

58. Speaker Characteristics

UFO Doctor, Sept 28th, 2012

1. Introduction

A perfect Speaker should show following specifications:

- Good response on FSK, this means a clear first negative PLL slope should be shown with no or little disturbances
- Omnidirectional characteristics in the horizontal plane
- Elevation angle up to +/- 30 Degree in the vertical plane
- High signal amplitude

2. Material and Test Setup

2.1. Material

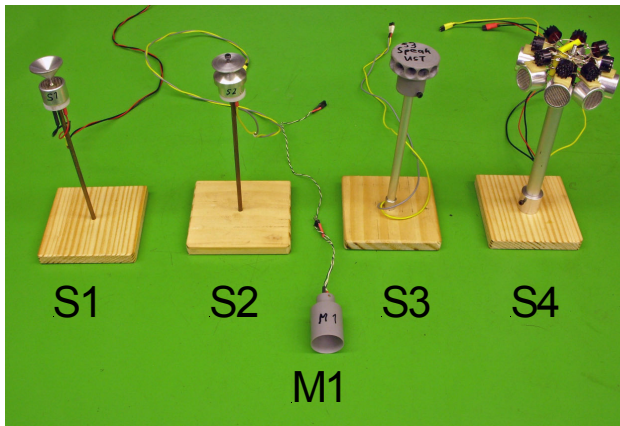


Fig. 1: Material

Speaker	Brand	Horn/Cone
S1	UST	D20 90 Deg Cone
S2	UST	D20 Expo Radial
S3	UST	D30 Multihorn 3
S4	UST	8xUST Minaret

