

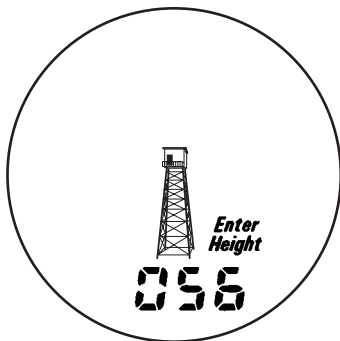
# KVH DataScope Notes



## The KVH DataScope® Rangefinder – How it Works

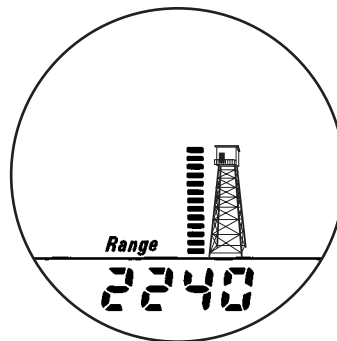
The DataScope Rangefinder is a state-of-the-art electronic version of the ratiometric scales found in high quality binoculars. The DataScope eliminated the need to perform the confusing calculations which are needed to determine range with conventional binoculars. In essence, it does all of the mathematics for you.

Operating the rangefinder is simple. The user first enters the height of the target or landmark into the DataScope. Heights can be estimated, (ie. a mature deer is approximately 6' high) or obtained from maps or charts. Next, using a 32 segment electronic scale, the user raises or lowers the number of segments to match the size of the object in the viewfinder. The system instantly calculates the range to the target displaying the distance in large digital numbers at the bottom of the viewfinder.



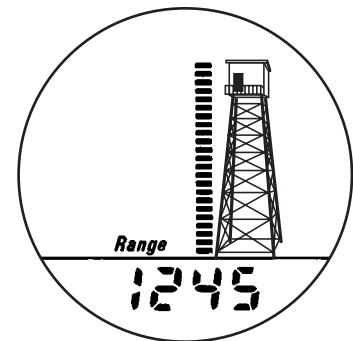
**Enter Height Mode**

*The unique electronic rangefinder uses known heights and relative size to determine distance to the target. Above, the height of 56 feet is entered in the "Enter Height" Mode.*



**Range Mode**

*Once the height is entered, match the bar segments to the size of the target in the reticle to determine the distance to the target. The tower is approximately 2240 feet away.*



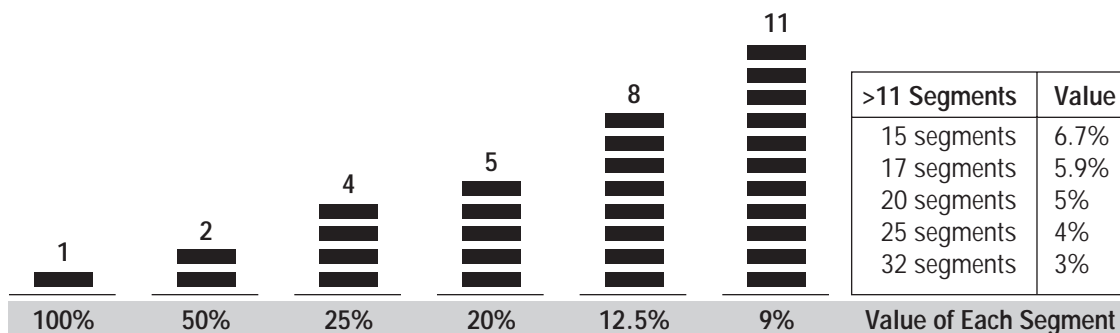
**Range Mode**

*As you get closer, more segments are needed to match the size of the target. The DataScope instantly calculates the distance based on the segments needed. In this example the tower is now 1245 feet away.*

Once you have matched the segments as closely as possible to the size of the object in the viewfinder, the number displayed is the distance to that object in whatever measure of unit you used in the "Enter Height" Mode (feet, inches, yards, miles, meters, etc.). Remember to use the unit of measure in the "Enter Height" Mode that you want the distance to be displayed in when in the "Range" Mode. For instance, if you want range in yards, you must enter the height of the object in yards.

