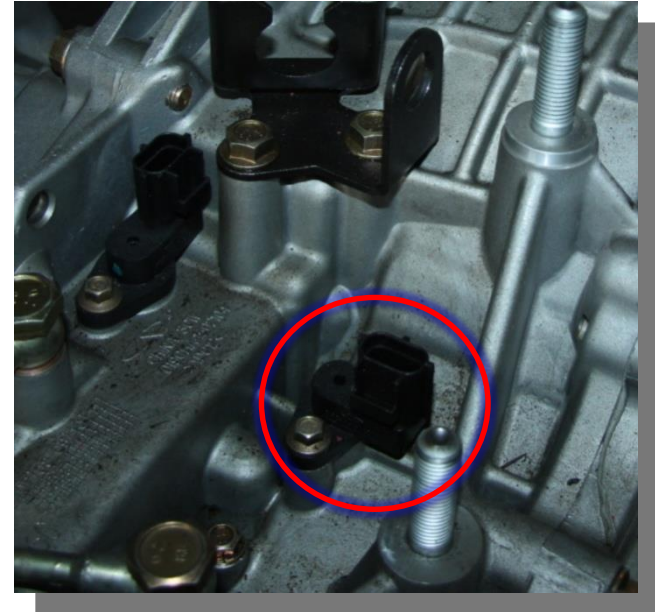
P0938	Signal range fault of CVT oil temperature sensor
P0939	Short circuit fault of CVT oil temperature sensor
P0940	Short circuit power failure of CVT oil temperature sensor

Oil temperature sensor



Input belt shaft speed sensor

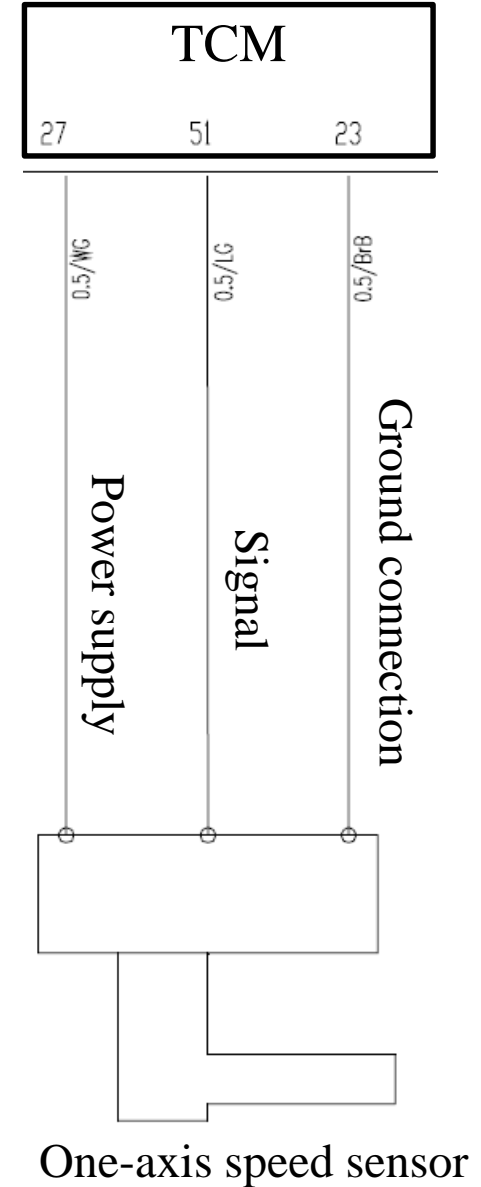
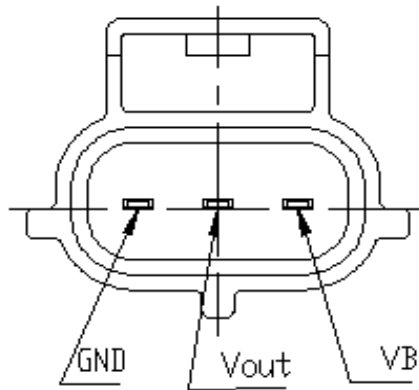
- Position: top of transmission;
- Function: TCM calculates the input pulley shaft speed according to the pulse signal. It's mainly used for the hydraulic torque converter locking, clutch combination and variable speed control function;
- Principle: Holzer type speed sensor.



Input belt shaft speed sensor

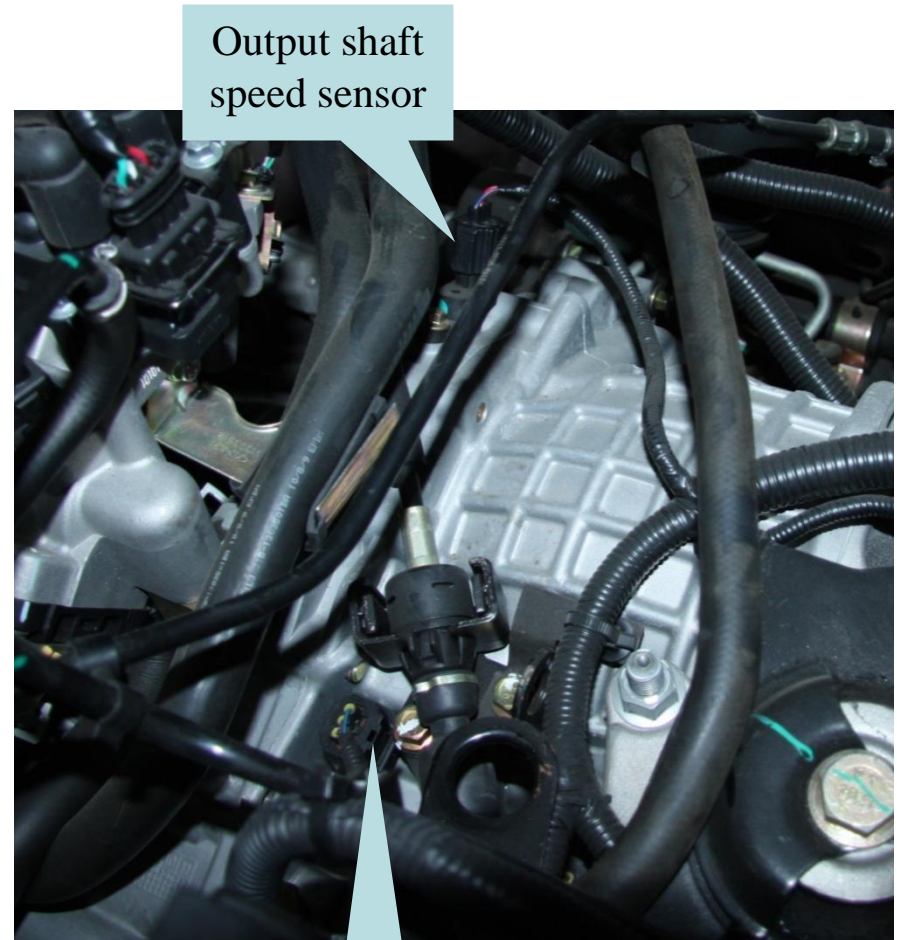
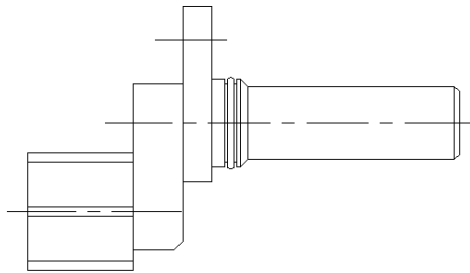
- Schematic circuit diagram
- Related fault codes:

P0791	Abnormal fluctuation of input speed signal
P0792	Abnormal range of input speed signal



Turbine / output belt shaft speed sensor

- Position: top of transmission;
- Function: TCM calculates the turbine and the input pulley shaft speed according to the pulse signal. It's mainly used for the hydraulic torque converter locking, clutch combination and variable speed control function;
- Principle: Holzer type speed sensor.

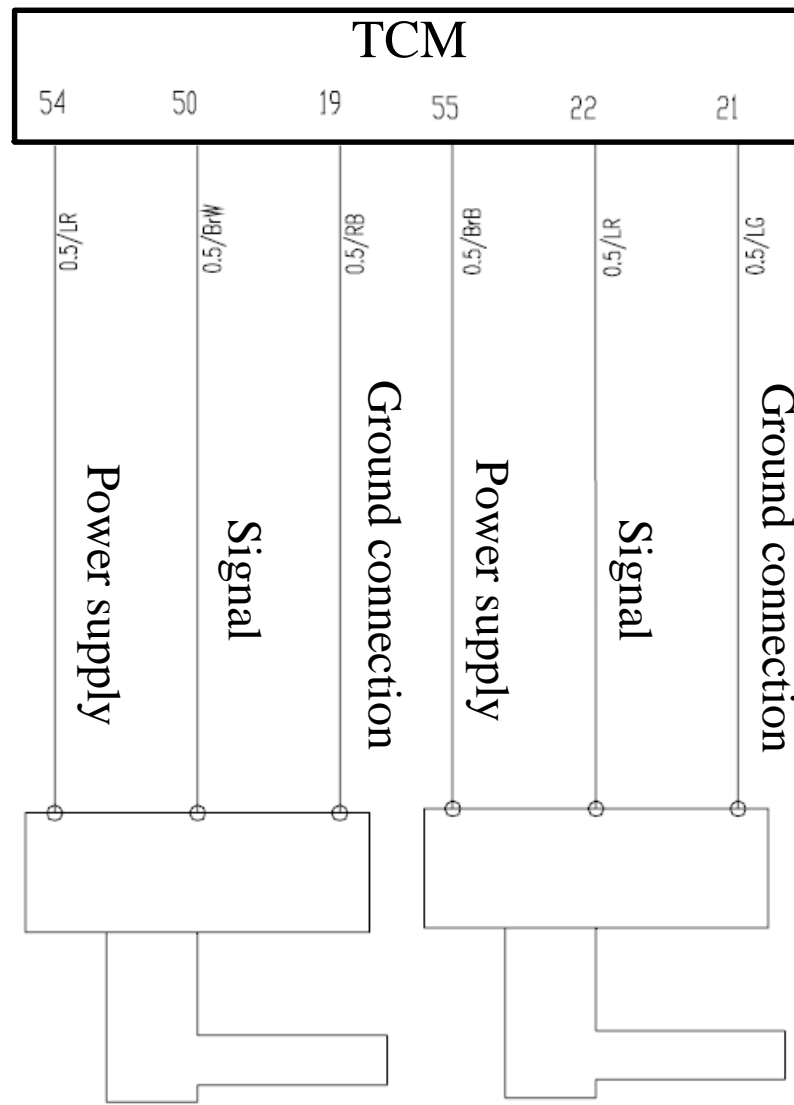
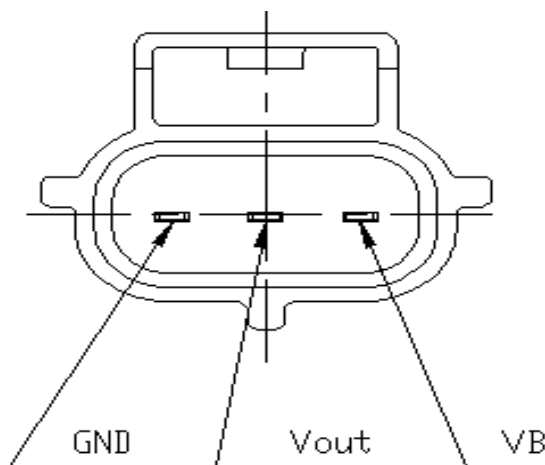


Turbine speed sensor

Turbine / output belt shaft speed sensor

- Schematic circuit diagram
- Related fault codes:

P0715	Abnormal fluctuation of turbine speed signal
P0716	Abnormal range of turbine speed signal
P0720	Abnormal fluctuation of output speed signal
P1745	Abnormal signal of output speed sensor



