

WIND & MIRAGE

*Precision Shooting – Learn to Make Wind and
Mirage Your Friends*

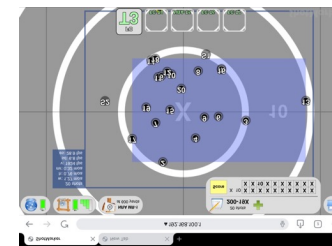


EXCELLENCE



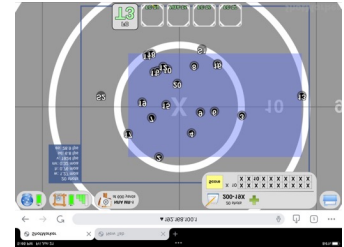
- EXCELLENCE IS NOT A RESULT .
- EXCELLENCE IS AN ATTITUDE.
- YOUR ATTITUDE DETERMINES THE DEGREE OF YOUR SUCCESS OR FAILURE.
- *GREAT ATTITUDE = GREAT RESULTS = EXCELLENCE.
- *POOR ATTITUDE = POOR RESULTS = CHANGE YOUR ATTITUDE.
- *YOU DETERMINE YOUR OWN ATTITUDE .
- ATTITUDE LEADS TO THE SELF FULL FILLING PROPHECY. YOU ARE WHO YOU THINK YOU ARE .

NRA & ICFRA MATCHES:



- COMPETE WITHIN YOUR OWN CLASSIFICATION.
- SHOOT 3 REGISTERED MATCHES FOR A CLASSIFICATION (240 Points for NRA SV, MR and 120 Shots for ART, F-Target and F-Open)
- TRIGGER TIME: AS MUCH AS POSSIBLE.
- PRACTICE PRACTICE PRACTICE PRACTICE
- PRACTICE SOME MORE
- FOCUS WHEN YOU PRACTICE

FUN MATCHES:



- AN OPPORTUNITY TO SHOOT UNDER MATCH CONDITIONS WITH OTHER SHOOTERS .
- SERVICE RIFLE, MATCH RIFLE , F-OPEN , FTR , AR TACTICAL OR ANY SCOPED RIFLE
- FALLS UNDER: PRACTICE PRACTICE PRACTICE .
- PRACTICE = CONFIDENCE = GREAT MARKSMANSHIP

KNOW YOUR ZEROS



- SHOOTER MUST HAVE SOLID ZEROS FOR 100, 200,300,500 AND 600 YARDS and for Long Range 800, 900 and 1,000
- THINGS THAT EFFECT ZEROS
 - SHOOTING WITH CANT.
 - WIND AND MIRAGE.
 - AMBIENT LIGHT.
 - POOR SIGHT PICTURE
 - LOOSE SIGHTS
 - RIFLE FIT

EQUIPMENT



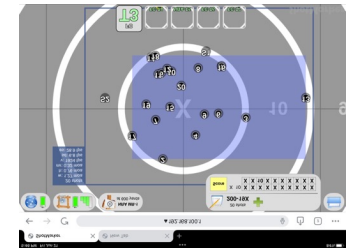
- RIFLE: IS YOUR RIFLE CAPABLE OF 1/2 MOA ACCURACY OUT TO 600 YARDS?
- VARMINT OR MATCH BARREL.
- TRIGGER DESIGNED FOR PRECISION SHOOTING. THE
- YOUR TRIGGER BECOMES AN EXTENSION OF YOUR FINGER .
- OPTICS: CAPABLE OF ELEVATION ADJUSTMENTS OUT TO 600 YARDS. 20 MOA SIGHT BASE RECOMMENDED .
- STOCK: IS A STOCK CONFIGURED FOR ADJUSTMENTS.
- SHOOTING PLATFORM: MECHANICAL RESTS, BIPODS OR SLINGS.
- SPOTTING SCOPE & STAND WITH A POWER RANGE OF 20-25X.
- PROPER SHOOTING GLASSES OF DIFFERENT COLORS FOR VARIOUS LIGHT CONDITIONS

