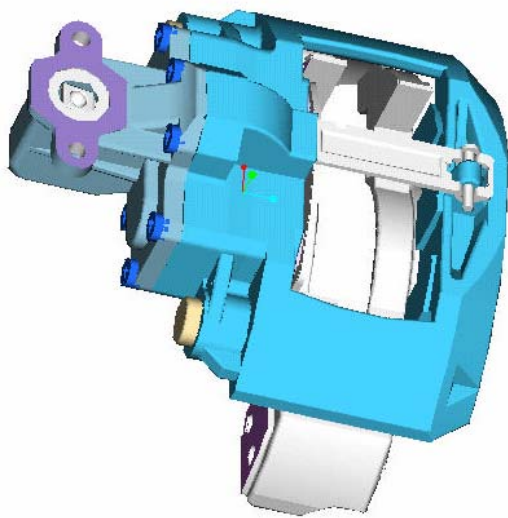


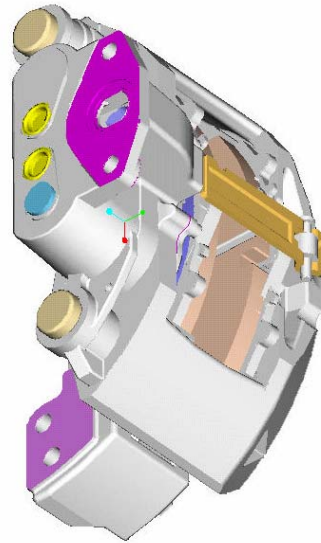


**WUHAN YOUFIN AUTO PARTS CO., LTD.**

**Maintenance manual for Double Tappets Air Disc Brake**



Radial air chamber



Axial air chamber

Fig.1. Double tappets air disc brake of YOUFIN

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## 1. Summary

The **Double Tappet** Air Disc Brake, produced by Wuhan Youfin Auto Parts Co., Ltd., is a **series of** new product **which been developed** based on **longtime** application experience of the **Single Tappet** Air Disc Brake. Its **MAX** braking torque is up to more than 20,000 Nm. It can be extensively used on the front and rear axle of passenger vehicles and load-carrying vehicles **by the wear clearance self-adjustment and better overall structure.**

## 2. Maintenance Illustration

### 2.1 Exploded Views

#### 2.1.1 Axial-double tappets air disc brake

#### 2.1.2 Radial-double tappets air disc brak

- |                        |                 |                  |                      |
|------------------------|-----------------|------------------|----------------------|
| 1. Caliper             | 2. Bracket      | 3. Covering Cap  | 4. Floating Pin      |
| 5. Bush                | 6. Adjuster Cap | 7. Fixed Pin     | 8. Floating Pin Boot |
| 9. Pad Support         | 10. Pad         | 11. Pad Retainer | 12. Pin              |
| 13. Pad Support Spring | 14. Tappet Boot | 15. Tappet       |                      |

### 2.2 Tools for Assembly/ Maintenance / Operation

No.	Recommended tools	Bolt or nut	Tightening moment Nm	Purpose
1.	Ratchet spanner	Outer hexagonal head sw=8	$\leq 3$	Clearance adjustment
2.	Pliers	Split pin		Friction plate replacement
3.	Box spanner Sleeve	Outer hexagonal bolt M8 Outer hexagonal bolt M16*1.5 Outer hexagonal bolt M20 *1.5	17±2 240±10 400±15	Sensor seat replacement Brake replacement
4.	Inner hexagonal spanner	Inner hexagonal bolt M16*1.5 Inner hexagonal bolt M12*1.25	340±20 110±10	Guide collar dust cover or sleeve replacement

5	Sharp nose snap spring clamp	Inner hexagonal bolt M10*1 Snap spring	68±5	Pad support spring replacement
6.	Box spanner or Sleeve	Hexagonal nut M16*1.5	210±10	Chamber replacement

## 2.3 Maintenance safety presentation

Sound **performance of brake** is crucial to the safety of driving and parking. During the **process** of vehicle operation, the **braking** state should be observed regularly. The key points are:

1、**The abrasion status of The Pads and Disc**

When the thickness of pads or disc is less than the given limit, **the pads or disc SHOULD BE replaced immediately.**

2、The clearance between the pads and disc

When the clearance is more than the given limit, **(the vehicle should be) stopped from operating to maintaining** in time .

