The 1358 Wind Guide

Contents

Glossary

Term / Abbreviation	Description
BC	Ballistic coefficient See https://en.wikipedia.org/wiki/Ballistic_coefficient
Cant / canting	Tilting (rolling, in flight terms) the rifle to the left or right. This causes the shot to land left or right of the aim point.
ChairGun	Ballistic software provided free-of-charge by Hawke See https://www.hawkeoptics.com/chairgun-and-x-act-end-of-life.html
Fps or ft/s	Feet per second. The unit commonly used to measure the speed of a pellet.
FT	Field Target
SAFTAA	South African Field Target Airgun Association
Windeeze	An online FT game See http://www.competitionshooter.co.uk/windeeze/

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Introduction

This guide is intended to provide a basic introduction to shooting FT in the wind. The guide does not promise to be the be-all-and-end-all of shooting in the wind, nor does it present the only way to gauge and allow for wind drift while shooting FT. It is simply one of many methods.

The method described herein is based on the mathematics of a pellet in flight. For those not mathematically inclined, the method is simple to use once you're used to it. If you prefer, you could also create a wind chart based on this method which you can refer to without having to calculate drift in your head (remember, electronic equipment is not allowed on an FT course during a competition so you may not use a calculator.)

Bear in mind that maths assumes fixed and accurate values in order to determine an exact answer. Since shooting FT inherently involves a number of variables, your results may not align exactly to those described herein. Just some of the variables we encounter while shooting:

- No one is absolutely dead-still while shooting. We move due to breathing, heart-beat, muscle movement and wind on our bodies. You can see this through the scope.
- No two pellets are exactly the same. Although a tin may be branded as 8.4gr, they are not all 8.4gr (generally only about half to three quarters of a tin are.) Nor are they exactly the same

size. And occasionally they have “shavings” stuck on them. You can reduce the impact of this variable by sorting pellets.

- No one shoots 1-hole groups at 50m in FT. If anyone says they do, they are lying.
- The wind is a natural thing, it is not constant – it doesn’t blow at an exact angle or speed. And what the wind is doing where you’re reading it (mostly around you), is not guaranteed to be what it’s doing 40m farther down the lane.
- Shooters are people, not machines. We occasionally make mistakes while we shoot – we cant the rifle, we snatch the trigger, sometimes we even shoot the wrong target

Fortunately, we don’t shoot pellet-sized hit zones. Hitting the center of the paddle scores the same as hitting just inside the paddle. So we only have to be accurate enough to hit a 15, 25 or 40 mm paddle.

1 The basics of wind drift

In simple terms, and assuming a constant wind speed and direction, the amount of drift a pellet will experience is determined by its weight and speed.

You can demonstrate this with a ping-pong ball and a squash ball. They’re the same shape and roughly the same size, but the squash ball is notably heavier. Roll both along a table top and blow on them from the side (90° to the path of the ball.) Rolled at the same speed, the ping-pong ball will move off of its course more than the squash ball (because the squash ball is heavier.) Rolled at faster speeds, each will move less than they did before (because your breath acts on them for a shorter time, and they have more energy); the squash ball will still move less than the ping-pong ball.

However, the weight of the ball is not the true factor here. If you had another squash ball that still weighed the same, but was 4 times the size, then it would move more than the normal squash ball (because your breath acts on a larger area of the ball.) Additionally, the shape of the ball impacts how much your breath moves it – if you flattened the ball into a disc, it would move less. The size and shape factors (among others) are all lumped together into the term “Ballistic Coefficient” (BC). In simple terms, a pellet’s BC indicates “how well it bucks the wind”. A pellet with a higher BC will move less in the wind than a pellet with a lower BC.

A second part of the demonstration can be done by blowing on the ball from different angles. If you blow at 45° from the ball’s path then the ball will move less, and blowing from 15° will move the ball even less.

1.1 The constant values

There are some things that are constant, namely the speed at which your rifle shoots (I hope), the BC of your pellet and how much that speed/BC combination will move in wind.

The speed at which your rifle shoots is measured, at the muzzle, by shooting through a chronograph. Typically, 8.4gr pellets tend to be shot at around 780fps, and 10.3gr pellets at around 710fps (these speeds give the shooter a bit of leeway before exceeding the maximum allowed power for competitive FT shooting.)

