Some protocol suggestions for

ksepi.e

DV26+ users

Online recon is no longer supported as GE's Orchestra recon does not handle EPI with normal DAB packets. Recon can be done offline using recon_epi.m, or, on the MR scanner's VRE using provided RPM version of ksepi (http://bit.ly/ksepi_RPM)

It is also possible to build your own RPM install file using the matlab folder in the KSFoundation repository

Pre-DV26 users

Karolinska has no longer access to pre-DV26 systems. Hence, GE's online recon for ksepi (working on DV24-25 only) and Pfile reading is soon deprecated

14 Feb 2019

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ksepi.e - supported scan modes

2D

- Diffusion MRI
- fMRI (no brainwaveRT connection)
- SE-EPI

Multi-shot EPI is used for GRAPPA acceleration. User CV5 controls Multi-shot vs. undersampling behavior

3D

- T1w 3D-EPI
- SWI 3D-EPI

ARC acceleration support in both phase encoding directions

Diffusion

2D ksepi - Imaging options

Enable the ART tab for acoustic reduction (at the expense of increased geometric distortions)

More bitdepth in data. Leave on

Enables IR for non-FLAIR scans. Could be used as STIR-EPI

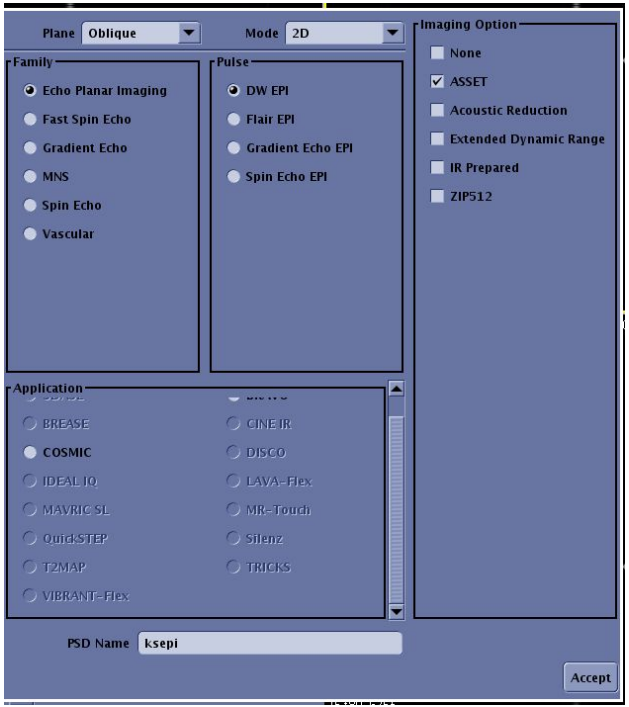
Acquire all time-frames before moving to next slice location

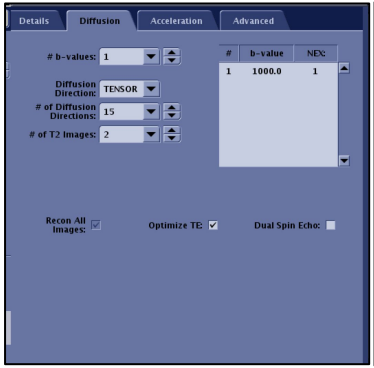
Zerofill to 512x512 matrix. Does increase Gibbs ringing artifacts (not recommended)

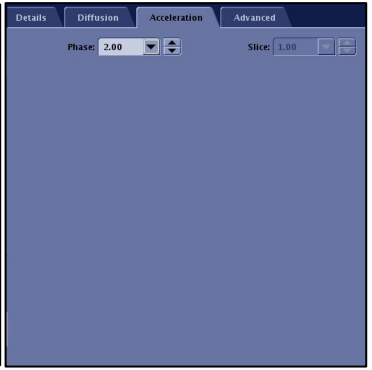
- Diffusion-weighted EPI (multi-bvalue DTI supported)
- FLAIR-EPI (contrast similar to a fat-sat T2FLAIR)
- Gradient Echo EPI. For fMRI/perfusion
- Spin Echo EPI

