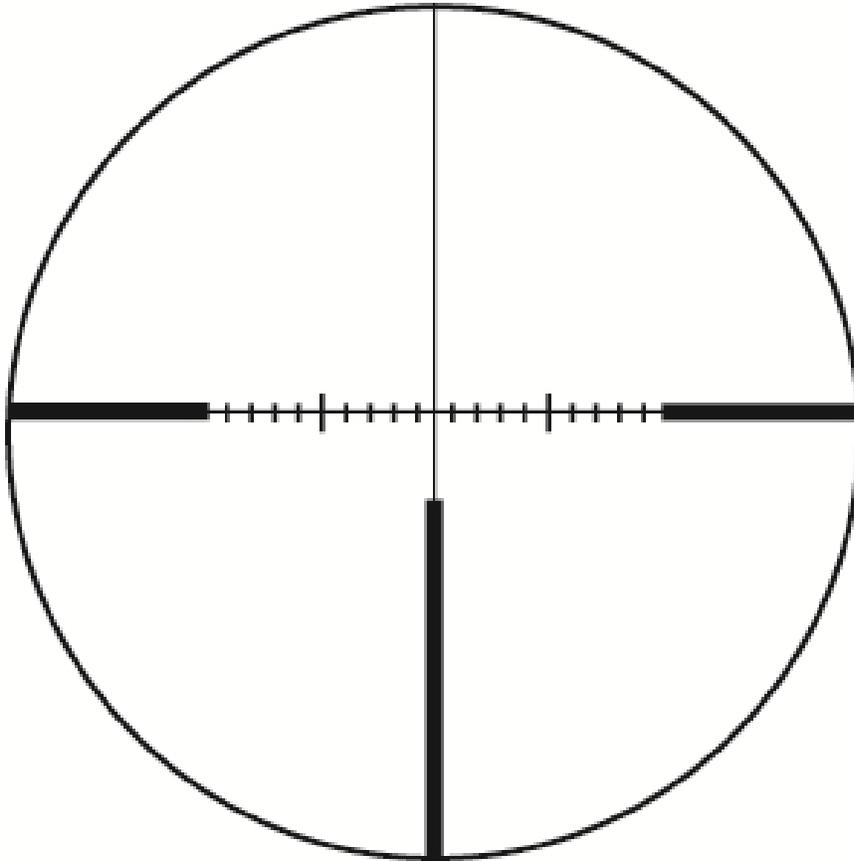# 4W RETICLE INSTRUCTIONS

Available in:
Z3 4-12x50 BT
Z5 3.5-18x44 BT
Z5 5-25x52 BT

Congratulations on your purchase of a SWAROVSKI OPTIK Ballistic Turret (BT) Rifle Scope with the **4W**, Wind Compensating reticle.

The concept of the BT/4W system is to easily allow the shooter or hunter to dial in the correct elevation needed for a shot with the Ballistic Turret (BT) system, and then if necessary, be able to compensate for wind by utilizing the vertical hash marks along the crosshair. These vertical hash marks are placed in 2 MOA (Minute of Angle) increments. The SWAROVSKI OPTIK Ballistic Calculator will be able to tell the shooter how many MOA to compensate for wind deflection. This is very much dependent upon wind speed and direction, in conjunction with the velocity and ballistic coefficient of the cartridge being used.

4W Reticle Description
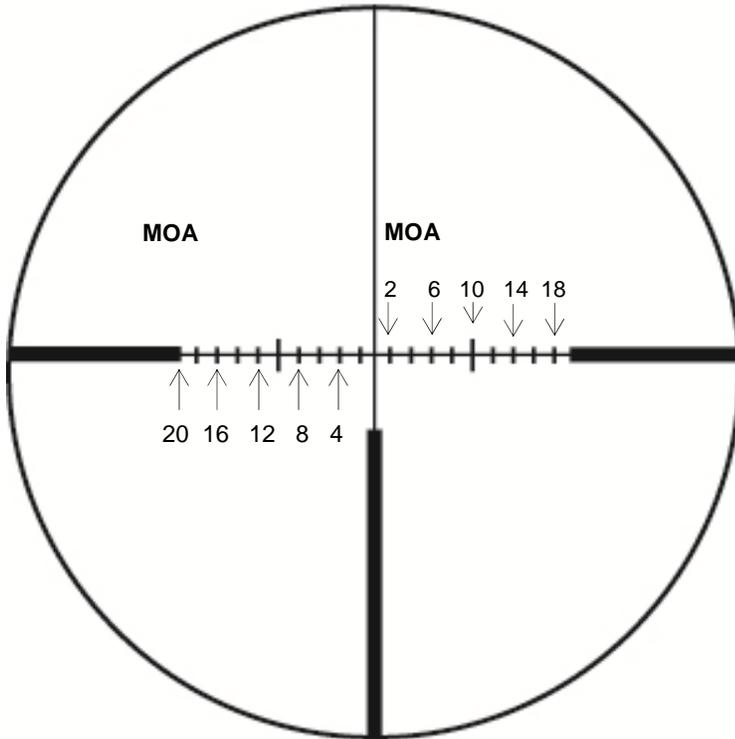
On the Horizontal Crosshair, the Vertical Hash Marks are spaced in 2 Minute of Angle (MOA) increments. This means that at 100 yards, the 1st hash mark from center = a 2 inch spacing. This same 1st hash mark at 300 yards = a 6 inch spacing (2 MOA x 3 = 6"). At 500 yards, this same 1st hash mark = 10 inches (2 MOA x 5 = 10").

The second hash mark from center = 4 MOA. At 100 yards, that's 4 inches. At 300 yards this 2nd hash mark = 12 inches (4 MOA x 3 = 12"). At 500 yards, this 2nd hash mark = 20 inches (4 MOA x 5 = 20").

