

Rifle Trajectory Table

By Chuck Hawks

In order to hit a distant target a rifle must be correctly sighted-in, and to accomplish that the shooter must have some working knowledge of the bullet's trajectory. Sighting-in a hunting rifle to hit a certain number of inches high at 100 yards (or 100 meters) maximizes the point blank range of the rifle and cartridge and is superior to zeroing at a fixed distance like 200 yards. This system maximizes the distance in which no "hold over" is necessary. Of course, the actual distance the bullet should hit above the point of aim at 100 yards (or 100 meters, which is about 108 yards) varies with the individual caliber and load.

The table below is designed to serve as a starting point from which a shooter can work. Used as such it can save a lot of trial and error experimentation. Of course, no trajectory table can possibly cover all loads for all calibers in all rifles. So after sighting-in, always check your individual rifle at various ranges to see how close its trajectory comes to the published data. (It may well vary.) This trajectory table can also serve as a comparative tool, allowing the reader to compare the trajectories of different cartridges or loads.

The trajectories in the table below were calculated for a maximum bullet rise of 1.5 inches above the line of sight for all small game and varmint loads, and three inches above the line of sight for all big game loads. In ballistics catalogs the point of maximum bullet rise is often called the mid-range trajectory, or sometimes the maximum ordinate. In the table below I used the term "mid-range trajectory," abbreviated "MRT."

A maximum bullet rise of 1.5 inches is

appropriate for shooting small animals, as they present a small target, particularly if head shots are necessary. Allowing a greater mid-range trajectory might result in shooting over an animal at an intermediate distance.

A maximum rise of 3 inches is appropriate for hunting the smaller species of big game, creatures from perhaps 75 pounds to 150 pounds on the hoof, which typically have a kill zone of about 8 inches from top to bottom. More mid-range rise can be accepted when hunting larger animals (a 4 inch MRT might be appropriate when hunting mule deer, for example), but if a mixed bag hunt for larger and smaller species is envisioned, then the 3 inch rise used for this table is probably safer. A 3 inch MRT also allows for a little bit of human error, which is probably a good thing when shooting in the field.

The Maximum Point Blank Range (MPBR), which is shown in the last column of the table below, is the distance at which the bullet falls 3 inches *below* the line of sight. Thus between the muzzle and the distance given as the MPBR, the bullet never strays more than 3 inches above or below the line of sight (1.5 inches for varmint loads).

Most of the loads below are similar to popular factory loads for the selected cartridges. All trajectories were calculated for a rifle with a low mounted telescopic sight of moderate size whose line of sight is 1.5 inches above the bore axis of the barrel. If your scope is not 1.5 inches over the bore, and most scopes with oversize objectives require higher mounts, your trajectory will vary from those given below. All trajectory figures are rounded off to one decimal place. While environmental factors such as altitude and ambient air temperature affect trajectory, their effect is relatively minor. For the record, this table was calculated for an air temperature of 60 degrees F and an altitude of 1000 feet. The following data was taken from

various sources including reloading manuals and the online Ballistics Calculator provided by *BigGameInfo*.

For an expanded version of this table showing more loads, including British, European, wildcat, obsolescent American and proprietary calibers, see the "Expanded Rifle Trajectory Table" on the *Tables, Charts and Lists Page*.

To save space, the following abbreviations are used in the table below: Wb = Weight of bullet (in grains); MV = Muzzle Velocity (in feet per second); BC = Ballistic Coefficient; MRT = Mid-Range Trajectory; yards = yds.; inches = "; MPBR = Maximum Point Blank Range; BT = Ballistic Tip; FP = Flat Point, HP = Hollow Point; RN = Round Nose; Sp = Spitzer; SP = Spire Point; SSp = Semi-Spitzer.

