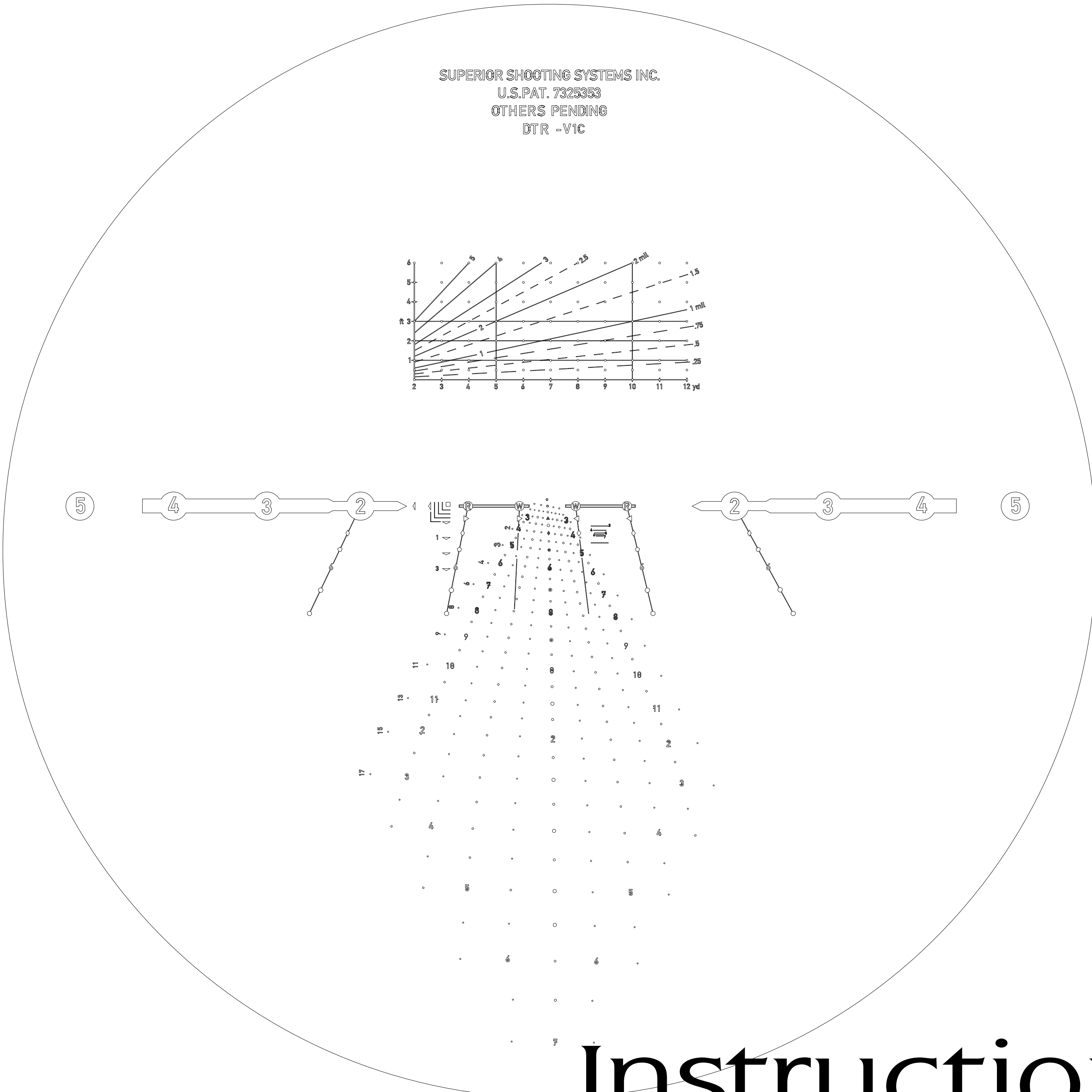
DYNAMIC TARGETING RETICLE

DTR™

WITH DRi (DISTANCE REDUCTION INDICATOR) ACCESSORY DEVICE



Instruction Manual

YARDS VERSION

DTR: US PATENT
#7,325,353; 8,701,330; 8,701,423; 9,121,672;
9,175,927 OTHERS PENDING

DYNAMIC TARGETING RETICLE DTR™

Overview and Manual Content

Contents

Test-drive DTR: **http://dtr.leestearns.com**
then username: **dtubb**, password: **dtr**
Always hit "refresh" on your web browser to ensure latest content.

Many things in this manual are interactive. Example: click on the section headings to go to that section. In the interest of best readability, not all links are visible, but we think you will find them to be accessible and logically positioned.

IN THIS EDITION OF THE DTR INSTRUCTION MANUAL we have included links to .PDF files that will enhance your knowledge and understanding of components and ideologies that make up the DTR system. There are several articles by David Tubb and also reference materials available for immediate viewing. These links are placed where appropriate within the manual, and are also contained on two pages at the back of this manual.

Also, look for "NOTES" icons placed throughout. Clicking on a NOTE icon will reveal additional textual information and also illustrations to clarify the material at hand.

DAVID TUBB (inventor of the DTR system) is one of the world's most accomplished rifle shooters. His wins include:

11 NRA National High Power Rifle championships at Camp Perry, Ohio (200, 300, 600 yards — fired from standing, sitting, and prone positions, plus rapid-fire events)

6 NRA High Power Long Range Rifle championships (with two national records, including a perfect championship aggregate score) at Camp Perry, Ohio (600, 800, 900, 1000 yards)

2 Wimbledon Cup titles at Camp Perry, Ohio (1000 yards)

1 Leech Cup title at Camp Perry, Ohio (1000 yards)

1 NRA National High Power Rifle Anysight Tactical Rifle championship

1 World Long Range Rifle Champion 2015-2019 (Sr. Div.)

Including his numerous NRA High Power Silhouette and Smallbore Rifle titles, David has won over 40 open, individual National Championships.

For more information on the science, design, and adaptability of the DTR, download our *Reference Materials* publication at www.DavidTubb.com

1 DTR Design Philosophy

David Tubb's Dynamic Targeting Reticle – **DTR** – is revolutionary and unique in many ways, most fundamentally because the firing solution is expressed in YARDS of range and MPH of crosswind velocity rather than angles (MILS or minutes of angle, MOA). Additionally the DTR provides automatic correction for the gyroscopic properties of downrange bullet flight on the *x* (horizontal) and *y* (vertical) axis (with or without the wind) none of which are provided by any other reticle. As a direct result of these unique capabilities, the shooter can develop precise long-range firing solutions faster than with any other reticle. And it is SPEED that defines the superiority of DTR.

The fact that this manual is probably the most lengthy and detailed ever written for a telescopic sight reticle might lead you to think that the reticle is hard to use. However, the truth is just the opposite: this manual is complex because the reticle automatically does so much for the shooter – explaining how it does it takes an extensive manual! The reason other reticles don't require complex manuals is that, by comparison to the DTR, they do very little *for* the shooter. If you are shooting a corresponding BC (ballistic coefficient) bullet and the muzzle velocity and current atmospheric conditions match your DTR's Nominal Assignment Value, all you have to do is call the range in YARDS and wind in MPH, place the dot(s) to center the target and release the shot. It is literally a point-and-shoot reticle out to the maximum range of your bullet. When any conditions change, it's very simple to reassign a density-corrected value to the DTR using an easy calculation. All the information you need is built into the scope itself. No other reticle even comes close to the DTR for providing extremely fast and precise dynamic targeting solutions.

Manual Organization

Section 2, DTR Overview identifies and then provides a look at each of the reticle's components.

Section 3, Using Your DTR contains the details required to use the reticle including determining range, air density, and angle firing solution.

Section 4, Usage Examples provides detailed examples of developing firing solutions.

Section 5, Density Adaptability discusses and illustrates the use of the DTR with different ammunition velocities and specifications.

Additionally, a detailed ***DTR Reference Materials*** manual provides information about air density, sensors, graphs, angles, ballistics, mounting the scope, zeroing, and more. This separate publication is available for download at **www.DavidTubb.com**.

There are also links to .PDF file publications throughout this manual. There are articles by David Tubb and additional reference materials available for instant viewing. They are also available at **www.DavidTubb.com.**

For those in a hurry, take a look at the ***Fast-Track*** publication that will get you on-target with DTR very quickly. This is shown on page 29.

1 DTR Design Philosophy

The design goal was to create a complete telescopic sighting system that encompasses the following attributes:

1. A system that is very quick to use and allows for shots from point blank range to well beyond 1000 yards. Time element was a huge factor in this design. Time is what wins most engagements.

2. A system that does not require the user to be dependent upon auxiliary computer or data book which take your attention away from the target and whose failure or loss would leave you ineffective. However, a DTR Ballistics App is included for extreme long-range situations.

3. A system that accommodates changing atmospheric conditions, allowing its use in any geographic location.

4. A system that provides the means to accurately measure distance in YARDS and determine EHP in YARDS — no conversion to MILS or MOA. (METER reticle works the same.)

5. A system that requires only the most simple of mathematical calculations by the user.

6. A system that calls wind in MPH and holds wind in MPH — no conversion to MILS or MOA (call in MPH, hold in MPH), along with allowing for the vertical component of a crosswind.

7. A system that accounts for the boundary layers of wind flow.

8. A system that accounts for gyroscopic precession, thus giving the user a true No Wind Zero at each central aiming dot.

9. A system that allows effective yardage hold points with no external corrections under all atmospheric conditions (meters in METER reticle).

12. A system that provides angle firing solutions without referencing cosines by using a simple Hold Closer Distance method.

Meeting all these goals was accomplished by employing one simple solution:

Providing graphs or correction #s etched into the scope body and in the reticle itself to facilitate ranging and ballistic computations. This allows the user to make compensations for varying shooting conditions without looking away from the scope. Graphs are powerful tools to display reference data and perform "no math" computations.

1 DTR Design Philosophy

There are many factors that influence the flight of a bullet. The goal is always a quick, accurate shot.

Our goal with the Dynamic Targeting Reticle was to develop a system that takes virtually all influential factors into account, addresses them, and provides "on the fly" compensations so the operator may quickly and accurately determine the firing solution. This "equation" gives you an idea of all that is at work. With the DTR, instead of these factors working against you and requiring excessive calculations, they now work for you — automatically!

The flat-fire trajectory (no firing angle) of a projectile can be characterized as follows:

[The Complete Flat Fire Trajectory (*Bullet Flight Phenomenon, no angle*)] = [The Flat Fire Point Mass Trajectory (*Bullet affected by gravity and air density*)]

+

[Gyroscopic Properties of the Bullet's Flight] on the *x* and *y* axis (horizontal / vertical)

+

[Epicyclic Swerve (Coreolis effect) (*Other small aerodynamic forces*)]

Source credit: "A Hybrid Supersonic/Subsonic Trajectory Model for Direct Fire Applications" Paul Weinacht, Army Research Laboratory

2 DTR Overview

Several DTRs are available for a number of popular bullets. This particular manual is for a .308, 175 gr. Sierra Match King bullet. The bullet path will correspond to the reticle at the following combinations of muzzle velocities and air densities:

-1k DA = 2700 FPS
0k DA = 2675 FPS
1k DA = 2650 FPS
2k DA = 2625 FPS
3k DA = 2600 FPS
4k DA = 2575 FPS
5k DA = 2550 FPS
6k DA = 2525 FPS
7k DA = 2500 FPS
8k DA = 2475 FPS
9k DA = 2450 FPS

Nominal Assignment Values (NAV)

When you set up your rifle system, you chronograph your rifle and pick the Density Altitude number which matches rifle velocity. *(If you do not have a chonograph, see page 27.)* These conditions which result in a bullet path that matches the reticle is referred to throughout this manual as the "Nominal Assignment Value" (NAV). This is a velocity-based assignment value and literally is your "nav point" for using the DTR. The scope legend, viewed by zooming back to the minimum magnification, shows the model and revision number of the reticle from which can be determined the main conditions which match the reticle. When you shoot at different Density Altitude numbers you will use the Air Density Correction (ADC) numbers (the Lazy #s) to the left of the reticle to make an effective hold point calculation.

