Field Setup

Antenna Configurations

The Radio Jove antenna can be installed in four different standard configurations – each configuration will produce a different antenna beam pattern in the sky. It is important that the antenna beam be aimed to the region of the sky where Jupiter (or the sun) will be passing during the observation period.
The four standard configurations are:

1. In-phase East-West
2. Anti-phase East-West
3. In-phase North-South
4. Anti-phase North-South

The East-West or North-South terminology refers to the direction that the dipole antenna wires are running. For example in an East-West setup the wires of each dipole are run from East to West.

In order to visualize the four different antenna patterns you should use Radio Jupiter Pro-Jove Edition software. This program is available on the Jove CD and also from the Jove website. The Radio Jupiter Pro (RJP) software includes a Sky Map view that shows both the track of Jupiter (and the sun) across the sky and also a projection of the antenna beam pattern on the sky.

An RJP Sky Map display for each of the four antenna configurations is shown below. These examples, which show the path of Jupiter across the sky on January 1, 2002, were generated for a monitoring station located in Washington DC. The tick marks along the track of Jupiter correspond to the location of Jupiter at hourly intervals. Best reception sensitivity occurs when Jupiter is inside of the oval(s) representing the antenna beam(s). The oval represents the half-power antenna beam contour – this means that the antenna is half as sensitive to signals at the edge of the oval as it is at the center. The antenna sensitivity (gain) decreases outside of the oval. Therefore, antenna performance is best at the center of the oval area with sensitivity decreasing rapidly outside the oval contour.

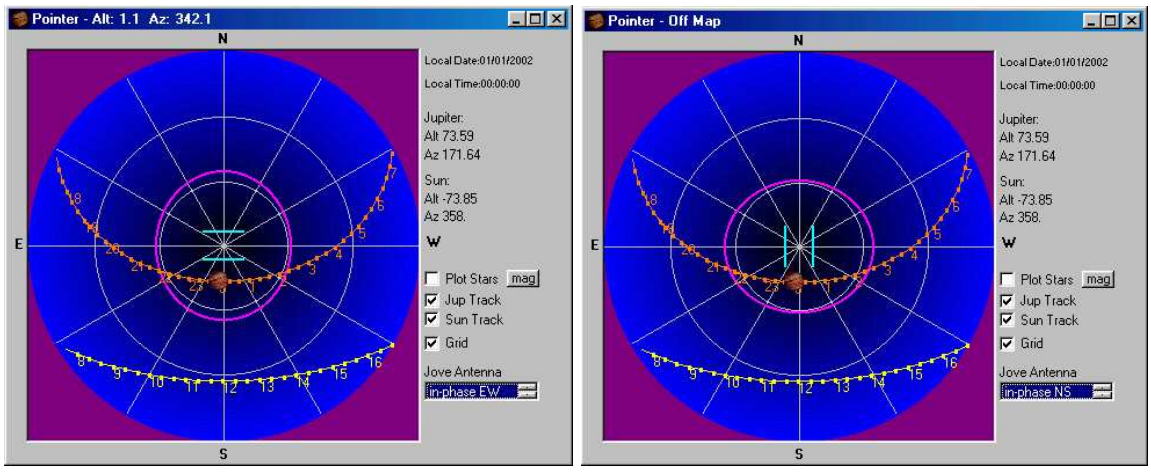

Figure 9a and 9b at midnight on January 1, 2002. 9a is setup in-phase EW and 9b is setup in-phase NS. Note that East and West are flipped because these views are looking up into the sky.

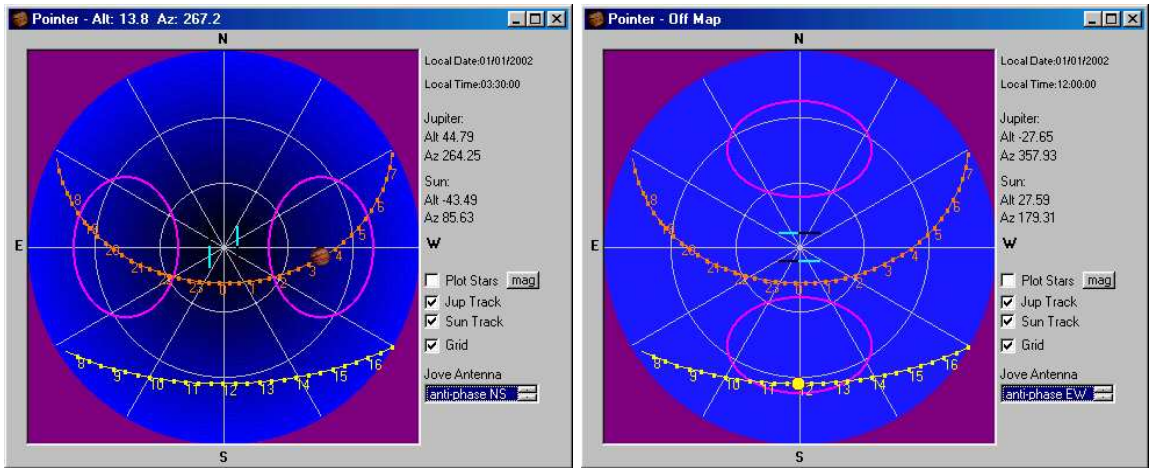

Figure 9c and 9d. Figure 9c is setup anti-phase NS at 03:30 on January 1, 2002. Figure 9d is setup anti-phase EW at noon on January 1, 2002. Note that Figure 9d is brighter than 9c because 9d is during the day, and 9c is at night.