Cartridge (Wb@MV)	Bullet BC	100 yds.	200 yds.	MRT@yds.	MPBR (yds.)
.17 HMR (17 SP at 2550)	.123	+1.5"	-5.5"	1.5"@100	165
.17 Mach IV (20 V-MAX at 4000)	.185	+1.2"	+0.8"	1.5"@140	260
.17 Rem. (20 V-MAX at 4200)	.185	+1.1"	+1.0"	1.5"@150	275
.204 Ruger (33 BT at 4225)	.185	+1.1"	+1.0"	1.5"@150	275
.218 Bee (45 SP at 2800)	.202	+1.6"	-1.5"	1.5"@125	200
.219 Zipper (60 SP at 3200)	.264	+1.4"	+/- 0"	1.5"@120	230
.22 LR (40	.100	-3.0"	-	1.5"@45	90

HP at 1255)			40.9"		
.22 WMR (40 HP at 1910)	.100	+0.5"	$\bar{19.0}$ "	1.5"@65	123
.22 Hornet (45 Sp at 2690)	.191	+1.5"	-2.5"	1.5"@100	188
.22 K- Hornet (45 SP at 2800)	.202	+1.6"	-1.5"	1.5"@125	200
.221 Fireball (50 BT at 2995)	.238	+1.4"	-0.7"	1.5"@116	214
.22 PPC (50 Sp at 3200)	.254	+1.4"	$\frac{+/-}{0}$ "	1.5"@125	230
.222 Rem. (50 Sp at 3140)	.220	+1.4"	-0.4"	1.5"@118	222
.223 Rem. (45 Sp at 3550)	.167	+1.4"	+0.2"	1.5"@130	235
.223 Rem. (55 SP at 3240)	.235	+1.4"	$\frac{+/-}{0}$ "	1.5"@120	230
.222 Rem. Mag. (55 SP at 3240)	.235	+1.4"	$\frac{+/-}{0}$ "	1.5"@120	230
5.6x50 Mag. (60 SP at 3200)	.264	+1.4"	$\frac{+/-}{0}$ "	1.5"@120	230
.225 Win.. (55 SP at 3500)	.235	+1.4"	+0.5"	1.5"@130	245
.224 Wby. (55 SP at 3600)	.235	+1.3"	+0.6"	1.5"@135	254
.22-250 Rem. (50 V-MAX at 3700)	.242	+1.3"	+0.8"	1.5"@140	260
.22-250 Rem. (55 SP at 3600)	.235	+1.3"	+0.6"	1.5"@135	254

.220 Swift (50 V-MAX at 3800)	.242	+1.2"	+0.8"	1.5"@140	265
.220 Swift (55 SP at 3800)	.235	+1.2"	+0.9"	1.5"@140	264
.223 WSSM (55 SP at 3800)	.235	+1.2"	+0.9"	1.5"@140	264
.224 TTH (70 Sp at 3650)	.290	+2.2"	+2.7"	3"@165	333
5.6x52R (70 Sp at 2777)	.288	+2.7"	+1.2"	3"@125	260
.243 Win. (80 Sp at 3350)	.255	+1.3"	+0.2"	1.5"@125	237
.243 Win. (95 BT at 3100)*	.379	+2.5"	+2.3"	3"@150	300
.243 Win. (100 Sp at 2960)	.351	+2.6"	+1.9"	3"@140	283
6mm Rem. (100 Sp at 3100)	.351	+2.5"	+2.2"	3"@150	296
.243 WSSM (100 Sp at 3100)	.351	+2.5"	+2.2"	3"@150	296
.240 Apex (100 Sp at 2900)	.351	+2.6"	+1.8"	3"@135	278
6x62mm Freres (100 Sp at 3300)	.351	+2.4"	+2.5"	3"@150	312
.240 Wby. Mag. (100 Sp at 3400)	.351	+2.4"	+2.6"	3"@160	322
.244 H&H Mag. (100 Sp at 3500)	.351	+2.3"	+2.7"	3"@165	330
.25-20 Win. (86 FP at	.190	+1.7"	- 19.1"	3"@65	139

