SOUTHWEST SCORCHER

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Ramblings by the president

Time sure flies by some times, and the honey-do list keeps growing. What can you say? But just continue to bite away at them when you can.

Enough of that and on to car talk, we have decided as a club to do a shown in April 2008. This is continuing our annual Cactus Classic series of shows we have put on for the last six plus years. Anyway I am asking for everyone's help in looking for a place to hold this show. In the past we have held it at UTI (Universal Technical Institute) in Avondale, Phoenix and in the town on Anthem to name a few. So if you have any ideas where we can hold the April show in 2008 please investigate them and present you findings and suggestion in one of the upcoming meetings. On a semi-related note if you have any ideas or suggestions for the national show in 2011 please bring them to our attention. Our next meeting is August 25th at ***JB's*** (see Calendar of Events for details)….Jim

All about Mufflers

If you've ever heard a car engine running without a muffler, you know what a huge difference a muffler can make to the noise level. Inside a muffler, you'll find a deceptively simple set of tubes with some holes in them. These tubes and chambers are actually as finely tuned as a musical instrument. They are designed to reflect the sound waves produced by the engine in such a way that they partially cancel themselves out. Mufflers use some pretty neat technology to cancel out the noise. In this article, we'll take a look inside a real car muffler and learn about the principles that make it work.

But first, we need to know a little about sound. **Where Does the Sound Come From?**

Sound is a **pressure wave** formed from pulses of alternating high and low air pressure. These pulses makes their way through the air at -- you guessed it -- the speed of sound.

In an engine, pulses are created when an exhaust valve opens and a burst of high-pressure gas suddenly enters the exhaust system. The molecules in this gas collide with the lower-pressure molecules in the pipe, causing them to stack up on each other. They in turn stack up on the molecules a little further down the pipe, leaving an area of low pressure behind. In this way, the sound wave makes its way down the pipe much faster than the actual gases do.

When these pressure pulses reach your ear, the eardrum vibrates back and forth. Your brain interprets this motion as sound. Two main characteristics of the wave determine how we perceive the sound:

- **Sound wave frequency** - A higher wave frequency simply means that the air pressure fluctuates faster. The faster an engine runs, the higher the pitch we hear. Slower fluctuations sound like a lower pitch.
- **Air pressure level** - The wave's amplitude determines how loud the sound is. Sound waves with greater amplitudes move our eardrums more, and we register this sensation as a higher volume.

It turns out that it is possible to add two or more sound waves together and get *less* sound. Let's see how.

How Can You Cancel Out Sound?

The key thing about sound waves is that the result at your ear is the sum of all the sound waves hitting your ear at that time. If you are listening to a band, even though you may hear several distinct sources of sound, the pressure waves hitting your ear drum all add together, so your ear drum only feels one pressure at any given moment.

Now comes the cool part: It is possible to produce a sound wave that is exactly the opposite of another wave. This is the basis for those noise-canceling headphones you may have seen. Take a look at the figure below. The wave on top and the second wave are both pure tones. If the two waves are in phase, they add up to a wave with the same frequency but twice the amplitude. This is called **constructive interference**. But, if they are exactly out of phase, they add up to zero. This is called **destructive interference**. At the time when the first wave is at its maximum pressure, the second wave is at its minimum. If both of these waves hit your ear drum at the same time, you would not hear anything because the two waves always add up to zero.

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Jim Jensen – President/Membership Chairman 602-549-9092
John Elle – Vice President 623-487-8285
Terry Fletcher – Treasurer 623-486-3620
Dwight Scholtens –Secretary 602-569-5390
Gary Zinman - Newsletter Editor 623-566-7956