SHOOTING CONDITIONS



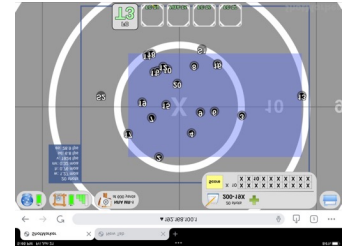
- PRINT OFF RANGE CARDS FOR YOUR AMMO.
- INDEX YOUR SIGHTS. USE OF DIFFERENT COLORED DOTS FOR DIFFERENT DISTANCES.
 - WHITE : 200 YARDS
 - YELLOW: 300 YARDS
 - RED: 500 YARDS
 - BLUE: 600 YARDS
- A. USE PAINTERS TAPE ON TOP TURRETS WITH COLORED HASH MARKS.

SIGHTING IN



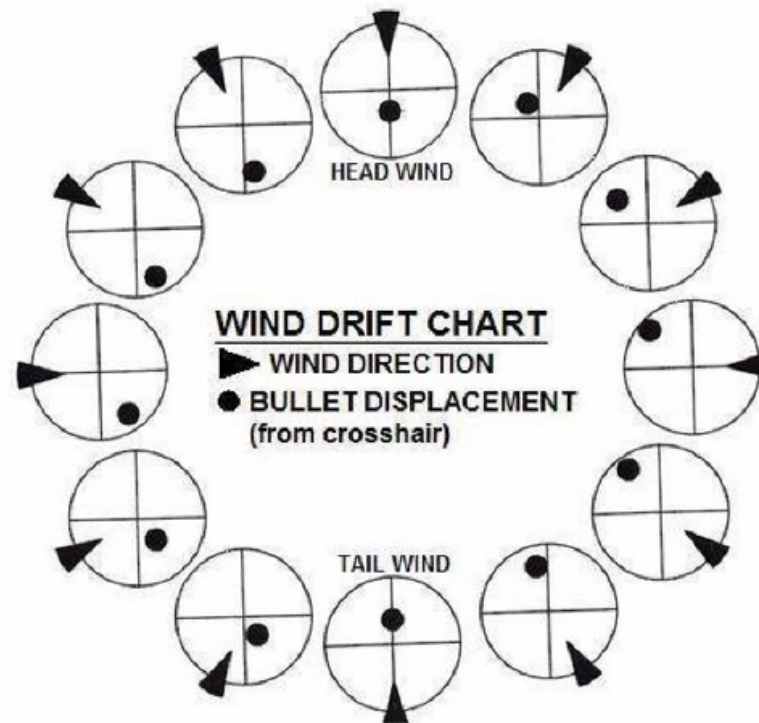
- BEST TIME IS AT 0800 HRS ON A DAY WITH SOLID OVERCAST WITH
- NO WIND. FIRST ROUND MUST GO DOWN RANGE AT 0800 HRS.
- AMMO: YOU MUST USE THE SAME AMMO YOU WOULD USE FOR COMPETITIONS.
- KEEP RECORDS OF ENVIRONMENTAL CONDITIONS AND LOAD DATA FOR THAT DAY - RECORDS RECORDS RECORDS...
- SET UP A NOTEBOOK TO RECORD ROUNDS FIRED OUT OF THAT BARREL . ALONG WITH COMMENTS.

WIND: Moves Bullets



- THE EFFECT WIND HAS ON BULLET IS PROPORTIONAL TO THE VELOCITY OF THE BULLET .
 - WIND IS DIRECTIONAL.
 - LEFT TO RIGHT
 - RIGHT TO LEFT.
 - HEAD WIND.
 - TAIL WIND.

