



M16/M4 Accuracy Error

Shot Process error is the biggest factor in shooting performance. A better understanding of equipment is the second biggest issue.

Sgt. 1st Class John M. Buol Jr.

There are many reasons why some Soldiers remain poor marksmen. Ranges and qualifications conducted by non-experts that haven't bothered to read current doctrine while happily parroting whatever suspect advice they overheard from other non-experts is at the top. Too many Soldiers fail to realize the Drill Sergeant Academy does nothing about small arms training beyond confirming candidates can minimally pass the same initial entry, basic qualification as the new recruits they'll be teaching. A novice shooter that does nothing more than repeat a novice course once or twice every fiscal year (or less often...) will forever remain a novice, no matter their rank, how long they've been in, how many deployments they served, or how loud they yell.

Beyond questionable shooting advice by non-shooters routinely found throughout the Army, a misunderstanding of equipment particulars is also common. Concerning rifle/carbine use, equipment misunderstanding is the second most common cause of zeroing problems and qualification failures.

The Department of Defense has been using the same basic rifle/carbine design first patented by Fairchild Engine and Airplane Corporation in 1956. Patent number 2,951,424 "Gas operated bolt and carrier system" describes mechanisms operated by propellant charge energy for automatically opening the lock, gas-operated by direct action of gas pressure on bolt or locking elements. This patent was the primary basis of Fairchild's subsidiary company, ArmaLite, and their AR-10 and AR-15 rifles. Both of these rifles were first released to the civilian market for years before a Dutch arms manufacturer and then the United States Air Force first adopted them.

It's worth noting the AR-10, AR-15, and M16/M4 series is not a "direct impingement" design, rather, it is an internal piston design. This is explained in the original patent application by its inventor, Eugene Stoner. Reasons for this can be found by reading the patent document explaining Stoner's original design emphasis about saving weight. Eliminating metal external pistons and operating rods common in other gas operated designs helped shave ounces and pounds. Combining the functions of a bolt and a piston/gas rings in one part and a carrier and gas cylinder/sleeve in another part also saved weight. The use of aluminum finding then-new "space age" uses in 1950s-era aeronautical development coupled with plastics to replace steel and wood saved even more.

One of the design decisions for saving weight in the AR-15 and M16/M4 was the use of a simple handguard that is little more than a plastic barrel shroud. The good news is this is a simple and robust-enough design. The bad news is its effects on point of impact. Worst of all is how few Soldiers realize any of this.

Good Vibrations

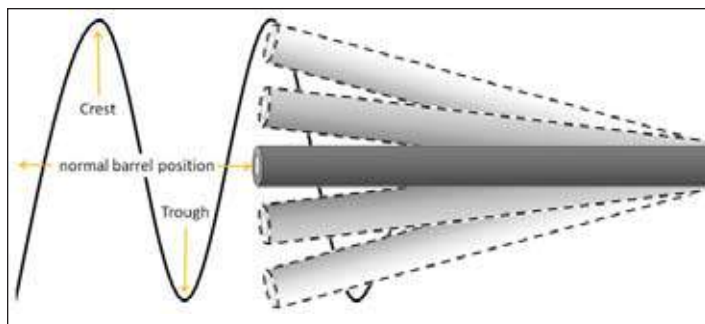
Upon firing, the barrel vibrates with the muzzle oscillating in an oblong circular path as the bullet is moving down the bore. This is due to the large forces created by propellant peaking at around 55,000 PSI (pounds per square inch) accelerating the bullet from rest to about three times the speed of sound (about 3,000 feet per second or over 2,000 miles per hour) within about 0.002 seconds down a "runway" of about two feet or less while twisting from zero to about 250,000-300,000 RPM along with the counter rotation of the rifle twist.

Call For Articles

All information, articles, and ideas helpful to improving small arms training, qualification, and competition for Army Reserve Soldiers are welcome. Submit anything you'd like included in ***Army Reserve Marksman*** to the editor: john.m.buol.mil@mail.mil

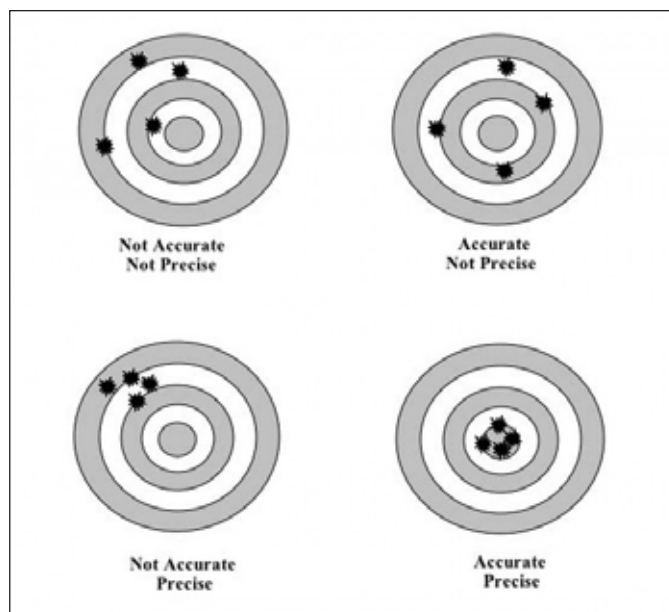
In This Issue

- M16/M4 Accuracy Error
- M4A1 Shooting Tip
- Basics Are Critical
- Doctrine Insights
- Army TC Opinion
- Service Conditions (Combat) Data Book



Above: The barrel vibrates with the muzzle oscillating in an oblong circular path as the bullet is moving down the bore. Touching the barrel or applying pressure to it while this happens can and will influence accuracy and possibly precision as well.

Let's review what precision and accuracy means. Precision is the ability to shoot to the same place with minimal deviation without regard to the intended target. Accuracy concerns the location of shots with regard to the intended target. Both are needed to secure hits, obviously. Keeping the cone of fire centered on target but with poor precision results in some errant shots. Great



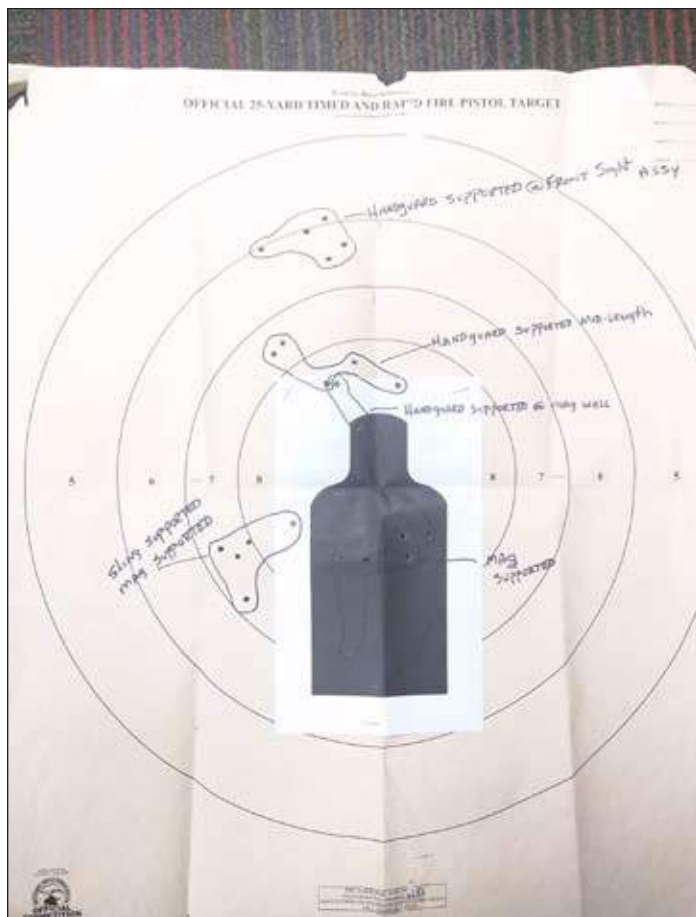
Above: Accuracy vs. Precision

precision that is off target (poor accuracy) also misses.

A good hit rate needs accuracy (keep shots centered on target) and precision (hitting the same place or close repeatedly). Beyond a consistent Shot Process, this depends on getting all the bullets to be consistently exiting the muzzle at one of the end of whip points (crest and trough) where the muzzle is most still in its movement and to do so consistently. Yes, I wrote the word "consistent" multiple times in that sentence and on purpose. Anything that is different from shot to shot has an effect on precision and/or accuracy.

A common error combines a misunderstanding of precision versus accuracy coupled with a misunderstanding of the consequence of having a handguard in direct contact with a vibrating barrel.

The pictured target was shot with an as-issued, rack-grade M16A4 and ACOG at 100 meters. For reference, the 25-Yard Timed and Rapid Fire Pistol Target (NRA B-8) underneath the silhouette target has a bull which



Left Shot with an as-issued, rack-grade M16A4 and ACOG at 100 meters. The 25-Yard Timed and Rapid Fire Pistol Target (NRA B-8) underneath the silhouette target has a bull which is a black 5.5-inch circle extending out to the 9 ring. The white border of the silhouette here is the same width, and the silhouette itself is four inches wide. At the 100 meter line, this silhouette is just under 4 MOA wide, the same relative width as the white diamond in the center of the current A8 Army 25-meter zero target.



Above: Most Service Conditions shooters hold at the magazine well when shooting a rack grade M16/M4, especially with optics. It may not be as stable but it avoids point of impact (accuracy) problems.

is a black 5.5-inch circle extending out to the 9 ring. The white border of the silhouette here is the same width, and the silhouette itself is four inches wide. At the 100 meter line, this silhouette is just under 4 MOA wide, the same relative width as the white diamond in the center of the current A8 Army 25-meter zero target.

No sight adjustments were made for any group pictured and the same point of aim was used.

Each of the fired groups pictured have a similar

Below: Many shooters at this match were surprised how much their point of impact moved when using a sling on their rack grade M16A2 rifles, even with a front iron sight that moves with the flexed barrel.



amount of precision as the size of each five-round group is about the same. Starting with a magazine supported prone position at 100 meters, the group was centered on the silhouette as this is the normal base position and distance most Service Conditions competitors zero from. ACOG reticles are intended to zero at that distance.

While precision was consistent, the accuracy varied wildly. The group at target left was fired using a sling attached to the normal front sling swivel and fired with a right handed shooter using the sling on the left arm for support. The groups above the target were fired prone supported using support under the handguard at varying places.

Again, no sight adjustments were made for any group pictured and the same point of aim was used.

As the support moved further away from the receiver and up the barrel, the point of impact location (accuracy) changed. The worst point of impact (accuracy) errors with the most change were sling supported (out at left) and prone supported using support at the front sight assembly. Given the barrel oscillation that occurs during firing and considering the increased amount of leverage possible by applying pressure on a longer lever as we move up the length of the barrel, it's easy to understand why.

Note, none these positions or supports are inherently unstable or "bad." In fact, firm support on the handguard and under the barrel is likely very stable. There will be minimum motion in the sights. Each of these five-round

Below: Service Rifle shooters have commonly used float tubes surrounding the barrel to avoid point of impact problems since the 1990s. This is extra important now that optics are common in NRA and CMP competition.





Above: Competition shooters have been using float tubes on AR-15 rifles that avoid touching the barrel for decades to avoid point of impact errors. It is deeply disappointing that nobody with sufficient authority in the Department of Defense has made something like this a common issue improvement.

groups has similar precision and is less than 4 MOA, meaning that all of them are precise enough to fit inside the white diamond on the A8 zero target if fired at 25 meters. However, what effects that support has on the oscillating barrel can cause profound point of impact changes.

Once again, no sight adjustments were made for any group pictured and the same point of aim was used.

Yes, I said that three times because Soldiers can sometimes be hard headed. Stoner's design is now about seven decades old and these issues have been understood for most of those decades by knowledgeable shoot-

ers but we still see Soldiers zeroing with hard support directly under the barrel and even touching the barrel directly into support.

This is why a 25 meter "nearo" should never be considered a final zero. Shooting at 25 meters is a good exercise and it will get you close to a good zero but a confirmation at distance is needed. TC 3-20.0 and TC 3-20.40 require this and provide direction as to ways it can be done.

Many units fail to offer a zero confirmation at full distance, which was a good idea even before TC 3-20.0 and TC 3-20.40 directed it as a requirement. It is likely most Soldiers will be forced to zero at 25 meters and then qualify without confirming. You can help mitigate problems by insisting upon a degree of consistency. It is better to sacrifice a small degree of precision to improve accuracy, especially when done from positions that are the same as that used during qualification.

Table II and IV exercises can be done at 25 meters and are helpful. After declaring they are successfully zeroed, have Soldiers shoot groups from all the positions they'll use in qualification. Postal Match courses also have a Validation score. Beyond Shot Process errors, failing to meet that minimum Validation score is likely due to accuracy errors created by Soldiers that don't fully understand how their equipment works. **ARM**

Below: Seventy years of continuous service and Soldiers are still unaware of why using hard, direct support under the barrel like this - especially right at the front sight housing - with a rack grade M16/M4 is a terrible idea doomed to inflict accuracy errors. Drill sergeants often don't know why either.



M4A1 Shooting Tip

An experienced rifleman and winning Service Conditions and Service Rifle competitor shares insight in shooting your rack grade M4 better.

Master Sgt. Lance Espinosa

I've been frustrated by the M4/M4A1 since we drew them. I have never been able to shoot them as well as I shot an M16A4. Well, I think I may have figured it out...

Note, the technique below may not be necessary for people who don't slam Monster energy drinks for breakfast, lol. My point is if you can consistently shoot a 2 MOA group holding the magazine well, don't change what you're doing.

Magazine on the ground with the non-firing hand wrapped around the mag well has been the norm in Service Conditions competition for years if you wanted your no-float-tube rifle's pencil barrel to get groups to be predictable on the target's center.

Since transitioning to an M4A1, mag on the ground has consistently felt like it was resting on a greased ball bearing. Keeping the crosshair/dot in the center of my aiming point was ridiculously difficult with fliers all over. 10 round strings often had 3 or 4 good shots with 6 or 7 that looked like rat turds in a dresser drawer, making the groups 5 or 6 MOA.

I don't know fully why it is so difficult for me to get the results I enjoyed with the M16A4. I'm pretty sure it has something to do with my cheek to stock weld on a lower tube as opposed to an A2 style buttstock. That, and I miss the full-size "musket" I first learned on during basic training...

Anyhow, I think I finally solved it.

