

## SECTION 4 BRAKE SYSTEM

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## SECTION 4 BRAKE SYSTEM

### GROUP 1 STRUCTURE AND FUNCTION

#### 1. OUTLINE

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

In the foot brake system, oil pressure is generated in the master cylinder by treading on the brake pedal. This pressure causes the wheel cylinder pistons to extend, expanding the brake shoes and pressing them against the brake drums to attain braking force.

In the hand (parking) brake system, the brake shoes are expanded by operating the brake lever.

Force from the lever is transmitted to the brake shoes through the hand brake cables and a lever arm in each disk brake assembly.

#### 2. SPECIFICATION

##### 1) SERVICE BRAKE

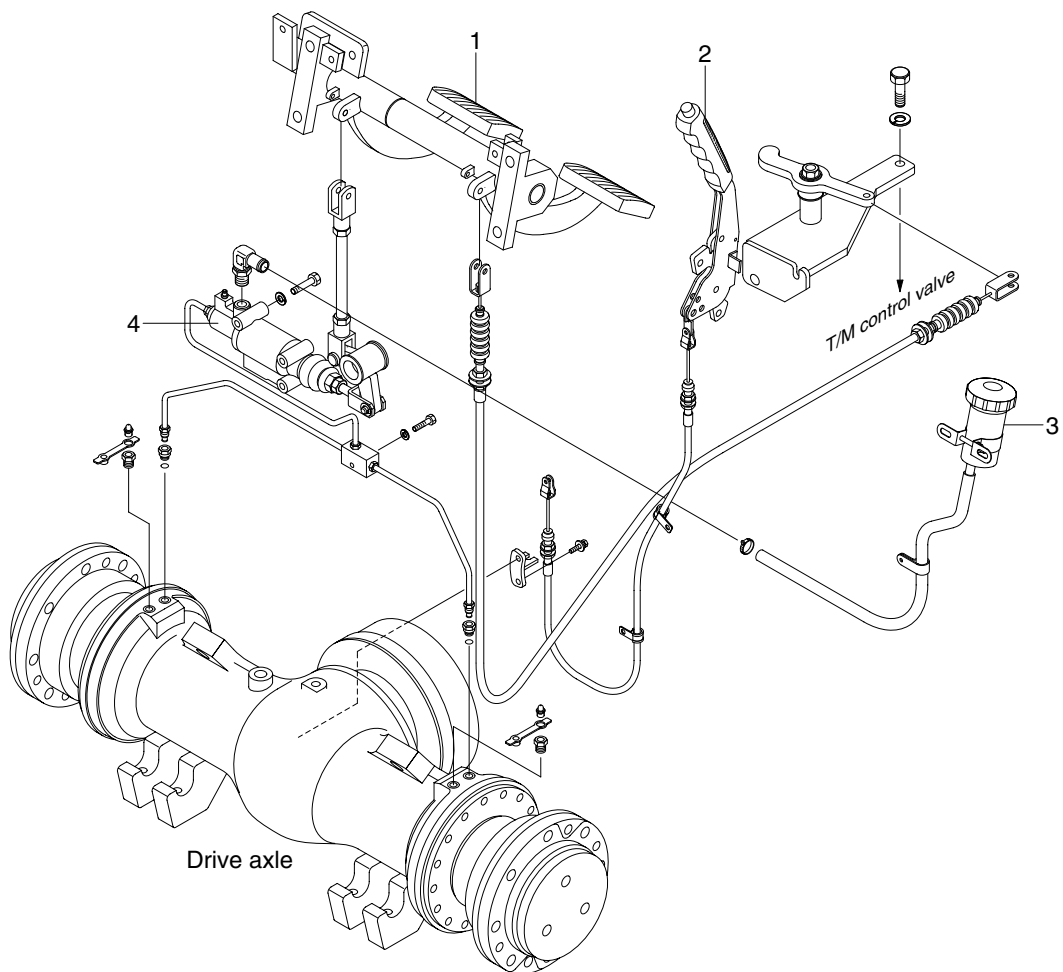
Item		Specification
Type		Wet disk brake
Brake valve step/bore piston diameter		40 mm (1.6 in) / 30 mm (1.2 in)
Pedal adjustment	Pedal height	126~134 mm (5.0~5.3 in)
	Play	2~4 mm (0.08~0.16 in)
Brake oil		Azolla ZS32 (ISO VG32 hydraulic oil)

