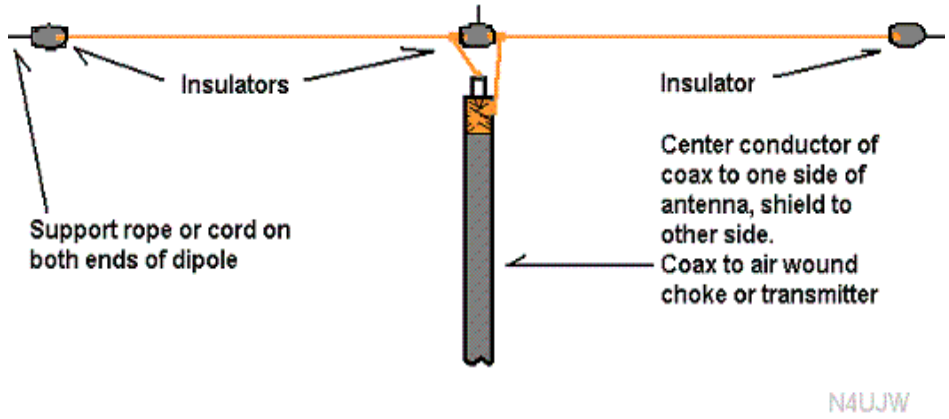
Build a 10 Meter Technician Class Dipole

Get on 10 Meters fast with this basic 10 Meter Dipole project!

This 10 meter dipole project will enable you to start using your new HF privileges as a Technician class operator on 10 meter SSB between 28.300mhz and 28.500mhz.
It is a half wave dipole designed for the center frequency of 28.400mhz but should cover most of this 200khz spread with low SWR. This project shows the 10 meter dipole in the horizontal configuration but may also be installed in the inverted V fashion.
Since any dipole is considered a balanced antenna, it should be used with an air wound choke to help eliminate rf on the coax. See the "Ugly Balun Project" for instructions on how to build one from coax.

Building the 10 meter dipole is very easy and simple construction is used with very inexpensive materials you may already have laying around the shack. See drawing below:



It consists of 2 equal lengths of #12 or #14 wire insulated in the center and on each end and supported with rope, nylon cord, etc from both ends and the center if needed.

The insulators can be homebrewed from any non-conductive material that will withstand the rigors of mother nature such as glass, plexiglass, painted wood, pvc, heavy plastic, commercially made insulators,etc.

The center insulator actually can be used as a duel purpose device, both for support at the center and to prevent the two outer radiators from touching. It should be made heavier and a bit larger to handle the weight of the entire antenna, coax and support ropes. Remember that it contains all connections to the antenna and some method must be used to secure them from separating from each other due to wind load, etc such as plastic wire ties to eliminate strain on the coax end.

The center support rope at the insulator may not be needed depending on how much the completed assembly droops when put up between the end supports. Don't suspend it between trees unless some method is used on the ends to prevent tension from breaking the wire if the wind blows.

It is fed with standard 50 ohm coaxial cable, from the center of the dipole with the center conductor attaching to one side of the dipole and the shield of the coax to the other side. The type of coax is up to you but the larger coax like RG8 will give a bit less loss depending on feedline length. The coax should come away from the dipole at a 90 degree angle to the wire if at all possible when tuning and in the final installation.
It does not matter which side is connected at the coax just as long as neither side of the antenna is shorted to the other side, hence, the insulator in the middle. Seal all connections at the coax end where it connects to the antenna including the end of the coax. This keep water out.
From the antenna, the coax should go to an air wound choke AT the antenna as mentioned above using the same coax that would go to the transmitter.
NOTE: Rather than have connectors at each end of the air choke, just make the feed line coax about 18 to 21 feet longer than needed to reach from the transmitter to the antenna and then wind your coil on the form and attach to the antenna.

Here is the standard formula used for half wave dipoles that you should already know and it is used for the overall length of the radiating elements.

NOTE! It is always better to start LONGER with each half of the dipole than the formula results below!
No two antennas will perform the same in all locations with the formula!
It is much easier to cut than add wire to a dipole.

468 / freqmhz = total length in feet:
Example,
468 / 28.400mhz = 16.478 feet (total length end to end in feet)
Round off 16.478 feet to about 17 to 18 feet total length, end to end, for swr tuning.
Don't forget to feed it in the exact center giving you 2 equal legs on each side of the center insulator.
Do not attempt to tune the antenna on the ground! It must be raised to it's final operating height for tuning! If you have an MFJ 259B analyzer or equal, your tuning will be much quicker and you can do it off the air!

