DO LOUD PIPES REALLY SAVE LIVES?

by Ken Condon

Bob recently bought a brand-new cruiser after several years away from motorcycling. Unfortunately, Bob has had several close calls in the short time he's owned his bike. His friends suggest that he install some loud pipes to help him stand out in traffic and make his presence known to those inattentive drivers who don't seem to notice him. Bob's friends also inform him that loud pipes will convey a more aggressive attitude, discouraging people from "messing" with him.

These arguments make sense to Bob, so he decides to install some loud aftermarket exhaust pipes. But Bob's first ride with the new pipes installed stirs some mixed feelings within him. On the one hand, he feels more conspicuous in traffic, but he's also embarrassed at times by the loud noise.

Loud exhausts have been a part of motorcycling for many years. Motorcyclists have modified or replaced stock exhaust systems since the early days to improve performance, enhance the "tough-guy" image, or simply to boost the motorcycle's visceral sensations. Some riders also believe that loud pipes are a safety feature that warns drivers of a motorcyclist's presence and helps to avoid a collision. This view is summed up by the often-heard statement; "loud pipes save lives."

But not all agree with this philosophy. The quiet bike proponents argue that exhaust noise is an unreliable collision deterrent. Some even perceive the "loud pipes save lives" issue as merely a defensive ploy to justify an anti-social behavior, rather than a legitimate safety issue. In this installment, we'll attempt to shed some light on the claim that loud pipes enhance safety, and add some insight on how noise risks the future of motorcycling.

Decibels

Scientists use the decibel (dB) scale to measure sound intensity (loudness). The decibel scale is often "filtered" to correlate with human hearing. The "a" contour filter is most commonly used and is described as dBA. The human threshold of hearing (the faintest sound heard by humans) is given the value of 0. Because the human ear can detect a very wide range of sound intensity, the decibel scale is based on the power or multiples of 10. A 10dB sound is 10 times louder than the threshold of hearing, and a 20dB sound is 100 times louder. An example of a 10dB sound is the rustling of leaves. A mosquito's buzz at close range is about 40dB. Normal conversation is roughly 60 dB, or 100 times louder than the sound of the mosquito. A Kawasaki Vulcan 1500 produces about 80dB in stock trim in standardized tests. The same motorcycle rolling by with an aftermarket pipe produces between 90dB and 95dB, making the aftermarket pipe, at minimum, more than 10 times louder than the stock unit.

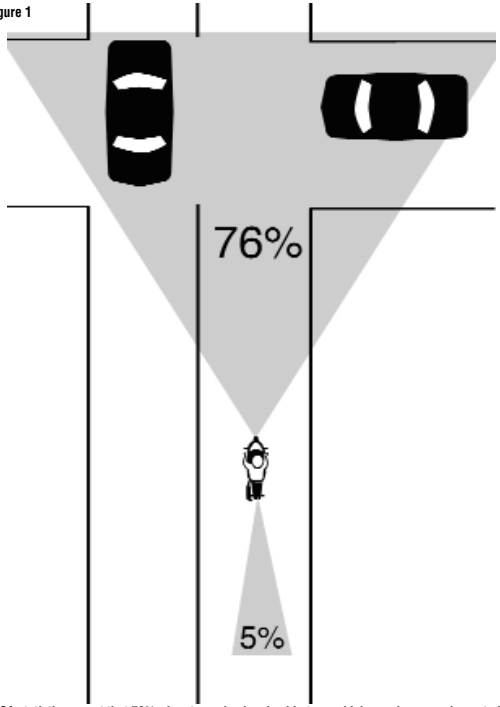
Conspicuity

In common situations, sound can be an effective device for warning others of our presence. For instance, we might command someone to "watch out" if they are about to step on our toes, or say, "excuse me, coming through," to someone in our way. But sound has its limitations as a way of getting attention. We all know that it can be hard to get the attention of a person who is deep in thought, distracted by conversation, or deafened by the noise of a loud party. Loud pipes can work the same way. Noise from a motorcycle's exhaust can make drivers aware of a motorcycle's presence, but are likely to be effective only in lower speed situations when road and wind noise are at a minimum. Automobile manufacturers are very aware of the intrusion of outside noise, and take steps to insulate the "cabin." Increased speeds, noise of a moderately loud radio, distraction of a voice chattering on a cell phone, or even the whir of an air conditioning fan can make it very difficult for a driver to hear outside noises.

