

## 17. First Outdoor Test of the Ultrasonic Distance Measuring System

UFO Doctor, Dec 30th, 2011

Draft 1.1

### 1. Material and Method

- Miru Program Duc015 ( $F_c = 40.4 \text{ kHz}$ ,  $\pm 2\%$ )
- UST 40T and 40R with (removable) radial reflectors
- HP-BP with  $100\text{pF}$  parallel to  $R_5$ ,  $R_6 = 4.7\text{k}$  (TP Gain 10 at  $f_c$ )
- Important: BP tuned to max output for the higher frequency  $f_2$ !
- Supply Mama Board:  $7.2 \text{ V}$ , acoustic power about  $50 \text{ mW}$
- Baby Duck: UST 40R with reflectors
- Mama Duck: UST 40T without reflector, directed to baby duck



Fig. 1. Test Setup: 1: Baby Duck;  
2: Mama Duck; 3: Transmitter DX6i  
(the house wall is to the right, 2m)

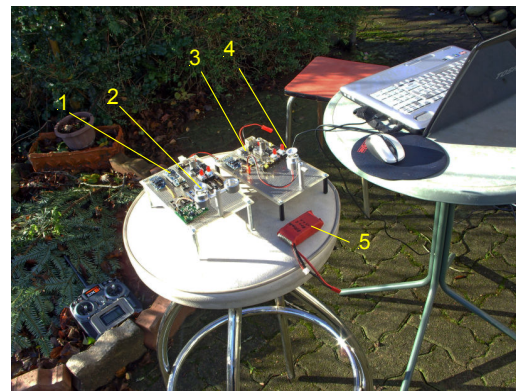


Fig. 2. 1: Baby Duck; 2: Radial Mic  
3: Mama Duck; 4: Speaker (but in this  
test without radial reflector); 5: Lipo 7.2V

### 2. Result

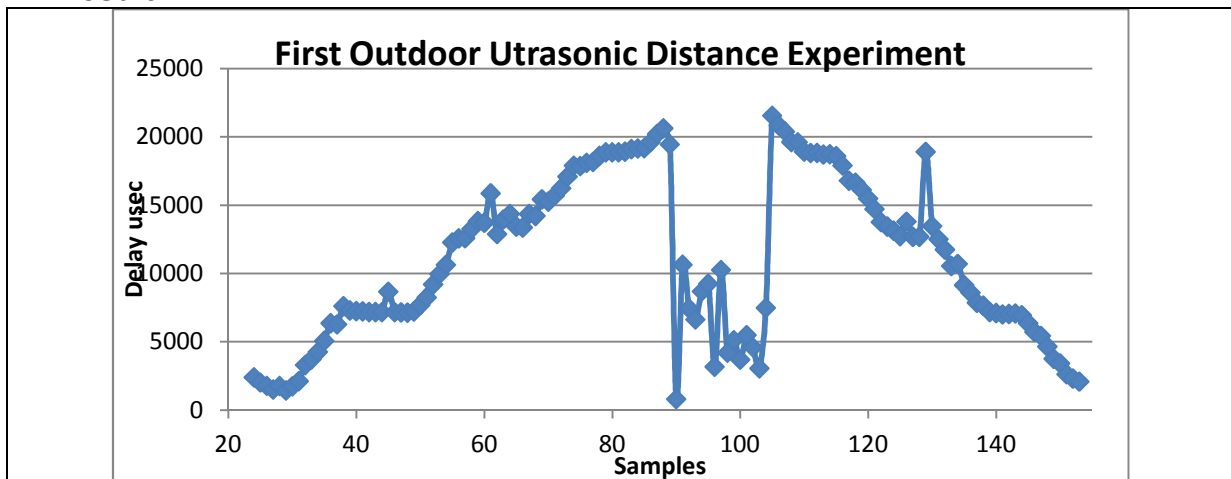


Fig. 3. Hyper Terminal results, Mama Duck transported in the hands of Papa Duck  
Transmitting distance with stops at 0, 2m, 4m, 6m and 8 m  
The maximum detectable delay is 21msec (frame rate of the RC-System)

### 3. Discussion

The system works quite well with Mama speaker directed to the Baby.  
Less good results when Mama Speaker is equipped with a reflector!  
The next experiments will be done with 4 speakers at Mama Duck, looking  
0, 90, 180 and 270 degrees. The reverberation problem (see report 16) is of minor  
importance in outdoor conditions.