##### 2) PARKING BRAKE

Item		Specification
Type		Ratchet, internal expanding mechanical type
Parking lever stroke		23°
Parking cable stroke		28 mm (1.1 in)

### 3. BRAKE PEDAL AND PIPING

#### 1) STRUCTURE



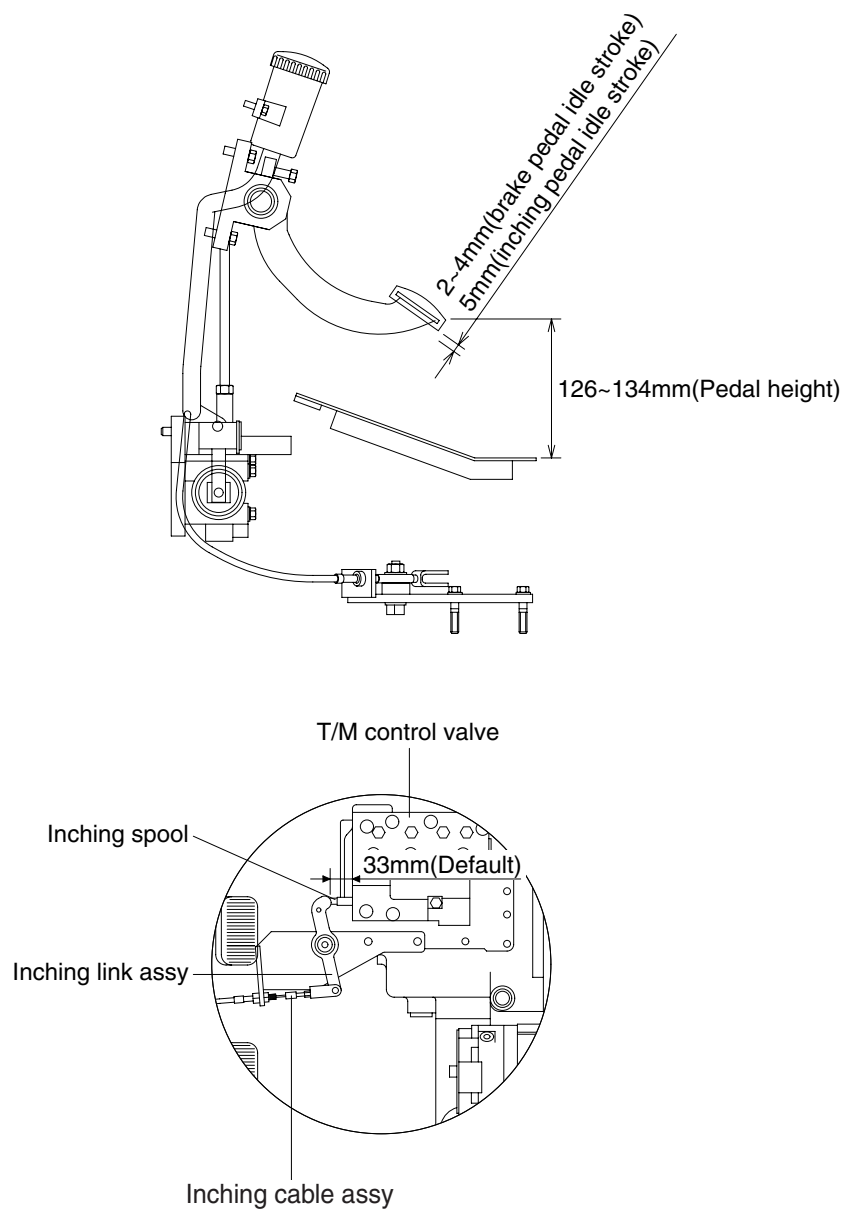
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- 1 Brake pedal & bracket assembly
- 2 Parking lever assembly

