Data Books; what are they, how do we use them and what benefit do they serve?

By Jon Couch

Data books are pieces of gear that are often misunderstood, used by few shooters, and as a result that lack of usage, many above average shooters fail to become excellent shooters. The purpose of this article is to enlighten the uninitiated as to the use of data books, as well as help adequate shooters reach their true marksmanship potential.

This article includes the following subjects:

- An explanation of what data books are, as well as the various types
- A detailed explanation of how to use data books.
- How data books help us while preparing new loads.
- How data books help us better prepare for (formal or informal) matches or competitions.
- Sources (or where) we can acquire data books and, finally,
- How we might make our own data books, as well as where to get the materials for the home made data book.

What are Data books?

Data books are small, typically 5 X 8 sized handbooks, that allow shooters to gather data about shooting. There are commercial data books, military data books (used for rifle or pistol requalification, matches, and sniping), as well as the home made variety. Being a former Marine, I am most familiar with those used in the Corps; at least through 1999 when I retired from active duty.

In essence, data books allow the shooter to go back at a certain period in time on the range (or deployment for snipers) and review what the shooting conditions were, how the conditions affected the shooter, round, weapon, and optics (in the case of scoped shooting). Data books also provide the shooter a place to record his performance and thoughts about that day's shooting session.

For match shooters, the data collected in these books often mean the difference between one day ending up in the top few shooters or in some cases, not even placing in the top or advancing shooters for matches. Match shooters will often go through their data books and review previous shooting conditions, rounds (and loads used) for a specific shooting location. To illustrate this point, I will discuss shooting data captured in my personal data book and then explain how this effected my later shooting sessions at nearby Marine Corps Base Quantico ranges.

On 28 February 2010, I was shooting at Quantico's Range 1 (100 and 300 yards). During this particular session, I was chronographing new loads for my .Remington 700 (.308 Winchester). I had narrowed the load down for this gun to four likely candidates

(for the desired 2700 FPS for the .30 caliber Sierra Match King round). The load I finally settled on, based on the chronograh data, was 44.5 grains of Alliant Powder's Reloader-15. I recorded all the velocities, as well as the barometric pressure, altitude, temperature, as well as the wind conditions. Using this data, I then went home and used EXBAL Ballistics Calculator to generate my elevation data (in minutes of angle) in 10 degree increments from 40 degrees to 90 degrees.

A few weekends later, I went back out to Quantico's ranges; this time on Range 4 (100 yards all the way out to 1000 yards). Using the data from my previous chronographing session, as well as notes about weather conditions, I shot at 100, 300, and 600 yards. I confirmed my zero at 100 yards, but also took notes of the wind and weather conditions. A picture of this range's challenges started forming in my mind as I learned more about this range.

One thing I very quickly learned is that wind at Quantico's Range 4 is very deceiving (see below depiction of the range). On this particular day, I noted that the wind came from the shooters 9:00 o'clock (or shooter's left). We would observe the range flags (the two red dots in the impact area at the top of the drawing), then look at the trees in the impact area, as well as observe and try to detect blowing grass. What we were to learn (and record in the data books) was the effects the wind had on the rounds, and more importantly that these conditions were the "norm" for conditions at this range.

At this range, the wind typically blows from the shooter's left – over the berms with trees – and would effect the bullets at their points of greatest trajectory (or highest point). The tricky part, and the reason this needed to be recorded was that the range flags rarely indicate the true winds for 600 yards and beyond on this range.