The illustration on page 7 indicates several elements of the reticle:

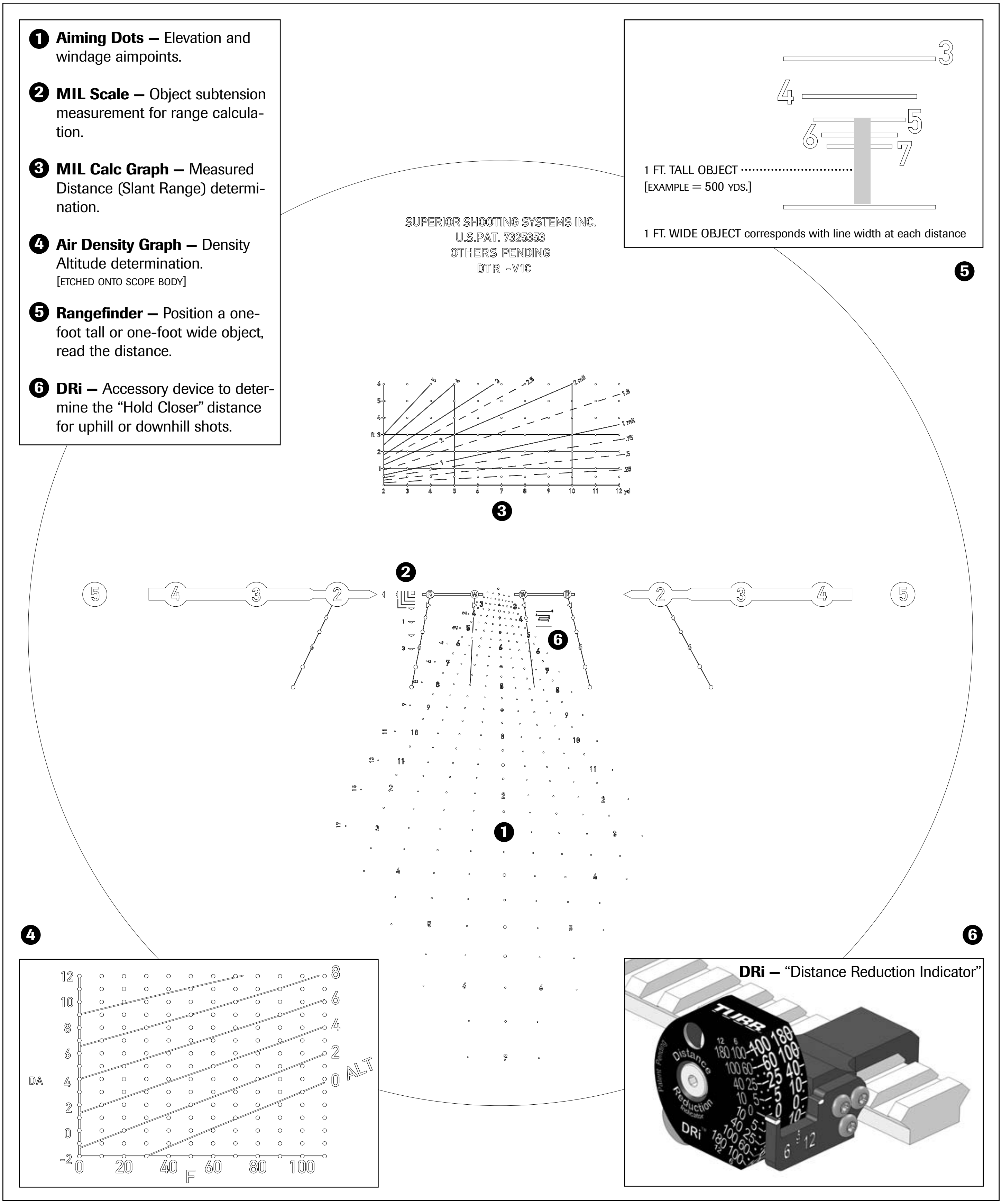
1. **Aiming Dots —** Elevation and windage aimpoints.
2. **MIL Scale —** Object subtension measurement for range calculation.
3. **MIL Range Graph —** Measured Distance (Slant Range) determination.
4. **Air Density Graph —** Density Altitude determination (etched onto scope body).
5. **"One-Foot" Rangefinder —** Position a one-foot tall object on the bottom line, read the range in hundreds of yards along the line that touches the top of the object. Each line is also one foot in width at those distances, so they can function on horizontally-oriented objects.

! **"Hold Closer" Distance** (angle firing solution) determination is handled by the DRi accessory device, details on page 10 and 15.

This section provides a brief introduction to each of the reticle's main features at a summary level of detail. Section 3, "Using the DTR" contains the details required to use the reticle. Section 4, "Usage Examples" provides detailed examples of developing firing solutions. Note that the illustration on page 7 is how the composite reticle appears when viewed through the scope at minimum power.

Next we'll look at DTR components in more detail.

2 DTR Overview

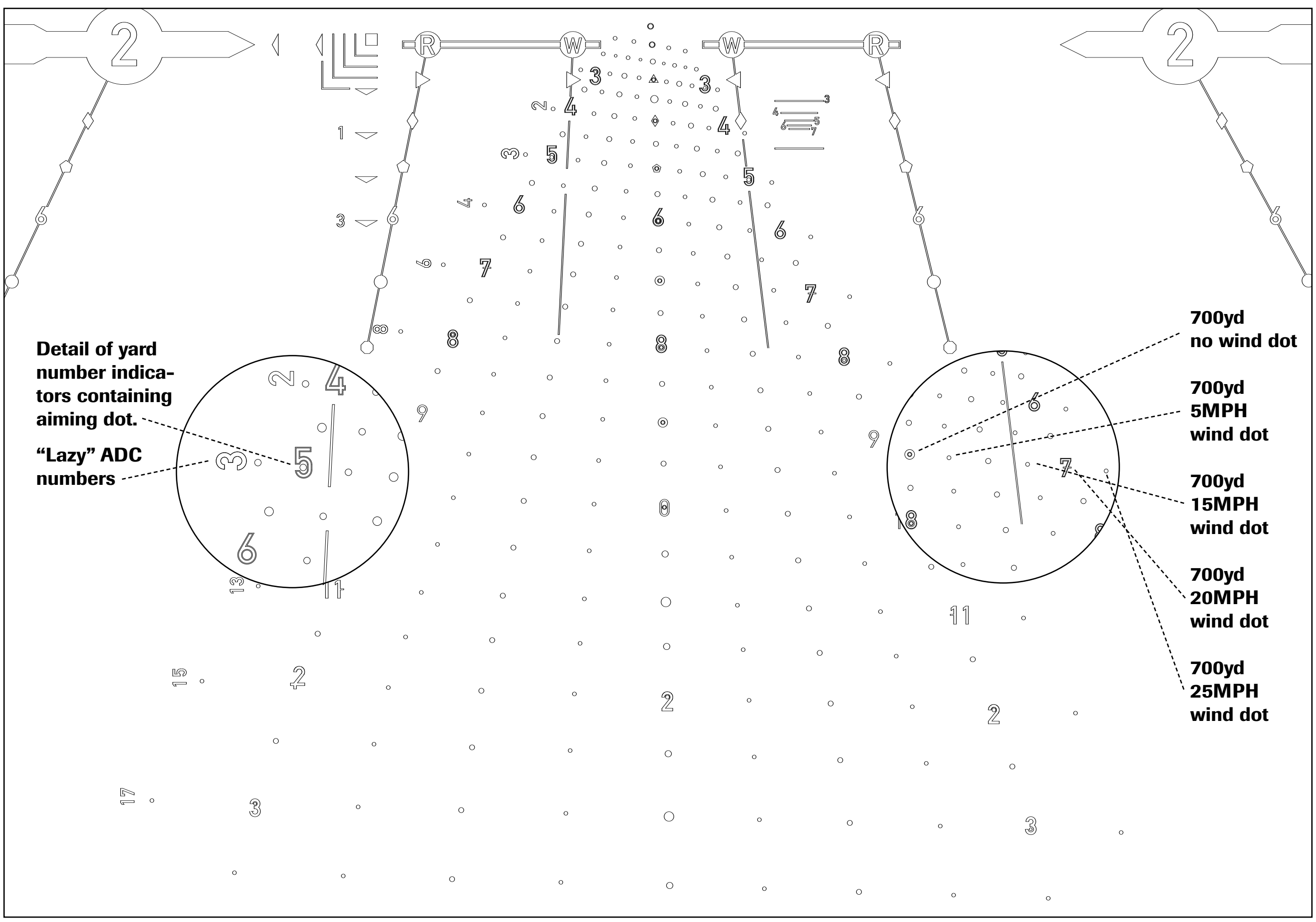


2 DTR Overview

Aiming Dots / Gyroscopic Properties (GP)

Each DTR is a bullet-drop compensated reticle. The DTR in this manual was designed for a 175gr .308. It is perfectly useable with other combinations, and adapting your DTR to accommodate another combination is discussed later in this manual. The aiming references are displayed in YARDS of range and MPH of cross wind rather than angles (MOA or MILS). The primary objects are the aiming dots arrayed in a column marked with yard markers at 100 yard intervals with 50 yard dots in between as shown. Rifling produces Gyroscopic Precession (GP). The spin imparted to a bullet is kind of like a curve ball thrown by a pitcher in that the direction of rotation influences its flight. Notice that the central column of aiming dots does not go down in a straight line (as in other reticles). This line slants toward the right to correct for GP of the bullet (the reticle is designed for right-hand rifling twist). This correction is important at ranges as close as 200 yards. At maximum range, this correction can equal several MOA. No other reticle provides GP correction, which is crucial in accounting for your TRUE "No Wind Zero" (no wind conditions) at distance. The bullet drifts in the direction of the rifling twist.
Right twist = Right drift.

Starting at 250 yards, windage hold points are placed in 5 mph increments, each 50 yard increment. Numbers, starting at 3, represent the 100s of yards for a given row of aiming dots; these also function as



The longer the Time of Flight (TOF) the greater the lateral drift of the bullet. A .308 Sierra 175gr at 2600 fps in an 8-twist barrel has approximately 11 inches of lateral movement at 1000 yards.

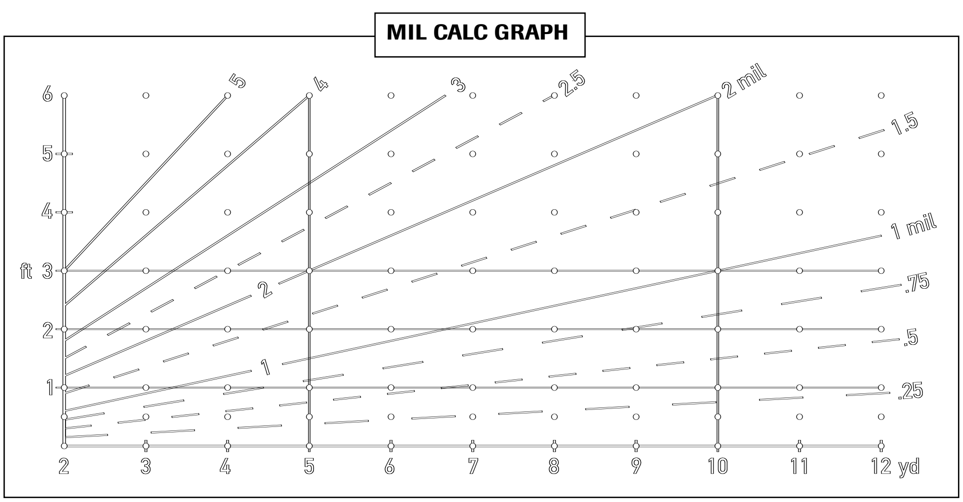
the 20 mph crosswind dots. Each number contains a dot or cross which is the aiming point. There are 25 mph aiming dots each 100 yards; these dots are outside the yard number. (**Note:** Central dots subtend 1/2 MOA; wind dots subtend 3/8 MOA.)

Placement of the windage hold points in the DTR address additional phenomenon which are not included in any other reticle: Crosswind Jump (CJ), Dissimilar Wind Drift (DWD), and Boundary Layers of Air Flow.

Gyroscopic and aerodynamic effects together cause a right-hand spinning bullet to strike higher in a right crosswind and lower in a left crosswind; the higher the wind velocity the larger the CJ. From an 8-twist barrel, a 10 mph crosswind at 200 yards will give an impact shift of 1/2 MOA. Increase wind velocity to 20 mph and the CJ increases to 1 MOA. Thus, the wind drift hold points are high on the left and low on the right resulting in a tilted or angulated array within the reticle.

Based on rigorous testing, it can be authoritatively stated that right-hand spinning bullets are deflected more by a right crosswind than by a left crosswind; and conversely for left-hand-twist barrels. Exhaustive, precise firing data have recently reconfirmed this phenomenon. Simultaneous (volley) firings were used to evaluate both left and right crosswind conditions using paper targets with both right-twist and left-twist barrels on otherwise identical TUBB 2000 rifles at long ranges. Thus the windage dot placement on the reticle is not symmetrical. With a right-twist rifle, right wind deflections (on the left side of the reticle) are larger than left wind deflections (virtually all rifles have right-twist barrels). To put this in perspective, say we are shooting a .308 in a 10 MPH crosswind at 1000 yards. For this right-twist barrel, if it's a left wind rather than a right wind, the difference is equivalent to being 100 yds closer. *(References: Harold Vaughn "Accuracy Facts," and McCoy "Applied Ballistics," plus our own tests.)* *(See also "DWD Testing" article on page 29.)*

The DTR provides an additional targeting aid found on no other reticle: **aiming references for moving targets** that are located along a horizontal line adjacent to the central 200 yard aiming dot. These are for 3MPH (walking); 9MPH (running) out to 800 yards; and also 20MPH, 30MPH, 40MPH, 50MPH lead aiming points. Using the bold horizontal line at low power allows for close-distance use.