Pitch and Direction

Even though you can make your presence known by making a loud noise, it's also important for the intended receiver to

Figure 1



NHTSA statistics report that 76% of motorcycles involved in two-vehicle crashes were impacted from the front, with only 5% coming from the rear. Rear facing exhaust outlets face the wrong way to be especially effective at alerting drivers ahead of you to your presence.

figure out where the sound is coming from. Locating a nearby motorcycle can be difficult, because low frequency sounds, such as the slow bangs emanating from a V-twin's exhaust, tend to spread in all directions. High frequency sounds are much more unidirectional—that is, they travel mostly in one direction. Another characteristic of sound is that it travels in waves away from its source. This is why sirens of emergency vehicles point forward, to alert those in front of the approaching vehicle. Put it together, and you can appreciate why sirens on emergency vehicles are loud, high-pitched, and pointed forward. The loudness helps you to be aware, the pitch helps you to pinpoint the location, and the direction of the siren points toward those who need to be aware of the emergency vehicle's approach.

So, what does that say about exhaust pipes that point behind the bike? Research indicates that most motorcycle collisions occur with the motorcycle running into another vehicle. Figure 1 shows the relative frequency of collisions by direction. In other words, an exhaust pipe pointed rearward is opposite the direction from where the vast majority of hazards occur.

But, wouldn't a driver ahead of you be able to hear a loud exhaust note even if the pipe were pointed the other way? Well, it's true that low frequency explosions of a slow turning engine scatter in all directions, but low frequency sounds are less capable of providing directional clues. It should suggest to you that loud pipes are not particularly effective at getting the attention of drivers ahead—the very drivers that will likely be the most hazardous to your health.

The location of a sound's source can be hard to determine for other reasons. Sound can bounce off reflective surfaces, such as buildings and pavement, and will be sharper and sustain its intensity longer in such an environment. Even though reflective surfaces will help maintain sound intensity, that same reflectivity can also help to disguise the location of the sound's source. In city traffic, a driver may be able to hear a bike with loud pipes, but have a particularly hard time recognizing where the noise is coming from. Rural areas aren't any better, because there are few hard surfaces to sustain the sound and plenty of vegetation that absorbs and dissipates low frequency sounds.

Now that we have a basic understanding of how sounds relate to other drivers, let's look at how sound can be used by the motorcyclist seeking to alert other road users of his presence.

Motorcycles are harder to see because of their relatively narrow shape, not because they are quiet.

Close Call

Bob's bike, fitted with the new exhaust, thunders loudly as he accelerates through the town retail district toward a diner where he is meeting his riding buddies. Traffic is heavy with Saturday morning shoppers. Bob feels annoyed by the hurried four-wheelers. He rides close behind a mini-van in an attempt to keep a tailgater off his butt. He also rides in the center of his lane away from the cars on either side.

Bob approaches a busy intersection with several cars in the oncoming lane waiting for the opportunity to turn left into a shopping center on his right. Because of Bob's lane position, the left turning drivers can't see him. As the mini-van ahead of Bob rolls into the intersection, the first car in line begins to accelerate across the lane, its driver completely unaware of Bob's presence. Bob suddenly sees the left-turning car, but at that point there isn't much he can do. Luckily for Bob, the driver finally sees him and slams on his brakes, missing the bike's rear fender by inches.

At the diner, Bob tells the story of how the car driver almost collided with him. Bob's friends shake their heads in disgust. They quickly credit Bob's loud pipes for preventing a collision by getting the driver's attention. But Bob's not so sure the loud pipes did anything to prevent the near miss. It seems to Bob that it was the driver's quick response after seeing him that prevented a collision.