Mic	Brand	Horn
M1	Kobitone	D20x25

2.2. Test Setup

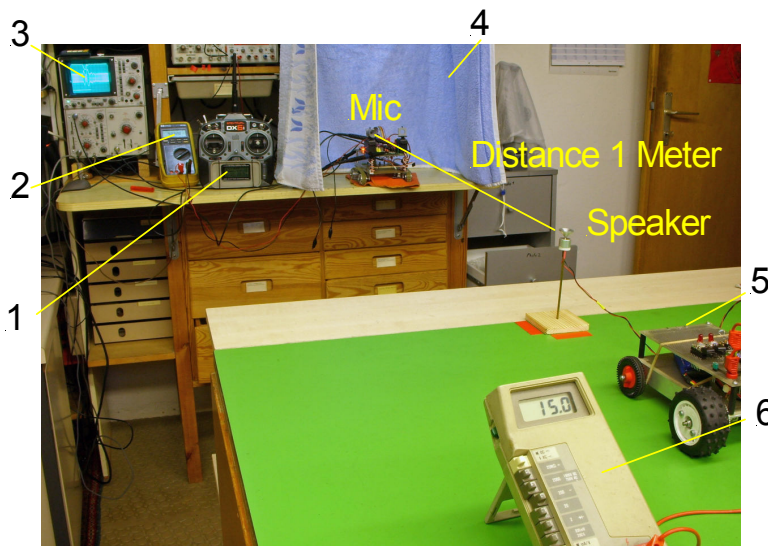


Fig. 2: Test Setup

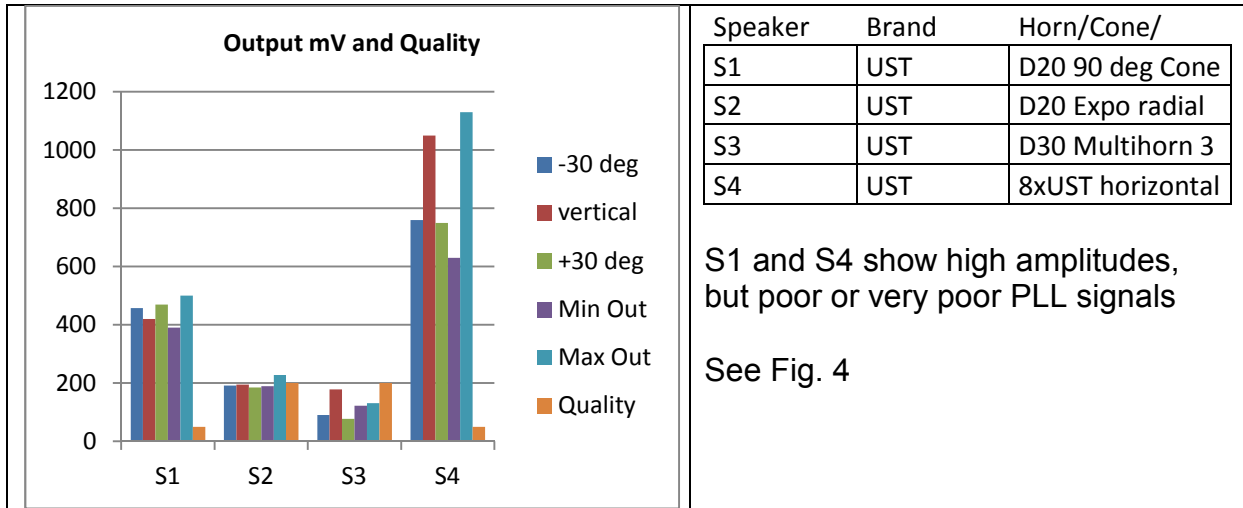
Test distance 1 Meter

- 1: RC
- 2: DVM, Mic at 40 dB amplifier
- 3: Oscilloscope
- 4: Turkish Towel against reflections
- 5: Mama Duck
- 6: Speaker Supply 15 V

3. Results

Recorded data:

- 1: Speaker tilted -30 deg (forward)
- 2: Speaker vertical
- 3: Speaker tilted 30 deg (backward)
- 4: Speaker rotated horizontal for Minimum Output Signal
- 5: Speaker rotated horizontal for Maximum Output Signal
6. Estimation of Signal Quality: Q=200 for perfect first negative slope



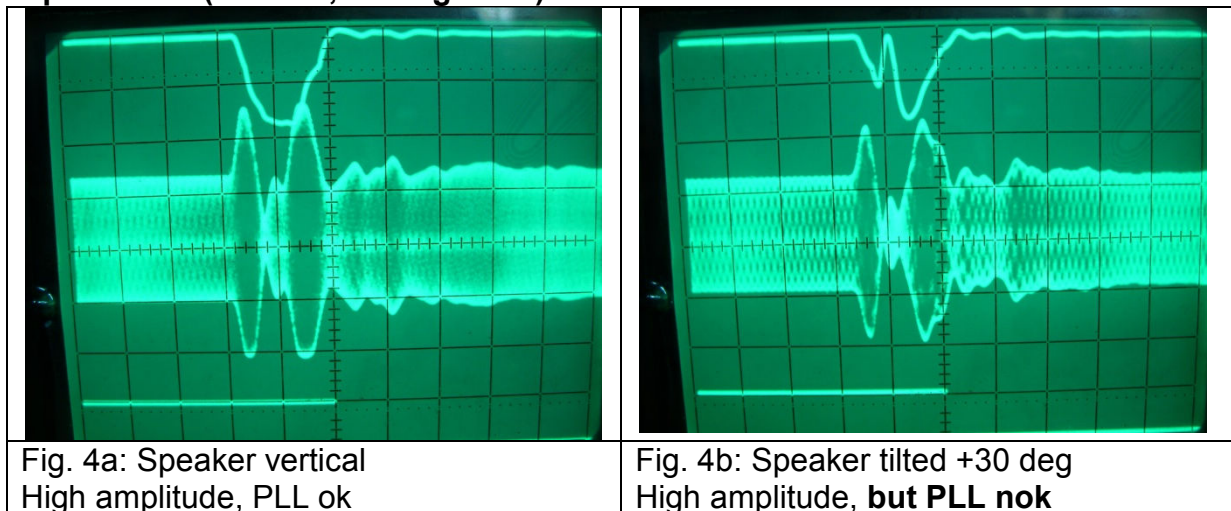
Comment 1:

Speaker S2 offers the best overall performance

4. PLL Analog Signal Quality Results

Top: PLL Analog Out, 2V/Div
 Middle: Mic 40 dB gain, 0.5V/Div
 Below: Synch Signal, 5V/Div
 Time setting: 1 msec/Div

Speaker S1 (D20mm, 90 Deg cone)



VERY IMPORTANT: The first negative PLL slope should be clear and stable!

