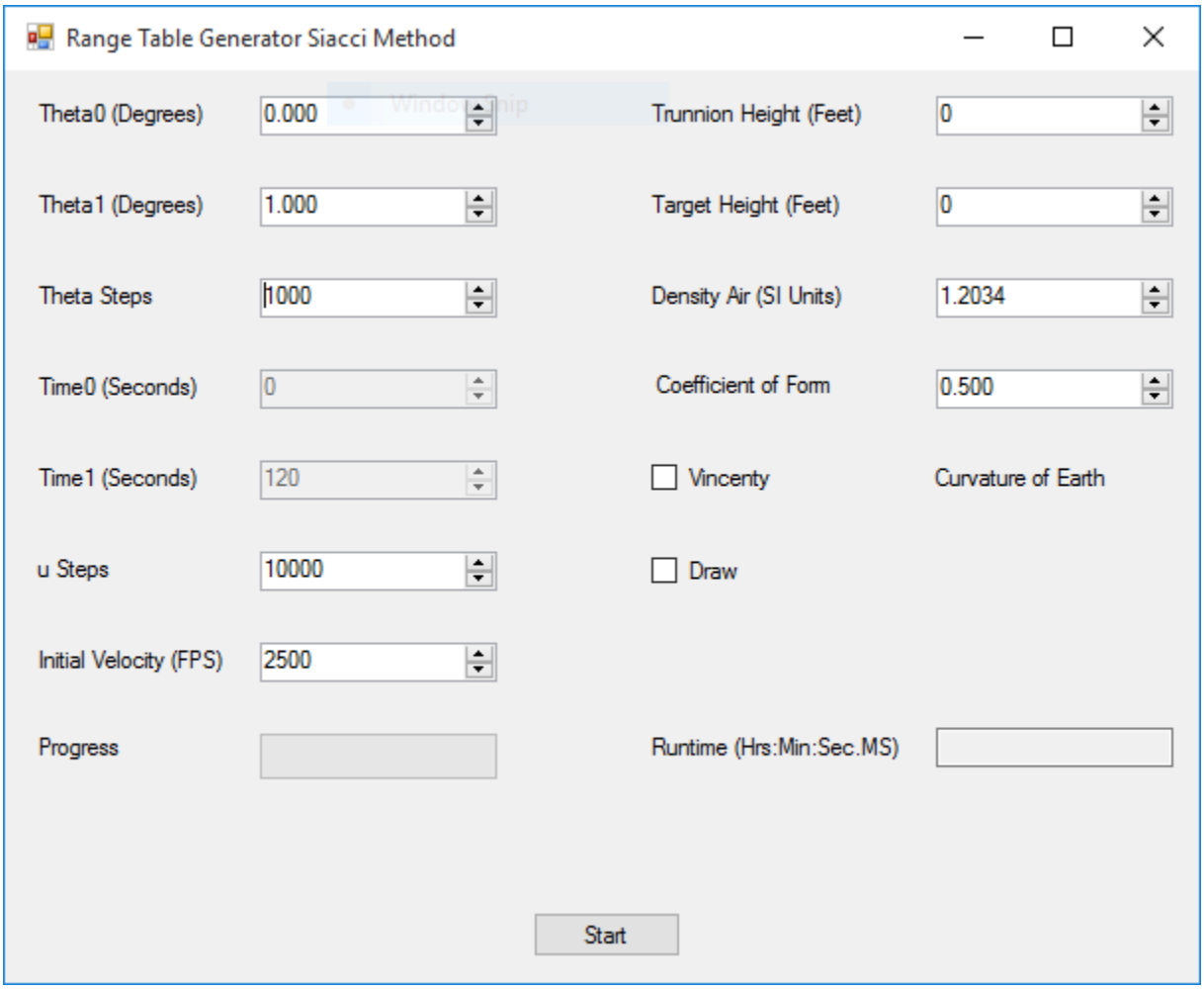
Blog Entry © Tuesday, May 27, 2025, Translation of a Siacci's Method C# App to C/C++ by James Pate Williams, Jr., BA, BS, MSWE, PhD

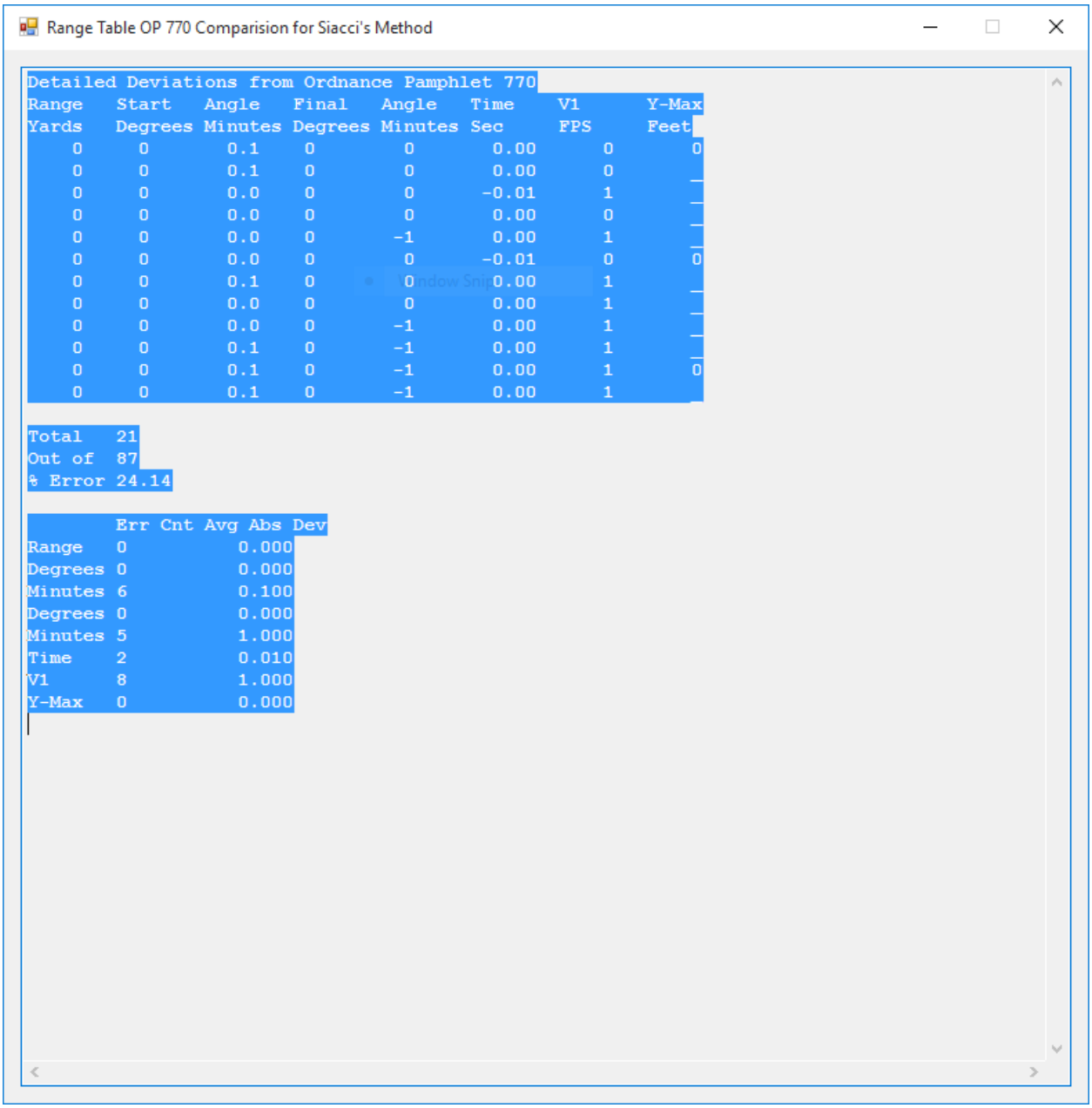
Siacci's Method is a technique to solve the exterior ballistics problem for small elevation of the rifle's barrel. My original C# app was created in September of 2017. The equations used were from the textbook ***Exterior ballistics, 1935*** by Ernest Edward Herrmann. The Gauss-Legendre quadrature algorithm was utilized. The opening Windows input form is illustrated below. The angle of elevation should be less than approximately 12 degrees which is 0.2094395163 radians.

