

Mil-Dot Rangefinder For iPhone



Version 4.4 User Manual

Copyright © 2011 Tom Holsten

Introduction	4
What is a mil-dot reticle?	4
What is a milliradian?	4
The basics of range estimation with a mil-dot scope	5
Using Mil-Dot Rangefinder to estimate range	7
Mil-Dot Rangefinder	8
<i>Controls</i>	<i>8</i>
<i>Target Size Manual Adjustment</i>	<i>9</i>
<i>Target Shapes and Size Presets</i>	<i>9</i>
<i>Reticle Subtension</i>	<i>10</i>
<i>Range Estimate</i>	<i>10</i>
<i>Solution Information</i>	<i>10</i>
<i>Target Anchor Points</i>	<i>11</i>
<i>Free Floating Anchor</i>	<i>12</i>
<i>Solution Information</i>	<i>12</i>
<i>Settings</i>	<i>13</i>
<i>Mode</i>	<i>14</i>

<i>Training</i>	14
<i>Reticle</i>	14
<i>Focal Plane</i>	15
<i>Maximum Magnification</i>	15
<i>Ranging Magnification</i>	16
<i>Minimum Magnification</i>	16
<i>Target UOM</i>	17
<i>Target Size Precision</i>	17
<i>Range UOM</i>	18
<i>Colors</i>	18
<i>Display</i>	19
<i>Control Wheel Sensitivity</i>	19
<i>Display Brightness</i>	20
<i>Angle Calculator</i>	20
Support	21
Disclaimer	22

Introduction

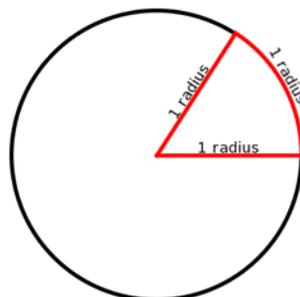
Mil-Dot Rangefinder is a range estimation utility. It is designed to make range estimation with a mil or MOA scale reticle fast and easy. The intuitive graphical interface was designed to replicate what you would actually see through your riflescope.

What is a mil-dot reticle?

The mil-dot reticle is a range estimation reticle that was developed for military applications. The space between the center of one dot on the reticle to the center of the next dot subtends one milliradian (mil). Hence the name mil-dot. One mil subtends 3.6" at 100 yards, or 36" at 1000 yards.

What is a milliradian?

A milliradian is 1/1000 of a radian. A radian is an angular measurement similar to degrees. But unlike degrees, it is not an arbitrary unit selected by man. Instead it is based on the basic components of a circle. A radian is the measure of the central angle subtended by an arc equal in length to the radius of a circle.

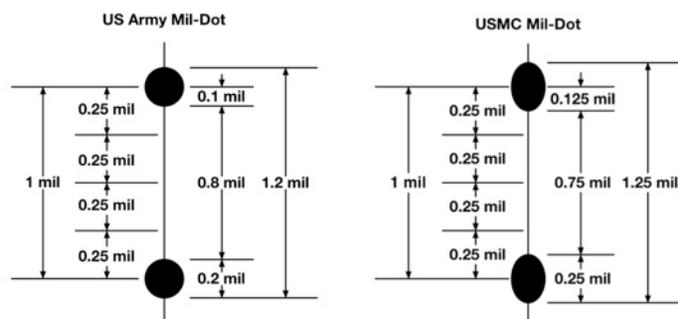


There are 2π ($2 \times \pi$) radians in a circle (360°). This equates to about 6.283185 radians or 6283.185 milliradians.

The basics of range estimation with a mil-dot scope

To estimate the range of a target with a mil-dot riflescope, you must know the actual physical size of the target. This can be the height, width, or an identifiable portion thereof.

1. View the target through the scope.
2. Place one of the reference points (horizontal posts, vertical posts, center of crosshair) against one edge (top, bottom, or either side) of the target so that the reticle extends along its width or height.
3. Using the dots or hash marks, measure along the reticle to the opposite edge of the target. Note, the portion of the target that you are measuring with the reticle, must be the same portion for which you know the actual physical size.



Note: Not all “mil-dot” reticles conform to the above dimensions. Consult your riflescope’s manual to verify reticle dimensions.

