SECTION 4 BRAKE SYSTEM

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GROUP 1 STRUCTURE AND FUNCTION

1. OUTLINE

There are two brake systems, the foot brake system and the parking brake system.

The foot brake adopts the brake system of oil type at drive axle.

Oil pressure is generated in maximum 60kgf/cm^2 through brake oil input path of the left and right drive axle housing, this pressure allows the piston brake to advance and compresses a friction plate and a plate.

So when the transportation travels, it is possible to brake.

The parking brake works by the switch installed on steering column.

2. SPECIFICATION

1) DISK BRAKE

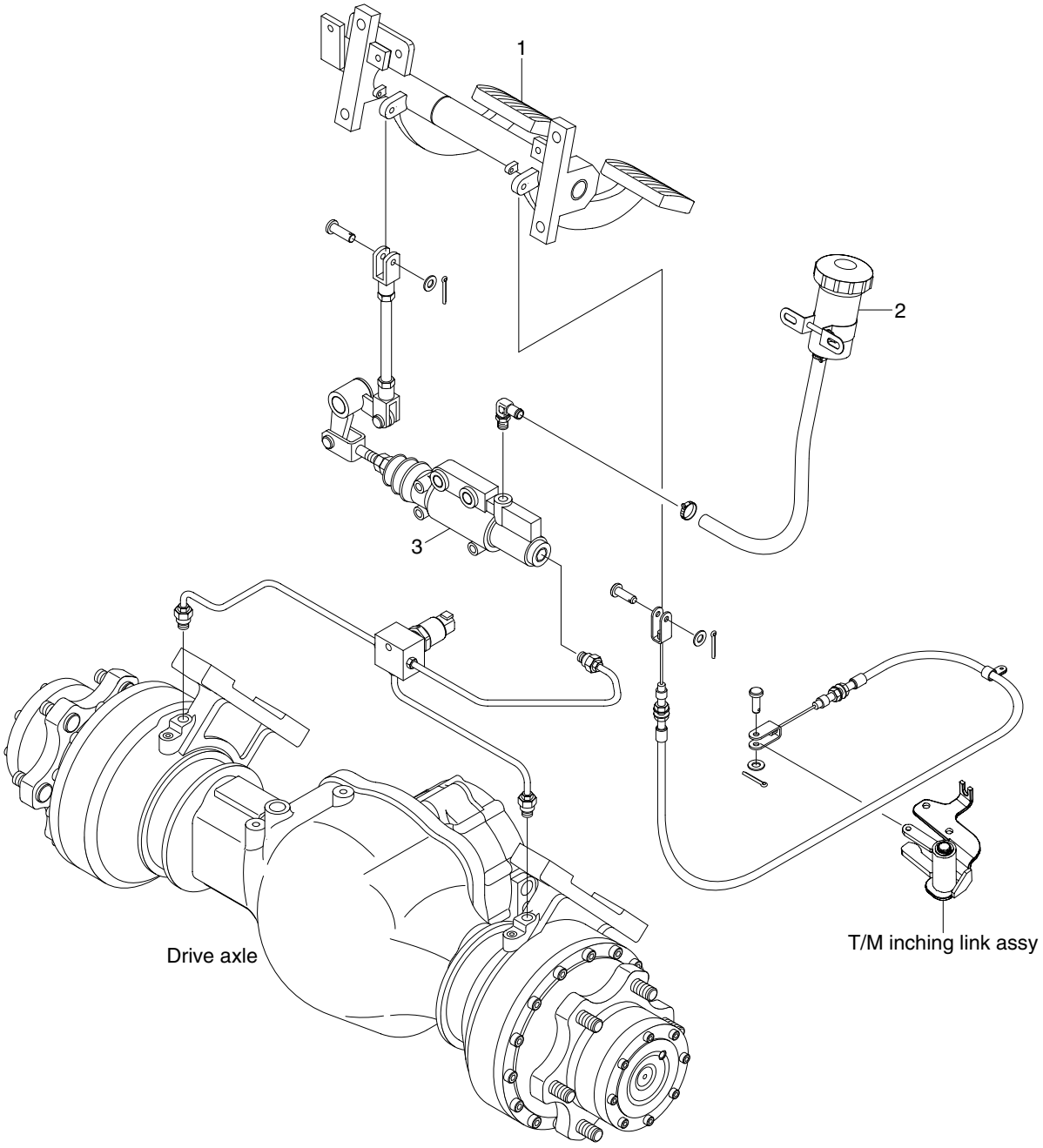
Item		Specification
Type		Wet disk brake
Master cylinder bore diameter (Non boosted)		22.23 mm (0.875 in)
Pedal adjustment	Pedal height	119 mm
	Play	2~4 mm
Brake oil		Azolla ZS32 (ISO VG32 hydraulic oil)