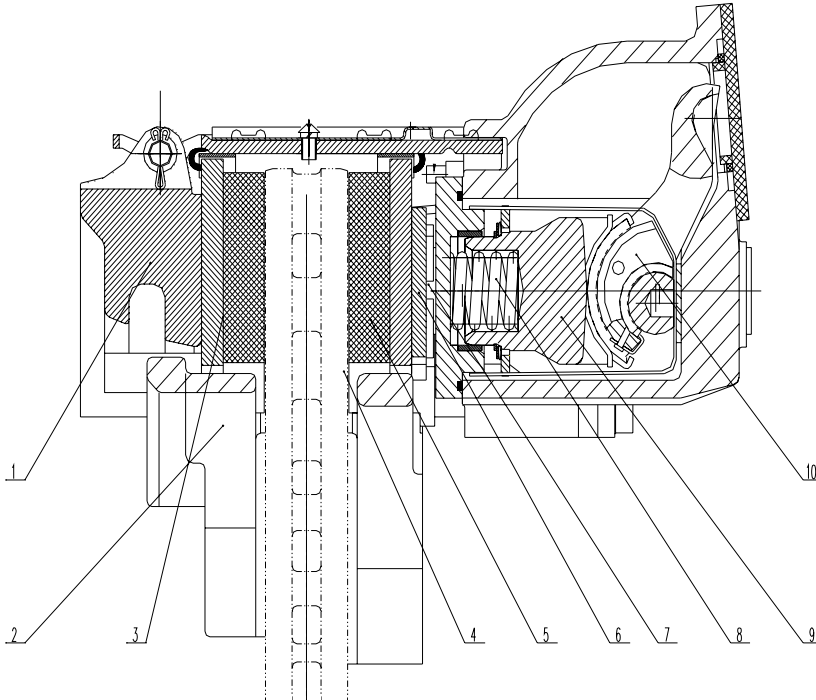
During maintenance, the vehicle should be parked on the flat ground and the wheels should be blocked by **fixity (e.g. wood plate or stone)** to prevent rolling. The suitable lifting or parking platform is suggested.

Caution:

- 1、Do **NOT** brake while replacing pads.
- 2、Make sure that the vehicle is parked stably **WITHOUT** any moving. **The moving vehicle will caused serious damage.**
- 3、**NEVER** use compressed air or other high pressure **equipments(liquid)** to clean brake assembly . (Otherwise avoiding personal injury.
- 4、Maintenance/disassembling /assembling **SHOULD** be **operating** under the coordination of related engineer, avoiding personal injury.
- 5、Use the pads and fittings supplied or **authorized** by YOUFIN ONLY.
- 6、After the new pads had been **replaced**, **the** emergency braking or long-distance braking should be avoided in the initial 50km of driving, so as to avoid potential danger caused by fail braking or over heat.
- 7、Use the recommended tools for maintenance as far as possible. Tighten the bolts and nuts according to the requirement.

### 3. Brake function introduction

#### 3.1 Axial brake function diagram



1. Caliper; 2. Bracket; 3. Outer pad; 4. Brake disc; 5. Inner pad; 6. Pad support; 7. Tappet; 8. Return spring; 9. Bridge; 10. Lever;

#### 3.2 Function description

##### **Braking Process:**

During braking, the knockout-pin in the air chamber pushes the lever to tilt.

The tilted lever brings the braking displacement and increases the braking force. The increased braking force makes the inner pad be pressed onto disc transfer with braking displacement to the bridge. After that, the bridge transfers the braking force to the tappets, which pushes the inner pad. After the clearance between the pad and disc is eliminated, the outer pad shall contact with the disc, therefore, the inner and outer pads shall lock the disc to implement braking.