The more specific you are in your estimation of the size of your target in mils, the more accurate your results will be. This is especially important when estimating the range to a small target or a target at a great distance. Measuring the size of a target with a scope sounds easy in theory, but it takes a lot of practice and a steady hand to get accurate results in the field.

Once the measurement of the target has been determined in mils, the range can be estimated with a simple formula.

The formula for estimating the range in Yards

$$\frac{\text{Size of Target in Yards} * 1000}{\text{Size of Target in mils}} = \text{Range of the target in Yards}$$

The formula for estimating the range in Meters:

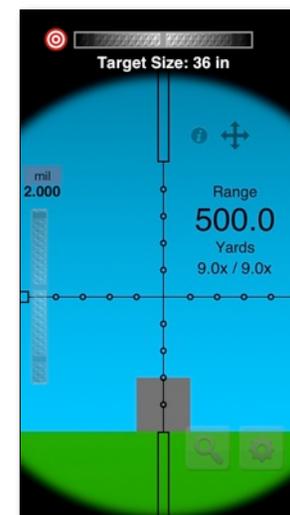
$$\frac{\text{Size of Target in Meters} * 1000}{\text{Size of Target in mils}} = \text{Range of the target in Meters}$$

Note: A lot of mil-dot scopes do not have the reticle on the first focal plane. If the reticle is not on the first focal plane, the reticle subtension is only calibrated at a specific magnification level. As you change your magnification level, the reticle does not grow or shrink with the magnification level. Consult your riflescope's manual for the proper magnification to range targets at. With a first focal plane reticle, the reticle subtension does not change with magnification adjustments. In other words, the reticle grows or shrinks with the magnification level. The advantage of a first focal plane riflescope is that you can accurately range a target without regard to the magnification setting.

Using Mil-Dot Rangefinder to estimate range

Estimating range with Mil-Dot Rangefinder is fast and easy.

1. View the target through the riflescope.
2. Place one of the reference points (horizontal posts, vertical posts, center of crosshair) against one edge (top, bottom, or either side) of the target so that the reticle extends along it's width or height.
3. Using the dots or hash marks, measure along the reticle to the opposite edge of the target. Note: the portion of the target that you are measuring with the reticle, must be the same portion of the target for which you know the actual physical size.
4. Dial in the physical size of the target by swiping the dial at the top of the reticle display left or right.
5. Dial in the measurement of the target in mils by swiping up or down on the left side of the reticle display to match what you see in the riflescope.
6. Read the range.



Mil-Dot Rangefinder Controls

Swipe left or right to adjust target size. (locked when real target shapes are used)

Target size lock indicator signals that the target size wheel is locked because a real target shape was selected.

Double tap Target Size label to cycle through the available units of measure

Tap the 4 way arrow icon to adjust the target anchor point.

Double tap the Range label to toggle between Yards and Meters

Current Magnification / Calibrated Magnification (for second focal plane scopes)

Tap this button to view the Settings display

Tap this button to adjust reticle scale and / or magnification

Tap to access target settings

Tap the info button to see how the range is calculated

Swipe up or down to adjust the size of the target as it appears in the reticle (Subtension Input), or the range to the target (Range Input). Input mode can be selected in the settings display.

The screenshot shows a rangefinder interface with a central reticle. At the top, there is a target size wheel and a lock icon. The target size is currently set to 18" x 30". Below this, the range is displayed as 277.8 Yards. The current magnification is 9.0x / 9.0x. On the left side, there is a subtension input section showing 1.800 x 3.000 mil. At the bottom, there are two buttons: a magnifying glass icon and a gear icon. Red arrows point from text annotations to these various UI elements.

Target Size Manual Adjustment

When the target shape is set to one of the basic shapes (circle or square) you can adjust the target size by sliding the horizontal dial at the top of the reticle display, left or right until the proper measurement is displayed. You can change the target size unit of measure by double-tapping the target size label. This will cycle the target size unit of measure through the available unit types. The target size UOM can also be set in the settings display.

Target Shapes and Size Presets

To access the target Shapes and Size Presets display, tap the red and white target icon in the upper left hand corner of the reticle display.