Range Measurement

Besides the One-Foot Rangefinder, the DTR provides ranging capability with two features: the MIL Scale and the MIL Calc Graph (shown on left). With the scope set at a medium power the MIL Scale is visible to the left of the horizontal stadia line. The isosceles triangles are separated by one MIL (3.6 moa) and the lines are 1/4 MIL. Then once the subtended angle of the object of known size is determined, the **MIL Calc Graph**, visible at low power above the aiming dots, is used to determine Measured Distance.

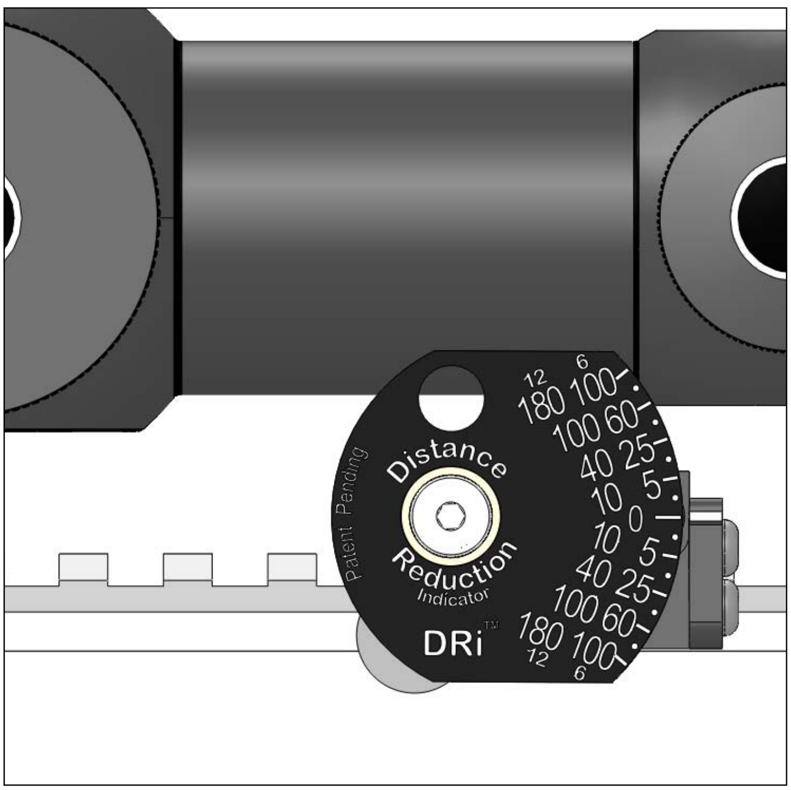
2 DTR Overview

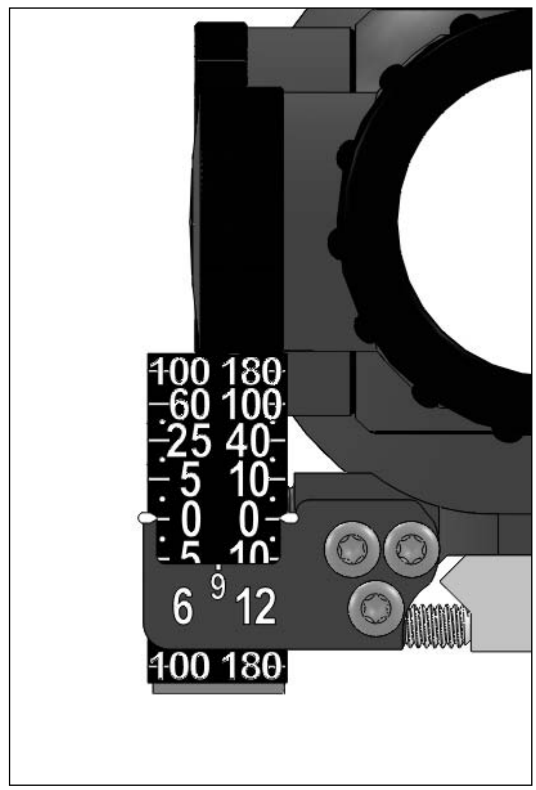
Angle Firing Solutions – DRi Accessory Device

The DRi (“Distance Reduction Indicator”) accessory device provides solutions to correct for the effect of elevated or depressed targets — angle firing. No matter if it’s uphill or downhill, firing on an angle results in the bullet hitting high. The shooter must make a compensation in the holding point to correct for this.

To enhance the accuracy and speed of determining this “Hold Closer Distance,” the user abandons the need for cosine or angle calculations / tables and replaces that with a mechanical accessory that mounts to the Picatinny rail on your rifle and shows you directly and accurately the Hold Closer Distance.

The Hold Closer Distance approach lets you quickly see what effect firing angle change will have on your Effective Hold Point (EHP). The numbers on the DRi dial indicate the amount to hold closer for different built-in distances (600, 900, 1200 yards/meters) on the device (for other distances, it’s easy to interpolate using only basic arithmetic). The DRi device use is detailed further on Page 15.





Air Density

A good understanding of air density is necessary to get the best performance from your DTR because density variations dramatically affect the bullet path. We recommend the use of an iPhone with the (included) DTR Ballistics App, linked to your local weather station. However, if none is available, the Air Density Graph shown on page 12 allows you to estimate the density of the air and determine Density Altitude. This graph is etched onto the front bell of the scope body.

As noted, your DTR will provide accurate targeting over a large range of density and muzzle velocity combinations so operating in air of different density is no problem. If you know the geographic altitude and the temperature, you can approximate Density Altitude with the graph.

2 DTR Overview

Dissimilar Loads

While each DTR is optimized for a specific bullet and velocity range, any of our reticles will provide excellent results when used with any combinations of ballistic coefficient and muzzle velocity. In conjunction with the DTR Ballistics App, this allows the reticle to be useable with any bullet/velocity combination. The optimum trajectory on which each reticle is based is engraved on the scope cap. Infinite compatible sets of BC, velocity, and air density can be easily determined using the DTR Ballistic Program.

Now that you are familiar with the components contained in the DTR, and their function, following the next section guides you through their use. We'll also describe a few other features built into your DTR.

This section describes in complete detail the steps required to develop a field-expedient firing solution. We assume that you are going to be in a dynamic environment where the conditions change rapidly especially the range as often happens in hunting situations. Additionally, wind and sometimes slope change quickly. Factors which don't normally change quickly are bullet type, velocity, and air density.

The need for accuracy is a given; it's probably the most talked about characteristic of any weapon. However, of equal importance and less often discussed is the need for speed. Prior to the development of the Dynamic Targeting Reticle, the requirement for extreme accuracy and speed were usually mutually exclusive.

Preparation

The following describes the process of defining the correct aiming dot for a complex firing solution. Assuming that you have become familiar with your rifle's velocity and have assigned the reticle a value based on that velocity and current temperature if using a temperature-sensitive propellant, the sequence is:

1. Know the *current* Air Density (DA). This is likely to be different than your reticle Nominal Assigned Value (NAV).

2. Determine the Measured Distance to the target, in YARDS (Slant Range, perceived target distance).

5. If there is a measurable uphill/downhill angle, use the DRi to determine your Hold Closer Distance.

3. Determine the Density Corrected Hold Point by correcting for air density (DA):

DISTANCE IN YARDS = (**NOMINAL DA** or **NAV – CURRENT DA**) x **ADC#** ["Lazy Numbers" next to yd.# indicators]

YD = (**FACTOR#**) x **ADC#**

Simplified: YD = FACTOR# x ADC# **Factor Number can be positive or negative!**

4. Determine the wind hold in miles per hour (MPH) corrected for vector (fractional) angle if wind direction is not 90° (true crosswind).

6. Select the Effective Hold Point (EHP) aiming/hold location and release the shot.

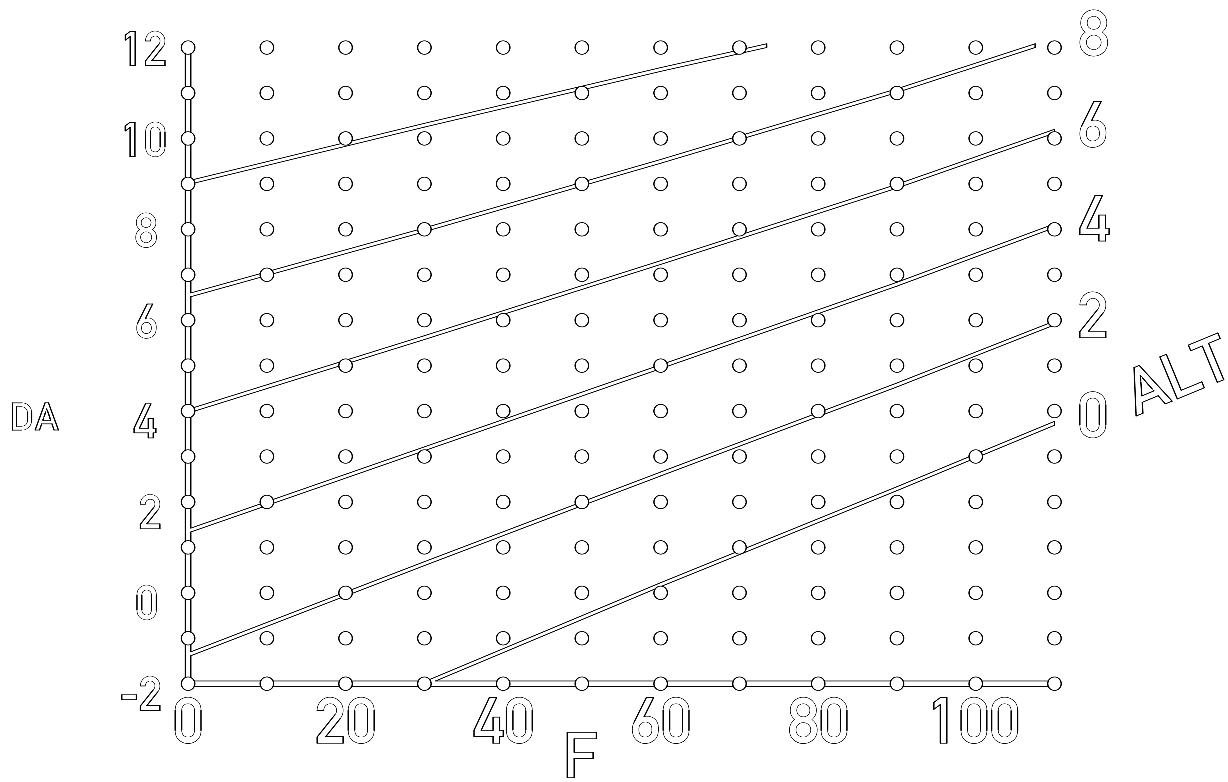
The reticle will *automatically* compensate for the Gyroscopic Properties of Bullet Flight and Boundary

Layers of wind flow. Further, the DTR eliminates the need to make adjustments with the elevation and windage knobs so time is saved and a major source of errors is totally eliminated. Elevation and windage knob adjustments contribute errors: 1) The range has to be converted to either MOA or MILS, 2) the knob has to be set to the desired value, and 3) reticles have to be reset to zero after the shot — which can be either forgotten or reset improperly, especially when the returned zero is mistakenly set one revolution off. External knob adjustment is a liability from several aspects of zero stop slipping, to being damaged by impact, to leaking moisture from a bad seal. DTR can utilize capped knobs since **once your scope is sighted in there is NO NEED for external adjustments**.

Air Density Graph

To accurately employ the DTR, you must be aware of current air density because it affects the bullet path, especially at intermediate and long ranges. You should determine the air density before taking the field so you will be ready to shoot immediately. You should monitor the air density during the day and make appropriate corrections to your firing solutions. We recommend the use of your DTR Ballistics App on your iPhone, or similar device. Should you not have one or it becomes inoperative, we have developed the Air Density Graph (shown below) which provides an adequate estimation of the current air density. This graph is etched into the front bell of your scope for easy reference.

The Air Density Graph will read air density in ICAO Standard Atmosphere which reads density in thousands of feet of altitude, abbreviated as DA (Density Altitude). The density of sea level air at 59F is 0KDA. The density of air at 4,000 ft. and 43° F is 4KDA, etc.