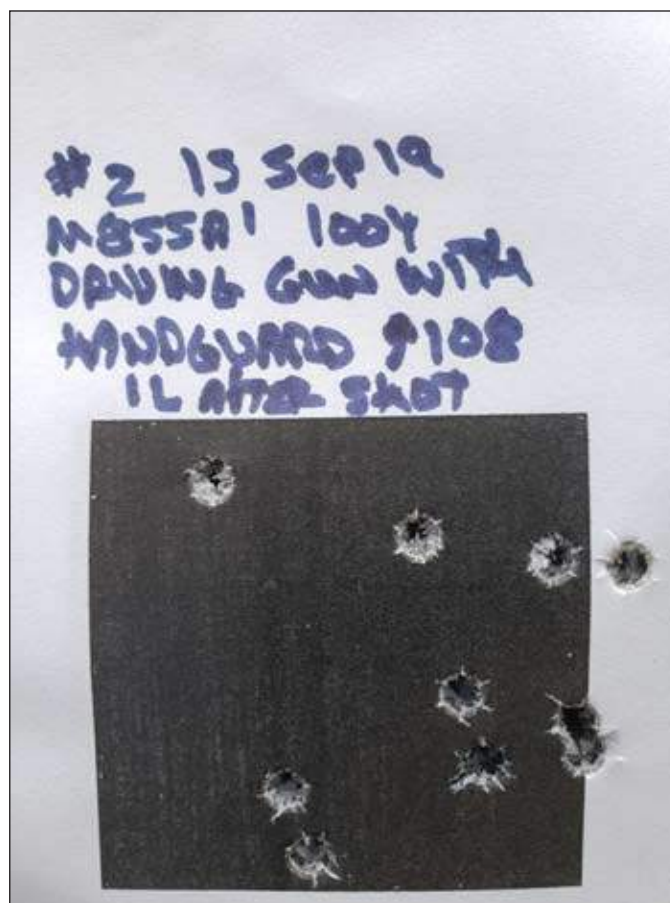
With the M4A1 I moved my non-firing hand from the mag well to the front of the handguard. I know, it's blasphemy to a combat gun purist, but it flat out works for me. I now drive the gun with the handguard. I don't bear downward, I pull back in a moderate fashion and point the gun with that hand with a little downward pressure instead of trying to get my shoulder and magazine well hold in sync. Groups are now sub 2 MOA and predictable, which is all one can ask for out of a rack-grade combat gun with ball ammo.

I just wanted to pass along what took me several years and several thousand rounds to figure out and maybe save

you some time and frustration. And ammo.

As always your mileage may vary.
- Oddball out.

Below: 100-yard target from MSG Espinosa shooting his Team-issue, rack-grade M4 using the technique outlined. He advises that drinking Monster for breakfast helps...



Editor's Note

Wait, didn't this article by MSG Espinosa just contradict the previous article, "M16/M4 Accuracy Error"? No, not at all. Here's why.

First point, these point of impact errors are not ordained but they are often observable in given circumstances. As

“M16/M4 Accuracy Error” discusses, a float tube changes those circumstances and thus removes the problem.

The worst POI error with a M16/M4 typically happens with an optically-sighted M16A4. Given the long, tapered, thin barrel inside the long, non-supportive handguard, it is easy to see how a longer leverage with no support can cause issues. This can be mitigated to a degree with the M5 RAS (Rail Adapter System) being stiffer than plain plastic handguards.

Now consider an M4A1 with a RAS: Shorter barrel allows less leverage to pull on with a RAS making the area less susceptible to forces upon it. A RAS is not a float tube but making a shorter length of barrel more stiff can only reduce the potential for error.

The most important point is this is not due to a random notion or from retelling some random story. MSG Espinosa actually tested the idea many times and has fired targets and repeatable data showing consistent results leading to his conclusion. That is the most important thing. **ARM**

Army Reserve Postal Matches

All units are eligible to be a part of the World-wide Chief, Army Reserve Postal Matches and all Soldiers are encouraged to participate. Host during the conduct of routine qualification at no expense to the unit or to Soldiers. Learn more at <https://www.usar.army.mil/ARM>

Call For Articles

All information, articles, and ideas helpful to improving small arms training, qualification, and competition for Army Reserve Soldiers are welcome. Submit anything you'd like included in *Army Reserve Marksman* to the editor: john.m.buol.mil@mail.mil

Basics Are Critical

All shooting skills in every context are dependent upon solid, basic skills.

From John Holbrook, II in an article about his interview with Christian Sailer in the November/December 2019 issue of *Front Sight*, the magazine published for members of the United States Practical Shooting Association. Young Mr. Sailer was the 2019 Open Division National Champion and the winner of all eight Area Championships.

Kindly note what he called his *ah-ha* moment and biggest tip. Notice that his epiphany describes the kind of shooting necessary to do well in National Match Course shooting, the basis of Service Pistol and Service Rifle competition. Consider this anytime anyone wonders why we still shoot at bullseye targets for maximum Shot Process skill development. **ARM**

USPSA: What was your big 'ah-ha' moment in your shooting? When did you see the most dramatic results?

CS: That was during my 2018 season – that summer after high school. I could always move and shoot pretty well, but the fundamentals were not solid. I took a step back and focused on the elements needed to make a good shot. I also spent a lot more time analyzing my videos and match performances. One thing I really focused on last year was trigger control – that helped a ton.

USPSA: What is the biggest tip you can share with our readers?

CS: Two part – work on trigger control, and work on throttle control, which is better defined as trigger control. Different targets at different distances require different trigger pulls. Part of it is learning what you can get away with. Scaled focus and a scaled trigger pull are important. I also recommend analyzing your match videos and addressing your weaknesses.

Doctrine Insights

Ever wonder why Army manuals have the numbers that they do? Or about the origins of our small arms doctrine? The Weapons and Gunnery Branch at the Maneuver Center of Excellence provides us some insights.

Recently (kind of) all of the weapons manuals changed from FMs to TCs. Where can you find out more about why some information is found in an FM vs TC vs STP vs ATP vs ADP vs TM? Also, how does the numbering system work for the publications? The weapons all seem to be 3-2#.# "code" for the manual numbers. Is there some sort of key?

Stephen Krivitsky
Chief, Weapons and Gunnery Branch
Maneuver Center of Excellence

Doctrine 2015 was the plan initiated by Gen. Dempsey. At the time, there were just over 650 field manuals. The Doctrine 2015 plan was to have Field Manuals with meaning, limiting their number to 50. The remainder, if determined still necessary, became other publication types. In the case of weapons and weapon systems, they transitioned into Training Circulars. Some changed their FM's into Technical Manuals rather than TC's. Those are getting corrected in their subsequent revision.

The numbering system is based on TRADOC Pam 350-70-1, where it establishes the general numbering system. We use "20" as in TC 3-20.xx for our common training strategies. We use "22" for weapons. What comes after the dot is generally up to the proponent.

The Rifle/Carbine manual has been .9 for so long, it wasn't worth changing to something else, much like the pistol manual being the .35.

However, we changed the strange .65 and .68 into TC 3-22.249, TC 3-22.240, TC 3-22.50, and TC 3-22.19. Because it made sense to me, and in this context, it was easy to apply simple logic to book numbering.

The other item we are working on right now is TC 3-22.17, Modular Handgun System. It will not replace the Pistol manual, TC 3-22.35, as that focuses on the M9. We elected to have a completely separate manual for the M17. As the M9's are removed from the inventory completely, we will rescind the M9 .35 publication.

Then there are the training strategies. They follow TC 3-20.0 format. After the dot, we made echelon-based numbers for the next generation of training publications that had the training strategies in them. We tied them to their associated readiness rating: T1, T2, T3, and T4, respectively. So, the first digit after the dot indicates the unit's relative readiness rating if they successfully completed that series and all subordinate manuals. That plan also allowed HQDA to identify resources by echelon and readiness, which they likely within a few years.

TC 3-20.10 = Maneuver Battalion and Squadron
 TC 3-20.11 = Maneuver Company and Troop.

If a unit completed those and all subordinate strategies successfully, they would be T1.

TC 3-20.20, Maneuver Section and Platoon
 Completing those and subordinate strategies get you to T2.

TC 3-20.30, Squad
 TC 3-20.31, Crew Platforms
 TC 3-20.33, Mortars
 Completing those and subordinate strategies gets a unit to T3.

TC 3-20.40, Individual Weapons
 TC 3-20.41, Crew Served Weapons
 TC 3-20.42, Special Purpose Weapons.
 Completing these successfully gets a unit to T4.

So, if the Army wanted focused readiness, they could identify a brigade to be T3... and only provide the resources for the .4 and .3 training strategies. In a nutshell.

Note, the "T" and tiers were removed a bit ago for a number of reasons, but the numbers still actually mean the same thing. When Objective-T went away, the system of training is still unchanged... just not linked directly as the Army is again changing.

Another note, many of these manuals are still being worked on. The .40 is out.. .11 is awaiting approval. .20

and .30 are working in tandem to replace TC 7-9 plus FM 3.20.21 HBCT Gunnery. We are revising .31 and some of the supporting manuals (fire commands and vehicle crew evaluator), and working on .41 and .42 now. Seems slow, and it is.. but we have 12 guys working these now.. most we ever had in the office.. and still at 60% strength by TDA.

Additional Insights

The following is from a different member of the **Maneuver Center of Excellence**

Here's an odd thing about doctrine, the Army and Army Marksmanship Unit (active duty):

When I first started talking to them in 2011, I was in command of the company that owned all the small arms manuals. It did not take long to realize that the NCOs who were updating the .9 at the time weren't really making significant changes. They were doing things like deleting all the M16A1s, correcting some minor factual errors etc.

None of the NCOs in the platoon that owned these books were really shooters, as the organization surrendered its mission of being a BRM committee to Sand Hill several years before I got there. So...I want to update doctrine and change the Army, but I don't have any NCOs in my company who are shooters, and I am having a hell of a time finding people who can write.

I reached out to AMU. Two of their rifle team guys would come over to the company and we'd talk about shooting, and doctrine and the Army so I could go write things for the .9 based on our discussions. These two NCOs told me that the AMU was not allowed to go against published doctrine. Since AMU is not in FORSCOM or TRADOC, they don't own any doctrine.

Doctrine was jacked up in a lot of ways as I think everyone here knows. There was all kinds of erroneous stuff in the old .9. One of these AMU guys told me "Sir, if you knew nothing about shooting...and you read the .9 cover to cover...you'd know less about shooting than had you never opened it" and he was right.

Call For Articles

All information, articles, and ideas helpful to improving small arms training, qualification, and competition for Army Reserve Soldiers are welcome. Submit anything you'd like included in **Army Reserve Marksman** to the editor: john.m.buol.mil@mail.mil

Army Reserve Postal Matches

All units are eligible to be a part of the World-wide Chief, Army Reserve Postal Matches and all Soldiers are encouraged to participate. Host during the conduct of routine qualification at no expense to the unit or to Soldiers. Learn more at <https://www.usar.army.mil/ARM>

So, the AMU had talented shooters. The Infantry School had, over time, stopped putting shooters of any variety in charge of the books. If AMU wanted to teach something different than what was in the .9, they believed there would be some kind of repercussions from their CoC for going against the .9...so they made workarounds.

That, I think, is how we ended up with all these confusing lists of cute phrases, 'firing tasks' that are different from 'the fundamentals' etc.

One AMU guy told me a story about the '255 meter zero' which means that you zero your M16A2 using the old zero target...but your POI goes in the bottom of the circle. Maybe that really is a '255 meter zero' but he got his ass chewed for calling it a '255 meter zero' since the Army's standard is a '300 meter zero'

I'm not convinced a lot of young AMU Soldiers know the history of the things they say, or why they were taught to say those things.

Further Info

What's the difference between a tactic, a technique and a procedure? What is the best form of operation orders? What's the hierarchy of Army doctrine? Do FMs take precedence over ADPs? What about ATPs? To what extent does doctrine bind us to specific actions? Why do we even have doctrine? Learn more:

<https://lethalityranch.com/army-doctrine-summary-adp101>

Download ADP 1-01
DOCTRINE PRIMER
<https://armypubs.army.mil>

ARM

Army TC Opinion

An opinion on current Army small arms doctrine.

Sgt. 1st Class John M. Buol Jr.

The Training Circulars detailing the Army's small arms training are an overall improvement, from doctrine to the qualifications. I have not yet encountered a knowledgeable shooter that disagrees.

Sustain

Like the new TCs, this is an improvement on Army doctrine. Reading this I'm reminded how similar this is to the coursework we had at the now-defunct Reserve Instructor Academy back in 2007-2009. I think it a positive indicator that knowledgeable groups independently working to solve the same problem arrive at very similar conclusions.

The progressions, drills, and Tables I-VI are solid. I was especially pleased by this specific bit:

"7-119

"Table IV-B requires gunners to practice trigger control and requires the firer to fire one five to seven round burst at each specified point target or series of targets in the area target sequences. Gunners are authorized to fire only one five to seven round burst at each paster."

Getting this idea across seemed like pulling teeth. I still have the DA Form 2028 I submitted requesting previous FMs to include verbiage like this. The Cold Steel Challenge, a Postal Match for machine guns, already uses this idea.

Improve

I'll defer to Col. Gregory C. Kane. ***"The Army and the USAIC currently do not have a coherent and coordinated small arms training strategy."***

Assess, 7-97

"Soldiers who fail to zero an aiming device will receive a NO GO. The scorer records the results in block 7 on the DA Form 7450. The scorer will also identify and record any perceived deficiencies and provides the Soldier feedback to assist in remedial training. The Soldier is retrained and must return to the firing order to complete Table IV zero."

Fair enough. Beyond documenting and acknowledging the no go, what next? What does remedial training look like? There should be a drill list or tables of progression for remedial training for Soldiers struggling to meet standards.

I'd argue this is more important than what is used for the qualification itself.

Every qualification progression is simple enough when personnel arrive capable of successfully working through it with minimal problem. Despite what the Army calls it, that isn't training, it's validation of already-developed knowledge and ability. Actual training is improving beyond current capability, which means that current capacity is less than what we ultimately want to develop and there will be a necessary struggle to improve it.

A person that deserves to be called an Experienced Coach will have practical, working knowledge to address this. Most Soldiers do not. I imagine that future Army ranges will replace lesser-skilled personnel parroting, "Uh... remember the four fundamentals" with "Uh... remember the Shot Process."

Providing something to assist with this troubleshooting, steps for what remedial training might entail, would be helpful and round out a coherent and coordinated small arms training strategy. Putting this into more easily-digestible bits - something like a 1-4 page article with illustrations discussing one point - might make it easier to communicate. The main HMG TC is 256 pages, the Training and Qualification chapter for the HMG is 150 pages, and this doesn't include any of our other small arms. Most Soldiers won't read all of this. The series of articles posted in *Army Reserve Marksman* is an example. [ARM](http://www.usar.army.mil/ARM)

Army Reserve Postal Matches

All units are eligible to be a part of the World-wide Chief, Army Reserve Postal Matches and all Soldiers and encouraged to participate. Host during the conduct of routine qualification at no expense to the unit or to Soldiers. Learn more at <https://www.usar.army.mil/ARM>

Service Conditions (Combat) Data Book

2nd Lt. Victor Liwanag

I am currently assigned to Fort Benning detailed to the Army Marksmanship Unit Service Rifle Team from Infantry School. Prior to this, I shoot on at the Texas A&M Army Marksmanship Training Unit at Texas A&M and have been shooting Civilian Marksmanship Program and Service Conditions (Combat) matches for seven years, as well Precision Pistol (Bullseye). My father, Lt. Col. (ret.) David Liwanag served as the Commander of the Army Marksmanship Unit for many years. Among his many other accomplishments there, he was instrumental in bringing back the annual All Army Small Arms Championship.