2D ksepi - Diffusion (DV24-DV25.1 with GE online recon)

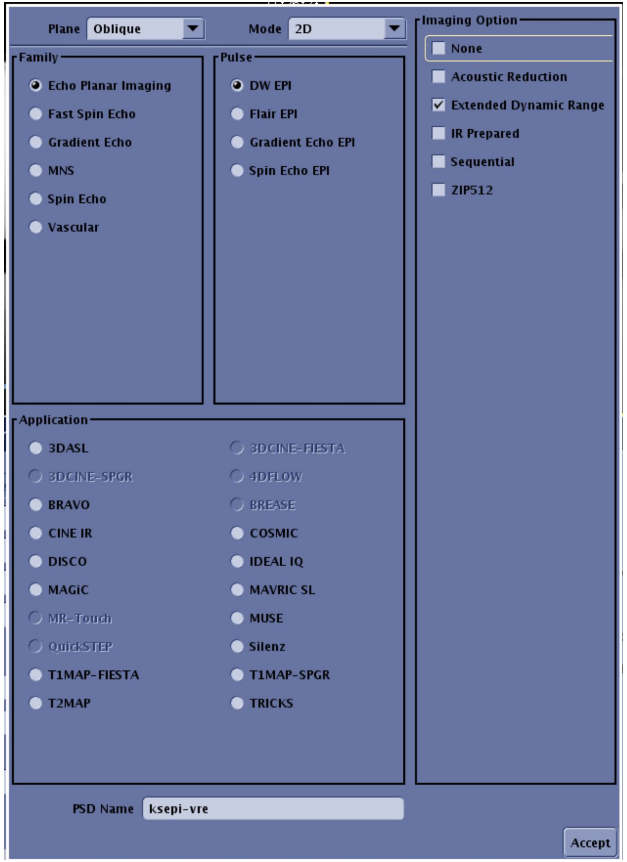
Images are reconstructed using GE's online recon. However DV24-25 have limited support

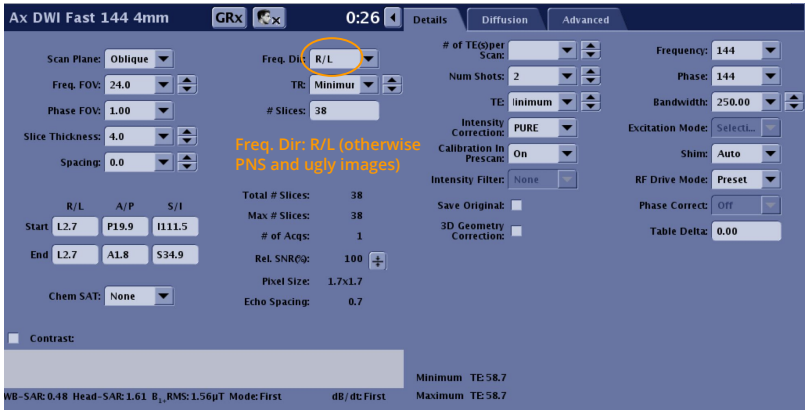


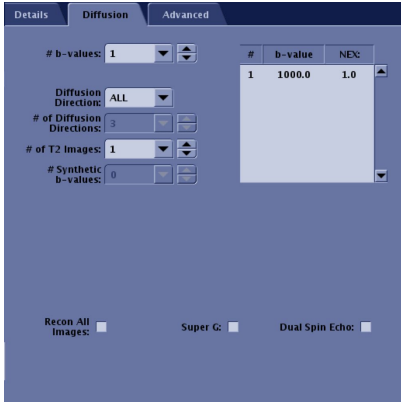


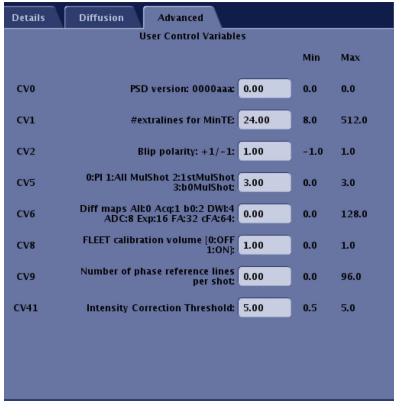


2D ksepi - Diffusion (Fast)