AIR DENSITY GRAPH

3 Using Your DTR

To use the Air Density Graph, locate the current temperature along the bottom axis (in degrees Fahrenheit) then move straight UP until you come to your current geographical elevation above sea level (SL) as depicted by the angled lines. These are drawn every 2000 feet of elevation, so just interpolate between these lines to estimate your specific elevation. You now move straight across to the left axis to read the air density in Density Altitude (KDA, in thousands of feet). In the early mornings the air will be more dense because the air temperature is lower. Then as the temperature increases the density altitude will increase. True air density will decrease. The air density should be determined prior to getting ready to shoot and should be monitored throughout the day.

Every 15 degrees temperature = +/- 1KDA movement

If the local air density is substantially different than that for which your rifle system is set up, the bullet path will not match the reticle; the point of impact will be higher in less dense air and lower in heavier, denser air. The reticle provides Air Density Corrections (ADC) that are easy to use. The ADC's are located to the left of the range numbers on the left side of the reticle. They stand out visually because they are oriented vertically (i.e., rotated 90 degrees, a "Lazy Number"). The ADC is the compensation in yards for the error caused by the air being one thousand feet (1KDA) of density altitude from Nominal Assignment Value (NAV). The ADC in yards is then either added to or subtracted from the Measured Range in order to determine the Density Corrected Hold Point. Subtract the ADC from the Measured Range if the air is less dense than nominal assigned value / add if the air is more dense.

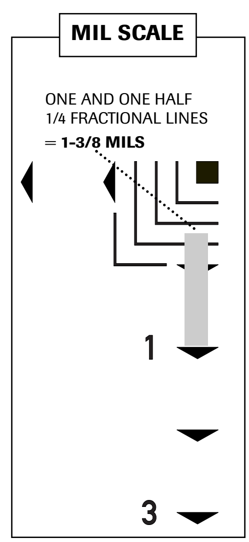
Range: Mil Scale and Mil Calc Graph

To measure distance to the target, a laser rangefinder will provide the most accurate information. If a rangefinder is not available, using the MIL Scale and the Mil Calc Graph contained within the DTR provides a way to estimate range.

There are a couple of points that will help you range more accurately using these features:

1. **Always MIL as large an object of known size as you can.** For example, if your target is a coyote with a chest height of 10 inches, but he is next to a fence you know is 4 feet tall, then you will be more accurate if you MIL the fence post rather than the coyote.

2. **Always try to MIL a vertical target rather than a horizontal target.** This is because, usually, the uphill/downhill angle is less of a factor than whether the target angle is perpendicular to you. For example, let's say you have a windmill and you know the diameter of the blades is 6 feet. Thus, we know the object we are going to MIL is 6 feet tall and 6 feet wide. Suppose the wind is coming over your right shoulder. This turns the blades so we see it being taller than it is wide. Thus, the width of an object in a perspective view is not the true dimension. A severe uphill or downhill target will present the same problem in a vertical direction.



The DTR provides a MIL Scale for measuring the subtended angle of an object (space it covers) in MILS which is accurate to approximately 1/8 MIL. Each axis has four lines, each of which is spaced in 1/4 MIL increments which allow measurement your target to 1/8 MIL resolution, or better (in between 1/4 MILS = 1/8 MIL resolution).

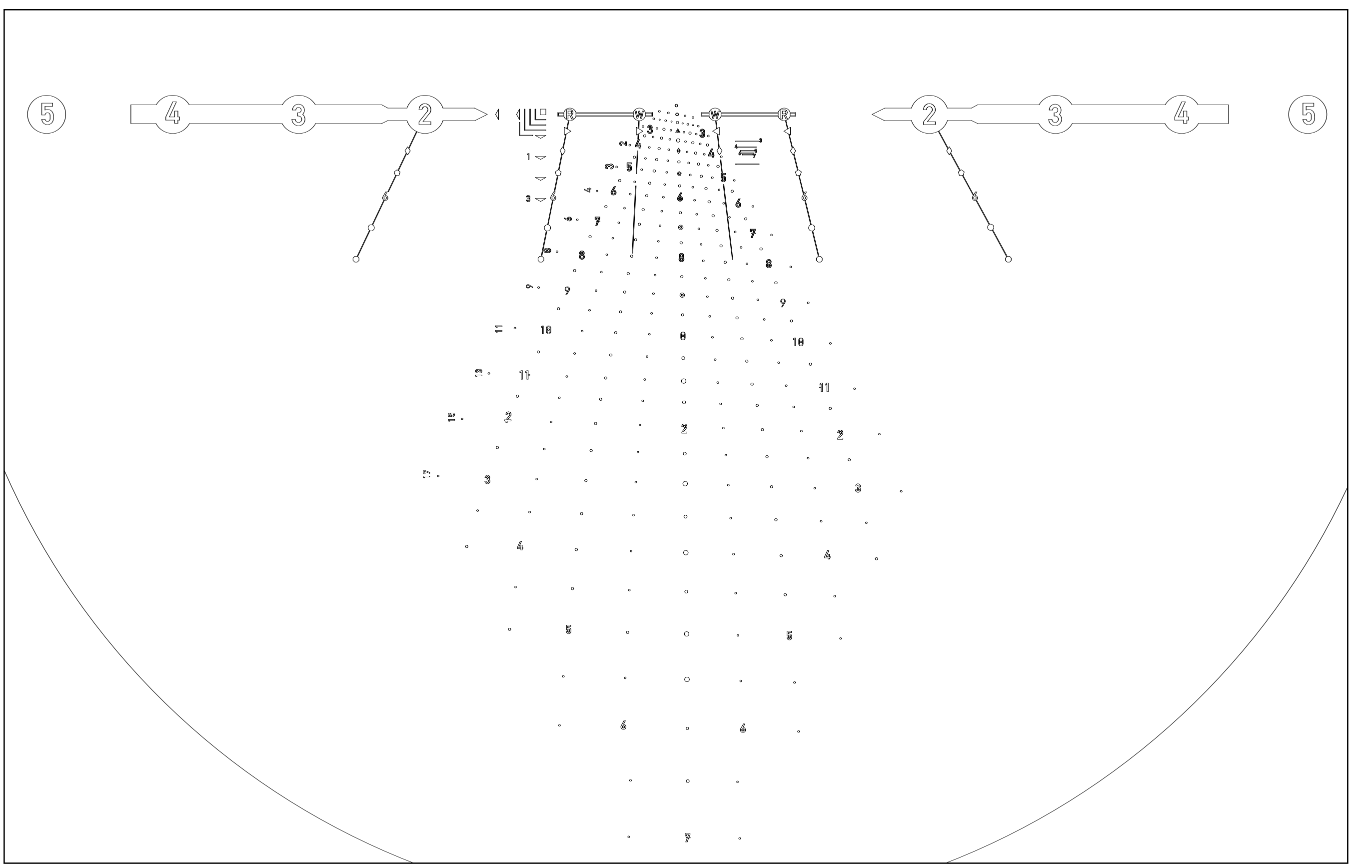
3 Using Your DTR

Position the bottom of your object (vertical orientation) or left edge (horizontal orientation) on a whole MIL mark so that the object extends up into the 1/4 MIL stadia lines; these are the L-shaped marks, each space is 1/4 MIL (a half space is 1/8 MIL). Read the fractional portion of your MIL measurement at the top or left edge, as shown.

Take the subtended angle of the object measured in MILS to the MIL Range Graph which is located directly above the central aiming dots. Find the known size of the object on the left vertical axis and then follow that horizontal line to the right until you intersect the subtended angle in MILS (these are indicated by the angled lines). You may or may not be directly on a MIL reference line so you must use your judgment to interpolate the correct point. From this point go straight down to read the distance in hundreds of yards to the target. Again, judgment is necessary to estimate location along the scale and determine the reading.

An additional lateral aiming device is included for moving targets. On the central horizontal stadia line you will see an “R” and a “W” in circles. These are hold points for a running (R) or walking (W) target out to 800 yards. DTRs have a third pair of lead lines which are for a sprinting target. Actual target movement speed, angle of target movement (whether perpendicular to the shot) and your reaction time all affect how accurate these will be. Along with the bold leveling stadia, these also help to engage close targets at lower power settings. Included are W(alk) = 3MPH, R(un) = 9MPH, plus 2(0), 3(0), 4(0), 5(0)MPH lead points.

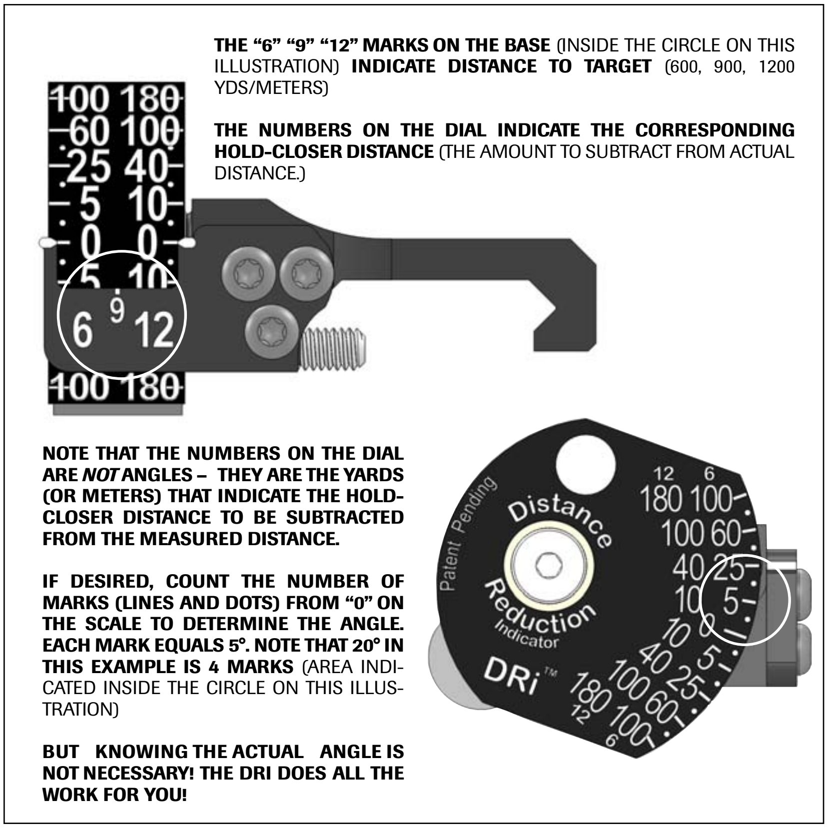
Refer to the DTR Ballistics App (included with your DTR scope) for transonic/subsonic distances where the ADC numbers (the Lazy #s) stop.



3 Using Your DTR

Angle Firing – Using the DRi (Distance Reduction Indicator) **Accessory Device**

For a thorough education and understanding of the **DRi**, please download the **DRi Instruction Manual** available at **DavidTubb.com.** Click **HERE** to get it. Click here for **VIDEOS**



Accurate values begin with knowing the straight-line distance to the target. Use a rangefinder or the MIL scale and MIL graph in the DTR reticle.

When you aim at the target, the DRi dial will rotate freely to indicate the need to hold closer, if there is one.

The DRi base is marked with "6" "9" and "12." These numbers correspond with 600, 900, 1200 yards or meters. The "6" and "12" have corresponding Hold Closer distance values etched into the dial; the "9" splits the 6 and 12 values and is used to average/interpolate for varying distances.

Use examples follow on the next page.

The large numbers on the dial indicate the hold-closer distance in yards or meters.

Whether the shot is uphill or downhill, the solution is the same! You will hold closer by the same amount for each.

To determine the DTR's Effective Hold Point (EHP), follow these steps:
1. Determine the Measured Distance to the target (Slant Range).
2. Aim the rifle at the target (this step engages the DRi to provide a read).
3. Determine Horizontal Range by subtracting the Hold Closer number for your distance.
4. Make Air Density Corrections to Horizontal Range to establish the EHP.
5. When you have determined the correct EHP, locate the appropriate aiming dot within the DTR.

The DRi is fast and easy to use. Like the DTR itself, it was conceived to do all the work and calculations for you, leaving you free to focus on the shot at hand.