- 3 Reservoir tank assembly
- 4 Brake valve

#### 4. INCHING PEDAL AND LINKAGE

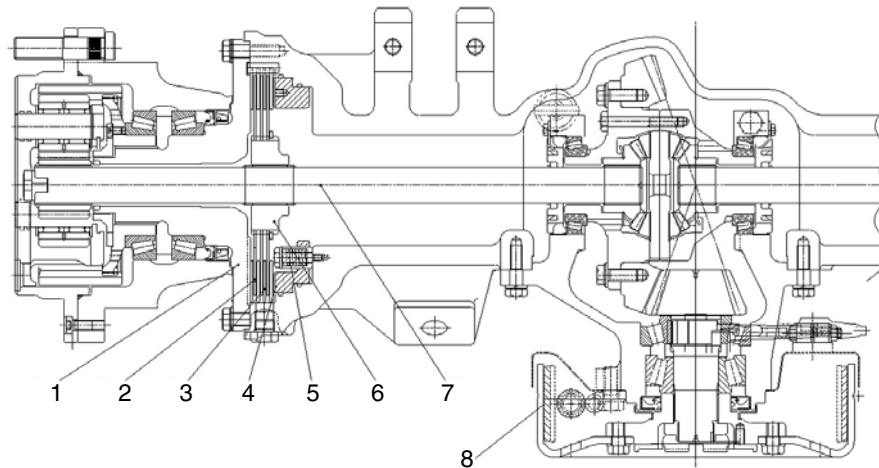
The brake pedal serves to actuate the hydraulic brakes on the front axle. At the beginning of the pedal stroke, the inching spool of the transmission control valve is actuated to shift the hydraulic clutch to neutral and turn off the driving force. By treading the pedal further, the brake is applied.



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## 5. WET DISK BRAKE

### 1) STRUCTURE



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- |               |                              |                 |
|---------------|------------------------------|-----------------|
| 1 Spindle     | 4 Service piston             | 7 Drive shaft   |
| 2 Steel plate | 5 Service piston adjust bolt | 8 Parking brake |
| 3 Disk plate  | 6 Spline collar              |                 |

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

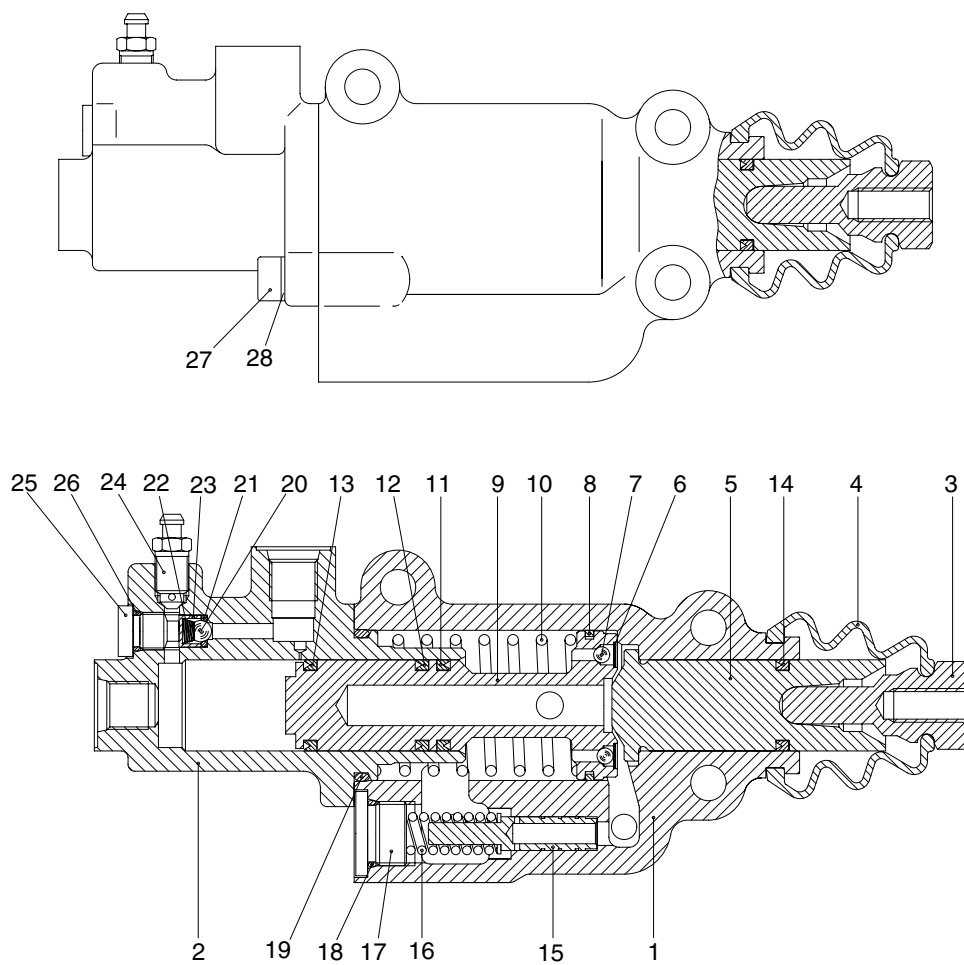
Because it is possible to use the brake semi-permanently, there is no need to replace or change the lining as drum type brake do. Also with self-adjust of friction plate clearance, it's easy to prevent the break performance drop due to friction material wear.

