Working Smart not Hard
Are *You* a Kestrel Addict?
MEMA (Margin of Error in Minutes of Angle)

Given - Competent/Consistent/Reliable
You are a decent marksman who understands the fundamentals (5+ 100yd group < 1.1")
You have repeatable/good ammunition with a modern bullet profile (sub MOA, SD < 18fps)
You have a predictable firearm (action/barrel/optic combination retains zero over 200rds without cleaning

Conditions - PRS-style targets
Targets are sub 1.5MOA @ 800yds (12")
Targets are sub 1.0MOA @ <600yds (6" or less)

My Setup
I bought my fist bolt action centerfire rifle last April (20" 6.5CM Tikka CTR, mounted in a KRG Bravo chassis, topped off with a Vortex Razor 4.5-27x56). After putting everything together using the correct torque specifications I shot 4 or 5 different versions of factory 6.5CM ammo - got the best, most-consistent 100yd group using Hornady 147gr (81501). Since that I have almost exclusively shot the 147gr Hornady factory ammo (~2540fps).

Becoming Proficient
I bolstered my marksmanship fundamentals by taking a SnipersHide class in MN, while also gathering good data.

I shot a local PRS-style match to get a feel for the sport and was "that guy" checking and rechecking my Kestrel every stage thinking surely since the environmentals had changed my elevation solution would too. I didn't really notice the trends I'm noticing now because of everything that's going on at a person's first match. (I was getting 3's and 4's all day, felt jittery and anxious, until the last 4 stages I settled into a zone and racked up an 8, 8, 7, 8.

The last part of "truing" my Kestrel was shooting at a substantially different DA out in CO at another class. Here I got data I could use later to tweak/confirm the 'ballistic-curve' I'd gathered previously. I also got good data to input a DSF.

** Disclaimer**
I know that latitude changes from FL to AK and specifically chose locations at least close to my input latitude (Minneapolis, MN - 45) to negate that point of contention. But I think latitude only plays into SD/CE et al. (which can be debated about how accurately those impacts are portrayed by ballistic calculators) and those effects really only start showing up at 1000+ yds.

Also, temperature sensitivity is plugged into my Kestrel to mirror my field results as closely as possible. My value is approximately equivalent to <0.2fps/degF>.

Relative humidity was kept constant at 50% throughout. DOF kept the same throughout (1deg). No wind data was input.

To get the solutions/data used in this simple analysis I'd pick the temperature desired and change the station pressure to get the desired DA for each column/matrix - then transfer the corresponding "Range Card" results to Excel.

So What the Hell is the Point?!
My numbers will be different from yours, that is not important here. What I am analyzing is the trend/pattern.