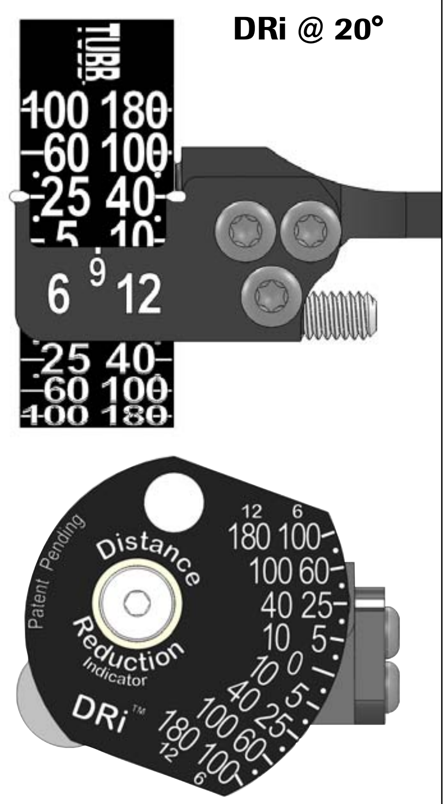
A few usage examples are on the next page. Download the **DRi Instruction Manual** for complete information, including proper installation and adjustment.

3 Using Your DTR

DRi Accessory Advice – Usage Examples

The following examples will give you a good working knowledge of the DRi device. With experience you'll be able to quickly and accurately solve for EHP on any reasonable angle shot.

The illustration shows the DRi indicating a 20° angle. That can be determined by counting the number of graduation marks between "0" and the indicated Hold Closer number on the dial. Each mark represents 5° and there are four marks indicated. **However, the actual angle is not at all important!** The calculation has already been made for you, and the examples will clarify how to use this information.



DRi @ 20°

Example 1 Target at 600 yds. DRi shows at 600 yds to reduce the elevation by 25 yds.
Effective Hold Point (EHP) = 600-25 = 575 yards

Example 2 Target at 900 yds. DRi shows at 600 yds to reduce elevation by 25 yds, and at 1200 yds to reduce it by 40 yds. Average the 25 and 40 to get 33 yds.
EHP = 900-33 = 867 yards

Example 3 Target at 870 yds. 870 is very close to 900. Determine EHP for 900 yds and subtract that value from 870 yds. The DRi shows at 600 yards to reduce the elevation by 25 yards, and at 1200 yards to reduce the elevation by 40 yards. Average the 25 and the 40 to get 33 yards.
EHP = 870-33 = 837 yards

Example 4 Target at 800 yds. DRi shows that at 600 yds to reduce elevation by 25 yds, and at 1200 yds to reduce it by 40 yds. Interpolate between the 25 and 40 and determine 30 yds. 800 is approximately 10% closer than 900.
EHP = 800-30 = 770 yards

(Using an EHP of 33 would be accurate for most shooting situations, because a 3 yd difference is less than 1/4 MOA correction.)
True interpolation value = [(800-600)(40-25)]/(1200-600)+25 = 30 yds*

Example 5 Target at 300 yds. (Note: At a distance of 0 yards, the elevation reduction is 0 yards.) DRi shows at 600 yds to reduce the elevation by 25 yds. Average the 0 and the 25 to get 13 yards (round up).
EHP = 300-13 = 287 yards

Example 6 Target at 1500 yds. First look at the nearest number, 1200 yds. The DRi shows at 1200 yds to reduce elevation by 40 yds. Determine the 900 yd value (the value that splits the 600 and 1200) by averaging the 25 and 40 to get 33 yards. Determine the difference between the 1200 and 900 yd values to get 7 (40-33 = 7). Add the 7 to the 1200 yard value of 40 (7+40) = 47.
EHP = 1500-47 = 1453 yards

Using Your DTR

Crosswind Correction

The DTR crosswind correction method is faster than any reticle because the wind is observed and held in wind velocity, MPH, rather than minutes of angle or MILs. The wind hold angle changes with range so with all traditional reticles, a different range requires a different MOA or MIL hold, but with the DTR, a 10 MPH wind hold at 800 yards is still a 10 MPH hold at 1000 yards.

If you know the crosswind component in MPH, you simply find the appropriate wind dot and shoot. Your point of impact indicates the true crosswind component. So, once you observe the crosswind component at any range, the reticle will give you the correct wind hold for any other range without the need for calculations or estimating. Instead of calling wind in MPH and then holding in increments of MILs or MOA, by using the DTR you call wind in MPH and hold wind in MPH (vectored percentage depending on direction).

This attribute is truly huge when it comes down to a second shooting opportunity in the general direction that you took the first shot. If you have feedback from your first shot then you already know the amount of wind you will be holding on the next shot.

This is applicable to any other target distance you will be engaging. In other words, if you held 5 MPH of left wind on a 500-yard shot and made a hit, then when a 900-yard shot presents itself in the same general direction you already know your wind hold.

So, to develop the wind hold solution, make your estimate and determine the appropriate wind dot or proportional holding point between wind dots. Remember to hold the center column of dots into the wind.

Wind Values / Boundary Layers

Most all ballistics program's wind drift tables for centerfire rifles are pretty good out to 500 yards. This is because the flight of the bullet is at most 4 feet off of the ground from muzzle to target. For longer shots the apex of the bullet's flight is significantly higher and encountering a higher velocity wind than is present 4 feet off of the ground.

The DTR solves for this by taking into account the "Boundary Layers" of wind flow values and factoring in increased wind speed percentages into the longer range 5, 10, 15, 20, 25 MPH incremental wind dots. What this means is if you shoot a target at 500 yards and hold the 5MPH left wind dot and connect, and a 900-yard target at the same wind vector angle is then engaged you will hold the 900-yard 5MPH left wind dot. This wind velocity effect on this shot is based on the higher trajectory of the longer distance bullet flight and greater than 5MPH wind speed, but by holding the same 5MPH dot (which is factored for increased crosswind value) the user can score a hit with ease.

Transition Zone — Factoring Air Density Correction Number (ADC#)

Past 800 yards, if the effective hold point is greater than + *or* - 50 yards difference from measured distance, which means the factoring number is greater than +5 or -5, then use the next ascending or descending range ADC# (closest 100 yds.) wherein the effective hold point will be occurring. In other words, use appropriate ADC# for the actual hold distance. *(Example continues on next page...)*

Example: 1100yd shot with a factoring number of + or - 5KDA change, use the closest ADC# wherein that the shot will be impacting. The factoring number of +5 would use the 1200yd ADC# of 15 so the 5x15=75 yards so the solution would be a 1175yd hold point. Conversely a factoring number of -5 would use the 1000yd ADC# of 11 so the -5x11=55 yards so the solution would be a 1045yd hold point. Both of these solutions have the bullet impacting greater than +/- 50 yards difference from the measured distance.

Indicating Nominal Assignment Value (NAV)

Take a marker with you to the range, and once you determine your Nominal Assignment Value (NAV) for your rifle ammo combination, write the NAV on your rifle. If you a get new batch of ammo you should recheck the NAV, and adjust as needed. This number is literally your "navigation point" for using the DTR.

If you are using a temperature-sensitive powder (as contained in M118LR, AB39, A191, and *all* U.S. Military 5.56x45mm NATO ammunition) and the temperature is now + or - 30 degrees of temperature change from where you assigned the NAV, you will want to reassign the nominal value based off the resulting 25 fps velocity change.

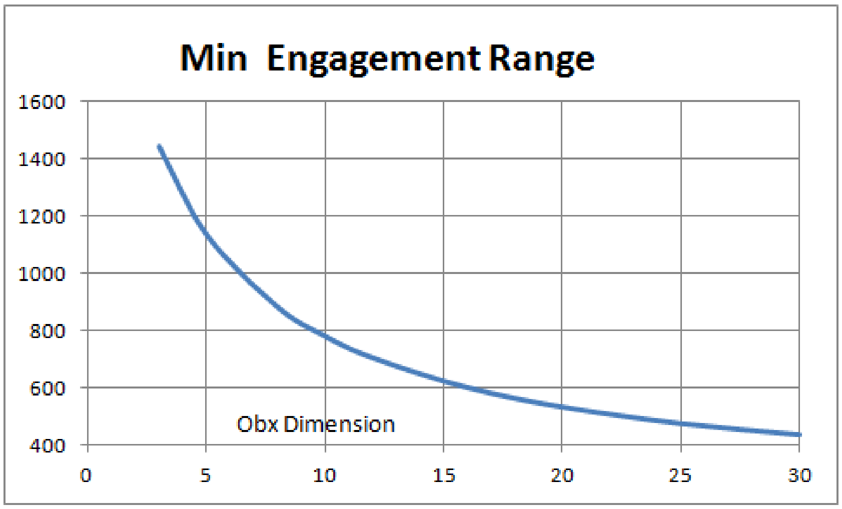
Example: Nominal Assignment Value (NAV) of 4KDA and temp goes up 30+ degrees. Reassign the nominal value to a 3KDA since the ammo is going 25 fps faster. When the temperature goes back down, reassign. The same goes for colder temperature (ammo is going 25 fps slower at -30° from NAV), so assign a 5KDA to a slower/colder velocity.

Obstruction Clearance Points (OBX)

OBX are designed for shooting from cover and having obstacles or obstructions in front of the muzzle which could affect bullet flight. Your DTR is easily useable in determining bullet clearance from the obstructions using OBX calculations. The best solution is to use the DTR Ballistics App which came with your scope to determine exactly what your OBX point is with your particular rifle/scope combination. Then check the appropriate yardage dot that will clear the obstruction (visible only at low power).

The table is based on a v1 308 DTR with a 2.5 in. sight height, 4KDA

OBX Distance from Muzzle	MIN RANGE (AIMING DOT VISIBLE)
3 YDS	1443 YDS
5	1134
8	881
10	779
12	703
16	599
20	531
25	473
30	434



It's also perfectly "safe" to ignore OBX calculations and simply make sure you have an unobstructed view of the bottommost aiming dot. That means that dot (visible at low power) is not obscured by the obstruction when the appropriate aiming dot for the shot is on target, and that you are at least 3 yards from the obstruction. Also, it's wise to conduct your own tests at the range. Take a piece of cardboard with you and situate it to construct various obstructions at varying positions.

3 Using Your DTR

Elevation vs. Wind

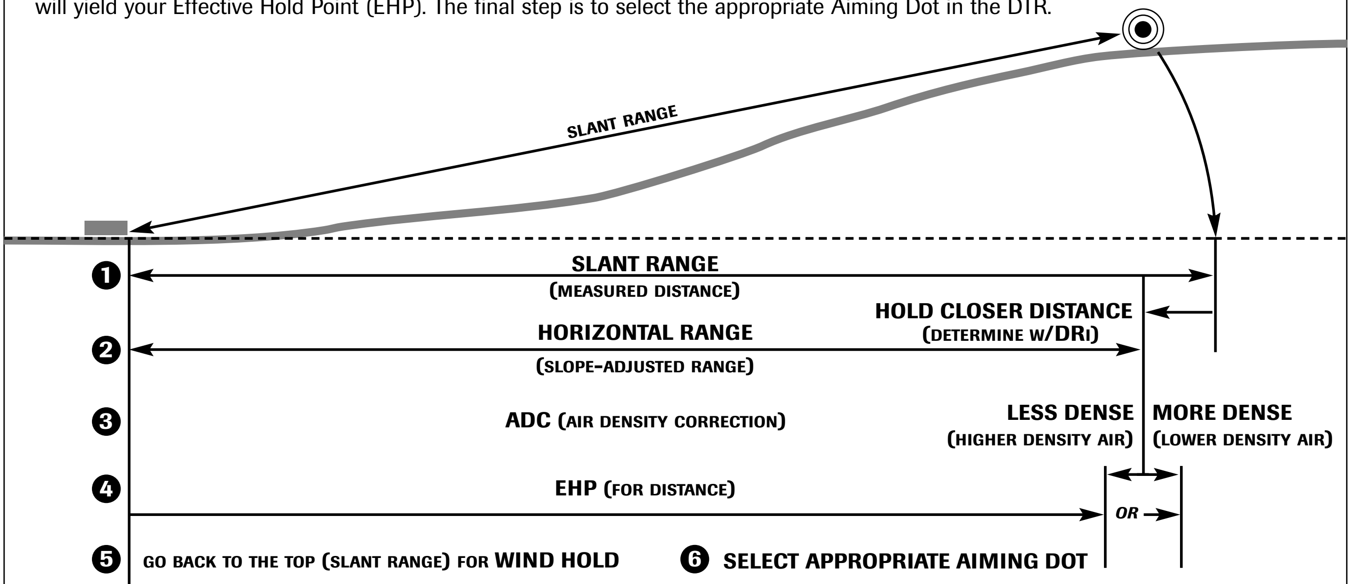
What is most important, elevation call or wind call? If you look at all the targets on a typical range all are about twice as tall as they are wide. *Wind is absolutely the most important call* because it requires at least double the defining call or hold ability. The best solution is to call wind in MPH and hold wind in MPH (allowing for angled wind value, or vectoring percentages).

