VHF Antenna Construction

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Introduction

- Licensed in 1976 as WD9BKC
- BSEE 1981
- Lake County RACES member 1985

Major HR interests include:
- 50Mhz & higher “All Mode” & DX
- Antenna experimenting & construction
- PA’s, Batteries/charging, Power Supplies etc.
Agenda

- Focus on VHF Antennas for FM
  - Most likely needed to participate with LCRACES
- Discuss the issues regarding Permanent, Go-Kit, & “Survival” antennas.
- Where to scrounge for materials.
- Ideas on how to put them together
Overview

- Why do you need an Antenna anyway?
  - And why that “Rubber Duck” just won’t do.
- Review of some basic Antenna theory
- Materials and techniques
  - For those who don’t have a machine shop

Gain
Feedline
Polarity
Impedance
SWR
DBi
Why do you need an Antenna anyway?

- Irritate your neighbors
- Get to know your village officials
- Piss-off your wife
- Give your ride that squad-car look
Why do you need an Antenna anyway?

- Irritate your neighbors
- Get to know your village officials
- Piss-off your wife
- Give your car that squad-car look
Why do you need an Antenna anyway?

- Provide an efficient transducer for the electrical signals to/from the transceiver / feedline into the atmosphere.
- Provide a suitable load for the transceiver.
Some basic theory
Some basic theory

- Resonance is a good thing
Some basic theory

- Resonance is a good thing
- A non-resonant antenna will radiate – but not nearly as efficiently
The greatest amount of current flows in the antenna when it is resonant. The shortest conductor that is self-resonant at a given frequency is one that is about a half-wavelength long. The reflection pattern on the antenna creates a standing wave of both voltage and current. The half-wave, center-fed antenna is often called a “doublet.”
The missing half of the dipole antenna is supplied by the ground image for the case of the Marconi antenna. Antenna feedpoint impedance is one-half that of dipole, or about 36.5 ohms.
Improving the impedance

Figure 5
THREE VERTICALLY POLARIZED LOW-ANGLE RADIATORS

Shown at A is the “sleeve” or “hypodermic” type of radiator. At B is shown the ground-plane vertical, and C shows a modification of this antenna system which increases the feed-point impedance to a value such that the system may be fed directly from a coaxial line with no standing waves on the feedline.
What’s gain?

- The DB
- DBi
- DBd
Where does gain come from?

- It ain’t free!
So how much gain does my Rubber Ducky have?
So how much gain does my Rubber Ducky have?

- Can be as low as –30 DBd
- Mfr. claims under ideal conditions
- Radio itself may be limiting
- Body proximity
Applications

- Permanent install
- Transportable (Go-kit)
- Improvised
Permanent install

- Mechanical durability
- Weather
- Appearance
Transportable

- Easy assembly / disassembly
- Durable in transport
- Adaptable mounting
- Common connections
- Doesn’t need to weather
- Not permanent mounting but safe
Improvised

- From car / other sources
- Material on hand
- Spare parts are a good thing
Practical examples
Practical examples

- The infamous SO239
- The easy 3/8”x24 stud
- Mirror bracket and gutter mount
- Get to know your plumbing dept.
- Forget Joan Crawford – I Love wire hangers!
- Coax or antenna? It’s both!
Practical examples

SD239

φ0.625
φ0.125
φ0.250

2.7500

Bulkhead

1.7500

3.75

1.250
Practical examples
Practical examples
Practical examples
Reference info:

Step drills: Harbor freight # 91616-1VGA $8.87
Thread files #1&2 Enco 990-3074 / 990-3075 $6.69 ea.

5/8 antenna

J-Pole references:
http://www.hamuniverse.com/jpole.html
http://www.alpharubicon.com/elect/jpolejadcn.htm
http://w4zt.com/jpole/
http://www.fiu.edu/orgs/w4ehw/Jpoleant.pdf
http://www.vcars.org/tech/J_Pole2M.html
http://arrowantennas.com/inst/ijpole.html
## Connector Frequency Range Chart

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<tbody>
<tr>
<td>VHF</td>
<td>100-300 MHz</td>
<td>1-2 GHz</td>
<td>2-4 GHz</td>
<td>4-8 GHz</td>
<td>8-12 GHz</td>
<td>12.4-18 GHz</td>
<td>18-26 GHz</td>
<td>26-40 GHz</td>
<td>40-100 GHz</td>
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<td>UHF</td>
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**Notes:**

1. SBC-75 Ohm connectors operate up to 1 GHz
2. SMB-75 Ohm & Mini SMB-75 Ohm connectors operate up to 4 GHz
3. MCX-75 Ohm connectors operate up to 6 GHz
4. SMC-75 Ohm connectors operate up to 10 GHz
5. N-75 Ohm connectors operate up to 1.5 GHz
6. TNC-75 Ohm connectors operate up to 1 GHz