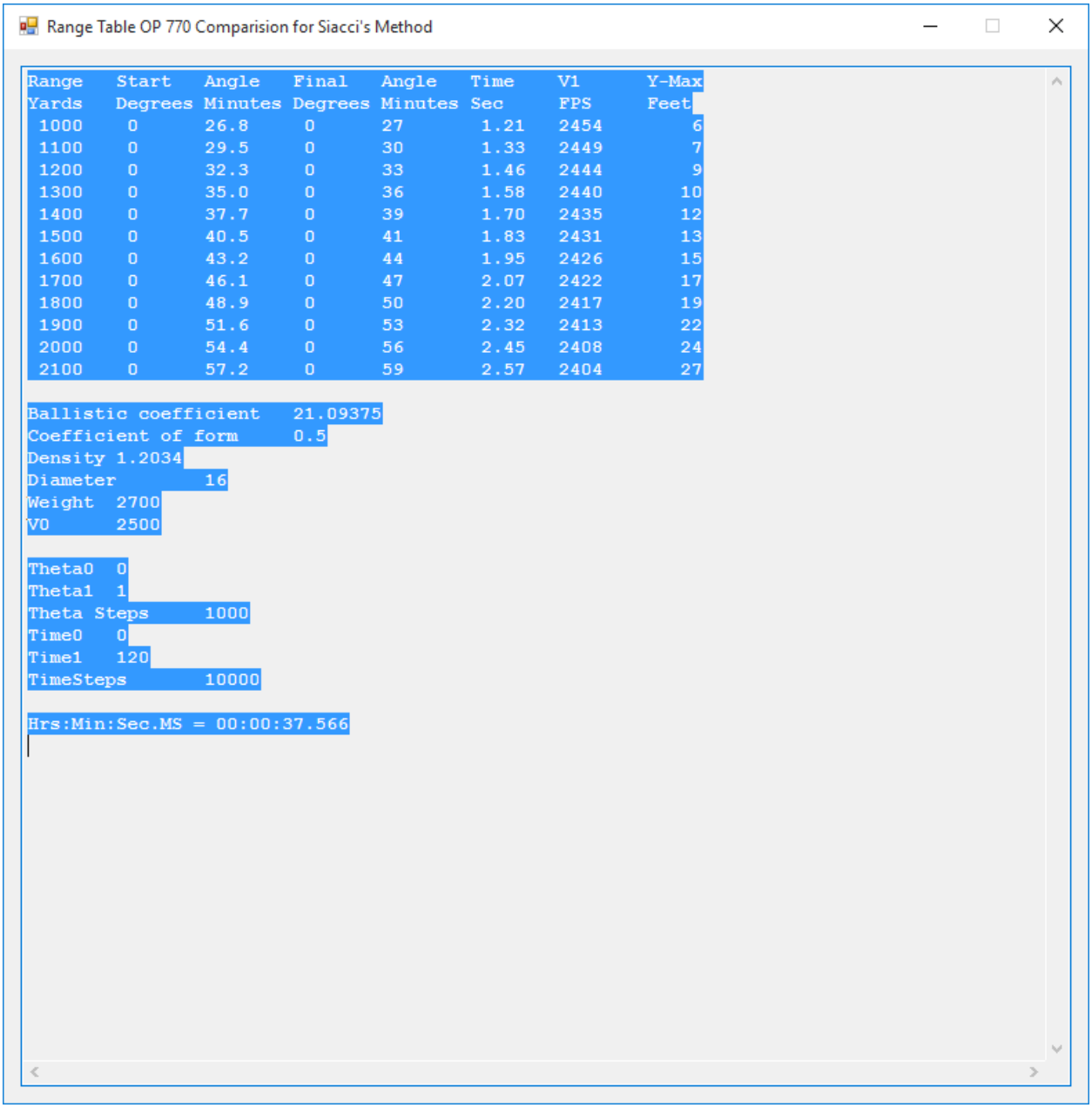


The rifle chosen to model is a 16-inch 50 caliber naval artillery gun for the Iowa class of fast battleships (BB-61 Iowa, BB-62 New Jersey, BB-63 Missouri, and BB-64 Wisconsin). 50 caliber means that the rifled barrel is 50 * 16 inches in length = 800 inches = 66.667 feet. The following form is a comparison of the app's data with the range table found in Ordnance Pamphlet 770 © October 1941 by the Navy Department Bureau of Ordnance:

OP-770 Page 1 Range Tables for 16"/50 caliber gun

The word Comparison is misspelled in the two following Windows forms.



