AR-15 Ammunition Selection and Zeroing for Civilians

by Karim Manassa

Unlike military and law enforcement users who operate with a tested, standardized, and predictable rifle and ammunition platform, civilians come to the party with different barrel lengths, twist rates, and ammunition that require additional effort to correctly dial in. This brief is to help guide civilian AR-15 users toward better ammunition selection and zeroing methods.

STEP 1 | DETERMINE YOUR APPLICATION

One of the benefits of the AR-15 platform is versatility. By simply swapping out the upper (and in some cases the right NFA tax stamp), you can change the barrel length, twist rate, sighting system, and even the caliber thus turning one rifle into many rifles to suit different applications.

The two most common civilian-centric applications we see in South Florida are Home Defense and outside Urban/Suburban. With these two in mind, we need to consider both possible overpenetration constraints and target distances.

For Home Defense use, we are typically discussing short distances inside a single family home or apartment residential structure, with the remote possibility of taking the fight outside but still limited to one's property boundaries. A suppressor is recommended to reduce volume, muzzle flash, and concussive muzzle blast.

In addition, we want to take advantage of the 5.56/.223's inherent terminal ballistics and ammunition choices when it comes to avoiding overpenetration of interior walls. Indeed, even if a no shoot is not immediately behind an interior wall, we must still avoid overpenetration as there may be a window behind that interior wall along the bullet's path and thus an over penetrating round through that wall could end up hitting our neighbor.

One possible configuration for Home Defense would be a suppressed short barrel rifle (to keep the overall form factor as compact as possible) with ammunition designed to avoid overpenetration such as Hornady's TAP Urban.

For outside Urban/Suburban use, we first need to determine the maximum distance we could be shooting. Laser ranging your neighborhood and other places frequented is a great way to confirm what your requirements are. In my own experience, I found that 287 yards was the longest distance containing an unimpeded line of sight, with the vast majority of distances

being no more than 120 yards. These distances fit well with the same short barrel rifle we use for Home Defense; the only difference would be ammunition.

For precision, semi-rural, and rural applications involving smaller targets and/or longer distances, 14.5" to 20" barrel lengths with magnified optics and corresponding ammunition would be recommended.

In summary, the first step is to think hard and to research your requirements, or as the late Pat Rogers would say "mission drives the gear."

STEP 2 | AMMUNITION STRATEGIES

Different requirements require different ammunition loads, and your rifle's barrel twist rate and length may widen or limit your options. Selecting the right ammunition is critical to exploiting your rifle's capabilities.

We generally recommend a 1:7 or 1:8 twist rate, as these stabilize most popular bullets from 55 grain to 77 grain. 1:9 works well with common military 55 to 62 grain bullets but not so much with heavier bullets, while 1:12 from the Vietnam era was optimized for 55 grain bullets at the expense of everything else. Fortunately, most quality rifles today come in a 1:7 or 1:8 twist.

Regarding barrel length, 10:5" to 11.5" short barrels are a popular choice for Home Defense and Urban/Suburban use because they can be suppressed and still be easy to maneuver. Short barrel rifles do have trade offs besides ballistic range, however, compared to a 14.5" or 16" barrel. Some of these trade offs include: more muzzle blast, more muzzle flash, higher sound volume, and greater felt recoil. Much of these trade offs can be mitigated with special SBR ammunition and a suppressor, though no supersonic ammunition is ever hearing safe.

I will use my personal suppressed 10.5" 1:7 twist rate rifle with a red dot sight and weapon mounted light as an example. At home, the rifle stays loaded with Hornady .223 55 grain TAP Urban (#83276) for inside and limited outside Home Defense use. Next to my rifle, however, are magazines loaded with Hornady 75 grain SBR Black (#81296) for use outside the home out to 300 yards. This SBR ammunition is designed for barrel lengths under 11.5" to optimize the bullet's ballistic impact, while reducing muzzle blast, muzzle flash, and sound levels by 9 dB.

This same rifle with a 16" 1:7 twist rate upper, magnified optic, and 77 grain ammunition suddenly becomes a 600 yard rifle. Add a suppressor and a bipod and you've got capability!