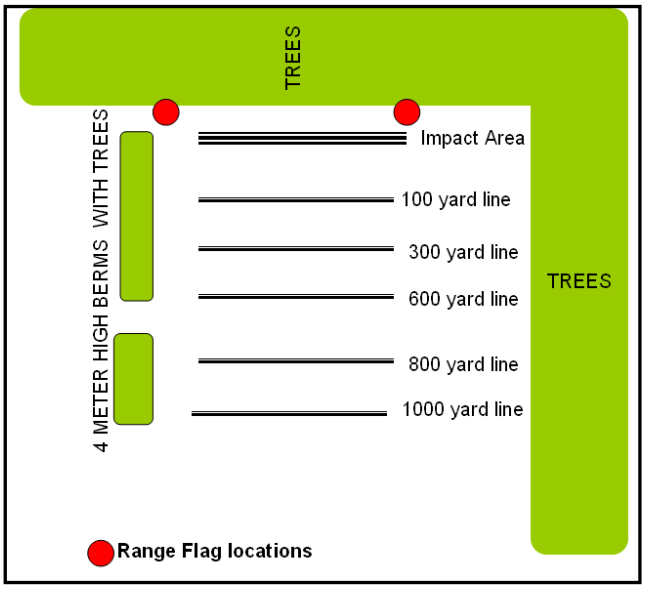


Diagram 1. MCB Quantico Range 4

I came back the next day, 21 March and (using the knowledge gathered the previous day) was able to correctly judge the winds at 1000 yards. Furthermore, since this data is captured in my data book, I know understand some of the range's effects on bullets (at least under these conditions). Remember, the data book is also used to record other factors like temperature, wind, humidity, humidity, barometric pressure, and altitude. This data would serve me well in the future. But how did I and how do shooters use these data books?

How to use data books.

In explaining how to use data books, I will cover three periods of time; before shooting, during shooting, and post shooting.

Pre-shooting. Before shooting, it is recommended that the shooters sit and observe the conditions at the range and then record these in his data book (see sample data book image below). For this collection I use a Kestrel 3500 anemometer. There are others on the market but this one has served me well. Record the time and date, range location, altitude. Most of this recorded information is seen in the top two lines of data for the sample data sheet (already filled in with blue ink for figure 2). Once this data is recorded, the shooter should then compare these conditions to previous sessions on this range. This will give the shooter a glimpse into what data (elevation and windage) did or didn't work. It will also indicate changes in overall conditions. These all affect the bullets performance. Lets now discuss using the data book during the shooting session.