The DTR reticle is designed as a Time Of Flight reticle (TOF)

This is important to keep in mind when considering how all the automatic compensations that are built into the DTR serve you. They all influence a bullet's time of flight and, therefore, the shot location. One picks an appropriate ADC multiple to determine the holdover/hold under distance in yards. When doing so all of the other atmospheric factors associated automatically come into synchronization; all compensations and calculations are built-in to the DTR reticle aiming dots. Additionally, the DRi accessory device cuts a WIDE swath into shooting uphill or downhill by leaving cosines "on the curb" so to speak. This allows the user to determine the Effective Hold Point (EHP) in a short amount of time.

SEQUENCE

For the vast majority of shots in the field, taking the steps as instructed provides the fastest, easiest means to hit the target. That is, first determine the Measured Distance (Slant Range) to the target, subtract the Hold Closer Distance using the DRi (this gives the Slope-Adjusted Range), factor ADC to determine Density Corrected Hold Point, determine the wind hold based on Slant Range. This will yield your Effective Hold Point (EHP). The final step is to select the appropriate Aiming Dot in the DTR.



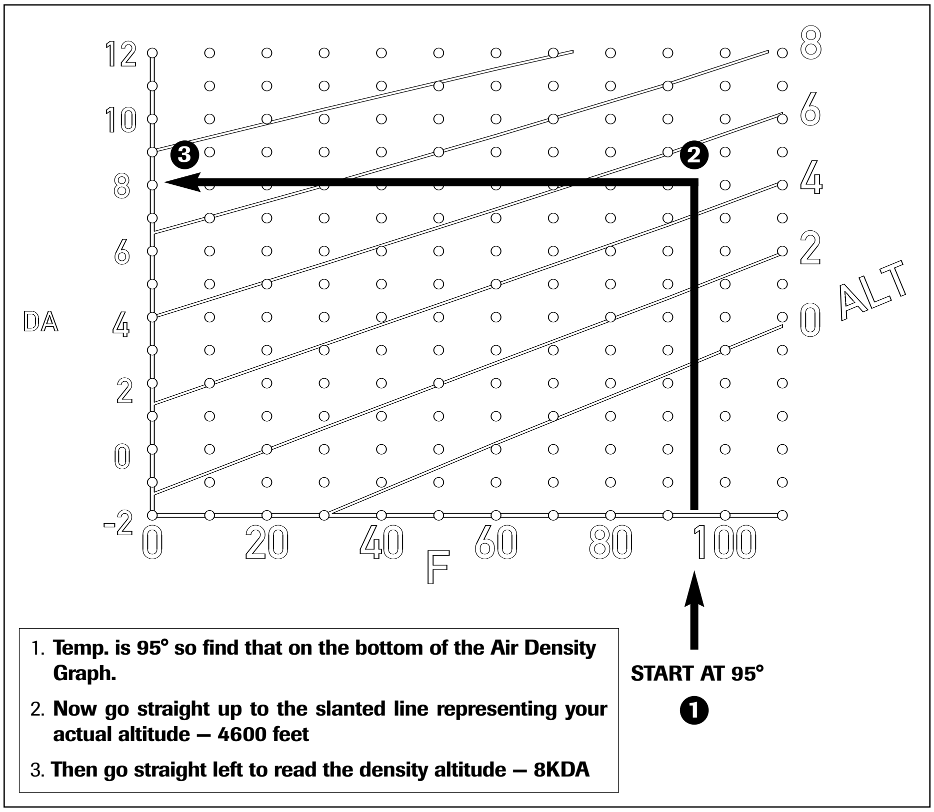
On the next few pages we'll work through an example of using the DTR in the field. We'll take a trip to New Mexico and you'll experience, first-hand, the effectiveness and utility of the DTR.

Keep in mind the importance of preparation. The more you know, the earlier, then the faster you will be in getting to the shot at hand. Upon arrival at any use-destination, determine the prevalent influential atmospheric and environmental conditions. These are **elevation** (altitude) and ambient **temperature**. These two inputs determine the current factor or NAV number you'll be using at that location. This number is crucial to correct interpretation by the DTR. Also keep in mind to continually re-check the inputs to maintain a current NAV. Mostly, **watch the temperature.** If you're in New Mexico you will most certainly have a different NAV at 7:00 AM than you will at 2:00 PM! Each 15° change in temperature equals a 1000-foot elevation change or 1KDA, move up or down. **Keep the NAV current as the day progresses!** Then you'll be ready to quickly and accurately make the next shot.

4 Usage Example

Circumstances and Conditions

We are shooting a 175gr Sierra Match King bullet in .308 Winchester at 2575 FPS. Therefore our reticle Nominal Assignment Value (NAV) equals 4K DA with this muzzle velocity (from the table on Page 5). We are in New Mexico hunting coyotes at 4600 feet elevation. The shade temperature is 95° F. We see a coyote next to a fence we know is 4 feet tall, and we are on a hill looking down at the animal.



Step One

Determine Air Density. If you have a Kestrel 4250, or similar device, it reads density altitude directly.

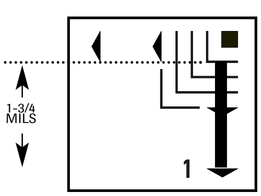
Otherwise, go to the Air Density Graph on your DTR. **You should have determined the DA before starting your hunt!** DA changes should be monitored and mentally noted throughout the day.

Look at the illustration on the left and follow the steps as outlined in the boxed text area.

To use the chart, find the temperature, go up to altitude, and then over to DA. **Ex. = 8KDA**

Step Two

Using the formula on the rear ocular lens of the DTR (△ = NAV# - KDA#) determine current factor number, which is the reticle **Nominal Assignment Value (NAV) minus current KDA.** In this circumstance it is **4-8 = -4 current factor number** [4KDA (NAV) - 8KDA (current) = -4KDA]. **Always remember to start an equation with the Nominal Assignment Value (NAV).** In other words, since the Nominal Assignment Value (NAV) of the particular DTR used in our examples is 4KDA, after determining that current DA is 8K, the equation is 4K - 8K = -4K. Negative numbers mean the air is less dense, positive numbers mean it's more dense, relative to the reticle Nominal Assignment Value (NAV).



Step Three

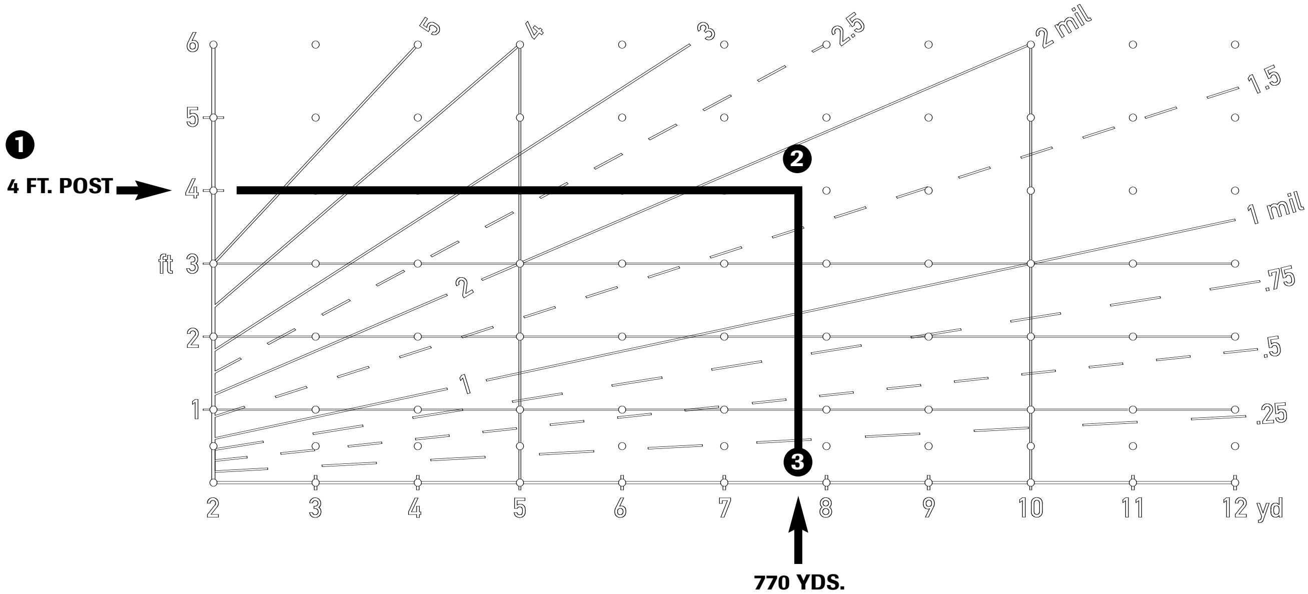
Determine measured distance to the target. If you have a range finder, use it. If not use the MIL Scale and the MIL Graph. The fence post (4 ft. tall) is bigger than the coyote so range the fence post. MIL the fence… = approximately 1-3/4 MIL

FENCE POST = 4 ft. tall

1. Put bottom of post directly on next whole MIL line, in this case "1MIL line."
2. Put top of post into fractional measuring stadia.
3. Read fractional measurement plus whole measurement = 1-3/4 MIL

Step Four

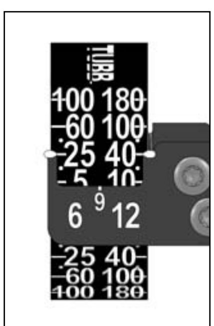
Determine the range to the fence (see MIL Range Graph). Find 4 feet (height of fence post) on the vertical axis and go horizontally to the right until you are at 1-3/4 MIL location found in Step One, which is halfway between the 1-1/2 MIL line and the 2 MIL line. Then go straight down to read the Measured Distance (Slant Range) — 770 yards.



1. Locate 4 ft., the height of the known object (the fence post) on the vertical axis (left side).
2. Go across toward the right to locate the MIL measurement from the measuring stadia (1-3/4) MILS
3. Read straight down to find the Measured Distance (770 yds.)

Because we have an angle shot (downhill), the next step is to determine the measured distance to the target and then determine the effective distance.

(The sequence or order of these steps can vary, and after a short time solving various firing solutions, you'll learn what is the most efficient means for any circumstance. For instance, with no angle involved, skip directly to Step 6 in this process.)



Step Five

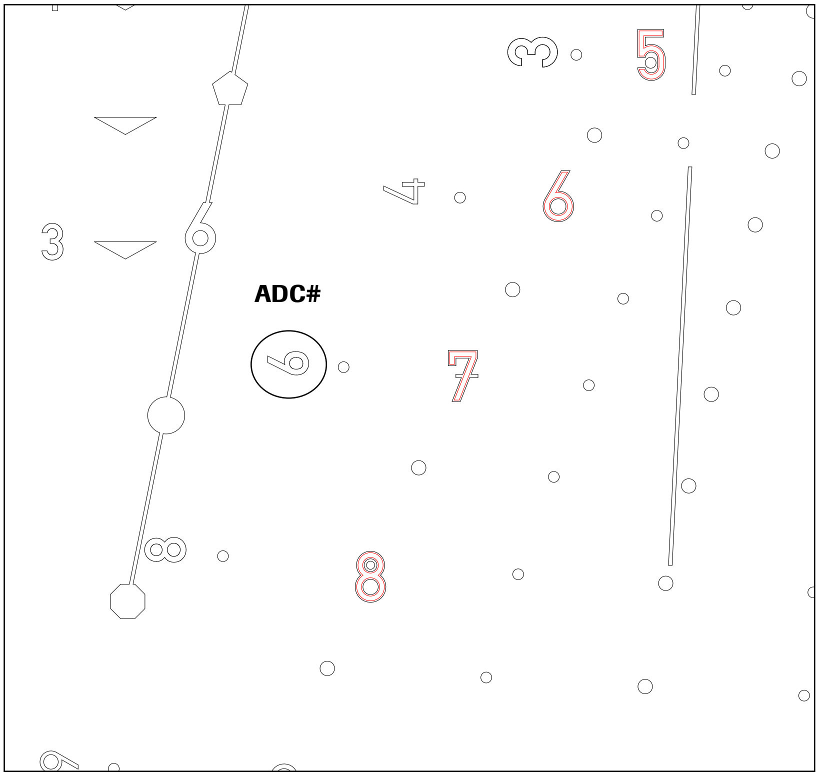
Determine the Hold Closer Distance for 770 yds using the DRi accessory device. Aim at the target to engage the DRi. DRi shows that at 600 yds to reduce elevation by 25 yds, and at 1200 yds to reduce it by 40 yds. Interpolate between the 25 and 40 and determine 33 yds. That is the value for 900 yds. 800 yds is approximately 10% closer than 900, so 33 yds - 3 yds (10% of 33) = 30 yds. For the additional 30 yds difference (800 to 770), deduct 1 yd. (770 is approximately 97% of 800), so 30 - 1 (3% of 30) = 29 yds.