I have been an avid reader of Army Reserve Marksman and other newsletters as well as regularly lurking marksmanship forums. To add a contribution for the benefit of all, I've attached a copy of my Data Book for Service Conditions (Combat) shooting. It was a pet project of mine and I figured this would be the best place to forward it too. No one has a monopoly on good ideas and I'd like to pass this on to the rest of the force. I'm still working on a book for courses used at the Armed Forces Skill at Arms Meeting and Winston P. Wilson (WPW) matches hosted at the National Guard Marksmanship Training Center, Camp Robinson.

This follows the match order and format in pages for All Army 2021. Print-off double sided with color. All pages are numbered. In order to reduce formatting error ensure your printer is set to "Fit" setting to print. From there cut all stock in half. Based on previous copies, once bound it should be able to fit in a cargo pocket.

All the ballistic formulas, tables, and data have been either proven on the range, through records, or from AMU ballistic study.

Keep them all in the center! **ARM**

Call For Articles

All information, articles, and ideas helpful to improving small arms training, qualification, and competition for Army Reserve Soldiers are welcome. Submit anything you'd like included in **Army Reserve Marksman** to the editor: john.m.buol.mil@mail.mil

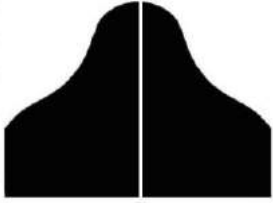
Army Reserve Postal Matches

All units are eligible to be a part of the World-wide Chief, Army Reserve Postal Matches and all Soldiers are encouraged to participate. Host during the conduct of routine qualification at no expense to the unit or to Soldiers. Learn more at <https://www.usar.army.mil/ARM>

COMBAT RIFLE DATA BOOK

Name: _____

20 IN




25 IN

100 Yard Front Sight

1 1/4 IN

General Zero Information			
Range	Elevation	Wind	Remarks
100			
200			
300			
400			
500			

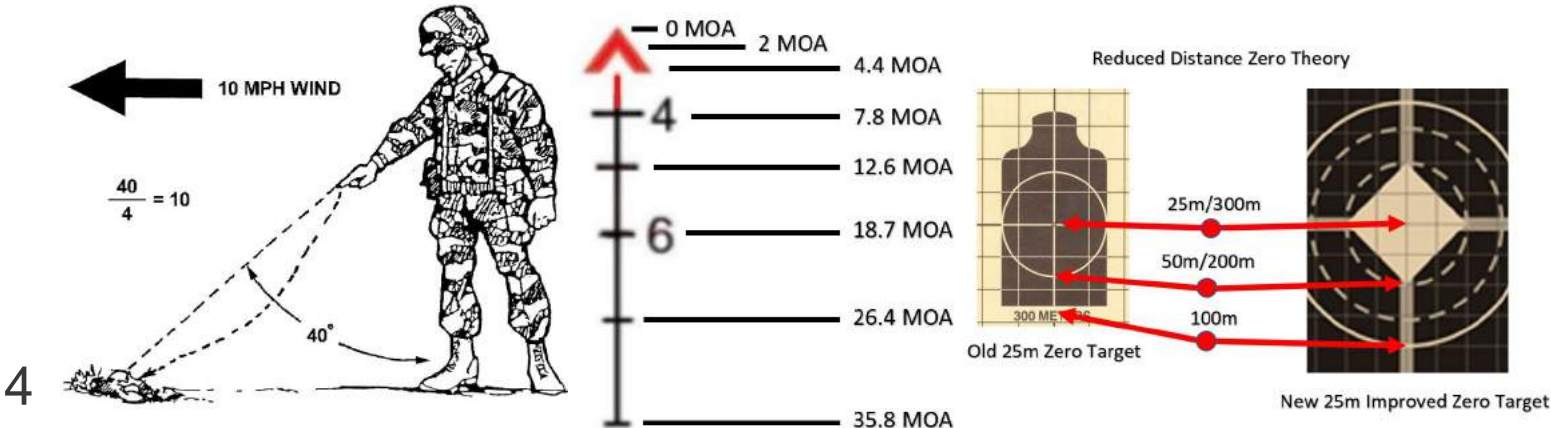
40 IN



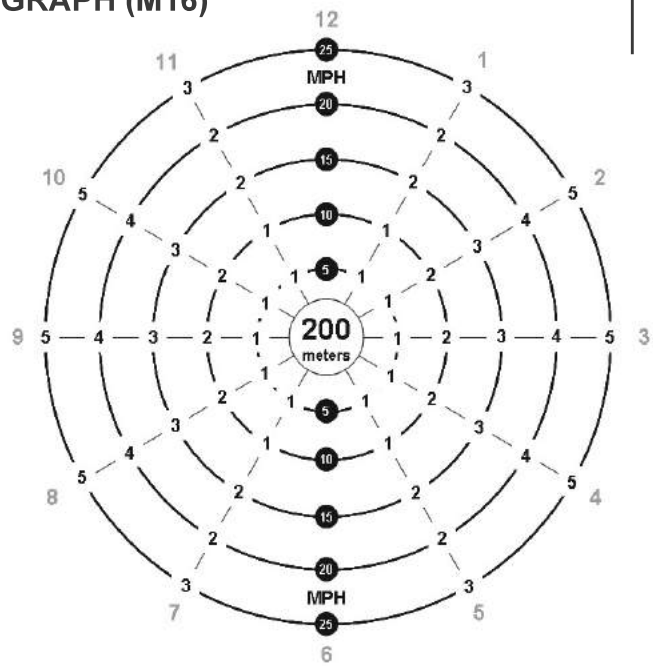
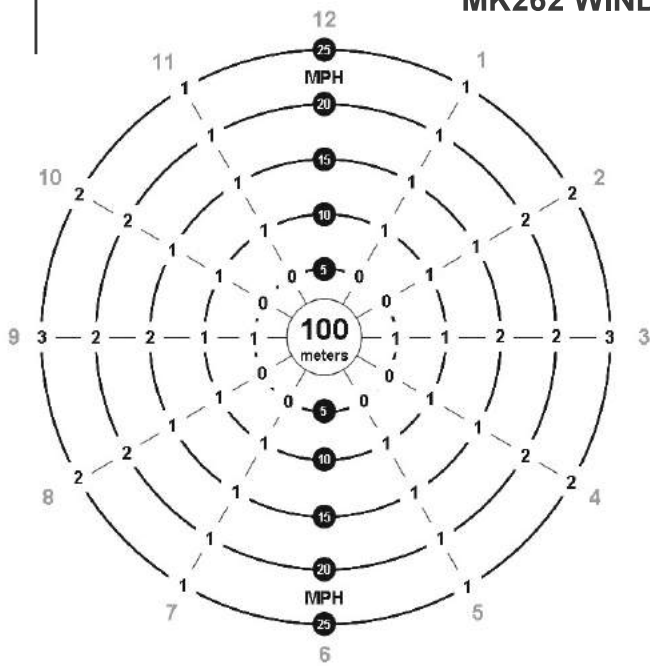
5 IN 10 IN 20 IN

*Elevation is 3/4 MOA clicks / Windage is 3/4 MOA clicks for Detachable Carry Handle M4A1

Ballistics Table in Yards for 5.56mm 62gr FMJBT M855A1 Ball for 14.5" Bbl, M4A1							
Range (YARDS)	Velocity (FPS)	Elevation (IN)	Dial (MOA)	Drift 5 MPH Full (MOA)	Drift 5 MPH Half (MOA)	Drift 7 MPH Full (MOA)	Drift 7 MPH Half (MOA)
100	2724.6	0	0	0.4	0.3	0.6	0.9
200	2455	2	1	0.9	0.6	1.3	1.8
300	2198.4	9.8	3.1	1.4	1	2	2.9
400	1960.1	24.8	5.9	2	1.4	2.8	4
500	1736.3	49.1	9.4	2.7	1.9	3.8	5.4

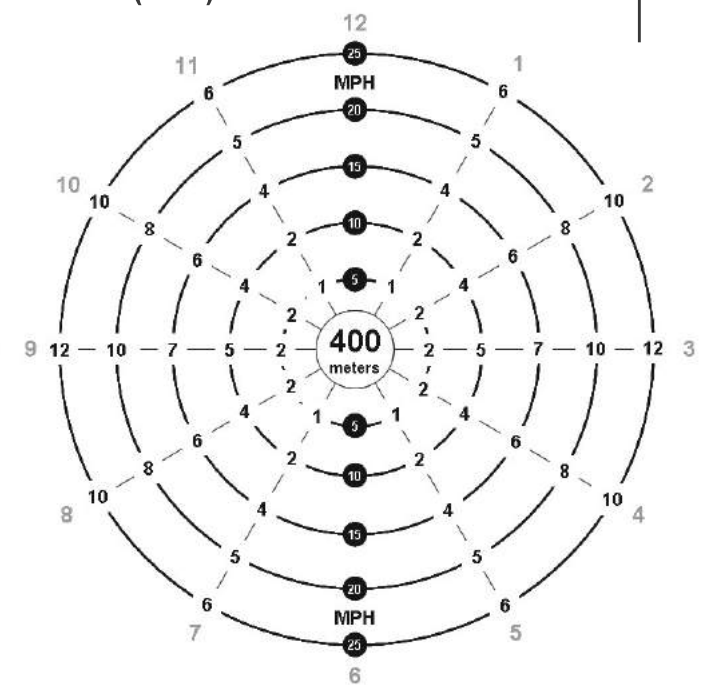
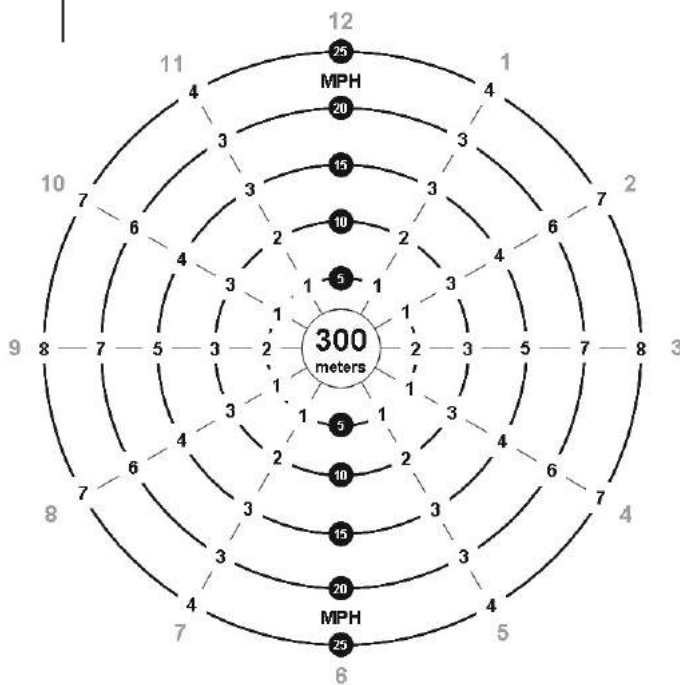


MK262 WIND GRAPH (M16)



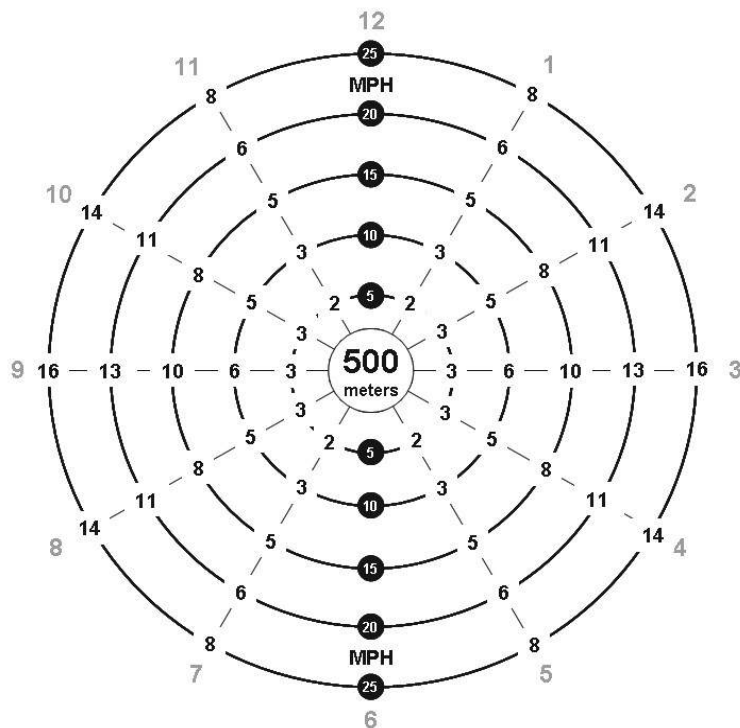
2 | 100 Yards Minutes of Angle 200 Yards

MK262 WIND GRAPH (M16)



300 Yards Minutes of Angle 400 Yards

MK262 WIND GRAPH (M16)



500 Yards
Minutes of Angle

5

MPH	KPH	Observed Effects on Natural Objects
<1	<1	Smoke rises straight up. No movement of grass.
1-3	2-5	Smoke moves w/ wind. Slight movement of leaves & grass.
4-7	6-11	Wind just felt on face. Tree leaves barely rustle. Grass sways.
8-12	12-19	Leaves turn, twigs & treetops in motion. Loose paper ruffled.
13-18	20-29	Small branches move. Loose dust & paper blow around.
19-24	30-39	Large branches & small trees sway. Clouds of dust.
25-31	40-50	Large branches in constant motion. Wind starts to whistle.
32+	51+	Whole trees in motion. Hard to walk.