Speaker S2 (D20, Exponential radial)

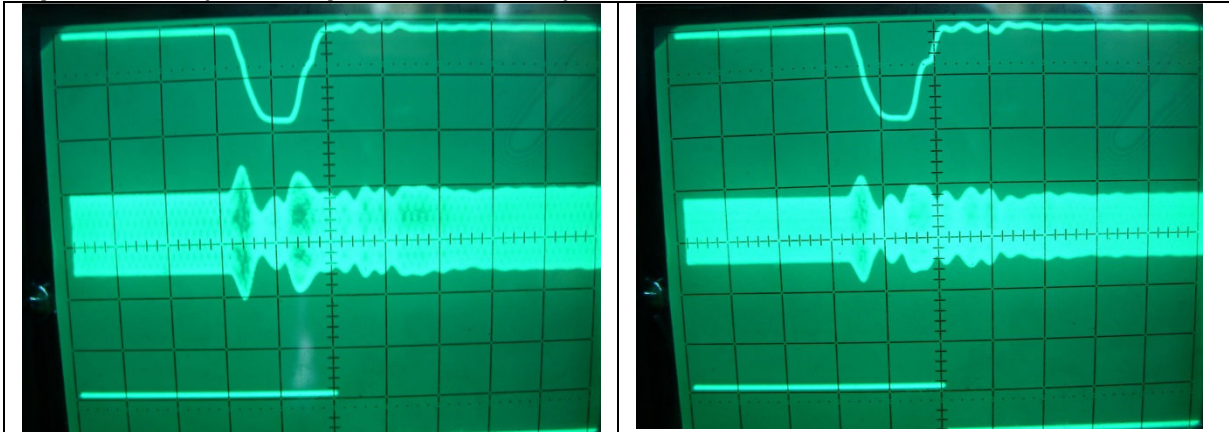


Fig. 4c: Speaker vertical
Medium amplitude, PLL ok, **Good!**

Fig. 4d: Speaker tilted +30 deg
Medium amplitude, PLL ok, **Good!**

Speaker S3 (D30, Multihorn 3)

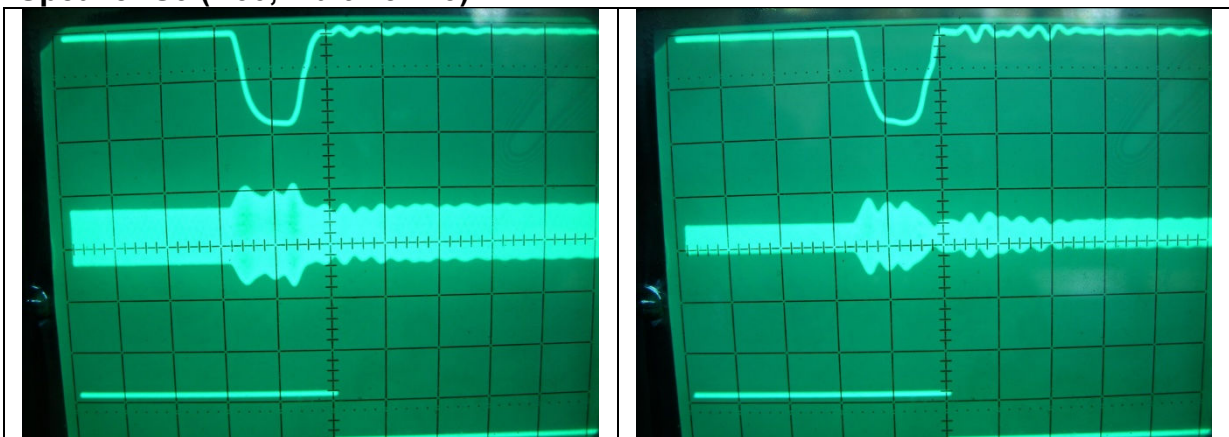


Fig. 4e: Speaker vertical
Medium amplitude, PLL ok

Fig. 4f: Speaker tilted +30 deg
Low amplitude, PLL ok

Speaker S4 (8xUST Minaret)

