



Literature

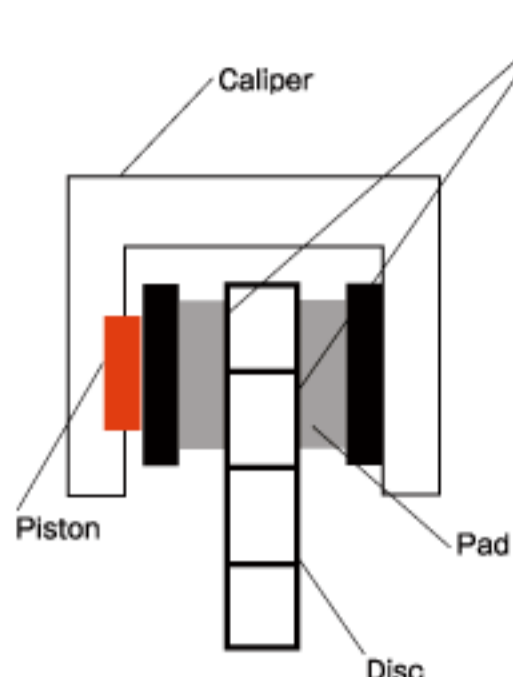
Brake Literature / BRAKE Squeal

Regarding Brake Squeal

After brake pad replacement, squeals occur frequently. While it is well known problem, the cause or measure is not known unexpectedly. Or, literatures regarding the squeal are seldom available to study and faced the dead end stage. Here in after, we would like to introduce troubleshooting guide for you to understand deeply about squeal mechanism, causes, measures when squeal generated.

Mechanism to generate Brake Squeal

By braking operation, contact vibration caused between pad and disc touch (vibration = natural frequency = sound) will be amplified by disc body to amplified as larger sound (disc itself functioned as speaker and enlarge the sound) Brake squeal can be explained in the illustration as follows.



When brake applied, pad pushed by piston, contact with disc. There is no problem when strong and uniformed pressure applied, however in reality it will not happen and vibration occur (judder). Such judder amplified by disc and in the worst case it transferred to caliper and suspension, further widely to vehicle body, also become variety of noise.

Such Judder will

1. Absorbed by pad material softness (attenuation characteristics)
 2. Absorbed by disc softness (attenuation characteristics)
 3. Absorbed by the shim between pad back plate and piston.
- Should absorption not effective -> **become larger and unpleasant noise (claim)**

Brake noise generated initially by pad and disc contact, therefore may suspect pad and disc only. It is too simple-minded. Although pad and disc cause the noise, it is highly important to find the real cause creating such situation. The followings are the illustration by examples and explanations.

Case study 1 on brake squeal

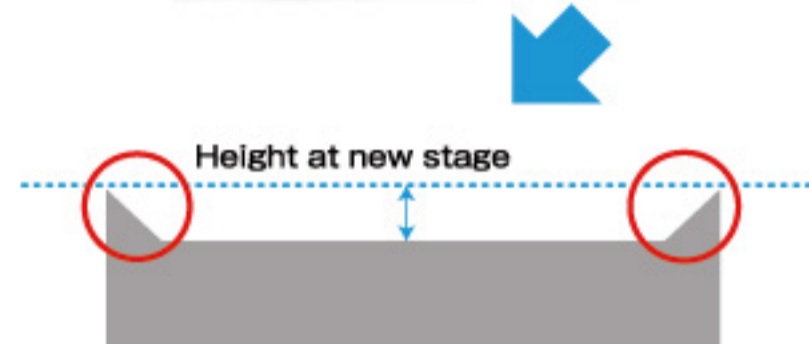
Case1

Continue to utilise used disc, replaced only new pad. Right after the replacement the squeal start. Since pad replaced, the cause must be on the pad. However there is no abnormality shown on the pad. Inspected for various possible causes, not fully understood. While careful inspection of disc, the disc edge (area circulated by red ink) sharply pointed is noticed.



Case2

Continued to utilise used disc, replaced only new pad. Right after the replacement the squeal start. Since pad replaced, the cause must be on the pad. However there is no abnormality shown on the pad. Inspected for various possible causes, not fully understood. While there is no abnormality shown on the pad, surface of the disc has friction material left over and deposit from previously used pad, and further, steps created.



Conclusion

Firstly, in the case 1, since the new pad applied naturally the friction surface being fully flat. Then combined with used disc having sharply pointed edge (area circulated in red ink) alone touch against and rubbed as scratched by nail, start squeal. Only the very small portion of disc touched and cautious for very poor effect.

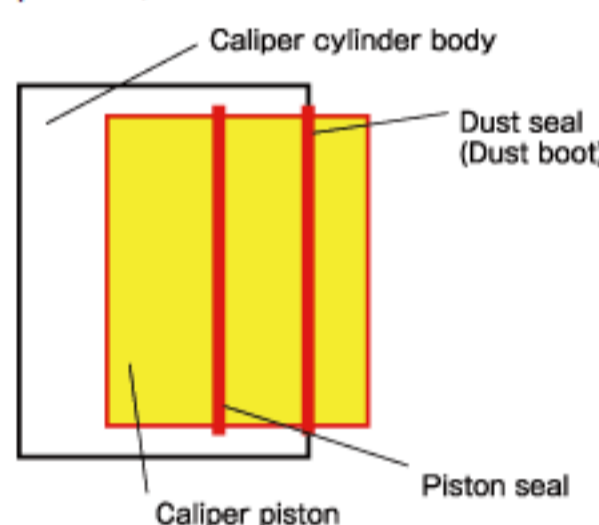
Next, in the case 2, while friction material adhered to disc surface, such area alone exclusively dragged and cause squeal. Or, there are steps, pad and disc will not adhere tightly and vibration appeared to create squeal.