The 5th hash mark (longer than the rest) from center = 10 MOA. At 100 yards this = 10 inches. At 300 yards, this 5th hash mark = 30 inches (10 MOA x 3 = 30"). At 500 yards this 5th hash mark = 50 inches (10 MOA x 5 = 50").

NOTE: Because this rifle scope has a 2nd focal plane reticle, the rifle scope must be on its maximum magnification to accurately compensate for wind in MOA utilizing the hash marks. If wind is not a factor in making a shot, simply use the main central crosshair at any magnification.

There is room for 20 MOA adjustments, to either the left or right of the main central crosshair. The 5th hash mark to either side is slightly longer than the others and indicates the 10 MOA position. The ends of the heavy horizontal posts would represent the 20 MOA increment from the crosshair center.

Compensating for Wind in General
In the field, wind calculation for bullet impact placement is best referred to as an "Inexact Science" and can be sometimes difficult to calculate or predict. This is due to real world factors such as the wind blowing at a certain velocity from a certain direction at the shooting position, but could very possibly be blowing at a different velocity and from a different direction at the target.

If you ever find yourself in the above scenario, keep in mind that what the wind is doing closer to the target has more significance in determining wind compensation, than what the wind is doing at the rifle. This is because the bullet is constantly slowing down on its way to the target. If you had a 600 yard shot, knowing which direction the wind is blowing between 300 and 600 yards is more important, as it will be "pushing" the bullet for a slightly longer period of time, than the faster velocity between the muzzle and 300 yards. Watching grass move, leaves or brush moving, a cloud of dust move, etc.., will give you a better idea what the wind is doing closer to the target.

From a ballistic standpoint, bullets with higher ballistic coefficient (BC) values, traveling at higher velocities, will be able to get to the target with less wind deflection. A classic example of BC value effect is 2 different 30-06, 180 gr loads, both leaving the muzzle at 2700 fps, but one bullet has a BC value of 0.248, the other a BC value of 0.500. At 400 yards, in a 10mph 90 degree crosswind, the bullet with the 0.248 BC will be deflected about 27 inches. The bullet with the BC of 0.500 will only be deflected about 12 inches. With the **SWAROVSKI OPTIK 4W** reticle, you would be able to compensate for either very easily.

Wind calculation can be determined with a fair amount of precision if the wind comes from a specific direction, at a specific velocity, that stays relatively constant over the bullet's distance to the target.

Practice in differing wind conditions, where you know the wind conditions all the way to the target will give you the best insight as a rifleman.

Getting to the Calculator for your BT/4W Rifle Scope:
To find for elevation and windage compensation with the BT/4W reticle system, you can go to the SWAROVSKI OPTIK Ballistic Calculator at WWW.SWAROVSKIOPTIK.COM . First, at the Home page, place the cursor on the word "Products" and select "Rifle Scopes".

Step 1:
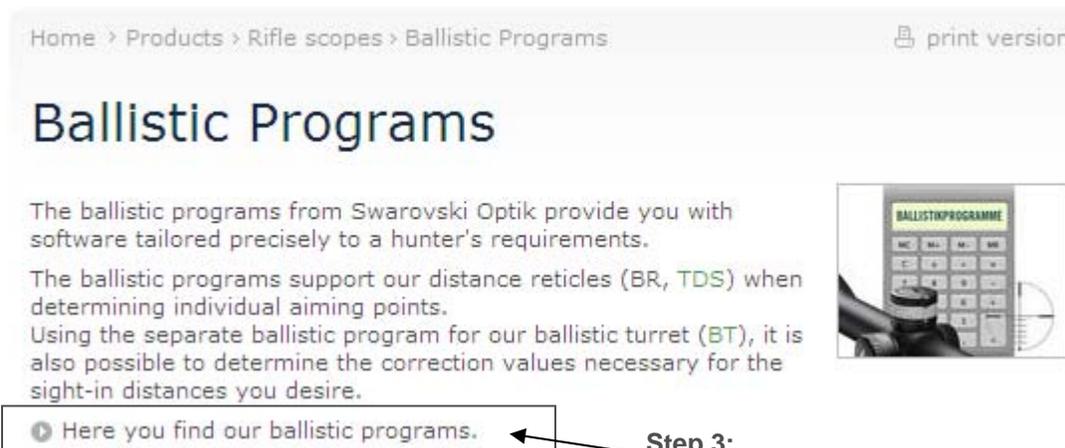Select "Rifle Scopes"
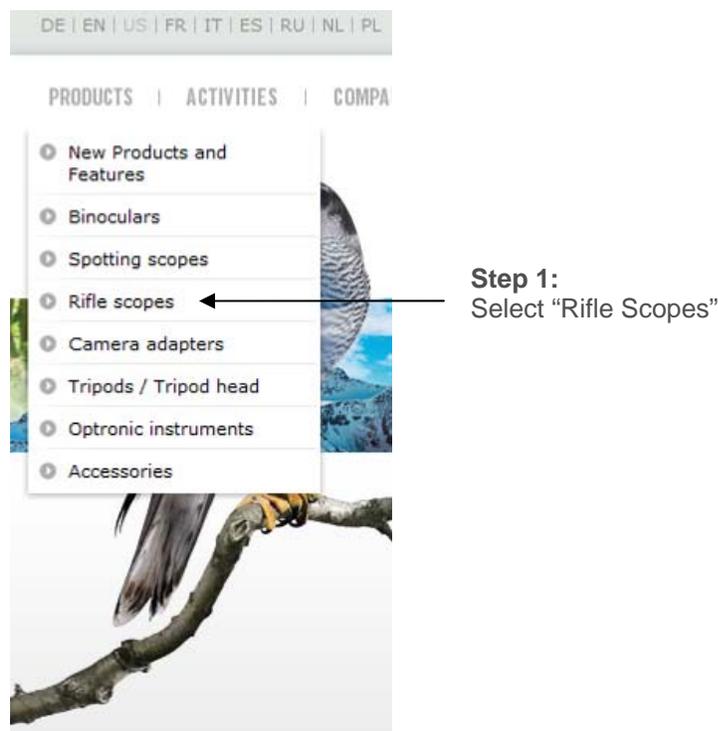
Then, click on "Ballistic Programs" that is listed under "Rifle Scopes".
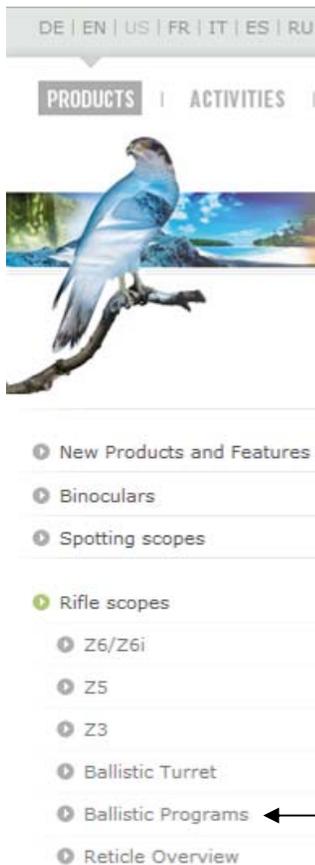
Step 2:
Select "Ballistic Programs"