Gentle	Moderate	Fresh	Strong	V.Strong
4 mph	8 mph	12 mph	16 mph	20 mph

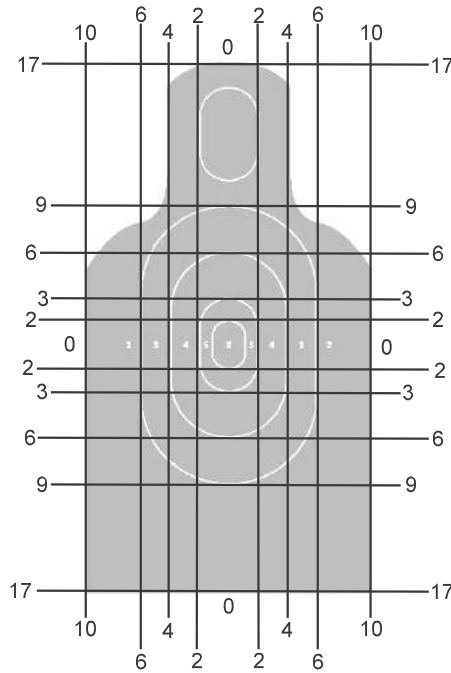
Mirage			
While looking downrange, dial counterclockwise 1/16-turn out of focus.			
Vertical: 0 MPH	30°: 1-3 MPH / 2-5 KPH	45°: 4-7 MPH / 6-11 KPH	90°: 8+ MPH / 12+ KPH

X - RING	4" X 2"
5 - RING	6" X 4"
4 - RING	12" X 8"
3 - RING	18" X 12"
2 - RING	34" X 19.5"

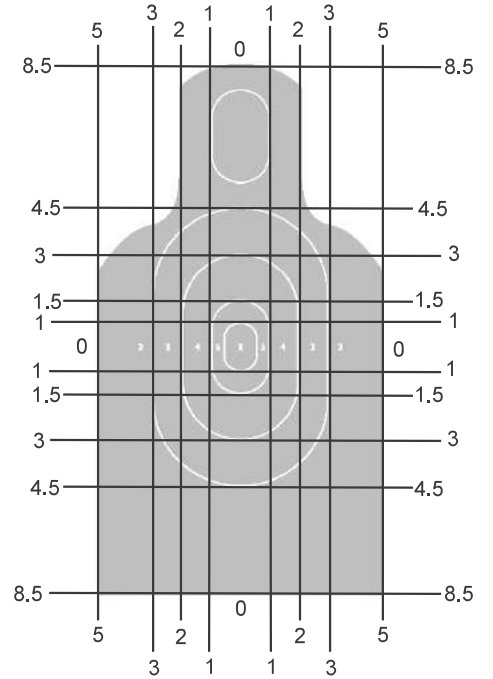
MOAs on Targets

6

100 yd

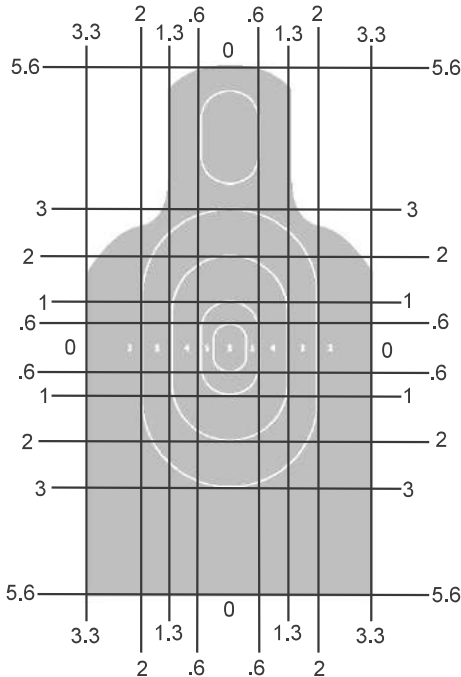


200 yd



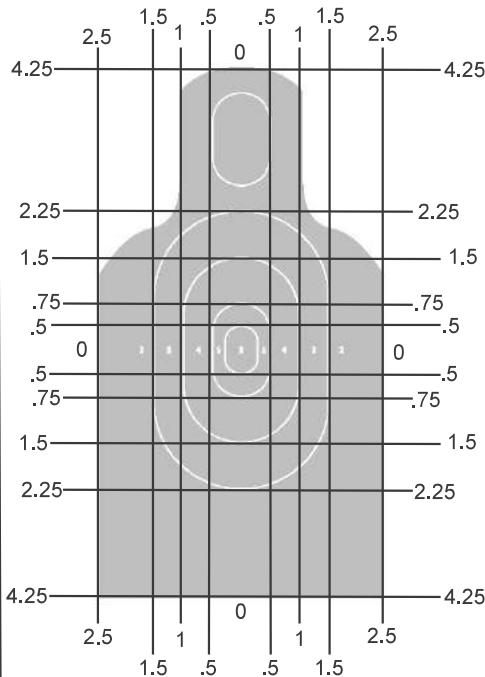
300 yd

MINUTES



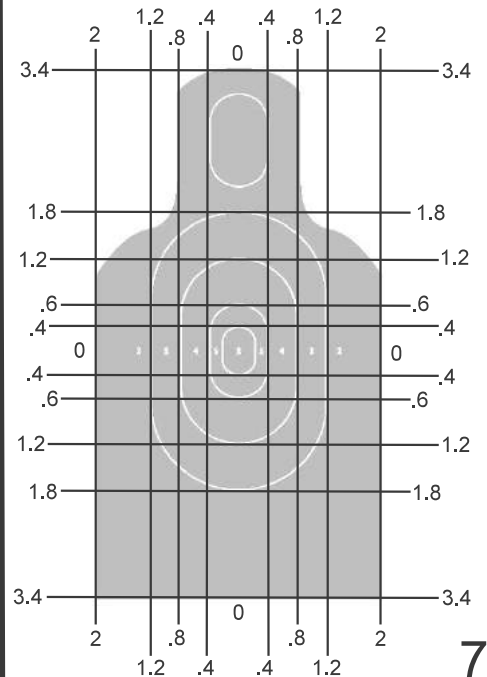
400 yd

MINUTES



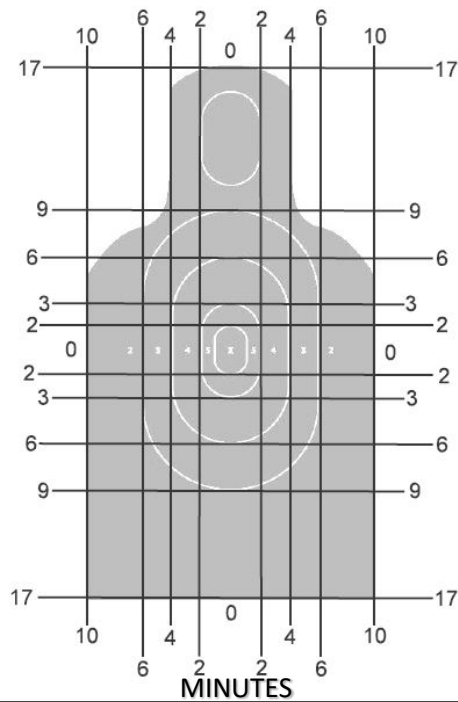
500 yd

MINUTES



7

100 Yard Slow Fire Score Sheet

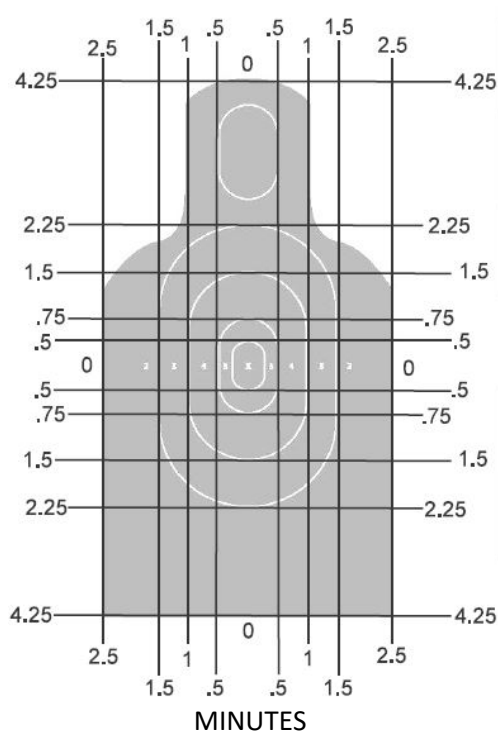


PLACE		DATE	
TARGET NO.		RELAY	
RIFLE NO.		AMMUNITION	
LIGHT DIRECTION 		WIND DIRECTION 	
TEMPERATURE		MPH MIRAGE	
ELEVATION USED		WINDAGE USED	
ELEVATION CORRECT		WINDAGE CORRECT	
S1 S2		1 2 3 4 5 6 7 8 9 10	
ELEV.			
WIND.			
CALL			
VALUE			
		11 12 13 14 15 16 17 18 19 20	
ELEVATION			
WINDAGE			
CALL			
VALUE			

REMARKS Iron sight zero should be 2" high at 100 Yards.

9

400 Yard Slow Fire Score Sheet

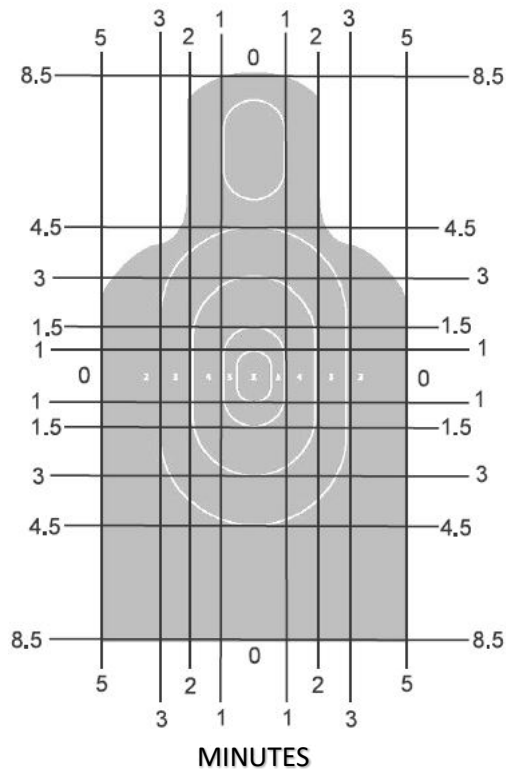


PLACE		DATE	
TARGET NO.		RELAY	
RIFLE NO.		AMMUNITION	
LIGHT DIRECTION 		WIND DIRECTION 	
TEMPERATURE		MPH MIRAGE	
ELEVATION USED		WINDAGE USED	
ELEVATION CORRECT		WINDAGE CORRECT	
S1 S2		1 2 3 4 5 6 7 8 9 10	
ELEV.			
WIND.			
CALL			
VALUE			
		11 12 13 14 15 16 17 18 19 20	
ELEVATION			
WINDAGE			
CALL			
VALUE			

REMARKS

12

200 Yard Slow Fire Score Sheet

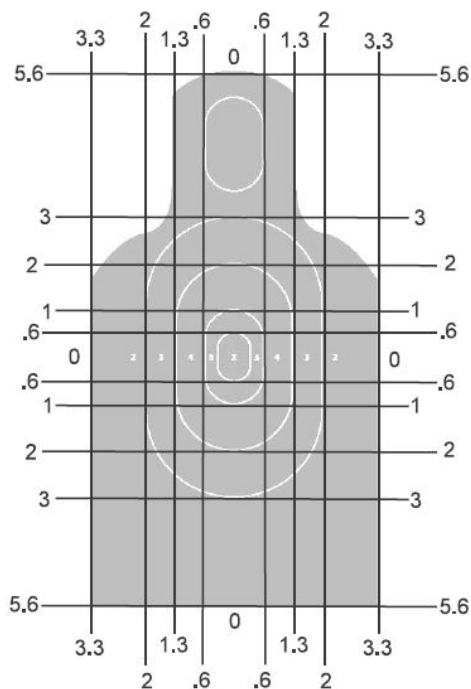


PLACE		DATE	
TARGET NO.		RELAY	HOUR
RIFLE NO.		AMMUNITION	
LIGHT DIRECTION 	WIND DIRECTION 	SIGHT PICTURE 	
TEMPERATURE	MPH	MIRAGE	
ELEVATION USED		WINDAGE USED	
ELEVATION CORRECT		WINDAGE CORRECT	
	S1	S2	1 2 3 4 5 6 7 8 9 10
ELEV.			
WIND.			
CALL			
VALUE			
		11 12 13 14 15 16 17 18 19 20	
ELEVATION			
WINDAGE			
CALL			
VALUE			

REMARKS

10

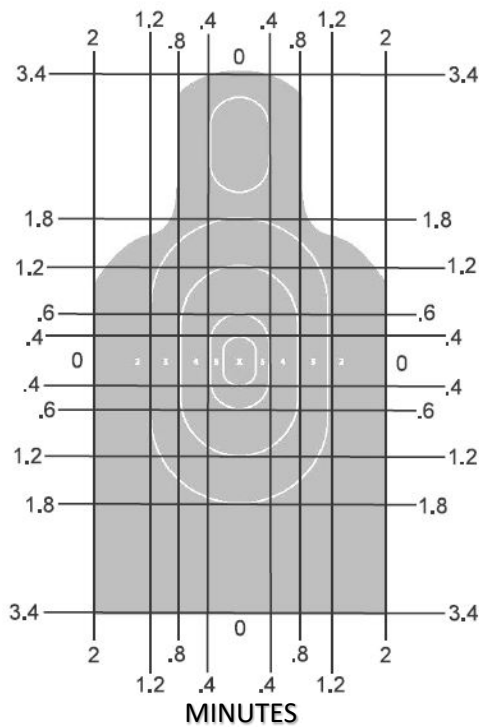
300 Yard Slow Fire Score Sheet



PLACE		DATE	
TARGET NO.		RELAY	HOUR
RIFLE NO.		AMMUNITION	
LIGHT DIRECTION 	WIND DIRECTION 	SIGHT PICTURE 	
TEMPERATURE	MPH	MIRAGE	
ELEVATION USED		WINDAGE USED	
ELEVATION CORRECT		WINDAGE CORRECT	
	S1	S2	1 2 3 4 5 6 7 8 9 10
ELEV.			
WIND.			
CALL			
VALUE			
		11 12 13 14 15 16 17 18 19 20	
ELEVATION			
WINDAGE			
CALL			
VALUE			