Major components are 3 disk plates (3), 4 steel plates (2), service piston (4) and 4 piston adjust bolts (5).

Braking take places when the discs and plates are pressed each other which make rotation resistance to the collar (6) and the drive shaft (7).

## 6. BRAKE VALVE

### 1) STRUCTURE

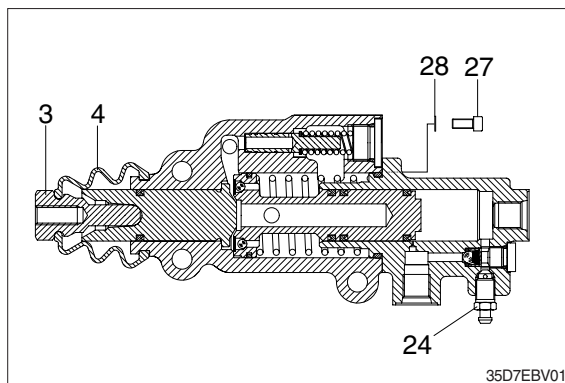


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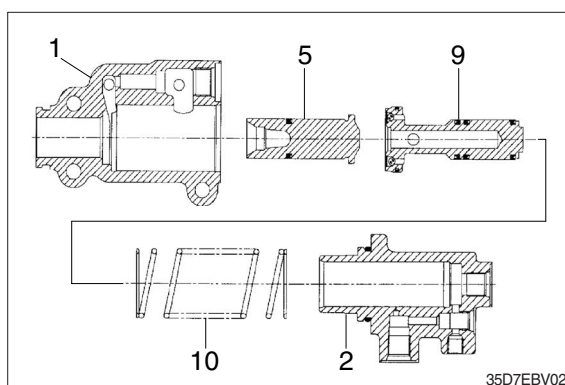
1	Front housing	11	U-cup seal	21	O-ring
2	Rear housing	12	U-cup seal	22	Spring
3	Push rod	13	U-cup seal	23	Gauge
4	Bellows	14	U-cup seal	24	Air bent
5	Master piston	15	Relief piston	25	Plug
6	Lock washer	16	Relief spring	26	O-ring
7	Piston ball	17	Relief plug	27	Bolt
8	Piston ring	18	O-ring	28	Spring washer
9	Servo piston				
10	Servo spring	20	Ball		

## 2) DISASSEMBLY

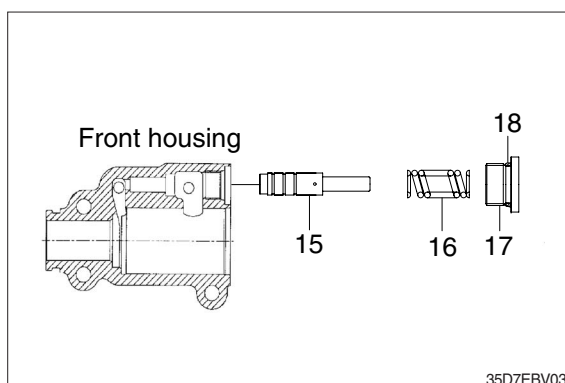
- (1) Remove push rod (3), bellows (4), air vent (24), bolt (27) and washer (28).



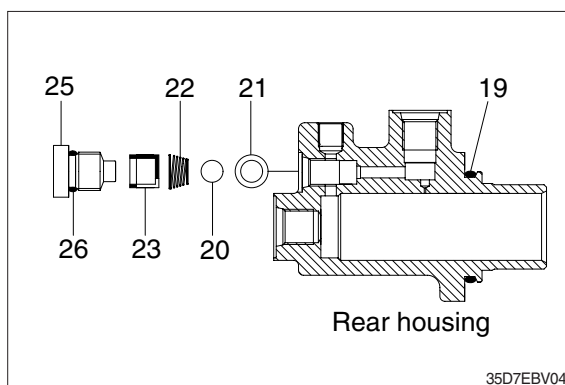
- (2) Remove front housing (1), rear housing (2), servo spring (10), servo piston (9) and master piston (5).