CV1: Number of k-space lines beyond half k-space for MinTE scans. Lower value gives shorter TE but risk for dark phase "worms" in the image

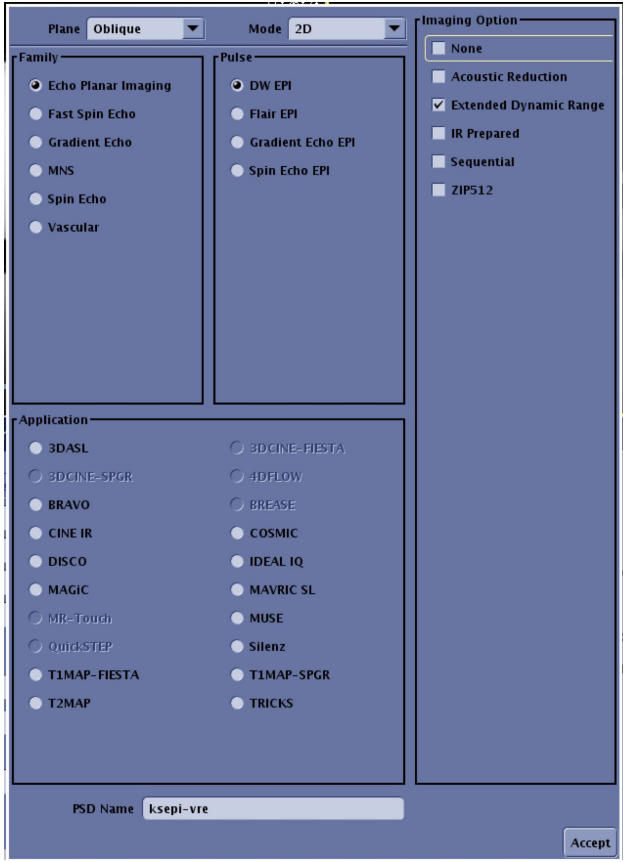
CV2: Positive or negative phase encoding blips. This controls the direction of geometric distortions along the phase encoding direction (A/P)

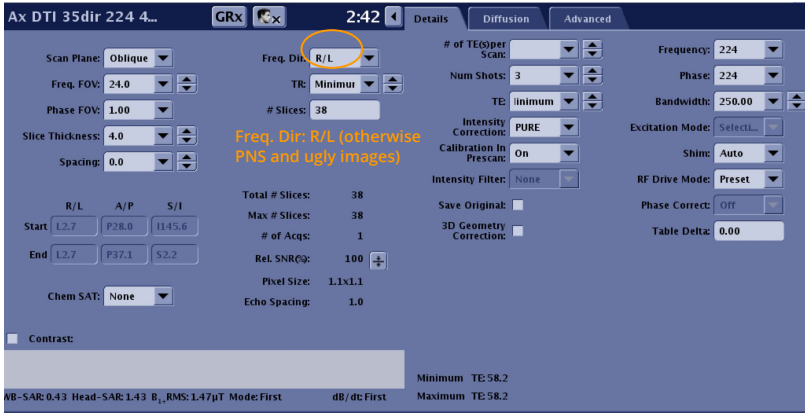
CV5 = 3: Multishot only for b0 (from which GRAPPA weights are estimated using recon_epi.m). Diffusion directions undersampled (R = #shots). Don't select 0 (!)