REMARKS

500 Yard Slow Fire Score Sheet

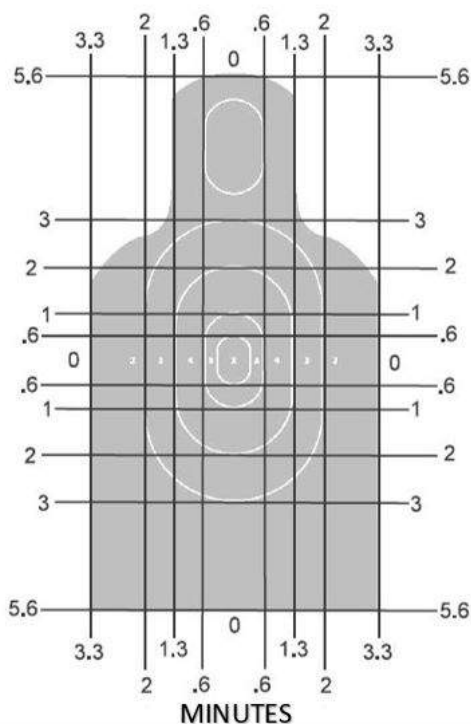


PLACE		DATE	
TARGET NO.		RELAY	HOUR
RIFLE NO.		AMMUNITION	
LIGHT DIRECTION 	WIND DIRECTION 	SIGHT PICTURE 	
TEMPERATURE	MPH	MIRAGE	
ELEVATION USED		WINDAGE USED	
ELEVATION CORRECT		WINDAGE CORRECT	
	S1	S2	1 2 3 4 5 6 7 8 9 10
ELEV.			
WIND.			
CALL			
VALUE			
		11 12 13 14 15 16 17 18 19 20	
ELEVATION			
WINDAGE			
CALL			
VALUE			

REMARKS

13

300 Yard Rapid Fire Score Sheet



PLACE		DATE	
TARGET NO.		RELAY	HOUR
PISTOL NO.		AMMUNITION	
LIGHT DIRECTION 	WIND DIRECTION 	SIGHT PICTURE 	
TEMPERATURE	MPH	MIRAGE	
ELEVATION USED		WINDAGE USED	
ELEVATION CORRECT		WINDAGE CORRECT	
X's	5's	4's	3's 2's M's
			SCORE

REMARKS

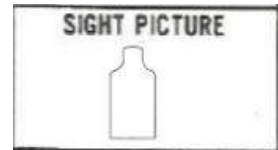
16

Yard Line	
Location	
Range	
Date	
Match	

	T1	T2	T3	T4	SCORE
X					
5					
4					
3					
2					
M					



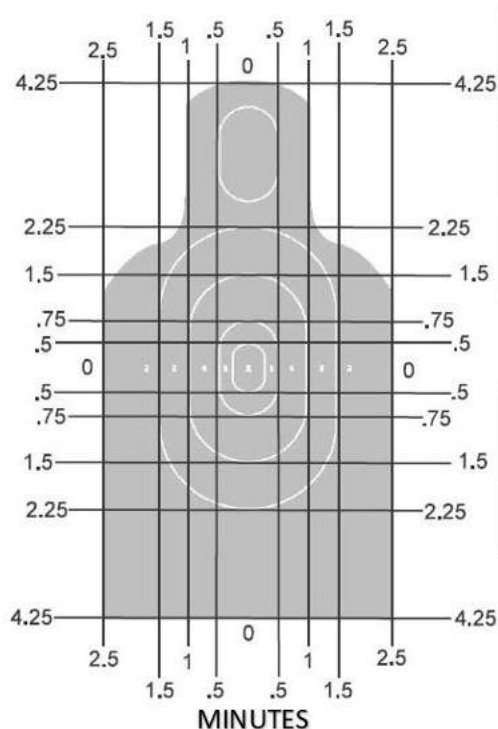
TOTAL SCORE



REMARKS

14

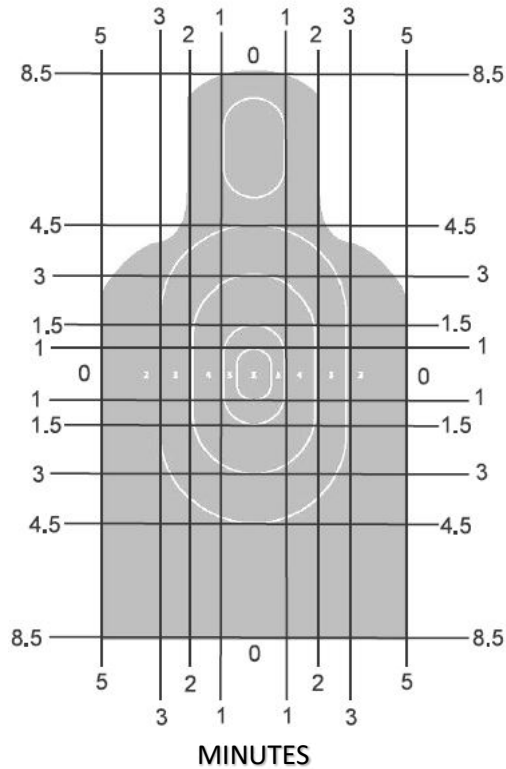
400 Yard Rapid Fire Score Sheet



PLACE		DATE	
TARGET NO.		RELAY	
PISTOL NO.		AMMUNITION	
LIGHT DIRECTION 	WIND DIRECTION 	SIGHT PICTURE 	
TEMPERATURE	MPH	MIRAGE	
ELEVATION USED		WINDAGE USED	
ELEVATION CORRECT		WINDAGE CORRECT	
X's	5's	4's	3's
2's	M's	SCORE	

REMARKS

200 Yard Rapid Fire Score Sheet



PLACE		DATE	
TARGET NO.	RELAY	HOUR	
PISTOL NO.		AMMUNITION	
LIGHT DIRECTION 	WIND DIRECTION 	SIGHT PICTURE 	
TEMPERATURE	MPH	MIRAGE	
ELEVATION USED		WINDAGE USED	
ELEVATION CORRECT		WINDAGE CORRECT	
X's	5's	4's	3's
2's	M's	SCORE	

REMARKS

17

Yard Line	
Location	
Range	
Date	
Match	

	T1	T2	T3	T4	SCORE
X					
5					
4					
3					
2					
M					



TOTAL SCORE

SIGHT PICTURE






REMARKS

19

100 Yard Rapid Fire Score Sheet

MINUTES

PLACE						DATE	
TARGET NO.			RELAY			HOUR	
PISTOL NO.			AMMUNITION				
LIGHT DIRECTION 		WIND DIRECTION 		SIGHT PICTURE 			
TEMPERATURE		MPH		MIRAGE			
ELEVATION USED				WINDAGE USED			
ELEVATION CORRECT				WINDAGE CORRECT			
X's	5's	4's	3's	2's	M's	SCORE	

RELOADING INFORMATION:

CASE TYPE _____ PRIMER _____
POWDER TYPE _____ GR.WT. _____
BULLET TYPE _____ GR.WT. _____

REMARKS

18


Yard Line	
Location	
Range	
Date	
Match	

	T1	T2	T3	T4	SCORE
X					
5					
4					
3					
2					
M					



TOTAL SCORE

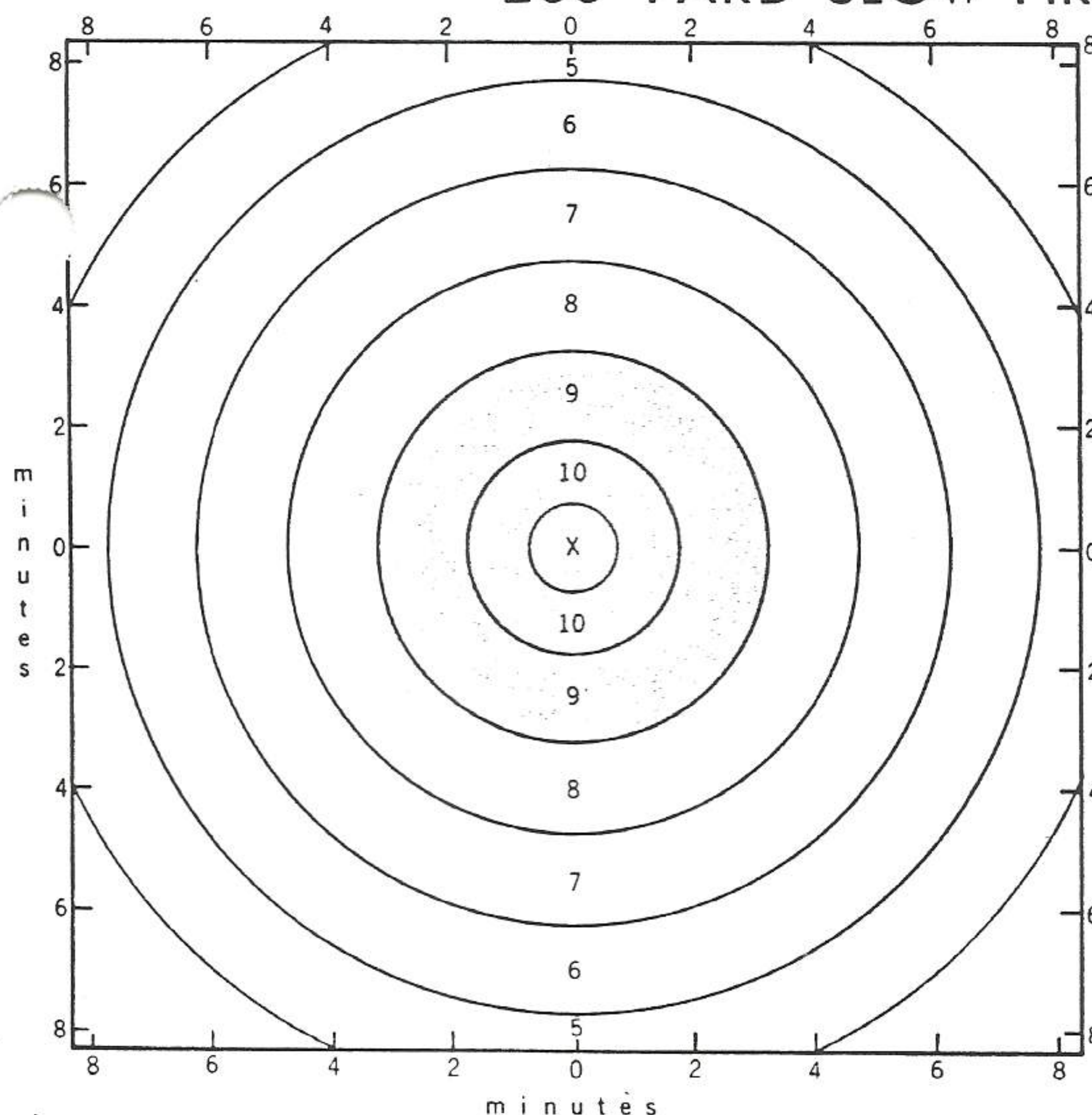
SIGHT PICTURE



REMARKS

20

200 YARD SLOW FIRE SCORE SHEET

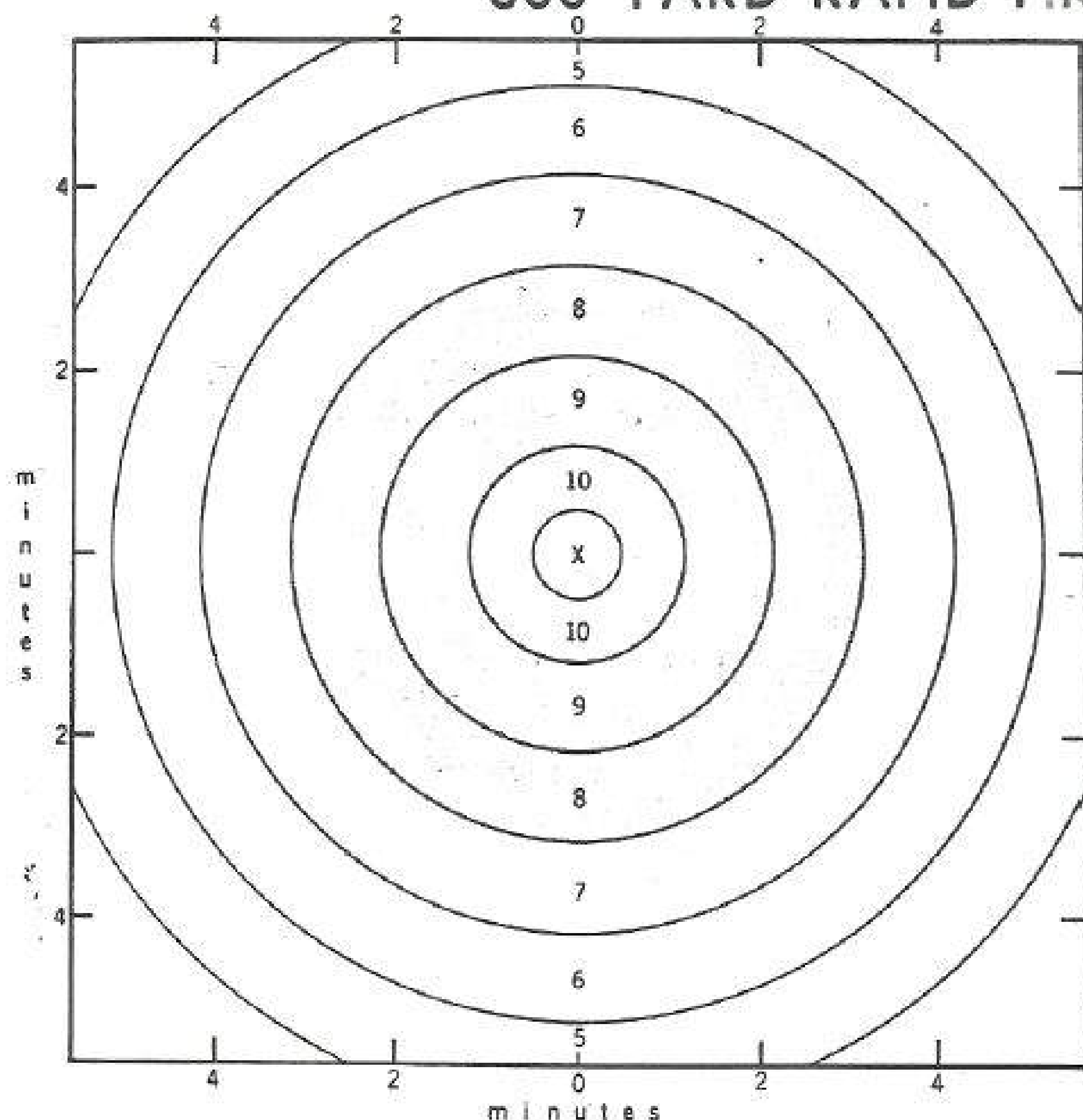


PLACE		DATE	
TARGET NO.	RELAY	HOUR	
RIFLE NO.		AMMUNITION	
LIGHT DIRECTION 	WIND DIRECTION 	SIGHT PICTURE 	
TEMPERATURE	MPH	MIRAGE	
ELEVATION USED		WINDAGE USED	
ELEVATION CORRECT		WINDAGE CORRECT	
	S1	S2	1 2 3 4 5 6 7 8 9 10
ELEV.			
WIND.			
CALL			
VALUE			
	11	12	13 14 15 16 17 18 19 20
ELEVATION			
WINDAGE			
CALL			
VALUE			
TOTAL SCORE			

RELOADING INFORMATION:

