Source Phase Angles (Written for Multisim Version 8)

Introduction:

Multisim has had an issue for years with phase angles on sources. I'm not sure why the issue but it is possible that it is just a different way of looking at angles between our way and the Commonwealth (or European) way. For whatever the reason, Interactive Image (EWB) has seemed to be unwilling to fix what we see as a bug. Up until version 8, I thought that they were unwilling to even agree that there was an issue. However, with version 8 comes a setting in the Options menu which allows us to have it both ways!

The Problem:

In order to understand the problem we need to be able to go back and review sine and cosine waves. The sine wave and the cosine wave differ by 90° as can be seen in the figure to the right. The question is: Do they differ by $+90^{\circ}$ or -90° ? Well, one way to tell is to plot out the function and see.





The +90° waveform to the left was obtained with the following expression:

```
1 \bullet \sin \left\{ 2\pi \left( 1 \mathrm{khz} \right) + 90^{\circ} \right\}
```

It should be obvious that the sine +90° curve has the same relationship with the sine curve as the cosine wave curve in the top figure. So, the question has been answered.

So, what is the problem you might ask? Let's now go to EWB (version 8) and set up two AC voltage sources (one with 0° and one with +90°) and compare their output. (The Figure to the right demonstrates how the setting is made in the AC voltage source model).

| | SIGNAL_VOLTAGE_SOURCES | | | l |
|---------------------------------------|-------------------------------|-----------------------|-------------------|----|
| | Label Display Value Fault | Pins | | |
| · · · · · · · · · · · · · · · · · · · | Voltage (This dialog is scrol | lable; please press l | eft button and mo |)V |
| 100 | Voltage Offset: | 0 | V ÷ | |
| V4 | Frequency (F): | 1 | kHz ÷ | |
| | Time Delay: | 0 | sec 🔹 | |
| 90Deg | Damping Factor (1/sec): | 0 | _ | |
| | Phase: | 90 | Deg | |
| | AC Analysis Magnitude: | 1 | V ÷ | |



The Solution

So, what do we do about this?

- **PRE-Version 8:** Before version 8 we had to keep the problem in mind and then if we wanted a positive angle we had to enter it as a negative angle and vice versa.
- Version 8: With version 8 we now have a setting which allows us to set the system to interpret the angle setting the way we want it to interpret it. Go to OPTIONS/GLOBAL/PARTS in the pull-down menu and you will get the figure below (currently in its default setting).



As can be seen in the figure to the left, there is now a Positive Phase Shift Direction setting available. It you desire to have the degree setting in the Phase Parameter setting of AC sources interpreted the way. Mathematically correct (and the way our Eng. Tech books teach it), select the "Shift Right" parameter.



SEE FIGURE AND WARNING ON NEXT PAGE.

EWB TUTORIAL

Source Phase Angles



With the change in settings, our source will now provide the correct phase shift.

WARNING!!!!

When you set this setting, any sources which currently have positive degree setting will automatically become negative and vice versa. You will need to go back in and change the sign yourself!!!