2) PARKING BRAKE

Item	Specification
Type	Wet disk brake (Negative)
Switch location	Steering column
Disc location	Axle carrier assy

3. BRAKE PEDAL AND PIPING

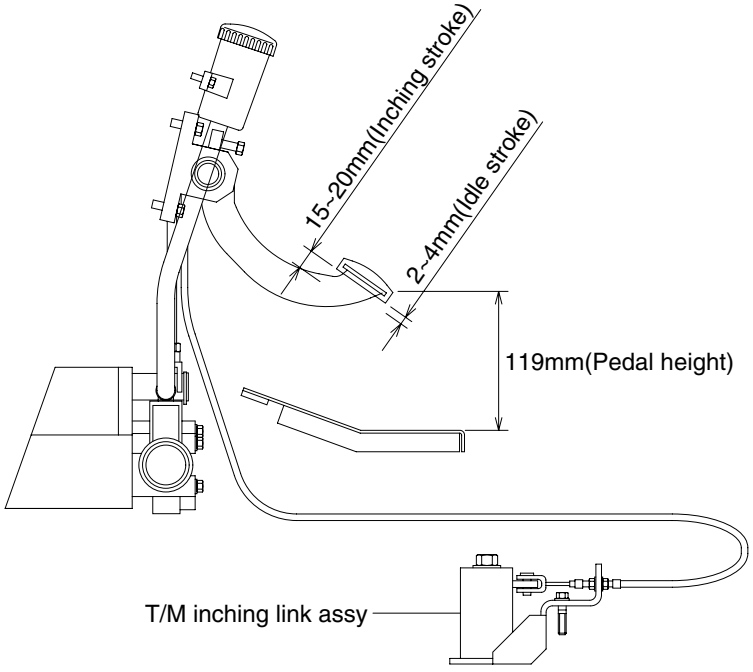
1) STRUCTURE

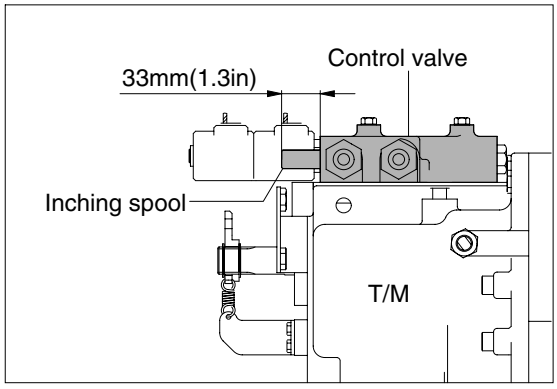


1 Brake pedal
2 Reservoir tank assembly
3 Brake master cylinder

4. INCHING PEDAL AND LINKAGE

The brake pedal serves to actuate the hydraulic brakes on the drive axle. At the beginning of the pedal stroke, the inching spool of the transmission control valve is actuated to shift the hydraulic clutch to neutral and turn off the driving force. By treading the pedal further, the brake is applied.