WIND : Velocity & Spin Drift

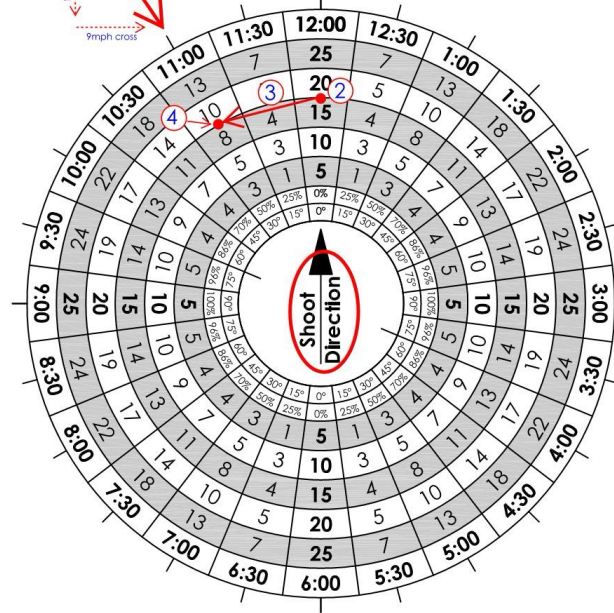


WIND: Modern Wind Rose



Example how to use:

- ① Measure Actual wind (17 MPH at 11:00)
- ② Find measured wind in chart
- ③ Read around chart to wind angle
- ④ Read chart for 90 deg vector of wind = 9mph cross wind



WIND HAS VALUE RELATED TO ANGLE

- ZERO VALUE: ABSENCE OF WIND.
- FULL VALUE: RUNNING 180* LATERALLY.
- HALF VALUE: ANGULAR (45*).
- WIND CHARACTERISTICS:
 - CONSTANT: EXAMPLE STEADY AT 10 MPH.
 - GUSTING: BUILD-STEADY-LET OFF or WORSE: THE BIG CROSSOVER
 - FISH TAILING: BACK AND FORTH MOTION.



FLAGS



- WIND SPEED CALCULATED BY THE ANGLE OF THE FLAG.
- ANGLE DIVIDED BY 4 EQUALS WIND SPEED.
- EXAMPLE: FULL VALUE: WIND FLAG AT 45* DIVIDED BY 4 = 11.25 MPH.
- EXAMPLE: HALF VALUE: WIND FLAG AT 45* DIVIDED BY 4 = 11.25 MPH DIVIDED BY 2 = 5.6 MPH.
- 5. HEIGHT OF WIND FLAG: 12-16 FEET OFF OF THE GROUND - SHOWS WIND SPEED AT THAT ALTITUDE

FLAGS



FLAGS

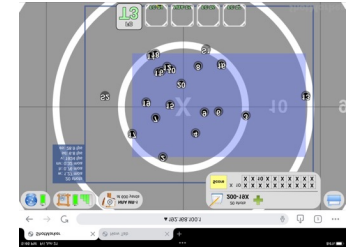


RANGE CARDS

- USE OF BALLISTIC COMPUTERS FOR RANGE CARDS
- FILL IN THE BLANKS WITH ACCURATE INFORMATION
- MIRAGE : MOVES IMAGE OF TARGET
- IMAGE DISPLACEMENT CAUSED BY REFRACTED LIGHT - AKA:THE GHOST TARGET.



BALLISTIC APPLICATIONS



AT&T 4:09 PM 67%

Favorites Solution

BC	Bullet Weight	Muzzle Velocity	Zero Range	Sight Height	LOS Angle
0.252	G7 105gr	3198	100	2.7 in	0°
Altitude	Pressure	Temp	RH	Wind Velocity	Wind Angle
0.0	29.92 Hg.	59.0 °F	78%	-	-
Zero Altitude	Zero Pressure	Zero Temp	Zero RH	Min. PBR	Max. PBR
85.0	30.25 Hg.	57.0 °F	65%	0	290