CASE TYPE _____ PRIMER _____
 POWDER TYPE _____ GR.WT. _____
 BULLET TYPE _____ GR.WT. _____

300 YARD RAPID FIRE SCORE SHEET

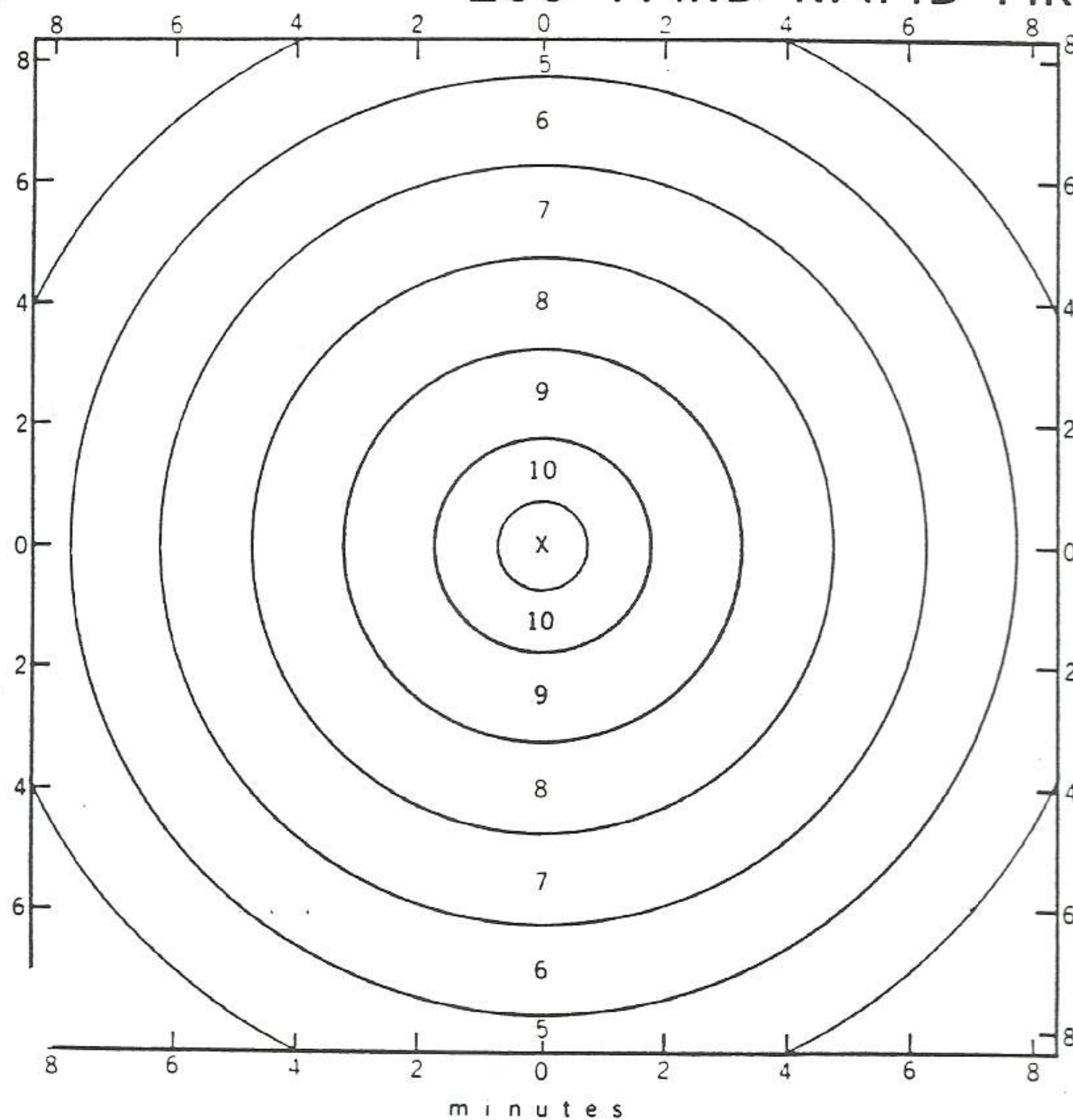


PLACE		DATE	
TARGET NO.	RELAY	HOUR	
RIFLE NO.		AMMUNITION	
LIGHT DIRECTION 	WIND DIRECTION 	SIGHT PICTURE 	
TEMPERATURE	MPH	MIRAGE	
ELEVATION USED		WINDAGE USED	
ELEVATION CORRECT		WINDAGE CORRECT	
FIRST STRING			SCORE
X's	10's	9's 8's 7's 6's 5's	
SECOND STRING			SCORE
X's	10's	9's 8's 7's 6's 5's	
TOTAL SCORE			

RELOADING INFORMATION:

CASE TYPE _____ PRIMER _____
 POWDER TYPE _____ GR.WT. _____
 BULLET TYPE _____ GR.WT. _____

200 YARD RAPID FIRE SCORE SHEET



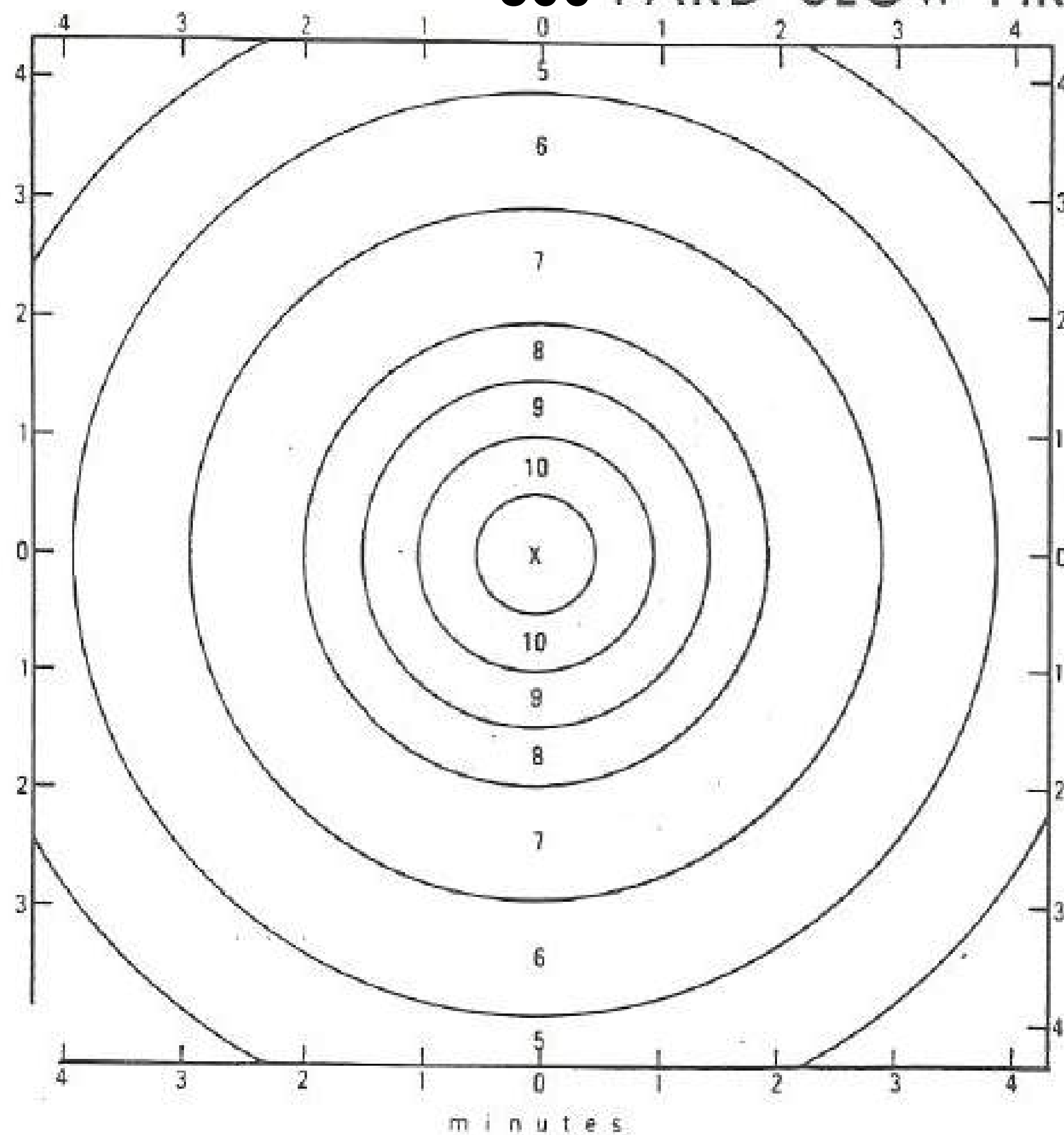
REMARKS

PLACE		DATE					
TARGET NO.		RELAY	HOUR				
RIFLE NO.		AMMUNITION					
LIGHT DIRECTION 	WIND DIRECTION 	SIGHT PICTURE 					
TEMPERATURE	MPH	MIRAGE					
ELEVATION USED		WINDAGE USED					
ELEVATION CORRECT		WINDAGE CORRECT					
FIRST STRING							SCORE
X's	10's	9's	8's	7's	6's	5's	
SECOND STRING							SCORE
X's	10's	9's	8's	7's	6's	5's	
TOTAL SCORE							

RELOADING INFORMATION:

CASE TYPE _____ PRIMER _____
POWDER TYPE _____ GR.WT. _____
BULLET TYPE _____ GR.WT. _____

500 YARD SLOW FIRE SCORE SHEET



REMARKS

PLACE		DATE		
TARGET NO.		RELAY	HOUR	
RIFLE NO.		AMMUNITION		
LIGHT DIRECTION 	WIND DIRECTION 	SIGHT PICTURE 		
TEMPERATURE	MPH	MIRAGE		
ELEVATION USED		WINDAGE USED		
ELEVATION CORRECT		WINDAGE CORRECT		
	S1	S2	1 2 3 4 5 6 7 8 9 10	SCORE
ELEV.				
WIND.				
CALL				
VALUE				
		11	12 13 14 15 16 17 18 19 20	SCORE
ELEVATION				
WINDAGE				
CALL				
VALUE				
TOTAL SCORE				

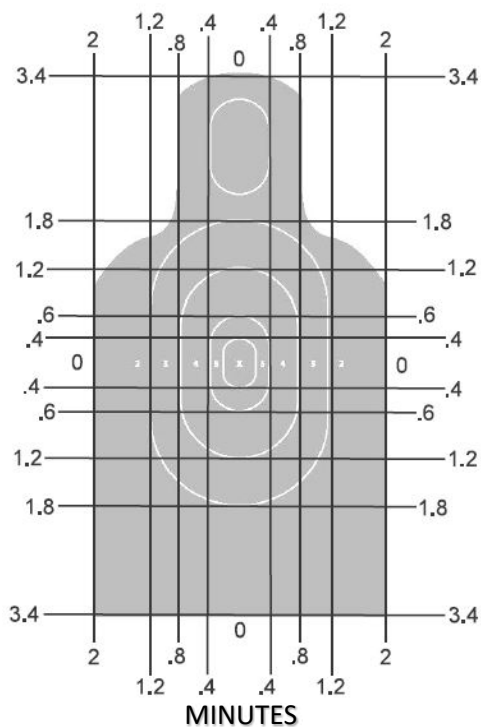
RELOADING INFORMATION:

CASE TYPE _____ PRIMER _____
POWDER TYPE _____ GR.WT. _____
RIFLE TYPE _____ GR.WT. _____

200
R
A
P
I
D

600
S
L
O
W

500 Rapid Fire Score Sheet

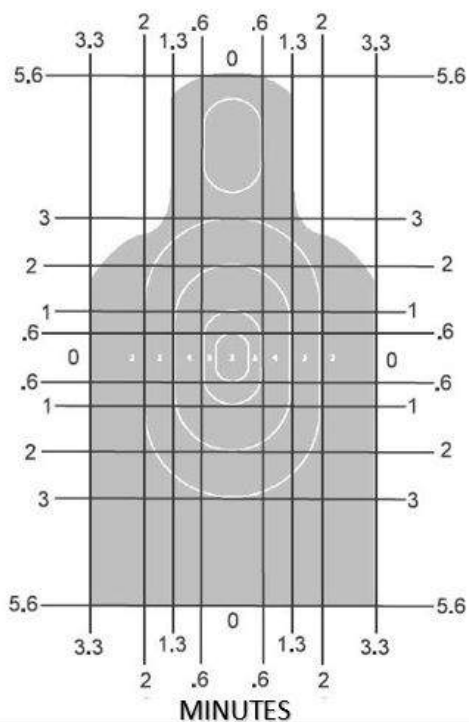


PLACE		DATE				
TARGET NO.		RELAY	HOUR			
PISTOL NO.		AMMUNITION				
LIGHT DIRECTION 	WIND DIRECTION 	SIGHT PICTURE 				
TEMPERATURE	MPH	MIRAGE				
ELEVATION USED		WINDAGE USED				
ELEVATION CORRECT		WINDAGE CORRECT				
X's	5's	4's	3's	2's	M's	SCORE

REMARKS

25

300 Yard Rapid Fire Score Sheet



PLACE		DATE				
TARGET NO.		RELAY	HOUR			
PISTOL NO.		AMMUNITION				
LIGHT DIRECTION 	WIND DIRECTION 	SIGHT PICTURE 				
TEMPERATURE	MPH	MIRAGE				
ELEVATION USED		WINDAGE USED				
ELEVATION CORRECT		WINDAGE CORRECT				
X's	5's	4's	3's	2's	M's	SCORE

REMARKS

27

REMARKS

26

REMARKS




28

RELOADING INFORMATION:

CASE TYPE _____ PRIMER _____
POWDER TYPE _____ GR.WT. _____
BULLET TYPE _____ GR.WT. _____

REMARKS

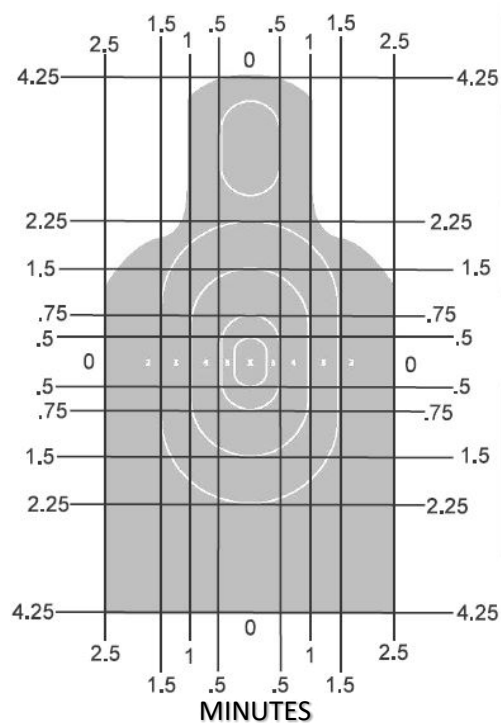
29

PLACE					DATE																																		
TARGET NO.					RELAY					HOUR																													
PISTOL NO.										AMMUNITION																													
LIGHT DIRECTION					WIND DIRECTION					SIGHT PICTURE																													
																																							