1460)				
.25-35 Win. (117 RN at 2300)	.238	+2.9" -1.7"	3"@108	212
.250 Sav. (100 Sp at 2820)	.336	+2.7" +1.6"	3"@125	270
.257 Roberts (100 Sp at 3000)	.336	+2.6" +2.0"	3"@150	286
.257 Roberts (120 Sp at 2780)	.391	+2.7" +1.6"	3"@125	271
.257 Rob. Imp. (115 BT at 2900)	.453	+2.6" +1.9"	3"@140	286
.25 WSSM (120 Sp at 2990)	.391	+2.5" +2.0"	3"@145	291
.25-06 Rem. (100 Sp at 3210)	.336	+2.5" +2.4"	3"@150	305
.25-06 Rem. (120 Sp at 2990)	.391	+2.5" +2.0"	3"@145	291
.257 Wby. Mag. (100 Sp at 3600)	.336	+2.2" +2.8"	3"@175	337
.257 Wby. Mag. (120 Sp at 3305)	.391	+2.4" +2.5"	3"@155	317
6.5x54 (140 PSP at 2400)	.435	+2.9" +0.2"	3"@115	238
6.5x55 (125 NP at 2875)	.449	+2.6" +1.9"	3"@135	284
6.5x55 (140 Sp at 2645)	.435	+2.7" +1.2"	3"@125	260
6.5x57 (140 SP at 2740)	.465	+2.7" +1.6"	3"@130	272
.260 Rem.	.433	+2.6" +1.9"	3"@135	284

(120 Sp at 2890)				
.260 Rem. (140 Sp at 2750)	.435	+2.7"	+1.6" 3"@125	271
6.5-284 Norma (140 PSP at 2900)	.435	+2.6"	+2.0" 3"@140	286
6.5mm Rem. Mag. (120 Sp at 3210)	.433	+2.4"	+2.5" 3"@150	312
6.5mm Rem. Mag. (140 PSP at 2900)	.435	+2.6"	+2.0" 3"@140	286
6.5x65 RWS (127 Sp at 3313)	.449	+2.4"	+2.6" 3"@160	323
6.5x68 S (140 Sp at 2990)	.435	+2.6"	+2.1" 3"@150	294
.264 Win. Mag. (120 Sp at 3300)	.433	+2.4"	+2.6" 3"@160	321
.264 Win. Mag. (140 Sp at 3100)	.435	+2.5"	+2.3" 3"@150	303
6.8mm Rem. SPC (110 BTSP at 2500)	.360	+2.9"	+0.5" 3"@125	243
6.8mm Rem. SPC (115 Sp at 2800)	.325	+2.6"	+1.3" 3"@130	267
.270 Win. (130 Sp at 3140)	.416	+2.5"	+2.4" 3"@150	305
.270 Win. (140 AB at 2950)	.496	+2.6"	+2.1" 3"@140	293

.270 Win. (150 Sp at 2900)	.481	+2.6"	+2.0"	3"@138	287
.270 WSM (130 Sp at 3206)	.416	+2.4"	+2.4"	3"@150	311
.270 WSM (150 Sp at 3150)	.481	+2.5"	+2.4"	3"@150	311
.270 Wby. Mag. (130 Sp at 3375)	.416	+2.3"	+2.6"	3"@150	326
.270 Wby. Mag. (150 Sp at 3245)	.481	+2.4"	+2.6"	3"@160	320
7-30 Waters (120 FP at 2700)	.195	+2.9"	+0.4"	3"@125	238
7x57 (140 BT at 2660)	.485	+2.7"	+1.3"	3"@125	264
7x57 (175 Sp at 2540)	.519	+2.8"	+1.0"	3"@125	256
7mm-08 Rem. (120 Sp at 3000)	.343	+2.6"	+2.0"	3"@140	287
7mm-08 Rem. (140 BT at 2860)	.485	+2.6"	+1.9"	3"@140	285
7x64 (140 BT at 3000)	.485	+2.6"	+2.2"	3"@150	298
7x65R (175 Sp at 2650)	.465	+2.7"	+1.3"	3"@125	262
.284 Win. (150 Sp at 2750)	.456	+2.7"	+1.6"	3"@130	272
.280 Rem. (140 BT at 3000)	.485	+2.6"	+2.2"	3"@150	298
.280 Rem. (160 Sp at 2890)	.475	+2.6"	+1.9"	3"@140	287
7mm SAUM (150	.456	+2.5"	+2.3"	3"@150	305

