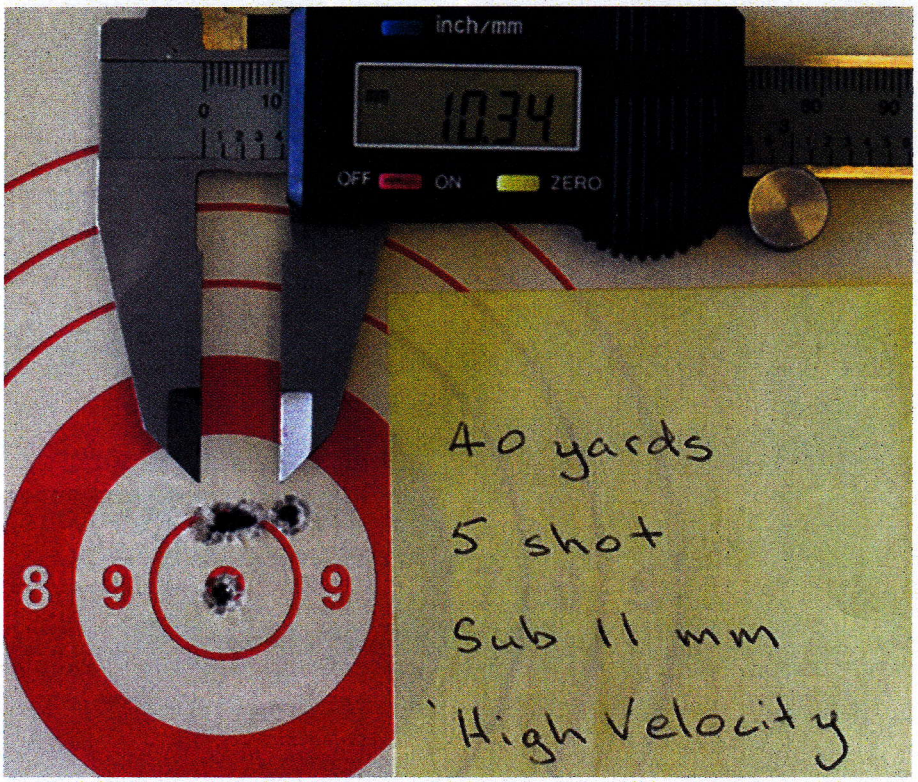
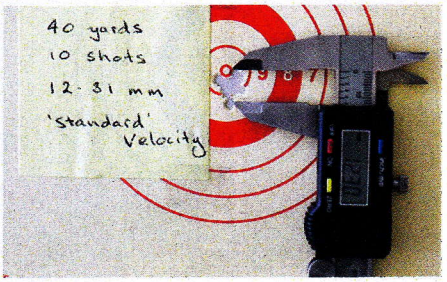
.22 rimfire foibles

by Steve Hurt





The Oxford Dictionary describes a 'foible' as a special defect or peculiarity of…character, *especially* one that causes a misguided sense of… (for the purposes of this article) accuracy.

Sitting at the rimfire bench at the local range recently, another shooter sitting beside me was announcing in rather colorfully expressive and less-than-flattering terms the qualities of the current tool sitting on the bench. Paraphrased for the sake of decorum, the declaration went something along the lines of 'It doesn't matter what you think you know about centrefires, when it comes to rimfires, all bets are off. They are each and every one a law unto themselves'.

Now, knowing this man well as a good friend and that he is highly respected in competitive rimfire circles, it was hard not to smile at the proceedings. The standards required were indeed very high to be sure, but this particular scenario would have been difficult to accept by any measure and the irritation was obvious. The fact that my hunting rifle was producing much tighter groups on the day certainly wasn't helping matters any either. 'Go away' will suffice for the response uttered when the targets were compared at the end of the session.

The problem? The groups he was routinely achieving at 40 yards were 7 to 10mm. The groups achieved at 50 yards were in the 20 to 25mm range. Something clearly wasn't going well.

Now, anyone with any experience in rimfires will know that there are indeed a number of issues that have to be addressed that simply don't appear to be quite so important with centrefires. The first is resonance. Rimfires in particular seem to be susceptible to resonance interference, and both barrel and action must appear as 'dead' if it has any chance of shooting well. By 'dead', it is meant that a barrel tapped with something hard should not ring at all, and the bolt should not rise and fall when the trigger is activated on an empty chamber.

