

Blog Entry © Friday, January 16, 2026, by James Pate Williams, Jr., Another Update of My Iowa Class Battleship Artillery Exterior Ballistics Application

References: ***Exterior ballistics, 1935*** © 1935 by Lieutenant Commander Ernest Edward Herrmann of the United States Naval Academy and [OP-770 Page 1 Range Tables for 16"/50 caliber gun](#)

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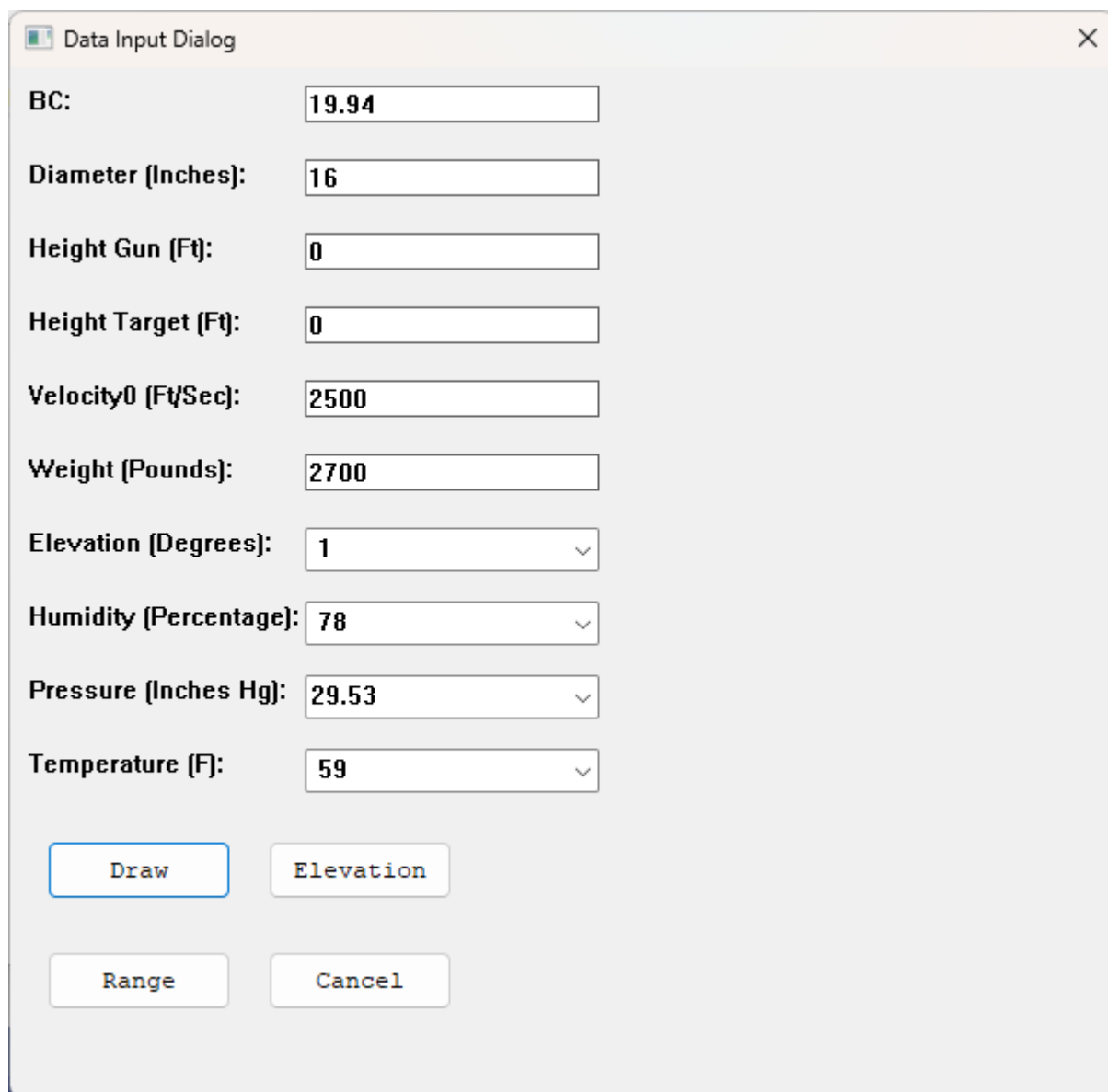
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Rebuild started at 6:25 PM...