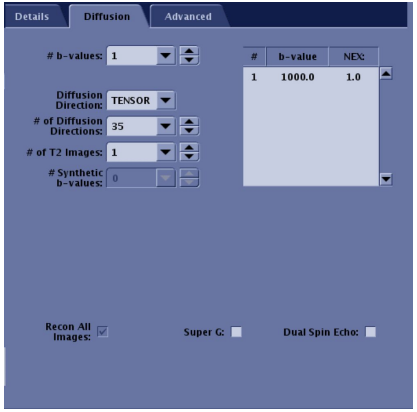
CV6: 0 will return everything (in different series). For custom choice of maps to be returned, add the numbers up (bitmask)

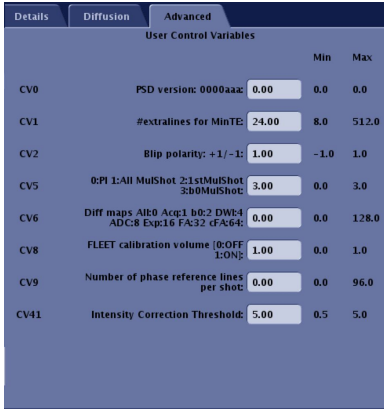
CV8: FLEET calibration. An extra few-second volume is added for calibration, more robust GRAPPA weights in the presence of motion

2D ksepi - Diffusion (High-res)









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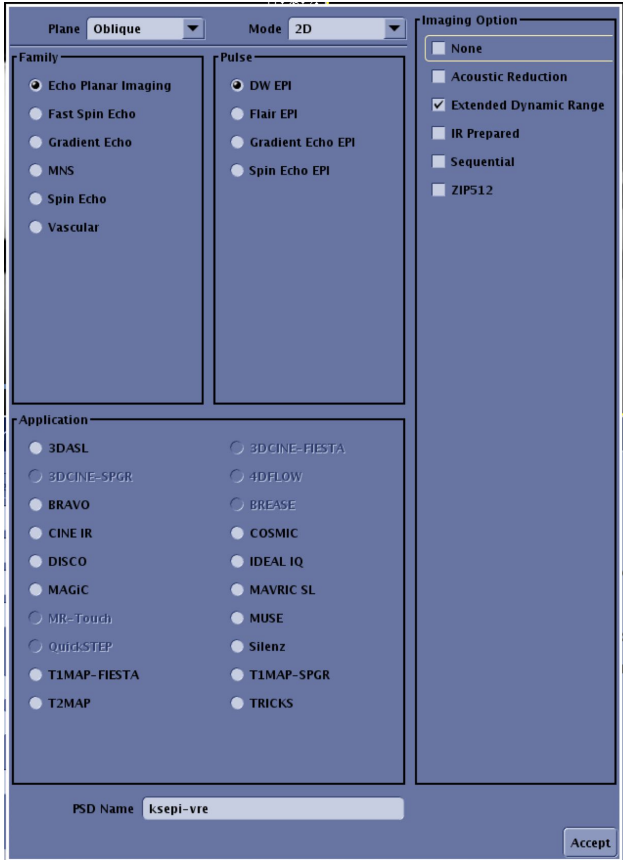
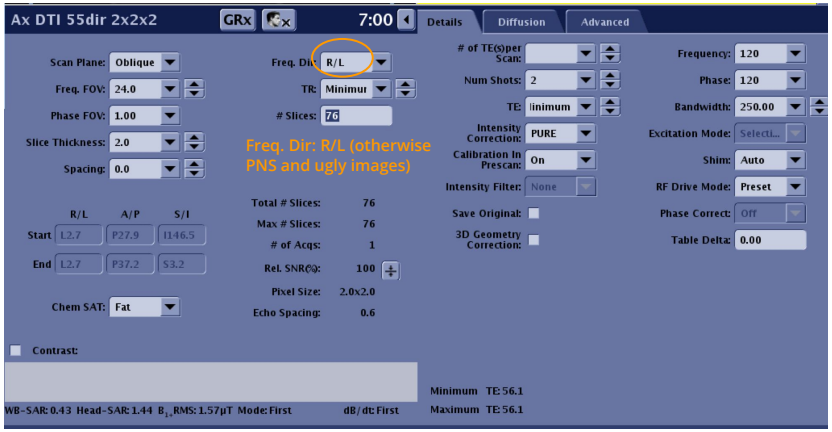
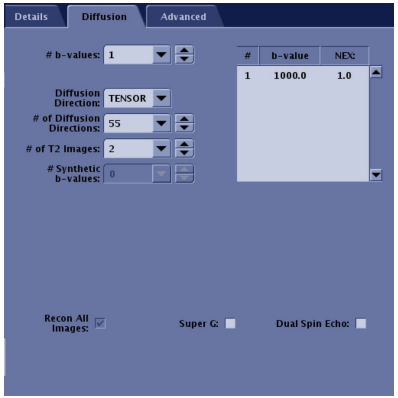
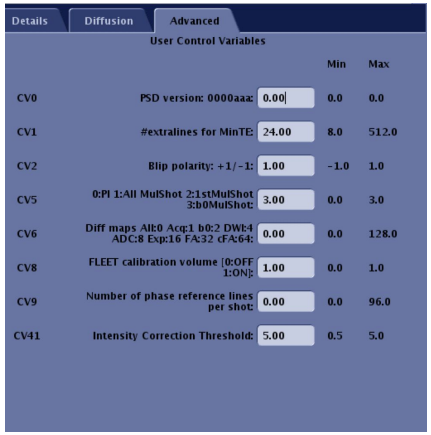
2D ksepi - Diffusion (isotropic)