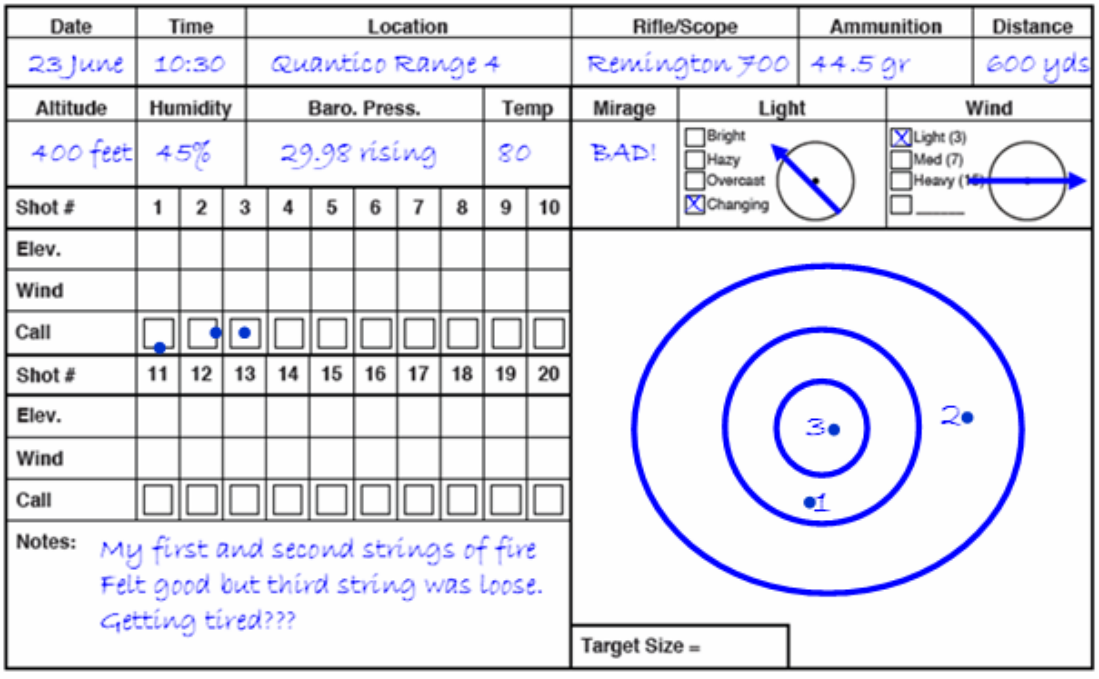


Figure 2. Sample data book page

During shooting. Figure 2 is used to walk the shooter through the process of using the data book during shooting. The conditions are already plotted. The shooter should accomplish the below (in the order listed).

1. Watch for the weather (wind) to become favorable for the shot. Note that some shooters like shooting in the lulls, while others may shoot in the wind. Each shooter will have to try both methods to see which works best and under what conditions each method may be used.
2. Shoulder the weapon and go through the basics of getting the best shot, e.g., breathe, relax, aim, stop (breathing), and squeeze. When comfortable that you have a good shot, take the first shot. Don't forget follow-through.
3. After taking the shoot, do not remove the weapon from your shoulder. Think for a moment where the front sight post or cross hairs were at the instant the weapon went off.
4. Go to your data book and record where on the target you believe the shot was (for this example we're using the twenty small targets on Figure 2). This is called "calling the shot". For the first shot, you believed the shot was low on the target (or at six o'clock). You place a dot at six o'clock.
5. Now you look at the target, either through the spotting scope or look for the shot markers (in the case of formal matches where down range personnel will spot your shots). For more informal shooting, simply try and find the bullet hole with your spotting scope. For the range book in Figure 2., there is a large area in the right hand center portion. It is here that the shooter would draw the target being used for firing. In the example we used, the first shot was indeed low (six o'clock) so we put a number one where the bullet impacted the target.
6. The shooter would then look at the wind, note the windage and elevation settings used and then make a judgment for adjustments prior to the next shot.
7. In this case, the shooter called the shot low and that's where the shot impacted, so no adjustments were made to the sights.
8. The shooter takes a second shot. The shooter again goes through the sequence of calling the shot, plotting the call, looking for the true impact, and placing an indication of the impact point in his drawn target. For shot number two, the shooter called the shot to the right. In this case, the shot impacted to the right. Again, no sight adjustments were made.
