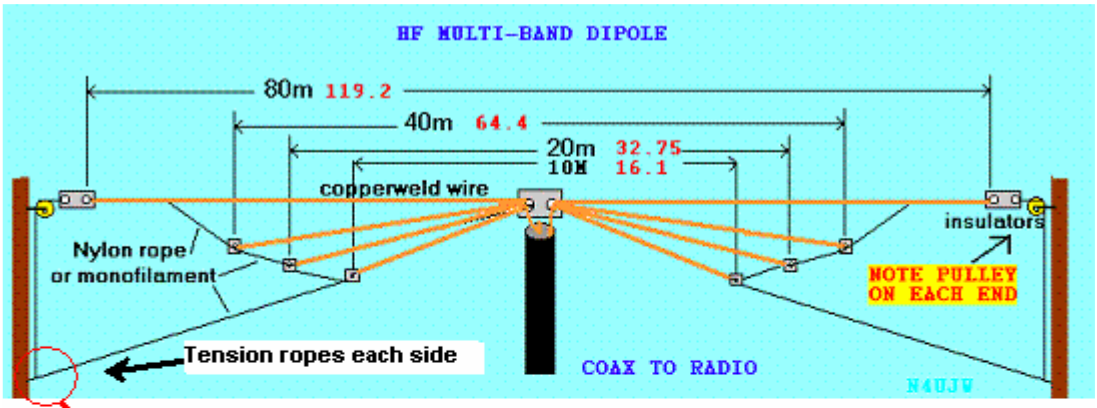
BUILD THIS MULTIBAND FAN DIPOLE
FOR ALL BAND HF ANTENNA EXCITEMENT



Tension rope is not tied to pully rope in picture. It is tied near location of pully rope down on supports within easy reach. It is tied last after final SWR adjustment and the antenna is in it's final position.

Suggested total lengths:
80 meters - 120 feet
40 meters - 65 to 66 feet
20 meters - 34 feet
10 meters - 17 feet
These lengths are not exact. Some tuning may be required. Use the standard formula 468 / freqmhz for total feet for each band (freq) of interest. Adjust each length longer or shorter as needed.

Here is a fairly simple and easy to build multi band horizontal fan type dipole that can be constructed for all band operation from 160 meters up thru 6 meters or even higher.
In the drawing above, it is shown for just four bands, 80 thru 10. One separate dipole for each band needed. However you can build it to suit your own preferences by using the standard formula for a dipole: 468/freq mhz = total length for each band. Use the formula for your desired center frequency.

Each dipole length above in **RED** is in feet and tenths of a foot for the center of the General portion of each band and is derived from the above formula and should be cut longer for swr trimming. USE #12 TO #14 GAUGE COPPERWELD WIRE IF POSSIBLE or use what you have on hand. The top most dipole must support the entire weight of the antenna.

Start with your lowest (in frequency) band of operation as the main (top)

support for the entire setup. Cut it per the formula but add a couple of feet on each end for tuning. Try to use a wire size that will support the other dipoles.
This is the main support for all the other dipoles and must carry their weight.
Cut a dipole for each band of operation. (SEE EDITORS NOTE AT BOTTOM OF ARTICLE**)**
Cut each full length in half....example: for the 10 meter length from the formula you get 16.1 feet for the total length. Cut it in half at about 8 feet per side. Make sure you cut each length about a foot or more longer for swr trimming and attaching to center and end insulators!
If you are building the four band dipole above, you should have 8 lengths of wire scattered all over your work area.

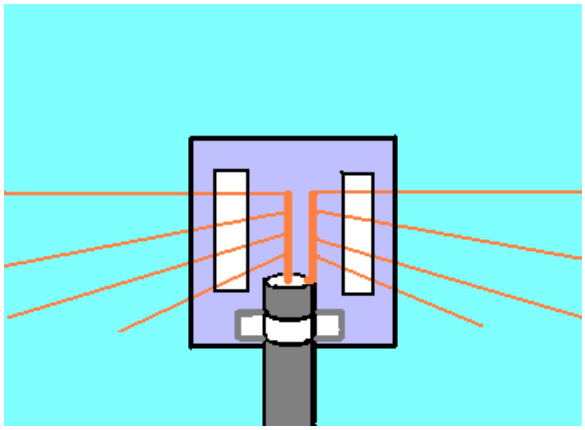
WARNING! DON'T DO IT IN YOUR LIVING ROOM, THE XYL WILL NOT BE VERY HAPPY WITH YOU AND AFTER SHE GETS FINISHED WITH THE QRM,,,, ALL YOUR ANTENNA BUILDING WILL HAVE TO BE DONE FROM THE DOG'S HAM SHACK!

