

SKYPROBES™ Inc.

***The long range antenna specialists for Handhelds, Base Stations,
FCC Part 15 & other RF devices.***

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Applications Note: Distance Calculations for SSP58 Antenna versus the typical Rubber Duck antenna

One of the most wanted things that users of VHF handhelds want to know is how far will my unit communicate reliably. It is difficult to do this because of the many factors that will affect range. These things are:

1. Surface features such as canyons, ridges, hills
2. Weather such as cloud formations with rain or just thick clouds
3. Metal structures such as building directly in your path or inside a building or car especially at VHF.
4. Obstructions such as a thick forest
5. Lightning or other electromagnetic interference from motors etc.

This application note will give the best possible or theoretical long distance communication distance ignoring the 5 factors given above.

The first calculation will be the Line of Sight using a calculator found at www.qsl.net/kd4sai/distance.html. Handheld will use a person's height of 6 feet plus antenna height of 4 inches for the rubber duck and a person's height of 6 feet plus antenna height of 36 inches for the gain antenna. The difference between the two is only 1 mile so we will only one number for the combined distance.

<u>Base station height</u>	<u>Theoretical Line of sight combined distance</u>
2500 feet	75 miles
1500 feet	59 miles
1000 feet	48 miles
500 feet	36 miles
9 feet	7 miles (handheld to handheld)

But we know from experience that handheld to handheld with rubber ducks is typically 2-4 miles.

The next calculation is what is called the Free Space Propagation this calculator is found at www.ND2X.net/calculators/Freesp.html/. "Free space propagation, often referred to as "Free Space Loss", is not actually "loss" but is, instead, the result of energy spreading out as it travels farther and farther from the point of origin. Only a portion of energy radiated is, as a result, available at a point of reception to be intercepted by an antenna.

Free space propagation is a simplistic, best case calculation which assumes no additional losses between transmit and receive antennas. This worksheet calculates how much energy is left at a known distance from a radiating source due to simple energy spread" (from www.ND2X.net/calculators/Freesp.html/)

For the Rubber Duck Antenna: Using 170 Mhz. as the operating frequency and adjusting the distance so a RSL of -120db receiver sensitivity is achieved; ignoring cable losses we use the following for the Rubber Duck Antenna:

0 dB transmitter antenna gain

0 dB receive antenna gain

1 watt into the antenna due to typical efficiencies of Rubber Duck antenna

We get a potential distance of 4.5 miles

For the SKYPROBES SSP58 Antenna: Using 170 Mhz. as the operating frequency and adjusting the distance so a RSL of -120db receiver sensitivity is achieved; ignoring cable losses we use the following for the SSP58 Antenna:

0 dB transmitter antenna gain (most base station antennas have gain)

11 dB receive antenna gain

5 watt into the antenna due to the efficiency of SSP58 antenna

We get a potential distance of 35 miles or almost 8 times the distance of a rubber duck

So we can see from these calculations that the combination of a base station or repeater antenna at a decent height 1500 feet plus combined with an antenna like the SSP58 can potentially give line of sight communication distances of 50 to 75 miles. We have users telling us that they get 50 to 75 miles range and "it's like having a base station in your hand."

In tough terrains the SSP58 antenna will also give superior performance over Rubber Duck antennas due to its gain and power transmitted.

You get a unique initial warranty

If you feel that the SKYPROBES handheld antenna has not increased your communicating range, return it within 30 days in good condition and we will refund your purchase price.

If you have any questions or would like price and delivery,

Please call us at 1-602-293-6844

or email us at skyprobes1964@yahoo.com