Sp at 3110)					
7mm WSM					
(150 Sp at 3200)	.456	+2.4"	+2.5"	3"@150	314
.275 H&H					
Mag. (160 Sp at 3050)	.475	+2.5"	+2.3"	3"@145	301
7x61 S&H					
(154 SP at 3060)	.433	+2.5"	+2.3"	3"@150	300
7mm Rem.					
Mag. (140 BT at 3150)	.485	+2.5"	+2.4"	3"@150	310
7mm Rem.					
Mag. (150 Sp at 3110)	.456	+2.5"	+2.3"	3"@150	305
7mm Rem.					
Mag. (160 Sp at 2950)	.475	+2.6"	+2.1"	3"@140	292
7mm Wby.					
Mag. (154 SP at 3260)	.433	+2.4"	+2.5"	3"@150	317
7mm Wby.					
Mag. (160 Sp at 3200)	.475	+2.4"	+2.5"	3"@150	314
7mm STW					
(160 Sp at 3185)	.475	+2.4"	+2.5"	3"@150	313
7mm Ultra					
Mag (160 Sp at 3200)	.475	+2.4"	+2.5"	3"@150	314
7.5x55 (180 Sp at 2566)	.431	+2.8"	+0.9"	3"@125	252
.30 Carbine					
(110 RN at 1990)	.144	+2.8"	-8.2"	3"@85	171
.30-30 Win.					
(150 FP at 2390)	.268	+2.9"	-0.6"	3"@110	225
.30-30 Win.					
(160 Evo at 2400)	.330	+2.9"	-0.2"	3"@110	232
.30-30 Win.	.304	+2.9"	-1.8"	3"@105	211

(170 FP at 2200)				
.300 Sav. (150 BT at 2630)	.435	+2.8"	+1.2" 3"@125	259
.307 Win. (150 FP at 2600)	.268	+2.8"	+0.5" 3"@120	243
.308 Marlin (160 EVO at 2660)*	.400	+2.8"	+1.2" 3"@130	261
.308 Win. (150 BT at 2800)	.435	+2.7"	+1.7" 3"@135	275
.308 Win. (165 Sp at 2700)	.410	+2.7"	+1.3" 3"@130	264
.308 Win. (180 Sp at 2610)	.483	+2.8"	+1.2" 3"@125	259
.30-06 (150 BT at 2910)	.435	+2.6"	+2.0" 3"@145	287
.30-06 (165 Sp at 2800)	.410	+2.7"	+1.7" 3"@135	273
.30-06 (180 Sp at 2700)	.483	+2.7"	+1.5" 3"@125	269
.300 SAUM (165 Sp at 3075)	.410	+2.5"	+2.3" 3"@145	300
.300 WSM (150 BT at 3300)	.435	+2.4"	+2.6" 3"@150	321
.300 WSM (180 Sp at 2970)	.483	+2.6"	+2.2" 3"@150	294
.308 Norma Mag. (150 BT at 3300)	.435	+2.4"	+2.6" 3"@150	321
.300 Win. Mag. (150 BT at 3300)	.435	+2.4"	+2.6" 3"@150	321
.300 Win. Mag. (165	.410	+2.5"	+2.3" 3"@145	303