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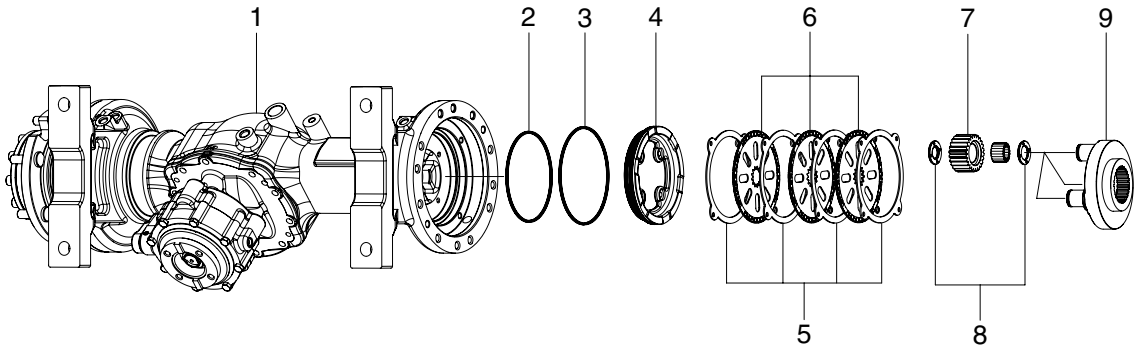
5. WET DISK BRAKE

1) STRUCTURE



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1	Drive axle housing	4	Piston brake	7	Planet gear
2	Square ring	5	Plate	8	Snap ring
3	Square ring	6	Friction plate	9	Planet carrier

2) OPERATION

Sealed up structure of hydraulic disk brake system secures good brake performance even in the high humid or dusty area.

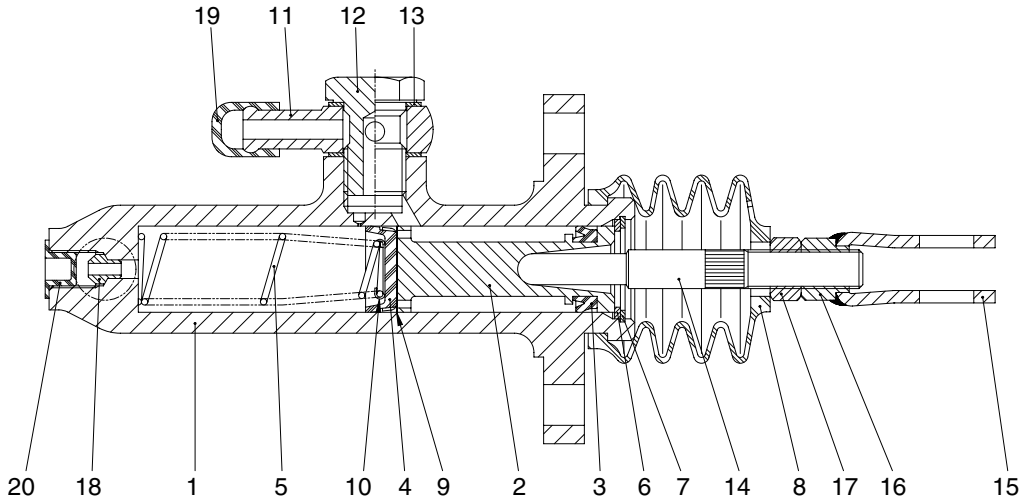
Because it is possible to use the brake semi-permanently, there is no need to replace or change the lining as drum type brake do.

Major components are 6 plates (5), 5 friction plates (6), piston brake (4), and brake housing.

Braking force is applied by restricting the drive force from drive shaft and spline collar.

6. BRAKE MASTER CYLINDER

1) STRUCTURE



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1	Body	8	Boot	15	Head
2	Piston	9	Spacer	16	Head pin
3	Secondary cup	10	Spring seat	17	Nut
4	Primary cup	11	Union	18	Seat
5	Spring	12	Union bolt	19	Cap
6	Plate	13	Washer	20	Cap
7	Snap ring	14	Rod		

2) DISASSEMBLY

(1) Remove the master cylinder boot (8) and remove the rod (14).

(2) Remove the snap ring (7) and take out the plate (6), the piston (2), the piston primary cup (4), and piston spring (5).

(3) Specification of master cylinder.

- Cylinder bore diameter : 22.22 mm
- Piston stroke : 35 mm

3) INSPECTION

(1) Clean and check these components.

※ **Use isopropyl alcohol or brake fluid for washing the components. Do not use gasoline, kerosene or any other mineral oils. When using alcohol, do not leave rubber parts in the liquid for more than 30 seconds.**

(2) Inspect the inside wall of the master cylinder, and if any faults are found, replace the cylinder assembly.