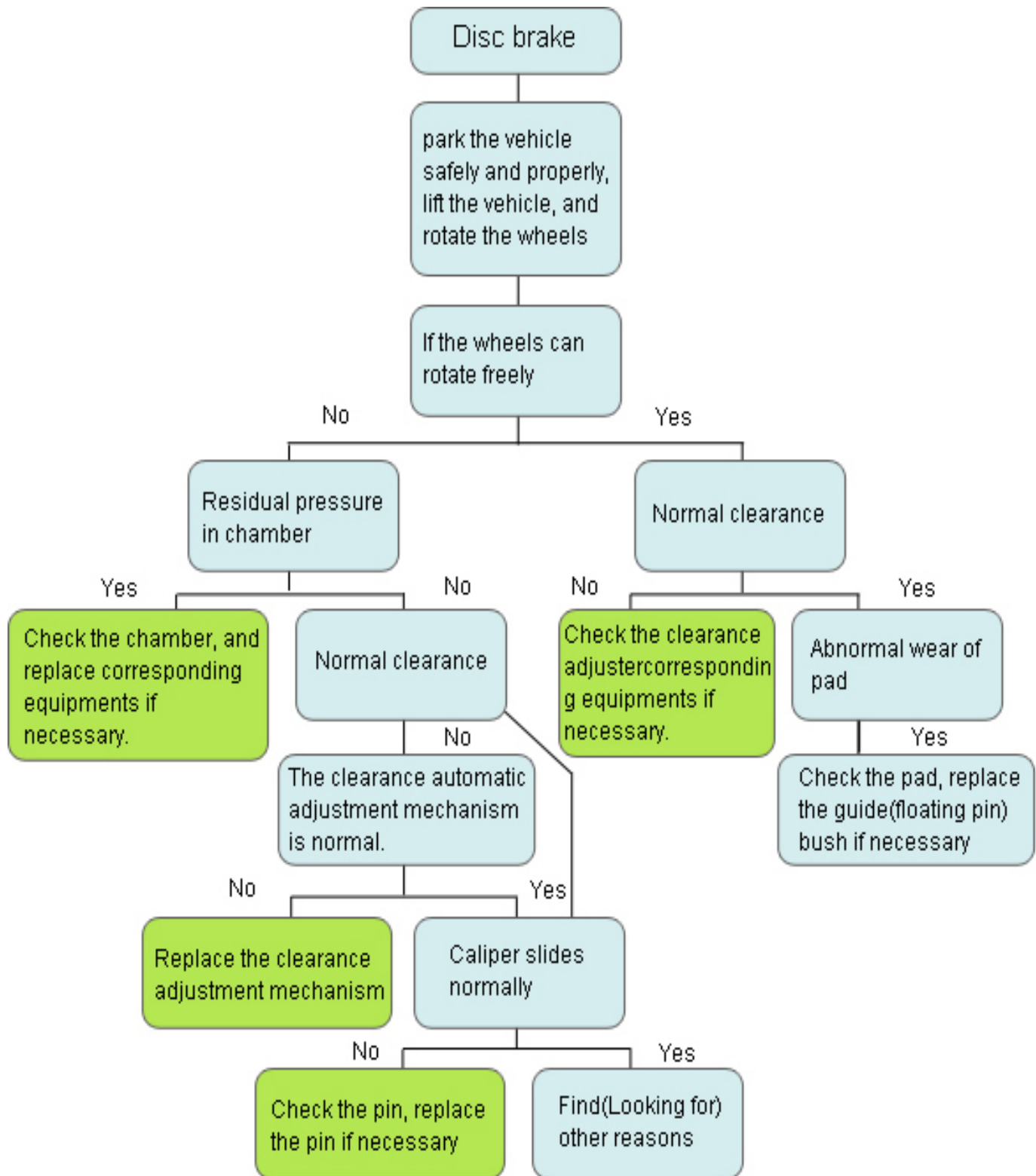
**Releasing Process:** Once the braking pedal is loosened, the air pressure in the chamber will be released, and the bridge will bring the tappets back to the initial position by the action of the return spring. In this way, a certain clearance can be guaranteed between the disc and pads.

##### **Braking clearance self-adjusting process:**

In order to ensure a **certain** clearance value between pad and disc, we designed an automatic adjuster **which operates in every work cycle** for the wear clearance of pad for the brake. Its touch sensitive device is mounted on the lever. If the clearance value is bigger than the set value, the adjuster **will** compensate the **added** clearance value through rotating tappets thread pair. The normal clearance value between the pad and disc is 0.7-1.2mm. Too narrow clearance **may** lead to superheat in the braking area. And **if there is too large clearance**, it **will** result in lack of braking **torque power** or braking failure.