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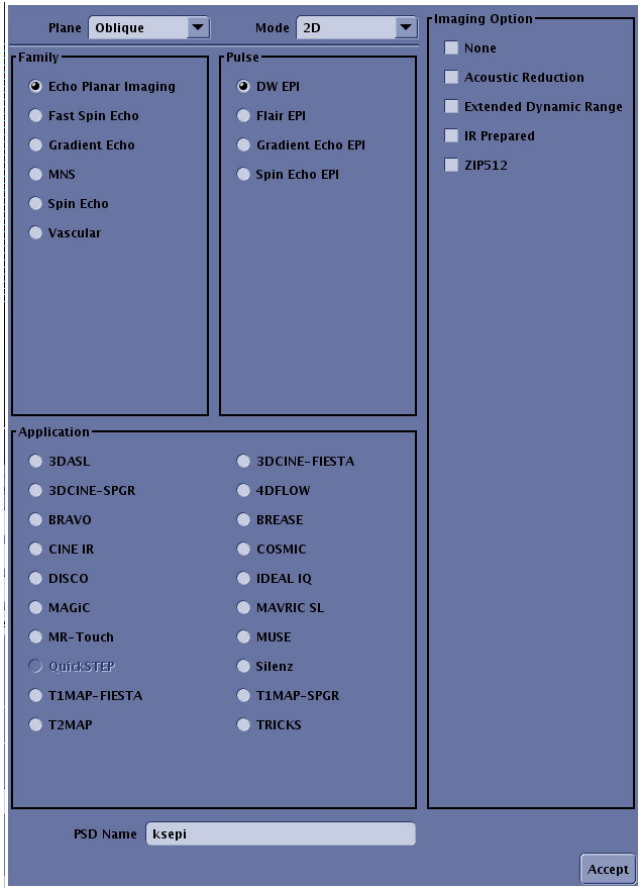
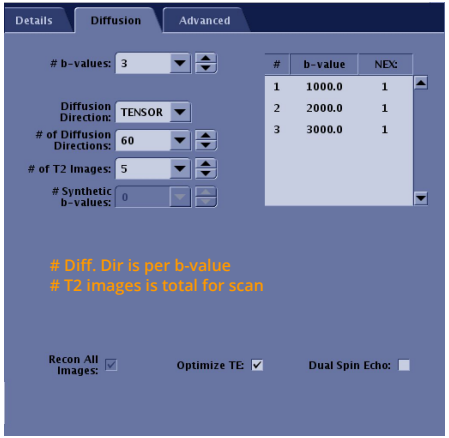
2D ksepi - Diffusion (isotropic 3-shell HARDI)