That trend/pattern says that if you are shooting at under 600yd there is no practical difference in the "firing solution" given that you, your gun, and your ammo all shoot <1MOA and you are shooting at a 1MOA target (which is normal, perhaps even small-ish target by PRS standards). Also, when shooting 600-800yd, there is no practical difference when shooting at a 1.5MOA target (<13"); and when you consider most PRS shooters will have at least a 2MOA *wobble-zone* because of the unsupported firing positions utilized in the sport.
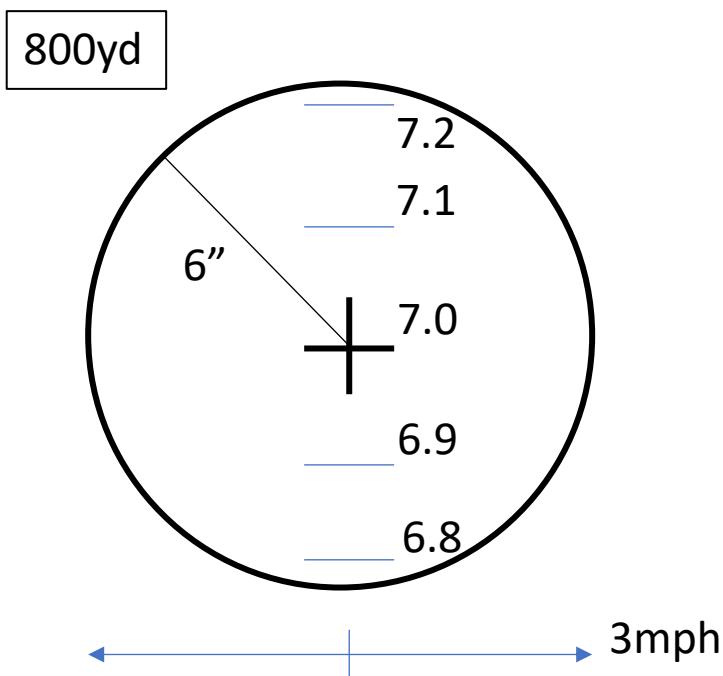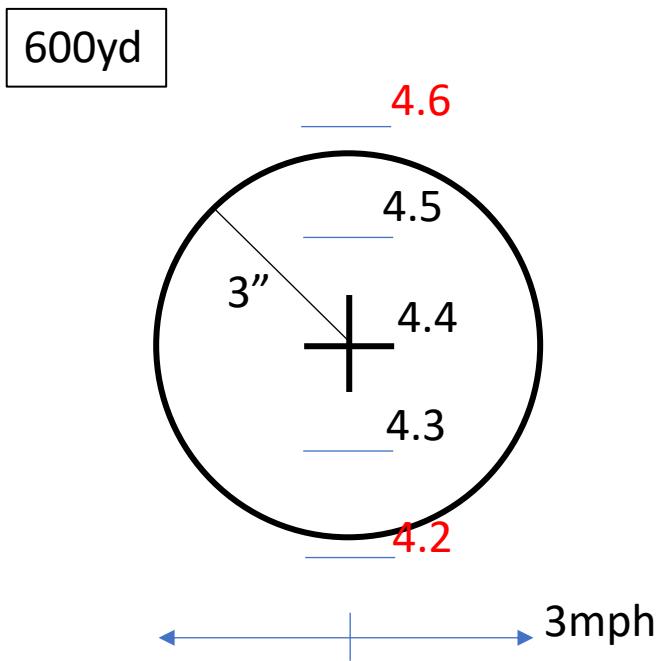
Conclusion
If you gather accurate DOPE on a 70deg day at DA=2000ft, you will be +/- 1 click, regardless of the conditions, inside 600yd. This holds true whether at the same location for a match (cold morning, warm afternoon) as well as for different locations within the same season (<90deg shift and/or 7000ft DA swing) - meaning you don't need to be a Kestrel whore unless you are shooting exclusively 1000+yd.

If you are inside 800yd and shooting even at relatively small targets all you really need to have is well gathered DOPE corrected to a middle-of-the-road temp/DA (70deg/2000ft); if you have that and are in [cold weather/lower DA area] subtract 1 click (2 at 800), [warm weather/high DA area] add 1 click (2 at 800) and you will invariably be on target.

Really if you look at how much wind it would take to throw your bullet off of a 1MOA plate at 600yd, or 1.5MOA plate at 800yd, the answer for me was 3mph (aiming center). So spend your time figuring out the angle and magnitude of the wind (best done by spotting hits for person in front of you). And don't worry so much about environmentals changing your DOPE (1MEMA <600yd; 1.5MEMA @ 800yd)