Two-axis speed sensor

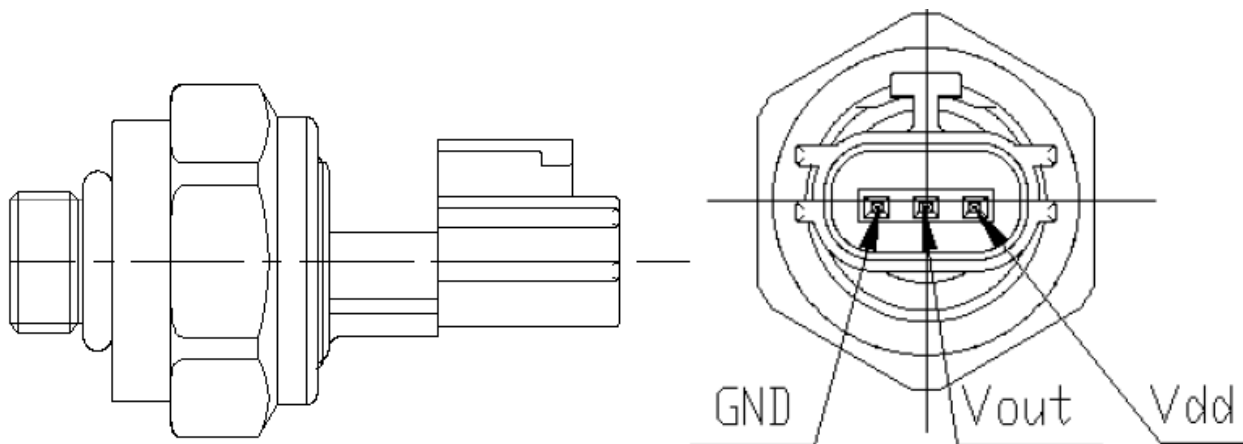
Turbine speed sensor

Technical parameters of speed sensor

Parameter	Symbol	Test condition	Minimum	Rated	Maximum	Unit
Power supply voltage	V_{DD}	Running	3.5	12	24	V
Current consumption	I_{DD}	$V_{DD}=12V$	1.5	3.0	4.5	mA
Output current	I_{OUT}	Operating			25	mA
Detection gap	/	Input belt shaft sensor			0.5	mm
	/	Turbine/two-axis speed sensor			0.6	mm

Input belt shaft oil pressure sensor

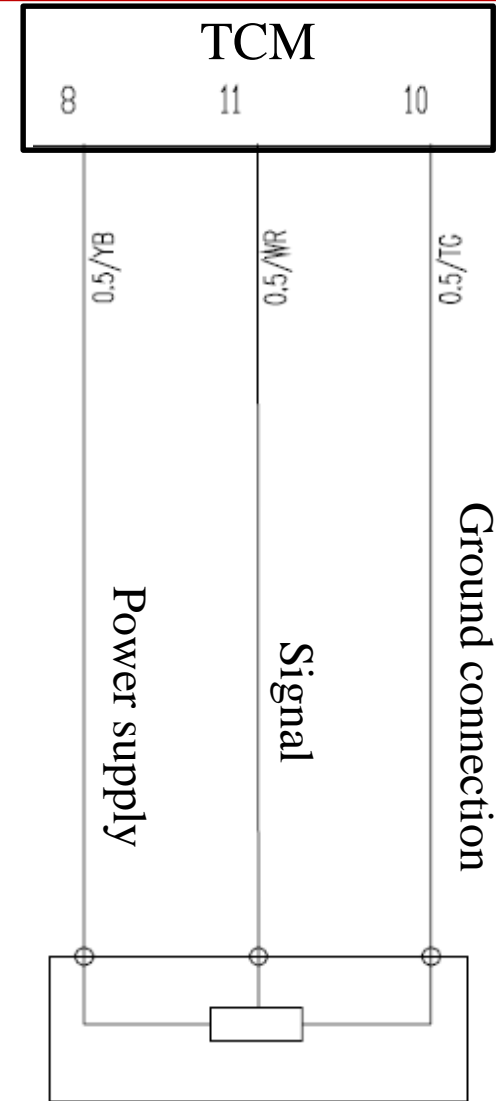
- Position: underside of the rear end cover of the gearbox;
- Function: the transmission fluid pressure sensor A (the input belt shaft pressure sensor) detects the input belt shaft pressure sensor of CVT and send signals to TCM.
- Principle: piezoelectric type



Input belt shaft oil pressure sensor

- Schematic circuit diagram
- Related fault codes:

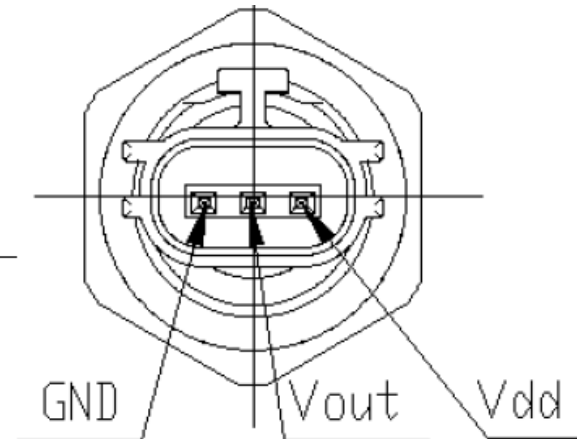
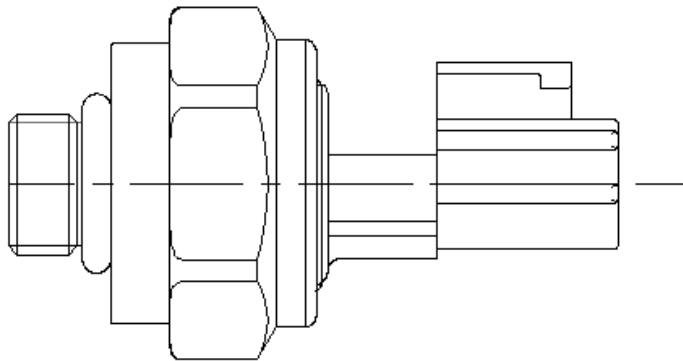
P0842	Short fault of the transmission fluid pressure sensor A circuit (the input belt shaft pressure sensor)
P0843	Power fault of the transmission fluid pressure sensor A circuit (the input belt shaft pressure sensor)



One-axis oil pressure sensor

Output belt shaft oil pressure sensor

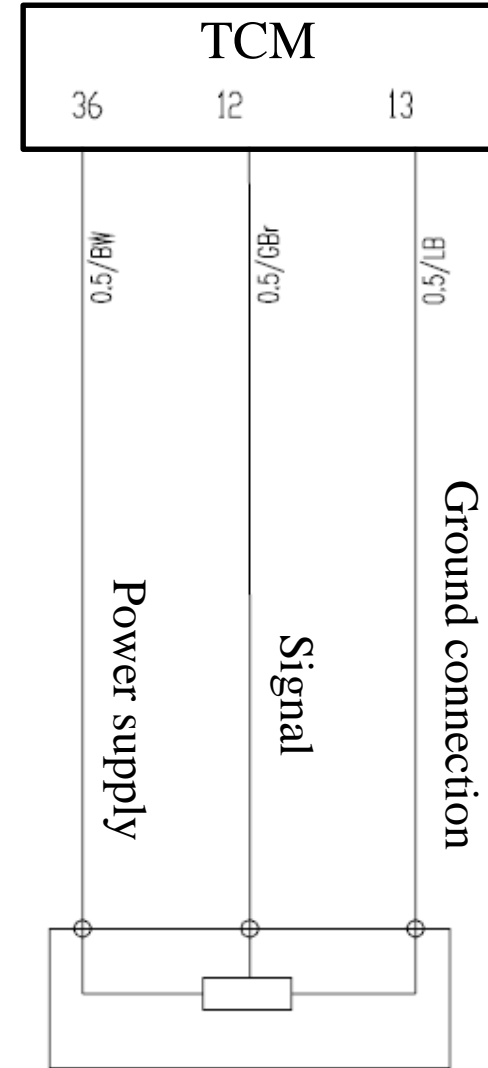
- Position: upper side of transmission rear end cover;
- Functions: transmission pressure sensor B (output pulley shaft pressure sensor) detects the pressure of CVT output pulley shaft, and sends the signals to TCM.
- Principle: piezoelectric type



Output belt shaft oil pressure sensor

- Schematic circuit diagram
- Related fault codes:

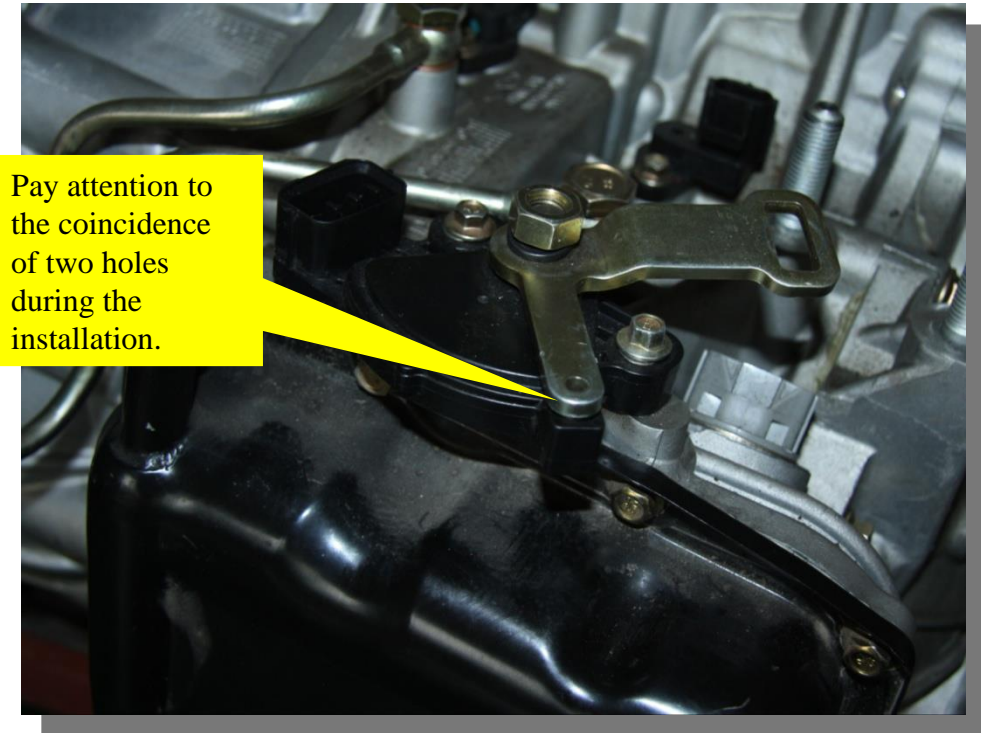
P0847	Short circuit of transmission hydraulic pressure sensor B circuit (output pulley shaft pressure sensor)
P0848	Transmission hydraulic pressure sensor B circuit (output pulley shaft pressure sensor) short to power source



Second shaft oil pressure sensor

Shift switch

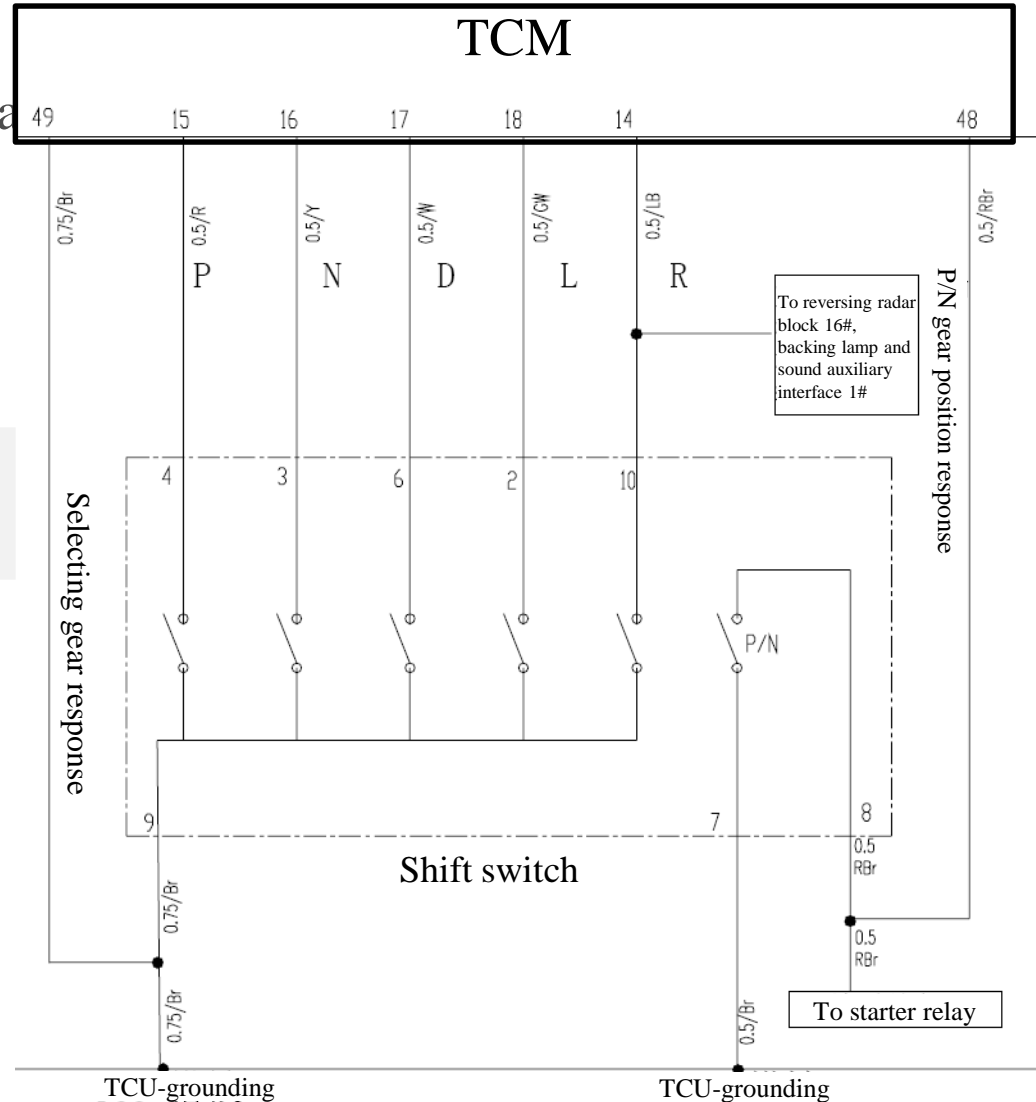
- Position: top of transmission;
- Functions: the switch is controlled by a gear lever and inputs the current gear position into TCM, and TCM performs the corresponding gear shifting function;
- Principle: switching type.