(3) Replace the boot (8), the primary cup (4), piston (2), if deformation or any other defect is found.

4) ASSEMBLY

※ **Prior to assembly make sure again of no contaminant of the components. Apply a thin coat of brake oil to the components.**

- Assembly is in opposite order to disassembly.

GROUP 2 OPERATIONAL CHECKS AND TROUBLESHOOTING

1. OPERATIONAL CHECKS

1) GENERAL INFORMATION

Brake system generate small metal wear particles at a fairly steady rate, especially during the break-in period.
If these fine, but hard particles are allowed to circulate in the lubricant, along with external moisture and dirt, internal components will wear at a much faster rate than normal.

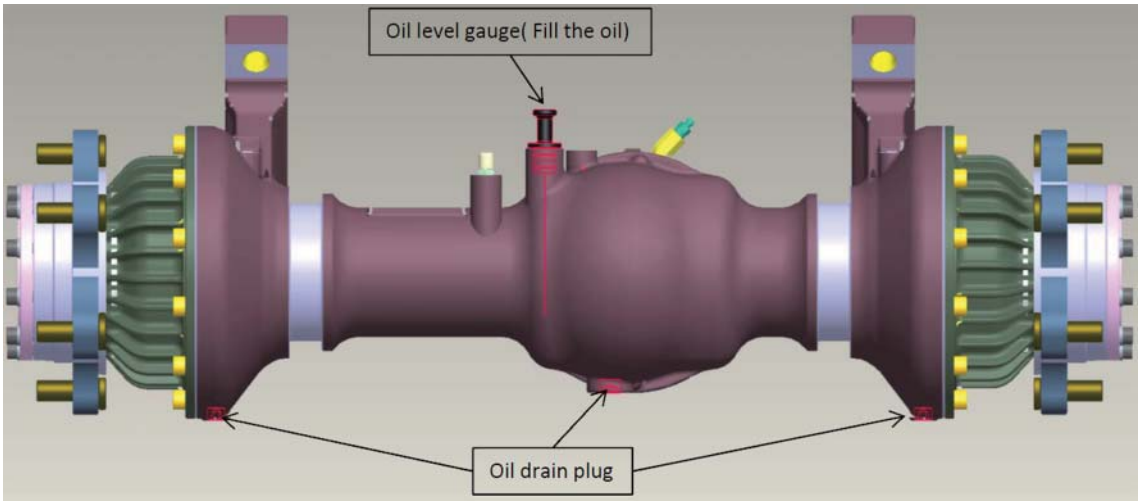
2) BRAKE PIPING

(1) Check pipes, hoses and joints for damage, oil leakage or interference.
(2) Operate brake pedal and check operating force when pedal in depressed. Check also change in operating force, and change in position of pedal when pedal is kept depressed.

3) OIL LEVEL

(1) Check and adjust oil

Axle housing has oil level gauge and drain plug.



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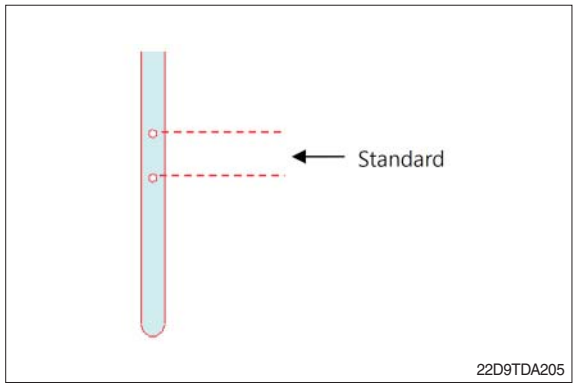
① Make sure the vehicle is on a level surface.
② Pull out oil level gauge from axle, then check the height of oil.
③ If the height of oil of level gauge is higher than the upper limit, take oil out by loosening drain plug and keep the standard refer to (2), page 4-6 if the height of oil is lower than the lowest limit, pour oil in to level gauge and keep the standard.



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(2) Oil change

⚠ Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. Do not work under a vehicle supported only jacks. Jacks can slip and fall over. Serious personal injury can result.