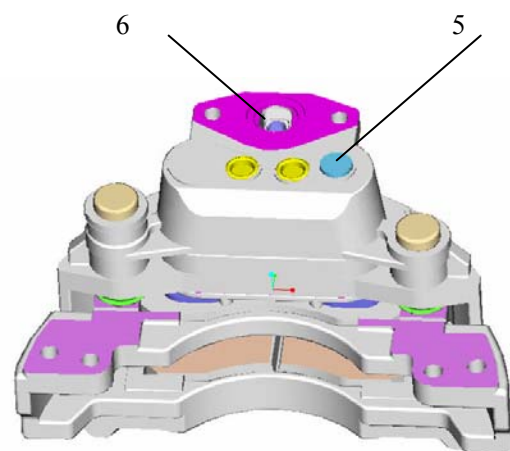
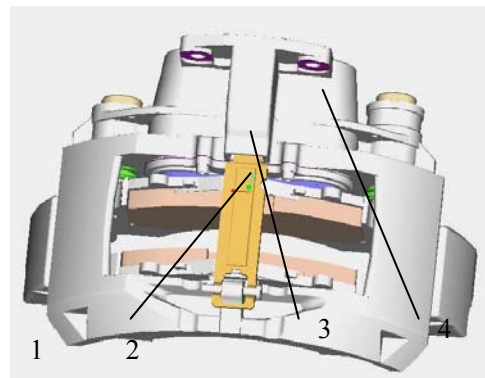
#### 4. Brakeing failure analysis

##### 4.1 Failure finding process



### Adjuster test

**Clearance check:** park the vehicle safely and properly, remove the wheel, push the caliper **out along the wheel** till it can not move, **use** the clearance gauge to check the clearance between the **outer** pad and disc. The normal clearance is 0.7mm-1.2mm. If the practical clearance is not in the normal **range**, the clearance adjustment mechanism needs **to be maintained and adjusted**.



### Clearance adjuster test: Working(Operating) process

1. Take pin 2 **away**, remove the pad retainer 3 and wear indicator fixed frame, move the caliper and take off the inner pad 4;

2. Take off the adjuster cap 5 on the head of the brake(**caliper**);

3. Use the ratchet spanner to turn the hexagonal M8 clockwise which can adjust the clearance. The plate 1 should extend out while pushing;

Turn the hexagonal M8 anti-clockwise. If the plate 1 could be receded while pushing, that means the transmission chain of the adjuster is normal. If the push plate can not be extended or receded, that means the adjuster is failure, then replace the adjuster or the brake;

4. Based on the step 3, push the lever 6, observe the movement of the hexagonal M8:

- a. the hexagonal M8 does not move at all;



- b. rotation amount of the hexagonal M8 can not increase with the raise of the rotation angle of lever 6, which means failure of certain parts of the adjuster, and some parts of the adjuster or the adjuster should be replaced;

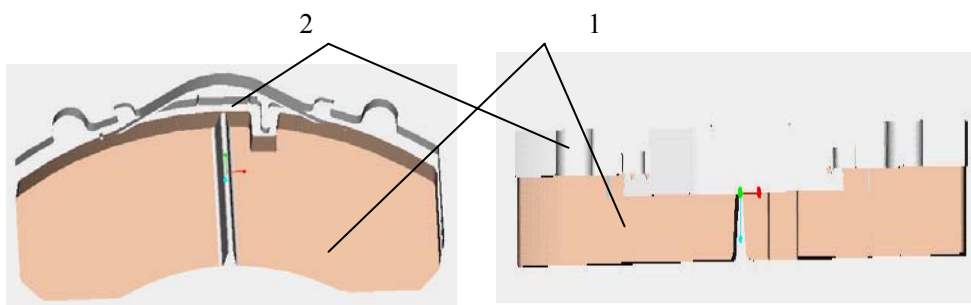
After testing and maintenance, the brake should be reassembled to ensure its initial state.

Caution:

1. The purpose of taking off inner pad 4 is to leave room for inspecting the adjuster
2. Only use the ratchet spanner to adjust the hexagonal M8, don't adjust the hexagonal forcefully.

### 4.3 Brake wear test

Pad



The figure 1 in blue is friction material; the figure 2 in white is steel back.

