Revision Date: 5/17/2023

Siemens Prisma 3T MRI Scanner

User Guide

UCLA
Brain Mapping Center

Ahmanson-Lovelace Brain Mapping Center
University of California, Los Angeles

Revision Date: 5/17/2023

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BMC Contacts

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6. BMC Emergency ONLY Line: 323-999-1593		

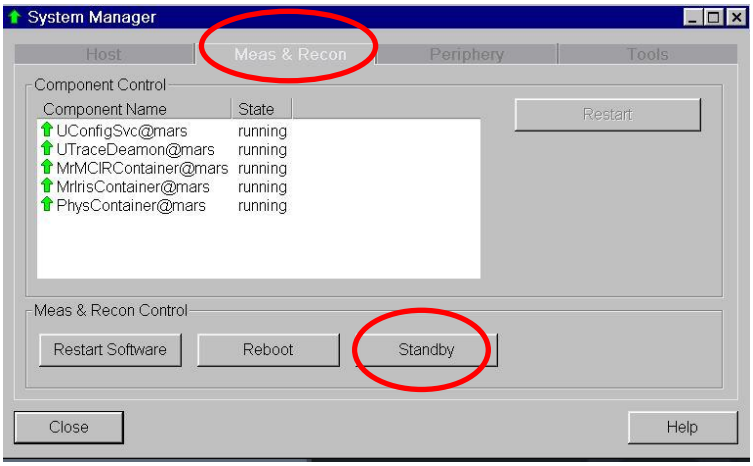
Scanner Operation

How to do a "Standby" Reboot

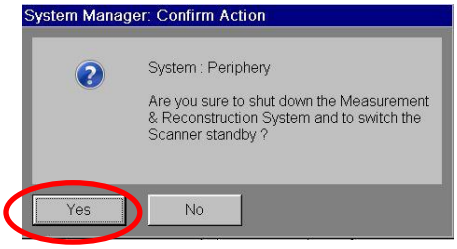
This type of reboot clears most errors and takes approximately 7-10 minutes

1. Make sure the scanner bed is at the home position (all the way up and all the way out)
2. If a coil is on the table, all elements should be plugged in
3. Click the "System" tab at the top of the screen
4. Click on "Control"

5. Click the "Meas & Recon" Tab
6. Click "Standby"



7. Click "Yes" to the pop up message if needed



8. The system will take 1-2 minutes to turn off – you will hear a "clunk" when the equipment shutdowns and the LCD above the bore in the scanner room will turn off

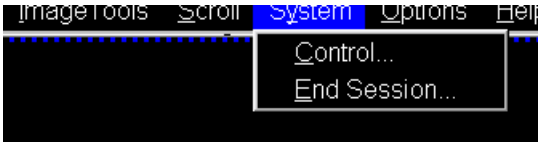
9. Wait a few seconds and then press the “system on” button on the Siemens scanner control box located on the wall next to the MR Scanner window

10. When the scanner starts booting up, the LCD screen in the scanner room will turn back on
11. It will take approximately 6 minutes for the system to completely boot up

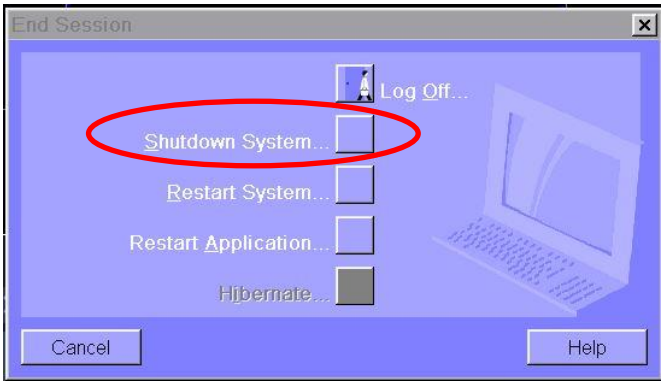
How to Turn Off the MRI Scanner/Computer (Full Shutdown)

This type of full shutdown takes approximately 20 minutes – try this method if a “Standby” reboot did clear the issue

1. Make sure the scanner bed is at the home position (all the way up and all the way out)
2. If a coil is on the table, all elements should be plugged in
3. Click the “System” tab at the top of the screen
4. Click on “End Session”

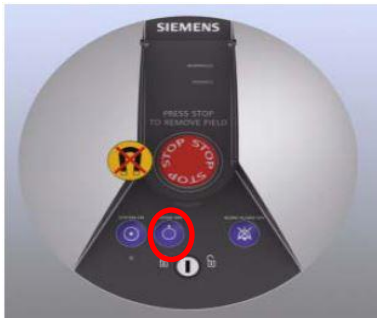


5. Click “Shutdown System”



6. It will take approximately 5 minutes before you see “it is now safe to turn off your computer”

7. Press the blue “system off” button on the Siemens scanner control box located on the wall next to the MR Scanner window
8. Wait 5min before turning the system back on



