MEG Advanced Users Notes

Nao Suzuki
nao@nmr.mgh.harvard.edu
617-726-8517
Updated May 2011

I: Tuning: Noise, Tune, and Manual Tune

• Open the Acquisition program
  ○ Change project to “noise”
  ○ File, Load Settings, “noise 500ms”
  ○ You do not need to enter a subject name at this point.
• Go to Tools, Tuner
  ○ File, Load tunings, Load other
    Here you will see a list of previously saved tunings beginning with “vv-“. Select the file called “vv-now.tnp”
• Click on Measure Noise in the lower left of the window
  ○ This will show a histogram of noise for all channels
  ○ Hit Tune
    Will look quite noisy at first as program tries to find best fit
    Once the noise settles, you optimally want a noise level of about 2.5-2.7 (should take no more than ~5 minutes)
    A few channels may still stand out as very noisy… note these so that they can be fixed at a later point
  ○ Once the optimal level is reached, hit Stop. At this point you can fix the individual noisy channels.
    Go to Job, Manual Tune. Click on the Manual Tune button in the lower left.
  ○ In order to view the noisy channels you noticed earlier, simply type the channel number in the box which currently reads MEG0111 (ie, leave the “MEG” and type in the appropriate channel number). You should now see a sinusoidal curve for the channel you specified.
    The curves are periodic functions of applied flux to each sensor
• What to look for and appropriate solutions:
  ○ Curve has a flat trough
  ○ Missing channels

--Adjust the bias; increase (slowly!) until curve is no longer flattened at the bottom

  ○ Curve is too high/low with respect to axis (should be 1/3 below)

--Adjust the offset; use either arrows to move curve, or press ctrl+shift and click curve at desired location

  ○ Channel shows trapped flux: extra lines or large bubbles on the curve

--Heat the sensor; go to Commands, Heat sensor (or press ctrl+H)
--Heating once should be enough, but may need to do repeatedly

  ○ Curve is not smooth

--Change the gate in increments of 10 (usually decreasing by 10 is the most helpful) until curve is smooth
--Do NOT let the gate drop below 150!! Gate is very slow to change, and should you accidentally lower it too far, it could take up to 30 minutes for the channel to return to normal

• Once you have fixed all noisy channels, hit Stop and go back to Job, Noise, and hit Measure

Noise (to be sure that your changes have helped lower the noise). When satisfied, note the
average noise level in the logbook and hit Stop.
• Go to File, Save, Save elsewhere
  ○ Save as (and thus over-write) “vv-now”
  ○ Save once again as seated or supine( )% - ( ) includes the %number for Helium level at that point i.e. seated45%)
• Quit the Tuner program

II: Making an Empty Room Measurement

• Once you have quit the Tuner program, go back to the Acquisition window and hit Go.
• In the raw display window, hit the Selection button in order to view all channels. Browse
through the channels to check that they’re all OK.
  ○ If any still show artifact, use the Squiddler program to fix (see notes on Squiddler below).
• If all channels look good, you are ready to record. Click: Stimulate, Average, and Record
Raw buttons.
  ○ The settings you loaded earlier allow you to record both an averaged and raw data set. I typically record 5mins.
  ○ Once you have reached 5mins, hit Stop and save your data to **MEGRAID 57** for both averaged and raw data sets as: “noise01” and “noise01_raw.”
• In the logbook please note any channels that remained bad even after Tuning and Squiddling.

III: Identifying Artifacts and Fixing Appropriately with Squiddler

• Generally the first and easiest step to fix a bad channel (i.e. one showing artifact) is to Heat
the sensor using the Squiddler program.
  ○ This occasionally does not fix the problem, and the steps taken above with manual tune can be applied using the “tune” mode of the Squiddler program.
• Go to Tools, Squiddler, and then Mode, Tune.
  ○ In the box reading MEG0111, type in the desired channel and hit enter
  ○ On the raw data display window on the right-hand monitor, hit the “xy” button at the bottom of the screen. This will bring up a graph with which you can view the curve.
  ○ Depending on the problem (flat trough, too low/high, unsmooth curve), adjust the bias, offset, and gate accordingly.
  ○ Once you have fixed all channels, hit Mode, Measure, and then Commands, Reset All. You should now see the regular raw display and check that the channels look OK after tuning.
  ○ If they are still bad, go ahead and record, but please note them in the logbook.
• If a channel is unfixable and so bad that trials are constantly rejected, you should go to Online, Set Bad Channels. Here you can select which channels you’d like to ignore in terms
of artifact rejection.
  ○ Data will still be recorded from this channel, it simply won’t cause trials to be rejected anymore.

IV: Troubleshooting:

Acquisition Program Freezes

  ○ This should not happen frequently, but if it does the fix is quite fast and simple. **DO NOT**

under any circumstances turn off the HP-workstation!!

- Go to the Neuromag folder, then to Maintenance and “Restart Acquisition Program”
- A terminal window will pop up asking you to say yes/no to continue. Type yes and simply wait until the process is done (should take about 2 mins).
- When the process is finished, it will prompt you to hit enter to close the terminal.
- Because you have restarted the program, you need to load in the tuning settings you saved earlier. In order to do this:
  - Load in the appropriate Project name
  - Go to Tools, Tuner
  - Under File select Load Tunings, Load Other, and “vv-now”
  - Exit Tuner
- You can now load in your own Settings, and Subject information.
  - If you have already digitized your subject, you can load in their digitization info by going to File, Load Preparation and selecting the appropriate file.
- If you were in the middle of recording when the program froze, there are two programs which may be able to rescue the data for you. They are also in the Neuromag, Maintenance folder, and are called “Rescue Evoked Data” and “Rescue Raw Data.”

Interpreting Error Messages

- “Failure to connect to data server” or “Read failed, connection timed out”
  - There has been a power failure, and the easiest fix is usually to run “Restart Acquisition”
  - If this still does not work, then the power in the electronics cabinet needs to be recycled (please do NOT do this yourself!)
- “Not enough space on current volume”
  - While trying to save your data, the current megraid became full. Simply switch to the next raid available and try saving again.

No Triggers Are Sent

- Check the Trigger Switch Box to make sure the proper computer is selected
- Check the two boxes labeled “Triggers out from PCs” and “Meg Acq Triggers” to be sure that all BNC cables are properly plugged in

No Triggers from Response Pads

- Open the stimulus cabinet to the side of the MSR, checking that the proper response pads are connected to the trigger box (i.e. BNC cables for the 1 finger pads vs those for the 4 fingered pad).
- Check that the position of the BNC cables of this box match those of both the trigger boxes by the stimulus computers (i.e. 5 and 6 for both boxes)
- On the side of these boxes, check that the Polarity and Pull-up switches are in the desired positions

Projector Isn’t Working Properly

- Check the Projector Input switch box to be sure that the proper computer is selected
- Hit the menu button on the projector’s remote control, select any category, and then hit the

“STD” button. This will return all settings back to factory-standard, and you can adjust properly from there.