TEMPERATURE					MPH					MIRAGE																													
ELEVATION USED										WINDAGE USED																													
ELEVATION CORRECT										WINDAGE CORRECT																													
X's					5's					4's					3's					2's					M's					SCORE									

REMARKS

31

400 Yard Rapid Fire Score Sheet

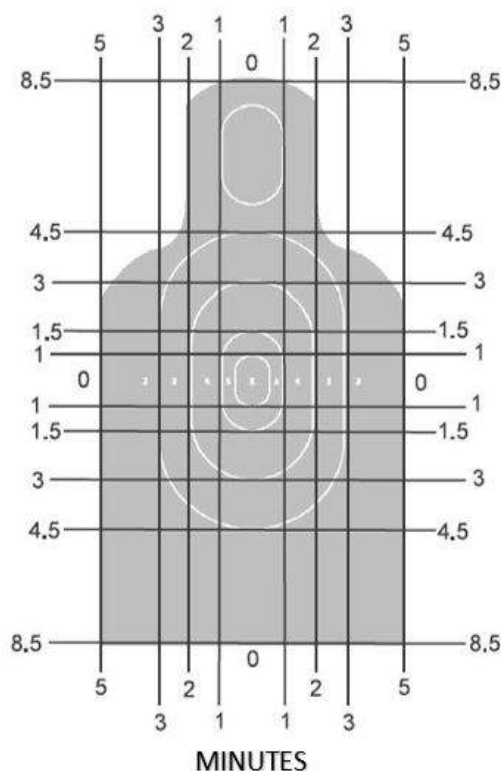


PLACE		DATE				
TARGET NO.		RELAY	HOUR			
PISTOL NO.		AMMUNITION				
LIGHT DIRECTION 	WIND DIRECTION 	SIGHT PICTURE 				
TEMPERATURE	MPH	MIRAGE				
ELEVATION USED		WINDAGE USED				
ELEVATION CORRECT		WINDAGE CORRECT				
X's	5's	4's	3's	2's	M's	SCORE

REMARKS

30

200 Yard Rapid Fire Score Sheet

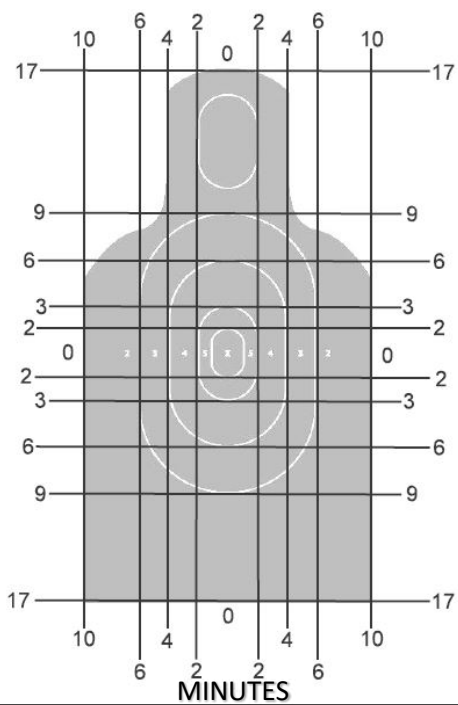





PLACE		DATE				
TARGET NO.		RELAY	HOUR			
PISTOL NO.		AMMUNITION				
LIGHT DIRECTION 	WIND DIRECTION 	SIGHT PICTURE 				
TEMPERATURE	MPH	MIRAGE				
ELEVATION USED		WINDAGE USED				
ELEVATION CORRECT		WINDAGE CORRECT				
X's	5's	4's	3's	2's	M's	SCORE

REMARKS

32

100 Yard Rapid Fire Score Sheet



PLACE						DATE	
TARGET NO.				RELAY		HOUR	
PISTOL NO.				AMMUNITION			
LIGHT DIRECTION 		WIND DIRECTION 		SIGHT PICTURE 			
TEMPERATURE		MPH		MIRAGE			
ELEVATION USED				WINDAGE USED			
ELEVATION CORRECT				WINDAGE CORRECT			
X's	5's	4's	3's	2's	M's	SCORE	

RELOADING INFORMATION:

CASE TYPE _____ PRIMER _____
POWDER TYPE _____ GR.WT. _____
BULLET TYPE _____ GR.WT. _____

REMARKS

33

Yard Line	
Location	
Range	
Date	
Match	

	T1	T2	T3	T4	SCORE
X					
5					
4					
3					
2					
M					



TOTAL SCORE

SIGHT PICTURE



REMARKS

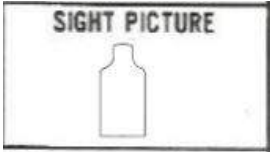
35

Yard Line	
Location	
Range	
Date	
Match	

	T1	T2	T3	T4	SCORE
X					
5					
4					
3					
2					
M					



TOTAL SCORE



REMARKS

34

400 Yard ITT Coach Score Sheet






<div>SIGHT PICTURE</div> <div>HITS</div> <div></div> <div>MINUTES</div>	<div>SIGHT PICTURE</div> <div>HITS</div> <div></div>	<div>SIGHT PICTURE</div> <div>HITS</div> <div></div>	<div>SIGHT PICTURE</div> <div>HITS</div> <div></div>	<div>SIGHT PICTURE</div> <div>HITS</div> <div></div>
---	--	--	--	--

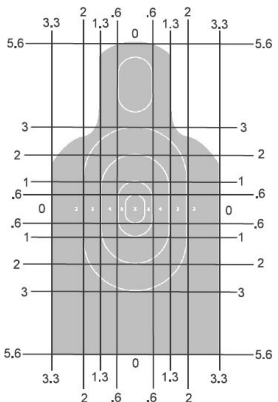
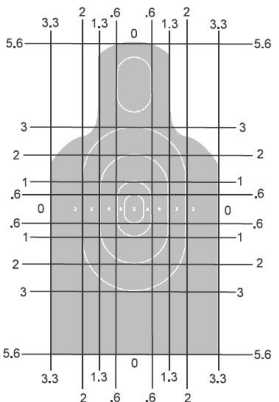
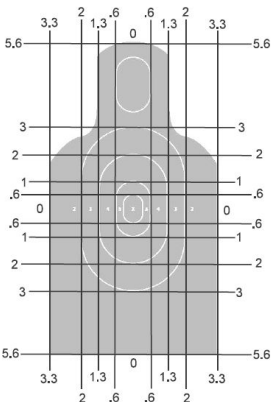
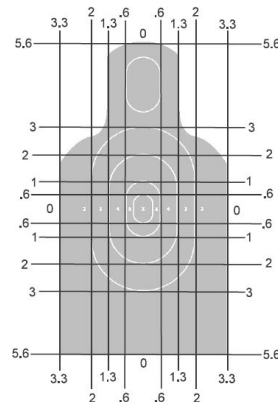
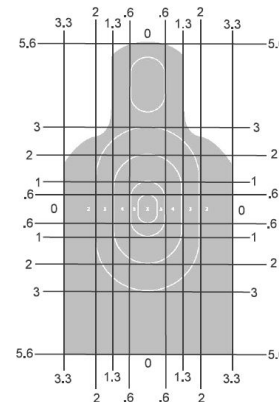
REMARKS

36

PLACE	DATE
TARGET NO.	RELAY
RIFLE NO.	AMMUNITION
LIGHT DIRECTION	WIND DIRECTION
TEMPERATURE	MPH
	MIRAGE



300 Yard ITT Coach Score Sheet

SIGHT PICTURE 	SIGHT PICTURE 	SIGHT PICTURE 	SIGHT PICTURE 	SIGHT PICTURE 
HITS 	HITS 	HITS 	HITS 	HITS

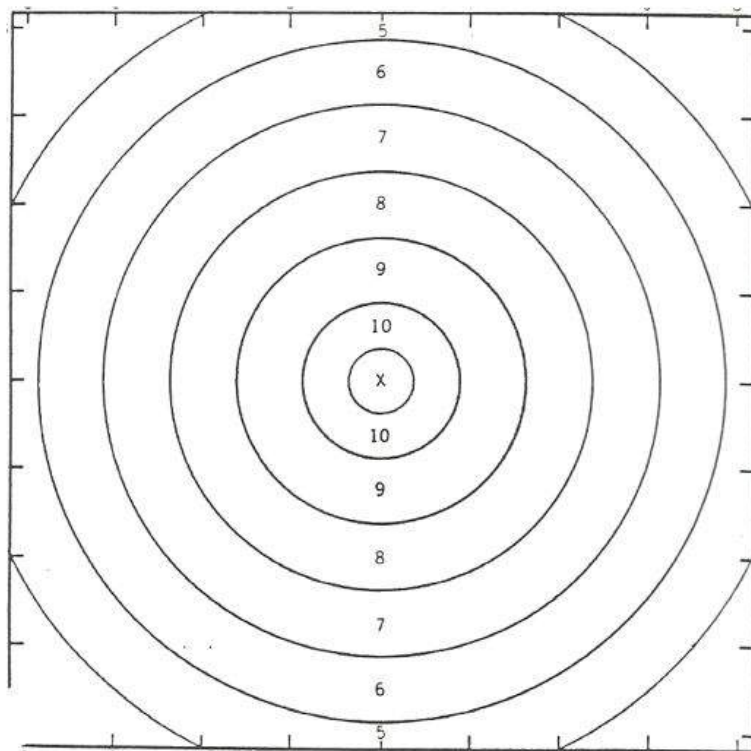
MINUTES

REMARKS




PLACE		DATE	
TARGET NO.	RELAY	HOUR	
RIFLE NO.		AMMUNITION	
LIGHT DIRECTION  TEMPERATURE	WIND DIRECTION  MPH	MIRAGE	

37

25 YARD TIMED FIRE SCORE SHEET



REMARKS

PLACE		DATE	
TARGET NO.	RELAY	HOUR	
PISTOL NO.		AMMUNITION	
LIGHT DIRECTION  TEMPERATURE	WIND DIRECTION  MPH	SIGHT PICTURE 	
ELEVATION USED		WINDAGE USED	
ELEVATION CORRECT		WINDAGE CORRECT	
X's	10's	9's	8's
7's	6's	5's	SCORE

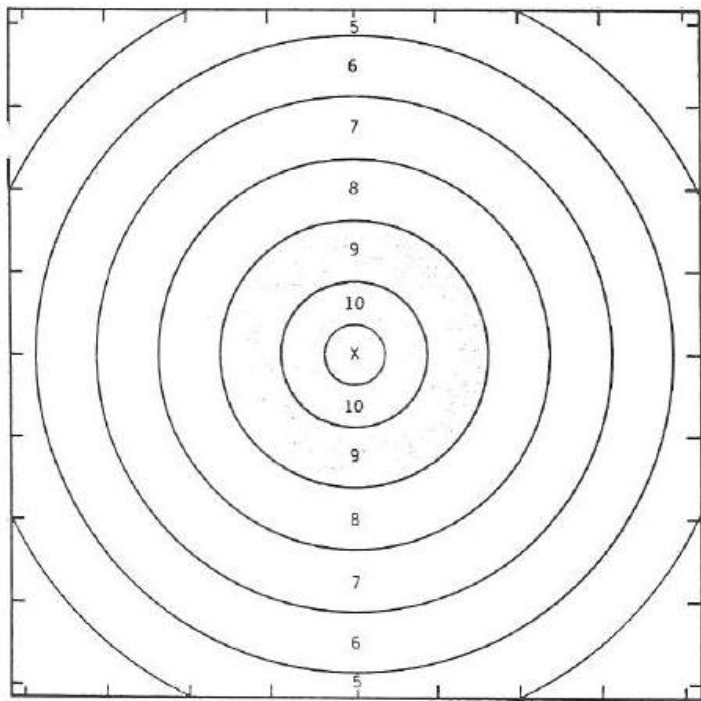
Aiming Black (inches)				Rings in White (inches)			
X ring	1.69	10 ring	3.36	8 ring	8.00	7 ring	11.00
9 ring	5.54	6 ring	14.80	5 ring	19.68		

RELOADING INFORMATION:

CASE TYPE _____ PRIMER _____
POWDER TYPE _____ GR.WT. _____
BULLET TYPE _____ GR.WT. _____

39

50 YARD SLOW FIRE SCORE SHEET



PLACE		DATE	
TARGET NO.		RELAY	HOUR
PISTOL NO.		AMMUNITION	
LIGHT DIRECTION 		WIND DIRECTION 	
TEMPERATURE		MPH	MIRAGE
ELEVATION USED		WINDAGE USED	
ELEVATION CORRECT		WINDAGE CORRECT	
S1 S2 1 2 3 4 5 6 7 8 9 10		SCORE	
ELEV.			
WIND.			
CALL			
RELOADING INFORMATION:			TOTAL SCORE

CASE TYPE _____ PRIMER _____
 POWDER TYPE _____ GR.WT. _____
 BULLET TYPE _____ GR.WT. _____

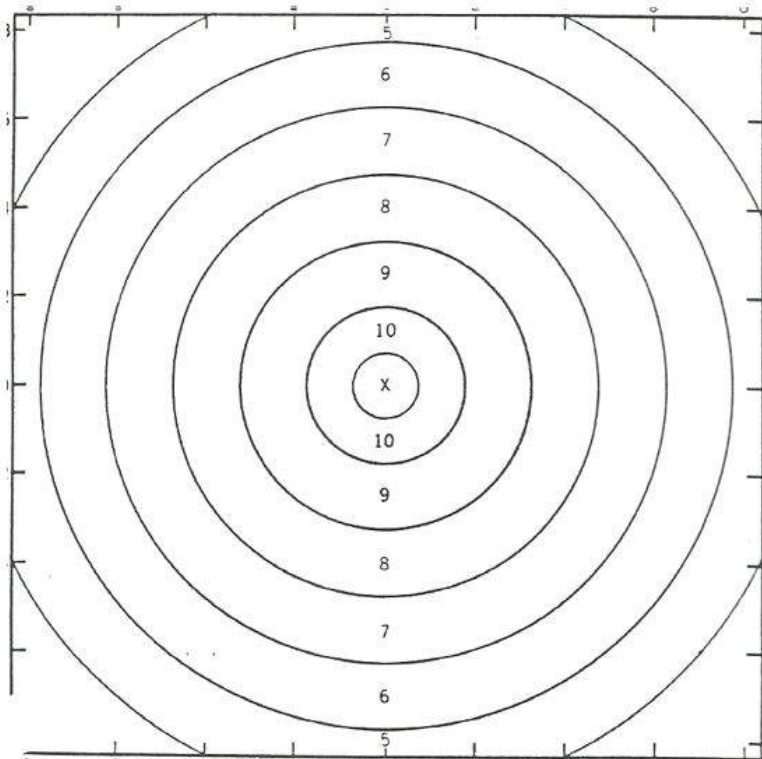
REMARKS

Aiming Black (inches)