You will now see the screen below. Click where it says, "Here you find our ballistic programs", at the bottom of the paragraph.

Step 3:
Select "Here you find our ballistic programs"

You will then be directed to the screen below. At the bottom of this screen you will see a highlighted box, just to the left of "I have read and agree to these legal terms." Click on this Box.

Step 4:
Click in the box next to "I have read and agree to these legal terms"

After you have clicked there, a check mark will appear in the box and the Arrow in the lower right hand corner will become highlighted, click on this Arrow (as shown below).

Step 5:
Click on the green arrow above

This is the next screen that will appear - Indicating on the US/EN web sites, Imperial Units (Yards, Inches, etc.) will be the default units of measurements. You will also have the opportunity to click on "Download iPhone App" and "Download Offline-Version". Click on the Arrow at the bottom right, again.
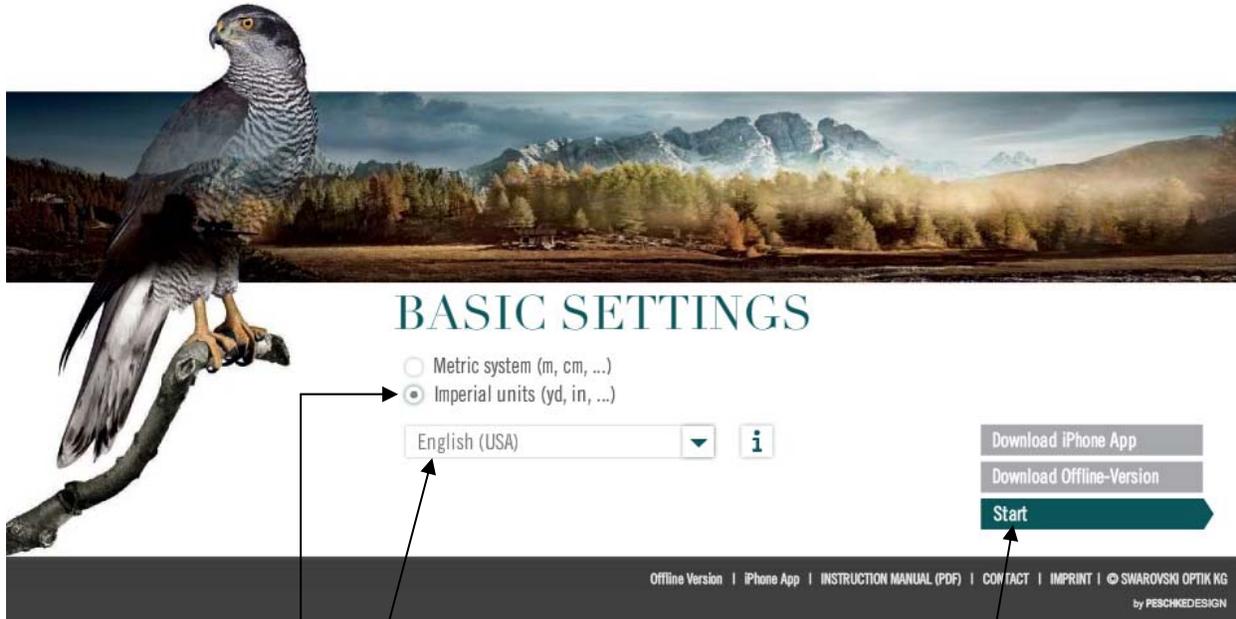
Step 6A:
Make sure "Imperial Units" and "English" USA is selected