Mil-Dot Ballistics now allows you to select two basic shapes, circle or square, and a number of realistic target shapes. When you chose one of the basic shapes, you can adjust the size of the target to match the height or width of any target or landmark to establish a range estimation of the target. You can save commonly used target sizes in the Size Presets section of the Basic Shapes display.

To add a size preset, first dial in the target size you want to save, then tap the **Add** button.

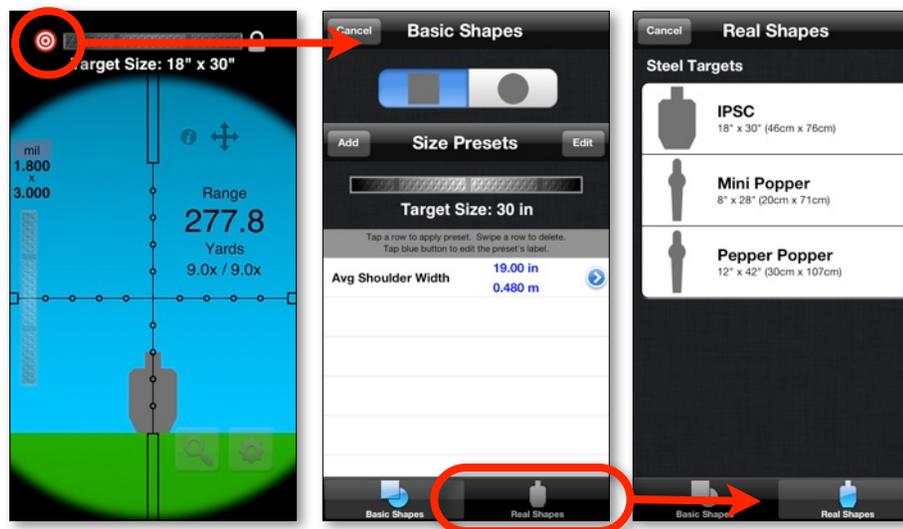
To rename the size preset, tap the blue arrow icon next to the preset.

To delete a preset, swipe the size preset you wish to delete, then tap the **Delete** button that appears.

To use a preset value, tap the size preset you wish to use. This will apply the preset value and close the Target Shapes and Size Presets display.

To rearrange the order of the size presets, first tap the **Edit** button, then use the three line control on the right side of the row you wish to move to drag it to the new location.

To exit the Target Size Presets display without applying a preset, tap the **Done** button.



Reticle Subtension

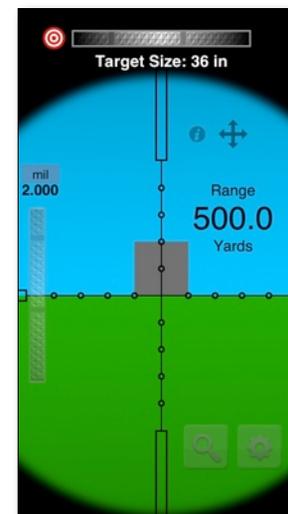
Reticle Subtension is the amount of the reticle occupied by the target. Or simply, how big does the target appear in the reticle. To adjust the size of the target as it appears in the reticle, slide the vertical dial on the left side of the reticle display up or down. The current subtension measurement of the target appears just above the dial. In the example to the right, we can see that the target, which is 36" tall, occupies 2 mil in the reticle, which results in an estimated range of 500 yards. Another way to state it is that at 500 yards, 2 mil subtends 36".

Range Estimate

As you adjust the Target Size and/or the Reticle Subtension, the range estimate is automatically calculated and updated. To toggle the range units between Yards and Meters, double tap the range label. This can also be selected in the settings display.

Solution Information

The solution information display illustrates how the range estimate is calculated. To access the solution information display, tap the info button above the Range label. After all, you really should know how to calculate the range by yourself. Batteries can go dead, and electronics can fail or break, and usually happens at the least opportune times.