There are ways to calculate your pellet's BC; you can Google for methods. They're time consuming and require you to shoot perfectly, in windless conditions with consistent pellets. Fortunately, the results of these methods have already been documented and are accessible in ChairGun. BC values for commonly-used pellets:

Pellet	**BC**
JSB Exact 8.44gr	0.021
JSB Exact Heavy 10.3gr	0.031

Using the typical speeds (780fps for 8.4gr, and 710fps for 10.3gr) and BCs, you can expect movement, per 1km/h of wind, of the following amounts at the following distances:

Pellet	**Distance**	**Movement**
JSB Exact 8.4gr	20m	**1**mm
JSB Exact 8.4gr	30m	**3**mm
JSB Exact 8.4gr	40m	**5**mm
JSB Exact 8.4gr	50m	**8**mm
JSB Exact Heavy 10.3gr	20m	1mm
JSB Exact Heavy 10.3gr	30m	2mm
JSB Exact Heavy 10.3gr	40m	4mm
JSB Exact Heavy 10.3gr	50m	6mm

The Movement amount is based on a "full value" 1km/h wind. Changing the pellet speed (up or down) by up to 30fps from the typical speeds has a negligible effect on the amount of movement.

Using the above, it can be calculated (for example) that when shooting a JSB Exact 8.4gr, travelling at a speed of 780fps, at a target that is 40m away, in a 7km/h wind – the pellet will move 35mm (5 x 7 = 35).

Notice the 1, 3, 5, 8 numbers?

2 Knowing the wind speed

In order to determine the amount of movement expected, you need to know the speed of the wind in which you are shooting. There are two common methods of determining the wind speed – with a windicator, and by feel.

Of course, you should use every available means to help read the wind speed. So use both a windicator and feel.

A possible third method exists – the target string. However, different strings are different weights and therefore don't move consistently enough to learn them. They are, however, useful to indicate whether the wind is blowing all the way through from you to the target, or if it dies halfway down the lane, or (heaven forbid) there's a crosswind.

2.1 Windicator

A windicator (wind indicator) is typically a piece of string attached to the rifle or scope.

2.1.1 Windicator weight

It shouldn't be too heavy, and it shouldn't to too light…

Too heavy: the windicator needs to be able to move in a 2km/h wind – shooting JSB Exact 8.4gr at 50m in a 2km/h wind will move the pellet about 16mm. Consider the variables encountered in shooting; if you're aiming at the center of the hit zone, you have a very small margin in which to land the pellet.

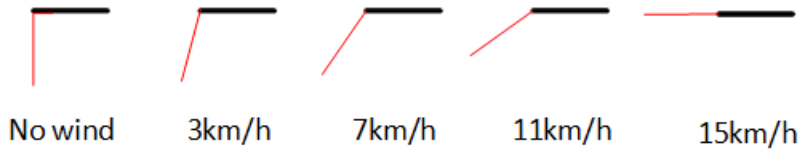
Too light: once the wind speed is "too much" for the windicator to measure, it simply flies parallel to the ground. Say the windicator string starts flying parallel to the ground at 10km/h – there is no way to measure the difference between a 10km/h and a 15km/h wind.

As a guideline, with a pinch of salt, go for a windicator weight that flies parallel to the ground at around 15km/h. If the windicator flies parallel "too soon", use a heavier material – do not attach weights to the end of the string as this prevents free movement of the string.

2.1.2 Windicator angle

The angle at which the windicator string is flying is used to "read" the wind speed.

To establish a starting point, get a digital anemometer and a common house fan. Put the fan next to the gun facing perpendicular to the barrel (i.e. create a 90° wind.) Turn the fan on, hold the anemometer above the windicator, record the anemometer reading and take note of the angle at which the windicator string is flying; the string may flutter and flap instead of flying stably, if so, average the angle. Move the fan further away (and/or change its power setting) to create different wind speeds and record the angles and speeds. You'll end up with something along the lines of the below diagram (perspective is from the shooter looking down the gun at the target, black line is the windicator stalk, red line is the string.)



You can now look at the angle at which the windicator is flying and know (or at least have a good idea of) the wind speed.

2.2 Feel

This takes more time to learn and use reliably.

Stand in an open area with an anemometer. Feel the amount of wind on you (and listen to it) and take note of the anemometer reading. Do this repeatedly on different days in different conditions. After a while, you'll become rather accurate at gauging wind speed by feel (perhaps more accurate than a windicator.)