Visualizing the Concept

600yd

4.6
4.5
3"   4.4
4.3
4.2

3mph

800yd

7.2
7.1
6"   7.0
6.9
6.8

3mph

Appendix A - Data

50%	45 Lat												
Temp - 10	29.57	28.73	27.91	27.11	26.33	25.56	24.81	24.08	23.36	22.66			
	DA (-3k)	DA (-2k)	DA (-1k)	DA (0)	DA (1k)	DA (2k)	DA (3k)	DA (4k)	DA (5k)	DA (6k)			
Range	mRad										range (mRad)	range (")	MEMA
100	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.0	0.0	0.0
200	0.6	0.59	0.59	0.59	0.59	0.58	0.58	0.58	0.58	0.57	0.0	0.1	0.0
300	1.42	1.41	1.4	1.39	1.38	1.38	1.37	1.36	1.36	1.35	0.0	0.3	0.1
400	2.36	2.35	2.33	2.31	2.3	2.28	2.27	2.25	2.24	2.23	0.1	0.9	0.2
500	3.42	3.39	3.36	3.33	3.31	3.28	3.26	3.23	3.21	3.19	0.1	1.8	0.4
600	4.59	4.55	4.5	4.46	4.41	4.37	4.33	4.3	4.26	4.22	0.2	3.7	0.6
700	5.9	5.82	5.75	5.69	5.63	5.56	5.51	5.45	5.4	5.34	0.2	6.0	0.9
800	7.34	7.24	7.14	7.05	6.95	6.87	6.78	6.7	6.63	6.55	0.4	10.4	1.3
900	8.96	8.82	8.68	8.54	8.42	8.29	8.18	8.07	7.96	7.86	0.5	16.2	1.8
1000	10.77	10.58	10.38	10.2	10.03	9.86	9.71	9.56	9.42	9.28	0.7	24.1	2.4
1100	12.76	12.5	12.25	12.03	11.81	11.59	11.39	11.19	11	10.82	0.9	34.1	3.1
1200	14.97	14.66	14.33	14.03	13.74	13.47	13.21	12.98	12.73	12.5	1.1	48.4	4.0

50%	45 Lat												
Temp - 40		30.6	29.73	28.87	28.04	27.22	26.43	25.65	24.89	24.14			
		DA (-2k)	DA (-1k)	DA (0)	DA (1k)	DA (2k)	DA (3k)	DA (4k)	DA (5k)	DA (6k)			
Range		mRad									range (mRad)	range (")	MEMA
100		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.0	0.0	0.0
200		0.6	0.59	0.59	0.59	0.58	0.58	0.58	0.58	0.57	0.0	0.1	0.0
300		1.41	1.4	1.4	1.39	1.38	1.37	1.37	1.36	1.35	0.0	0.3	0.1
400		2.36	2.34	2.32	2.31	2.29	2.28	2.26	2.25	2.23	0.1	0.9	0.2
500		3.41	3.38	3.35	3.32	3.3	3.27	3.25	3.22	3.2	0.1	1.8	0.4
600		4.58	4.53	4.48	4.44	4.4	4.36	4.32	4.28	4.24	0.2	3.5	0.6
700		5.87	5.8	5.73	5.67	5.6	5.54	5.48	5.43	5.38	0.3	6.3	0.9
800		7.31	7.21	7.11	7.01	6.92	6.84	6.75	6.68	6.6	0.4	10.4	1.3
900		8.91	8.77	8.63	8.5	8.37	8.25	8.14	8.03	7.93	0.5	15.9	1.8
1000		10.68	10.5	10.32	10.14	9.97	9.81	9.65	9.51	9.37	0.7	24.1	2.4
1100		12.65	12.4	12.15	11.93	11.72	11.52	11.31	11.12	10.93	0.8	33.3	3.0
1200		14.85	14.48	14.21	13.91	13.62	13.36	13.11	12.87	12.65	1.1	47.5	4.0

50%	45 Lat				*******								
Temp - 70			31.6	30.7	29.81	28.95	28.1	27.28	26.47	25.68			
			DA (-1k)	DA (0)	DA (1k)	DA (2k)	DA (3k)	DA (4k)	DA (5k)	DA (6k)			
Range			mRad								range (mRad)	range (")	MEMA
100			0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.0	0.0	0.0
200			0.59	0.59	0.59	0.59	0.58	0.58	0.58	0.58	0.0	0.1	0.0
300			1.41	1.4	1.39	1.39	1.38	1.37	1.36	1.36	0.0	0.3	0.1
400			2.35	2.33	2.32	2.3	2.29	2.27	2.26	2.24	0.1	0.9	0.2
500			3.4	3.37	3.34	3.31	3.29	3.26	3.24	3.21	0.1	1.8	0.4
600			4.56	4.51	4.47	4.42	4.38	4.34	4.3	4.27	0.2	3.7	0.6
700			5.84	5.77	5.71	5.64	5.58	5.52	5.46	5.41	0.3	6.3	0.9
800			7.27	7.17	7.07	6.98	6.89	6.81	6.73	6.65	0.3	9.8	1.2
900			8.86	8.72	8.58	8.45	8.33	8.21	8.1	7.99	0.5	15.6	1.7
1000			10.6	10.42	10.24	10.08	9.91	9.75	9.6	9.45	0.6	23.0	2.3
1100			12.54	12.29	12.05	11.83	11.62	11.43	11.24	11.05	0.8	32.1	2.9
1200			14.72	14.36	14.03	13.78	13.5	13.24	13	12.77	1.0	44.5	3.7