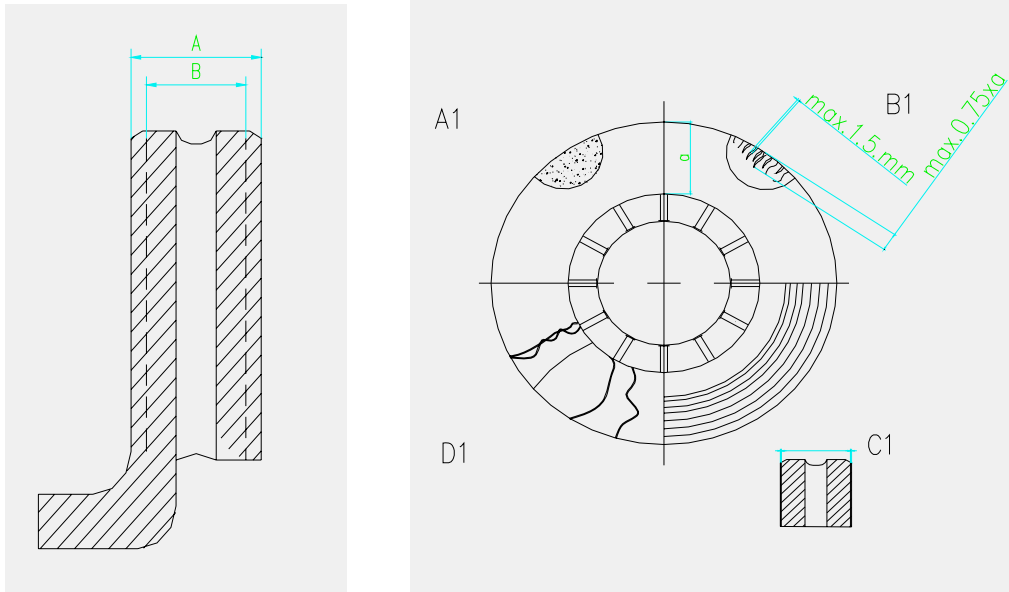
Permitted wear limit=steel back thickness + residual friction material thickness (minimum 2mm)

The thickness of the new pad: 30mm

Permitted wear limit : 12mm

#### **Relative requirements for pad using:**

1. If there is burn/ polish/crack / oil stain on either side of the friction material of the pad, it should be changed immediately;
2. The pad and the pad retainer should be replaced at the same time;
3. The pads on the same axle should be replaced at the same time.



According to the requirement of part 4.2, measure the thickness of the disc after removing the inner and outer pads.

The initial thickness A of the disc : 45mm

The limit thickness B : 37mm

Jumping Scope : 0.15mm

Maximum thickness gap : 1mm

**Disc crack inspection:**

- A1=crack permitted
- B1=maximum radiate crack 0.5mm wide permitted
- C1=unevenness less than 1.5 mm permitted
- D1=radial through crack surface non-permitted
- a=working friction surface

Caution: 1.excessive wear of the friction and disc will lead to failure of braking;  
 2. The discs on the same axle should be changed simultaneously. After replacing the new disc, it is recommended to assemble the new pad.

**4.4 Failure diagnosis**

Symptom	Causes	Measures
Noise and vibration of braking	The disc brake and its parts are not fixed on the axle according to the requirement ;	follow the vehicle operation manual
	There is crack / slot on the disc;	Replace or repair the disc
	The jumping amount of the disc does not meet the requirement;	Replace or repair the disc

	The pad retainer is deformed permanently;	Replace the pad retainer
	The pad can not move freely on the bracket;	Take off the pad and the pad support, clean the pad, pad support and bracket
	Not adopt the pad designated by Wuhan Youfin ;	Adopt the pad with Youfin mark;
Braking deflection	Either side of the pad is polished	Replace the pad
	The clearance between the pad and disc is abnormal	Adjust the initial clearance and do the functional testing.
	The pad can not move freely on the bracket	Take off the pad and the pad support; clean the pad, pad support and bracket
	The air pressure of the chambers on both side of the axle is not consistent	Follow the vehicle operation manual
	The air release plug on the brake chamber is not removed	Remove the air release plug of the braking chamber
	Not adopt the pads designated by Youfin	Adopt the pad with Youfin mark
Braking drag or braking can not be released	There is compressed air in the brake chamber when the braking is released	Refer the operation manual provided by the vehicle manufacturer
	The spring braking of all braking chambers has not been released when the braking for parking is released	Release the spring braking
	The clearance between the pad and the disc is abnormal.	Adjust the initial clearance
	The pad can not move freely on the bracket	Take off the pad and push plate, clean the pad, push plate and bracket
	The sliding function of the braking clamp is abnormal	Replace the guide sleeve or lining
	The clearance of the hub bearing is abnormal	Reference the operation manual provided by the vehicle manufacturer
	The air release plug of the brake chamber has not been removed	Remove the air release plug of the braking chamber
	Not adopt the pads designated by Youfin	Adopt the pad with Youfin mark
No braking or poor braking	The pad is polished	Replace the pad
	The clearance between pad and disc is too wide	Adjust clearance
	The disc is not in good condition	Replace or repair the disc