Shift switch

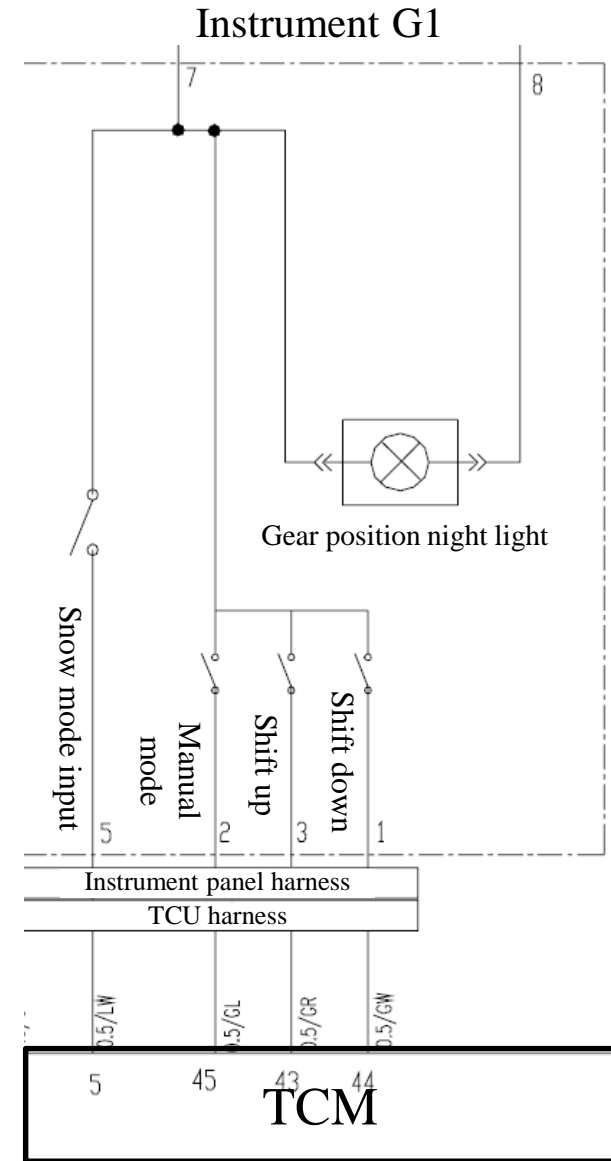
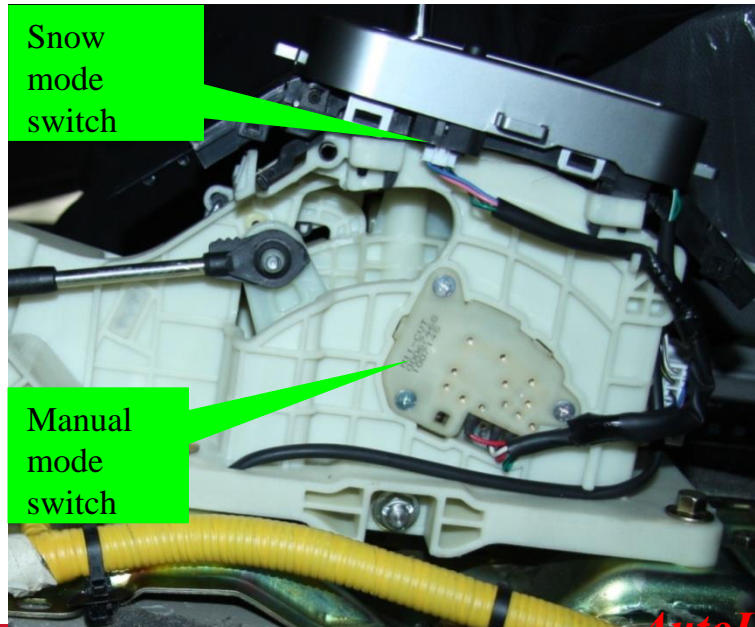
- Schematic circuit diagram
- Related fault codes:

P0705	Abnormal gear of transmission
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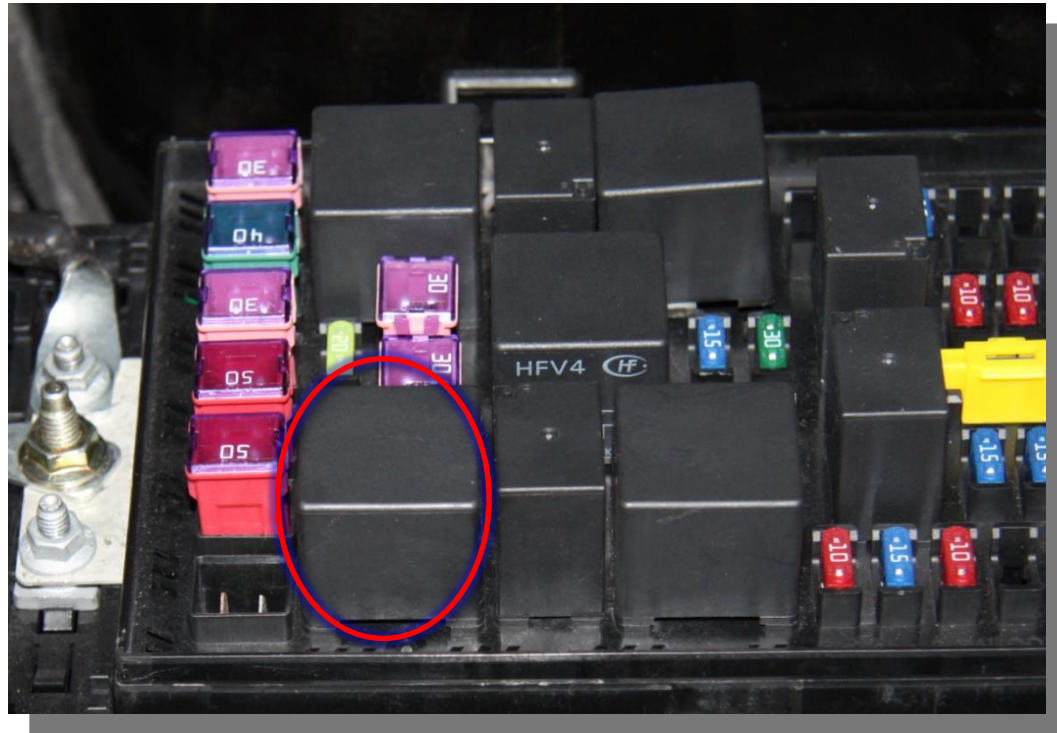
Mode switch

- Position: lower section of cab gear lever;
- Functions: transmission shifting mode switch, possible to realize snow mode, manual mode and automatic mode;
- Principle: switching type;
- No relevant fault codes.



TCM relay

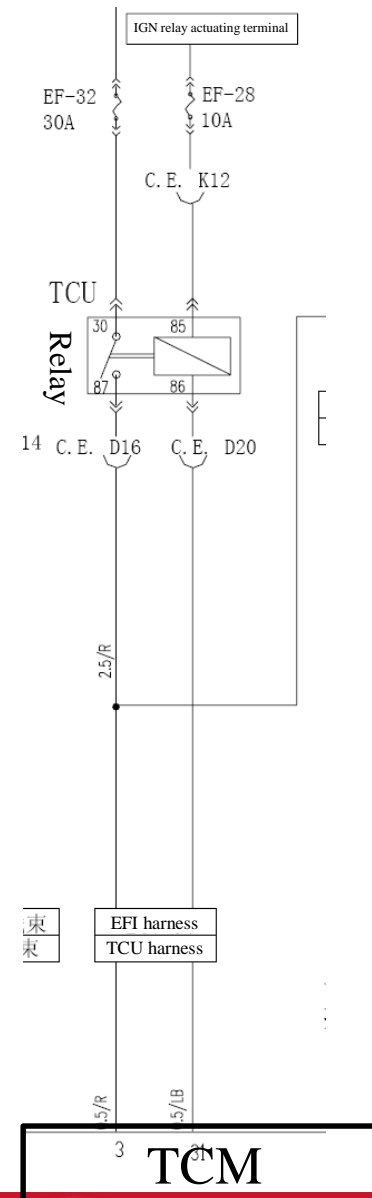
- Position: see the figure below;
- Functions: after TCM receives the signal of ignition switch “ON” position, it controls the actuation of TCM relay, and power TCM and all the solenoid valves.



TCM relay

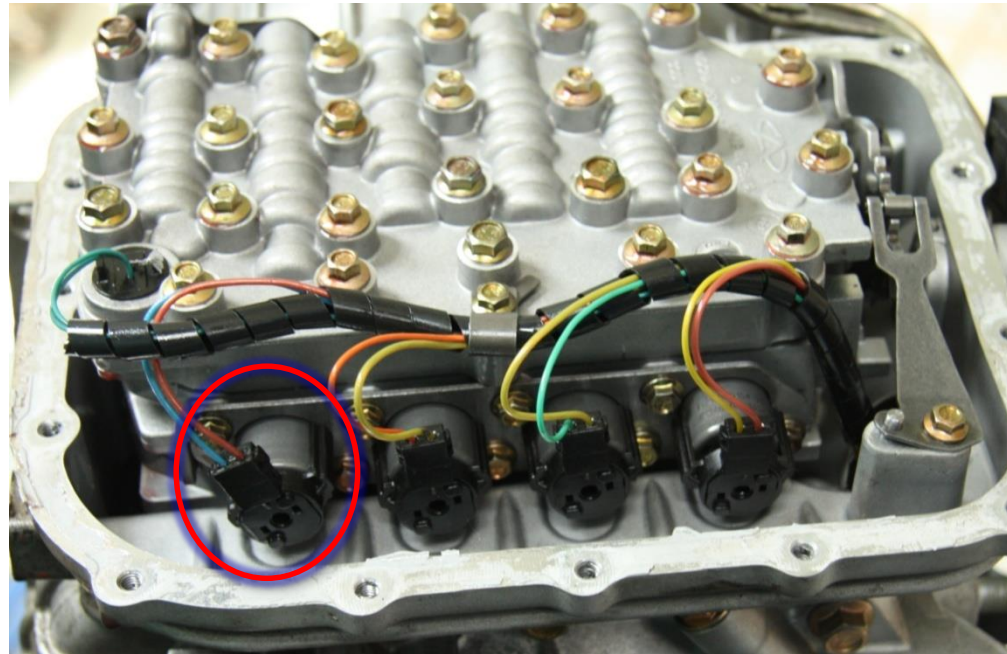
- Schematic diagram:
- Related fault codes:

P0890	Short circuit of TCM power relay loop
P0891	Short to power source of TCM power relay loop