In summary, the second step is to understand how your barrel length, twist rate, and ammunition choice fits or does not fit your mission.

STEP 3 | ZEROING

In order to avoid misses, it is critical for the end user to understand the relationship between his Point of Aim (POA) and his desired Point of Impact (POI). Zeroing our rifle establishes a baseline to help us determine where our point of impacts will be at various distances.

Regrettably, we often see civilian students whose zeroing process often goes something like this: "After watching YouTube, I decided the 25/36/50/100/200/300 yard zero was the best, so I just zeroed a few rounds at that one distance."

The problem with this approach to zeroing is that unless you find a YouTube zeroing video with the exact same rifle, ammo, and environmental setup as you (specifically: muzzle velocity, the bullet's ballistic coefficient, altitude, and weather conditions), you really don't know what your POI will be at various distances. What's worse, you are shortchanging yourself when it comes to maximizing your rifle's Point Blank Range (more on this later).

Another approach that's more dependable is to first pick and then dial in a popular zero such as 50 yards. Once you achieve POA/POI with this zero, the next step is to "walk the ground" and actually test fire your zero's impacts at various distances. For example, let's say you zero at 50, then you will want to fire at 25, 100, 200, and 300 to see where the POI is at those distances.

The upside to this approach is you are verifying exactly where your rounds hit at what distances, and are then able to record your holdovers or holdunders accordingly. The downsides to this approach include: challenges getting access to a long range shooting facility, expenditure of time, expenditure of ammo, and again potentially shortchanging yourself when it comes to maximizing your rifle's Point Blank Range.

This leads to the third zeroing method, and the one I personally recommend when feasible. This method begins with the end goal of zeroing as achieving Point Blank Range. Point Blank Range is the maximum distance you can shoot line-of-site and hit a target of a given size, typically 6" round. This means you want your bullet trajectory to deviate no more than 3" high or 3" low in relation to your line of sight as the bullet traverses along this maximum distance.

The process to accomplish this type of zeroing begins with evaluating your individual rifle and ammunition to determine the ideal POA/POI zeroing distance. We need to know several variables: height from bore axis to sight, measured muzzle velocity using a chronograph, bullet weight, bullet ballistic coefficient, temperature, humidity, pressure, altitude.

Below are three examples on my rifle (50 yard, 100 yard, and 36 yard zero). What this shows is that zeroing at 50 or 100 results in a deviation in excess of 3" by the time we get to 175 and 150 yards, respectively. In contrast, the 36 yard zero maximized the Point Blank Range out to 200 yards. It also reduces holdovers beyond 200 yards compared to the 50 and 100 yard zeros.

To be clear, the 36 yard zero is no better or worse than other zeros. It just happened to be that this was the ideal zero for this particular exact rifle, ammunition, suppressor combination. My 16" upper with different ammunition prefers a 200 yard zero in order to maximize Point Blank Range. ***Every situation is unique.***

INPUT VARIABLES

Ballistic Coefficient:	0.23	Velocity (ft/s):	2280	Weight (GR):	75
Maximum Range (yds):	300	Interval (yds):	25	Drag Function ():	G1
Sight Height (inches):	2.5	Shooting Angle (Deg.):	0	Zero Range (yds):	50
Wind Speed (mph):	0	Wind Angle (Deg.):	90	Altitude (ft):	0
Pressure (hg):	29.53	Temperature (F):	90	Humidity (%):	80

Ballistic Results - LWRC 10.5 | 1:7 | OSS Helix 556 | Hornady 81296 75 grain SBR | 50 yard zero

RANGE (YDS)	VELOCITY (FPS)	ENERGY (FT.-LB)	TRAJECTORY (IN)
0	2280	866	-2.5
25	2197	804	-1
50	2116	745	0
75	2036	691	0.5
100	1959	639	0.5
125	1883	591	0
150	1810	545	-1.2
175	1738	503	-3
200	1669	464	-5.6
225	1602	427	-8.9
250	1537	393	-13.1
275	1475	362	-18.2
300	1416	334	-24.3