How to Turn on the MRI Scanner/Computer

1. You must first press the “system on” button on the Siemens scanner control box located on the wall next to the MR Scanner window

2. It will take approximately 15 minutes for the system to completely boot up
3. After a successful reboot you will hear 3 small beeps and the LCD will come back on

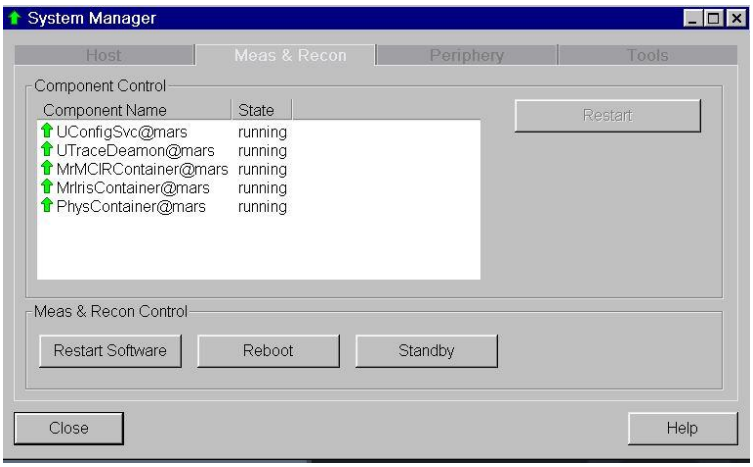
MR Scanner Error Save Log

1. Only do this if an engineer or tech tells you to make an MR save log.
2. This log entry helps the Siemens engineer isolate the scanner problem and expedite the system repair. To make a MR Save Log entry, you must do the following:
    - At the top of the screen – click system, then control, then tools
    - Click on “Save system log files”
        - You will see a box pop up with script on a black background, LEAVE THIS ALONE!
        - Another box will pop up where you can input the problem
        - Fill out the “User” section and then click OK
        - You must wait until the black pop box with script closes before you can proceed to reboot, scan etc
3. Please email BMCTechs@mednet.ucla.edu with details of the problem

How to Check the System Manager

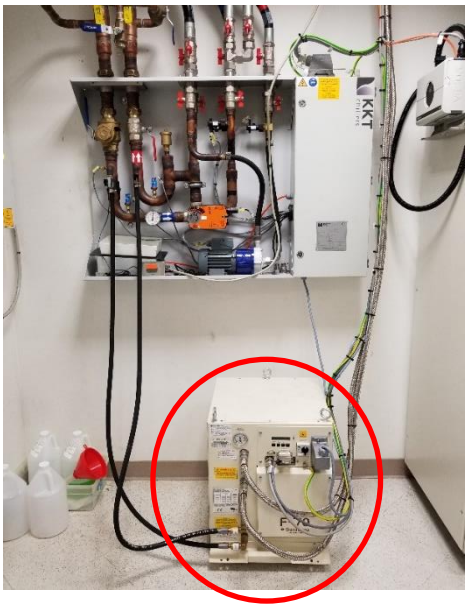
1. Click the “System” tab at the top of the screen
2. Click on “Control”

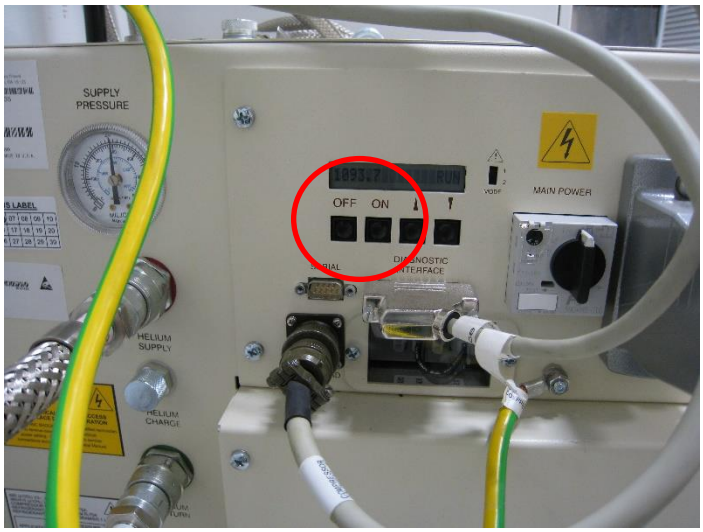
3. You will get a “System Manager” pop-up box - within the “System Manager” box you can check that the “Host,” “Meas & Recon ” and “Periphery” components are working properly



How to Restart the Coldhead

1. In case of a power-surge, or other problem, the Coldhead may need to be restarted
2. You will know the Coldhead has been shut off if you do NOT hear the steady “chirping” noise in the scanner room
3. Enter the equipment room (through the sliding glass door) and look at the south wall (as shown below)