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1>----- Rebuild All started: Project: BallisticsWin32,
Configuration: Release x64 -----
1>pch.cpp
1>BallisticsWin32.cpp
1>RK5Ballistics.cpp
1>Track.cpp
1>Generating code
1>Previous IPDB not found, fall back to full compilation.
1>All 399 functions were compiled because no usable IPDB/IOBJ
from previous compilation was found.
1>Finished generating code
1>BallisticsWin32.vcxproj ->
D:\BallisticsWin32\x64\Release\BallisticsWin32.exe
===== Rebuild All: 1 succeeded, 0 failed, 0 skipped
=====
===== Rebuild completed at 6:25 PM and took 11.050 seconds
=====

```



A screenshot of a software window titled "Data Input Dialog" with a close button (X) in the top right corner. The window contains several input fields for various parameters, each with a label and a corresponding text box or dropdown menu. The parameters and their values are: BC (19.94), Diameter (Inches) (16), Height Gun (Ft) (0), Height Target (Ft) (0), Velocity0 (Ft/Sec) (2500), Weight (Pounds) (2700), Elevation (Degrees) (1), Humidity (Percentage) (78), Pressure (Inches Hg) (29.53), and Temperature (F) (59). At the bottom of the window, there are four buttons: "Draw", "Elevation", "Range", and "Cancel".

Parameter	Value
BC:	19.94
Diameter (Inches):	16
Height Gun (Ft):	0
Height Target (Ft):	0
Velocity0 (Ft/Sec):	2500
Weight (Pounds):	2700
Elevation (Degrees):	1
Humidity (Percentage):	78
Pressure (Inches Hg):	29.53
Temperature (F):	59

Buttons: Draw, Elevation, Range, Cancel

Figure 1 Data Input Dialog

Range	Angle of Elevation		Angle of Fall		Time	Striking Velocity	Drift	Apogee Summit	Kinetic Energy
Yards	Degrees	Minutes	Degrees	Minutes	Seconds	Ft-Sec	Yards	Feet	Ft-Lb
1	0	0.0	0	0.0	0.00	2500	0	0	262236820
2195	1	0.0	1	2.0	2.69	2393	1	29	240323760
4266	2	0.0	2	7.0	5.34	2297	3	115	221416001
6224	3	0.0	3	15.0	7.96	2211	7	255	205057533
8080	4	0.0	4	27.0	10.54	2133	12	447	190871391
9841	5	0.0	5	41.0	13.08	2063	19	688	178557862
11518	6	0.0	6	57.0	15.59	2000	26	978	167847955
13115	7	0.0	8	16.0	18.06	1944	36	1314	158528551
14641	8	0.0	9	37.0	20.50	1893	46	1694	150410086
16102	9	0.0	10	59.0	22.91	1848	57	2117	143339364
17502	10	0.0	12	22.0	25.29	1808	70	2581	137188410
18845	11	0.0	13	47.0	27.66	1761	84	3084	130067576
20134	12	0.0	15	15.0	30.00	1717	99	3627	123710936
21369	13	0.0	16	44.0	32.33	1680	115	4207	118470683
22553	14	0.0	18	14.0	34.63	1649	132	4823	114157148
23689	15	0.0	19	45.0	36.91	1624	150	5474	110618520
24780	16	0.0	21	14.0	39.16	1602	169	6159	107731793
25830	17	0.0	22	44.0	41.39	1585	189	6878	105399333