Sp at 3120)					
.300 Win.					
Mag. (180	.483	+2.5"	+2.3"	3"@150	303
Sp at 3070)					
.300 H&H					
Mag. (180	.483	+2.6"	+2.0"	3"@140	286
Sp at 2880)					
.300 Wby.					
Mag. (150	.435	+2.2"	+2.8"	3"@170	343
BT at 3540)					
.300 Wby.					
Mag. (180	.483	+2.4"	+2.6"	3"@155	320
Sp at 3250)					
.300 Ultra					
Mag (180	.483	+2.4"	+2.6"	3"@155	320
Sp at 3250)					
.30-378					
Wby. Mag.	.483	+2.3"	+2.7"	3"@160	336
(180 Sp at					
3420)					
7.62x39					
(123 Sp at	.292	+2.9"	-0.5"	3"@110	225
2365)					
.303 British					
(150 Sp at	.411	+2.8"	+1.5"	3"@130	267
2723)					
.303 British					
(180 RN at	.328	+2.9"	+0.1"	3"@115	237
2460)					
7.65x53					
(180 RN at	.328	+2.9"	+0.4"	3"@115	241
2400)					
.32 Spec.					
(170 FP at	.297	+3.0"	-1.3"	3"@105	215
2250)					
8x56 M-S					
(200 RN at	.253	+3.0"	-2.6"	3"@100	202
2170)					
8x57JS					
(150 Sp at	.369	+2.6"	+1.9"	3"@135	280
2900)					
8x57JS					
(200 Sp at	.426	+2.8"	+1.2"	3"@125	260

2650)				
.325 WSM (180 Sp at 2975)	.394	+2.6"	+2.0" 3"@140	289
.325 WSM (220 Sp at 2840)	.383	+2.7"	+1.7" 3"@130	276
8x68S (150 Sp at 3300)	.369	+2.4"	+2.5" 3"@150	316
8x68S (220 Sp at 2800)	.448	+2.7"	+1.7" 3"@135	277
8mm Rem. Mag. (200 Sp at 2900)	.426	+2.6"	+2.0" 3"@138	284
.338-57 O'Connor (200 FP at 2400)	.200	+2.9"	-0.3" 3"@110	214
.338 Marlin Express (200 FTX at 2565)*	.430	+2.8"	+0.9" 3"@125	254
.338 Federal (180 BT at 2830)	.372	+2.7"	+1.6" 3"@135	274
.338 Federal (200 Sp at 2400)	.448	+2.9"	+0.3" 3"@115	240
.338 Federal (210 Sp at 2630)	.400	+2.8"	+1.1" 3"@120	258
.338-06 (200 BT at 2800)	.414	+2.7"	+1.7" 3"@135	274
.338 Win. Mag. (200 BT at 2960)	.414	+2.6"	+2.1" 3"@150	289
.338 Win. Mag. (225 Sp at 2780)*	.454	+2.7"	+1.8" 3"@138	274
.338 Win. Mag. (250	.473	+2.7"	+1.4" 3"@126	268

Sp at 2700)					
.340 Wby.					
Mag. (250	.473	+2.6"	+2.1"	3"@150	291
Sp at 2941)					
.338 Ultra					
Mag (250	.473	+2.7"	+1.9"	3"@140	285
Sp at 2860)					
.338 Lapua					
Mag. (225	.454	+2.6"	+2.2"	3"@150	296
Sp at 3000)					
.338-378					
Wby. Mag.					
(250 Sp at	.473	+2.6"	+2.2"	3"@150	297
3000)					
.348 Win					
(200 FP at	.246	+2.9"	-0.1"	3"@115	233
2520)					
.357 Mag.					
(158 FP at	.158	+2.7"	10.5"	3"@85	163
1830)					
.35 Rem.					
(200 RN at	.180	+2.9"	-5.1"	3"@93	186
2080)					
.356 Win.					
(200 RN at	.180	+2.9"	-1.8"	3"@108	211
2400)					
.358 Win.					
(200 Sp at	.295	+2.9"	+0.3"	3"@115	239
2520)					
.35 Whelen					
(200 Sp at	.295	+2.8"	+1.0"	3"@125	254
2700)					
.350 Rem.					
Mag. (200	.295	+2.7"	+1.3"	3"@125	260
Sp at 2775)					
.350 Rem.					
Mag. (225	.430	+2.8"	+0.8"	3"@120	253
NP at 2550)					
.350 Rem.					
Mag. (250	.409	+2.8"	+0.5"	3"@120	246
SP at 2500)					
.358 Norma					
Mag. (250	.409	+2.7"	+1.7"	3"@125	274