## The KVH DataScope® Rangefinder – Accuracy Principle

The DataScope Rangefinder's accuracy is a function of: 1) the height of the object, 2) the distance to the object, and 3) your ability to "match" the size of the object to the viewfinder's segments. The height of the object and the distance to the object work together to determine how many segments are used in the rangefinder.

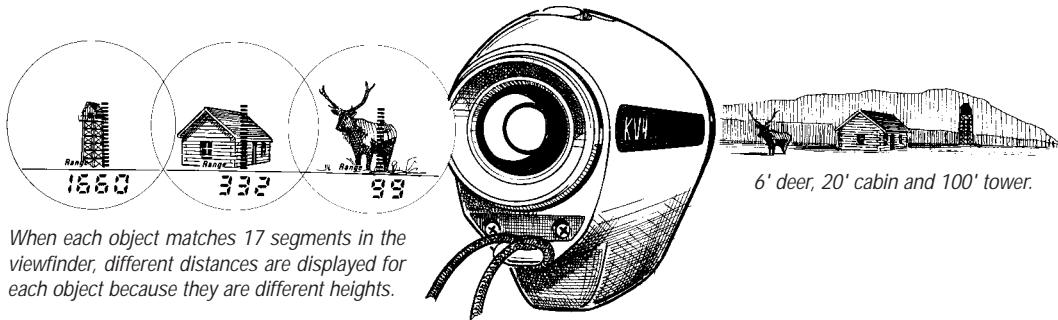


**The precision of the rangefinder increases as you use more segments, resulting in greater accuracy.**



## The KVH DataScope® Rangefinder – Relative Accuracy

The rangefinder's accuracy is determined by the height of the target and the distance to the target. The illustration below demonstrates the impact of height and distance on the rangefinder's accuracy. Because the rangefinder is ratiometric, accuracy is expressed as a percentage of the total distance to the target. Thus, sighting on a 6 foot high deer about 100 feet away, a 20 foot cabin about 330 feet away and a 100 foot tower 1660 feet away all result in the same percentage of accuracy - less than ±5.9% (all match 17 segments in the viewfinder - 5.9% is the value of each of the 17 segments). Obviously, 5.9% of 100 feet (5.9 feet) is a much smaller distance error than 5.9% of 1660 feet (98 feet), but proportionally they are the same. If all three were the same distance away, the range accuracy to the tower would be better than to the cabin or the deer because more segments would be needed to match its size in the viewfinder. The more segments used, the more precise the rangefinder.



Hint: For sightings which do not exactly match the segments in the viewfinder (ie. 6 segments are not enough and 7 are too much), it is very easy to interpolate between the two distances displayed to "guess"timate the distance to target. The chart below shows how distance and height impact the rangefinder's relative accuracy.