26841	18	0.0	24	11.0	43.59	1571	210	7628	103538571
27814	19	0.0	25	38.0	45.76	1560	232	8410	102083919
28754	20	0.0	27	3.0	47.91	1551	254	9222	100978564
29661	21	0.0	28	26.0	50.03	1545	277	10063	100176929
30536	22	0.0	29	47.0	52.13	1541	301	10933	99639847
31382	23	0.0	31	6.0	54.21	1539	326	11829	99334523
32198	24	0.0	32	23.0	56.26	1538	351	12752	99232591
32986	25	0.0	33	38.0	58.30	1538	377	13700	99309351
33747	26	0.0	34	51.0	60.32	1540	403	14672	99543943
34480	27	0.0	36	2.0	62.31	1543	430	15667	99918025
35186	28	0.0	37	11.0	64.29	1547	458	16685	100414857
35864	29	0.0	38	18.0	66.25	1552	487	17724	101020721
36515	30	0.0	39	23.0	68.20	1557	516	18783	101722377
37138	31	0.0	40	26.0	70.13	1563	546	19862	102508655
37732	32	0.0	41	28.0	72.03	1570	577	20961	103368953
38297	33	0.0	42	28.0	73.93	1577	608	22077	104294368
38833	34	0.0	43	27.0	75.80	1584	640	23210	105275908
39337	35	0.0	44	24.0	77.66	1592	673	24360	106306112
39810	36	0.0	45	20.0	79.50	1600	706	25524	107377624
40250	37	0.0	46	15.0	81.32	1608	741	26703	108483887
40657	38	0.0	47	9.0	83.13	1616	775	27895	109619425
41028	39	0.0	48	1.0	84.91	1625	811	29100	110778032
41362	40	0.0	48	53.0	86.68	1633	847	30315	111954163
41660	41	0.0	49	43.0	88.43	1642	884	31541	113143996
41919	42	0.0	50	33.0	90.16	1651	921	32775	114342141
42003	43	0.0	51	36.0	91.89	1655	959	34017	114980789
42148	44	0.0	52	27.0	93.58	1663	997	35265	116089820

Figure 2 Elevation Exterior Ballistics 2500 Feet Per Second Initial Velocity

Tabular Data									
Range	Angle of Elevation		Angle of Fall		Time	Striking Velocity	Drift	Apogee Summit	Kinetic Energy
Yards	Degrees	Minutes	Degrees	Minutes	Seconds	Ft-Sec	Yards	Feet	Ft-Lb
1	0	0.0	0	0.0	0.00	2510	0	0	264338875
2212	1	0.0	1	2.0	2.70	2402	1	29	242090396
4298	2	0.0	2	7.0	5.37	2305	3	116	222904163
6270	3	0.0	3	15.0	7.99	2217	7	257	206325539
8137	4	0.0	4	27.0	10.58	2139	12	450	191970059
9911	5	0.0	5	41.0	13.13	2068	19	694	179509081
11597	6	0.0	6	58.0	15.64	2005	27	985	168686450
13204	7	0.0	8	17.0	18.12	1948	36	1323	159271257
14739	8	0.0	9	37.0	20.57	1898	46	1706	151077445
16208	9	0.0	10	59.0	22.99	1852	58	2132	143945140
17615	10	0.0	12	23.0	25.38	1812	71	2599	137744085
18966	11	0.0	13	48.0	27.75	1765	85	3106	130784750
20262	12	0.0	15	15.0	30.11	1721	100	3652	124341405
21504	13	0.0	16	45.0	32.44	1684	116	4236	119030009
22695	14	0.0	18	15.0	34.75	1653	133	4856	114659768
23838	15	0.0	19	46.0	37.04	1627	151	5512	111076958
24936	16	0.0	21	16.0	39.30	1606	171	6202	108156658
25992	17	0.0	22	45.0	41.53	1588	191	6925	105797738
27009	18	0.0	24	13.0	43.73	1574	212	7680	103916643
