

PRODUCT BULLETIN

PRODUCT: MaxFilter™ 2.2

Date: 08-10-2013

FCO Ref: 145 056 01 080

Changing the fine-calibration file

Scope:

Applies to the below MEG system serial numbers:

3001, 3002, 3004, 3008, 3009, 3010, 3013, 3014, 3016, 3017, 3018, 3019, 3020, 3021, 3022, 3023, 3024, 3025, 3026, 3027, 3028, 3029, 3030, 3031, 3032, 3032, 3033, 3034, 3035, 3036, 3037, 3038, 3039, 3040, 3041, 3042, 3043, 3044, 3045, 3046, 3047, 3048, 3049, 3050, 3051, 3052, 3053, 3054, 3055, 3056, 3058, 3059, 3061, 3101, 3102, 3103, 3104, 3105, 3107, 3108, 3109, 3110, 3111, 3112, 3113, 3114, 3116, 3117, 3118, 3119

During our continuous surveillance of the Elekta Neuromag® and Elekta Neuromag® TRIUX systems, we have recognized that the instructions concerning the fine-calibration changes are incomplete. The following describes the instructions for

1. Defining the need of a new fine-calibration file.
2. Computation of the fine-calibration.
3. Installation of the new fine-calibration file.
4. Use of the old and new calibration files in the MaxFilter™ 2.2 software.

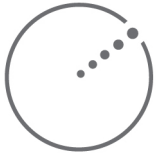
Basically, items 1 – 3 should be performed by authorized service personnel, but item 1 can be performed by any user of Elekta Neuromag system. Item 4 concerns all users of MaxFilter™.

This bulletin concerns all installations of MaxFilter™ 2.2.

1. When a new fine-calibration for MaxFilter™ is needed?

When MEG sensor units or preamplifiers have been replaced, the software shielding capability of MaxFilter™ may be reduced. The following steps can be applied to test the MaxFilter™ software shielding factor:

- a) Record two minutes of raw data from an empty magnetically shielded room. Do not use internal active shielding. The details are described in “NM24052A MaxFilter™ 2.2 Installation Guide (install.pdf on SW24052N Maxfilter™ 2.2 Installation CD)” Chapter 3. Note that the measured data must have sufficiently large signal amplitudes ($> \sim 200$ pT) in order to obtain sufficient suppression factor.



b) Run maxfilter:

```
/neuro/bin/util/maxfilter -v -f <path and name of the file recorded in step a>  
-cal /neuro/databases/sss/sss_cal.dat
```

c) Load the file recorded in step a in Graph using e.g. the *basic* setup. Overlay (superpose) the magnetometer channels and select an interval showing largest amplitudes (Figure 1a).

d) Repeat the previous step for the result of step b (filename_sss.fif). The interference peaks should be suppressed by at least a factor of 100. If the suppression factor is lower than 100, a new fine-calibration is needed.

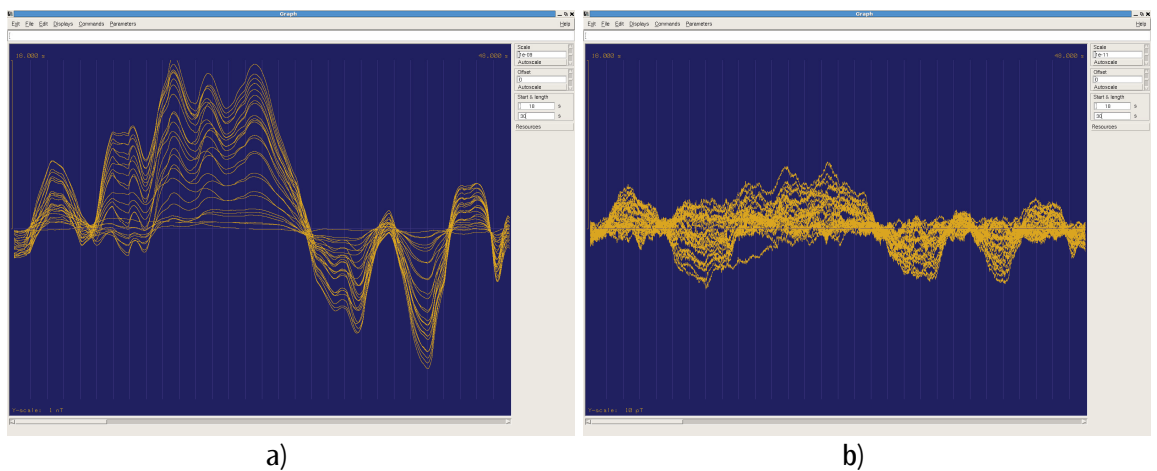


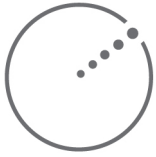
Figure 1. a) 30 seconds of raw data low-pass filtered at 40 Hz, all magnetometer channels are overlaid. The vertical scale is $1e-9$ T. b) The same data after MaxFilter™ processing. The vertical scale is $1e-11$ T. In this example, MaxFilter™ has suppressed the largest interference amplitudes by a factor of about 200.

2. Computation of the fine-calibration

At the moment, the actual calibration procedure is done by Elekta Oy. Therefore, you should contact meg-support@elekta.com for information on how to transfer your calibration data to the Elekta Oy office. Please follow the instructions in “NM24052A MaxFilter™ 2.2 Installation Guide” Chapter 3.

3. Installation of the changed fine-calibration file

When you have received the new calibration file, perform the following steps on all workstations running MaxFilter™. The fine-calibration files are normally located in the directory `/neuro/databases/sss`. Note that if this directory is shared from a server to



other workstations, you need to carry out the change only on the server. Note that you also need proper privileges to change the calibration file (user neuromag or root).

- a) Make a copy of the current calibration file, the default filename is `sss_cal.dat`. Please note that if there are more than one calibration files, name `sss_cal.dat` may be a link pointing to another file. In that case remove the link.

Copy the original file to a name such as `sss_cal_before_<change_date>.dat`. Here `<change_date>` indicates when the sensors or preamplifiers were replaced (e.g. 20121015).

- b) The new calibration filename is typically `sss_cal_<site>_<date>.dat` where `<site>` is the (four-digit) Serial Number of the MEG system and `<date>` is the date when new calibration was computed. Copy the new calibration file into directory `/neuro/databases/sss`.

- c) Create a link defining the default fine-calibration file:

```
cd /neuro/databases/sss
ln -s sss_cal_<site>_<date>.dat sss_cal.dat
```

4. Instructions for using the changed fine-calibration

After the installation according to the previous section, MaxFilter™ does automatically apply the new fine-calibration if the user does not select another file. However, the users need to be aware that the older fine-calibration file does still apply to the data recorded before the change.

If you don't know the recording date of the FIFF file, type the following command

```
/neuro/bin/util/show_fiff -vt204 filename.fif
```

It provides the measurement date, such as

```
204 date = Wed 08 Jul 2009 11:06:38 AM EEST
```

If the date is older than the calibration change, you need to select the older fine-calibration file. Please consult NM24057A MaxFilter™ 2.2 User's Guide Section 3.7.3 for details.



Conclusion

It is our assessment that none of the above limitations affects the safety of the system. With any question concerning the above, please contact meg-support@elekta.com or the undersigned.

Dubravko Kičić, Ph.D.

A handwritten signature in blue ink, appearing to read "Dubravko Kicic".

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