Bullet Trajectory

Range (yards)	Drop (in)	Drop (moa)	Wind (in)	Wind (moa)	Veloc. (fps)	Energy (ft-lbs)	Time (sec)
0	-2.71	0.00	0.00	0.00	3198	2384	0.00
100	0.00	0.00	0.02	0.02	3002	2101	0.10
200	-1.17	-0.56	0.07	0.03	2812	1843	0.20
290	-6.06	-1.99	0.16	0.05	2645	1629	0.30
300	-6.76	-2.15	0.17	0.05	2627	1609	0.31
400	-17.42	-4.16	0.31	0.07	2450	1399	0.43
500	-33.92	-6.48	0.50	0.10	2279	1210	0.56
600	-57.16	-9.10	0.75	0.12	2115	1043	0.69

Trajectory Favorites Rangefinder Target HUD

AT&T 4:28 PM 63%

Heidi 77gr HPBT MK N140

Distance	Wind Speed	Wind Direction	Lead
300	6	07:30	-3
400	7	08:00	-2
500	8	08:30	-1
600	9	09:00	0
	10	09:30	1
	11	10:00	2
	12	10:30	3

Yards mph O'Clock mph

Path (¼clk) Wind (¼clk)

U 63 R 19

Altitude 85 Pressure 29.68 Temp 46° Humidity 77%

LOS: 0.0° Z 100 V 1476 MV 2750

Trajectory Favorites Rangefinder Target HUD

GeoBallistics

Location (deg) 28.1, -80.6

Shot Angle (deg) 8.2

Shot Bearing (deg) 0

Range (yd) 600

Heidi ART EXPORT

Range (yd)	Elev. (MOA)	Wind (MOA)	Vel. (ft/s)	Energy (ft-lb)	Time (sec)
0.0	*	*	2710	1255	0.00
100.0	U 0.1	L 1.1	2377	966	0.12
135.2	U 0.7	L 1.6	2268	883	0.17
200.0	U 1.9	L 2.4	2069	731	0.25
300.0	U 5.1	L 3.9	1786	545	0.41
400.0	U 9.4	L 5.6	1534	402	0.59
500.0	U 14.8	L 7.5	1321	299	0.80
600.0	U 21.6	L 9.7	1160	230	1.05

Rifle Weather Hardware Map Menu

MIRAGE AND DISPLACEMENT



- DISPLAYS THE SAME CHARACTERISTICS OF WIND UP TO 18 MPH .
- LEFT TO RIGHT. RIGHT TO LEFT. ANGULAR ABOUT 1-15 MPH
- BETWEEN 20* AND 45*. BOILING INDICATES 0 MPH AND VISUALLY ELEVATES TARGET. IMAGE DISPLACEMENT.
- TO DETERMINE DIRECTION: FOCUS SCOPE AT HALFWAY POINT BETWEEN YOU AND TARGET.
- WHEN MIRAGE IS HEAVY – SHOOT WHEN IT IS FLOWING (LIKE A RIVER)
- WHEN MIRAGE IS HEAVY – DO NOT SHOOT WHEN IT GOES CLEAR – A CHANGE IS ABOUT TO HAPPEN – WAIT!
- DO NOT SHOOT IN A BOIL (EXCEPT WHEN YOU ARE SHORT ON TIME)

MIRAGE EXAMPLES



- EXAMPLE: AT 600 YARDS FOCUS SPOTTING SCOPE ON WIND
 - FLAG AT 200 YARDS. NOW TURN SPOTTING SCOPE ONTO YOUR
 - TARGET. NOW YOU SHOULD SEE A VERY FUZZY TARGET AND MIRAGE AND ITS DIRECTION.
- THE IMAGE WILL SHOW MIRAGE MOVING L-R OR R-L.
- IF YOU CAN STILL SEE WAVY LINES ITS 15 MPH OR LESS . IF YOU SEE A BLUR
 - ITS MOVING FASTER THAN 15 MPH AND HAS BECOME DIFFICULT TO
- ACCESS SPEED .
 - MIRAGE WILL MOVE AS A HEAD WIND OR TAIL WIND. GIVE AWAY,
 - THE IMAGE YOU'LL SEE WILL NOT BE CLEAR .
- THE IMAGE HAS BECOME ANGULAR INDICATING SPEED BETWEEN
 - 1-7 MPH . (1/2 VALUE WIND)