9. A third shot is taken, and again the shooter goes through the sequence of calling the shot, plotting the call, looking for the true impact, and placing an indication of the impact point. For shot number three, the shooter called the shot to the right. In this case, the shot impacted to the right. Still no sight adjustments were made.

Post shooting. Once the shooter has completed his shooting session (and after clearing and making the weapon safe), the shooter should then sit and write any notes of the general conditions and how the shooter felt about that shooting session. The shooter now has a record of what target he shot at, how he conducted each shot, when the weather and shooter acted in certain ways, e.g., wind gusts, jerked shots, etc. This does several things for the shooter.

- Permanent record. The shooter will know a month (or years) from now how he or she shot on that day and in what conditions.

- Reloading. This can help the shooter for reloading purposes – to be discussed next).

- Shooter's coach. The shooter's log helps that shooter's coach help the shooter improve the shooter's performance since the coach has a record of each shot. In the example used, we saw the shooter take three shots. Here the coach would take note of where the shooter called the shots and also has a record of the points of impact. In this case, the coach can assist the shooter – there is an accurate record of what occurred on the range.

- Gun performance. The shooter will also have a record of the rounds fired through that gun. This data may be then transferred to that shooter's gun log (if they are not included in the same log).

How data books help us while preparing new loads.

Reloading ammunition is both fun and rewarding for match shooters, hunters, and weekend plinkers alike. But, like anything else a shooter does, the shooting data must be recorded – and recorded accurately to be of any real use. This is where the shooter's data book comes in handy.

To make this discussion relevant, and perhaps useful for some shooters, I'll use the example of load development I recently did for my Remington 700 .308 long gun. I knew that I wanted to use .30 caliber 175 grain Sierra Match King rounds. I also knew the powder I liked using with the .308 but was not satisfied with the down range performance of the 175 SMK at the velocities I was currently shooting (2565 FPS). I wanted a velocity of around 2700 FPS so that my bullet would be traveling faster (and thus less drop) at 1000 yards.