The in-phase configurations produce nearly identical beams aimed directly overhead (Figure 9a, 9b). In both cases the beam is about 60 degrees wide – allowing for up to 4 hours of coverage if Jupiter passes directly overhead thru the center of the beam.

The anti-phase configurations each produce two antenna beams up about 45 degrees from the horizon (Figure 9c, 9d). The East-West anti-phase beams are 45 degrees up from the North and South points (Figure 9d) while the North-South anti-phase beams are 45 degrees up from the East and West points (Figure 9c). The anti-phase configurations do not provide much sensitivity overhead.

Lets assume that we want to listen to Jupiter at midnight local time on January 1, 2002 from our Washington DC station. Referring to Figures 9a and 9b we see that Jupiter is high in the sky and that either in-phase configuration will work. If we wanted to listen at 03:30 local time when Jupiter is in the western sky then the anti-phase NS configuration should be used (Figure 9c). High latitude observers (where Jupiter never passes directly overhead) may find that the anti-phase EW configuration is best with a beam up 45 degrees from the southern horizon. Solar observers in the northern hemisphere can take advantage of the anti-phase EW configuration in the winter months to listen near local noon when the sun is fairly low in the southern sky (Figure 9d).

Now that you understand how to select the best antenna configuration using Radio Jupiter Pro the next question is how to actually set up the antenna in each of these configurations. The key to this is understanding the feedpoint wiring. The feedpoint of each dipole is the center insulator where the coaxial cable is soldered. Recall that the coaxial shield is soldered to the dipole wire on one side of the insulator and the coax center conductor is soldered to the other wire. Think of the dipole wire connected to the center conductor as "hot" and the dipole wire connected to the shield as "cold". It might even help to put a piece of colored tape on the "hot" wire of each dipole. Now consider the EW in-phase configuration. The hot side of each dipole must be on the same side of the insulators – it doesn't matter if it's the east side or the west side – but they must be on the same side. For the anti-phase EW connection one dipole will have the "hot" wire on the east end of the insulator and the other dipole will have the "hot" wire on the west end of the insulator. If you have the two dipoles set up in-phase and then flip one dipole end for end you will have the anti-phase connection. RJP shows the "hot" and "cold" antenna wires at the center of the Sky Map diagram with a light and dark color for the anti-phase setup but only a light color for the in-phase configuration.

Setting Up the Antenna

Find a clear location at least 30 feet on a side to erect the antenna. Moderately soft soil will make it easier to insert the antenna mast tips. Three or four people can make quick work of putting up the antenna. Be sure to avoid any location where there are low power lines that might come into contact with the Jove antenna.

Standard In-Phase Antenna Setup

1) O Lay out each dipole antenna flat on the ground with the ends of each dipole running in the EAST-WEST direction (Figure 10a). Separate each dipole by about 20 feet (6.3 m). When the antenna is completely setup, the dipole wires are parallel to the ground and the ends are running in an EAST-WEST direction. **IMPORTANT**: for correct phasing of the antenna, make sure that the feedpoint of each antenna is oriented in the same direction. That is, the side of the dipole that has the center conductor soldered to it MUST be pointed toward the same direction (EAST, for example).
2) O Using one 25 ft. (7.6 m) section of rope, loop it TWICE through an eyebolt (Figure 8c). Tie loops into each end of the rope.
3) O One person holds up the pole straight while one or two others attach the rope loops to the tent stakes and push them into the ground (Figure 10b). Push them in at an angle where the top of the stake faces away from the pole. Once the pole is in position, push the foot of the pole (protruding bolt) into the ground and then tighten the ropes.
4) O Repeat steps 2 and 3 for the other pole making sure the poles stay vertical. The PVC poles will flex and show some bending, but that is okay. Make sure that the guy ropes are secure enough that the wire antenna is roughly horizontal (not too much sagging). Do not tighten the guy wires too tight because this will cause undue stress on the dipole antenna.
5) O At a North-South distance of 20 ft. (7.6 m) from the first dipole, repeat steps 2-4 and set up the other half of the antenna. Make sure both antennas are parallel and are roughly facing in the EAST-WEST direction (See Figure 10). **NOTE**: setting up the antenna in a NORTH-SOUTH direction (in-phase) gives a similar beam sensitivity pattern (Figure 9a and 9b).

Anti-Phase Antenna Setup

1) O Let's say the antenna is set up in the standard in-phase configuration (EAST-WEST)
2) O Take one of the two dipoles (it does not matter which one) and switch the support poles so that what was the EAST end of the wire is now the WEST end and vice-versa. In other word's, rotate one of the dipoles setup position 180 degrees. Your antenna is now setup anti-phase EAST-WEST.
IMPORTANT: The antenna sensitivity pattern now breaks into two oval areas centered 45 degrees down from the zenith and the line through the center of the ovals is perpendicular to the dipole wires (Figure 9c). **NOTE**: Setting up the antenna anti-phase NORTH-SOUTH is similar to anti-phase EAST-WEST and is achieved by repeating step 2 with the antenna setup NORTH-SOUTH instead of EAST-WEST (Figure 9d).