Step 6B:
Then, click on green arrow above

This is the next screen that will appear.
(If you can not see everything on your screen that is illustrated here, hit the F11 key to get the full view)
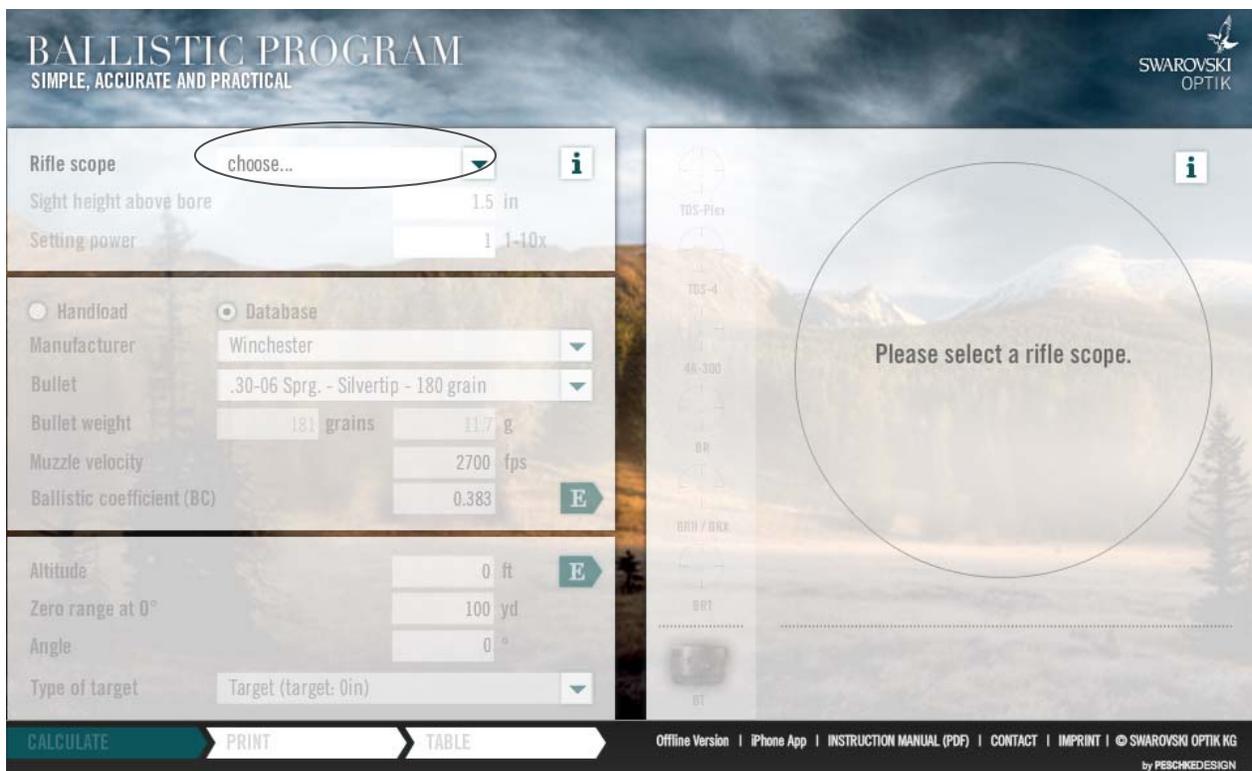
At this point, you must choose your rifle scope by clicking on the drop down arrow box at the top where it says "choose". If you have a Z5 3.5-18x44, you would click on that model:
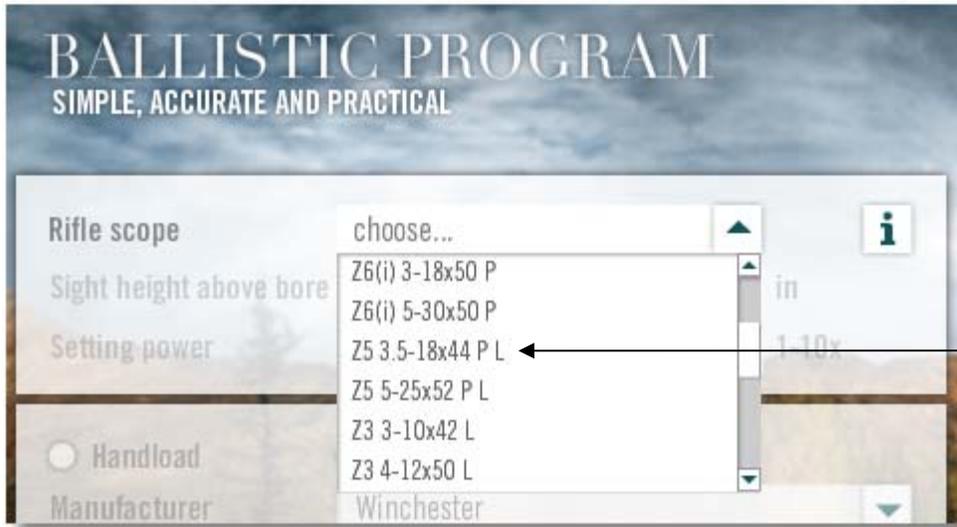
Step 7:
Under Rifle scope, select the rifle scope that you will be using. In this example, we've selected the Z5 3.5-18x44.

After you've selected the rifle scope you will be using, this is what the updated screen should now look like. At this point you would click on the BT Icon at the bottom left of the right screen, to get the following screen below.