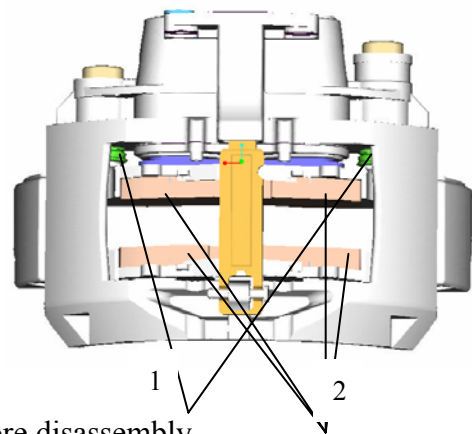
effect	The air pressure of the brake chamber is abnormal	Take remedy measures according to the requirement of the operation manual provided by the vehicle manufacturer
	The air release plug of the brake chamber is not removed	Remove the air release plug of the braking chamber
	Not adopt the pads designated by Youfin	Adopt the pad with Youfin mark
Brake smoking	The semi-axle oil seal is worn out	Replace the semi-axle oil seal
	The clearance between the pad and disc is too narrow	Adjust the initial clearance
	The oil in the axle shell is too much	Adjust the oil level in the axle shell
	Not adopt the pads designated by Youfin	Adopt the pad with Youfin mark

## 5、Wearing parts replacement

### 5.1 pad replacement

#### Working process:

1. Based on the part 4.2, take off the pad retainer, wear indicator, pay attention to take off the wear indicator sensor on the pad;
2. Use the ratchet spanner to adjust the clearance hexagon, make the pad support return to its initial position, move the caliper and take off the worn pad;
3. Use the wire-brush to clean the stain on the positioning face 2 of the opening pads of the bracket, and pay attention not to damage the floating pin boot1;
4. Inspect the disc according to the part 4.3, replace the disc when necessary;
5. Assemble the new pad on the opening bracket, and the friction material side should face the disc;
6. Rotate and adjust the hexagon till the inner and outer pads are against the disc closely, then adjust the hexagon by  $50 \pm 10$  degree reverse ;
7. Assemble the sensor, press plate, wear indicator fixed frame, pin and split pin according to the state before disassembly.



Caution: 1. Grease isn't permitted to appear on the surface of pad;

2. While assemble the wear indicator sensor, the touching point should be in the direction facing the disc. Pay attention to protect the conductor and prevent friction;
3. While rotate and adjust the hexagon, notice the rotation moment, do not overexert.

## 5.2 Disc replacement

### Working process:

1. Based on part 5.1, take off the pad and then take off the air chamber, disassemble brake assembly from the axle;
2. Take off the hub and disc according to operation manual provided by the axle factory;
3. Assemble the hub and disc according to the manual after replacing the disc;
4. Adjust ABS sensor according to the manual provided by axle factory;
5. Assemble the brake, pad and air chamber according to the requirement.

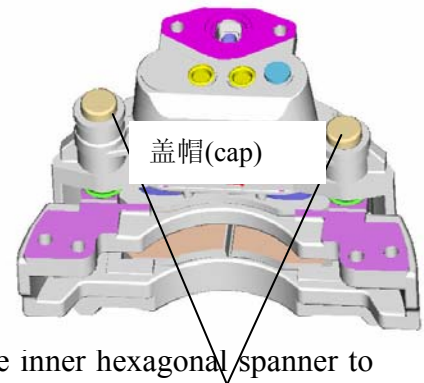
Caution: Before assembling the disc, the oil stain and other corrosion inhibitors on surface should be removed.