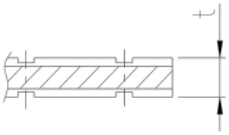
① Make sure the vehicle is on level surface.
② Raise lift of vehicle and drain oil by loosening drain plug.
③ After drain all oil, faster the plug cleaned.
④ Fill oil with checking the height of oil by level gauge at the front of vehicle.

(3) Oil capacity and using oil

① Oil volume is approximately 5.6 liters. Actual volume will vary by axle model and configuration.
② Using Hyundai Genune axle oil (If use incorrect axle oil, the product has noise and burn-out at component).

4) MAINTENANCE

(1) Period of check drive axle : 1,000 hrs
(2) O-ring, oil seal, rubber, gasket : Change all parts at every disassembling, if as necessary.
(3) Check internal leakage of brake system (Brake seal) : Replace as necessary or every 1,000 hrs
(4) Friction plate (disk), reaction (steel) plate : Change the part that exceeds the wear limits.

Item		Part no.	Standard	Limit
Friction plate (Disk)		21DA-10071	t=3.5	t=3.05
		21DA-20940	t=2.2	t=1.80
Plate (Steel plate)		21DA-10051	t=2.5	t=2.35
		21DA-20950	t=1.5	t=1.40

(5) Bearing : If in doubt about the wear or lack of lubrication, replace the bearing and oil
Check the release bearing the see if it rotates unfreely, use matel cleaner and then recheck.
If it is unfreely again, replace the part
(6) Spring : Measure free length of spring. If it has deform ±10% over then free length, replace the part
(7) Gear, shaft : If it is abnormal or change the cross sectional area, you have to change.
(8) Axle oil change

Recommended initial oil change	100 hrs
Check oil level	Every 250 operating hours
Periodic oil change	Evey 1,000 operating hours

2. TROUBLESHOOTING

1) BRAKE SYSTEM

Problem	Cause	Remedy
1. Insufficient braking force	· Hydraulic system leaks oil. · Hydraulic system leaks air. · Disk worn. · Brake valve malfunctioning. · Hydraulic system clogged.	· Repair and add oil. · Bleed air. · Replace. · Repair or replace. · Clean.
2. Brake acting unevenly. (Machine is turned to one side during braking.)	· Tires unequally inflated. · Brake out of adjustment. · Disk surface roughened. · Wheel bearing out of adjustment. · Hydraulic system clogged.	· Adjust tire pressure. · Adjust. · Repair by polishing or replace. · Adjust or replace. · Clean.
3. Brake trailing.	· Pedal has no play. · Piston cup faulty. · Brake valve return port clogged. · Hydraulic system clogged. · Wheel bearing out of adjustment.	· Adjust. · Replace. · Clean. · Clean. · Adjust or replace.
4. Brake chirps	· Brake trailing. · Piston fails to return. · Disk worn. · Disk surface roughened.	· See above. Brake trailing. · Replace. · Replace. · Repair by polishing or replace.
5. Brake squeaks	· Disk surface roughened. · Disk worn. · Excessively large friction between disk plate.	· Repair by polishing or replace. · Replace. · Clean and apply brake grease.
6. Large pedal stroke	· Brake out of adjustment. · Hydraulic line sucking air. · Oil leaks from hydraulic line, or lack of oil. · Disk worn.	· Adjust. · Bleed air. · Check and repair or add oil. · Replace.
7. Pedal dragging.	· Twisted push rod caused by improperly fitted brake valve. · Brake valve seal faulty.	· Adjust. · Replace.