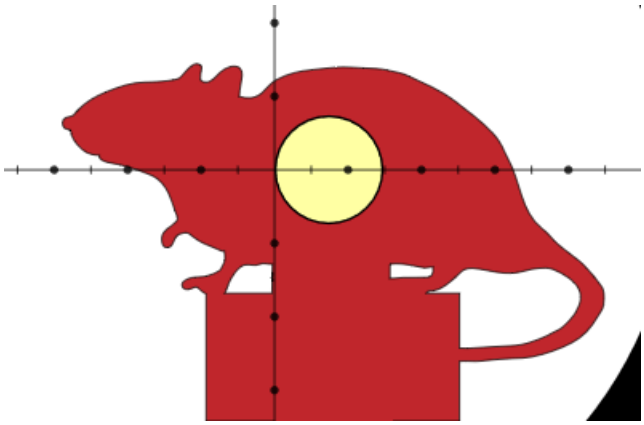
3 Holding off

So you've calculated that you're expecting 72mm of movement for a shot. How do you know where to put the crosshairs so that you're holding off that much? You cannot simply say each mildot or MOA line in your reticle is 20mm since that is only true at one distance and (unless you're using an FFP scope) magnification.

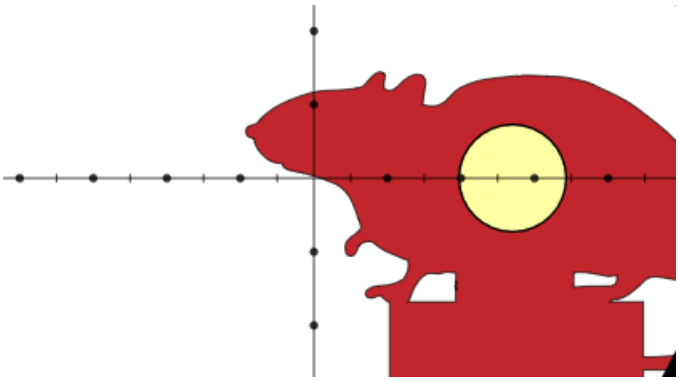
The way to do it is to bracket the hit zone you're currently aiming to hit to measure your reticle. You know the size of the hit zone you're aiming to hit (I hope). Put your crosshair on the one edge of the hit zone and see where the other edge is on the reticle. You then use that to measure the required holdoff.

Example: going back to the 72mm of movement expected, let's say:

- we're shooting at a 40mm hit zone
- we're using a half-mildot reticle
- the crosshair is on the left edge of the hit zone
- the right edge of the hit zone is on 1.5 mildots



Since you know the size of the hit zone, you know that 1.5 mildots is 40mm. 3 mildots would therefore be 80mm. We're looking for 72mm so we would use just-short-of 3 mildots to aim in the center of the hit zone:



The above images were taken from the Windeeze game.

4 Wind angles

In FT, there is no real-world scenario in which the wind is always blowing at 90° to your line of fire (known as "full value" wind.) The movement factors of 1, 3, 5, 8 assume such a scenario and therefore need to be adapted when shooting in angled wind.

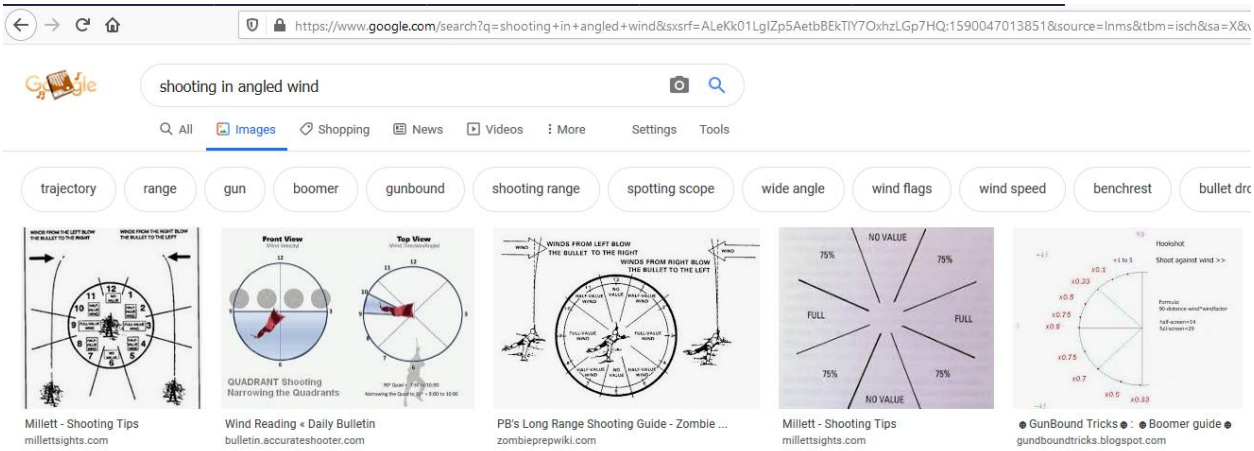
The diagrams in the "Windicator angle" section ignore the wind angle and assume a wind blowing at 90° to the line of fire. So a top-down view of the windicator string (for all wind speeds) would look like this:

Wind at 90°
from the right

There are two ways to include the wind angle when reading the wind – the "proper" way and the quick-n-dirty way.