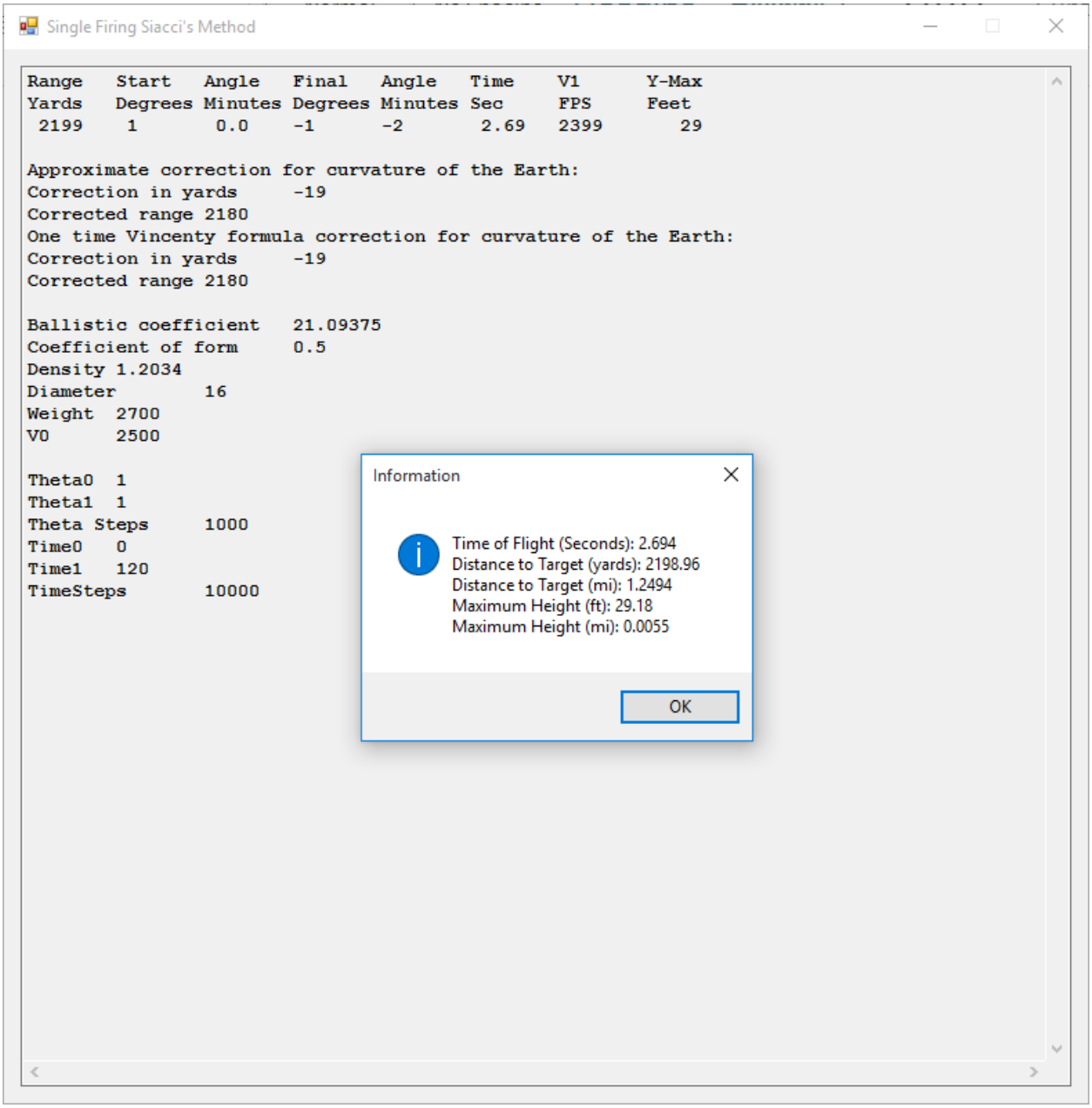


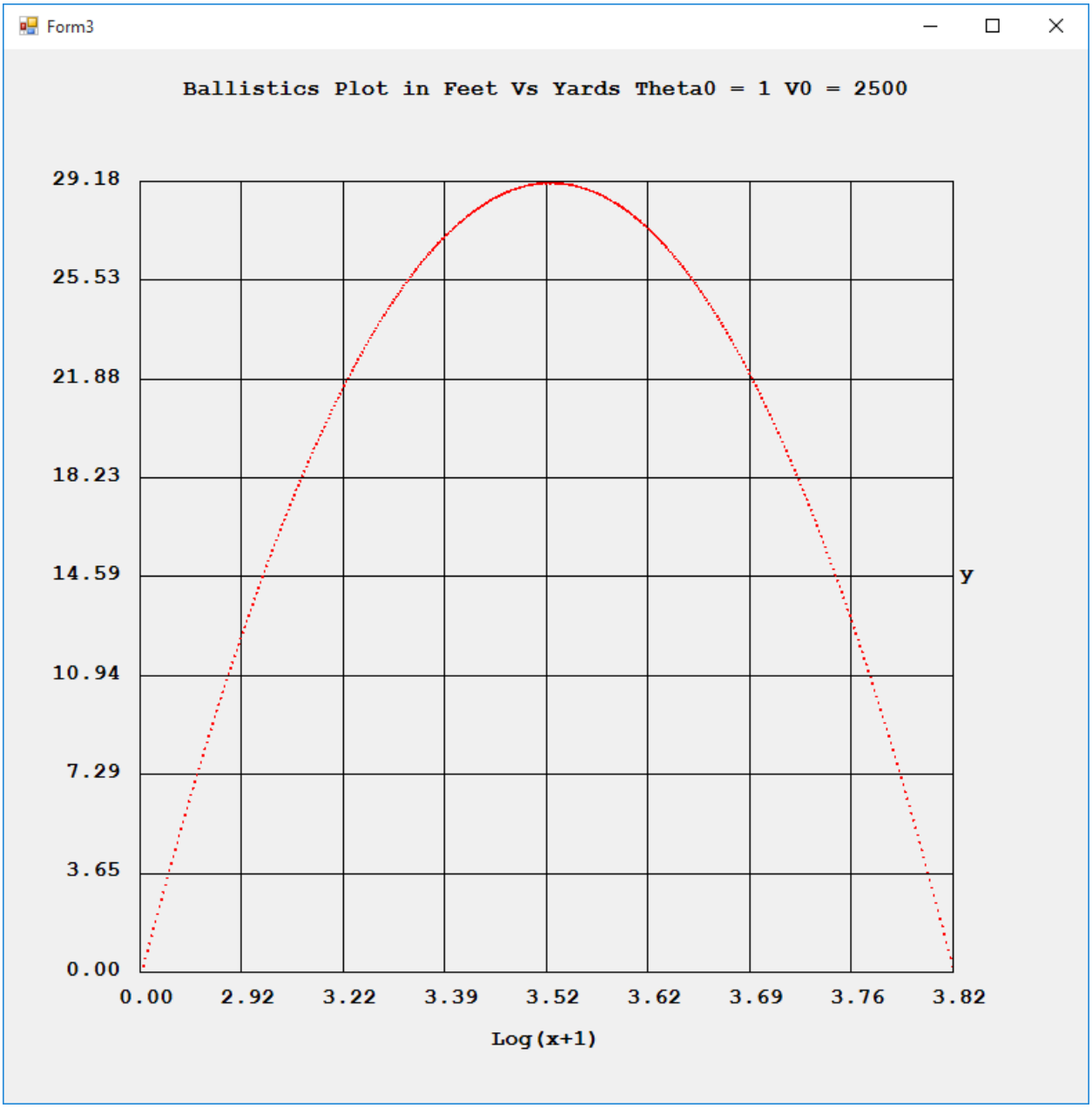
Range Yards	Start Degrees	Angle Minutes	Final Degrees	Angle Minutes	Time Sec	V1 FPS	Y-Max Feet
1000	0	26.8	0	27	1.21	2454	6
1100	0	29.5	0	30	1.33	2449	7
1200	0	32.3	0	33	1.46	2444	9
1300	0	35.0	0	36	1.58	2440	10
1400	0	37.7	0	39	1.70	2435	12
1500	0	40.5	0	41	1.83	2431	13
1600	0	43.2	0	44	1.95	2426	15
1700	0	46.1	0	47	2.07	2422	17