## 5.3 Clearance adjuster replacement

Based on the test result of part 4.2, if the clearance adjuster is not correct, adjust it according to the requirement.

### Working process:

1. Based on part 5.1, remove the pad retainer and pads;
2. Use special tools to remove the floating pin cap, use the inner hexagonal spanner to take off the floating pin bolt, and remove the caliper from the bracket, clean the contact surface of the bracket;
3. Use snap spring clamp to remove the pad support snap spring, take off the pad support, use the inner hexagonal spanner to remove the upper cover bolt;
4. Take off the bridge assembly in the caliper cavity.



### Assemblment:

1. Clean the stain inside the caliper cavity;
2. **Smear** the lubricating oil to the caliper cavity bush ,then put into the return spring, and put it in the bridge assembly;
3. Install the needle roller assembly2, lever 3 on the bridge1;
4. **Smear** the sealant to the cap seal groove and then use the torque wrench to tighten the bolt based on the principle of diagonal;

Caution: 1. Do not damage the tappet boot;  
2. Ensure tightening moment of the bolt;

## 5.4 Floating pin boot and bush replacement

If the floating pin boot is broken , it will affect the slide of the caliper body and lead to big dragging moment and broken bush, and abnormal worn pads, it should be replaced in time.

### Working process:

1. Based on part 5.1, remove the caliper body;
2. Remove the fixed pin and floating pin, take off the floating pin boot from the circular groove of the caliper;

3. Use special spindle to press the bush out from the caliper lug hole, clean floating pin hole;

**Installation:** 1. Use special pressing tool to press the bush, press one bush into the fixed pin and two bushes into floating pin. **Smear** the lubricating oil into the bore surface;

2. Install the new floating pin boot into the lug hole. Ensure that the boot is mounted in the circular groove of the inner hole without fold;

3. Install the fixed pin, floating pin in the pin hole respectively and set the top of the boot in the circular groove of the floating pin;

4. Connect the caliper body with the bracket through pin link by floating pin bolt, move the caliper back and forth on the pin link to check whether the sliding is normal or not;

5. Install the new cap on the caliper lug hole and use suitable tool to press it in;

6. Install the pad, press plate and wear indicator press plate according to the requirement;

Caution: 1. Do not damage the floating pin boot while installation.

2. Do not damage the machining surface while disassembling and assembling;

## 5.5 Air chamber replacement

### Working process :

1. Release the compressed air of air chamber, remove the air supply pipe of the brake chamber;
2. Use tool to remove the connecting bolt between the air chamber and caliper , and take off the air chamber.

### Installation:

1. Before installing the air chamber, clean the lever ball socket and the air chamber seal face connected to the caliper. **Smear** lubricating oil to the lever ball socket;
2. Connect the air chamber and caliper according to the torque value given in the air chamber manual.
3. Connect the air tube of the brake chamber, **avoid** the air tube from rubbing against other parts, do not interfere with braking clamp;
4. Conduct the functional testing of the brake. If there is air leakage, find the reason and conduct maintenance or replacement, then carry on testing.

Caution: Adopt the air chamber **designated (authorized)** by the automobile factory Only !

## 5.6 Brake assembly replacement

During the maintenance process after-service, if necessary, the brake may be supplied and replaced as assembly.

### Working process:

1. Based on part 5.1, take off the pad ;
2. Take off the brake chamber according to part 5.5;
3. Use box spanner to loosen the connecting bolt between the bracket and mounting

board, remove the brake assembly;

4. Check the disc and pad according to the requirement of part 4.3;

**Installation:**

1. Remove the pad from the brake assembly according to the requirement of part 5.1;
2. Install the brake across the disc on the axle, use spanner to tighten the bolt according to requirement;
3. Install the pad and pad retainer etc. according to requirement of part 5.1;
4. Install the air chamber according to the requirement of part 5.5;

- Caution:
1. Do not interchange the left and right brakes ;
  2. The arrow direction on the brake should be consistent with the rotation direction of the wheels;
  3. Notice the tightening moment and mounting sequence ,while installing the connecting bolt between the bracket and mounting board;
  4. After installing the air chamber ,make sure that the water drain outlet face to the ground is open, and let the other outlets closed.

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