

A number of students have had trouble getting their DC bias conditions working in the lab. This is because the Beta of our lab transistors may not match the PSpice model. I would compare the Beta's I measured in Lab 7 with what my PSpice output file is telling me in order to gauge the potential accuracy of the PSpice results.

My advice is to adjust the base biasing resistors with a potentiometer to get the correct collector current. Then replace the pot with a standard value resistor. If you need to increase the collector current, then you either need to increase RB2 or decrease RB1 – and vice versa if you need to decrease the collector current.

One of the reasons that you may be getting non-optimal DC conditions is that in the PSpice we are using the 2N2222 model and I think in your lab kit you have the 2N4401 transistor. From some quick simulations, it appears that the 2N4401 Beta is roughly half of the 2N2222.

Unfortunately, this transistor model is not in the default library. However, I have attached the 2N4401 model if you would like to use it in PSpice.

The quickest way to change the model in PSpice is to do the following:

In your schematic, select the transistor

Edit -> Model -> Edit Instance Model (ModelEditor)

This will pop up a new window. In the window with

```
.model Q2N2222-X NPN(Is=14.34f Xti=3 Eg=1.11 Vaf=74.03 Bf=255.9 Ne=1.307
+       Ise=14.34f Ikf=.2847 Xtb=1.5 Br=6.092 Nc=2 Isc=0 Ikr=0 Rc=1
+       Cjc=7.306p Mjc=.3416 Vjc=.75 Fc=.5 Cje=22.01p Mje=.377 Vje=.75
+       Tr=46.91n Tf=411.1p Itf=.6 Vtf=1.7 Xtf=3 Rb=10)
*       National      pid=19      case=TO18
*       88-09-07 bam creation
```

You should delete all the stuff following the parenthesis, and replace it with the text in parenthesis in the 2N4401 model:

```
.model Q2N2222-X NPN(Is=26.03f Xti=3 Eg=1.11 Vaf=90.7 Bf=4.292K Ne=1.244
+       Ise=26.03f Ikf=.2061 Xtb=1.5 Br=1.01 Nc=2 Isc=0 Ikr=0 Rc=.5
+       Cjc=11.01p Mjc=.3763 Vjc=.75 Fc=.5 Cje=24.07p Mje=.3641 Vje=.75
+       Tr=233.7n Tf=466.5p Itf=0 Vtf=0 Xtf=0 Rb=10)
*       Fairchild    pid=2N4400  case=TO92
*       88-09-13 bam creation
```

Note, don't copy the entire attached file – only the stuff following the parenthesis. If you want to go back to the original 2N2222 model, I have attached that file as well.

This material is also posted on the website.