BUILD THE J BEAM FOR 2 METERS AND UP!

Condensed from an article by Ed Bathgate, N3SDO as published in CQ VHF Magazine July, 1988 and used with his permission. Thanks Ed!

"Recently, while going thru some of my older Ham magazines, I ran into this article by Ed, N3SDO on the J BEAM antenna. It struck me that some of you out there may not have seen this fantastic project or maybe you do not get CQ VHF magazine, which is back now better than ever!

A little research on the web indicated that there is not much information on how to build the J beam antenna that is useable with clear graphics and good plans, so I contacted Ed, and after signing my XYL, car, home, bank account with $73.73 in it and all my good looks over to him he finally gave us the needed permission to put the plans on this site for all of you to enjoy. HI!.....

Thanks again Ed!".....**N4UJW**

LET'S GET STARTED

Now you've probably heard of a beam antenna, and maybe you've heard of a J-Pole.

But what's a J BEAM?

It's a vertical directional antenna made of 1/2 inch copper pipe and wood or PVC. It uses a standard J-pole antenna as the driven element and center support, with two parasitic elements-----a reflector and a director, to provide directivity and gain. See J Beam pattern below. It can be built for around $15.00 (1998 prices) and you can use your old Jpole as a basis for the JBeam. You'll probably need to shorten the main 1/2 wave element by 1 to 2 inches, as the reflector and director tend to couple and lower the resonance of your original jpole toward the lower part of the band. See formulas for cutting to your desired frequency of operation or band . A small amount of trimming on the tip of the main active 1/2 wave element may be needed to get the SWR as low as possible.

You shouldn't have to adjust the 1/4 wave matching stub, as this is not strongly affected by the parasitic elements.

Design Details and Drawbacks

The element lengths and spacings are a combination of info from the ARRL Antenna Book section on 2 meter Yagi antennas, and from experiments with a field strength meter and different length elements and spacings.

The reflector and director element spacings are equal at 16 inches. Slightly higher gain with reflector spacing at 18 inches from driven element and director spacing of 14 inches can be had but the antenna may tend to lean with unequal spacings if strong mast mounting is not used.
The bandwidth is not as wide as that of the standard jpole by itself. The SWR tends to rise faster toward the ends of the band, but you get an estimated 7dB gain and 20 dB F/B (front to back ratio).
High wind loading could potentiallly break off the jBeam at the bottom joint since the entire structure is supported by that point. You may want to reinforce it.

CONSTRUCTION

The lengths used in these plans are for the upper part of 2 meters and you can use the formulas to design it for your frequency.
1/2 inch copper pipe is used for all elements and standard soldering made with a small blowtorch. A soldering iron is just not hot enough!

Longest element = 58 1/2 inches (add about 2 feet for mast mounting)
matching 1/4 wave stub = 20 1/4 inches

Position matching stub toward director for a bit of added gain reflector - 40 inches
director = 32 inches

Stub and main element spacing = 3 inches

Coax feed point = 3 to 5 inches from bottom
(use hose clamps for feed point coax attachment connections for easy repair/adjustment)

Center boom is 1/2 inch by 1-inch wood or PVC and about 36 inches long

Measurements should be made as close as possible but are not extremly critical!
Element to boom mounting variations depend on your particular situation and construction materials at hand but insure that element centers are at center of boom Use your own imagination! (see pics for

better details)