EHP = 770-29 = 741 yds

That might have looked to be a lot of arithmetic, and it was. In the interest of detailed accuracy in computations, it's an example of how simple it can be to interpolate DRi information to accurately accommodate any distance. In actual use, however, proceeding with the shot based on a "30 yd" Hold Closer distance is less than 1/4 MOA error.

Step Six

Now find the **Air Density Correction (ADC) number.** These are the numbers at 90-degree angles (the "Lazy Numbers") located to the left of the left row of the reticle aiming dots yard line indicators.



Estimate the value of the ADC to the nearest yard line. In this example it's necessary to use intuition to determine the best ADC match. This shot (741 yds) is closest to 700 yards. **The 700 yard line ADC is 6, so assign the ADC number of 6.** Remember that an ADC of 6 yards means that you adjust the Measured Distance by 6 yards per 1KDA atmospheric change from NAV. Negative value, hold closer / Positive value, hold further.

So the net Air Density Correction is 6 yards per factor number or -4 x 6 = -24 yards; this is subtracted 741 - 24 = 717 Density Corrected Hold Point.

The Effective Hold Point (EHP) is 717 for distance and 770 for wind.

Step Seven

Estimate wind and use correct windage hold point. **Each wind dot along each yard line is worth 5 MPH**, so 10 MPH means use the second dot either side of the central aiming dot. You estimate that the wind is 10 MPH moving from right to left. **Remember that the wind hold is based on the Measured Distance (Slant Range) not the Effective Hold Point.** So the wind deflection is based on 770 yards at 10 MPH. Use this wind deflection with an Effective Hold Point of 717 yards to make the shot.

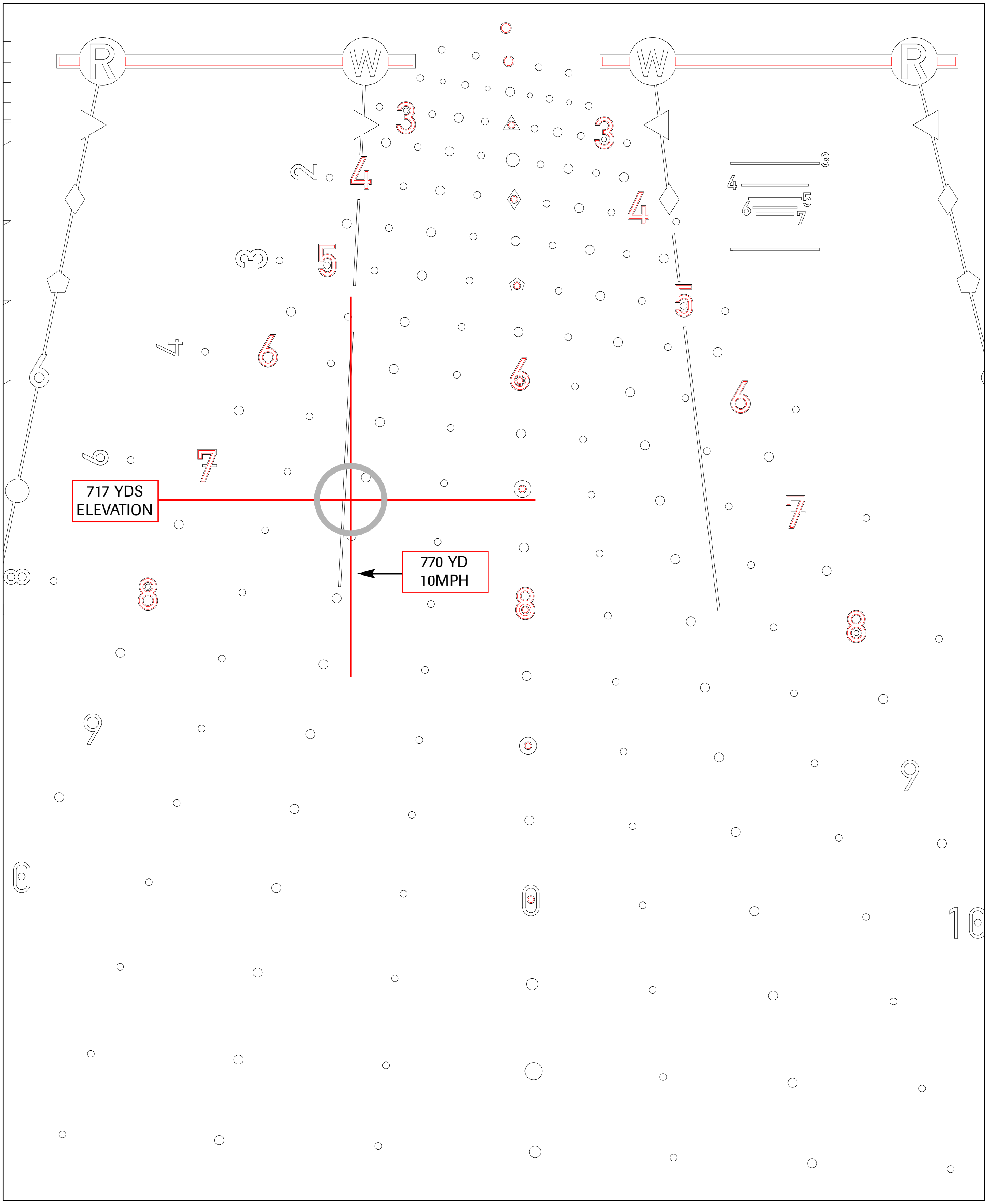
This reticle sometimes requires you to interpolate between 2 or 3 hold points to accommodate such "in between" shots. It's easy, very fast, and remarkably accurate with just a little practice.

Pick the closest dot to your aiming range hold point for elevation. Also give a quick glance at the 10 MPH hold for 770 yards. Estimate that amount of wind for your 717 windage hold to be the same amount as your 770 yard 10 MPH hold and release the shot. **Remember to always hold the central set of dots into the wind.**

Always know your current factor number. It changes one full KDA every 15 degrees temperature. It is the most important number you need to know. You need this factor number to calculate everything else you'll need to make an accurate shot. **Remember, this number can be negative or positive.**

Hold for the wind based on Measured Distance (Slant Range).

4 Usage Example



DON'T FORGET TO CHECK OBX – IN THE FIELD, A BUSH, ROCK, OR RISE IN THE TERRAIN CAN CREATE AN OBSTRUCTION. AND REMEMBER TO MONITOR AIR DENISTY SO YOU'LL KNOW THE CORRECT NAV#!

5 Density Adaptability

Density Adaptability and Dissimilar Cartridge/Bullet Combinations

As you know by now, the DTR as seen through the scope will support firing solutions from below sea level to as high as anyone shoots a rifle. The following data show 11 sets of density altitudes and muzzle velocities which match the reticle for the .308 Sierra 175 gr Sierra MatchKing bullet.

-1k DA = 2700 FPS
0k DA = 2675 FPS
1k DA = 2650 FPS
2k DA = 2625 FPS
3k DA = 2600 FPS
4k DA = 2575 FPS
5k DA = 2550 FPS
6k DA = 2525 FPS
7k DA = 2500 FPS
8k DA = 2475 FPS
9k DA = 2450 FPS

Nominal Assignment Values (NAV)

Barrel length, powder load and type, bullet weight and type and other variables set the muzzle velocity. The bullet path is controlled by bullet velocity, bullet weight and shape, height of the scope above the bore, the zeroed range, and other variables. Remember that ammunition temperature can change the muzzle velocity as much as 200 FPS for non-temperature stabilized powder and 50 FPS for even the best temperature-stabilized powder.

If you are using commercially loaded ammunition and know the bullet BC and its velocity in your rifle assign a Nominal Assigned Value (NAV) DA# for which the path will match the reticle. Shooting in air of different density requires using the Air Density Corrections (ADC) provided in the reticle, or the use of a DTR Ballistics App.

If you are handloading, you can adjust the velocity of your selected bullet in your rifle to match the reticle at a specific density altitude. Referring to the chart above, if you expect to be hunting in an area where the density altitude is 4KDA you would load for a muzzle velocity of 2575 FPS. Thus the Nominal Assigned Value (NAV) would be 4KDA and the nominal velocity would be 2575 FPS. You can determine the desired velocity using the DTR Ballistics App.

On the following pages are tables that detail the changes in flight based on varying air densities.

Compare **VELOCITY** and **BULLET PATH** (these have been highlighted in each table) to see the effect of different air densities that result in Nominal Assigned Values.

Test-drive DTR. **http://dtr.leestearns.com**
then username: **dtubb**, password: **dtr**
Always hit "refresh" on your web browser to ensure latest content.

Density Adaptability

0K

Trajectory for Sierra Bullets .308 dia. 175 gr. HPBT MatchKing at 2675 Feet per Second
At an Elevation Angle of: 0 degrees
Ballistic Coefficients of: 0.505 0.496 0.485 0.485 0.485
Velocity Boundaries (Feet per Second) of: 2800 1800 1800 1800
Wind Direction is: 0.0 o'clock and a Wind Velocity of: 0.0 Miles per hour
Wind Components are (Miles per Hour): Down Range: 0.0 Cross Range: 0.0 Vertical: 0.0
The Firing Point speed of sound is: 1123.51 fps
The bullet drops below the speed of sound on the trajectory (1123.69 fps) at: 1110 yards
Altitude: 0 Feet Humidity: 50 Percent Pressure: 30.2 in/Hg
Temperature: 62 F
Data Printed in English Units

Range (Yards)	VELOCITY (Ft/Sec)	Energy (Ft/Lbs)	Bullet Path (inches)	BULLET PATH (1 MoA)	Wind Drift (inches)	Wind Drift (1 MoA)	Time of Flight (Seconds)
0	2675	2780	-2.5	0	0	0	0
100	2492.6	2413.8	0	0	0	0	0.1162
200	2317.3	2086.2	-3.1	-1.5	0	0	0.241
300	2149	1794.2	-12.7	-4	0	0	0.3755
400	1987.9	1535.3	-29.83	-7.1	0	0	0.5206
500	1834.3	1307.3	-55.78	-10.7	0	0	0.6777
600	1686.8	1105.4	-92.08	-14.7	0	0	0.8483
700	1548.5	931.6	-140.64	-19.2	0	0	1.034
800	1421.7	785.3	-203.72	-24.3	0	0	1.2363
900	1308.3	665	-284.04	-30.1	0	0	1.4564
1000	1210.5	569.3	-384.69	-36.7	0	0	1.6951
1100	1130.2	496.3	-509.1	-44.2	0	0	1.9521
1200	1067.1	442.4	-660.73	-52.6	0	0	2.2258

4K

Trajectory for Sierra Bullets .308 dia. 175 gr. HPBT MatchKing at 2575 Feet per Second
At an Elevation Angle of: 0 degrees
Ballistic Coefficients of: 0.505 0.496 0.485 0.485 0.485
Velocity Boundaries (Feet per Second) of: 2800 1800 1800 1800
Wind Direction is: 0.0 o'clock and a Wind Velocity of: 0.0 Miles per hour
Wind Components are (Miles per Hour): Down Range: 0.0 Cross Range: 0.0 Vertical: 0.0
The Firing Point speed of sound is: 1123.51 fps
The bullet drops below the speed of sound on the trajectory (1123.73 fps) at: 1188 yards
Altitude: 0 Feet Humidity: 50 Percent Pressure: 26.83 in/Hg
Temperature: 62 F
Data Printed in English Units

Range (Yards)	VELOCITY (Ft/Sec)	Energy (Ft/Lbs)	Bullet Path (inches)	BULLET PATH (1 MoA)	Wind Drift (inches)	Wind Drift (1 MoA)	Time of Flight (Seconds)
0	2575	2576.1	-2.5	0	0	0	0
100	2416	2267.8	0	0	0	0	0.1203
200	2262.7	1989.1	-3.46	-1.7	0	0	0.2486
300	2114.8	1737.6	-13.73	-4.4	0	0	0.3857
400	1972.7	1511.9	-31.77	-7.6	0	0	0.5326
500	1836.6	1310.5	-58.77	-11.2	0	0	0.6903
600	1705	1129.5	-96.09	-15.3	0	0	0.8598
700	1580.4	970.4	-145.39	-19.8	0	0	1.0426
800	1464.6	833.4	-208.63	-24.9	0	0	1.2399
900	1358.8	717.4	-288.11	-30.6	0	0	1.4527
1000	1264.5	621.2	-386.44	-36.9	0	0	1.6818
1100	1183.3	544	-506.54	-44	0	0	1.9273
1200	1116.1	483.9	-651.5	-51.8	0	0	2.1888