PR input pulley shaft pressure control solenoid valve

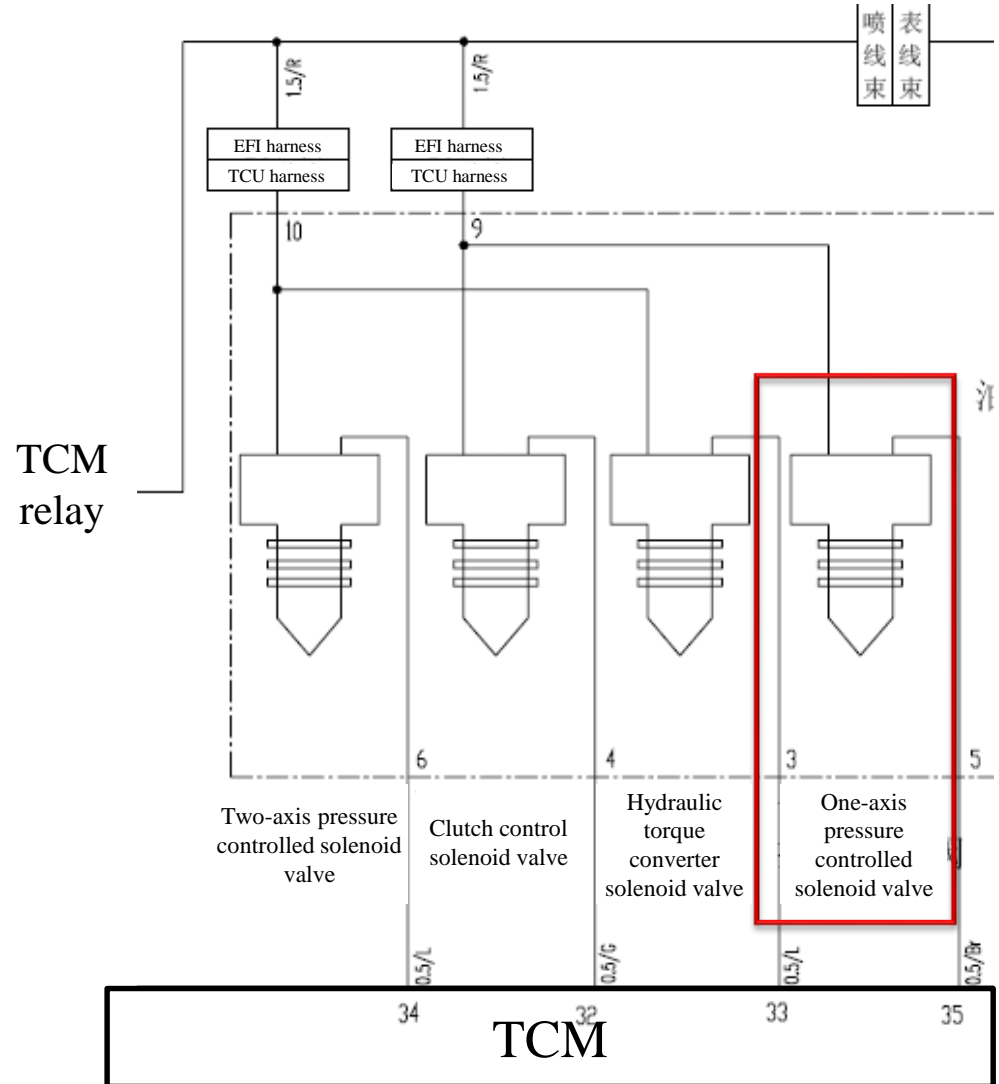
- Position: valve assembly;
- Functions: send accelerator pedal, gear position signal and speed to TCM, and TCM responds to the signal to start oil pressure control solenoid valve “A” and control CVT changes of speed ratio;
- Control mode: PWM.



Input pulley shaft (PR) pressure control solenoid valve

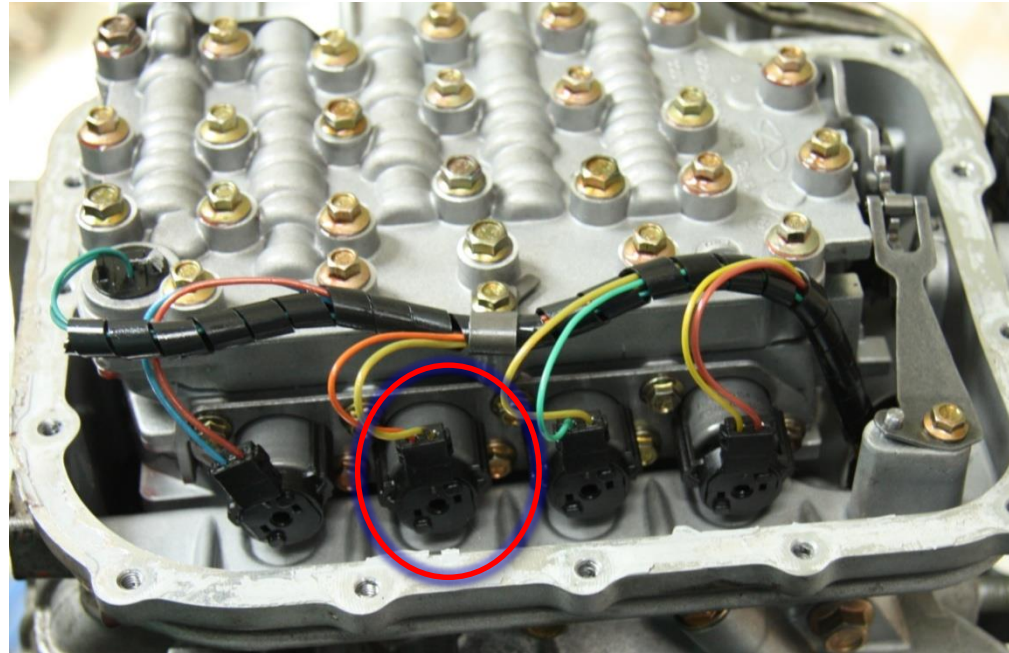
- Schematic diagram:
- Related fault codes:

P0960	Open circuit of oil pressure control solenoid valve “A” (main pressure solenoid valve) control circuit
P0962	Short circuit of oil pressure control solenoid valve “A” (main pressure solenoid valve) control circuit
P0963	Oil pressure control solenoid valve “A” (main pressure solenoid valve) control circuit short to power source



Output pulley shaft (PL) pressure control solenoid valve

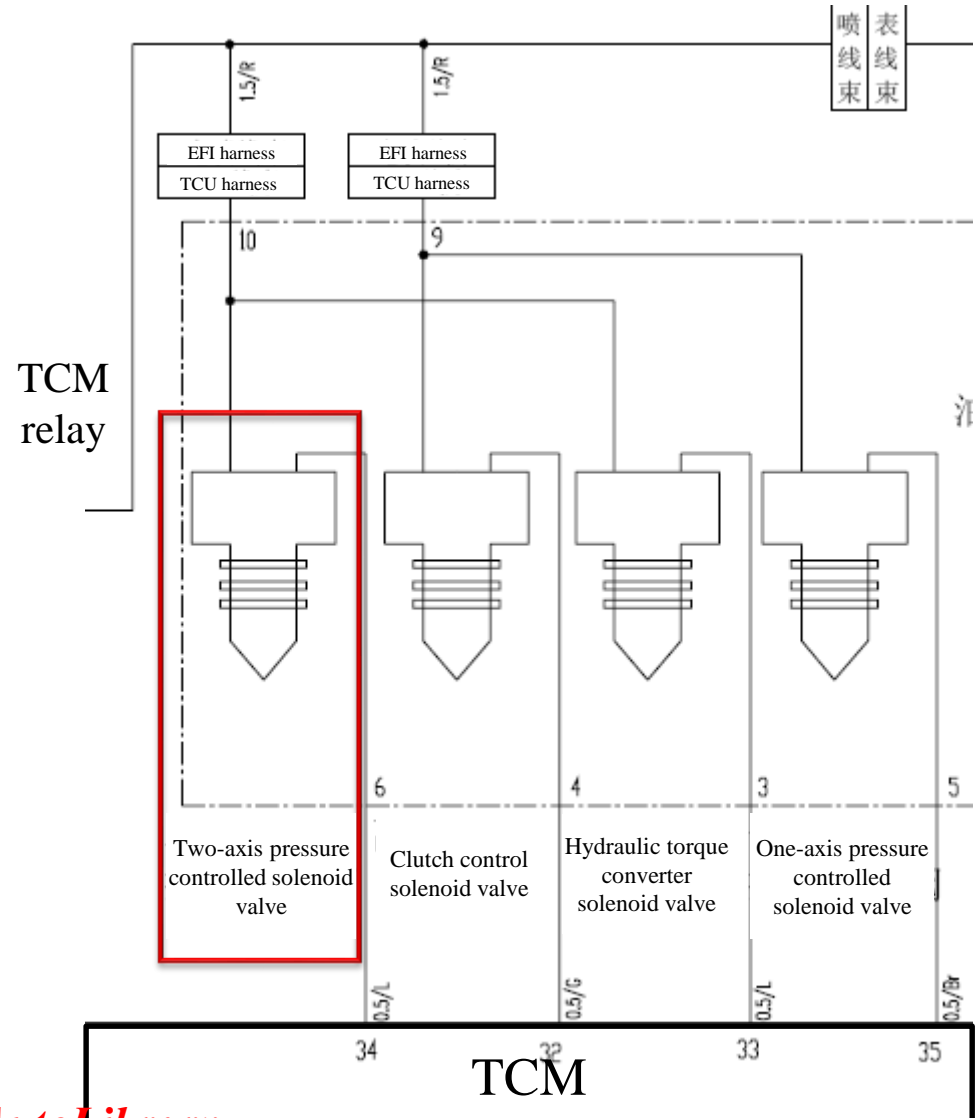
- Position: valve assembly;
- Functions: send accelerator pedal, gear position signal and speed to TCM, and TCM responds to the signal to start oil pressure control solenoid valve “B” and control CVT changes of speed ratio;
- Control mode: PWM.



PR output shaft pressure control solenoid valve

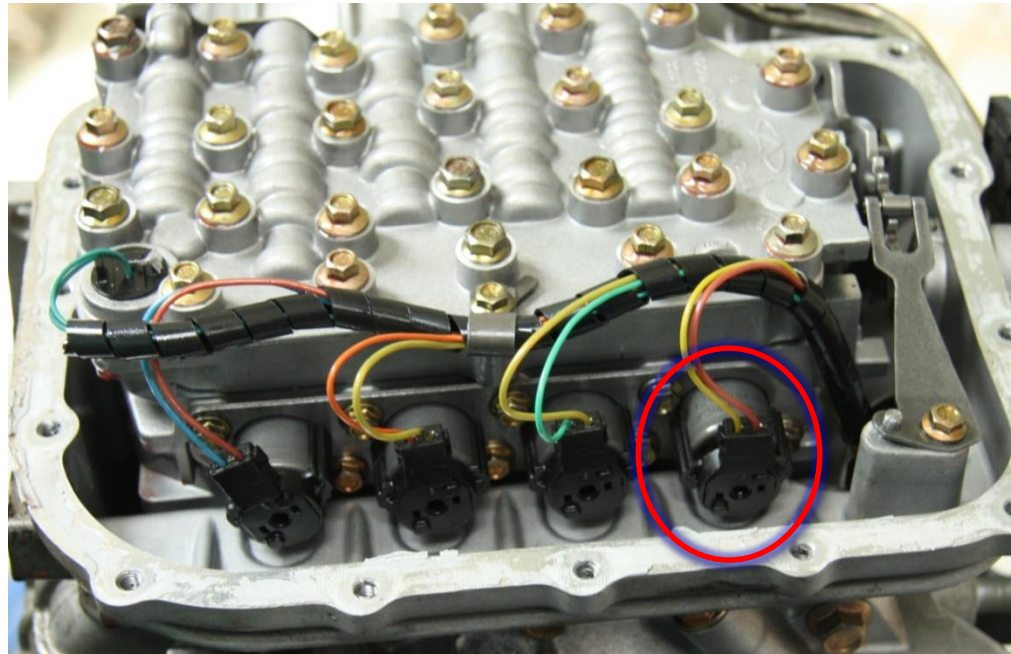
- Schematic diagram:
- Related fault codes:

P0964	Open circuit of oil pressure control solenoid valve “B” (auxiliary pressure solenoid valve) control circuit
P0966	Short circuit of oil pressure control solenoid valve “B” (auxiliary pressure solenoid valve) control circuit
P0967	Oil pressure control solenoid valve “B” (auxiliary pressure solenoid valve) control circuit short to power source



Clutch pressure control solenoid valve

- Position: valve assembly;
- Functions: send accelerator pedal and gear position signal to TCM, and TCM responds to the signal to start the clutch control solenoid valve and control the engagement of clutch;
- Control mode: PWM.