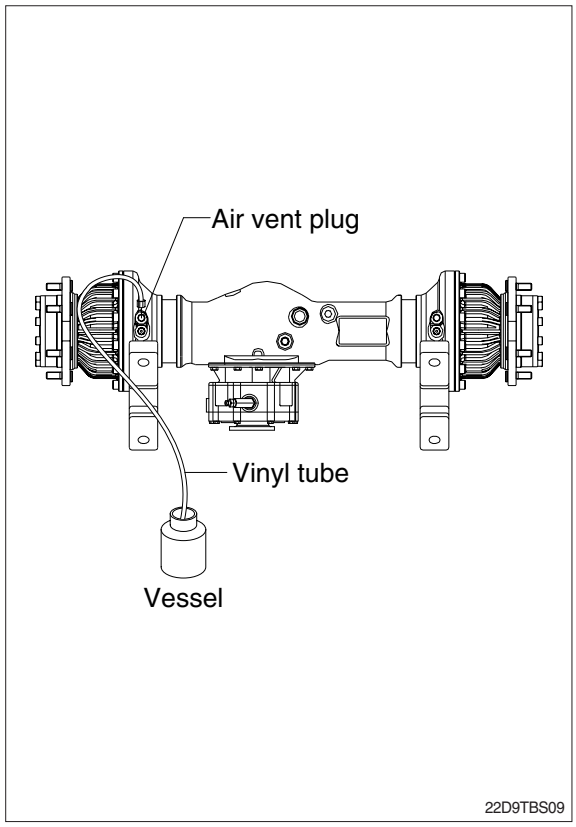
2) BRAKE SYSTEM OF THE DRIVE AXLE

Trouble symptom	Probable cause	Remedy
1. Inoperation of brake		
1) Service brake	· Non-inject or lack of brake oil	· Check oil level, set correct oil volume
	· Damage of brake seal	· Replace piston seal.
	· Wrong assemble brake seal	· After disassembly and adjust or replace part
	· Detect of slide on seal (Axle housing, pistion)	· Replace related part
	· Mix particle of slide on seal	· Wash slide part or replace piston seal
	· Damage of friction plate and plate	· After disassembly and adjust or replace part
	· Defect of material (or oil line)	· After disassembly and replace the part
2) Parking brake	· Damage of parking spring	· After disassembly and replace the part
	· Wrong assembly of parkgin spring	· After disassembly and adjust or replace part
	· Damage of friction plate and plate	· After disassembly and adjust or replace part
2. Impossible release of brake		
1) Service brake	· Failure of return at service brake piston	· After disassembly and adjust or replace part
	· Damage of friction plate and plate	· After disassembly and adjust or replace part
2) Leakage of parking brake	· Damage of brake seal	· After disassembly and replace the part
	· Wrong assemble brake seal	· After disassembly and adjust or replace part
	· Detect of slide on seal (Axle housing, Pistion)	· Replace related part
	· Mix particle of slide on seal	· Wash slide part or replace piston seal
	· Defect of material (or oil line)	· After disassembly and replace the part
3. Deterioration of brake	· Inadequate actuation fluid supply to brake	· Supply standard oil, replace seal of brake system
	· Inadequate pressure to apply brakes	· Check or replace of brake seal and brake oil line
	· Worn or damaged discs	· After disassembly and adjust or replace part
	· Air enter into brake system	· Remove air by air breather
	· Deform parking spring	· After disassembly and replace the part

GROUP 3 TESTS AND ADJUSTMENTS

1. AIR BLEEDING OF BRAKE SYSTEM

1) Air bleeding should be performed by two persons :
   One rides on truck for depressing and releasing brake pedal : the other person is on the ground and removes cap from air vent plug on wheel cylinder.
2) Block the front wheel securely and apply parking brake.
3) Start the engine.
4) Attach a vinyl tube to air vent plug and immerse other end of tube into a vessel filled with hydraulic oil.
5) Loosen air vent plug by turning it 3/4 with a wrench. Depress brake pedal to drain oil mixed with air bubbles from plug hole.
6) Depress brake pedal until no air bubbles come out of air vent plug hole.
7) After completion of air bleeding, securely tighten air vent plug. Install cap on plug.



2. ADJUSTMENT OF PEDAL

1) BRAKE PEDAL

(1) Pedal height from floor plate

Adjust with stopper bolt.

· Pedal height : 119 mm (4.7 in)

