Applied Rotor Technology
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Gas-Port Slot Direction and Alignment

ART machines gas-port slots onto the friction surfaces of the rotors. They offer the following advantages:

- Maximizes ventilation by increasing the rotor's ability to dissipate heat, resulting in cooler operating temperatures.
- Provides multiple pathways whereby the firebrand of boundary layer gases that are built up as a result of braking, have the ability to escape, thus allowing a better "bite" on the disc's friction surface.
- Lightens the rotor, thereby decreasing its rotational inertia, which aids in stopping.
- The rotor slot direction is **not** critical with respect to installation on the driver side or the passenger side and will not affect their performance. Note illustration drawing at the end of this file for reference.
- Please note that if the slot fills up with pad material, the system is then operating at too high a temperature.

WARNING:

CLEANING / PRE-INSTALLATION PREPARATION PROCEDURES:

Clean the brake discs before installation to remove rust inhibiters used to protect the friction surfaces.

NOTE: For rotors that are packaged with an anti-corrosive phosphate coating (dull, charcoal gray color friction surface), excess phosphate must be removed using a Scotch-Brite pad, steel wool, or equivalent. Excess phosphate coating is sufficiently removed when the grinder marks in the friction surface of the rotor become clearly visible (about 30 seconds per side).

Torque requirements

Ensure that the lug nuts of the vehicle are torqued in a pattern, down to the value referenced in the latest vehicle technical specifications.

For example, Ford Trucks & SUV's (Excursion, F-250, F-350 models 2000 or newer) this value is **165 ft-lbs**. Check with the manufacturer of your vehicle for the correct lug torque values.

Please consult the appropriate technical manual or an ASE-certified shop if you are not certain.

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Brake Calipers

Closely inspect your calipers to ensure that they are floating properly on their mounts.

Lubricate the pins that support the caliper on the spindles with a grease that is compatible with water and heat.

If you operate your vehicle in snow conditions, these components should be checked more often than you would driving in the city, as they tend to use salt on the highways to inhibit the formation of ice, and as you can imagine, this salt can cause sticking within these pins.

These checkpoints should decrease the likelihood of non-symmetrical pad application at the calipers and prevent pulling conditions from occurring.

Pad and Rotor Bedding-in Procedure for Street Performance Pads

After installing rotors and pads on a vehicle, a bedding or bed-in procedure must be performed on the brake system.

There are two objectives for bedding-in performance brakes. First, heating up the brake rotors and pads in a recommended manner, so as to promote the transfer of an even or uniform layer of pad material onto the new rotor discs; and the maturing the pad material, so that the resins used to bind and form them during manufacturing are ‘cooked-off’ the pads.

It should be noted here that there is one pitfall in this process, which must be avoided. The rotor and, therefore, the vehicle should not be brought to a complete stop, with the brakes still applied, as this risks the non-uniform transfer of pad material onto the friction surfaces. This uneven transfer is sometimes known as “pad-imprinting”.

The first objective is achieved by performing a series of five to six stops.

Plan where and when you do this procedure with care and concern for others’ safety and yourself. After the last stop, the system should be allowed to cool to normal driving temperatures.

If you come to a complete stop before the break-in process is completed there is the chance of pad imprinting. Be careful.

Perform five partial braking actions, from 60mph down to 10mph. Each event should achieve a moderate-to-high deceleration.

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In terms of stopping force or severity to use depends on the vehicle. If the vehicle is equipped with an ABS system and the stopping forces exceed approximately 0.9G's, the ABS system will typically intervene.

What you want to accomplish is stopping at a rate below the ABS system trigging or around 0.7G's and these events should be made one after the other, without allowing the brakes to cool other than under normal acceleration in between each stop.

Depending on the composition of the pad material, the brake friction will seem to gain slightly in performance, and will then lose or fade somewhat by around the fifth stop.

You may begin to smell the pads at around the 4th to 5th stop. This odor is green fade, and is characteristic of immature or 'green' pads, in which the resins still need to be "cooked-off" the pad material. This odor should diminish before the last stop.