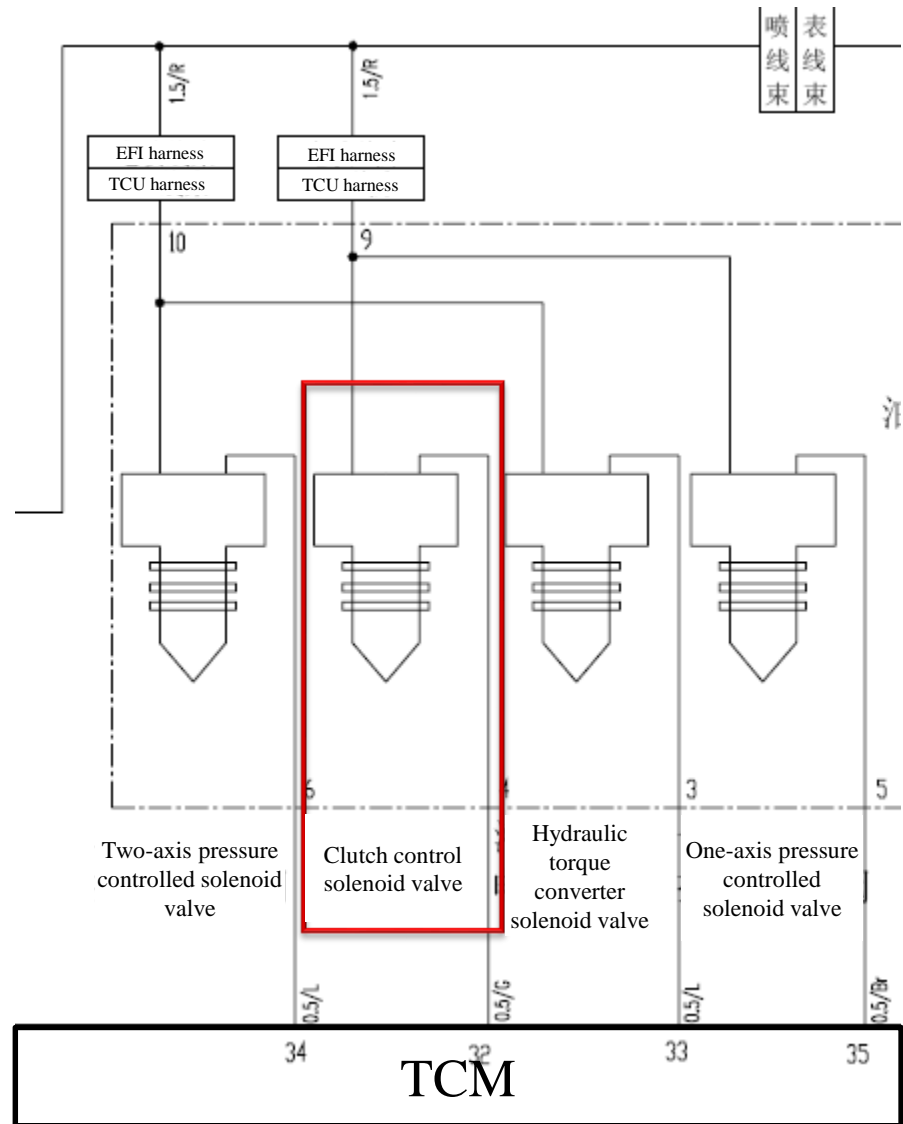
Clutch pressure control solenoid valve

- Schematic diagram:

- Related fault codes:

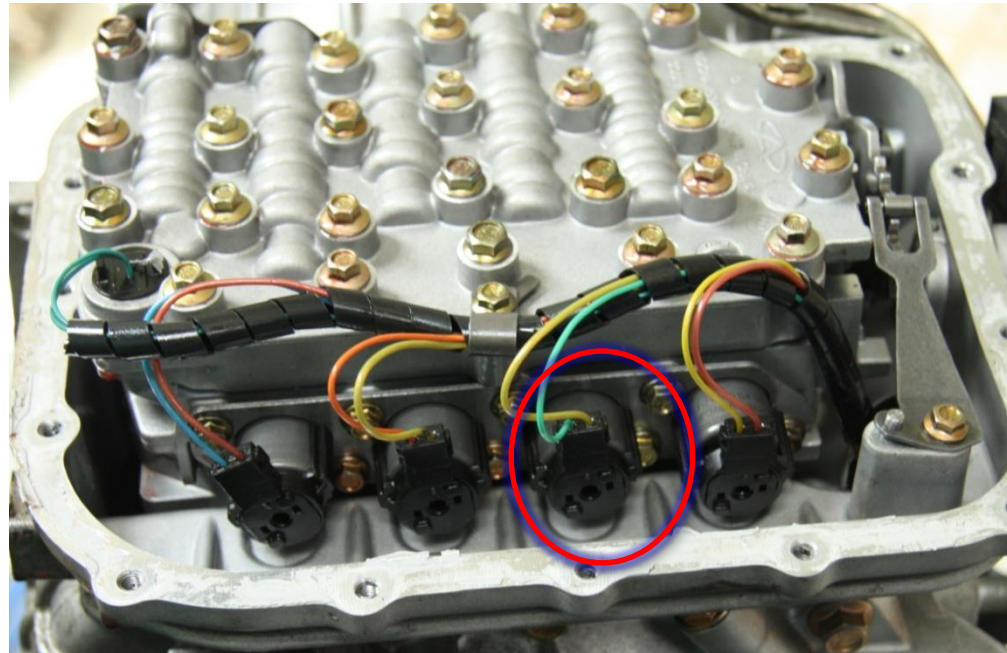
P0900	Open circuit of clutch control solenoid valve loop
P0902	Clutch control solenoid valve loop short to ground
P0903	Clutch control solenoid valve loop short to power source

TCM relay



Hydraulic torque converter pressure control solenoid valve

- Position: valve assembly;
- Functions: send accelerator pedal, gear position signal and speed to TCM, and TCM responds to the signal to start oil pressure control solenoid valve “C” and control the locking operation of hydraulic torque converter;
- Control mode: PWM.

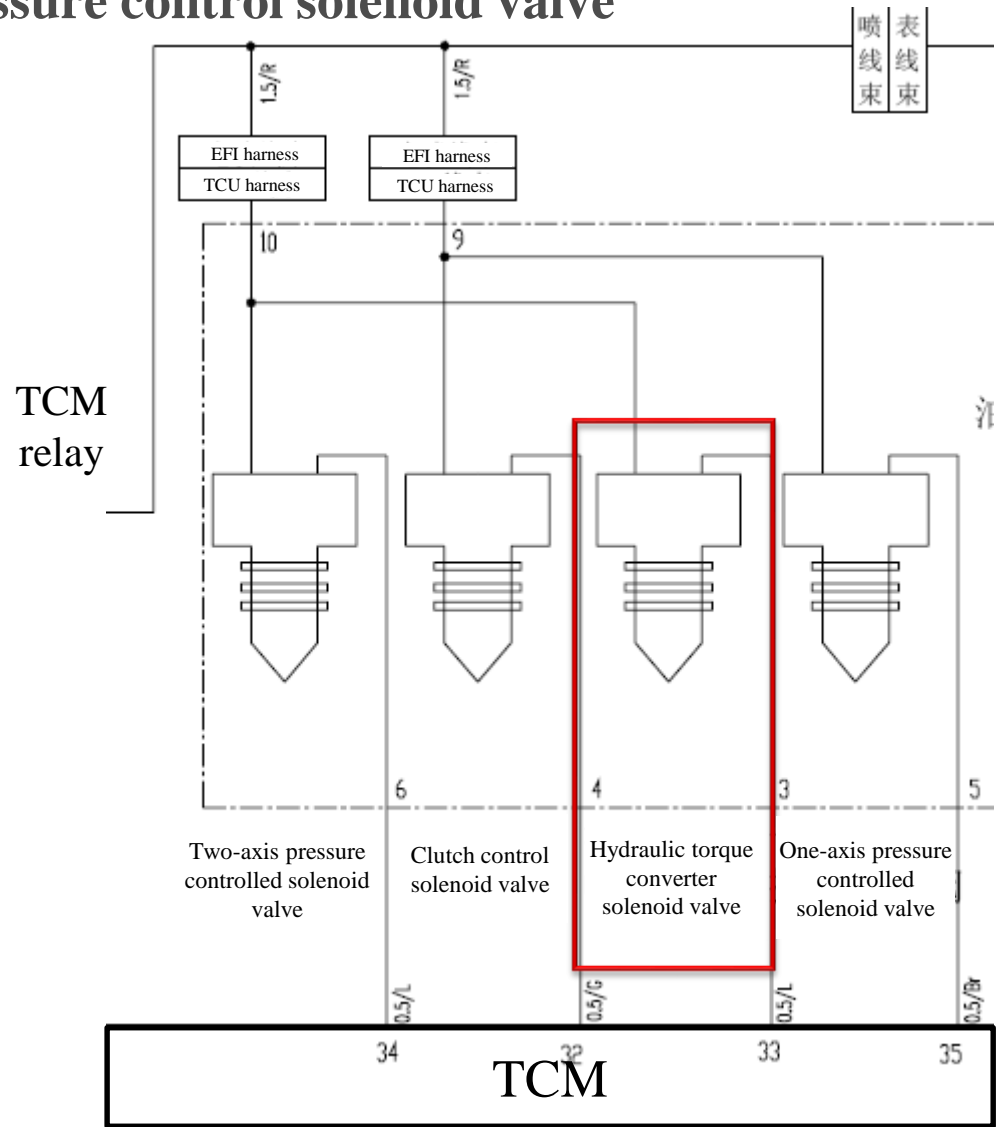


Hydraulic torque converter pressure control solenoid valve

- Schematic diagram:

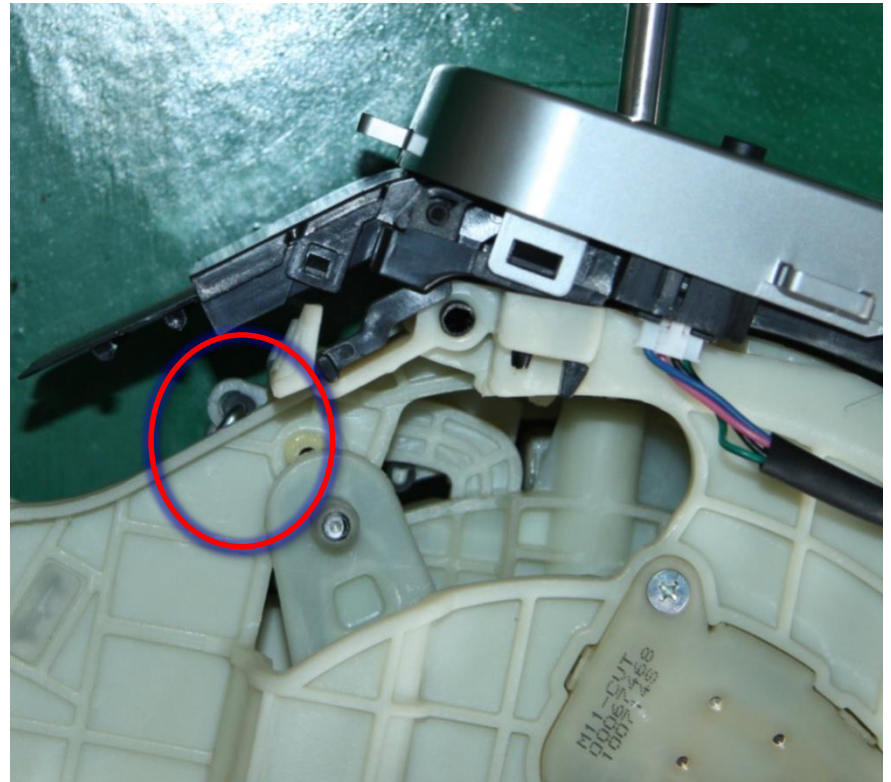
- Related fault codes:

P0968	Open circuit of oil pressure control solenoid valve “C” (hydraulic torque converter control solenoid valve) control circuit
P0970	Short circuit of oil pressure control solenoid valve “C” (hydraulic torque converter control solenoid valve) control circuit
P0971	Oil pressure control solenoid valve “C” (hydraulic torque converter control solenoid valve) control circuit short to power source



Shift lock solenoid valve

- Position: on gear position lever;
- Functions: in case of selecting R gear from P gear, it's required to brake the vehicle, otherwise the gear lock solenoid valve will work and prevent it from putting in R gear from P gear;
- Control mode: grounding control.