Note:
The Rifle scope you've selected will automatically appear here
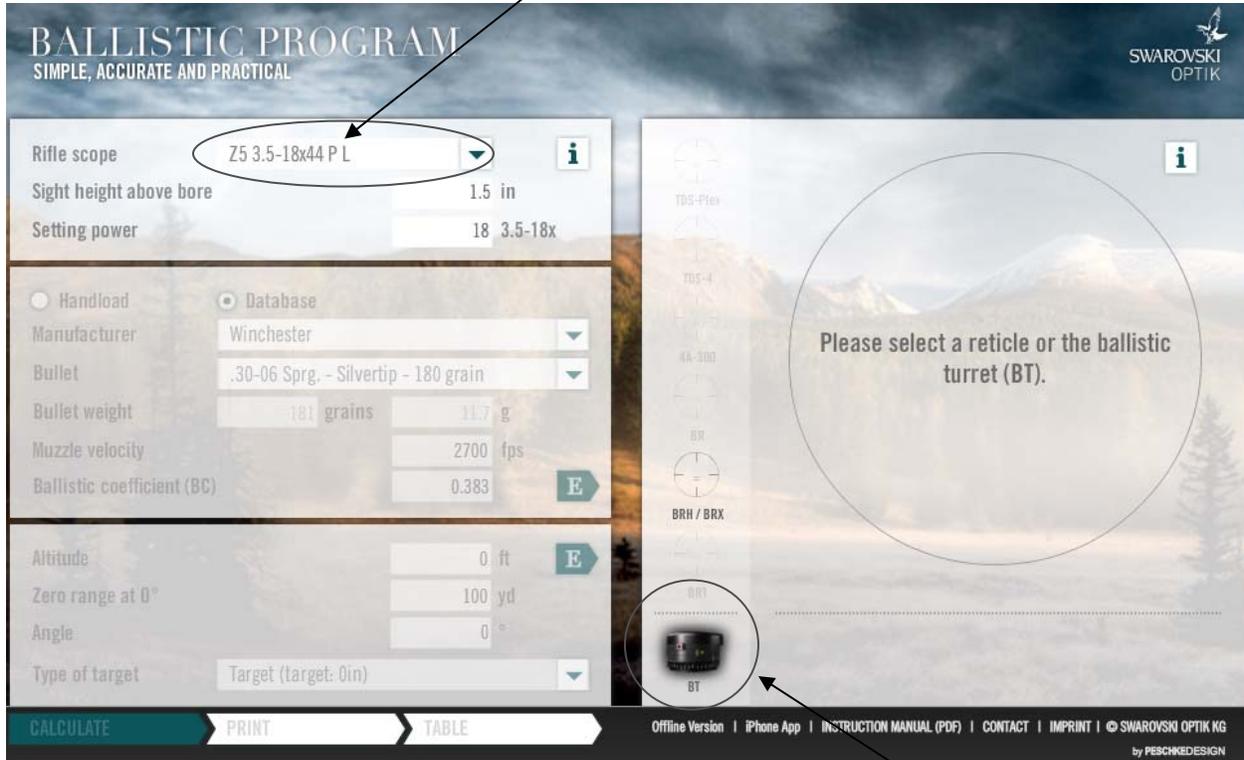
Step 8:
Click on BT Image

This screen defaults to "Database" from which you may choose factory ammunition.

Note:
The screen automatically defaults to "Database". The database contains over 2000 factory cartridges from which to choose.
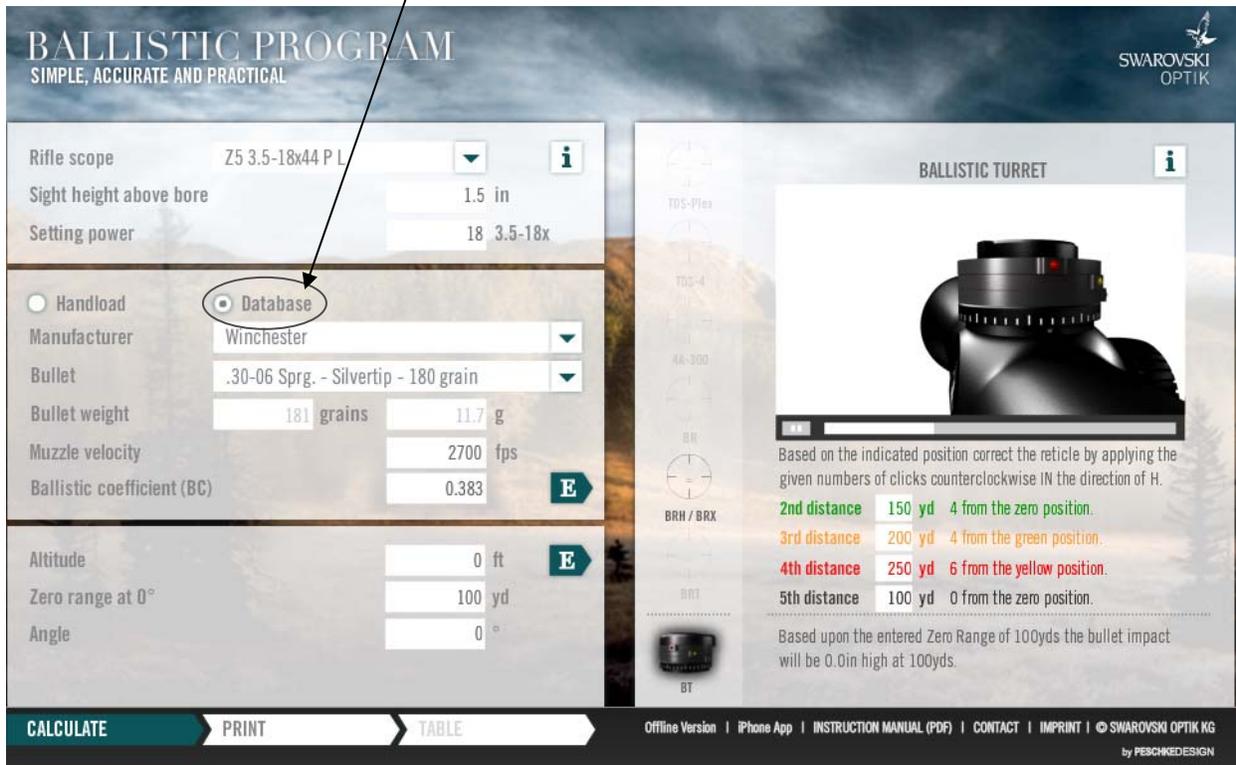
These last 2 screens will default to the Winchester Factory 180 gr Silvertip 30-06 Sprg. load in the manufacturer and bullet fields as well as the randomly chosen Green (150 yard), Yellow (200 yard) and Red (250 yard) downrange yardage settings. The information in these fields is designed to show 1st time users examples of "what" and "where" appropriate ballistic inputs are to be placed.