4.1 The “proper” way

On the internet, you’ll find a plethora of diagrams for shooting in angled wind:



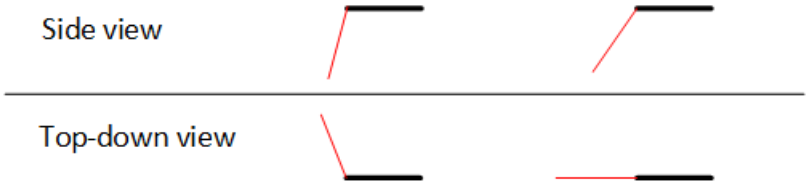
The gist of them is that head- and tail-wind is ignored (eish…) Wind at 90°, within a 30° arc, is treated as full value wind. Wind in-between those 2 scenarios is treated (sometimes in multiple increments) as somewhere between 30% and 75%. The values given to the angles are calculated and measured and undoubtedly accurate. However, you need a top-down view of your windicator in order to know the wind angle and getting such a view while shooting FT isn’t realistically possible.

4.2 The quick-n-dirty way

In brief, only pay attention to the windicator angle; ignore the wind angle.

Consider the following windicator angles:

Both are for a 7km/h wind. If we include a top-down view of them, they’d be something like:



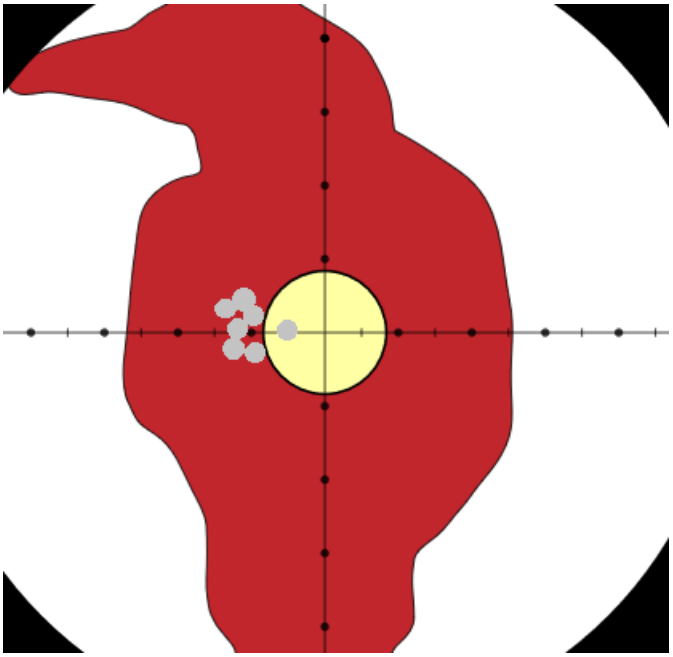
The first scenario **looks** like a 3km/h wind, but is actually a 7km/h wind at an angle (wind from the right & behind you.) The second scenario is a 7km/h wind at 90°.

If you ignore the wind angle (i.e. the top-down view) and only take note of the windicator angle, you'll end up treating the first scenario as a 3km/h wind … which, considering the wind speed and angle, is "right enough".

5 Tips

A few tips for shooting in the wind, in no particular order.

- When the wind blows then dies then blows then dies, wait for constant conditions. It is better to shoot in a constant wind than when the wind has suddenly died.
- When shooting into the wind, the pellet will impact slightly lower than expected. When shooting with the wind, the pellet will impact slightly higher than expected. This should only be a consideration in strong winds (10+km/h.)
- You can use other shooter's results to detect ghost wind. You may occasionally shoot in conditions that appear still, yet the pellet moves as if there was significant wind – this is ghost wind. If you get to a target and it looks like this:



yet you notice no wind, be wary of a ghost wind. You should be aiming at the right edge of the hit zone for this shot.