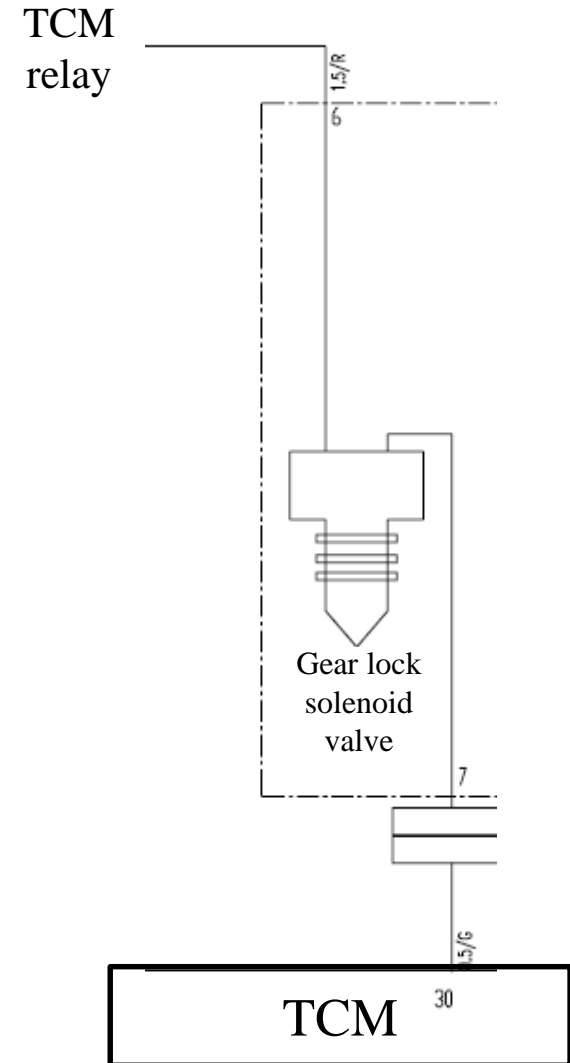


Shift lock solenoid valve

- Schematic diagram:

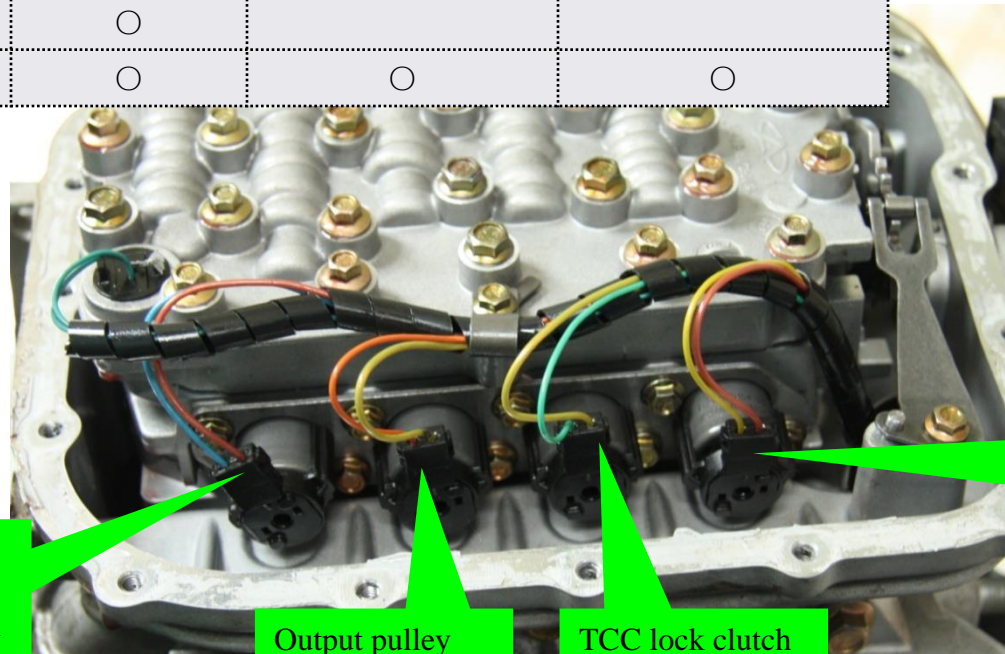
- Related fault codes:

P0928	Open circuit of gear lock solenoid valve control loop
P0930	Gear lock solenoid valve control loop short to ground
P0931	Gear lock solenoid valve control loop short to power source



Solenoid valve worksheet

Gear position	Solenoid valve			
	Output pulley shaft solenoid valve	Input pulley shaft solenoid valve	Forward / reverse clutch solenoid valve	TCC lock clutch control solenoid valve
P	○	○		
R	○	○	○	
N	○	○		
D	○	○	○	○



Input pulley shaft pressure control solenoid valve

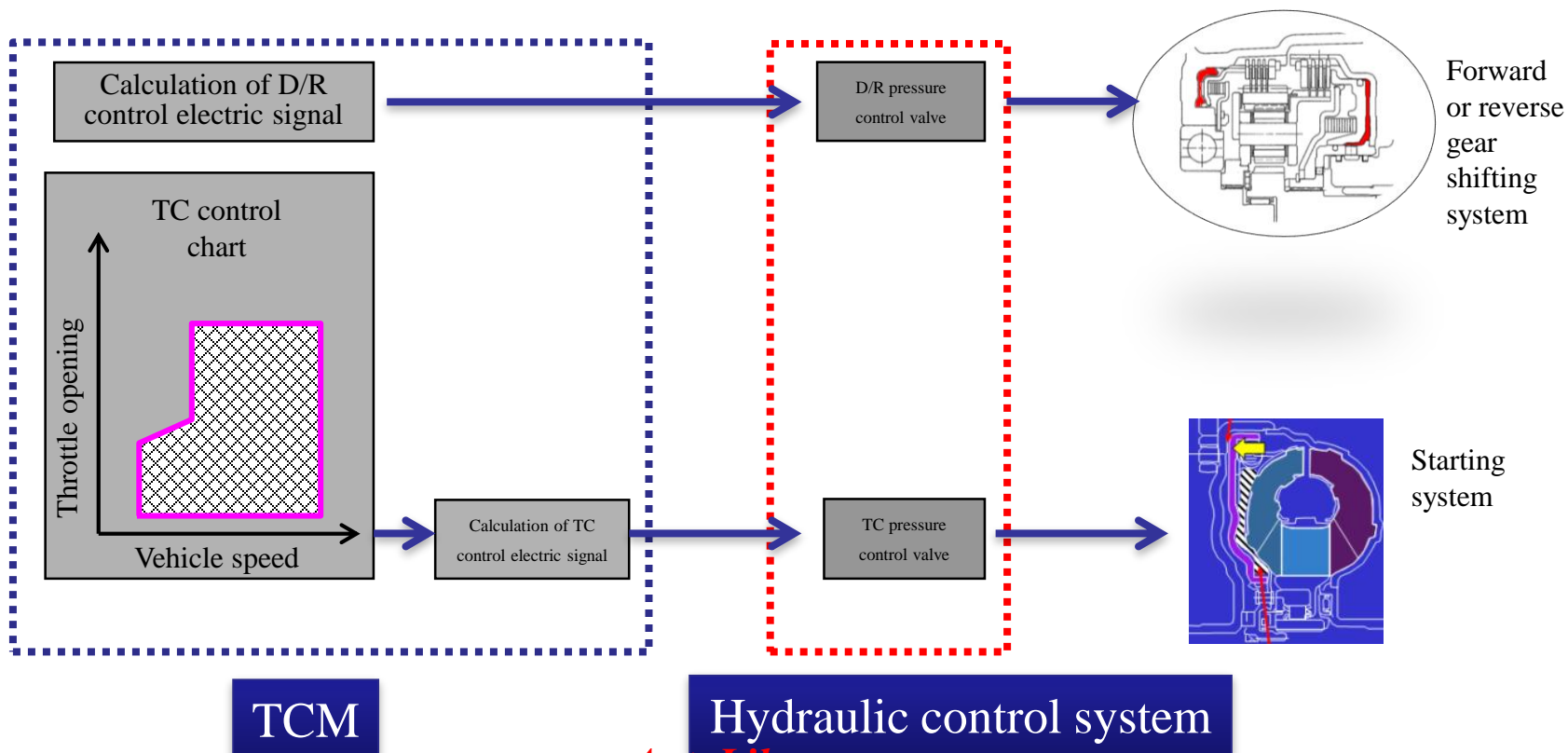
Output pulley shaft pressure control solenoid valve

TCC lock clutch control solenoid valve

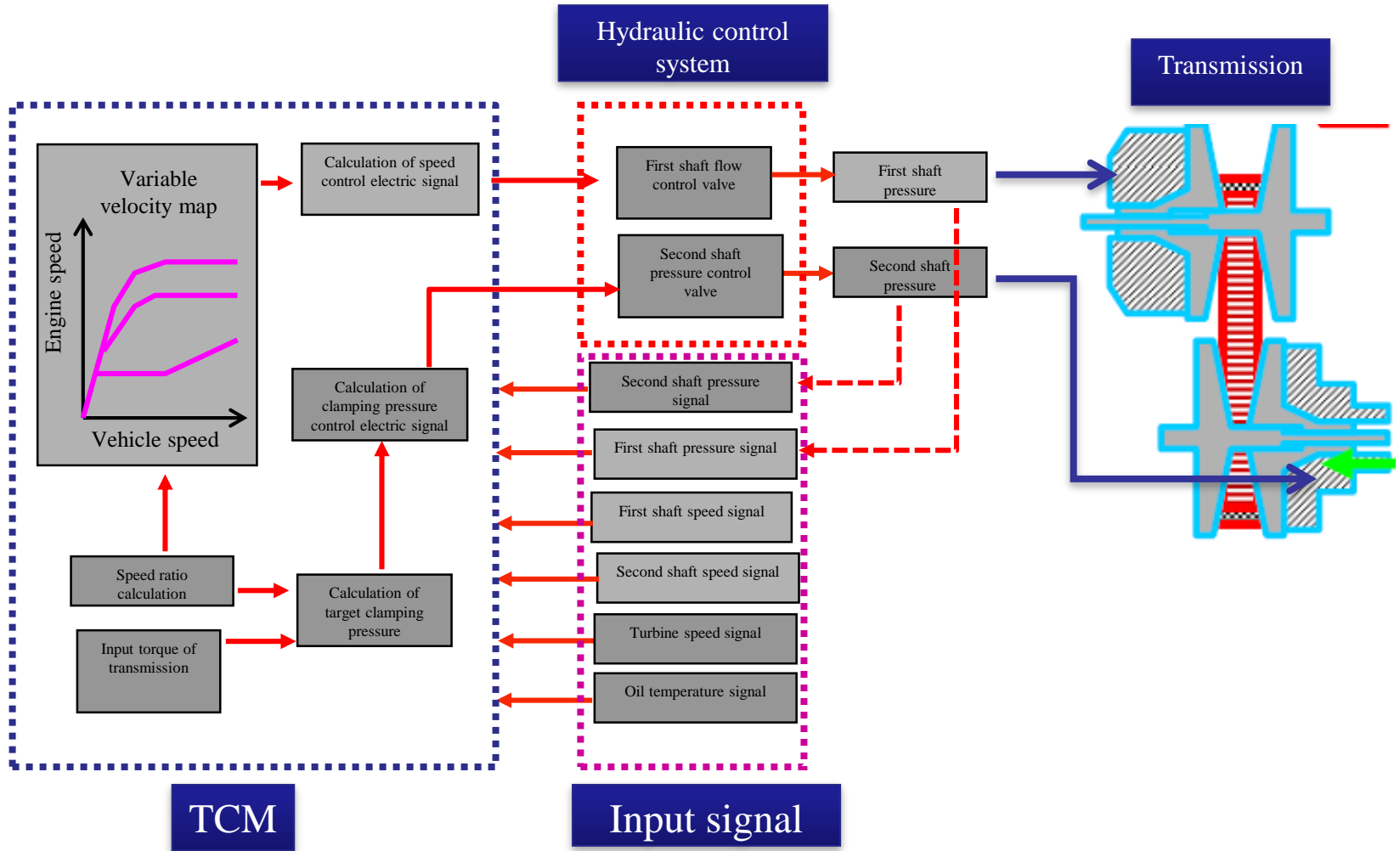
Forward / reverse clutch solenoid valve

Control of forward, reverse and lock clutch

- The forward or reverse clutch solenoid valve begins to work in case of putting in gear;
- The starting speed of lock clutch in case of engagement is 15km/h, while the bigger its throttle opening is, the slower its starting speed in case of engagement is due to the influences of throttle opening. Its speed for engagement will be also reduced in case of snow mode.



Control of speed control system



Driving mode

Snow starting mode

- Its speed ratio is less than its speed ratio for normal starting control to get a lower driving torque;
- The gear position can't be fixed, while the engagement of lock clutch will be postponed.

Kick-down

- In case of monitoring the throttle while driving;
- TCM will calculate an appropriate speed ratio reduction range as per its current vehicle speed and engine speed, thus it will make the engine speed increased to get a better power.

Sport mode

- The transmission can change its speed normally;
- Later than D gear up-shift time;
- Good dynamic performance, but its fuel consumption is increased.

Protection mode

High/low-temperature protection

- When the temperature of transmission is low, it will make the shift point postponed, thus the engine speed can be increased and its quick warm-up can be realized;
- TCM can adjust and control the oil tank of transmission by changing the shift curve.