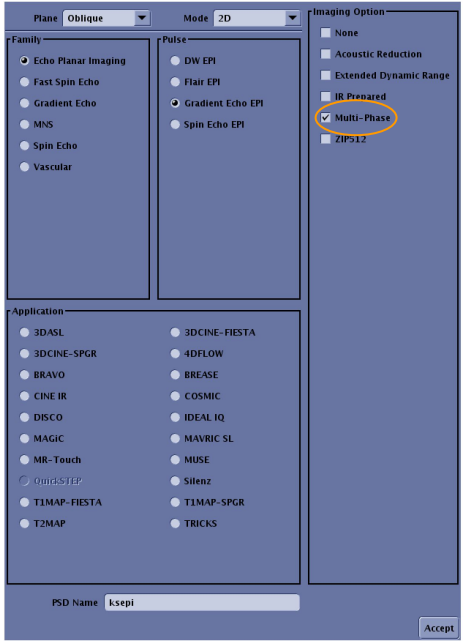


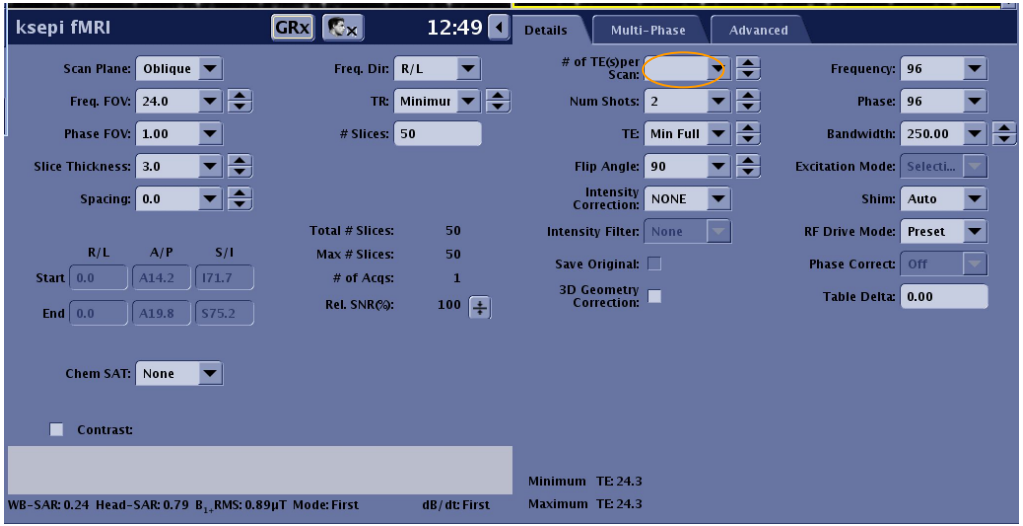


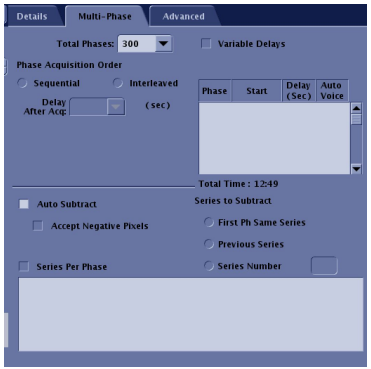
Single/Multi-echo fMRI / T2*-w

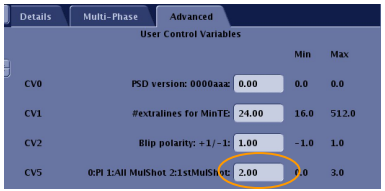
2D ksepi - T2* EPI (fMRI - 300 vols)

It is possible to play up to 16 EPI trains in ksepi.e. However, the UI blanks the #TEs per scan after NumShots have been selected, but multi-echo selections can still be made