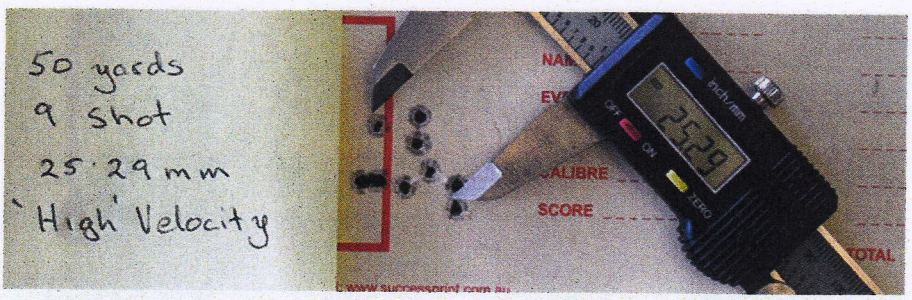
To this end, barrels tend to be relatively heavy and the stocks remain essentially made from timber or laminate in most quality rimfire rifles. Competitive shooters fiddle about with barrel tuners and 'bloop tubes', triggers, telescopic sights with adjustable objectives and so on. However, this area is generally outside the scope of most hunters' needs or requirements.

The next major issue is that rimfires do indeed appear to be a rule unto themselves in terms of ammunition preference, and sometimes, there is simply no explaining why. But then, it has to be said, sometimes there is - it may not have anything to do with the rifle at all, and perhaps only of partial relevance to ammunition quality.

A number of questions were asked of my friend regarding brand and type of ammunition being used, what standards were expected and the objectives. Clearly, between 40 and 50 yards something was happening that expanded the group way more than a 10-yard extension should apply, and in this context, it was a source of considerable frustration. For other brands of ammunition, the same thing applied, but sometimes at different ranges. All were batched, measured and recorded. The declaration was made that this situation was very common, but no-one could explain why with any level of satisfaction.

Coming from a background in long-range shooting (900m and beyond), I could hear the echoes of bygone instructors laughing and wondered if the subject had been explored before, for my friend and his rivals were all very experienced and extremely accomplished competitive shooters.

Going to the computer, the metrics for energy, velocity and bullet drop (kindly provided by the manufacturer in their sales brochure and verified in testing) were keyed in to a sophisticated ballistics program. It was here that the explanation to this particular challenge became self-evident. As suspected, the irregularities were all



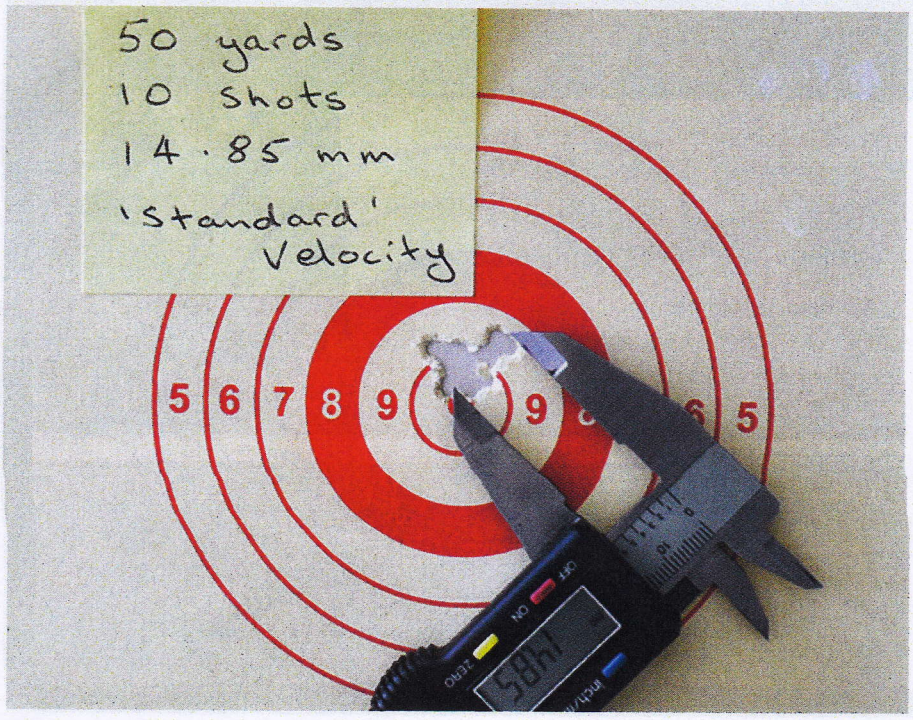
appearing at the hurdles of that three-way mess we call the 'transonic zone'. Those bullets that did not show any irregularities didn't appear to be encountering any of the transonic hurdles over the set ranges to which they were being applied.