The powder I use is Reloader 15. I was using 43.3 grains for the 2565 FPS so I loaded four batches (of five rounds each) in increasing powder amounts (43.7, 44.0, 44.3, etc). I recorded these four powder amounts into my data book (all else about the rounds remained the same, e.g., overall length, type primers, case prep, etc.).

I went to the range on 28 February with my shooting gear – including my data book. I took shots through the chronograph, recorded the velocities in the data book, as well as the exact temperature, winds, light conditions, barometric conditions, and humidity.

When I got home, after cleaning my rifle, I then broke out the data book. I computed the standard deviations for each load, as well as looked at which load had the

smallest deviations. In this case, I was very pleased. The 44.5 gr load that came up with 2706 FPS and only a 9 FPS deviation (or spread). I next had to load this data into the computer, and using the EXBAL Ballistic calculator (excellent software made for either handheld computers or laptops/towers), made an elevation chart for the various temperatures. I made an Excel spreadsheet for use on the range (as part of my data book). See Figure 3. for this spreadsheet.

.308 Winchester at 2706 FPS at 400 FT AGL (MOA elevation and full value wind corrections)																								
	40 degrees				50 degrees				60 degrees				70 degrees				80 degrees				90 degrees			
	ELE	3.5 mph	5 mph	10 mph	ELE	3.5 mph	5 mph	10 mph	ELE	3.5 mph	5 mph	10 mph	ELE	3.5 mph	5 mph	10 mph	ELE	3.5 mph	5 mph	10 mph	ELE	3.5 mph	5 mph	10 mph
100	0.00	0.25	0.25	0.75	0.00	0.25	0.25	0.75	0.00	0.25	0.25	0.75	0.00	0.25	0.25	0.50	0.00	0.25	0.25	0.50	0.00	0.25	0.25	0.50
150	0.75	0.25	0.50	1.00	0.75	0.25	0.50	1.00	0.75	0.25	0.50	1.00	0.75	0.25	0.50	1.00	0.75	0.25	0.50	1.00	0.75	0.25	0.50	1.00
200	2.00	0.50	0.75	1.25	2.00	0.50	0.75	1.25	2.00	0.50	0.75	1.25	1.75	0.50	0.75	1.25	1.75	0.50	0.75	1.25	1.75	0.50	0.75	1.25
250	3.25	0.50	0.75	1.75	3.25	0.50	0.75	1.75	3.25	0.50	0.75	1.75	3.00	0.50	0.75	1.75	3.00	0.50	0.75	1.50	3.00	0.50	0.75	1.50
300	4.50	0.75	1.00	2.25	4.50	0.75	1.00	2.00	4.50	0.75	1.00	2.00	4.50	0.75	1.00	2.00	4.50	0.75	1.00	2.00	4.50	0.75	1.00	2.00
350	6.00	1.00	1.25	2.50	6.00	0.75	1.25	2.50	6.00	0.75	1.25	2.50	6.00	0.75	1.25	2.50	6.00	0.75	1.25	2.25	6.00	0.75	1.25	2.25
400	7.50	1.00	1.50	3.00	7.50	1.00	1.50	3.00	7.50	1.00	1.50	2.75	7.50	1.00	1.50	2.75	7.50	1.00	1.25	2.75	7.50	1.00	1.25	2.75
450	9.25	1.25	1.75	3.50	9.25	1.25	1.75	3.25	9.25	1.25	1.75	3.25	9.25	1.00	1.50	3.25	9.00	1.00	1.50	3.25	9.00	1.00	1.50	3.00
500	11.00	1.25	2.00	3.75	11.00	1.25	2.00	3.75	11.00	1.25	1.75	3.75	11.00	1.25	1.75	3.50	10.75	1.25	1.75	3.50	10.75	1.25	1.75	3.50
550	13.00	1.50	2.25	4.25	13.00	1.50	2.00	4.25	12.75	1.50	2.00	4.25	12.75	1.50	2.00	4.00	12.75	1.50	2.00	4.00	12.50	1.25	2.00	4.00
600	15.00	1.75	2.50	4.75	15.00	1.75	2.25	4.75	14.75	1.50	2.25	4.50	14.75	1.50	2.25	4.50	14.50	1.50	2.25	4.50	14.50	1.50	2.25	4.25
650	17.25	1.75	2.75	5.25	17.00	1.75	2.50	5.25	16.75	1.75	2.50	5.00	16.75	1.75	2.50	5.00	16.75	1.75	2.50	4.75	16.50	1.75	2.50	4.75
700	19.50	2.00	3.00	5.75	19.25	2.00	2.75	5.75	19.00	2.00	2.75	5.50	19.00	2.00	2.75	5.50	18.75	1.75	2.75	5.25	18.75	1.75	2.50	5.25
750	21.75	2.25	3.25	6.25	21.50	2.25	3.00	6.25	21.50	2.25	3.00	6.00	21.25	2.00	3.00	6.00	21.00	2.00	3.00	5.75	21.00	2.00	2.75	5.75
800	24.50	2.50	3.50	7.00	24.25	2.25	3.50	6.75	24.00	2.25	3.25	6.75	23.75	2.25	3.25	6.50	23.50	2.25	3.25	6.25	23.25	2.25	3.00	6.25
850	27.00	2.75	3.75	7.50	26.75	2.50	3.75	7.25	26.50	2.50	3.50	7.25	26.25	2.50	3.50	7.00	26.00	2.50	3.50	7.00	25.75	2.25	3.25	6.75
900	30.00	2.75	4.00	8.25	29.75	2.75	4.00	8.00	29.25	2.75	4.00	7.75	29.00	2.75	3.75	7.50	28.75	2.50	3.75	7.50	28.50	2.50	3.75	7.25
950	33.00	3.00	4.50	8.75	32.75	3.00	4.25	8.50	32.25	3.00	4.25	8.25	32.00	2.75	4.00	8.25	31.50	2.75	4.00	8.00	31.25	2.75	4.00	7.75
1000	36.50	3.25	4.75	9.50	36.00	3.25	4.50	9.25	35.50	3.25	4.50	9.00	35.00	3.00	4.50	8.75	34.75	3.00	4.25	8.50	34.25	3.00	4.25	8.25