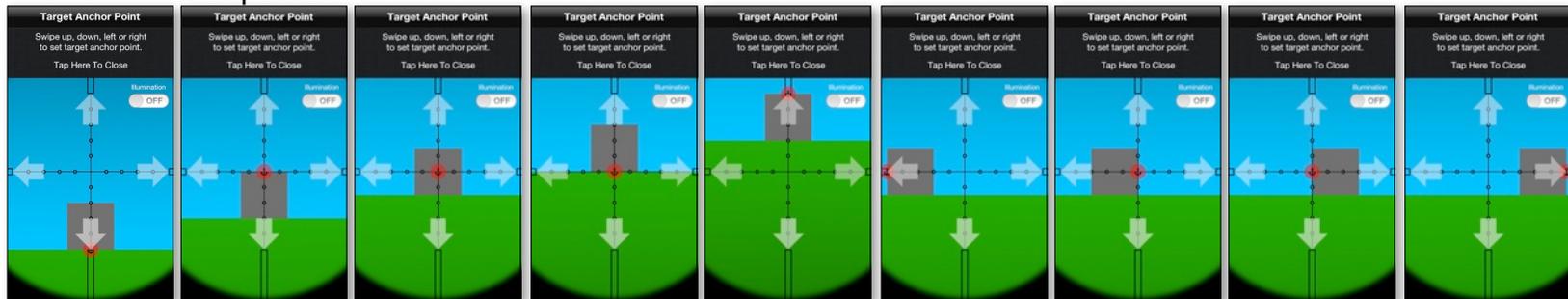


Target Anchor Points

You can anchor the target to nine different points on the reticle by tapping the 4-way arrow icon on the main display to enter the Target Anchor Display, then swipe up, down, left or right to set the anchor point you desire. To exit the Target Anchor Point display, tap anywhere in the header area. When adjusting the subtension measurement of the target, the target will grow or shrink from the anchor point.



The 9 reticle anchor points:

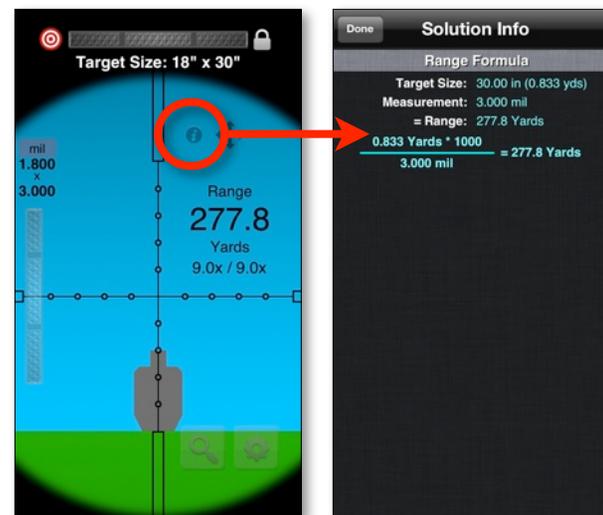


Free Floating Anchor

In addition to the 9 reticle anchor points, you can anchor the target anywhere in the reticle that you like. Tap and hold on the target for one second, the target will dim slightly and you can drag it to any location within the reticle. The last reticle anchor point used, will define the point from which the target will grow/shrink when adjusting the reticle subtension.

Solution Information

The solution information display illustrates how the range estimate is calculated, as well as the following trajectory information:

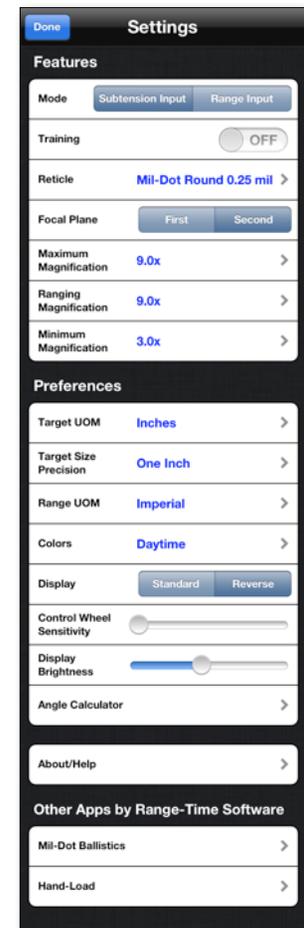


Settings

To access the settings page, tap the gear symbol in the lower right hand corner of the reticle display. To change a setting tap the corresponding item.