After you have built the antenna, raise it to the final operating height, (the higher the better), tune your transmitter to 28.400mhz, listen for unused frequency and using the AM, CW or tune mode with very little power, (just enough to get a reading on your SWR meter), transmit your callsign and say testing; (here again assuming you have a clear frequency).....immediately check SWR, say you're call sign again and "Test clear, unkey, trim short equal amounts from each end, again listen for unused frequency, and repeat on the air "Testing" with your call sign, keyup, check SWR again, unkey, repeat as needed for lowest SWR on 28.400mhz so you will be centered in the Tech portion of the band.
Once you have tuned it for lowest SWR, make certain you have all supports firmly tied down and your ready for some fun on 10 meter SSB!
Added notes of interest:
If the dipole is installed in a horizontal (flat top) fashion, it will tend to be bi-directional, meaning that it will transmit and receive equally well at 90 degrees (broadside) to the antenna and very little off each end.

A more popular method of installing it is in the inverted V fashion which will yield you a more omni (all direction) pattern. You will have to compensate with the swr tuning using this method as it may be different from horizontal mounting.
For an inverted V, simply have the center higher than the ends, like an upside down V. Don't bring both ends together. Use about a 45 degree angle from the center insulator.
Performance:
The dipole has no gain compared to a yagi (beam) antenna. The dipole is used as a reference antenna for comparison of other types of antennas and is usually referenced as 0db gain or in techincal terms

0dbd. The "d" at the right side of 0dbd represents the reference (dipole). It is a standard, basic antenna and the most widely used of all antenna types. A reference to a dipole is much more realistic when comparing antennas.

Until the 11 year sunspot cycle starts to climb, activity on 10 meters (DX) will be very difficult and limited.
The band will be most active during the daylight hours (when it is "open"), but very good "local" contacts will be made using ground wave coverage anytime, so don't expect to set the world on fire until the 11 year cycle really starts to climb! Then the world will open up to you with stations from around the world.
When the sun spot cycle is at it's peak, it is very common to work around the world with 5 watts SSB using a 10 meter dipole!

More about dipoles!

A dipole antenna is a straight electrical conductor measuring 1/2 wavelength from end to end and connected at the center to a radio-frequency (RF) feed line that is connected to the transmitter/receiver. This antenna, also called a *doublet*, is one of the simplest and most basic types of antennas, and makes up the main RF radiating and receiving element in various sophisticated types of antennas.
The dipole is inherently a balanced antenna, because it is bilaterally symmetrical or contains equal conductors on each side of the feed point.

Ideally, a dipole antenna is fed with a balanced, parallel-wire transmission line. However, this type of line is not extremly common and it's impedance does not match the output of most ham transceivers. It is extremly low loss however, and due to this fact, it is often used by hams and can be matched to most 50 ohm output radios. This is usually done with a matching transformer called a balun, which is a contraction of the words "balanced" and "unbalanced".
An unbalanced feed line, such as coaxial cable, can be used, but to ensure optimum RF current distribution on the antenna element and in the feed line, a *balun* should be inserted in the system at the point where the feed line joins the antenna.

How high should it be in the air?

For best performance, a dipole antenna should be at least or more than 1/2 wavelength above the ground, the surface of a body of water, or other horizontal, conducting medium such as sheet metal roofing. The

antenna should also be at least several wavelengths away from electrically conducting obstructions such as supporting towers, utility wires, guy wires, and other antennas. This is very difficult to do with most ham installations.

Dipole antennas can be oriented horizontally, vertically, or at a slant. The polarization of the electromagnetic field (EM) radiated by a dipole transmitting antenna corresponds to the orientation of the element. This means that if the antenna is installed with it's wire horizontal to the ground, it radiates a horizontally polarized field. If it is installed in a vertical position, then it would be said to have a vertical polarized field in reference to the ground. When the antenna is used to receive RF signals, it is most sensitive to EM fields whose polarization is parallel to the orientation of the element.
The RF current in a dipole is maximum at the center (the point where the feed line joins the element), and is minimum at the ends of the element. The RF voltage is maximum at the ends and is minimum at the center.
The RF current portion of the antenna is where the maximum rf field is radiated.
To learn even more about antennas in general, it is highly recommended that you get a copy of the ARRL Antenna Book seen below!
Enjoy and welcome to the world of HF....73