You are now ready to select your Factory Cartridge from the Database by clicking on the drop down arrows for "Manufacturer" (Hornady, Weatherby, Federal, Remington, etc.) and then "Bullet" for an individual/specific cartridge and bullet weight. Factory advertised Bullet weight, Muzzle Velocities and Ballistic Coefficients will appear in their respective fields.

Step 8A:
Select Ammunition Manufacturer on the drop down menu

Step 8B:
Then, select the Cartridge on the drop down menu next to "Bullet"

Note:
If you are a reloader, click on the circle just to the left of word "Handload" to enter reloading data. The fields below will become blank so that you can enter your own ballistic data.

SWAROVSKI OPTIK Tip:
A zero ("Zero Range at 0º" field) of 100 yards, with downrange values of 200, 300, 400, or a zero of 200 with downrange values of 300, 400, 500 are very common and popular settings for the BT, but you are able to choose any reasonable down range yardage distances, within the limitations of cartridge trajectories and the scope's adjustment range.

These are the maximum number of upward clicks allowed by the BT system, in scopes offered with the 4W reticle, dependent upon the rifle scope.
1) Z3 4-12x50 BT – 42 upward clicks (within 173 total clicks of this scope)
2) Z5 3.5-18x44 BT – 53 upward clicks (within 230 total clicks of this scope)
3) Z5 5-25x52 BT – 53 upward clicks (within 173 total clicks of this scope)

You will be able to use these maximum Upward Click values to squeeze out the farthest possible distance in the "5th distance" field box. If you have gone further than the maximum distance of the cartridge/scope combination, the distance will revert back to the last "allowable" distance that was entered. If you are using a Z3 4-12x50 BT, you can "creep up" to the farthest allowable distance in the 5th distance box, by entering yardages, until 42 (max clicks for that model) appears in front of "…from the zero position."

Example of use: First - BT Elevation Compensation
In this example, we will use a Hornady manufactured 30-06 Sprg. with a 165 grain BTSP InterLock bullet, Muzzle velocity of 2800 fps, Ballistic Coefficient of 0.435. To get this information, you will need to choose Hornady with the drop down arrow in the "Manufacturer" field, then the individual cartridge in the "Bullet" field with its drop down arrow.

The rifle scope that we've selected as an example is a Z5 3.5-18x44 BT.

Select Ammunition Manufacturer on the drop down menu (our example is a Hornady Factory Round)

Then, select the Cartridge on the drop down menu next to "Bullet". We've selected as an example the .30-06 Sprg. 165 grain BTSP InterLock.

BALLISTIC PROGRAM
SIMPLE, ACCURATE AND PRACTICAL

Rifle scope	Z5 3.5-18x44 P L
Sight height above bore	1.5 in
Setting power	18 3.5-18x

○ Handload   ⊙ Database

Manufacturer	Hornady
Bullet	.30-06 Sprg. (7,62 x 63) - BTSP InterLock - 1
Bullet weight	165 grains 10.7 g
Muzzle velocity	2800 fps
Ballistic coefficient (BC)	0.435 **E**

Altitude	0 ft **E**
Zero range at 0°	200 yd
Angle	0 °

CALCULATE   PRINT   TABLE

The Muzzle Velocity and Ballistic Coefficient, and Bullet Weight are automatically computed after the Bullet has been selected.

The zero (Zero range at 0°) is defaulted at 100 yards; in the example below, we changed it to **200** yards. Also, note to the right of the BT icon, 100 yard sight in data is given (in this case 1.8" high @ 100 yards) for 100 yard sighting in purposes. After entering the desired down range distances of 300, 400, 500 yards into the appropriate fields of the SWAROVSKI OPTIK BT Ballistic Calculator, the BT calculator will now show the following:

Step 9:
Enter your downrange yardage value in the white boxes above. We've decided to enter 300, 400, and 500 yards for our downrange yardage values and a 500 yard shot has presented itself.

For the 500 yard shot, you would place the BT at its red 500 yard position which is the red dot aligned with the white dot at base of the turret as shown below.
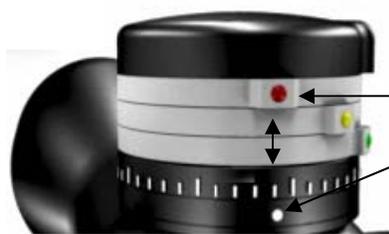
Step 10:
Align the red dot vertically to the white dot at the base of the turret

Wind Compensation and Calculation
It can be very useful in the hunting field to know wind speeds. There are many companies that offer a variety of wind meters with different features. Knowing the current Wind Speed and Wind Directions will allow for a more accurate shot, especially at long range.

Another tip on wind direction can be used by gauging the always present "heat mirage". If the heat mirage waves seem to be going straight up, then there is usually no wind, or the wind is coming at you, or going directly away from you. If the heat mirage seem to be bending the "waves" almost straight to the sides, that is indicative of about a 10 mph wind.

Second - Windage Compensation using MOA measurements
In this example, we will use a distance to the target of 500 yards and introduce a crosswind of 10 miles per hour at a 90º (right or perpendicular) angle. To do this, click on the tab "**TABLE"** at the bottom center of the screen. [If the table will not open, click on the BRH/BRX Reticle icon above the BT icon to open the table. The Ballistic data will remain the same.] When the "**TABLE**" window has opened, there are fields at the very top with wind velocity and direction fields. Appropriate values can now be entered into the "Wind from" and "Wind speed" fields in this ballistic "**TABLE**".