After the first bed-in procedure, allow the brakes to cool by driving the vehicle at the highest safe speed for the conditions, without bringing the vehicle to a complete stop.

After cooling, a second set of five partial braking events should be performed, followed by another cooling exercise.

The bed-in process is not complete until both sets of stops have been performed.

Close inspection of properly bedded pads will show an area about 1/8" deep of a powdery gray area becoming visible on the edges of the pad's friction face. This is where the paint and resins are cooking-off.

Depending on the pad compound, easy use of the brakes for an extended period of time may also lead to the removal of the bedded transfer layers on the discs by the ordinary abrasive action of the pads. Exercising the brake systems with a partial re-bedding will prevent uneven pick-up when a vehicle has seen easy braking use for a while.

"Mushy-Pedal" Phenomenon

It is absolutely critical that one inspects and changes accordingly the vehicle's brake fluid and bleeds the brakes.

The function of brake fluid is to provide an incompressible medium to transmit the driver's foot pressure on the brake pedal through the master cylinder(s) to the calipers in order to clamp the friction material against the rotor discs. The foot pressure is multiplied by the mechanical pedal ratio and the hydraulic ratio of the master cylinders, booster (if used) and caliper piston(s).

This is a simple concept. When fresh, all brake fluids are virtually incompressible and the system works as well as its mechanical and hydraulic design allows. There are, however significant problems. Overheated brake fluid can (and will) boil in the caliper. Boiling produces gas bubbles

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within any fluid. Gases are compressible so boiling brake fluid leads to a “soft” brake pedal with long travel. In extreme cases overheated brake fluid necessitates “pumping the brake pedal” to minimize these bubbles, in order to get a pedal at all.

A low-cost solution to the boiling fluid problem for normal folks is to simply change to a brake fluid with a higher boiling point.

Some of the reputable racing fluids that we would recommend include:

· AP 550
· AP 600
· ATE Super Blue Racing
· ATE TYP 200
· Motul 550
· Motul 600
· Performance Friction Z rated

Finally, Castrol SRF is a super duty synthetic and is probably the best racing brake fluid on the market today.

Brake fluids are classified by both “dry boiling point” and “wet boiling point”. They are also classified by US Department of Transportation (DOT) rating, DOT 3, DOT 4, and DOT 5.

WARNING:

As far as the DOT ratings are concerned, please make every attempt to stick with the type of brake fluid that your vehicle was specifically designed for. For example, if your car was delivered with DOT 3 fluid, the internal components of the system (seals, brake hoses, and fittings for example) were specifically designed and tested for compatibility with DOT 3. Because DOT 4 fluids contain a different chemical composition, the system may not necessarily react in a positive fashion to the borate esters floating around in the mix.

In certain cases, just the difference in viscosity of the two different fluids may cause the seals to wear at different rates. What starts, as an annoying squeak might eventually become a torn seal or worse. The examples could go on and on, but the message here is this: it’s fine to upgrade from DOT 3 fluid A to DOT 3 fluid B, but you should think twice before even considering switching from DOT 3 fluid A to DOT 4 fluid of any sort.

BRAKE SQUEAL

Squeaking brakes? What else is more annoying? These noises are the result of the brake pads vibrating. There are several reasons why brakes can vibrate. Problems include worn pads; wrong pads have been installed, glazing to the pad or rotor friction faces. In some cases, warped rotor, misaligned or loose calipers, even loose wheel bearing, or sticky pistons can lead to braking noises.

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The first step in silencing noisy brakes is to do a complete inspection of the braking system to identify the source of the problem. Check for excessively thin brake pads scored or warped rotors, brake fluid leaks and oil or grease on pads.

Make sure pads and shoes have not worn down to the metal backing plate. Look for rust or corrosion that can prevent proper functioning such as a piston sticking in its cylinder(s). Check pads and shoes for equal side-to-side wear to determine if a piston might be sticking leading to unequal wear. If such an inspection and subsequent repairs are beyond your capabilities, take the vehicle to a qualified brake specialist or your dealer.