- (3) Remove relief plug (17) with O-ring (18), relief spring (16) and relief piston (15).



- (4) Remove O-ring (19), check plug (25) with O-ring (26), cage (23), check spring (22), check ball (20) and O-ring (21).



### **3) INSPECTION AND ASSEMBLY**

- (1) Clean all parts thoroughly and lubricate the parts either with mineral or with hydraulic oil, according to their use destination.
  - (2) All single parts are to be checked for damage and replaced, if required.
  - (3) Assembly is in opposite order to disassembly.
  - (4) Seal kit : XKAU-00176
- ▲ Use only brake fluid (Azolla ZS32) into the compensation reservoirs.



## GROUP 2 OPERATIONAL CHECKS AND TROUBLESHOOTING

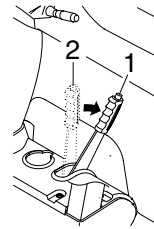
### 1. OPERATIONAL CHECKS

#### 1) BRAKE PIPING

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

#### 2) PARKING BRAKE

- (1) Operating force of parking lever is 35 ~ 40 kgf·m (253 ~ 290 lbf·ft).
- (2) Check that parking brake can hold machine in position when loaded on 20% slope. If there is no slope available, travel at low speed and check braking effect of parking brake.



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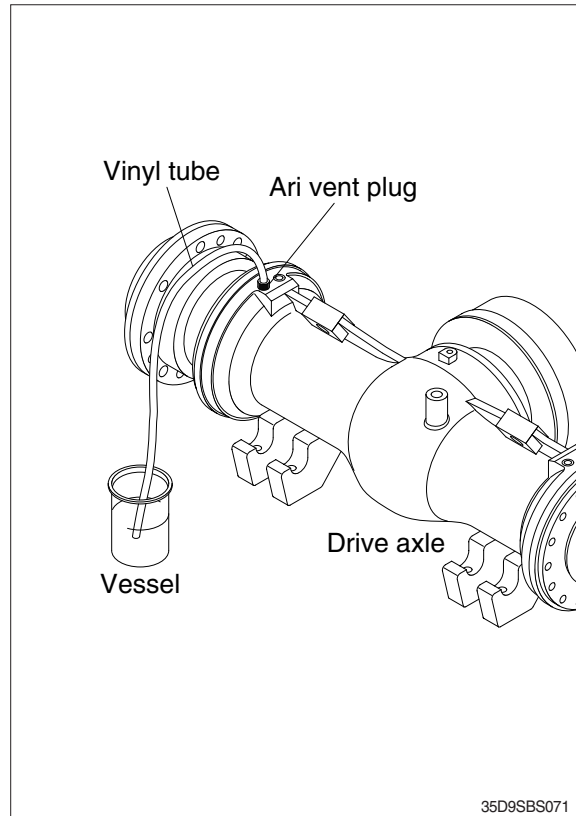
## 2. TROUBLESHOOTING