Rings in White (inches)

X ring.....1.69 7 ring.....11.00
 10 ring.....3.36 6 ring.....14.80
 9 ring.....5.54 5 ring.....19.68
 8 ring.....8.00

25 YARD RAPID FIRE SCORE SHEET



PLACE		DATE					
TARGET NO.		RELAY	HOUR				
PISTOL NO.		AMMUNITION					
LIGHT DIRECTION 		WIND DIRECTION 					
TEMPERATURE		MPH	MIRAGE				
ELEVATION USED		WINDAGE USED					
ELEVATION CORRECT		WINDAGE CORRECT					
X's	10's	9's	8's	7's	6's	5's	SCORE

Aiming Black (inches)


Rings in White (inches)

X ring.....1.69 8 ring.....8.00
 10 ring.....3.36 7 ring.....11.00
 9 ring.....5.54 6 ring.....14.80
 5 ring.....19.68

REMARKS

RELOADING INFORMATION:

CASE TYPE _____ PRIMER _____
 POWDER TYPE _____ GR.WT. _____
 BULLET TYPE _____ GR.WT. _____

<div>BACK UP IRON SIGHT (BUIS)</div> 		DIMENSIONS			
		LENGTH	2.1 in	5.3 cm	
		WIDTH	1.3 in	3.3 cm	
		HEIGHT	1.5 in	3.8 cm	
		WEIGHT	4.3 oz	122 g	
		SINGLE CLICK			
			White Line		
		FUNCTION			
		M16A4	White Line		
		ZERO WINDAGE			
		M4	White Line		
		ZERO ELEVATION			
		M4A1	White Line		
		WINDAGE			
		M16A4	300 meter setting		
		ELEVATION (RANGE) FRONT SIGHT POST			
		M4A1	300 meter setting		
		LEGEND			
			1/2 MOA		
			3/4 MOA		
			3/4 MOA		
			1 1/2 MOA		
			2 MOA		
			2 MOA		

Minute of Angle (MOA)

1 MOA= 1 inch per 100 meters
1 MOA @ 200 meters= 2"
1 MOA @ 300 meters= 3"
1 MOA @ 500 meters= 5"

MOVING TARGETS/WIND
WITH SUBTRACT- TARGET MOVING WITH WIND= LESS LEAD
AGAINST ADD- TARGET MOVING AGAINST WIND=MORE LEAD

ACOG

MOA per click IRON SIGHTS

Elevation

Windage

1/3 min

ELEV & WIND

M16A2/3

1 MOA

1/2 MOA

1 1/4 MOA

M16A4

1/2 MOA

1/2 MOA

1 1/4 MOA

M4

3/4 MOA

3/4 MOA

1 1/4 MOA

Wind Formula

Range(meters) X Velocity(MPH)

10

= MOA Drift

(4)00mX 5 MPH

10

= 2 MOA

Example: 8in@400m

Holdoffs

3 mph

5 mph

10 mph

15 mph

41

300m

300m



General Zero Information		Weapon	M4A1
NAME			Mechanical Zero Conversion
Range	Elevation "Green Tip"	Elevation A1 "Brown Tip"	
100	8/3 + 0	8/3 + 0	
200	8/3 + 1	8/3 + 1	A1 to Green Tip Conversion
300	8/3 + 4	8/3 + 4	for 200 Yard Zero
400	8/3 + 10	8/3 + 8	6 MOA Down Front Sight
500	8/3 + 17	8/3 + 16	1.5 MOA Right
General Zero Information		Weapon	M4A1 - TA31F ACOG
NAME			
Range	Elevation "Green Tip"	Elevation A1 "Brown Tip"	Remarks
100	Tip of Chevron	Tip of Chevron	
200	Corner of Chevron	Corner of Chevron	
300	Top of Red Line	Top of Red Line	
400	4 Line	"430" Mark	
500	5 Line	"530" Mark	

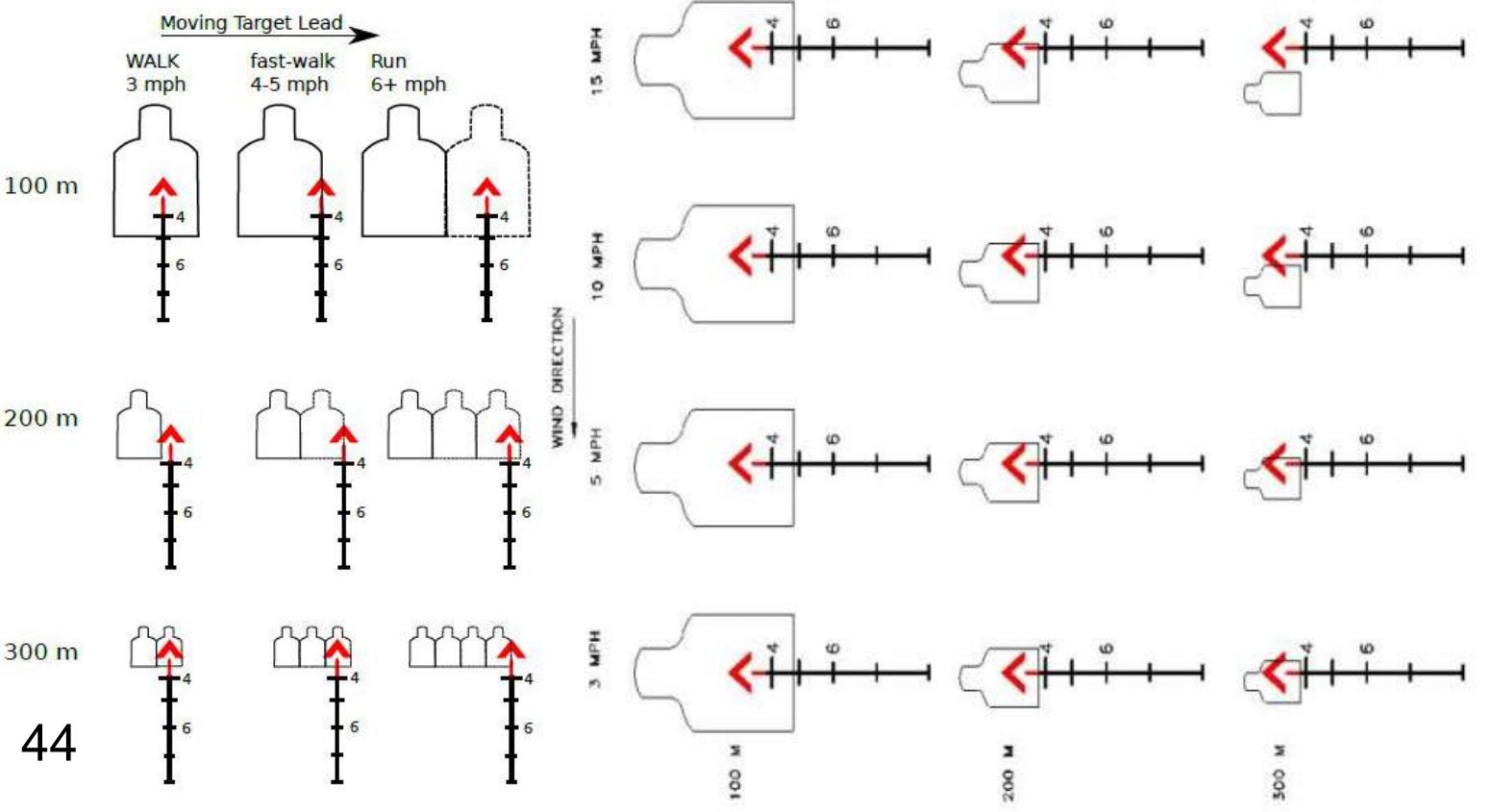
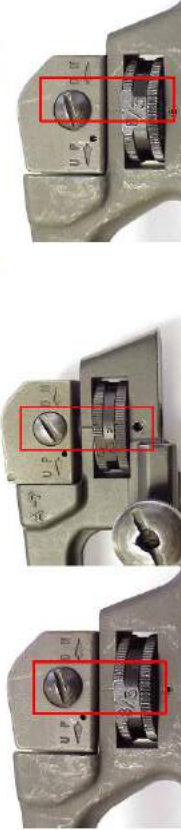
*General Rule: For each yard line **FROM 100 YARDS** the sights will need to be raised by approximately 3 MOA.



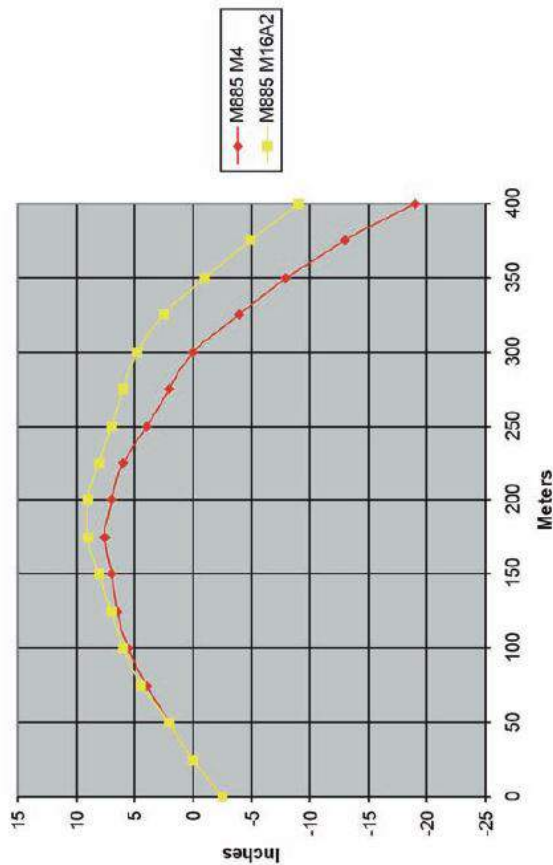
CARRYING HANDLE		DIMENSIONS	
LENGTH	7.3 in	18.5 cm	
WIDTH	3.5 in	9.0 cm	
HEIGHT	1.9 in	4.8 cm	
WEIGHT	20.8 oz	590 g	
FUNCTION	RIFLE	ADJUSTMENTS	
		M16A2	Center rear sight aperture for mechanical zero windage
ZERO WINDAGE	M16A4		
	M4		
	M4A1		
	M16A2		300 meter mark +1 click up for 25 m zeroing
ZERO ELEVATION	M16A4		Once zeroing is complete, rotate elevation knob -1 click down to apply 300 m zero
	M4		
	M4A1		
	M16A2		
WINDAGE	M16A4		1/2 MOA
	M4		1/2 MOA
	M4A1		1 MOA
	M16A2		1 MOA
ELEVATION (RANGE) FRONT SIGHT POST	M16A4		1 1/2 MOA
	M4		1 1/2 MOA
	M4A1		1 7/8 MOA
	M16A2		1 7/8 MOA
LEGEND			
BDC	bullet drop compensator	g	minute of angle
cm	centimeters	in	ounces

ZEROING AT 25 METERS

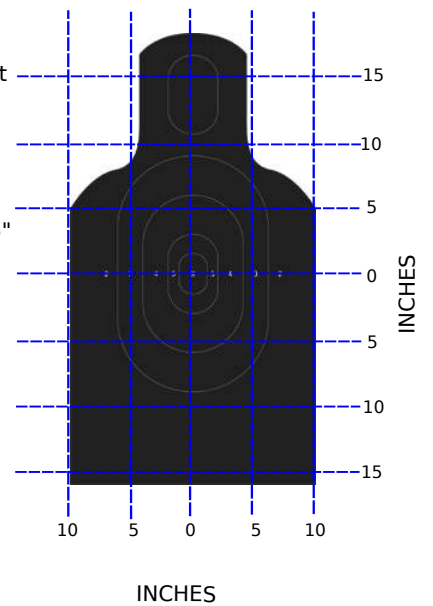
M16A2/A3 Up 1 click
M16A4 Up 2 clicks to Z setting on 300 setting
M4 Stays flush



Standard 25/300 Zero



EIC Combat Target
 Width: 20"
 Height: 34"
 X Ring: 2"x3"
 5 Ring: 4"x6"
 4 Ring: 8"x11.75"
 3 Ring: 12"x17.75"
 2 Scoring Area



WIND SPEED (mph)	RANGE (in meters)									
	25	50	75	100	150	175	200	250	300	
	DISTANCE MOVED (in inches)									
5	1/4	3/8	1/2	1	2	2.5	3.5	5	7.5	
10	1/2	3/4	1	2	4	5	7	10	15	
15	3/4	1-1/8	1.5	3	6	7.5	10.5	15	22.5	

DISTANCE (in meters)	DISTANCE 1 CLICK WILL ADJUST THE POINT OF IMPACT		
	Front Sight Post	Windage Knob	Elevation Wheel
	(in inches)	(in inches)	(in inches)
25	.83cm (3/8 in.)	.33cm (1/8 in.)	.5cm (1/4 in.)
50	1.5cm (5/8 in.)	.5cm (1/4 in.)	1.5cm (1/2 in.)
75	2.5cm (1 in.)	1.0cm (3/8 in.)	2.0cm (3/4 in.)
100	3.5cm (1 3/8 in.)	1.5cm (1/2 in.)	2.75cm (1 in.)
150	5.0cm (2 in.)	2.0cm (3/4 in.)	4.0cm (1 1/2 in.)
175	6.0cm (2 3/8 in.)	2.25cm (7/8 in.)	5.0cm (2 in.)
200	6.5cm (2 5/8 in.)	2.5cm (1 in.)	5.5cm (2 1/4 in.)
250	8.5cm (3 3/8 in.)	3.5cm (1 1/4 in.)	7.0cm (2 3/4 in.)
300	10.0cm (4 in.)	4.0cm (1 1/2 in.)	8.5cm (3 1/4 in.)
400	13.5cm (5 3/8 in.)	5.5cm (2 1/4 in.)	11.0cm (4 1/2 in.)
500	17.0cm (6 2/3 in.)	6.5cm (2 1/2 in.)	14.0cm (5 1/2 in.)
600	20.5cm (8 1/5 in.)	8.0cm (3 1/8 in.)	16.75cm (6 1/2 in.)
700	24.0cm (9 4/5 in.)	9.0cm (3 5/8 in.)	19.5cm (7 1/2 in.)
800	27.5cm (10 3/4 in.)	10.5cm (4 1/8 in.)	22.5cm (8 3/4 in.)

NOTE: All values are rounded off.

265 Yard Zero