Step 11:
Once the information above has been completed, click on "Table" to open the Ballistic Table.

Note: If the table will not open, click on the BRH/BRX Reticle icon above the BT icon to open the table. The Ballistic data will remain the same

The default direction (Wind from) is 90° and will not need changing here. Go to the Wind speed field and enter 10 in the m/h field, **then click on the CALCULATE tab**.

Step 12A:
Enter the appropriate wind direction here.

Step 12B:
Enter the appropriate wind speed here.

BALLISTIC PROGRAM
SIMPLE, ACCURATE AND PRACTICAL

SWAROVSKI OPTIK

Rifle scope	Z5 3.5-18x44 P L
Sight height above bore	1.5 in
Setting power	18 3.5-18x

○ Handload   ● Database

Manufacturer	Hornady
Bullet	.30-06 Sprg. (7,62 x 63) - BTSP InterLock - 1
Bullet weight	165 grains 10.7 g
Muzzle velocity	2800 fps
Ballistic coefficient (BC)	0.435 E

Altitude	0 ft E
Zero range at 0°	200 yd
Angle	0 °
Type of target	Target (target: 0in)

Wind from	90.0 °
Wind speed	10 m/h
Maximum distance	500 yds
Interval	25 yds

Tgt Range yd	Elevation MOA	Windage MOA	Elevation in	Windage in	Velocity fps	Energy ft-lbs
200	0.00	1.50	0	-3.1	2388	2089
225	0.50	1.75	-1.5	-3.9	2339	2005
250	1.25	1.75	-3.2	-4.9	2290	1925
275	2.00	2.00	-5.5	-6	2241	1843
300	2.50	2.25	-8.1	-7.1	2195	1766
325	3.25	2.50	-11.2	-8.4	2149	1693
350	4.00	2.75	-14.6	-9.8	2106	1624
375	4.75	3.00	-18.7	-11.4	2060	1554
400	5.50	3.00	-23.2	-13	2014	1489
425	6.50	3.25	-28.5	-14.8	1969	1423
450	7.25	3.50	-33.9	-16.7	1929	1364
475	8.25	3.75	-40.5	-18.8	1883	1302
500	9.00	4.00	-47.1	-20.9	1844	1247

CALCULATE   PRINT   TABLE

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Step 12C:
Click on "Calculate" for appropriate windage correction in MOA.

This will be the result: (scroll down to the bottom for 500 yards. A maximum of 2000 yards can be entered in the "Maximum distance" field).

Wind from	90.0 °
Wind speed	10 m/h
Maximum distance	500 yds
Interval	25 yds

Tgt Range yd	Elevation MOA	Windage MOA	Elevation in	Windage in	Velocity fps	Energy ft-lbs
200	0.00	1.50	0	-3.1	2388	2089
225	0.50	1.75	-1.5	-3.9	2339	2005
250	1.25	1.75	-3.2	-4.9	2290	1925
275	2.00	2.00	-5.5	-6	2241	1843
300	2.50	2.25	-8.1	-7.1	2195	1766
325	3.25	2.50	-11.2	-8.4	2149	1693
350	4.00	2.75	-14.6	-9.8	2106	1624
375	4.75	3.00	-18.7	-11.4	2060	1554
400	5.50	3.00	-23.2	-13	2014	1489
425	6.50	3.25	-28.5	-14.8	1969	1423
450	7.25	3.50	-33.9	-16.7	1929	1364
475	8.25	3.75	-40.5	-18.8	1883	1302
500	9.00	4.00	-47.1	-20.9	1844	1247

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Note:
The above windage calculates the MOA that is used for a hold point for right to left wind in this example.

Notice in the chart there is a Windage (correction) column with values shown in MOA. In the case of this 500 yard shot with this cartridge, it shows the "Windage MOA" correction to be 4.00 MOA. The actual value in inches of wind deflection is 20.9 inches, that is equivalent to 4.00 MOA. Remember, each hash mark is spaced in 2 MOA increments – 2 hash marks, to the left or right, equal 4 MOA
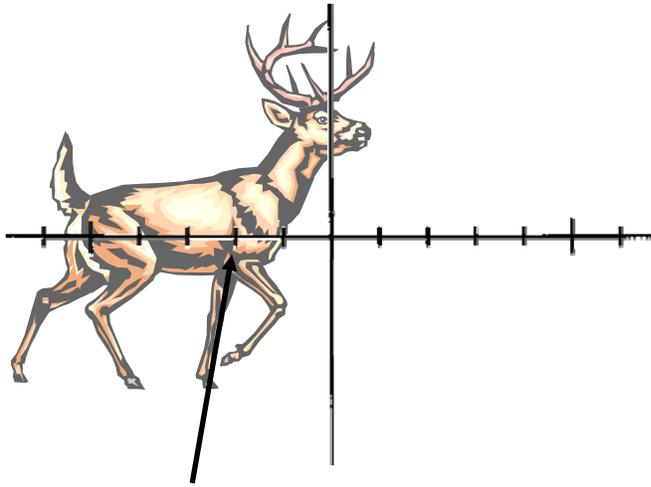
4 MOA
Use as Hold Point for Right to Left Wind, 90 degree, 10 mph wind.
Each hash mark above indicates 2 MOA.

In this case, if the wind was blowing from← right to left ←,that would be pushing the bullet to the left, you would hold the reticle INTO the wind, to the right, then using the second **Left** vertical hash mark as the aiming point, representing 4 MOA to the left, to hold where you want the bullet to hit.

REMINDER FOR USE IN DETERMINING WINDAGE COMPENSATION. THE HASH MARKS ON THE HORIZONTAL CROSSHAIR ARE CALCULATED TO BE IN MOA AT THE SCOPE'S MAXIMUM MAGNIFICATION. In order for the windage hold point to be correct, the scope must be at its maximum magnification.