Failure protection mode

- After the failure of important sensors and actuators, the transmission will lock it in its highest gear, and a forceless acceleration will occur to the vehicle;
- If CAN network communication fails, the transmission will be locked in its lowest gear position, and the speed of vehicle can't be increased.

Perform the alternative procedures

- If any fault occurs to the turbine speed sensor, it will adopt an engine speed signal for alternative calculation;
- When any fault occurs to the input pulley shaft speed sensor, it will adopt a turbine speed sensor signal for alternative calculation;
- When any fault occurs to the output pulley shaft speed sensor, it will adopt a vehicle speed signal for alternative calculation.

5 Maintenance and inspection

1. User's instructions
2. Fault inspection procedures
3. Maintenance
4. Fault code
5. Stalling test
6. Emergency handling
7. Analysis of common faults
8. Serviceable list

019CH series continuously variable transmission (CVT) includes:

- one parking gear (P gear)
- one reverse gear (R gear)
- one neutral gear (N gear)
- one forward gear (D gear)

These gears can be shifted via a gear lever.

Others can be supplied as per the demands of vehicle:

- **Ds gear (sport mode)**
- **M gear (manual mode)**
- **Low speed gear (L gear)**
- **M gear (manual mode)**
- **Snow mode (WIN)**
- **Sport mode (SPORT)**
- **Economic mode (ECO), etc**

- Low speed gear or manual mode can be shifted via a shift lever;
- Snow mode, sport mode or economic mode, etc can be triggered or released through a mode button. There are at most two modes triggered or released by the button at the same time;
- Mode priority: the highest priority is manual mode. The sport mode and economic mode can't be triggered at the same time. In case of triggering the manual mode and sport mode (or economic mode) at the same time, the system defaults to manual mode.

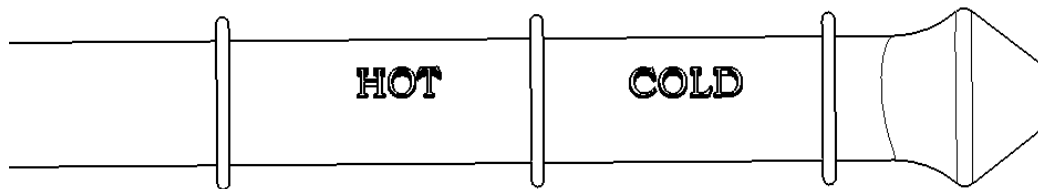
Fault handling procedures for automatic transmission



Microsoft Excel

Check of transmission oil

- Vehicle driving makes the temperature of transmission oil reach its normal operating temperature (75 to 80°C);
- Park the vehicle on flat ground, and pull up the parking brake handle;
- Start the engine to make it idling, step the brake pedal and move the gear selector lever to each gear at least five times, and finally put it to “P” or “N” position;
- Pull out the dipstick of automatic transmission, scrub it with lint-free paper, insert its dipstick into the filler pipe again as much as possible, pull it out, and observe whether it’s within “HOT” range.



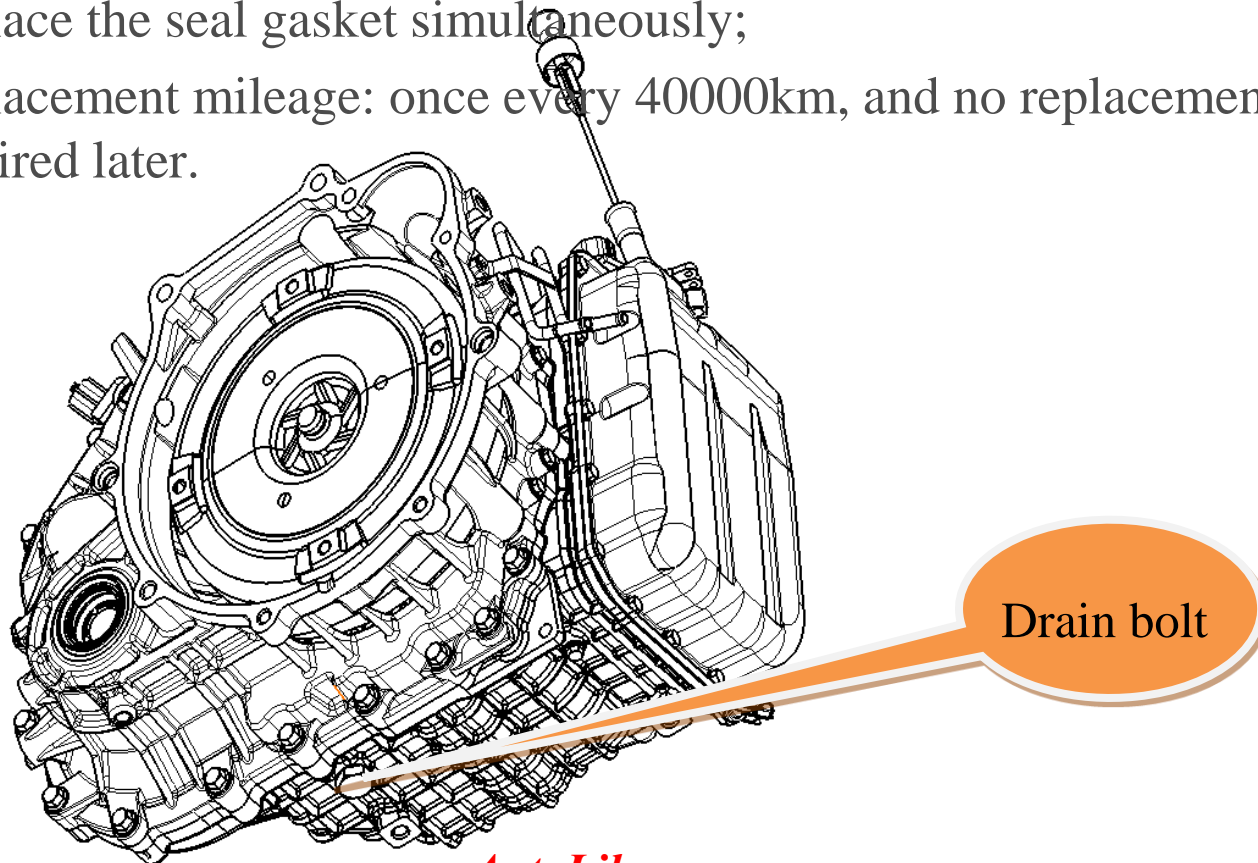
Caution:

If the smell of ATF burning exists and it gets dark, the transmission must be faulty.



Replacement of ATF

- Place the vehicle on the lifter for rising;
- Remove the drain plug of transmission (as shown in the figure below), and drain ATF;
- Replace the seal gasket simultaneously;
- Replacement mileage: once every 40000km, and no replacement is required later.



Replacement of ATF

- Install the drain bolt (torque: 29-34Nm), and fill in new ATF oil from the opening of dipstick (its filling amount is the drained amount of ATF);
- Start the engine to make it running for 1-2min;
- Step the brake pedal, move the gear selector lever to each gear at least 5 times, and put the gear selector lever in “N” or “P” position;
- Pull out the dipstick of automatic transmission, scrub it again with lint-free paper, pull it out again, and observe whether it’s within “HOT” range. If its oil level is too low, add ATF, until it should be within “HOT” range;
- It’s required to replace the drain bolt gasket after each oil change.

Note: change ATF once each time the vehicle drives 40000km. Then ATF isn’t required to change during the vehicle maintenance.

Fault code

- Diagnosis via K line;
- The fault codes must be cleared via diagnostic unit;
- If no faults are detected by the system within 3 driving cycles after TCM records the fault code, the fault codes will be automatically removed.
- **Fault category**
 - **Category I: after any fault related to oil temperature occurs, the system will record the fault code and activate the fault lamp immediately, and the fault warning lamp will flash at this time;**
 - **Category II: after the fault occurs, the system will record the fault code and activate the fault lamp immediately, but it won't flash;**
 - **Category III: the fault lamp will go out after the fault occurs three times.**

Fault code table

No.	Fault code	Fault name	Remark
1	P0703	Abnormal brake signal	
2	P0705	Abnormal gear signal of transmission	
3	P0716	Abnormal range of turbine speed signal	
4	P0730	Abnormal speed ratio control	
5	P0792	Abnormal range of input pulley shaft speed signal	
6	P0811	Slippage of forward clutch	
7	P081E	Slippage of reverse clutch	
8	P0842	Pressure sensor A circuit (input pulley shaft) short to ground or opened	
9	P0843	pressure sensor A circuit (input pulley shaft) short to power source	
10	P0847	pressure sensor B circuit (output pulley shaft) short to ground or opened	
11	P0848	pressure sensor B circuit (output pulley shaft) short to power source	
12	P0890	TCU main relay control circuit short to ground or opened	
13	P0894	Slippage of hydraulic torque converter clutch	
14	P0900	Open circuit of clutch solenoid valve control circuit	
15	P0902	Clutch solenoid valve control circuit short to ground	
16	P0903	Clutch solenoid valve control circuit short to power source	
17	P0938	Overhigh temperature of transmission oil	
18	P0939	Transmission oil temperature sensor circuit short to ground	
19	P0940	Transmission oil temperature sensor circuit short to power source or opened	

Fault code table

No.	Fault code	Fault name	Remark
20	P0960	Open circuit of pressure control solenoid valve “A” (input pulley shaft) control circuit	
21	P0962	Short circuit of pressure control solenoid valve “A” (input pulley shaft) control circuit	
22	P0963	Pressure control solenoid valve “A”(input pulley shaft) control circuit short to power source	
23	P0964	Open circuit of pressure control solenoid valve “B”(output pulley shaft) control circuit	
24	P0966	Short circuit of pressure control solenoid valve “B”(output pulley shaft) control circuit	
25	P0967	Pressure control solenoid valve “B”(output pulley shaft) control circuit short to power source	
26	P0968	Open circuit of pressure control solenoid valve “C”(hydraulic torque converter) control circuit	
27	P0970	Short circuit of pressure control solenoid valve “C”(hydraulic torque converter) control circuit	
28	P0971	Pressure control solenoid valve “C”(hydraulic torque converter) control circuit short to power source	
29	P1706	Slippage of steel belt	
30	P1745	Abnormal range of output pulley shaft speed signal	
31	P2797	Abnormal control of input pulley shaft pressure	
32	P2798	Abnormal control of output pulley shaft pressure	
33	U0100	ECM communication fault	
34	U0121	ABS communication fault	
35	U0401	Abnormal ECM data reception	

Processing of fault code related to “incorrect speed ratio”

1. Confirm if there are other fault codes, if there are other fault codes, first remove other faults, and then try again to test whether the fault code can be cleared;
2. Confirm whether the signals of input and output pulley shaft speed sensors are normal;
3. Confirm whether the power supply and grounding circuit of TCM are normal;
4. Confirm if TCM control is normal;
- 5. Depot repair of mechanic assembly.**

Processing of fault code related to “slippage”

1. Confirm if there are other fault codes, if there are other fault codes, first remove other faults, and then try again to test whether the fault code can be cleared;
2. Confirm whether the signals of upstream and downstream speed sensors of this part are normal;
3. Confirm whether the power supply and grounding circuit of TCM are normal;
4. Measure the oil pressure value of the relevant components
5. Confirm if TCM control is normal;
- 6. Depot repair of mechanic assembly.**

Processing of fault code related to “abnormal pressure control”

1. Confirm if there are other fault codes, if there are other fault codes, first remove other faults, and then try again to test whether the fault code can be cleared;
2. Confirm whether relevant oil pressure sensor and its circuit are normal;
3. Measure the oil pressure value of the relevant components
4. Confirm whether relevant solenoid valve and its circuit are normal;
5. Confirm whether the power supply and grounding circuit of TCM are normal;
6. Confirm if TCM control is normal;
- 7. Depot repair of mechanic assembly.**

Application of fault code setting policies of maintenance manual in fault remedy

P0705

Abnormal transmission gear position signal

- Basic description: the transmission gear position signal (PRND) is received through TCM circuit processing, and low potential of its gear position signal is valid. It's mainly used to judge current vehicle driving mode, and provide the important information for engagement or speed control function of clutch.
- DTC diagnosis logic: when several gear position signals (>1) and diagnostic conditions are available, perform the error confirmation procedure for this fault. Once the error is confirmed, the system will enter into the failure protection mode or perform the alternative procedure, and MIL lamp will go on.
- Fault causes: failure of shifter switch; gear position signal harness short to ground; failure of TCU digital signal processing circuit.
- Fault diagnosis operation: 1. Enter into the automatic transmission (CVT) system of vehicle related to diagnostic unit, and read its fault code. 2. Clear the fault code. 3. Start the engine, and shift P-R-N-D gears. 4. Check the fault code again. In case of detecting DTC, find out its possible causes.