1800	0	48.9	0	50	2.20	2417	19
1900	0	51.6	0	53	2.32	2413	22
2000	0	54.4	0	56	2.45	2408	24
2100	0	57.2	0	59	2.57	2404	27

Ballistic coefficient 21.09375
Coefficient of form 0.5
Density 1.2034
Diameter 16
Weight 2700
V0 2500

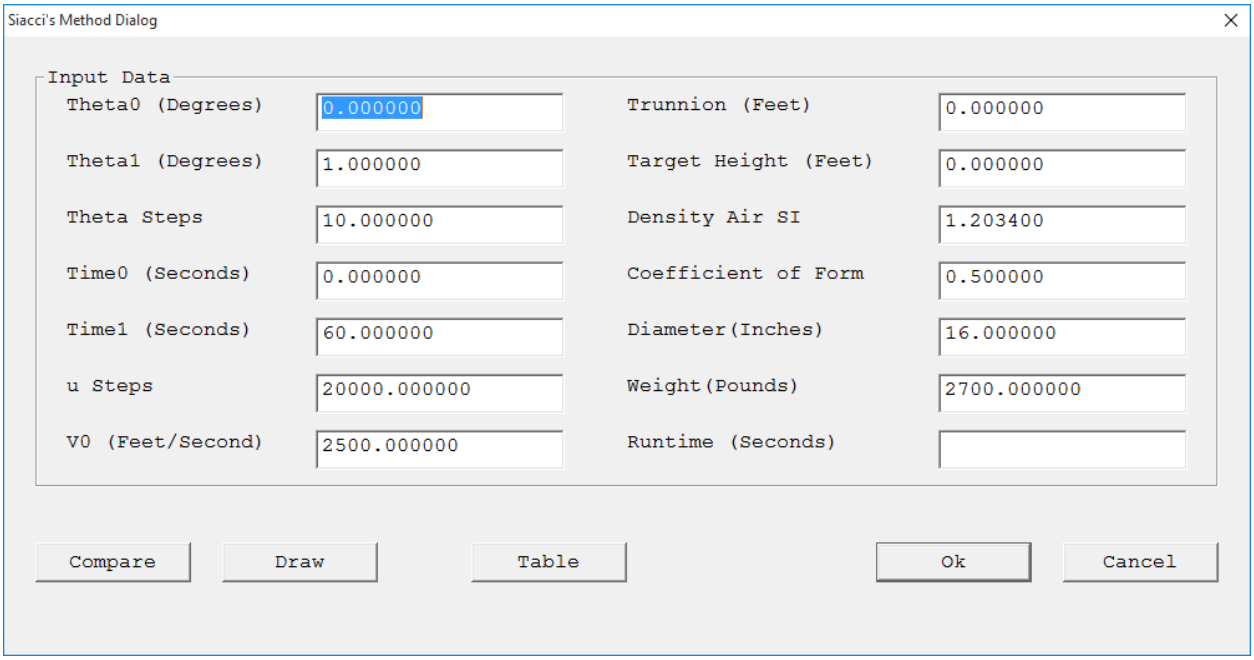
Theta0 0
Theta1 1
Theta Steps 1000
Time0 0
Time1 120
TimeSteps 10000

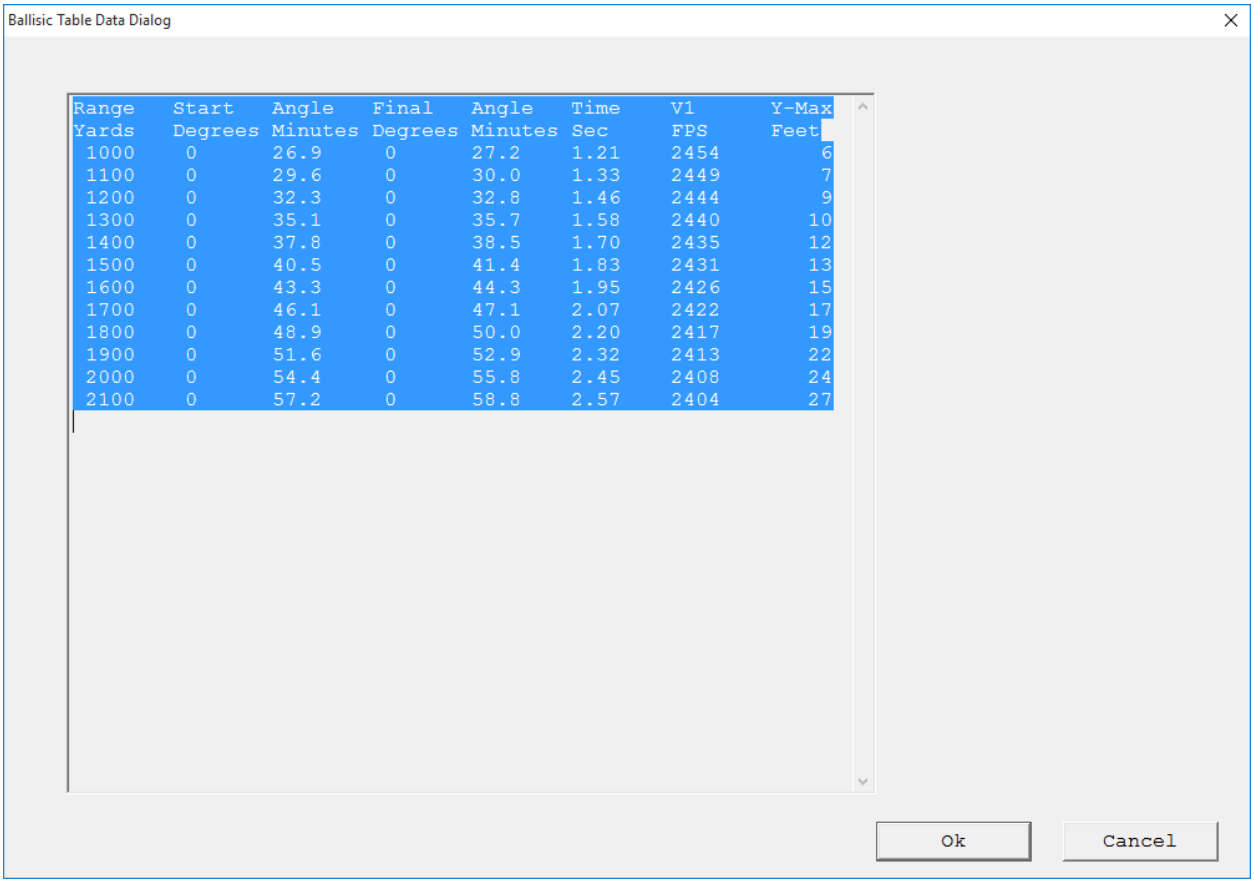
Hrs:Min:Sec.MS = 00:00:37.566


Single Firing Siacci's Method
Range Yards 2199
Start Degrees 1
Angle Minutes 0.0
Final Degrees -1
Angle Minutes -2
Time Sec 2.69
V1 FPS 2399
Y-Max Feet 29
Approximate correction for curvature of the Earth:
Correction in yards -19
Corrected range 2180
One time Vincenty formula correction for curvature of the Earth:
Correction in yards -19
Corrected range 2180
Ballistic coefficient 21.09375
Coefficient of form 0.5
Density 1.2034
Diameter 16
Weight 2700
V0 2500
Theta0 1
Theta1 1
Theta Steps 1000
Time0 0
Time1 120
TimeSteps 10000
Information
Time of Flight (Seconds): 2.694
Distance to Target (yards): 2198.96
Distance to Target (mi): 1.2494
Maximum Height (ft): 29.18
Maximum Height (mi): 0.0055
OK



Next, we present some preliminary results found using the C/C++ translation of the C# app.