Figure 3. .308 Elevation Chart for pet load

During my next trip to the range (7 March), I shot from the bench at 100 and 300 yards. Recording the elevation and windage, I recorded how the gun (and shooter) performed. On 20 March, I went back to the range; this time to the 100, 300 and 600 yard lines (shooting from the prone). I recorded the shot data, the weather, elevation, windage used and how my judgments of the wind equated to dope (or windage) adjustments. On 21 and 27 March, as well as 4 April I went back to Quantico shooting to 1000 yards. The data collected in my data book has allowed cold bore (or first round) shots all the way back to 1000 yards.

None of this would have been possible had I not recorded the range conditions, the guns performance, and what I – the shooter did or did not do. Now the pressing question is "where do I get these data books?"

Data books.

Data books may be purchased at better shooting supply stores; they may be purchased online, or may be made at home using home computers. First, the purchased data books.

Commercial data books Commercial data books range from general data books (not intended to a specific type of shooting) to the more specialized F Class or formal match shooting. In Figure 4, we see one of the fine data book pages available through Impactdatabooks.com. This example is one perhaps suited for more specialized shooting.

The folks at Impact data books.com have several types of data books available (service, F Class, etc) so the shooter may very well find the perfect data book here.

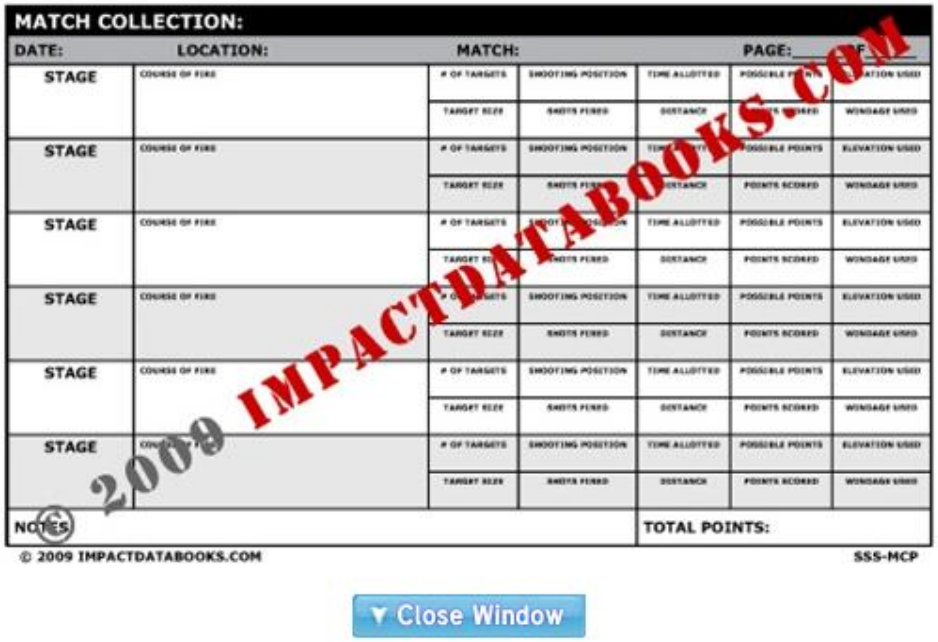


Figure 4. Impactdatabooks.com data book page

Other data books. Other data books available include the below:

1. The Creedmore Rifle data book. These books are of the highest quality and are intended for formal shooting (national match, 200, 300, 600, and 1000 yard shooting).
2. Tactical data books (intended for sniper work). These data books are made on waterproof paper. These are available in bulk, ready made books, page inserts.
3. Millet also makes a data book, and although intended for more formal shooting, again gives the shooter more options for the data book.

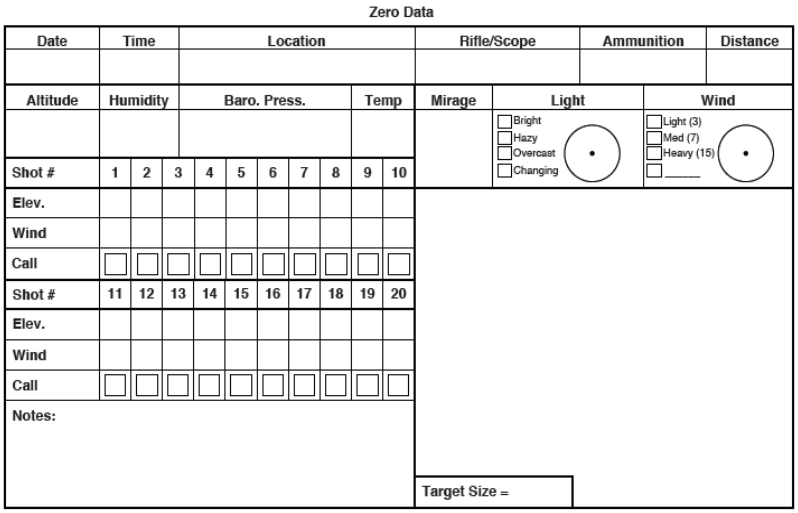
Pros and Cons of commercial data books.

Pros. Commercial data books can be made to suit almost every shooter, shooting style and for any weather condition.

Cons. Although they may be widely available, some data books may not provide the shooter exactly what is required, and in some cases can be expensive.

Home made data books. Home made data books offer the shooter a great deal of flexibility in the size, construction and format for the data book desired. Figure 5 shows the type of data pages I made and currently use. Figure 5 is the data sheet for formal

range firing (a commercial data book, not one I made). Figure 6 shows the home made sheets I use for the collection of range and weather data.