8K

Trajectory for Sierra Bullets .308 dia. 175 gr. HPBT MatchKing at 2475 Feet per Second
At an Elevation Angle of: 0 degrees
Ballistic Coefficients of: 0.505 0.496 0.485 0.485 0.485
Velocity Boundaries (Feet per Second) of: 2800 1800 1800 1800
Wind Direction is: 0.0 o'clock and a Wind Velocity of: 0.0 Miles per hour
Wind Components are (Miles per Hour): Down Range: 0.0 Cross Range: 0.0 Vertical: 0.0
The Firing Point speed of sound is: 1123.51 fps
The bullet drops below the speed of sound on the trajectory (1123.77 fps) at: 1271 yards
Altitude: 0 Feet Humidity: 50 Percent Pressure: 23.76 in/Hg
Temperature: 62 F
Data Printed in English Units

Range (Yards)	VELOCITY (Ft/Sec)	Energy (Ft/Lbs)	Bullet Path (inches)	BULLET PATH (1 MoA)	Wind Drift (inches)	Wind Drift (1 MoA)	Time of Flight (Seconds)
0	2475	2379.9	-2.5	0	0	0	0
100	2337	2121.9	0	0	0	0	0.1247
200	2203.4	1886.3	-3.87	-1.8	0	0	0.2569
300	2074.2	1671.5	-14.91	-4.7	0	0	0.3973
400	1949.5	1476.5	-34.04	-8.1	0	0	0.5465
500	1829.6	1300.5	-62.32	-11.9	0	0	0.7053
600	1713	1140	-101.01	-16.1	0	0	0.8748
700	1601.8	996.8	-151.56	-20.7	0	0	1.056
800	1497.3	871	-215.68	-25.7	0	0	1.2497
900	1400.4	762	-295.32	-31.3	0	0	1.457
1000	1312	668.8	-392.72	-37.5	0	0	1.6785
1100	1233.3	590.9	-510.34	-44.3	0	0	1.9146
1200	1165.2	527.5	-650.84	-51.8	0	0	2.1653

5 Density Adaptability

Another facet to contemplate: Let us imagine you shot all your M118LR (175 gr. Sierra) and all that is left is G.I. M80 147-150 grain ball ammunition. Assigning a 4 DA to this round at 2740 fps we see it is useable to 900 yards with the DTR, other Nominal Assigned Value (NAV) DA numbers also match.

Trajectory for Sierra Bullets .308 dia. 150 gr. HPBT MatchKing at 2740 Feet per Second
At an Elevation Angle of: 0 degrees
Ballistic Coefficients of: 0.417 0.397 0.355 0.355 0.355
Velocity Boundaries (Feet per Second) of: 2800 1800 1800 1800
Wind Direction is: 0.0 o'clock and a Wind Velocity of: 0.0 Miles per hour
Wind Components are (Miles per Hour): DownRange: 0.0 Cross Range: 0.0 Vertical: 0.0
The Firing Point speed of sound is: 1102.86 fps
The bullet does not drop below the speed within the max range specified.
Altitude: 0 Feet Humidity: 0 Percent Pressure: 25.84 in/Hg
Temperature: 43 F
Data Printed in English Units

Range (Yards)	VELOCITY (Ft/Sec)	Energy (Ft/Lbs)	Bullet Path (inches)	BULLET PATH (1 MoA)	Wind Drift (inches)	Wind Drift (1 MoA)	Time of Flight (Seconds)
0	2740	2500.1	-2.5	0	0	0	0
100	2536.6	2142.7	0	0	0	0	0.1138
200	2342.2	1826.9	-2.91	-1.4	0	0	0.2369
300	2156.4	1548.5	-12.18	-3.9	0	0	0.3704
400	1979	1304.3	-28.94	-6.9	0	0	0.5156
500	1810.8	1091.9	-54.6	-10.4	0	0	0.6741
600	1635.9	891.2	-90.92	-14.5	0	0	0.8484
700	1474.4	723.9	-140.28	-19.1	0	0	1.0417
800	1330.5	589.5	-205.69	-24.6	0	0	1.256
900	1207.8	485.8	-290.78	-30.9	0	0	1.493

Application

Two shooters with .308s and DTR V1's and same Lot of AB 39 which chronographed 100 FPS difference in velocity in their respective rifles. Wind is 5 MPH from the left. Firing is on a level plane.

The Nominal Assignment Values (NAVs) for the DTR v1 are as follows:

Rifle1, 2600 fps = 3KDA
Rifle2, 2500 fps = 7KDA

Shot is 812 yds Measured Distance. Current Atmospheric is 5KDA.

Rifle1 = -2 factor# x ADC# and **Rifle2** = +2 factor# x ADC#
ADC# for 800 yards = 8 (ADC# is the sideways number in the reticle)
812-16 (-2x8=-16) = 796 yds Density Corrected Hold Point for Rifle1
812+16 (2x8=16) = 828 yds Density Corrected Hold Point for Rifle2

So in order to hit the target for elevation they will hold a total of 32 yards difference in elevation.
In order to hit the target for the wind value, both will hold the same corresponding 5 mph value at their Effective Hold Point (EHP). This is significant since both Rifle1 and Rifle2 can now work together when holding wind velocity correction values.

Since Rifle2 shot 32 yards further, the corresponding wind drift dots are synchronized to the bullet's additional Time Of Flight (TOF). There is a difference of .0573 seconds in the TOF between Rifle1 and Rifle2.

No Chronograph?

Obtaining ADC# Without a Chronograph

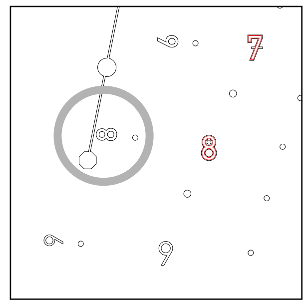
In the case where you are not able to chronograph to accurately determine a bullet velocity to use as a factor in assigning a rifle number, here is a way to solve this.

Zero your .308 with the 175gr bullet at 100 or 200 yards.

Use a Kestrel or the Air Density Graph within the DTR to determine your current atmospheric. For this example, lets assume that it is a 4KDA current atmospheric.

Shoot a known-distance target at 800 yds to obtain an 800yd Effective Hold Point.
(Example: EHP is 775 yds in your DTR which yields a center hit on the 800yd target).

Use the ADC# multiple at 800 to determine the closest multiple of the ADC correction number.
(800yd ADC# is 8) 8 x -3 = -24 yds



Rifle is shooting closer so the EHP is less than 800 yds.
800-775 = 25 yards closer

Current 4KDA minus the 3 multiple of 8 (24 yds closer) = 1KDA

A 175gr Sierra MatchKing at 2650 fps is a 1KDA Nominal Assignment Value.

No chronograph needed!

So looking at the formula at the rear of the scope.

YD = FACTOR# x ADC#

Distance is 1KDA minus the current 4KDA condition is -3. -3 times the ADC# of 8 is -24 yards Hold Closer Distance.

-24 = -3 x 8

→ **800-24=776 EHP**

-1k DA = 2700 FPS
0k DA = 2675 FPS
1k DA = 2650 FPS
2k DA = 2625 FPS
3k DA = 2600 FPS
4k DA = 2575 FPS
5k DA = 2550 FPS
6k DA = 2525 FPS
7k DA = 2500 FPS
8k DA = 2475 FPS
9k DA = 2450 FPS

NAV

Ultimate Value

Why Using the DTR Increases Your First Round Hit Probability

(This is also applicable to the Dynamic Targeting RangeCard.)

After reading either of the *DTR Instruction Manual(s)* and *Reference Materials* publications you will have increased your percentage of first round hits by having knowledge of:

1. Knowing the need to hold either higher or lower in a crosswind that can change your point of impact a full 1 MOA up or down in a 20+ MPH crosswind is quite important.

2. Having a TRUE no wind zero at each yard line is additionally crucial.

3. Boundary layers of air flow factored into the incremental 5 MPH wind dots for the bullet's flight allows you to gather data at your firing position and hold the same wind speed correction from close to far distances (on a level plane).

4. The bullet's lateral movement downrange caused by crosswinds is not an equal amount when comparing right and left winds. This phenomenon is COMPLETELY independent of Spin Drift.

5. You now understand the need to adjust for the vertical component of the wind since downrange data will be influenced by your range zero.

Your DTR will increase your FIRST ROUND hit probability, as well as increasing your follow-up shot hit probability with moving target leads to 800 yards.

Time

If there is one word that sums up DTR, it's TIME.

The world is in constant motion. Nothing waits. DTR reduces the time in which you can fire an accurate shot, one shot or more than one shot.

The "Split Time" is the lapse between when you saw the target and hit the target. Split Time can be the difference between success and failure. The moment of truth lasts just a few seconds.

DTR gives you everything faster. Everything else that must be accounted for, compensated for is built into the reticle. Distance is really all that remains. If the first shot was a miss, adjust distance on a follow-up shot. With DTR this is as simple as interpolating the next nearest aiming dot. Normally, if you miss, the target is gone. It's moving. If it stops there's another shot opportunity, and here is where the Split-Time really matters. Plus, if it doesn't stop moving, the DTR moving target aiming references provide an incalculably better opportunity to make a hit using DTR.

DTR PDF Reference Links

Fast access to PDF information links

Throughout this manual, there are imbedded links provided to add more to the content and understanding of the DTR system and ideologies, as well as instructions and more information about additional products in the DTR family. All those links are contained on this page for faster reference.

DTR APP at http://dtr.leestearns.com

DTR Fast-Track Instructions (one page).

DTR Reference Materials.

DRi accessory device instructions.

Article by David Tubb on field data gathered using left and right twist barrels in otherwise identical rifles.

Dissimilar Wind Drift (DWD) article by David Tubb.

DYNAMIC TARGETING RETICLE
DTR™

Army Research Laboratory

A Hybrid Supersonic/Subsonic Trajectory Model for Direct Fire Applications

by Paul Weinacht

ARL-TR-5574 June 2011

Approved for public release; distribution is unlimited.

Influential elements of bullet flight information, starting manual page 2 (document page 10)

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January 2013
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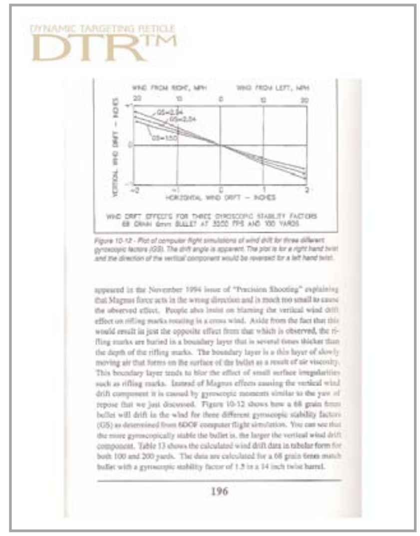
WHY THE DTR WILL MAKE YOU A BETTER WIND READER...

AN ARTICLE BY DAVID TUBB

Article by David Tubb on learning from DTR use.



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Excerpts from Vaughn and McCoy referenced on DTR Manual page 9.

VIDEO TITLES AND ASSOCIATED URLS FOR TUBB CHANNEL:

DTR

David Tubb introduces the DTR
https://youtu.be/MGH0nHhdoM4

KYL (Know Your Limits) course with the DTR
https://youtu.be/PTtOGT9jkml

Baboon Hunting with the DTR
https://youtu.be/umkEy0Womk0

DTR Long Distance Techniques
https://youtu.be/EGUwHe01rD8

Milling & Ranging with the DTR
https://youtu.be/qEdvLbAKkBw

David Tubb introduces the DTR
https://youtu.be/MGH0nHhdoM4

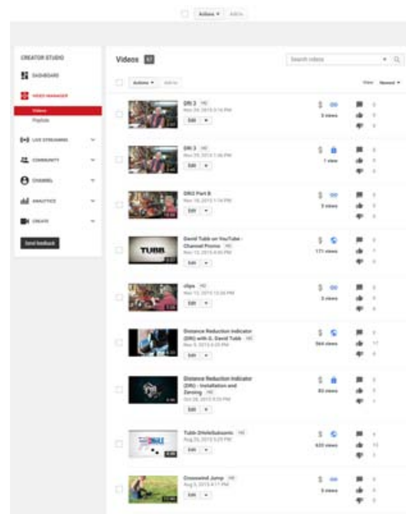
DTR: Engaging Moving Targets
https://youtu.be/-ClF-wjkJBg

DRi

Distance Reduction Indicator (DRi) with David Tubb
https://youtu.be/gKsjqEV3Sls

Distance Reduction Indicator (DRi) – Installation and Zeroing
https://youtu.be/2e4zF24Dru0

Distance Reduction Indicator (DRi) – Interpolating the DRi
https://youtu.be/9xBSmVmrKyo



ALL Superior Shooting Systems LLC, David Tubb, DTR, and other links in one PDF file, 11 pages total.

DYNAMIC TARGETING RETICLE

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