Reading Mirage with Wind Effects

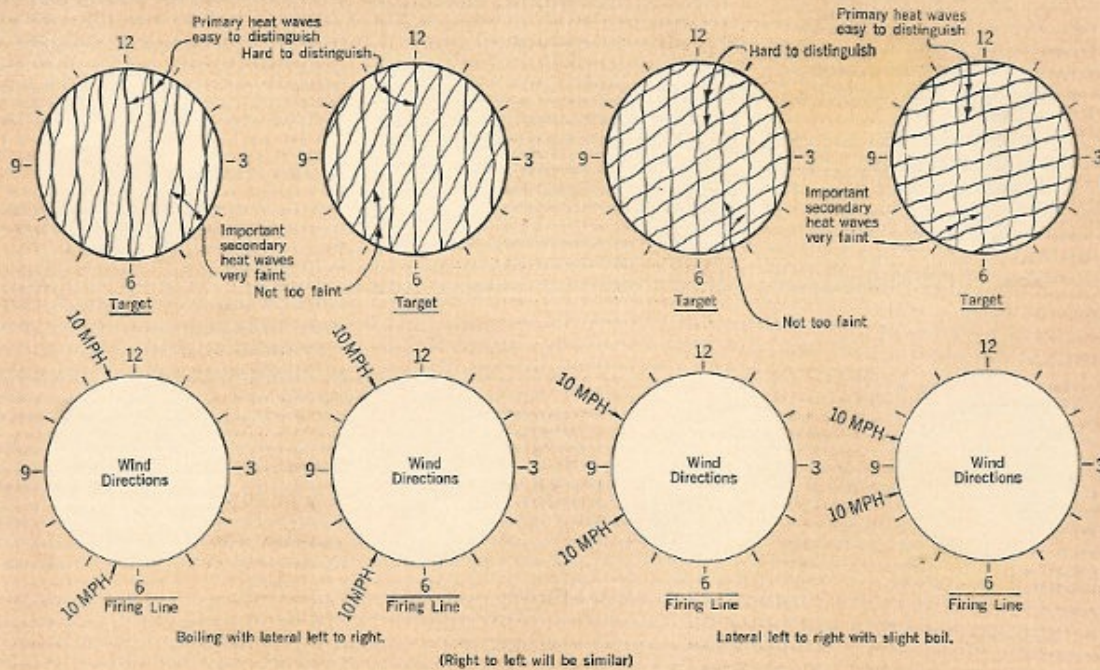
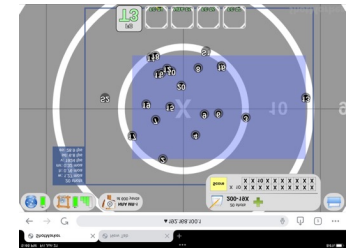


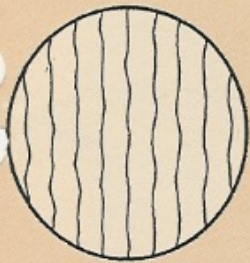
Fig. 7: "Boiling" with lateral left or right (10 miles per hour wind velocity).



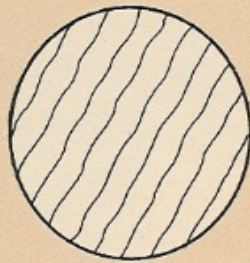


MIRAGE CLASSIFICATIONS

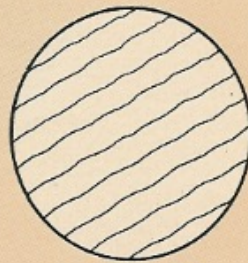
Wind from 9 or 3 o'clock



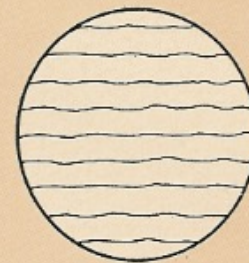
Boiling
0 m.p.h.