It is assumed that you have your end support poles, trees, center and end insulators, pulleys all ready to go before you start working on the actual dipoles.

A very important part of this design is the installation of the pulleys (in yellow on drawing) on each end attached to each side support.
They are added to this design due to the swr trimming process and make it very easy to pull the entire antenna up and down while making the swr adjustments. Mount a suitable size pulley on each end attached to your pole, trees, etc for the diameter of cord or rope used to support the system.

Start your antenna trimming with the top dipole.... attach your coax to the center insulator leaving several inches of the center conductor and shield exposed. Each half of each dipole will be connected to the coax center pigtail and the shield separately. In other words, connect one side of the dipole to the center conductor and the other side to the shield.
Attach the other end of each half of the longest wire to the support cord and run thru the pulley on each end and pull the dipole up into the air between the end supports. Check swr.
Trim as needed with low power for lowest swr possible, lower with pulleys, attach the next highest band dipole electrically to the same

point as the first dipole, raise it to operating height, check swr, lower for trimming, up and down, up and down.....due the same for all other dipoles for each higher band of operation.
When you are finished with the highest band of operation, pull the entire system up with the pulleys and tie of at the bottom securely.
Make certain that the coax center conductor is attached to one half of each dipole and the shield to the other half. All dipole ends at center insulator are connected together.
This may not be very clear to the new antenna builder so please see the drawing below for the center insulator arrangement.



The white areas in the center support drawing above are mechanical supports, clamps, wire ties or whatever your genius can come up with to support the main (top wire) and the weight of the coax.
Remember, all the weight of this antenna system is supported by the top wire.
The connections should be soldered and all should be sealed including coax end from water, ice, snow etc.
Use a 1:1 balun like the "**Ugly Balun**" project page on this site close to the center before coax goes to your rig.

For best performance get it as high as possible and remember that since this is a dipole arrangement, it will be somewhat bi-directional towards and away from you as viewed in the drawing. (BROADSIDE)
Remember that all elements will interact with each other in the tuning process and the final setup must be secured so the angle or distance between each dipole does not change when blowing in the wind, etc.
The angle or distance between each dipole is not critical but the final spacing must be maintained!
It will take lots of work (trial and error) in getting each dipole to the lowest SWR. Just keep TRYING.

It should also be noted that the antenna can be used in an inverted v fashion but remember the spacing should be secure in the final operating position. Tune it as in all the above instructions. You may use a tuner with this antenna un-trimmed to save a lot of work!
EXPERIMENT! EXPERIMENT! EXPERIMENT!

Editors note:
The multiband fan dipole can be very difficult to tune for lowest swr in some installations. There are many variables that will make tuning difficult. Height above ground, sometimes the angle of each dipole relative to the other dipoles, surroundings , etc. If you can get the swr to around 2 to 1 or lower for each band....don't worry too much about it. You might also consider using a good antenna tuner if you are having major tuning problems. A 2:1 SWR can be handled by most radios.

You might also consider removing HF combinations such as 40/15 meters and 80/30 meters.
For these cases, cut the element for the lower frequency and let it serve double duty at the odd harmonic. In other words, cut the 40 meter element and let it serve also as the 15 meter element which eliminates the 15 meter section.
Make sure that the distance between all dipole elements does not change when tuning.
They must be in a fixed position always with some sort of spacer. In theory, we could fashion a four-wire antenna for the 80, 40, 30, 20, 15 and 10-meter bands.

In practice, it may be difficult to obtain a good match on all bands. Since the resonant length of a given element in the presence of the others is not the same as a dipole by itself, tuning can be a tedious and difficult procedure. Adjust elements for resonance in order from lowest frequency to the highest such as in an 80 40 20 10 combo.....start with 80 first.....then go to next higher frequency dipole.
Always cut each dipole a lot longer than required for each band to make tuning easier.
Trim as needed for your operating frequency.
All of these bandwidth, adjustment and matching problems are easily solved with an antenna tuner at the transmitter, feeding the antenna through 100 feet or less of RG-8 coax.