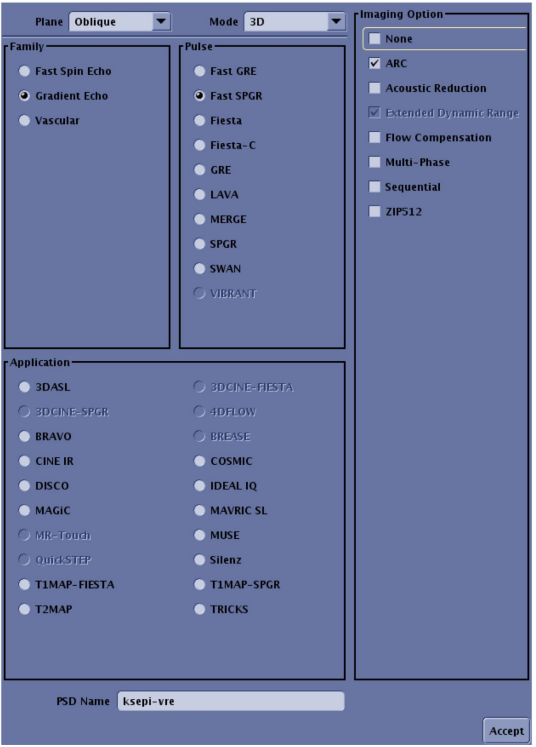


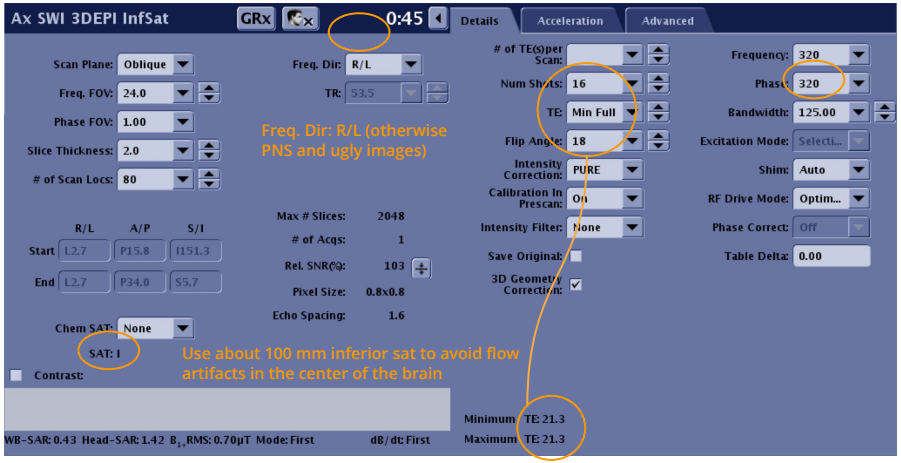


CV5 = 2: 1st volume acquired in here 2 shots (fully sampled k-space), while remaining volumes are undersampled as only the 1st shot is played out

SWI 3D-EPI

3D ksepi - SWI (3T)



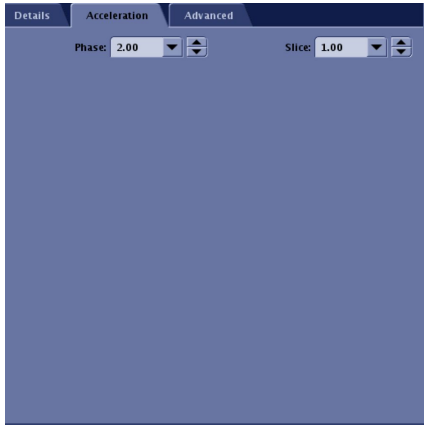


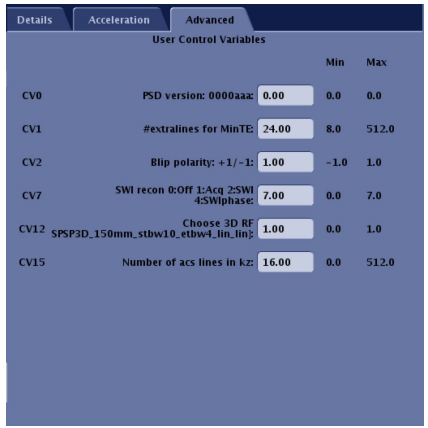
Use Bandwidth of 125 (or lower) to not overdrive gradients and for increased SNR