The following settings are available:

- Mode
- Training
- Reticle
- Focal Plane
- Maximum Magnification
- Ranging Magnification
- Minimum Magnification
- Target UOM
- Target Size Precision
- Range UOM
- Colors
- Display (Standard, Reverse)
- Control Wheel Sensitivity
- Display Brightness
- Angle Calculator



Mode

The standard mode for the application is “Subtension Input”. This mode allows you to estimate range by dialing in the physical size of the target along with a measurement of the target (subtension) in reticle units (e.g. 2.5 mil).

The “Range Input” mode allows you to dial in a range value directly. Instead of estimating range, the “Range Input” mode will calculate the measurement of the target (subtension) in reticle units (e.g. .25 mil).

Training

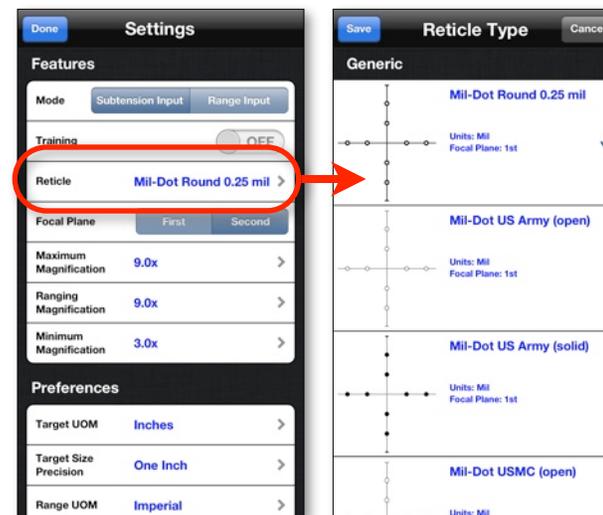
The training option is provided so that you can practice your range estimation math skills. When you enable the training option, the output value on the reticle display is hidden so that you can figure out the calculation yourself. To check your work, tap the solution info button on the reticle display.

Reticle

Defines what reticle is drawn on the reticle display when this profile is selected. To change the Reticle Type, tap the Reticle you want to use then tap the **Select** button. To preview a reticle tap the Reticle row then tap the **Preview** button.

Mil-Dot Rangefinder comes with 4 different reticle designs.

- Mil-Dot Round 0.25 mil
- US Army Mil-Dot (open)
- US Army Mil-Dot (solid)
- USMC Mil-Dot (open)
- USMC Mil-Dot (solid)



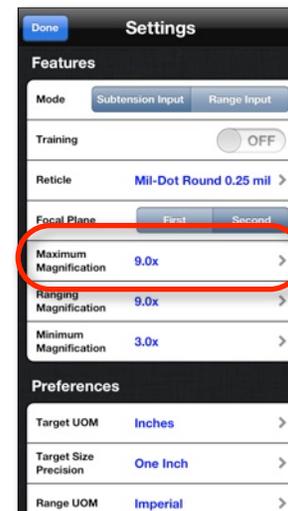
Focal Plane

Defines whether the reticle is treated as a first focal plane or second focal plane scope. When you adjust the magnification on a first focal plane scope, the reticle and target increase/decrease in size according to the magnification setting. On a first focal plane scope, the reticle subtension is always the same regardless of the magnification.

With a second focal plane scope, the target increases/decreases in size according to the magnification setting, but the reticle does not. On a second focal plane, the reticle subtension is calibrated at a specific magnification (usually the highest magnification, but can vary from one scope to the next). For example, lets take standard second focal plane 2.5-10x44 mil-dot scope that calibrated at 10x magnification. At the 10x magnification the center of one dot to the center of the next dot subtends 1 mil. However if you were to change the magnification to 2.5x, the center of one dot to the center of the next dot would subtend 4 mil. You must take in account the magnification setting when ranging a target, or setting up your hold over values for a shot when using a second focal plane scope.

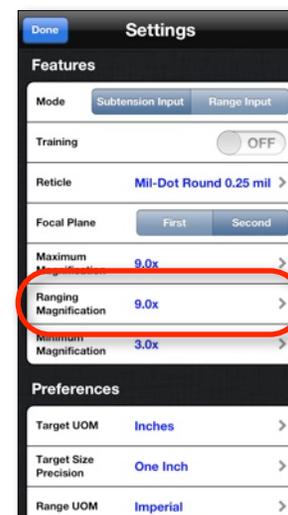
Maximum Magnification

The maximum magnification that your second focal plane scope is rated for. This value sets the upper limit of the magnification. To edit the Maximum Magnification, tap the Maximum Magnification row. This setting is only available when the Focal Plane setting is set to Second.



