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The National Underwriter Company

Brake Fluid Contamination

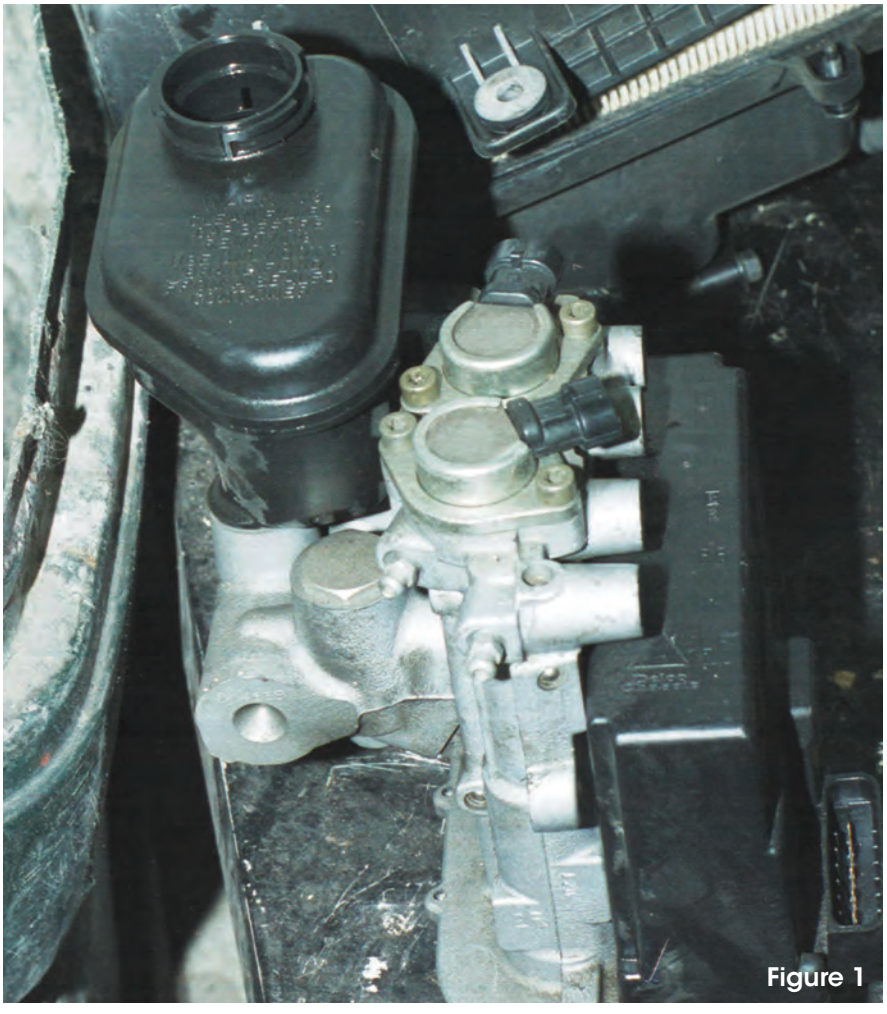

Figure 1

Figure 2

Brake fluid is the lifeblood of automotive brake systems. It must transmit high pressures through brake lines to actuate brakes on all four wheels without leakage through the seals.

Automotive brake fluid contamination can cause brake malfunction such as brake lockup, increased stopping distance or no braking at all. Brake fluid is alcohol-based and designed to resist heat and absorb whatever moisture enters the brake system.

The rubber seals in the brake system are designed to handle brake fluid but not other types. Consequently, any contamination can be catastrophic to the master cylinder and antilock module, damaging seals and causing brakee failure, resulting in an ac-cident. The brake fluid reservoir is shown at the upper left of the photo with the cap removed. This is where brake fluid is added to maintain the proper level and also the avenue for contaminants to enter the system.

Adding brake fluid when the reservoir is low does not suggest leakage. As brakes wear, the wheel cylinder and calipers move toward the brake material causing an increase in volume of the brake fluid system, which is fed by the reservoir, reducing the brake fluid level.

Figure 2 is a view of the cap that covers the fill opening for the brake fluid reservoir. The warning says: "Use only DOT 3 brake fluid." Figure 3 shows the underside of two brake fluid reservoir caps. The one on the left shows a normal seal. The one on the right shows swelling of the rubber seal.

Figure 4 shows the swelling of the rubber seals on a brake caliper. This damage is consistent with a petroleum-based liquid that was added to the brake fluid reservoir. The brake fluid, when placed in a glass jar, was found to be clear, but after a period of time, there was a separation of two liquids. This suggests the contaminants are immiscible and is a common situation where power steering fluid, which is nearly the same color as the brake fluid, may have been added to the master cylinder reservoir.

The evidence of a petroleum-based contaminant starts with the swelling of the cap seals, but during brake usage, the contaminant is quickly distributed throughout the brake system. The deterioration usually occurs rapidly in the form of swelling of seals. This can block vital fluid passages in the master cylinder, which can cause brake lock up. The seals then tend to deteriorate, resulting in loss of brake pressure and no braking.

Attempting to find out who added the contaminant to the brake system can be

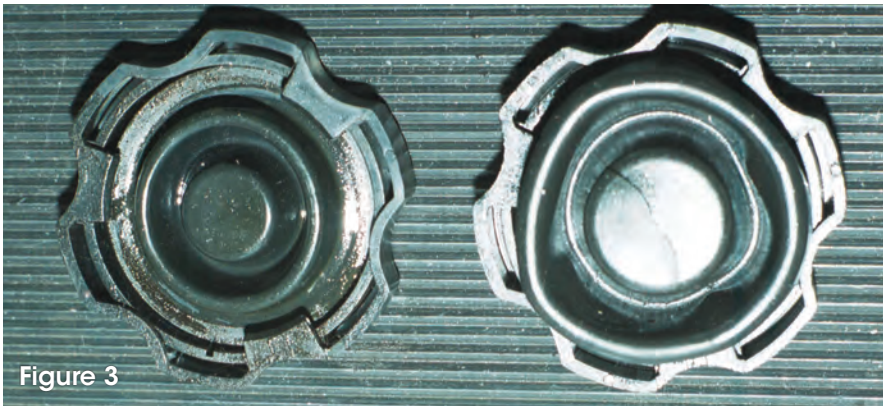
Figure 3

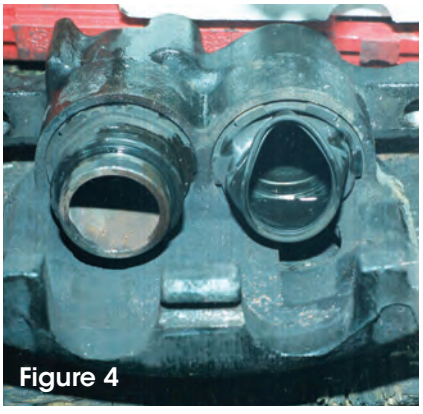
Figure 4

difficult. Sometimes the owner added power steering fluid to the brake fluid reservoir, not knowing the consequences of such decision. Other times, a repair shop inadvertently added the wrong fluid to the brake reservoir. Chemical testing of the fluid in the brake system may be helpful in determining the nature and/or identity of the contaminant or rule out other suspected materials.

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