50%	45 Lat												
Temp - 100					31.72	30.81	29.91	29.04	28.19	27.35			
					DA (1k)	DA (2k)	DA (3k)	DA (4k)	DA (5k)	DA (6k)			MOE in MOA
Range	mRad										range (mRad)	range (")	MEMA
100					0.03	0.03	0.03	0.03	0.03	0.03	0.0	0.0	0.0
200					0.59	0.59	0.59	0.58	0.58	0.58	0.0	0.1	0.0
300					1.4	1.39	1.38	1.38	1.37	1.36	0.0	0.3	0.1
400					2.33	2.31	2.3	2.28	2.27	2.25	0.1	0.9	0.2
500					3.36	3.33	3.3	3.28	3.25	3.23	0.1	1.8	0.4
600					4.5	4.45	4.41	4.37	4.33	4.29	0.2	3.5	0.6
700					5.75	5.69	5.62	5.56	5.5	5.45	0.2	6.0	0.9
800					7.13	7.04	6.95	6.86	6.78	6.7	0.3	9.8	1.2
900					8.67	8.53	8.41	8.29	8.17	8.06	0.5	15.2	1.7
1000					10.34	10.17	10.01	9.85	9.7	9.55	0.6	22.3	2.2
1100					12.19	11.96	11.74	11.54	11.34	11.16	0.8	31.7	2.9
1200					14.23	13.9	13.66	13.39	13.14	12.89	1.0	43.6	3.6

Appendix B - Analysis

extremes					
	6k@100deg to -1k@10deg				
	100	10			
	27.35	27.91			
	DA (6k)	DA (-1k)			
Range			range (mRad)	range (")	MEMA
100	0.03	0.03	0.0	0.0	0.0
200	0.58	0.59	0.0	0.1	0.0
300	1.36	1.4	0.0	0.4	0.1
400	2.25	2.33	0.1	1.2	0.3
500	3.23	3.36	0.1	2.3	0.5
600	4.29	4.5	0.2	4.5	0.8
700	5.45	5.75	0.3	7.6	1.08
800	6.7	7.14	0.4	12.7	1.6
900	8.06	8.68	0.6	20.1	2.2
1000	9.55	10.38	0.8	29.9	3.0
1100	11.16	12.25	1.1	43.2	3.9
1200	12.89	14.33	1.4	62.2	5.2
	8k DA change and 90deg temp change				

	warm high	cold high	cold low	nominal	nominal			
	5066	5118	830	1155	322		**(PRS across similar Lats	
	Elko, NV	Casper, WY	Minneapolis,	Fort Dodge, I	Harrisburg, PA			
highs	70-90	60-80	70-80	60-80	70-90			
lows	40-50	20-40	50-60	40-60	50-70			
	70	40	40	70	70			
	25.68	25.65	28.87	28.95	29.81			
	DA (6k)	DA (4k)	DA (0)	DA (2k)	DA (1k)			
Range						range (mRad)	range (")	MEMA
100	0.03	0.03	0.03	0.03	0.03	0.0	0.0	0.0
200	0.58	0.58	0.59	0.59	0.59	0.0	0.1	0.0
300	1.36	1.37	1.4	1.39	1.39	0.0	0.4	0.1
400	2.24	2.26	2.32	2.3	2.32	0.1	1.2	0.3
500	3.21	3.25	3.35	3.31	3.34	0.1	2.5	0.5
600	4.27	4.32	4.48	4.42	4.47	0.2	4.5	0.8
700	5.41	5.48	5.73	5.64	5.71	0.3	8.1	1.2
800	6.65	6.75	7.11	6.98	7.07	0.5	13.2	1.7
900	7.99	8.14	8.63	8.45	8.58	0.6	20.7	2.3
1000	9.45	9.65	10.32	10.08	10.24	0.9	31.3	3.1
1100	11.05	11.31	12.15	11.83	12.05	1.1	43.6	4.0
1200	12.77	13.11	14.21	13.78	14.03	1.4	62.2	5.2