27989	19	0.0	25	40.0	45.91	1563	233	8467	102447021
28934	20	0.0	27	4.0	48.07	1554	256	9284	101331349
29846	21	0.0	28	28.0	50.20	1548	279	10131	100523098
30727	22	0.0	29	49.0	52.31	1544	303	11006	99982427
31578	23	0.0	31	8.0	54.39	1541	328	11909	99675939
32399	24	0.0	32	25.0	56.46	1540	353	12838	99574930
33193	25	0.0	33	40.0	58.50	1541	379	13792	99654495
33958	26	0.0	34	53.0	60.52	1543	406	14771	99893219
34696	27	0.0	36	4.0	62.53	1546	433	15773	100272685
35406	28	0.0	37	13.0	64.52	1550	462	16797	100775949
36089	29	0.0	38	20.0	66.48	1554	490	17843	101389100
36745	30	0.0	39	25.0	68.44	1560	520	18910	102098762
37372	31	0.0	40	29.0	70.37	1566	550	19997	102893631
37971	32	0.0	41	30.0	72.28	1573	581	21103	103762899
38540	33	0.0	42	31.0	74.18	1580	612	22227	104697505
39080	34	0.0	43	29.0	76.07	1587	645	23368	105688782
39589	35	0.0	44	27.0	77.93	1595	678	24526	106728951
40065	36	0.0	45	22.0	79.78	1603	711	25698	107810605
40509	37	0.0	46	17.0	81.61	1611	746	26886	108927222
40919	38	0.0	47	11.0	83.42	1620	781	28086	110072740
41294	39	0.0	48	3.0	85.21	1628	816	29299	111241258
41632	40	0.0	48	54.0	86.98	1637	853	30523	112427820
41932	41	0.0	49	45.0	88.74	1646	890	31758	113627595
42194	42	0.0	50	35.0	90.47	1654	928	33001	114836049
42297	43	0.0	51	36.0	92.21	1660	966	34251	115555880
42434	44	0.0	52	28.0	93.91	1667	1004	35508	116636383

Compute

Cancel

Figure 3 Elevation Exterior Ballistics 2510 Feet Per Second Initial Velocity

Range Yards	Elevation Degrees
0	0
17	1
32	2
46	3
57	4
70	5
79	6
89	7
98	8
106	9
113	10
121	11
128	12
135	13
142	14
149	15
156	16
162	17
168	18
175	19
180	20
185	21
191	22
196	23
201	24
207	25
211	26
216	27
220	28
225	29
230	30
234	31
239	32
243	33
247	34
252	35
255	36
259	37
262	38
266	39
270	40

272	41
275	42
294	43
286	44

Table 1 Difference Between 2510 Feet Per Seconds and 2500 Feet Per Seconds Initial Velocity and Elevation in Degrees

Tabular Data									
Range	Angle of Elevation		Angle of Fall		Time	Striking Velocity	Drift	Apogee Summit	Kinetic Energy
Yards	Degrees	Minutes	Degrees	Minutes	Seconds	Ft-Sec	Yards	Feet	Ft-Lb
1	0	0.0	0	0.0	0.00	2500	0	0	261265540
2195	1	0.0	1	2.0	2.69	2393	1	29	239357669
4265	2	0.0	2	7.0	5.34	2296	3	115	220462984
6222	3	0.0	3	15.0	7.96	2210	7	255	204122565
8076	4	0.0	4	27.0	10.54	2132	12	447	189967274
9837	5	0.0	5	41.0	13.08	2062	19	688	177674896
11511	6	0.0	6	58.0	15.58	1999	27	978	166990522
13108	7	0.0	8	16.0	18.05	1942	36	1313	157692245
14633	8	0.0	9	37.0	20.50	1892	46	1693	149594333
16091	9	0.0	10	59.0	22.91	1847	58	2116	142548369
17489	10	0.0	12	22.0	25.29	1806	70	2579	136415289