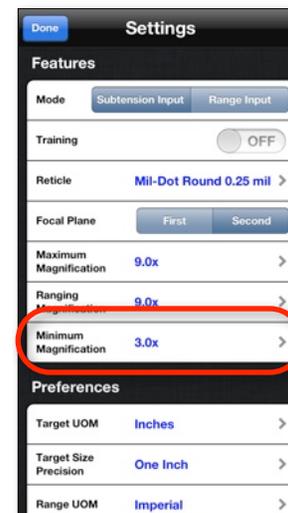
Ranging Magnification

The magnification setting that your second focal plane reticle is calibrated for. To edit the Ranging Magnification, tap the Ranging Magnification row. This setting is only available when the Focal Plane setting is set to Second.



Minimum Magnification

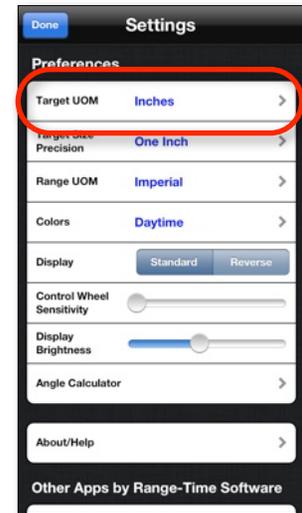
The minimum magnification that your second focal plane scope is rated for. This value sets the lower limit of the magnification. To edit the minimum magnification, tap the Minimum Magnification row. This setting is only available when the Focal Plane setting is set to Second.



Target UOM

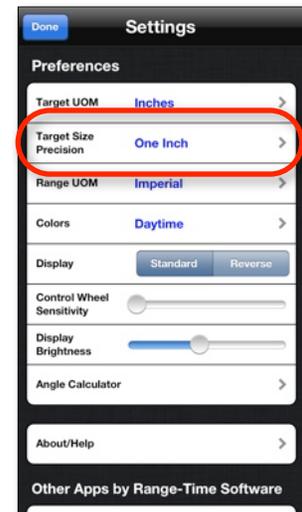
The target size can be displayed in 5 different units of measure.

- Inches (e.g. 38 in)
- Feet - Inches (e.g. 3'-2")
- Feet (e.g. 3.17 ft)
- Yards (e.g. 1.056 yds)
- Centimeters (e.g. 95 cm)
- Meters (e.g. 0.95 meters)



Target Size Precision

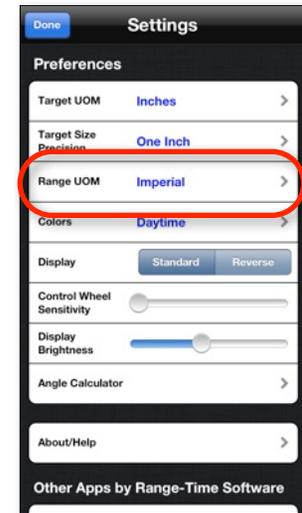
The Target Size Precision setting determines how precise the target size measurement is when viewing target size in imperial units.



Range UOM

The range estimation can be displayed in two different units of measure:

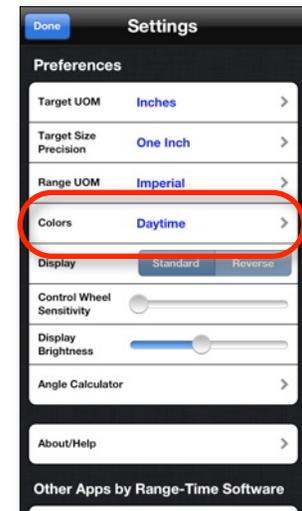
- Imperial (Yards)
- Metric (Meters)



Colors

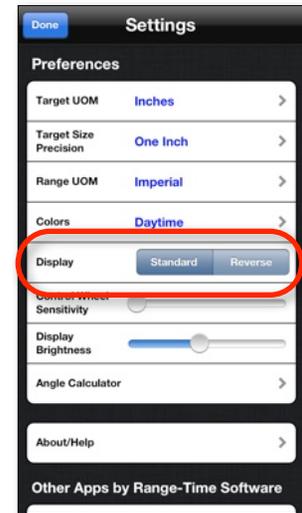
Three different color schemes are available