Sound vs. Sight

There are many riders who swear that their loud pipes saved them from being creamed in an accident. Arguably, the louder exhaust may have provided *some* added conspicuity. But evidence suggests that it is better to make yourself more visible, by tactics such as wearing bright clothing, and using lane positions that keep you in sight. Riders who rely on noisy pipes rather than keen riding strategies are probably putting themselves at increased risk. Bob learned the important lesson that it is more important to focus on how to be *seen* rather than trying to be *heard*. It's important to always remember that motorcycles are harder to see because of their relatively narrow shape, not because they are quiet.

Loud pipes may alert a driver that a motorcycle is in the vicinity, but the driver may be left wondering where the bike is until he actually sees it. And only then can a driver know the actual location, direction and speed the bike is traveling and determine what might be an appropriate action to avoid a collision. It is generally accepted that sound is considerably less reliable or effective than sight in providing information critical for crash avoidance. The Motorcycle Safety Foundation even suggests that fully 90% of traffic-related information is gained through sight.

Music or Noise?

Quality and tolerance of sound is a relative thing, and individuals perceive sounds differently. Some people may perceive a certain sound as disturbing "noise," whereas others may consider the same sound to be pleasant. The factors that can affect this perception are pitch, duration and frequency of the sound, as well as the values of the listener. High-pitched sounds that last too long and have awkward timing between tones are often offensive. Also, some people value silence more than others and will be disturbed by relatively non-invasive noise. Sound is deemed "good" or "bad" according to the judgement of the receiver. Some people perceive Rap music as offensive, cringing at every obscene word and wishing to escape the monotone rhythm. However, the same individual may swoon blissfully to Classical music, even though both musical numbers are played at exactly the same decibel level.

The equivalent attitudes can be compared between a motorcycle exhaust and, say, a gas-engined leaf blower. Both may have approximately the same dB level, but the loud motorcycle can be perceived as more of a problem by someone more inclined toward gardening. If it isn't obvious, the majority of citizens don't ride motorcycles, and therefore most people consider motorcycle sounds as obnoxious noise, not acceptable music.

Increased highway speeds, quieter auto soundproofing and increased vehicle interior noises have rendered loud pipes practically useless as a crash deterrent.

Risking Rights

The loud pipes issue stirs passionate debate between fellow motorcyclists about the benefit of "saving lives," or the importance of personal freedom versus the potential for government to restrict motorcycling. Loud pipes disturbing the public makes motorcycling a hot topic among government officials and their constituents who are voicing their opposition and threatening action against this auditory invasion. Some municipalities and private associations have gone so far as to ban all motorcycles from certain areas because of the noise generated by a few riders. In Europe, many of the best mountain passes have been closed to motorcyclists because of noise. And laws have been passed in Europe requiring tamper-proof exhaust systems on all motorcycles.

Whether you are for or against loud pipes, it is important that we all recognize that riding a motorcycle is not a "right," and that motorcycle noise has a very negative affect on the future of our favorite pastime. The American Motorcyclist Association has been in a constant legal fight to reverse road closures in the USA, and has initiated a number of campaigns to educate motorcyclists to the damage caused by loud pipes. In the early years, AMA newsletter articles pressured riders not to "bypass" their motorcycle's mufflers. The effort continued into the 1940s, when the AMA introduced "Muffler Mike," and continues today with the "Loud Pipes Risk Rights" campaign launched a few years ago.

Last year, the AMA sent Chairman of the Board, Rick Gray, to several motorcycle events to help educate riders about the negative impact of loud pipes. They also hosted a national summit, which was attended by manufacturers, aftermarket companies, event organizers, law enforcement, government, research institutions and regulatory agencies to address the motorcycle noise issue. The AMA position is that continued excessive noise from both street and off-road motorcycles will lead to unfavorable legislation that will make it increasingly more difficult for motorcyclists. The AMA also knows that changing motorcyclists' attitudes will take a long time and will meet with stiff resistance. The AMA does not suggest that aftermarket exhausts should be outlawed. However, they do stress restraint. If you insist on installing an aftermarket exhaust, we encourage you to consider installing a quieter "street" exhaust instead of straight pipes or a "race" exhaust. The difference in reducing risks will be insignificant, while the positive effect on public opinion and tolerance of motorcycles will be dramatic.