1.5T adjustments

- Bandwidth 83.33
- Num Shots 12
- Flip Angle 20

Minimum TE (bottom) should be about 35 ms



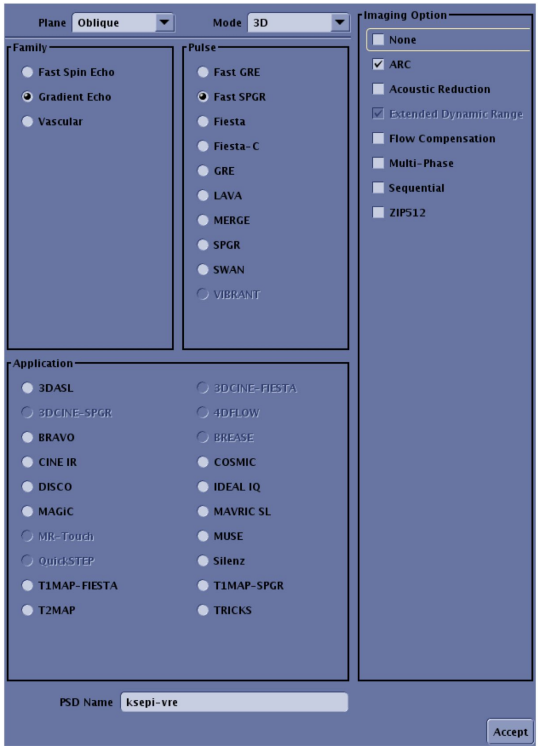


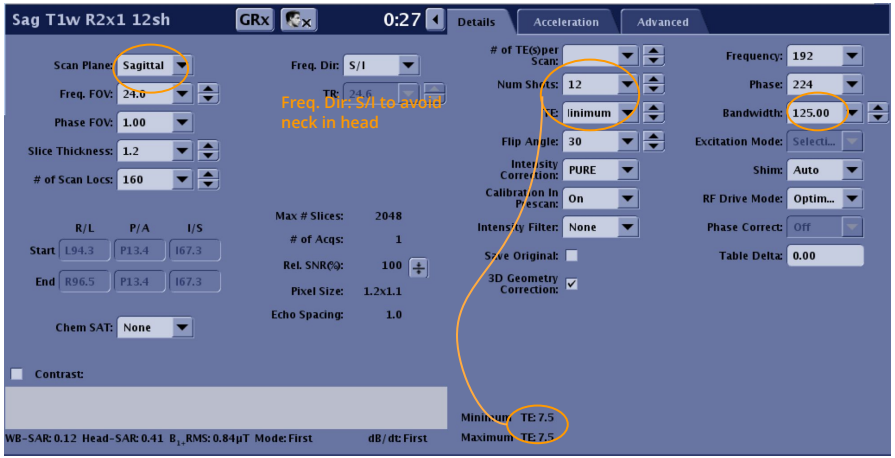
CV7: Bitmask. 2 will return just the SWI processed image. 1+2+4=7 will return acquired image, SWI processed image and filtered phase image

CV12: 1 for SPSP RF pulse optimized for 3D

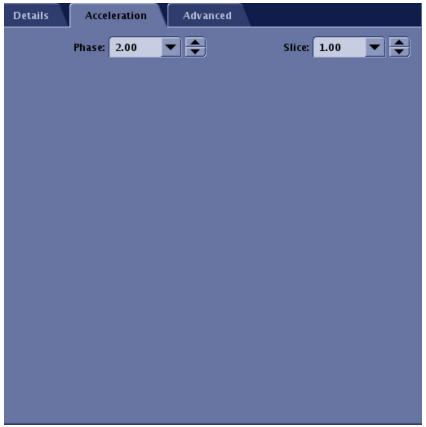
CV15: 8-16 are reasonably good values here

3D ksepi - T1w (isotropic)





Use Bandwidth of 125 (or lower) to not overdrive gradients and for increased SNR



CV7: Set to 0 since not SWI

CV12: 1 for SPSP RF pulse optimized for 3D

CV15: 8-16 are reasonably good values here

Matlab offline recon: recon_epi.m

- How to run (autodetects 2D vs 3D):
  - >> recon_epi
- Supports:
  - Mac, Linux, Windows
  - Pfiles (multivolume Pfiles) & ScanArchives
  - Diffusion & non-Diffusion, 3D-EPI
  - Multi-echo & multi-shot
  - ksepi.e (but also prod GE epi.e & epi2.e)
  - ASSET (deprecated)
  - Eddy current & motion correction (2D)