INPUT VARIABLES

Ballistic Coefficient:	0.23	Velocity (ft/s):	2280	Weight (GR):	75
Maximum Range (yds):	300	Interval (yds):	25	Drag Function ():	G1
Sight Height (inches):	2.5	Shooting Angle (Deg.):	0	Zero Range (yds):	100
Wind Speed (mph):	0	Wind Angle (Deg.):	90	Altitude (ft):	0
Pressure (hg):	29.53	Temperature (F):	90	Humidity (%):	80

Ballistic Results - LWRC 10.5 | 1:7 | OSS Helix 556 | Hornady 81296 75 grain SBR | 100 yard zero

RANGE (YDS)	VELOCITY (FPS)	ENERGY (FT.-LB)	TRAJECTORY (IN)
0	2280	866	-2.5
25	2197	804	-1.2
50	2116	745	-0.3
75	2036	691	0.1
100	1959	639	0
125	1883	591	-0.7
150	1810	545	-2
175	1738	503	-4
200	1669	464	-6.7
225	1602	427	-10.1
250	1537	393	-14.4
275	1475	362	-19.7
300	1416	334	-25.9

INPUT VARIABLES

Ballistic Coefficient:	0.23	Velocity (ft/s):	2280	Weight (GR):	75
Maximum Range (yds):	300	Interval (yds):	25	Drag Function ():	G1
Sight Height (inches):	2.5	Shooting Angle (Deg.):	0	Zero Range (yds):	36
Wind Speed (mph):	0	Wind Angle (Deg.):	90	Altitude (ft):	0
Pressure (hg):	29.53	Temperature (F):	90	Humidity (%):	80

Ballistic Results - LWRC 10.5 | 1:7 | OSS Helix 556 | Hornady 81296 75 grain SBR | 36 yard zero

RANGE (YDS)	VELOCITY (FPS)	ENERGY (FT.-LB)	TRAJECTORY (IN)
0	2280	866	-2.5
25	2197	804	-0.7
50	2116	745	0.7
75	2036	691	1.6
100	1959	639	1.9
125	1883	591	1.7
150	1810	545	0.9
175	1738	503	-0.6
200	1669	464	-2.8
225	1602	427	-5.8
250	1537	393	-9.6
275	1475	362	-14.4
300	1416	334	-20.1

