The Geometry of ASL

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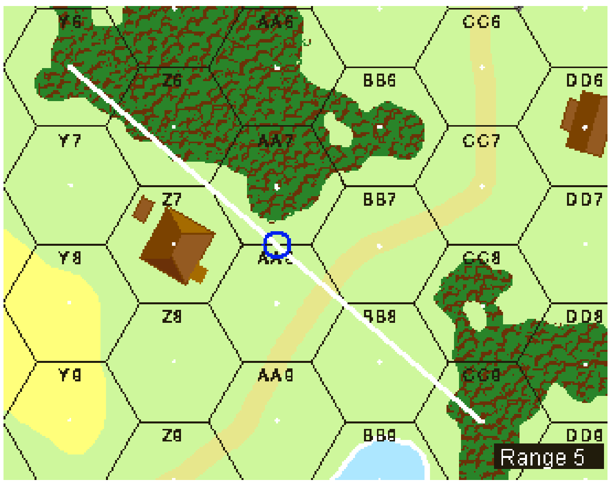
I continue to encounter players at tournaments who are unaware of some simple techniques that can help determine lines of sight. I will explain two different concepts that are related to geometric properties of our old friend the hexagon. I should also note that these calculations rely on accurate hex centers.

The first is very simple. If you locate the midpoint between two hex centers you will find either the midpoint of a hexside or another hex center. If it is a hex center, the process can easily be repeated. By breaking an LOS down into shorter and shorter segments, it becomes easier to eyeball, and fewer shots are wasted knocking leaves off trees. The first two examples use board 17.

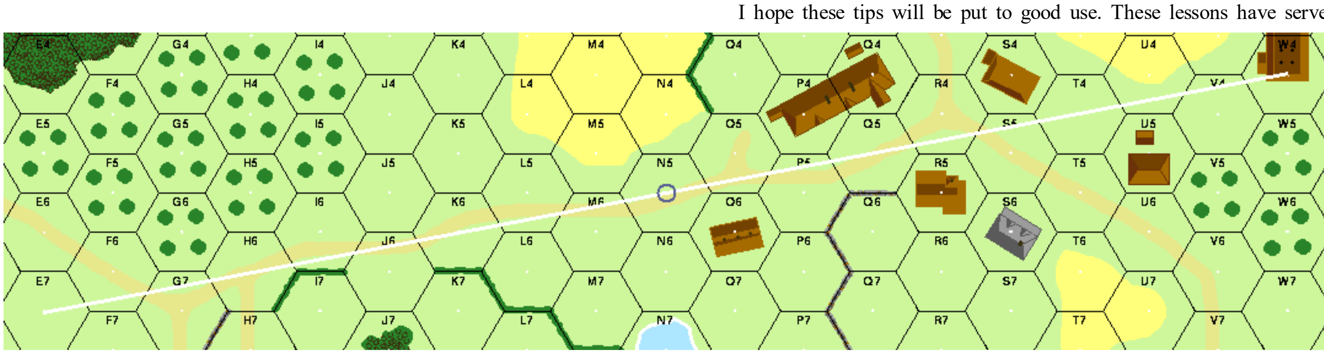
Example 1: LOS from 17CC9 to 17Y6



The midpoint of the hexside between AA7 and AA8 lies on the LOS. The LOS is obviously blocked in the above diagram, although on my actual board 17 it is clear.

