WAGNER

BRAKE PRODUCTS

BRAKE NOISE -Solutions

All sound is the result of a vibration. The pitch is determined by the frequency of the vibration. This means a "slow" vibration sounds like a *groan,* while a "fast" vibration will sound like a *squeal.* A vibration in one part can induce a secondary vibration into another part, particularly as parts are lighter each year and resonate easier. In most O.E. brake designs, dampening is performed by clips to assure rigidity or by insulator shims behind the pads. The two ways to solve noise are:

DAMPEN VIBRATION

-O.E. KITS	**-Some specific models require a tuned dampener assembly from the manufacturer to eliminate the secondary resonant frequency vibration.**
-EMP COMPOUND	**-Put on a heavy bead of cushioning material or spray behind the pads and let dry , to form an *absorbing cushion* at the pad-to-caliper contact points.**
-SHIM INSULATORS	**-Forms a *permanent cushion* to dampen vibration; inner layer of spring steel resists wear, while the outer rubberized cushioning nytrile layers will last the life of the pads.**
-HI-TEMP GREASE	**-Use *high temperature silicon grease* on caliper slides, and on floating pins to prevent caliper binding and chatter.**

PREVENT VIBRATION

-PAD TABS	**-Bend any tabs or ears on the pads, to make sure that the pads; *are tight* in the calipers. ,**
-ROTOR FINISH	**-Sand rotor *smooth and flat* using 120 to 150 grit sandpaper, to get the full pad surface contact, while preventing grab and chatter .**
-CLEANING	**-Wash with *soap and water* to demagnetize the rotor, which will remove *all the fine grit* that gets under the new pad & causes chatter.**
-HARDWARE	**-Replace all anti-rattle clips, springs and pins, which can loose their spring tempering due to the higher brake heat. Make sure pins are not binding which would create vibration.**

BRAKE SYSTEM NOISE

The primary cause of brake system noise is vibration and all brake systems vibrate to one degree or another creating an initial noise. For the most part this initial noise is beyond detection to the human ear. In part this is due to the dampening effect which the larger mass brake components generate in the system. The key factor in dampening initial noise is the stability or rigidity of the brake system components. In most O.E. disc brake designs, dampening is assisted by (1) insulators called shims or noise suppression gaskets which reduce vibration between the disc plate and the caliper contact surfaces and/or (2) clips mounted on an inboard or outboard disc plate to assure rigidity of those components.

The type of noise we will address in this discussion occurs when the initial noise in the brake system is amplified (instead of dampened) to a level which becomes disagreeable to the vehicle operator. This amplification is called a secondary vibration. The secondary vibration occurs when the initial vibration frequency reaches an audible level.

Friction materials are not normally the cause of a secondary vibration. It generally results from distorted or loose components and/or the wearing or weakening of an original part. As components weaken or become fatigued from the heat and stress generated in the brake system, they no longer fit as tightly as necessary to maintain proper rigidity. Any vibration resulting from the backing plate to caliper contact points will result in a very audible, irritating noise such as squeal.

Many installers believe that changing to disc pads with a "softer" (more forgiving) friction material will cure noise problems. In reality, changing to the "softer" material changes the balance of the brake system, and this results in a change in noise frequency to an inaudible noise level. The Important tradeoff to consider; wear rate of softer pads is much higher, thus life expectancy is greatly reduced.

Compare today's popular front wheel drive vehicle with the rear wheel drives of the past and you will find many differences in their systems. Keep in mind that the principles of the brake system are the same, but are achieved in different ways. Front wheel drive domestic and Import vehicles present unique problems of their own because of their different characteristics.

- **Their brake system components are smaller in design and mass and do not effectively dampen the initial noise level. Rear wheel drive cars absorbed the initial noise through the massive components such as the rotor, spindle, suspension, and large full frames.**

- **Domestic front wheel drive brake balance has changed. With 80%-85% or more of the braking performed by the front disc brakes while 15%-20% is done by the rear brakes. Typical rear wheel drive vehicles performed 55%-60% of braking up front and 40%-45% in the rear brakes. Front wheel drive disc operating temperatures are much higher, resulting in increased glazing and wear.**

- **Front disc brake rotors are smaller, both dimensionally and in mass. Many are non-vented (solid) and they do not dissipate heat well which makes them more prone to vibration, warpage, and noise.**

In the front wheel drive brake systems, noise dampening is greatly reduced and component deterioration or weakening is increased. These conditions can contribute to brake noise.

Any brake system is capable of generating noise after repeated braking in heavy traffic or hilly driving conditions. During these very demanding operating conditions temperatures can reach 1000 degrees or more. At these temperatures brake squeal is a common occurrence due to a metallurgical structure change that occurs in the rotor or drum surface. While braking under these conditions heat build up causes glazing of the friction surfaces (a thin surface hardening or flaking is formed on the surface of pads/shoes) and all these conditions can produce noise.