Zero Data

Date	Time	Location	Rifle/Scope	Ammunition	Distance

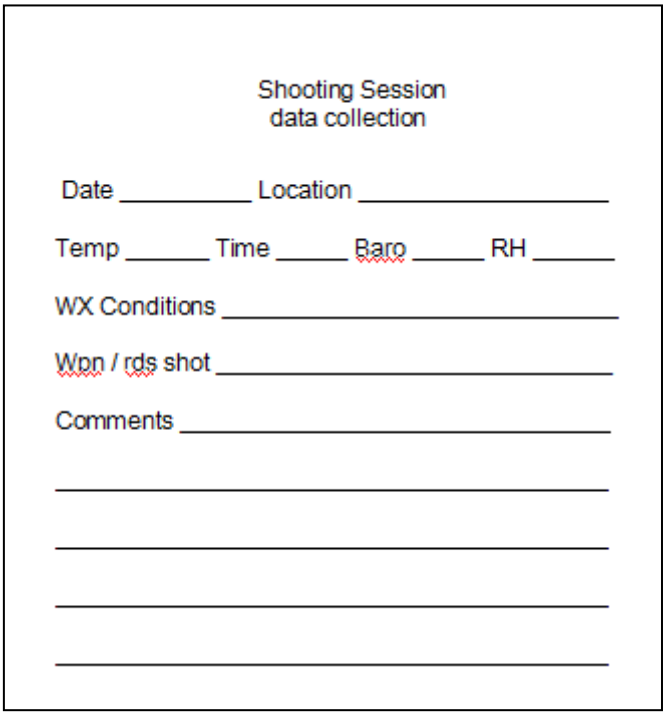
Altitude	Humidity	Baro. Press.	Temp	Mirage	Light	Wind
					☐ Bright ☐ Hazy ☐ Overcast ☐ Changing	☐ Light (3) ☐ Med (7) ☐ Heavy (15) ☐ ____

Shot #	1	2	3	4	5	6	7	8	9	10
Elev.										
Wind										
Call	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Shot #	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Elev.										
Wind										
Call	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Notes:

Target Size =

Figure 5. Formal data book page



Shooting Session
data collection

Date _____ Location _____

Temp _____ Time _____ Baro _____ RH _____

WX Conditions _____

Wpn / rds shot _____

Comments _____

_____

_____

_____

_____

Figure 6. Range data collection sheet

Pros and Cons of home made data books.

Pros. Flexibility is the number one advantage. The user can make his data book from waterproof paper (source cited below), normal card stock (available at commercial outlets like Office Max), as well as normal paper. The user can use laser or ink jet printers. Perhaps most appealing aspect of the home made data books is that the shooter can make the data book to exactly fit his needs; size, colors, data contained can all be adjusted. Although the user will have to absorb the cost of paper, I bought 200 sheets of white 8.5 X 11 waterproof for the same cost as one of the commercially available data books yet I can print three-four data books with this amount of paper.

Cons. The user will need a computer with print capabilities as well as basic computer skills (MS suite of tools like Excel, PowerPoint, and MS Word).

Sources for data books or other shooting related equipment.

Waterproof paper:

Rite in the rain brand: http://www.riteintherain.com

Waterproof paper.com: http://www.waterproof-paper.com/

Commercial data books:

Millet data books: Available at: http://www.millettsights.com/resources/shooting-tips/the-rifle-data-book/

Tactical Supply: http://ustacticalsupply.com/sniperdatabooks-1.aspx.

Creedmore Rifle data books: https://www.championshooters.com

Summary.

At the end of the day, it is not just the proper shooting techniques applied that makes us better shooters. Do not simply shoot one thousand shots at the range, but "shoot one shot a thousand times". The data book is the tool that allows us to record what we do for these "thousand shots", what our rifle does, and the effects the local conditions. Without recording the data, we simply shoot and try to recall what we shot yesterday, last week, or years ago at the range. It is the data book that makes multiple shots, done exactly the same way possible – and this consistency is what gets us in the bulls-eye.

Happy shooting and be safe.