Slow
1-3 m.p.h.



Medium
4-7 m.p.h.



Fast
8-12 m.p.h.

TABULATION OF CORRECTIONS—IN MINUTES

Mirage Category	Boiling 0 m.p.h.		Slow 1-3 m.p.h.		Medium 4-7 m.p.h.		Fast 8-12 m.p.h.	
	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.
HEAVY	1½	0	1¼	¾	¾	1¼	0	1½
INTERMEDIATE	1	0	¾	½	½	¾	0	1
LIGHT	½	0	½	¼	¼	½	0	½

Note: Category designations were selected to indicate density while classification designations were selected to denote speed. No 2 key words begin with the same letter; therefore, mirage can be recorded by using 2 letters, the initial of each word.

Fig. 8: Mirage effect for various categories and classifications.

RIFLE SCOPE / SPOTTING SCOPE



- FOCUS RIFLE SCOPE ON YOUR TARGET AND MAKE IT AS CLEAR AS POSSIBLE.
- USE YOUR SPOTTING SCOPE TO DETERMINE MIRAGE SPEED AND DIRECTION.
- USING YOUR KNOWN ZERO , MAKE YOUR HOLDOVER CORRECTION ON A CLEAR TARGET
- IF THE TARGET IMAGE ISN" T CLEAR DUE TO HEAVY MIRAGE YOU MAY NEED TO TURN IT DOWN TO SEE THE RINGS FOR YOUR HOLD

DON'T FORGET LIGHTING



- LIGHT INTENSITY WILL AFFECT YOUR POINT OF AIM (POA).
- IF YOU HAVE SHOT SOME OR A LOT OF IRON SIGHTED RIFLES YOU SHOULD BE FAMILIAR WITH THE OLD SAW “LIGHTS UP – SIGHTS UP, LIGHTS DOWN SIGHTS DOWN”.
- IT REMAINS TRUE WITH SCOPED RIFLES, USUALLY TO A LESSER DEGREE, BUT IT STILL WILL IMPACT YOUR POINT OF IMPACT (POI).
- USE PRACTICE TIME TO WITH VARIABLE LIGHT CONDITIONS TO LEARN WHAT LIGHT INTENSITY DOES TO YOUR POA/POI.
- IF YOU USE A SUNSHADE AND IT IS GETTING DARK OR VERY OVERCAST CONSIDER REMOVING IT.

TAKE YOUR SHOT



- TARGET PAUSED (TIME DELAY) FOR SCORING.
- BACK ON SPOTTING SCOPE LOOKING FOR CHANGES.
- TARGET RETURNS, PLOT SHOT, CHECK PREVIOUS SHOT AND SHOOT.
- REPEAT PROCESS. MAKE GOOD USE OF EXTRA TIME BETWEEN SHOTS.
- USE ALL OF YOUR MINUTES. OUT OF 22 MINUTES MANY WILL BE FINISHED AT THE 12 MIN MARK IN NRA MATCHES.
- IN FULLBORE (ICFRA) YOU HAVE 45 SECONDS TO TAKE YOUR SHOT AFTER YOUR SHOOTING PARTNER, PAY ATTENTION TO HOW HE IS SHOOTING AND THE RESULT IN THE CONDITIONS YOU ARE SEEING.
- SLOW DOWN. THINK...
- IT IS BETTER NOT TO IF YOU CAN AVOID IT, BUT IF YOU KNOW YOU HAVE A “CONDITION” THAT YOU CAN BENEFIT FROM THAT WILL NOT LAST LONG – SHOOT FAST, BUT SMART.
- SOMETIMES WITH “CRAZY IVAN WINDS” YOUR ONLY CHOICE IS TO PLAY CHASE THE SPOTTER AS A LAST RESORT.