#### 4. Appendix

Failed experiment:

Mama Duck speaker vertical, equipped with radial reflector:

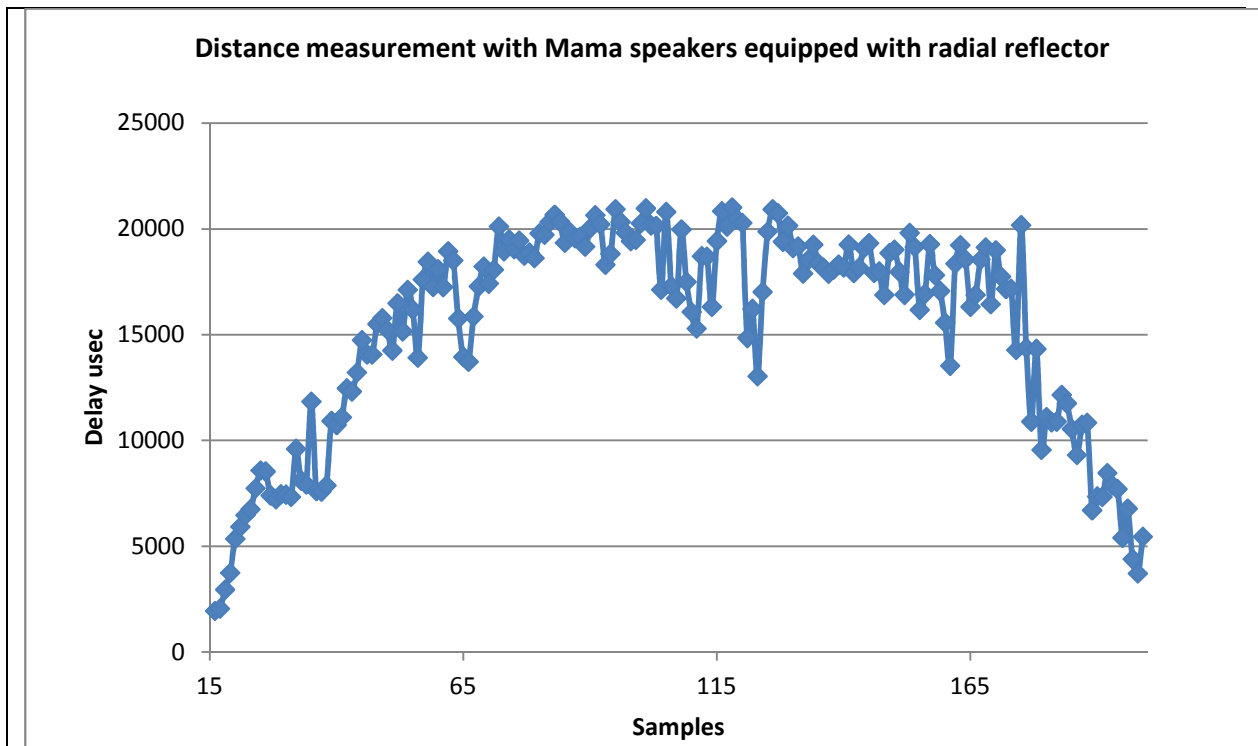


Fig. 4. Hyper Terminal Results 2nd,  
Mama Duck with speaker equipped with radial reflector  
Mama Duck transported in the hands of Papa Duck,  
Transmitting distance with stops at 0, 2m, 4m, 6m and 8 m  
Not so good!

#### 5. Discussion of Fig. 4.

A hell of spikes in the recording, even at short distances!

Frankly, we cannot say what was going wrong in this experiment.

It could be that radiated power (distributed in the horizontal plane) was not sufficient, but this should be investigated later.

Another reason could be that the wall of our house was too close (2 meters) to the test area.