(2) Idle stroke

Adjust with rod of master cylinder

· Play : 2~4 mm

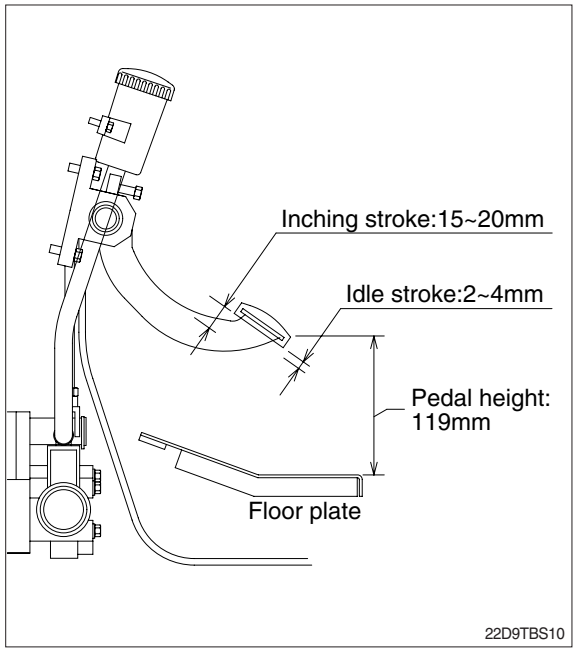
2) INCHING PEDAL

(1) Pedal height from floor plate

Adjust with stopper bolt.

· Pedal height : 119 mm (4.7 in)

(2) Adjust bolt so that brake pedal interconnects with inching pedal at inching pedal stroke 15~20 mm (0.6~0.8 in).

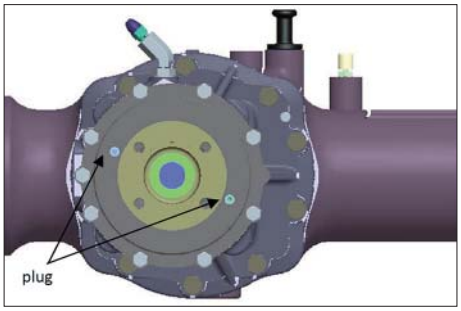


3. PARKING BRAKE RELEASE

In case of malfunction of transmission, it's hard to supply pressure at parking brake.
Using function of parking force release at carrier sub assembly of drive axle, it is possible to tow the truck.

1) DISASSEMBLE PLUG

Must wash surrounding plug before disassembly
Tool : Use 5 mm six-angular lench or bitsocket



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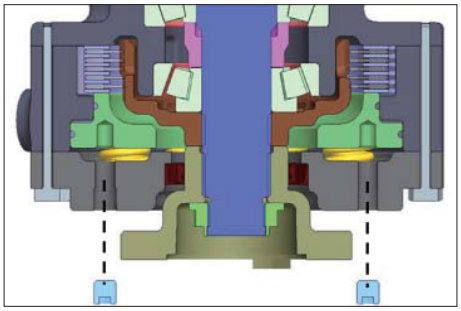
※ Correspond with hole of assembly and tap hole of piston by guide pin.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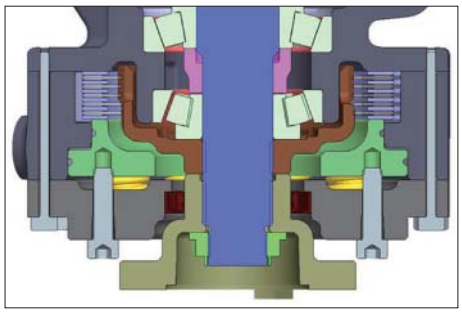
2) ASSEMBLE BOLT OF RELEASED PARKING

(1) Assemble bolt for released parking at hole of plug by disassemble.
Bolt spec : M8x1.25P×30L
Socket-bolt, S109-080304
(2) Assemble bolt by hand to reach axle housing.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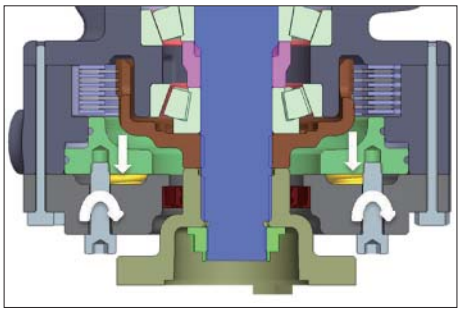
(3) Tighten two bolt like clockwise rotation.
According to the force of tighten bolt, pull piston and release parking brake.
Tool : Use 6 mm six-angluar lench or bitsocket
(4) Rotate 1.5~2 times by clockwise direction, and then release parking brake.
Do not exceed tightening torque 400 kgf-cm
(5) Check parking to rotate flange shaft by hand.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