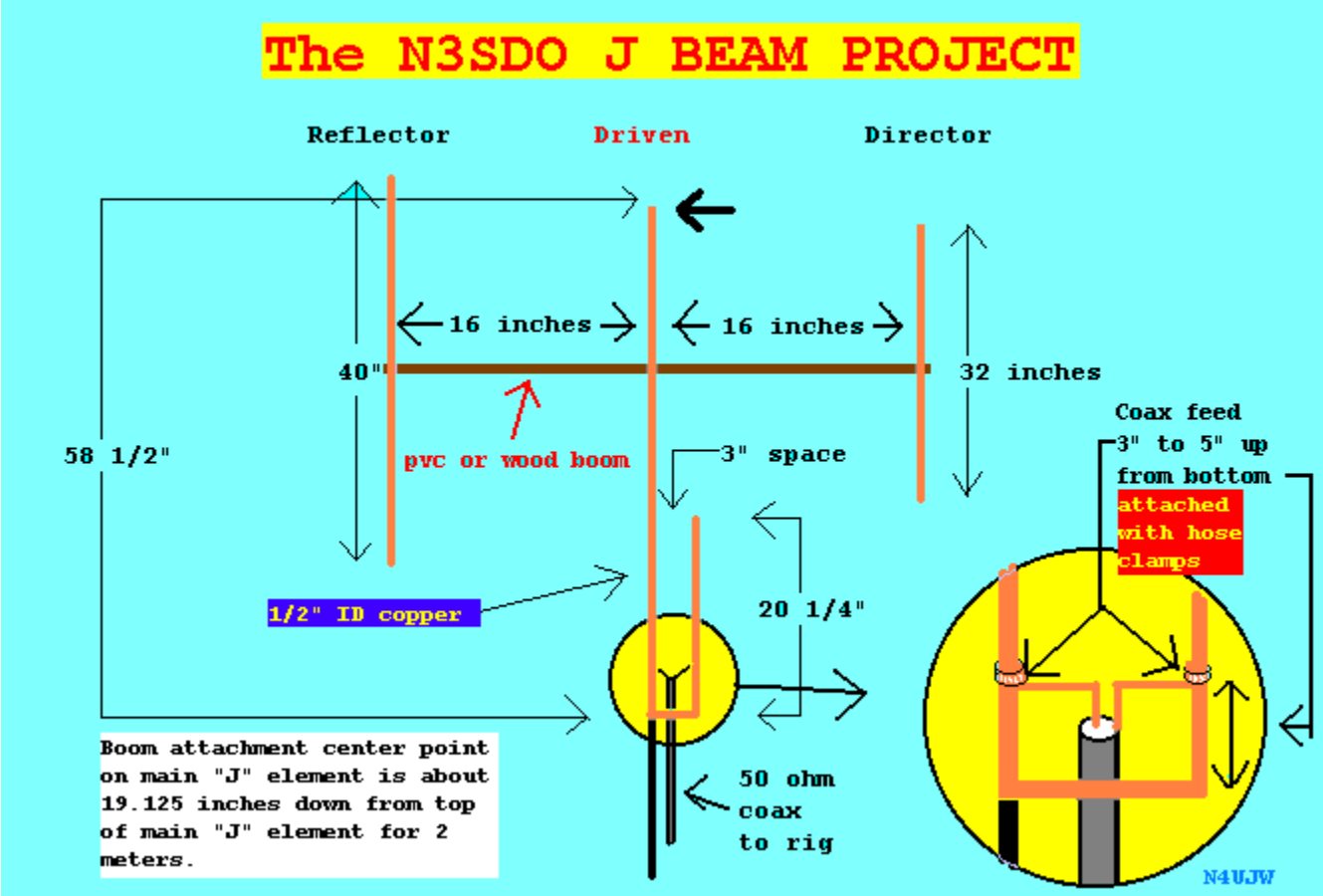
"One fellow built one with five elements-----just cutting the extra directors shorter by eye-----and was able to work a repeater 35 miles away, with a 5-watt HT holding the antenna, from a valley that's hard to get out of with 50 watts and an omnidirectional antenna at 30 feet!".....Ed Bathgate N3SDO

>FORMULAS<
J Pole Long element (in Inches) = 8568 / F mhz
J pole Stub (in inches) = 2952 / F in mhz
Reflector (in inches) = 5880 / F in mhz
Director (in inches) = 4704 / F in mhz
Spacing (in inches) = 2352 / F in mhz

Some examples for other bands:
224 mhz
DE: 38.25"
STUB: 13.17"
REF : 26.52"
DIR: 21"
SPACING: 10.5"

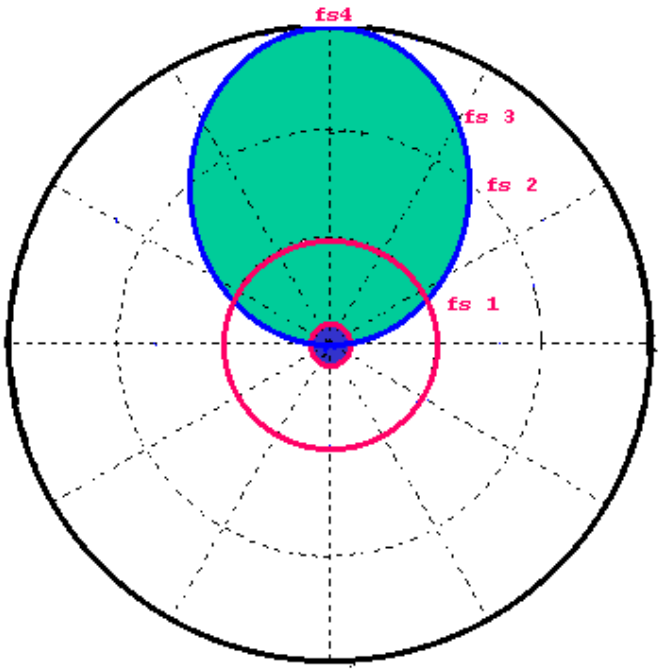
444 mhz
DE: 19.29"
STUB 6.6"
REF: 13.24"
DIR: 10.59"
SPACING: 5.29"

"A PICTURE IS WORTH A THOUSAND WORDS"
Here are two thousand words!



Notes: Make driven element about 2 feet longer at bottom for mast mounting.
Center conductor of coax to longest element, shield to shortest element

J BEAM PATTERN



Red circle is pattern of standard omni J Pole
Green area is estimated pattern of JBEAM
using field strength meter readings