So what on earth is the transonic zone and what are these hurdles? Most hunters using centrefire rifles have never experienced this influence and for good reason. The issue only arises at ranges beyond the normal and sensible ranges over which animals are most likely to be hunted, usually way beyond 500m.

The transonic zone can best be described as an object in flight passing through the sound barrier progressively. The speed of sound is nominated as roughly 1116fps at sea level at an air pressure of 29.92" of mercury at 59F, give or take a little. When an object, such as a bullet passes through the air at full supersonic speed, let's say 2000fps for example, there is a compressive pressure wave at the meplat (point of the bullet), where the elasticity of the air can't outrun the bullet and retreat to the vacuum created without violent and noisy air particle collision. Further, secondary pressure waves occur at the base of the ogive, the base of the shank and the base of the boat-tail if the bullet has one.

At 1500fps, all these pressure waves are still simultaneously supersonic and fairly similar in shape. When the bullet approaches the first transonic barrier (about 20 per cent above the speed of sound or 1339fps), these pressure waves will start to lose synch with each other and begin to show signs of pulling away and separating from the bullet. This begins a process of major destabilisation.

Which pressure wave does what and when will depend largely on the shape of the bullet. By the time the bullet falls through the sonic barrier, each pressure wave is indeed in business for itself and very different in shape, intensity or influence compared to the previously balanced supersonic proportions. By the time the bullet passes the 893fps mark, all the pressure waves have subsided to negligible effect. >



Now, each time one of these tipping points is experienced, the bullet will by virtue of its gyroscopic stability attempt to recover its path. The problem is that when it does so, the direction may have changed ever so slightly as to cause anomalies in required accuracy. This situation is not going to cause massive deviations, but a 20 to 25mm group at 50m is irritating to say the least, especially when you know that you and your rifle are capable of half that with better focused ammunition.

So what was happening to my friend? The ammunition he was using started at a launch velocity of 1235fps. According to the program, the bullets collided with the 1116fps sonic barrier at 43 yards, exactly where his problems were starting to show up. At the extended ranges of 80 and 100 yards, the groups did not expand significantly over the normal influence that extended ranges apply when compared to the 50-yard result, but a comparative train wreck by the 40-yard standard.

Ammunition that started at velocities of 1435fps had the most challenges dealing with ranges exceeding 100 yards, as they had to deal with both the transonic (1339fps at 25 yards) and sonic barrier (1116fps at 90 yards) over this distance, and the group results showed. It appears that one sonic hurdle will

still produce acceptable hunting accuracy, but two, or worse three, is a real problem for humanely accurate or competitive shot placement. The program aligning with the measured results conspired to support the findings. After all, it's no different to that which is experienced by, and well known to long-range centrefire shooters, albeit on a different scale.

Target ammunition that starts out in the 1050fps arena is already below the strategically important sound barrier. It doesn't reach the transonic exit hurdle of 893fps until 100m (110 yards) have been covered (and extends further as air pressure decreases). It is also the most accurate at extended ranges as it has only to jump one, not two or three, of the strategic sonic or transonic hurdles.

So what can we walk away with that's useful from all this? No-one is suggesting that hyper-velocity .22 rimfire ammunition is unfit. There are times when the authority of such cartridges is a distinct advantage on foxes and cats at moderate ranges out spotlighting. About 80m is the practical limit for chest-shot accuracy and authority with these cartridges.

Counter-intuitively, high-velocity ammunition in the 1235fps class is often sufficiently accurate to place a humane shot on a rabbit or hare out to 100m with very careful and deliberate shooting, but sufficient authority becomes questionable for cats and foxes at this range. For ranges beyond this, only target-quality ammunition, exceptionally accurate rifles and surgically precise shooting should be considered, and limited primarily to rabbits and targets. ●