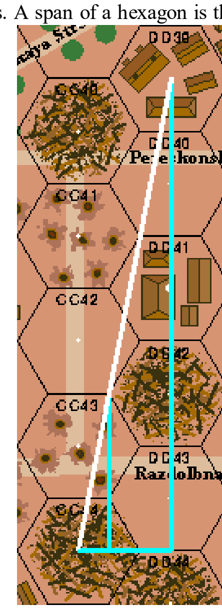
For longer LOS it may be more difficult to locate the midpoint. One method that might help is to count out range along hex grains. From W4 to K10 is 12 hexes SW, and from K10 to E7 is 6 hexes NW. The midpoint will be 6 hexes SW and 3 NW from W4, the hex center of N5. Now, because we found a hex center, we can continue to find additional points on the LOS (hexside midpoints of R4/S5 and I6/J6). An even better idea would be to recognize the pattern of 2 hexes SW then 1 hex NW. This would show the LOS to pass through hex centers at T4, Q5, N5, K6, and H6. All of which could then be used to locate other midpoints. The ratio of 2:1 can be obtained by reducing the ratio of hexes found when calculating the range.

Granted that not all LOS reduce nicely, and the center dots may not always be at the hex center, but I think you'll find it pays to consider this approach to LOS (if you don't already).



EX. 2: LOS from 17W4 to 17E7

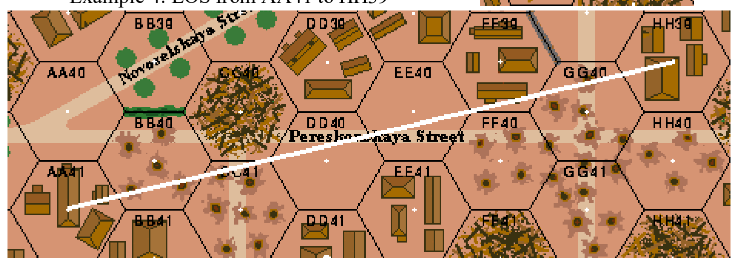
The advanced lesson is valuable when trying to determine if the vertex of an inherent terrain hex is going to interfere with LOS. First we must learn two terms related to a hexagon. A radius of a hexagon is the distance from the center to a vertex. Another important characteristic of a hexagon is that the length of a side is equal to its radius. A span of a hexagon is the distance from one side of the hexagon to the opposite side. I will show by example how similar triangles can be used to verify an LOS will cross a specific vertex. (For the advanced lessons, the RB map is used for its hex size, center dot accuracy, and plentiful inherent terrain.)



Example 3: LOS from CC44 to DD39

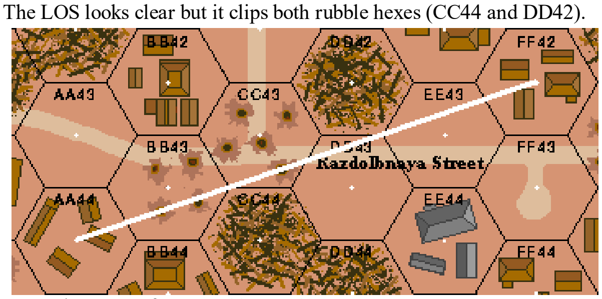
String the LOS and you will see that it appears to catch the vertex of the rubble in DD42, and we can show using similar triangles that it does. From CC44 hex center to DD39 hex center form a right triangle with one leg 1½ radii east and one leg 4½ spans north. Then from CC44 hex center to the vertex of DD42 in question create another right triangle with one leg ½ radii east and one leg 1½ spans north. Since these triangle's legs have the same ratio (1:3) they are similar, and this means the vertex lies on the LOS, blocking LOS.

Example 4: LOS from AA41 to HH39



This LOS is blocked by rubble in CC40 (3 radii and 6 spans compared to 1 radius and 2 spans).

Although there are other types, I think it is best to be familiar with characteristics of the range 5 type (EX. 3) and range 7 type (EX. 4). These are the most common ranges at which a vertex might be crossed. Another valuable point is that there will always be two vertices crossed. The LOS looks clear but it clips both rubble hexes (CC44 and DD42).



Example 5: LOS from AA44 to FF42

I hope these tips will be put to good use. These lessons have served me well. Many times opponents have been left shaking their heads in disbelief, with mangled bodies lying in open ground, and asking, "How did you know that LOS was clear?"

"Simple geometry" I say, "I'll show you after the game."