18830	11	0.0	13	48.0	27.65	1758	84	3083	129222069
20117	12	0.0	15	15.0	30.00	1715	99	3625	122914194
21350	13	0.0	16	45.0	32.32	1678	115	4205	117712409
22531	14	0.0	18	15.0	34.63	1647	133	4820	113432711
23665	15	0.0	19	46.0	36.90	1622	151	5471	109922677
24755	16	0.0	21	16.0	39.15	1600	170	6156	107060768
25802	17	0.0	22	45.0	41.38	1583	190	6874	104748999
26811	18	0.0	24	13.0	43.57	1569	211	7623	102904761
27783	19	0.0	25	39.0	45.74	1558	232	8404	101463151
28721	20	0.0	27	4.0	47.89	1549	255	9216	100368076
29626	21	0.0	28	27.0	50.01	1543	278	10056	99575154
30499	22	0.0	29	48.0	52.11	1539	302	10925	99044702
31344	23	0.0	31	7.0	54.18	1537	326	11821	98743892
32159	24	0.0	32	24.0	56.24	1536	352	12743	98645102
32945	25	0.0	33	39.0	58.27	1537	378	13690	98723927
33705	26	0.0	34	52.0	60.29	1539	404	14661	98959468
34436	27	0.0	36	3.0	62.29	1541	432	15655	99333122
35141	28	0.0	37	12.0	64.27	1545	460	16671	99829297
35818	29	0.0	38	19.0	66.22	1550	488	17709	100433116
36468	30	0.0	39	24.0	68.17	1555	518	18768	101132429
37090	31	0.0	40	28.0	70.09	1561	548	19846	101915488
37683	32	0.0	41	30.0	72.00	1568	579	20943	102772610
38247	33	0.0	42	30.0	73.89	1575	610	22058	103693838
38782	34	0.0	43	28.0	75.77	1582	642	23190	104671072
39286	35	0.0	44	26.0	77.62	1590	675	24338	105696657
39758	36	0.0	45	22.0	79.46	1598	708	25502	106763283
40198	37	0.0	46	16.0	81.28	1606	743	26680	107864863
40603	38	0.0	47	10.0	83.09	1615	777	27871	108994673
40974	39	0.0	48	2.0	84.87	1623	813	29074	110147739
41308	40	0.0	48	54.0	86.64	1632	849	30288	111318655
41605	41	0.0	49	44.0	88.39	1640	886	31512	112502402
41863	42	0.0	50	34.0	90.11	1649	924	32745	113694755
41944	43	0.0	51	38.0	91.85	1654	961	33986	114312583
42091	44	0.0	52	28.0	93.53	1662	1000	35232	115425905

Figure 4 Elevation Exterior Ballistics 2690 Pounds Projectile

Range	Elevation
Yards	Degrees
0	0
0	1
1	2
2	3
4	4
4	5
7	6
7	7
8	8
11	9
13	10
15	11
17	12
19	13
22	14
24	15
25	16
28	17
30	18
31	19
33	20
35	21
37	22
38	23
39	24
41	25
42	26
44	27
45	28
46	29
47	30
48	31
49	32
50	33
51	34
51	35
52	36
52	37
54	38
54	39
54	40

55 41
 56 42
 59 43
 57 44

Table 2 Elevation Exterior Ballistics for Weight of Projectile 2700 - 2690 in Yards

Tabular Data									
Range	Angle of Elevation		Angle of Fall		Time	Striking Velocity	Drift	Apogee Summit	Kinetic Energy
Yards	Degrees	Minutes	Degrees	Minutes	Seconds	Ft-Sec	Yards	Feet	Ft-Lb
1	0	0.0	0	0.0	0.00	2500	0	0	262236232
2190	1	0.0	1	2.0	2.69	2386	1	29	238958403
4250	2	0.0	2	7.0	5.34	2285	3	115	219042751
6191	3	0.0	3	16.0	7.95	2194	7	254	201955432
8025	4	0.0	4	28.0	10.52	2112	12	445	187248083
