Disc Brakes

Four advantages of Disc Brakes to Drum Brakes

1) Resistance to heat fade
2) Resistance to water fade
3) Less of a tendency to pull
4) Automatically adjust to lining wear
Self Adjusting Disc Brakes

No return spring
(Caliper seal performs minor retracting action)

As pad wears thin, caliper piston moves out of the caliper body

Brake fluid level in Master Cylinder reservoir will lower as pads wear
Disc Brakes
What are the parts called?
caliper
splash shield
brake pads
rotors
Squeaking - #1 complaint for disc brakes

Figure 9-5. Anti-rattle spring clips reduce brake pad vibration.
Anti-Rattle Clips

Wear out due to heat or corrosion
Replace with brake pads if defective
Often called “Small Parts kit”
May cause rattle when brakes are not applied
Brakes more likely to squeal if missing or worn
Figure 9-6. Anti-vibration shims are used behind the pads on some brake calipers.
Anti Vibration Pads

Should be replaced with pads

Will cause brake squeaking if not perfectly installed, or worn out

May be replaced by after-market kit or liquid noise suppressor (brake glue)
Small part shown in red often need replacing. Guide pins & bushings also wear and can be replaced.
Press Fit for Outboard Pad

Bendix style brake pads have ears that can be bent to keep pads from vibrating and squeaking.
Squeaking - #1 complaint for disc brakes

Rotor condition is critical for quiet brakes

Smooth surface (slow cross-feed and light cut) with non-directional finish is critical

Washing freshly machined rotors with soap & water is important!

New rotors MUST be washed with brake clean to remove anti-corrosion coating
Rotor Service

DO NOT turn a rotor unless out of spec.

Taper variation within .003”
(measure at several points)

Lateral runout within ..003”
be sure to compensate for wheel bearing end play

Lack of parallelism less than .0005”
(Causes pedal pulsation – ask customer)
Figure 11-16. Taper variation is a type of wear suffered by brake rotors.
Rotor Runout

Runout can be caused by uneven or excessive lug nut torque
Overheating brakes can cause Runout
Excessive Runout can cause knock-back (low brake pedal) and pulsating brakes
(loose wheel bearings can also do this)
.003” is considered O.K. on most vehicles
Runout may be reduced by cleaning the hub. Runout may be reduced by “indexing” rotor to hub, or using shim kits. Runout is reduced using On-Car brake lathe. New “floating” rotors should be checked for runout as hub fit is critical.
A clean hub is critical to rotor runout
On-Car brake lathe
Excellent for reducing rotor runout
Parallelism

Lack of Parallel is most critical to brake pedal pulsation

As little as .0005” can be felt through the brake pedal

Difficult to measure, quiz customer about brake pedal pulsation to decide if rotors need turning

Runout on a new rotor will lead to lack of parallism and pedal pulsation
Machine a Rotor

Turning will correct distortions and scoring

Ensure at least .015” thicker than discard spec

AFTER machining

Resurfacing will put a very smooth finish to allow
for proper coefficient of friction
Turning Rotors

• Smooth surface finish and rotor run-out are critical

• Clean & Smooth friction area is important for quiet operation

• Rotor runout will lead to pulsating brake pedal
Care & Feeding of a Brake Lathe

Use a sharp, rounded lathe bit for best finish
Use proper cone adapters for fixed or floating setup
Be sure to use silencing straps or vibration damper
Be sure to do two scratch cuts to ensure minimal final runout
Clean arbor and cone adapters
this will help insure centered mounting.
Figure 8-18. A typical mounting for a fixed drum or rotor.
Figure 8-19. A typical mounting for a floating drum or rotor.
After Turning Rotors

• Wash with soap & water

• Double Check runout after mounting on hub
Disc Brake Wear Sensors

“Squealers” rub on rotor to alert driver of worn pads

Some system use an electric sensor to turn on a dash warning lamp

Figure 7.6 When the lining is worn too much, the metal warning sensor contacts the brake rotor.
Replace or Rebuild Caliper when:

- Dust seal is damaged in any way
- Brake fluid is contaminated (especially with oil)
- Any evidence of uneven pad wear with inner or outer pad worn more than mate
Causes of uneven pad wear

Inboard Pad or Outboard Pad worn sticking caliper piston or guide pins or slider
One Pair worn more than other sticking caliper or defective brake hose
Tapered Pad
  Worn sliders or guide pins
  (some Datsuns use tapered pads in the design)
Loaded Calipers

Come with new brake pads installed

Cheaper than technician overhauling caliper
Remove Caliper from Rotor

Open the bleeder screw to keep contaminated fluid from being forced back into sensitive valves and antilock brake components

Gently force piston back into the caliper housing
Open Bleeder 1st

CALIPER BODY

C-CLAMP
Remove a Caliper

Do not leave any brake line open
(use brake pedal depressor)
Clean any spilled fluid with water

Hang caliper with a wire or hook to protect flexible brake hose
Rebuild a Caliper

Remove the Piston with:

Compressed Air
Hydraulic pressure from brakes
Overhaul a disc brake caliper

Clean Clean Clean!!

Piston condition is critical

Seal groove condition is important

Insure dust boot is fully seated
Disk brake caliper

- Bleeder Screw
- Seal
- Piston
- Caliper Body
- Dust Boot
Caliper Seals

Seal flex acts to retract piston
Excessive clearance in piston to bore leads to premature seal failure
Important to measure when overhauling .002”-.005” for steel piston & .005”-.010” for phenolic
Do not hone the caliper housing… (will lead to extra clearance and short seal life)
Caliper Pistons

Most important sealing area is the seal groove and...

The sides of the caliper piston

Any defects in the sides of the piston require new-replacement pistons
Disk brake caliper

- Bleeder Screw
- Seal
- Piston
- Caliper Body
- Dust Boot
Fixed Caliper Disc Brakes

What are the advantages of Fixed Brake Calipers?
1) Can apply more braking force as there is more hydraulic surface area
2) Can dissipate more heat
3) Rigid construction gives more even pad wear
Used on high performance and heavy vehicles
Fixed Caliper Disc Brakes

What are the disadvantages of Fixed Calipers?
1) Heavy (unsprung weight)
2) Expensive
3) More chances to leak
4) Alignment to rotor is critical and may require special machining of rotor and special mounting procedures
Rear Disc Parking Brake

- May be mini drum brake in the rotor “Hat”
- Most have parking brake integral with caliper
As disc pad wears, park brake will self adjust

Special tool used to retract piston for new brake pads
This tool screws the piston back into the bore
Disc brake Service

Lubricate everything with high temp disc brake grease

(antiseeze is OK)

Insure that brake pedal is pumped before backing out of stall
Break in the new Brakes

Use several moderate stops to heat pads

Allow cooling between stops

Improper lining material may cause a hard brake pedal

(some cars should not use semi-metallic linings)