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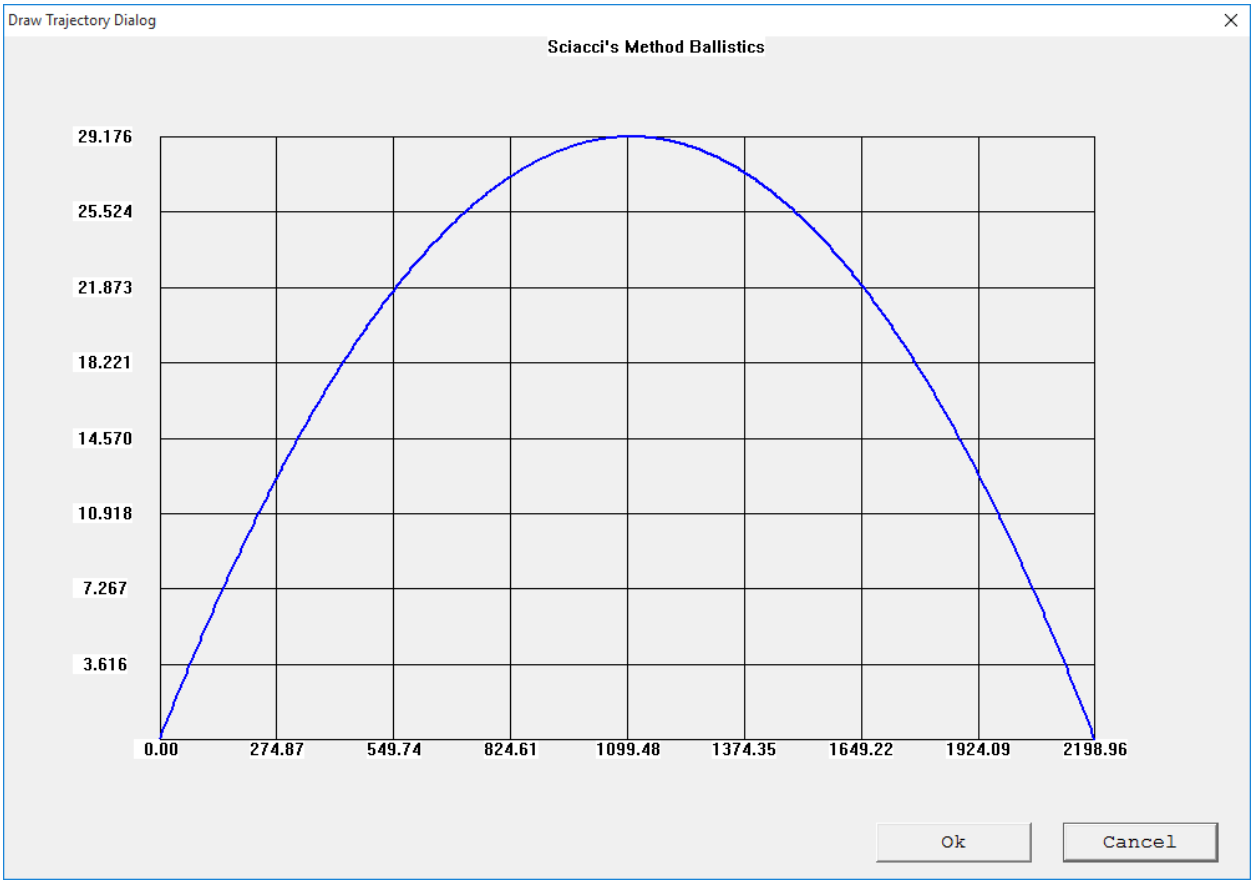
2100	0	57.2	0	58.8	2.57	2404	27



Currently the pamphlet comparison for the C/C++ translation is buggy.