9762	5	0.0	5	43.0	13.05	2040	19	685	174554859
11410	6	0.0	7	1.0	15.54	1974	26	973	163583523
12979	7	0.0	8	21.0	18.00	1916	35	1306	154080257
14473	8	0.0	9	42.0	20.43	1864	46	1683	145845102
15902	9	0.0	11	6.0	22.83	1818	57	2102	138699091
17269	10	0.0	12	31.0	25.20	1768	70	2561	131098538
18577	11	0.0	13	59.0	27.55	1718	83	3060	123847266
19827	12	0.0	15	29.0	29.89	1676	98	3596	117894270
21023	13	0.0	17	1.0	32.20	1641	114	4169	113006013
22168	14	0.0	18	32.0	34.48	1612	131	4777	108994970
23267	15	0.0	20	4.0	36.73	1587	149	5420	105714513
24322	16	0.0	21	35.0	38.96	1567	168	6096	103048821
25336	17	0.0	23	5.0	41.16	1551	187	6804	100902101
26313	18	0.0	24	34.0	43.33	1538	208	7543	99197827
27255	19	0.0	26	1.0	45.47	1527	229	8314	97873428
28163	20	0.0	27	26.0	47.59	1519	251	9113	96876272
29041	21	0.0	28	49.0	49.69	1514	274	9941	96164178
29888	22	0.0	30	10.0	51.76	1510	297	10796	95700365
30706	23	0.0	31	30.0	53.81	1508	321	11678	95453948
31498	24	0.0	32	47.0	55.84	1508	346	12585	95398666
32261	25	0.0	34	2.0	57.86	1509	371	13516	95511726
32998	26	0.0	35	15.0	59.85	1511	397	14470	95773415
33709	27	0.0	36	26.0	61.82	1514	424	15448	96166432
34394	28	0.0	37	35.0	63.78	1518	451	16447	96675854
35051	29	0.0	38	42.0	65.72	1523	479	17467	97287915
35683	30	0.0	39	47.0	67.64	1528	508	18507	97990980
36288	31	0.0	40	51.0	69.55	1534	537	19566	98773773
36865	32	0.0	41	53.0	71.44	1541	567	20644	99627094
37414	33	0.0	42	53.0	73.31	1548	597	21740	100541896
37934	34	0.0	43	51.0	75.16	1555	629	22852	101510037
38425	35	0.0	44	49.0	77.00	1563	661	23980	102524604
38884	36	0.0	45	44.0	78.82	1571	693	25123	103578248
39313	37	0.0	46	39.0	80.63	1579	727	26280	104665246
39709	38	0.0	47	32.0	82.41	1588	761	27451	105779996
40070	39	0.0	48	25.0	84.18	1596	795	28633	106916412
40397	40	0.0	49	16.0	85.93	1605	831	29826	108070151
40580	41	0.0	50	19.0	87.70	1610	867	31029	108702647
40781	42	0.0	51	14.0	89.42	1617	903	32241	109679326
40973	43	0.0	52	4.0	91.11	1625	940	33460	110812404
41138	44	0.0	52	52.0	92.77	1634	978	34684	112001384

Figure 5 Elevation for Humidity 38%, Pressure 30.00 Inches Hg and Temperature 34 Degrees Fahrenheit

Range Yards	Elevation Degrees
0	0
5	1
16	2
33	3
55	4
79	5
108	6
136	7
168	8
200	9
233	10
268	11
307	12
346	13
385	14
422	15
458	16
494	17
528	18
559	19
591	20
620	21
648	22
676	23
700	24
725	25
749	26
771	27
792	28
813	29
832	30
850	31
867	32
883	33
899	34
912	35
926	36
937	37
948	38
958	39
965	40

1080	41
1138	42
1030	43
1010	44

Elevation for Normal Minus Humidity 38%, Pressure 30.00 Inches Hg and Temperature 34 Degrees Fahrenheit