Your rifle scope has a 2nd focal plane reticle. As you adjust the magnification up and down, the reticle stays the same size, but the entire image dimensions are changing size against the "fixed" reticle size during magnification changes.

This does not mean that you must keep your BT/4W scope on maximum power all the time. If you were using your BT/4W rifle scope in the 500 yard example above (or any distance), and there was NO wind, or the wind was coming directly at, or going directly away from you, IT WOULD MAKE NO DIFFERENCE WHAT MAGNIFICATION THE RIFLE SCOPE WAS SET AT, because you would be using the central intersection of the reticle.

Example of Effect of Wind Direction

A 10 mph 90⁰ crosswind has become somewhat of an unofficial "standard" when demonstrating the effect on wind on a bullet's trajectory. But as we know, the wind is not always coming from a 90° direction. Let's use the same 165 gr 30-06 Sprg. cartridge in the above example, keeping the same 10 mph velocity, but have the wind coming from the left to right →, at say a shallower 30° angle ↘, this will obviously still be pushing the bullet from the left to right →, but with LESS pushing/deflecting effect.

Wind from	30.0 °
Wind speed	10 m/h
Maximum distance	500 yds
Interval	25 yds

Note:
Wind Direction changed here

Tgt Range yd	Elevation MOA	Windage MOA	Elevation in	Windage in	Velocity fps	Energy ft-lbs
200	0.00	0.75	0	-1.5	2388	2089
225	0.50	0.75	-1.5	-2	2339	2005
250	1.25	1.00	-3.2	-2.4	2290	1925
275	2.00	1.00	-5.5	-3	2241	1843
300	2.50	1.25	-8.1	-3.6	2195	1766
325	3.25	1.25	-11.2	-4.2	2149	1693
350	4.00	1.25	-14.6	-4.9	2106	1624
375	4.75	1.50	-18.7	-5.7	2060	1554
400	5.50	1.50	-23.2	-6.5	2014	1489
425	6.50	1.75	-28.5	-7.4	1969	1423
450	7.25	1.75	-33.9	-8.4	1929	1364
475	8.25	2.00	-40.5	-9.4	1883	1302
500	9.00	2.00	-47.1	-10.5	1844	1247

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2 MOA
Use as Hold Point for Left to Right, 30 degree, 10 mph wind.
Each hash mark above indicates 2 MOA.

In this situation, the shallower 30° angle has reduced the hold off to only 2 MOA at 500 yards, to compensate for the "lesser" 10.5 inch wind drift. Here, since the bullet is being pushed to the right, you would use the first vertical hash mark on the right as your aiming point, representing a 2 MOA hold point.

SWAROVSKI OPTIK Tip
It may be helpful in the field to write on an index card, the MOA values for a 10 mph 90° wind for your specific cartridge in 100 yard increments. In the 30-06 cartridge we have been using here at 500 yards, we know to use 4 MOA for a 10 mph, 90° wind. If this wind were coming from a 45° (1/2 the 90°) degree angle, the compensation would be close to ½ of the 90° value, or 2 MOA (2.75 MOA actual).

The same idea can be applied to wind speed. If the wind speed was doubled, or increased to 20 mph, using the same cartridge, simply double the MOA value. So at 500 yards from a 90° angle, the wind compensation would be for the 30-06 used here would be double 4 MOA, or 8 MOA of compensation.

A Discussion of Minute of Angle
A minute of angle is simply a measurement of part of the angle of a circle. There are 360 degrees in a circle. Each degree is broken down into 60 minutes (of arc). A minute of angle happens to measure 1.047 inches at 100 yards (in the metric world this measurement is 2.91 centimeters at 100 meters). Since this measurement is so close to being 1 inch, and the term "1 MOA" has been used in the firearms fraternity synonymously as "1 inch", 1 MOA and 1 inch are considered by most riflemen to be one in the same. As you can see they are not exactly the same thing, but very, very close.

Adjusting for Wind with the Windage Turret
To further help you understand wind correction and the relationship to MOA, this is how you would manually adjust for wind with the windage turret.

SWAROVSKI OPTIK 1 inch rifle scopes are equipped with turrets with ¼ inch @ 100 yard clicks or increments. If we take our 30-06 example above in a 10 mph, 90° wind, we would 1st need to know how much drift there will be at the intended target. In this case it is 20.9 inches at 500 yards. It is also imperative you understand the following:

If 1 click = ¼ inch @ 100 yards, then
1 click = ½ inch @ 200 yards – (.25" (click value) X 2 (for 200 yards) = 0.50" per click @ 200 yards, then
1 click = ¾ inch @ 300 yards – (.25 x 3 = .75" per click at 300 yards), then
1 click = 0.8425 inch at 337 yards – (.25" (click value) X 3.37 (for 337 yards) = 0.8425" per click @ 337 yards
1 click = 1 inch @ 400 yards – (.25 x 4 = 1.0" per click @ 400 yards, then
1 click = 1.25 inches @ 500 yards – (.25 x 5 = 1.25" per click @ 500 yards, then etc…

If we know the distance to the Target is 500 yards, and that the wind drift will be 20.9 inches at 500 yards, and that 1 click will equal 1.25 inches at 500 yards, then:
20.9" (wind drift) ÷ 1.25" (one click @ 500 yds) = 16.7 clicks, that would round off to 16 or 17 clicks

Now remember that 4, ¼ "or ¼ MOA clicks = 1 MOA. Since 4 clicks = 1 MOA, 16 clicks equals 4 MOA, the same 4 MOA correction that is listed in the table for that 500 yd shot in a 10mph 90° Wind.