Problem	Cause	Remedy
Insufficient braking force	<ul style="list-style-type: none"> <li>• Hydraulic system leaks oil.</li> <li>• Hydraulic system leaks air.</li> <li>• Disk worn.</li> <li>• Brake valve malfunctioning.</li> <li>• Hydraulic system clogged.</li> </ul>	<ul style="list-style-type: none"> <li>• Repair and add oil.</li> <li>• Bleed air.</li> <li>• Replace.</li> <li>• Repair or replace.</li> <li>• Clean.</li> </ul>
Brake acting unevenly. (Machine is turned to one side during braking.)	<ul style="list-style-type: none"> <li>• Tires unequally inflated.</li> <li>• Brake out of adjustment.</li> <li>• Disk surface roughened.</li> <li>• Wheel bearing out of adjustment.</li> <li>• Hydraulic system clogged.</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust tire pressure.</li> <li>• Adjust.</li> <li>• Repair by polishing or replace.</li> <li>• Adjust or replace.</li> <li>• Clean.</li> </ul>
Brake trailing.	<ul style="list-style-type: none"> <li>• Pedal has no play.</li> <li>• Piston cup faulty.</li> <li>• Brake valve return port clogged.</li> <li>• Hydraulic system clogged.</li> <li>• Wheel bearing out of adjustment.</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust.</li> <li>• Replace.</li> <li>• Clean.</li> <li>• Clean.</li> <li>• Adjust or replace.</li> </ul>
Brake chirps	<ul style="list-style-type: none"> <li>• Brake trailing.</li> <li>• Piston fails to return.</li> <li>• Disk worn.</li> <li>• Disk surface roughened.</li> </ul>	<ul style="list-style-type: none"> <li>• See above. Brake trailing.</li> <li>• Replace.</li> <li>• Replace.</li> <li>• Repair by polishing or replace.</li> </ul>
Brake squeaks	<ul style="list-style-type: none"> <li>• Disk surface roughened.</li> <li>• Disk worn.</li> <li>• Excessively large friction between disk plate.</li> </ul>	<ul style="list-style-type: none"> <li>• Repair by polishing or replace.</li> <li>• Replace.</li> <li>• Clean and apply brake grease.</li> </ul>
Large pedal stroke	<ul style="list-style-type: none"> <li>• Brake out of adjustment.</li> <li>• Hydraulic line sucking air.</li> <li>• Oil leaks from hydraulic line, or lack of oil.</li> <li>• Disk worn.</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust.</li> <li>• Bleed air.</li> <li>• Check and repair or add oil.</li> <li>• Replace.</li> </ul>
Pedal dragging.	<ul style="list-style-type: none"> <li>• Twisted push rod caused by improperly fitted brake valve.</li> <li>• Brake valve seal faulty.</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust.</li> <li>• Replace.</li> </ul>

## 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

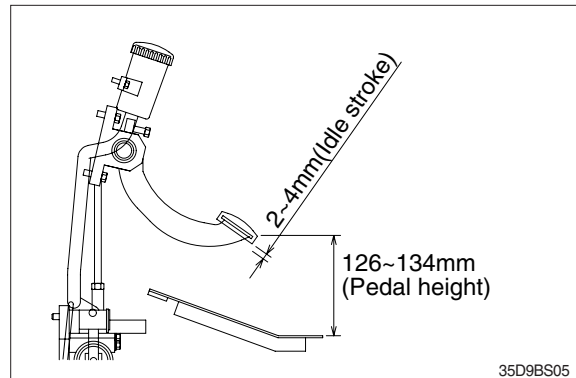
Adjust with stopper bolt.

- Pedal height : 126~134 mm (5.0~5.3 in)

##### (2) Idle stroke

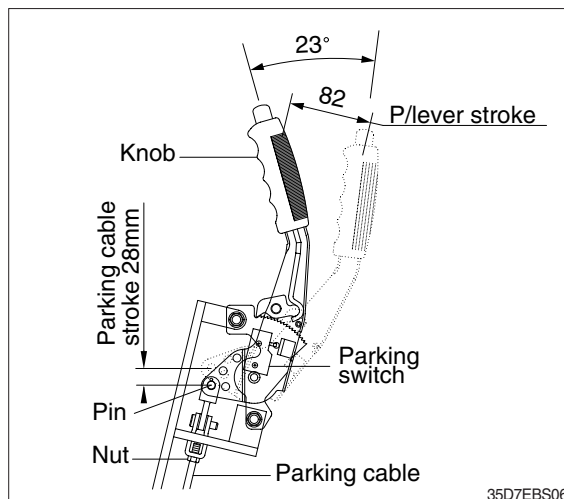
Adjust with rod of brake valve

- Play : 2~4 mm (0.08~0.16 in)



### (3) Micro switch for parking brake (if equipped)

- ① After assembling parking brake and parking cable, put the parking brake lever released.
- ② Loosen the nut for parking brake plate to play up and down.
- ③ Move up the plate so that the stopper can be contacted with the pin and then reassemble nut.
  - Micro switch stroke when parking brake is applied : 2~3 mm (0.08~0.1 in)



## 2) INCHING PEDAL

### (1) Pedal height from floor plate

Adjust with stopper bolt.

- Pedal height : 126~134 mm (5.0~5.3 in)

### (2) Adjust bolt so that brake pedal interconnects with inching pedal.

- Idle stroke: 5 mm (0.2 in)