SP at 2800)					
9.3x62 (270					
SSp at (2550)	.361	+2.8"	+0.7"	3"@125	247
9.3x62 (286					
SP-RP at (2360)	.410	+3.0"	+/- 0"	3"@110	234
9.3x74R					
(250 BT at 2550)	.494	+2.8"	+1.0"	3"@125	256
9.3x74R					
(286 SP-RP at 2360)	.410	+3.0"	+/- 0"	3"@110	234
.375 Win.					
(220 FP at 2012)	.231	+2.9"	-4.7"	3"@91	187
.375 H&H					
Mag. (270 SP at 2690)	.380	+2.7"	+1.3"	3"@130	260
.375 H&H					
Mag. (300 Sp at 2550)	.398	+2.8"	+0.8"	3"@125	250
.375 Wby.					
Mag. (300 Sp at 2800)	.398	+2.7"	+1.7"	3"@125	273
.375 Ultra					
Mag (300 SP at 2800)	.398	+2.7"	+1.7"	3"@125	273
.376 Steyr					
(270 SP at 2550)	.380	+2.8"	+0.7"	3"@115	248
.378 Wby.					
Mag. (300 Sp at 2935)	.398	+2.6"	+2.0"	3"@140	285
.404 Jeffery					
(400 RN at 2150)	.322	+3.0"	-2.1"	3"@100	207
.405 Win.					
(300 FP at 2200)	.225	+2.9"	-2.8"	3"@100	203
.416 Rem.					
Mag. (400 RN at 2400)	.316	+2.9"	-0.1"	3"@115	231

.416 Rigby (400 RN at 2400)	.316	+2.9"	-0.1"	3"@115	231
.416 Wby. Mag. (400 RN at 2650)	.316	+2.8"	+0.9"	3"@125	253
.44 Rem. Mag. (240 FP at 1760)	.165	+2.6"	11.6"	3"@75	159
.44 Rem. Mag. (275 FP at 1580)	.199	+2.2"	14.7"	3"@75	149
.444 Marlin (240 FP at 2350)	.165	+3.0"	-2.6"	3"@100	203
.444 Marlin (265 RN at 2200)	.191	+3.0"	-3.3"	3"@100	197
.45 Colt (250 FP at 1500)	.146	+1.7"	20.6"	3"@68	136
.45-70 (300 HP at 1800)	.197	+2.7"	-9.2"	3"@85	166
.45-70 (350 RN at 1900)	.189	+2.9"	-7.6"	3"@85	174
.45-70 (405 FP at 1330)	.214	+1.3"	22.9"	3"@65	131
.450 Marlin (350 RN at 2100)	.189	+3.0"	-4.5"	3"@100	189
.458 Win. Mag. (350 RN at 2100)	.189	+3.0"	-4.5"	3"@100	189
.458 Win. Mag. (500 RN at 2100)	.295	+3.0"	-2.9"	3"@100	200
.458 Lott (500 RN at 2300)	.295	+2.9"	-1.0"	3"@110	219
.460 Wby. Mag. (500 RN at 2600)	.295	+2.8"	+0.6"	3"@116	246
.470 N.E.	.321	+3.0"	-2.1"	3"@100	207

(500 RN at
2150)

.480 Ruger

(325 FN at .150 +1.5" $\frac{-}{22.1}$ " 3"@68 134
1450)

.50 BMG

(750 Sp at 1.07 +2.6" +1.8" 3"@135 281
2700)