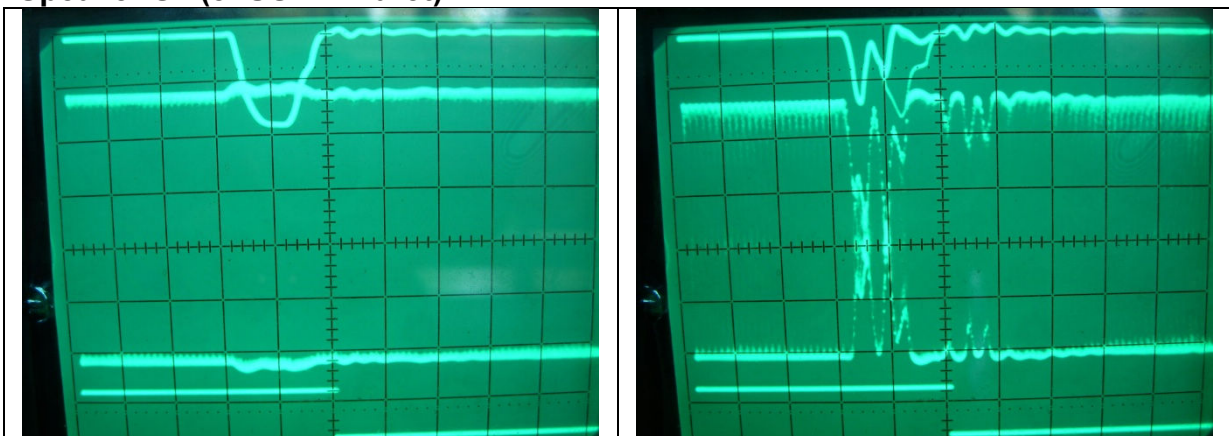


Fig. 4g: Speaker vertical
High amplitude, PLL ok

Fig. 4h: Speaker rotated to Minimum
High amplitude, **but PLL nok**

Comment 2:

Speaker S2 shows the best characteristics for our ambitious application!
The Speaker S4 (with very good amplitude) shows dramatic PLL Problems!