- Daytime
- Night Vision
- F.L.I.R. (Forward Looking Infrared)
- Red



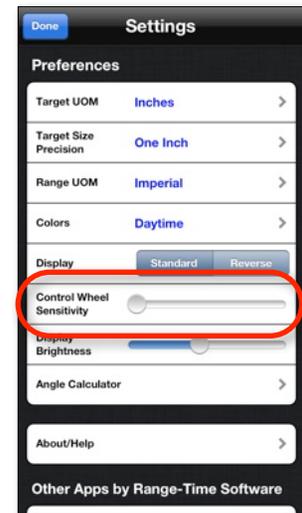
Display

Use the Display selector to reverse the controls and labels on the main reticle display.



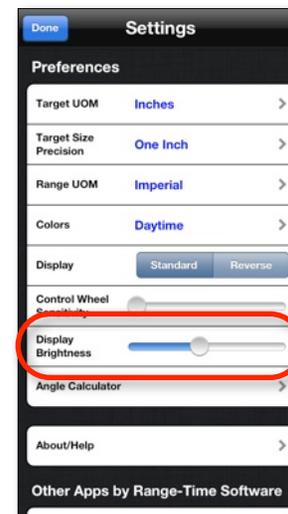
Control Wheel Sensitivity

The Control Wheel Sensitivity setting adjusts how responsive the control wheel inputs (target size, reticle subtension, target speed, and wind speed) are.



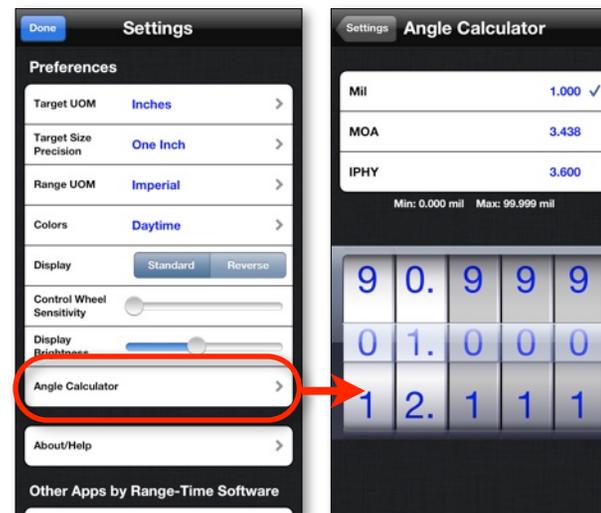
Display Brightness

The display brightness setting allows you to dim the display to make the application easier to use in low light settings. To adjust the display brightness, from the settings display, slide the Display Brightness slider left or right until the desired effect is reached.



Angle Calculator

The angle calculator is a simple utility that can quickly convert Mil to MOA to IPHY. Tap the Angle Calculator row to access the angle calculator. Select the input unit (denoted with the check mark), dial in the value and the other to units will automatically display the equivalent value.



Support

Please email any questions, issues or suggestions to mildot@me.com.

The highest form of compliments I can receive for my hard work are reviews in the App Store, and the referral of my apps to your friends and family. Honest reviews and ratings in the App Store help build buyer confidence, and are often a major factor in a buyer's decision to purchase. If you are having problems with Mil-Dot Rangefinder, please email me and give me a chance to make it right before you post a negative review or rating. If you find that I have not been helpful, then feel free to express your disappointment in the form of a negative review. If however you are pleased with my apps, please pass the word.

Thanks,
Tom Holsten
www.rangetimesoftware.com

Disclaimer

Mil-Dot Rangefinder is intended as a training aide only, and should be combined with experience in good marksmanship practices. Always follow all rules of firearms safety. All calculations should be considered estimates until validated by the shooter. Not recommended for use under duress or field combat situations. Author disclaims any liability from damage, injury, or death caused through the use of this software. Use entirely at your own risk.

Mil-Dot Rangefinder is not affiliated with, endorsed by, or sponsored by any manufacturer.