	CO FtM							MN GRRC				
	40	70						40	70			
	25.65	25.68						28.87	28.95			
	DA (4k)	DA (6k)						DA (0)	DA (2k)			
Range			range (mRad)	range (")	MEMA		Range			range (mRad)	range (")	MEMA
100	0.03	0.03	0.0	0.0	0.0		100	0.03	0.03	0.0	0.0	0.0
200	0.58	0.58	0.0	0.0	0.0		200	0.59	0.59	0.0	0.0	0.0
300	1.37	1.36	0.0	0.1	0.0		300	1.4	1.39	0.0	0.1	0.0
400	2.26	2.24	0.0	0.3	0.1		400	2.32	2.3	0.0	0.3	0.1
500	3.25	3.21	0.0	0.7	0.1		500	3.35	3.31	0.0	0.7	0.1
600	4.32	4.27	0.1	1.1	0.2		600	4.48	4.42	0.1	1.3	0.2
700	5.48	5.41	0.1	1.8	0.3		700	5.73	5.64	0.1	2.3	0.3
800	6.75	6.65	0.1	2.9	0.4		800	7.11	6.98	0.1	3.7	0.5
900	8.14	7.99	0.2	4.9	0.5		900	8.63	8.45	0.2	5.8	0.6
1000	9.65	9.45	0.2	7.2	0.7		1000	10.32	10.08	0.2	8.6	0.9
1100	11.31	11.05	0.3	10.3	0.9		1100	12.15	11.83	0.3	12.7	1.2
1200	13.11	12.77	0.3	14.7	1.2		1200	14.21	13.78	0.4	18.6	1.5

	hot high	cold low			
elev	6680	102			
	Raton, NM	Anchorage, AK			
	70	10			
	25.68	28.73			
	DA (6k)	DA (-2k)			
Range			range (mRad)	range (")	MEMA
100	0.03	0.03	0.0	0.0	0.0
200	0.58	0.59	0.0	0.1	0.0
300	1.36	1.41	0.0	0.5	0.2
400	2.24	2.35	0.1	1.6	0.4
500	3.21	3.39	0.2	3.2	0.6
600	4.27	4.55	0.3	6.0	1.0
700	5.41	5.82	0.4	10.3	1.5
800	6.65	7.24	0.6	17.0	2.1
900	7.99	8.82	0.8	26.9	3.0
1000	9.45	10.58	1.1	40.7	4.1
1100	11.05	12.5	1.5	57.4	5.2
1200	12.77	14.66	1.9	81.6	6.8

	NM	AK			
	40	40			
	24.14	28.87			
	DA (6k)	DA (0)			
Range			range (mRad)	range (")	MEMA
100	0.03	0.03	0.0	0.0	0.0
200	0.57	0.59	0.0	0.1	0.1
300	1.35	1.4	0.0	0.5	0.2
400	2.23	2.32	0.1	1.3	0.3
500	3.2	3.35	0.2	2.7	0.5
600	4.24	4.48	0.2	5.2	0.9
700	5.38	5.73	0.4	8.8	1.3
800	6.6	7.11	0.5	14.7	1.8
900	7.93	8.63	0.7	22.7	2.5
1000	9.37	10.32	1.0	34.2	3.4
1100	10.93	12.15	1.2	48.3	4.4
1200	12.65	14.21	1.6	67.4	5.6

**(extreme B

TOPOGRAPHIC RELIEF
Compiled by U.S. Geological Survey, 1968
Albers Equal Area Projection
SCALE 1:17,000,000