5. Drawing of the Speakers

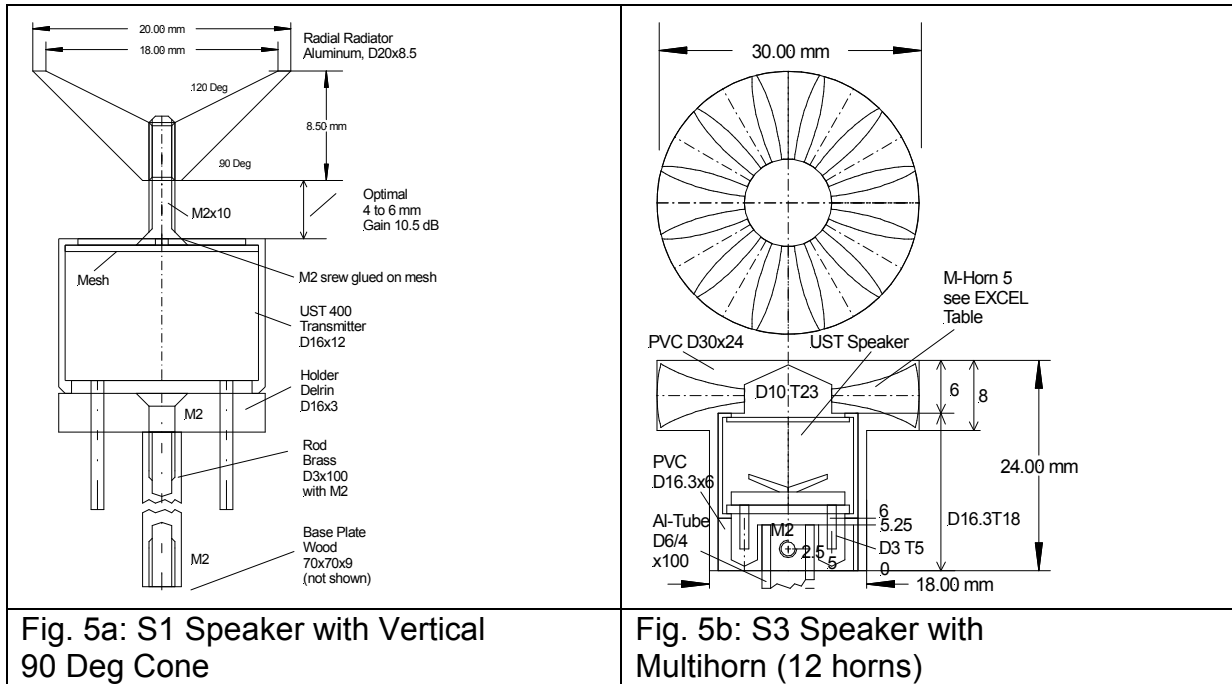


Fig. 5a: S1 Speaker with Vertical 90 Deg Cone

Fig. 5b: S3 Speaker with Multihorn (12 horns)

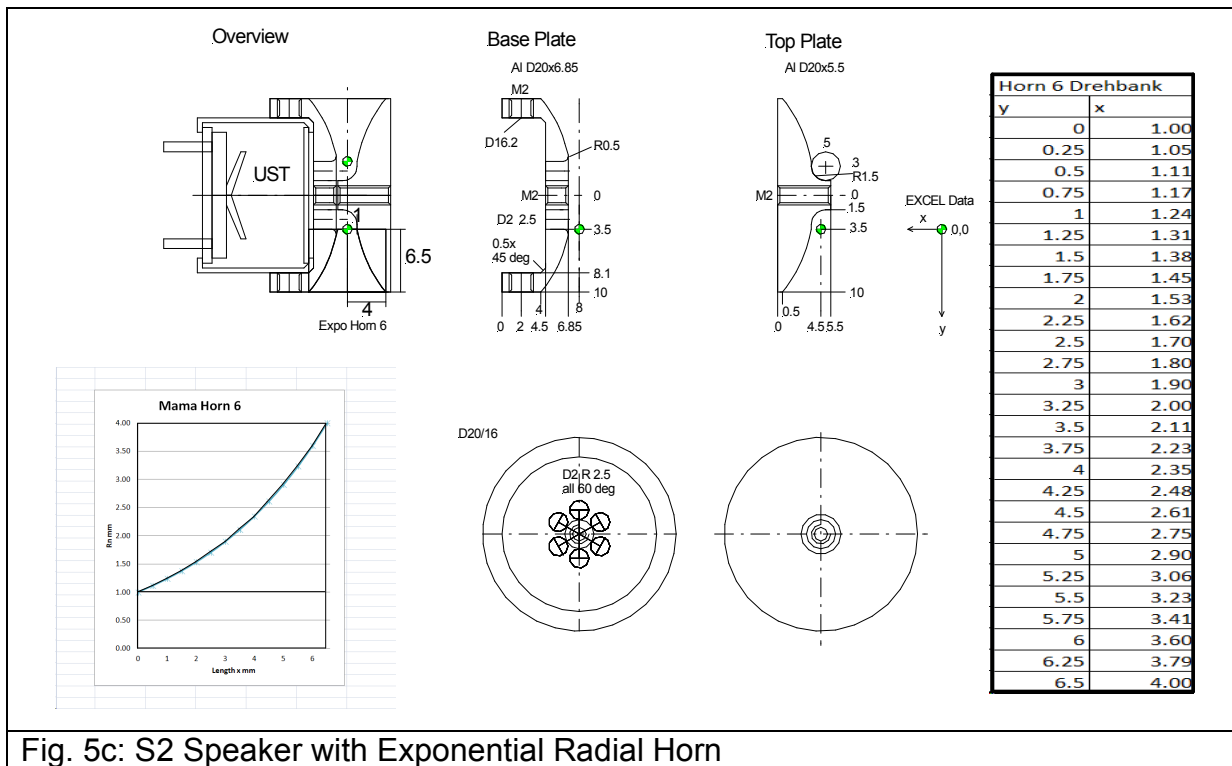


Fig. 5c: S2 Speaker with Exponential Radial Horn