Note: pay attention to the driving safety during the test. Clear the fault code after finishing the repair.

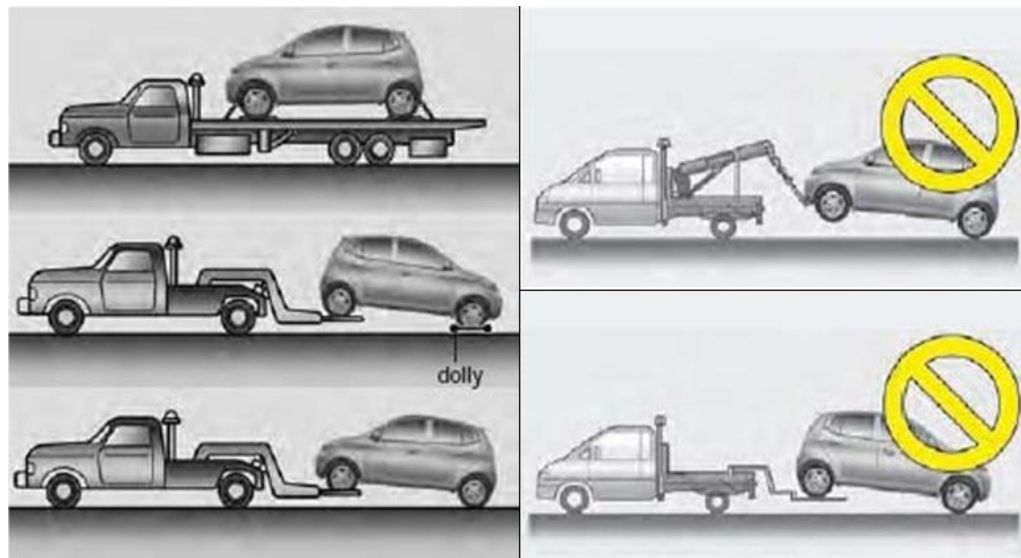
Vehicle traction

Adopt correct vehicle traction mode to avoid any unnecessary secondary damage of vehicle:

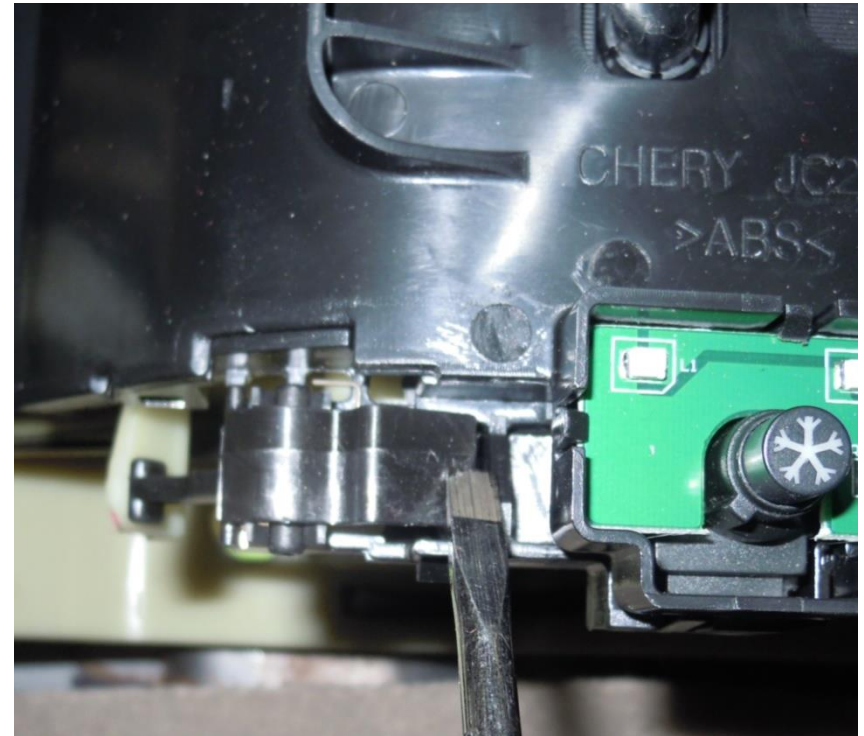
- Adopt a flat truck or big cat to put up the vehicle fully before traction;
- Adopt hard traction mode to put up the non-drive wheel, and put up the drive wheel via a small flat truck (supporting wheel) before traction;
- Adopt hard traction mode to put up the drive wheel before traction.

Note:

- ✓ Don't adopt soft traction mode to tow the drive wheel;
- ✓ Don't adopt soft traction mode to tow the non-drive wheel.



Emergency handling of gear lever



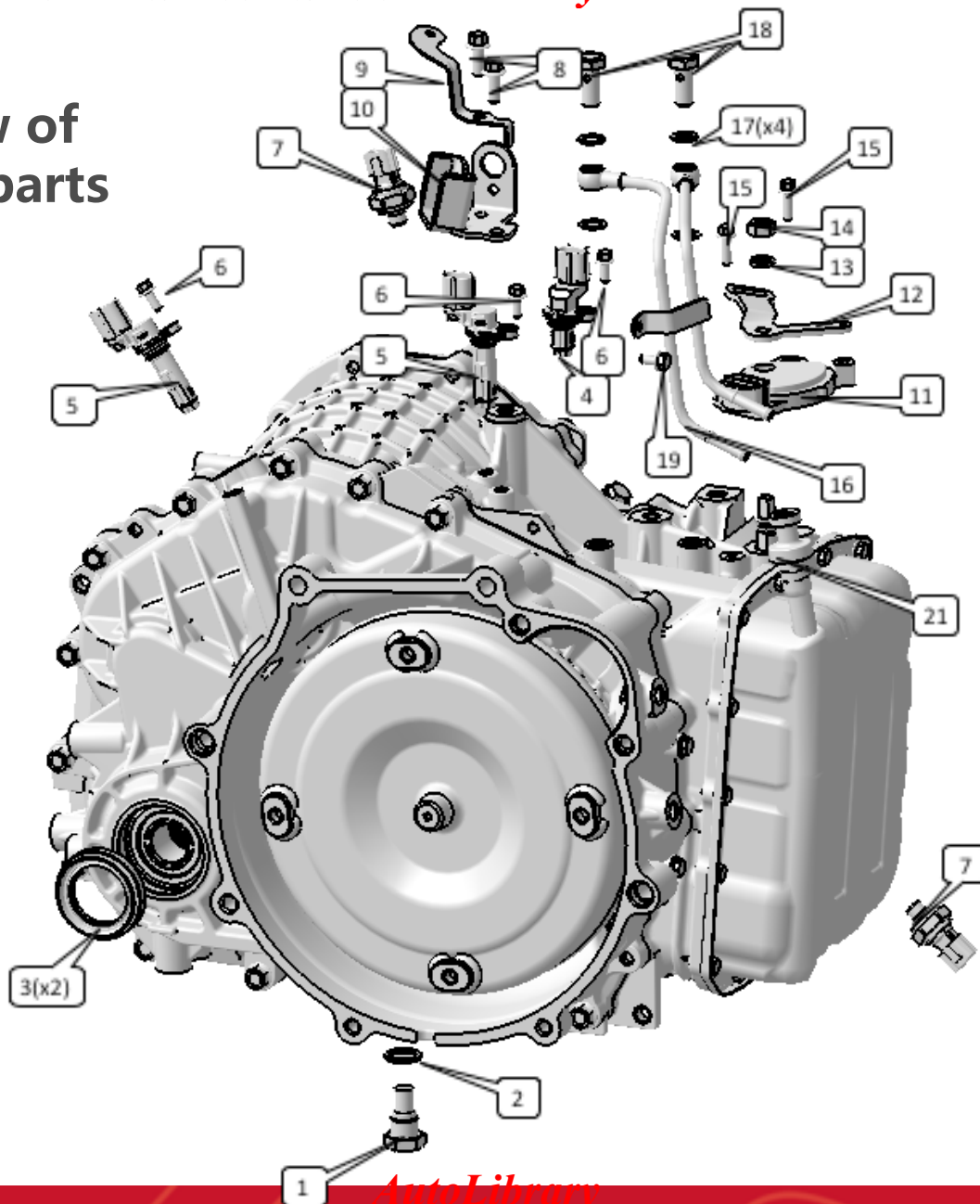
Description of common fault symptoms and causes:

Serial number	Common fault symptoms	Common causes
1	Brake in P gear can't be released after power-on or ignition.	Fault of brake signal, fault of gear lock solenoid valve
2	High impact of static gear shifting	Fault of turbine speed sensor, poor contact of sensor connector, fault of transmission clutch solenoid valve or transmission valve body.
3	Driving failure in case of putting in D/R gear, or different from put gear and gear indicated by the instrument.	No shifting pull wire or transmission shift rocker arm is assembled.
4	Abnormal speed control, disorder of driving speed control, abnormal driving and poorer comfort	Fault of first or second shaft pressure sensor, poor contact of sensor connector, fault of first or second shaft speed sensor, poor contact of sensor connector. ◦
5	Vehicle can't drive in case of putting in gear, but its gear position is normal.	Fault of transmission oil pump or transmission hydraulic valve body
6	Vehicle can't drive in case of putting in reverse gear	Failure of transmission planetary gear train (failure of reversing brake)
7	Vehicle stops in case of putting in D/R gear	Wrong mounting of hose for connecting the transmission heat radiator and transmission (the assembled oil pipe can't be normally bent or be folded), and abnormal detachment of lock clutch
8	Abnormal noises of transmission are produced during vehicle acceleration	Possible oil leakage of transmission
9	The power or speed of vehicle is suddenly reduced while driving at high speed.	Heat protection of transmission

- In case of installing the torque converter on transmission assembly, ensure the oil pump driving card slot is mounted in place, otherwise it will cause abnormal damages of transmission;**
- During the removal and installation of engine transmission, ensure no missing of bolts (4pcs) for connecting the engine flexible plate and torque converter;**
- During the installation of engine transmission, ensure that no connecting bolts are missed and their torques meet the instructions for maintenance manual;**
- During the removal and installation of engine transmission, ensure that the torque converter can't be detached;**
- During the removal and installation of drive shaft, ensure no damages of transmission differential oil seals;**
- During the installation of engine transmission, ensure no missing of emission protection baffles;**
- In case of replacing the transmission sensor, gear switch and oil seal, etc, ensure that they're mounted in place and their corresponding bolt torques meet the instructions for maintenance manual;**
- It's required to install or remove the transmission or replace its accessories in clean environment, and ensure no impurities enter into the transmission;**
- In case of replacing external oil pipe or heat radiator of transmission for repair, it's required to ensure no impurities, blockage or residual fluid on the assembled oil pipe or heat radiator, check its oil level again, and ensure no leaked oil after the replacement.**

5.8 Attentions for maintenance *AutoLibrary*

Explosive view of repairable parts



Serviceable list

Serial number	Part No.	Part name	Quantity per transmission	Torque	Remark
1	019CHA-1502190	Drain plug assembly	1	42~50N.m	
2	Q72318	Sealing gasket	1		★
3	019CHA-1502106	Differential oil seal	2		★
4	019CHA-1504240AB	Speed sensor assembly	1		
5	019CHA-1504230AB	Speed sensor assembly	2		
6	Q1820614F36	Hexagon flange bolts	3	10~12N.m	
7	019CHA-1504210	Oil pressure sensor assembly	2	15~22N.m	
8	Q1820820F36	Hexagon flange face bolt	2	10~12N.m	
9	019CHA-1504113	Harness support	1		
10	019CHA-1504110	Shifting pull wire support assembly	1		
11	019CHA-1504220	Gear switch assembly	1		
12	019CHA-1504102	Shifting arm	1		
13	Q40310F9	Spring washer	1		★
14	Q341C10F36	Hexagon nut	1	10~25N.m	
15	Q1820620F36	Hexagon flange bolts	2	10~12N.m	
16	019CHB-1502130	Oil pipe assembly	1		
17	019CHA-1502123	Sealing gasket	4		★
18	019CHA-1502122	Hollow bolt	2	27~33N.m	
19	Q1880612F36	Hexagon flange bolts	1		
20	B11-4004011	Automatic transmission oil (SP III)	/		△
21	019CHA-1502151	Vent plug	1		

★ it indicates that it's a disposable part, i.e. if it's required to disassemble this part during the repair, it must be renewed;
 △ the brand of automatic transmission oil is specified. Don't substitute it with other fluid, and the damages caused by applying other fluid are not within the warranty scope;

Thanks for your listening!

If you have any question, please feel free to contact me:

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