**Once you have entered the object's height, the DataScope does these calculations automatically:**

| Segment Value      | Segments on display | 18 inch high target |       | 6 foot high target |       | 20 foot high target |       | 100 foot high target |       |       |
|--------------------|---------------------|---------------------|-------|--------------------|-------|---------------------|-------|----------------------|-------|-------|
|                    |                     | feet                | yards | feet               | yards | feet                | yards | feet                 | yards | miles |
| 100.0%             | 1                   | 425                 | 142   | 1700               | 566   | 5660                | ...*  | 28300                | 9420  | 5.38  |
| 50.0%              | 2                   | 212                 | 70.7  | 849                | 283   | 2830                | 944   | 14200                | 4710  | 2.69  |
| 33.3%              | 3                   | 141                 | 47.1  | 565                | 188   | 1890                | 629   | 9430                 | 3140  | 1.79  |
| 25.0%              | 4                   | 106                 | 35.3  | 424                | 141   | 1410                | 472   | 7070                 | 2350  | 1.34  |
| 20.0%              | 5                   | 84.9                | 28.3  | 339                | 113   | 1130                | 378   | 5660                 | 1880  | 1.08  |
| 16.7%              | 6                   | 70.6                | 23.5  | 282                | 94    | 942                 | 314   | 4710                 | 1570  | 0.89  |
| 14.3%              | 7                   | 60.6                | 20.2  | 242                | 80    | 808                 | 269   | 4040                 | 1350  | 0.76  |
| 12.5%              | 8                   | 52.9                | 17.6  | 211                | 70    | 706                 | 235   | 3530                 | 1180  | 0.67  |
| 11.1%              | 9                   | 47.1                | 15.7  | 188                | 62    | 628                 | 209   | 3140                 | 1050  | 0.60  |
| 10.0%              | 10                  | 42.4                | 14.1  | 169                | 56    | 566                 | 189   | 2830                 | 942   | 0.54  |
| 9.1%               | 11                  | 38.5                | 12.8  | 154                | 51    | 514                 | 171   | 2570                 | 856   | 0.49  |
| 8.3%               | 12                  | 35.2                | 11.7  | 141                | 47    | 470                 | 157   | 2350                 | 783   | 0.45  |
| 7.7%               | 13                  | 32.5                | 10.8  | 130                | 43    | 434                 | 145   | 2170                 | 723   | 0.41  |
| 7.1%               | 14                  | 30.3                | 10.1  | 121                | 40    | 404                 | 135   | 2020                 | 673   | 0.38  |
| 6.7%               | 15                  | 28.2                | 9.4   | 112                | 37    | 376                 | 125   | 1880                 | 626   | 0.36  |
| 6.2%               | 16                  | 26.4                | 8.8   | 105                | 35    | 352                 | 117   | 1760                 | 586   | 0.33  |
| Above Example 5.9% | 17                  | 24.9                | 8.3   | 99                 | 33    | 332                 | 111   | 1660                 | 553   | 0.32  |
| 5.6%               | 18                  | 23.5                | 7.8   | 94                 | 31    | 314                 | 105   | 1570                 | 523   | 0.30  |
| 5.3%               | 19                  | 22.2                | 7.4   | 88                 | 29    | 296                 | 98.7  | 1480                 | 493   | 0.28  |
| 5.0%               | 20                  | 21.1                | 7     | 84                 | 28    | 282                 | 94    | 1410                 | 470   | 0.27  |
| 4.8%               | 21                  | 20.1                | 6.7   | 80                 | 26    | 268                 | 89.4  | 1340                 | 446   | 0.25  |
| 4.5%               | 22                  | 19.2                | 6.4   | 76                 | 25    | 256                 | 85.4  | 1280                 | 426   | 0.24  |
| 4.3%               | 23                  | 18.4                | 6.1   | 73                 | 24    | 246                 | 82    | 1230                 | 410   | 0.23  |
| 4.2%               | 24                  | 17.5                | 5.8   | 70                 | 23    | 234                 | 78    | 1170                 | 390   | 0.22  |
| 4.0%               | 25                  | 16.9                | 5.6   | 67                 | 22    | 226                 | 75.4  | 1130                 | 376   | 0.21  |
| 3.8%               | 26                  | 16.2                | 5.4   | 64                 | 21    | 216                 | 72    | 1080                 | 360   | 0.20  |
| 3.7%               | 27                  | 15.6                | 5.2   | 62                 | 20    | 208                 | 69.4  | 1040                 | 346   | 0.20  |
| 3.6%               | 28                  | 15.1                | 5     | 60                 | 20    | 202                 | 67.4  | 1010                 | 336   | 0.19  |
| 3.4%               | 29                  | 14.5                | 4.8   | 58                 | 19    | 194                 | 64.7  | 970                  | 323   | 0.18  |
| 3.3%               | 30                  | 14.1                | 4.7   | 56                 | 18    | 188                 | 62.7  | 940                  | 313   | 0.18  |
| 3.2%               | 31                  | 13.6                | 4.5   | 54                 | 18    | 182                 | 60.7  | 910                  | 303   | 0.17  |
| 3.1%               | 32                  | 13.2                | 4.4   | 52                 | 17    | 176                 | 58.7  | 880                  | 293   | 0.17  |

\*The DataScope will only display range to 5 places