Often the braking system checks out okay, but squealing persists. While probably not affecting braking safety and effectiveness, the noise can be irritating. If the squeal comes just as you about to come to a complete stop, often the reason is a brake pad that is vibrating against the rotor's friction faces or caliper.

One solution here is to install vibration dampeners. These are made of a self-stick fiber material, which adheres to the back of the brake pad backing plate to dampen brake pad vibration.

Another solution is to coat the back of the brake pads with an anti-squeal compound, a thick heat-resistant polymer adhesive applied to the back of the pad to provide a cushion between the pad and piston as well as help the pad retract with the piston.

This material comes as an aerosol spray or as a liquid. Coat only the area that contacts the piston, making sure that it does not get onto the front, contact area of the pad or rotor. Here is a link to this type of product. http://www.international-auto.com/index.cfm/fa/p/pid/2764/sc/8140

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Mounting, Direction of Rotation

ART-120.65086-401

TOLERANCE ON DIMENSIONS UNLESS OTHERWISE SPECIFIED
FRACT. ± 1/16, .X±.030, .XX±.015, .XXX±.007, ANGULAR ±0° 15'

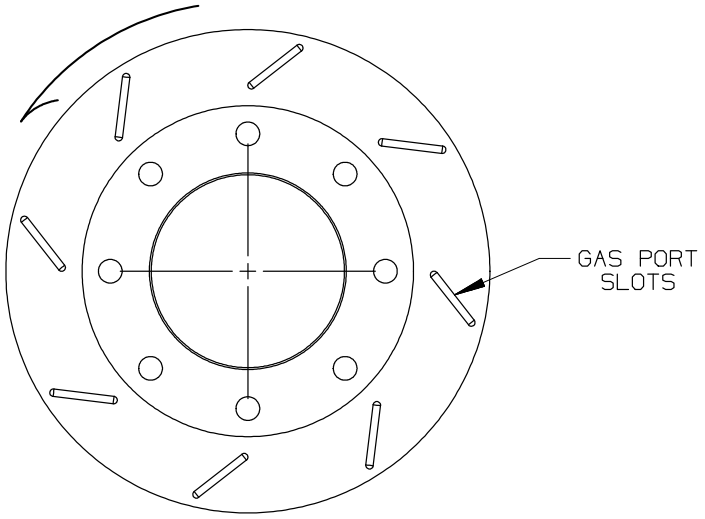
PROTECTIVE FINISH PER TDS1
IDENTIFY PER TDS1.

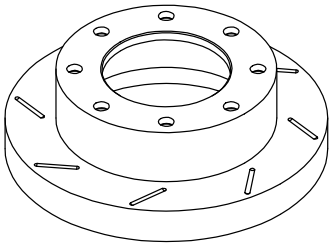
✓ DENOTES SURFACE ROUGHNESS PER ANSI B46.1

BREAK UNNECESSARY SHARP EDGES

T CHG	SERIAL	CHANGE RECORD DESCRIPTION	APPROVAL NAME & DATE
T2	T65086	ADDED NEW SLOTS (8) TOTAL	08/04/07

DIRECTION OF ROTATION





3D VIEW
SCALE: NONE

DET	QTY	SIZE & DESCRIPTION OF MATERIAL

UNLESS SPECIFIED OTHERWISE, REQUIREMENTS ARE IDENTICAL FOR OPPOSITE TOOL

MODEL	SCALE	MICRO FILM	T-1	SHEET
ART-650	1/2		ED- -	1 OF 1

TITLE: FORD 4WD SRW F-250, F350 & EXCURSIONS MODELS. SD MAR 15, 99, TO 2005

LEFT HAND SHOWN-RIGHT HAND OPPOSITE

ART-120.65086-401

APPLIED ROTOR TECHNOLOGY LOS ALAMITOS, CAL
TOOL DESIGN APPLIED ROTOR TECHNOLOGY INC.

GROUP LEADER	DATE				
S. MORGAN	08/04/07	P. NILAKANTAN	08/04/07		
DESIGNER	DATE	CHECKER	DATE	MATERIAL	DATE