Further, both in the case 1 and case 2, not only the pad replacement, grinding of disc or replacement to new disc virtually stop the squeal.

Hearing "since the parts replaced being pad alone, cause must be in pad?" Or, "No squeal appeared before, therefore, there is no other cause than pad" In these cases, possibility by pad is very low. Naturally, no squeal heard from long used pad and disc, However, it was based on fitting at uneven area like cogwheel, now pad without such uneven area combined ---. Simply imagined.

Case study 2 on brake squeal

To continue, we would like to explain on caliper piston which deeply related to brake squeal. Caliper piston is not only for brake squeal, but also related in brake problem, however over looked without questioning often. Firstly, please carefully look at the illustration of caliper piston.



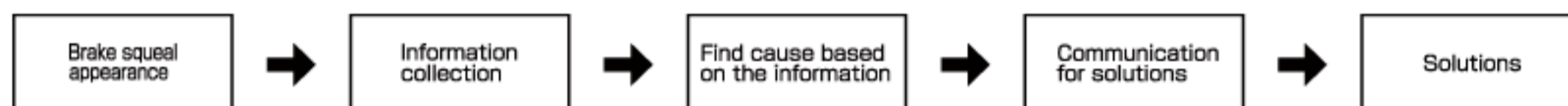
As shown in the illustration, caliper piston being held in cylinder body with piston seal. Then, by elasticity by the piston seal, pad to be pulled back when brake released, however, such elasticity lost releasing between pad and disc become poor, drag start. Moreover, not only such, vibration absorption become poor, pad vibration can easily transferred to caliper itself, encourage squeal. Now, it is understood that piston seal or dust boot being the important compartment, and when they deteriorated various harming occur but, most people have never experienced replacing them. Generally, it being said as replace once at each 100,000km run, depend upon living area or driving style. For those drive pretty hard need quicker replacement, it is best to replace once every 5 running events for circuit run drivers. Who never replaced seal (boot) once, people with longer running distance hearing problems such as squeal etc, we recommend replacement. Possibility of curing of symptoms is very high.



Surely you will be surprised to see such parts may cause the brake squeal. But, observation at these detracted parts make you understood. Questioning on replaced parts is not fault, and natural idea, it is very short minded to question replaced parts alone. At the same time with inspecting replaced parts, check for abnormality on parts not replaced, check for deteriorated parts may be the shortest way to solve brake squeal.

When brake squeal occurs ...

In many cases brake squeal may appeared by various causes combined, and various reasons can be thinkable therefore, please collect many information as possible as listed below.



- ◆Vehicle model ◆Pad / Disc part # ◆Installation period, run period after installation, overall run distance
- ◆Type of sound (squeal, croak, creak, gurgling, rattle etc)
- ◆Appearance situation (low speed or high speed, just before stop/ warm temp stage or low temp stage/ raining, winter early morning etc)
- ◆About disc (new or previously used old) ◆Disc condition (friction material adhesion or steps)
- ◆Pad condition (remaining, one-side wear, surface deterioration etc) ◆Condition of caliper piston (whether piston seal and/or dust seal replaced or not)
- ◆Measures (already conducted, period, method, effective or otherwise)

Brake squeal troubleshooting guide

Failure appearance period	Type of noise	Probable cause	Solutions
Immediately after replacement	Squeal	Pad and disc bedded-in, or insufficient anti-noise measures	Drive continuously. No effect then, pad chamfering process, attach squeal hold shim, apply grease (especially at caliper pad retainer area).
		installation failure.	Confirm correct installation. Especially for Japanese domestic vehicle, confirm if OEM metal shim installed, if not conduct installation
	Growl	Immediately used pad friction material adhered on disc surface, or stepped (case of used disc)	Shave disc or replace disc
Period elapsed from pad replacement	Squeal	Measures for squeal effect lowered or deteriorated	Re-application of pad grease, replacement of squeal hold shim, re-chamfer of pad and replacement of relative parts again
		Pad deterioration or friction material adhered on disc surface	If surface lightly deteriorated scrub with sand paper Passed usable limit or one side worn, replace with new part Disc shaving or disc replacement
	Grating	Disc surface with friction material adhere or friction material surface change	Shaving or sand paper scrub on pad or disc
Regardless of pad replacement period	Squeal	Caliper piston deterioration	Replacement of dust seal and piston seal (especially running distance as 70,000km, 5 years after new car registration need caution)
	Grating	Disc surface with friction material adhere, or friction material surface change	Scrubbing by sand paper or shaving on pad or disc
	Rattle, snap	Along with widen gap between pad and torque member, pad move at braking and hit torque holding area (reverse run from complete stop)	Replace squeal prevent metal or spring holding pad to leading side

※This troubleshooting guide being edited on the assumption only for street and highway, or mountain road at normal speed. Circuit run, or similar to such running conditions (repeated braking at high speed as in high way) in such case, initially as failure appearance period may not meet this guide which please note before hand.

BRAKE PAD

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- ▶ Correction in the application table
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BRAKE DISC

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