INPUT VARIABLES

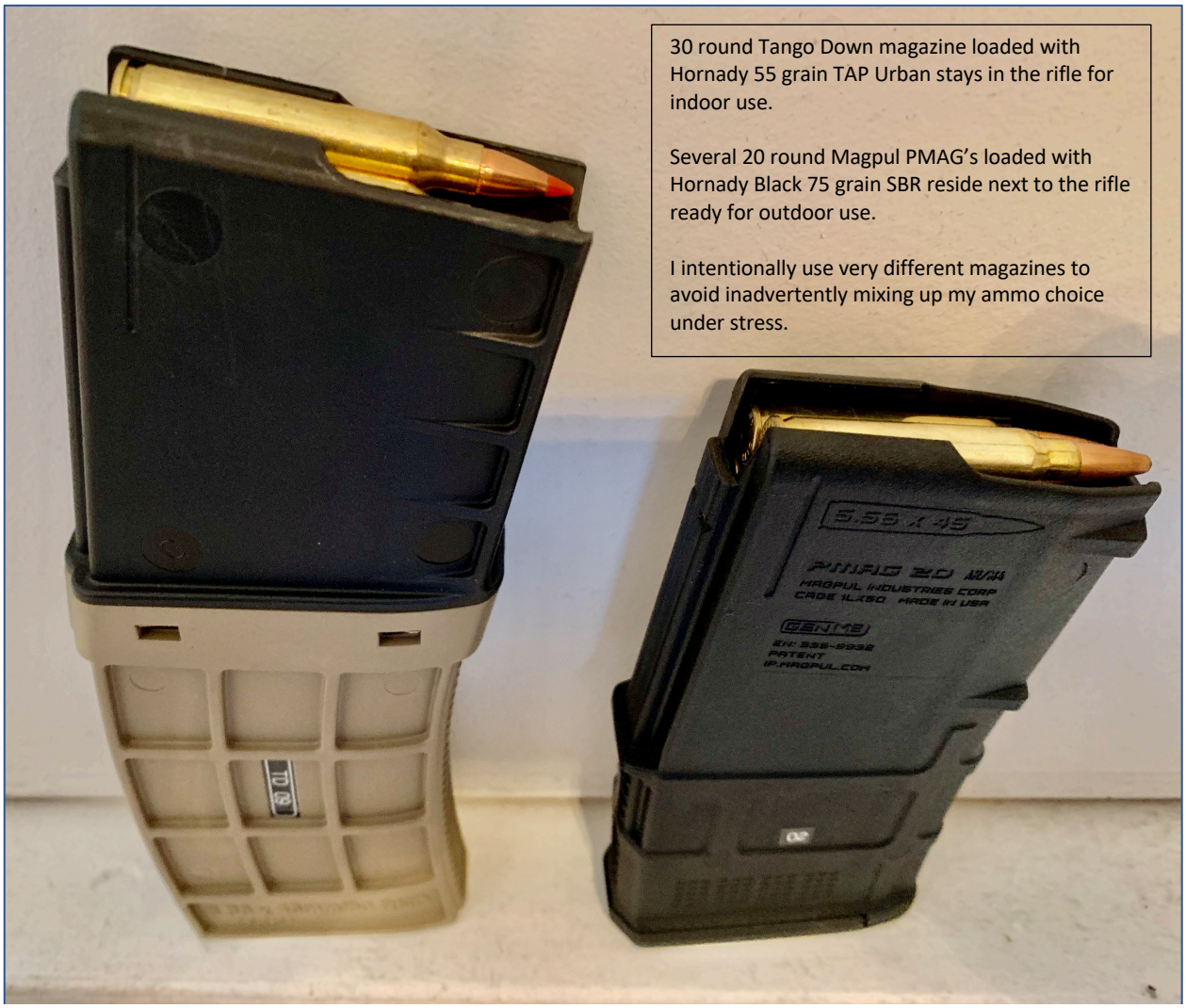
Ballistic Coefficient:	0.255	Velocity (ft/s):	2636	Weight (GR):	55
Maximum Range (yds):	300	Interval (yds):	25	Drag Function ():	G1
Sight Height (inches):	2.5	Shooting Angle (Deg.):	0	Zero Range (yds):	36
Wind Speed (mph):	0	Wind Angle (Deg.):	90	Altitude (ft):	0
Pressure (hg):	29.53	Temperature (F):	90	Humidity (%):	80

Ballistic Results - LWRC 10.5 | 1:7 | OSS Helix 556 | Hornady 83276 55 grain TAP URBAN | 36 yard zero

RANGE (YDS)	VELOCITY (FPS)	ENERGY (FT.-LB)	TRAJECTORY (IN)
0	2636	[illegible]49	-2.5
25	2555	[illegible]	-0.7
50	2475	[illegible]	0.8
75	2397	[illegible]	[illegible]
100	2320	[illegible]	[illegible]
125	2245	[illegible]	[illegible]
150	2171	[illegible]	[illegible]
175	2098	[illegible]	[illegible]
200	2027	[illegible]	[illegible]
225	1957	[illegible]	[illegible]
250	1889	[illegible]	[illegible]
275	1822	[illegible]	[illegible]
300	1757	[illegible]	[illegible]

While the rifle is zeroed for the 75 grain SBR ammo, the trajectory is the same at indoor distances using the 55 grain TAP URBAN.

In summary, zeroing and understanding holdovers and holdunders is both important and specific to each rifle and ammunition combination. Whether you use the popular "walking the ground" method or the Point Blank Range method, find what is most feasible for you.



30 round Tango Down magazine loaded with Hornady 55 grain TAP Urban stays in the rifle for indoor use.

Several 20 round Magpul PMAG's loaded with Hornady Black 75 grain SBR reside next to the rifle ready for outdoor use.

I intentionally use very different magazines to avoid inadvertently mixing up my ammo choice under stress.