

Comment on:

“Shell Altitude vs. Mortar Length” by Ron Dixon, Issue 11, p 70 (Summer 2000)

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Ron Dixon has presented results on the correlation between the altitude achieved by a 3-inch (76-mm) shell and the length of the mortar from which it was fired. Provided that the mortar length was at least 18 inches (457 mm), there was no further gain in shell altitude with increasing mortar length. My own anecdotal observations are entirely in accord with Ron Dixon's measurements, provided that a commercial Black Powder lift is used. However there may be more to the old pyrotechnists' wives' tale of increasing shell altitude with increasing mortar length than these measurements suggest.

My first shell building efforts were solely with 3-inch (76-mm) shells, one of the initial problems being with the attainment of sufficient altitude. It turns out that access to commercial Black Powder, such as Fg, would have made the solution trivially simple. A rather poor quality hand made powder, such as I had at the time, is quite a different story. Using 100 grams of this powder (granular, sieved to 5–10 mesh) as lift, the following mortar lengths were tried: 15, 18, 24, 30, 37, 40, and 42 inches (381, 457, 610, 762, 940, 1016, and 1067 mm). No measurements of shell altitude were made. However, the crude observations were that a mortar length of 15 or 18 inches (381 or 457 mm) resulted in the shell burst being on the ground after descent; 24 or 30 inches (610 or 762 mm) resulted in the shell burst being dangerously low during descent; and 37, 40, or 42-inch (940, 1016, or 1067-mm) mortar lengths were all satisfactory with no obvious difference between them.

The acquisition of commercial Black Powder radically changed the situation. Not only was the amount required greatly reduced, but also the mortar length could be reduced to 18 inches (457 mm) without any noticeable altitude diminution.

In summary, anecdotal observations of the relationship between mortar length and altitude achieved by 3-inch (76-mm) shells using commercial Black Powder lift were entirely consistent with the measurements of Ron Dixon, suggesting no further altitude gain beyond a mortar length of 18 inches (457 mm). However, when a larger quantity of an inferior hand made lift powder was used, there appeared to be a more gradual gain of shell altitude with mortar length at least until the latter was three feet (1 m). It would be of interest to subject this observation to quantitative measurement.