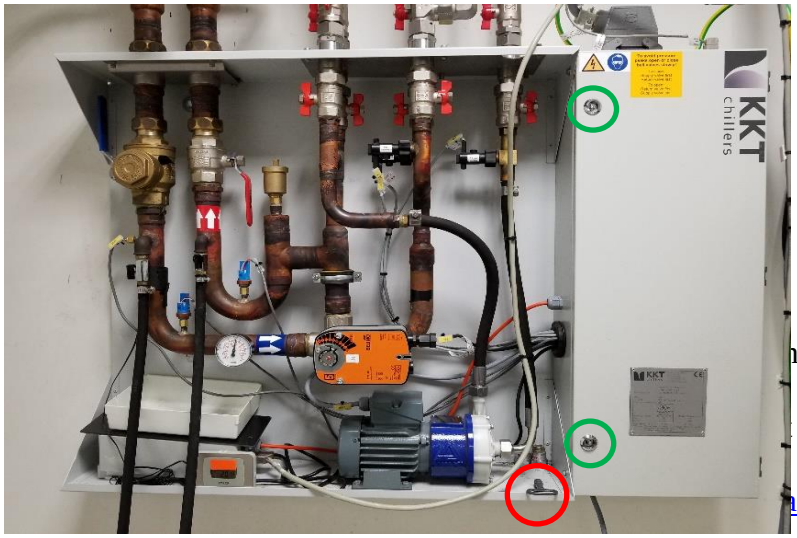


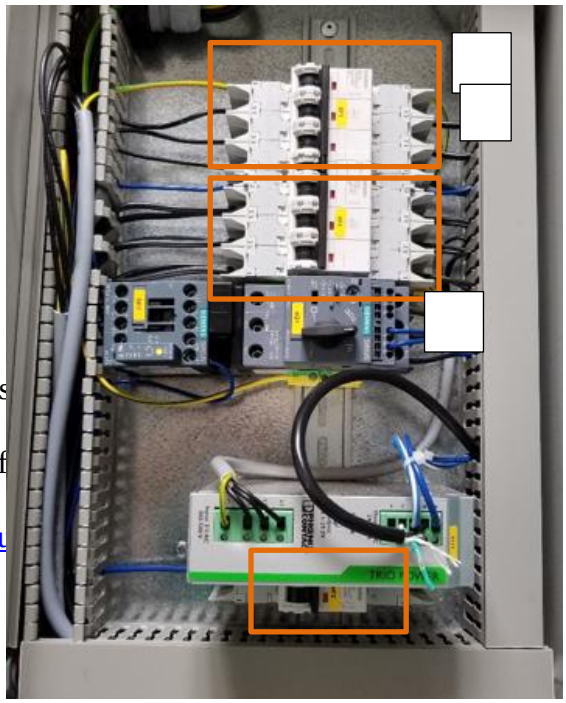


4. The coldhead is the white “box” next to the large cabinet
5. Walk over and look at the front of the coldhead and you will see the Coldhead controls (shown above)
6. Press the ON button and the Coldhead should turn back on
7. Please be sure to notify BMCTechs@mednet.ucla.edu and/or Dr. Woods if this occurs

How to Reboot the Chiller

1. Contact a tech before you do this (bmctechs@mednet.ucla.edu)
2. If you get “cooling errors” while scanning you can try to reboot the chiller to clear the faults, some examples include:
    - Cooling System: EPC Temperature High
    - Cooling System: Return Pressure Low
    - Cooling bypass
3. Enter the equipment room (through the sliding glass door) and look at the south wall (as shown below)
4. Locate the key to the chiller cabinet on the ledge (red circle)
5. Unlock the cabinet (green circles)





Re-import DICOM Data

How to Map a Dicom Network Folder on the Scanner Console to Re-import a Scan

1. Click control and click escape key
2. Click Advanced User and input password if not already logged in (contact techs for the password)
3. Click control and click escape key
4. Click Computer
5. Disconnect any other network drives that may still be mapped – right click on the drive and choose disconnect
6. Click on “Map Network Drive” on the top tool bar
7. When the box pops up choose an available drive, Z drive is the default, if it is being used choose the next available letter (i.e. Y, X, W etc) – DO NOT use drive M
8. Under “Folder” choose the path \\10.2.0.98\DICOM7 (or whichever dicom you are trying to access dicom7 is the current data directory)
9. Click on “Connect using different credentials" then click finish
10. Log in with your NRB credentials (don't forget the \bmap) before your name
    - bmap\username
    - Password
11. Navigate to your group folder and choose the participant folder that you want to import
12. Right click on the folder and click Copy
13. Now, open up Computer – then, Med System C: Temp/_User_Data (select a temp folder or create a new one)
14. Paste the copied files into the Temp folder
15. Now go to the Patient Browser – Transfer – Import from Off Line
16. A box pops up for you to browse the Temp folder
17. Select your Temp folder (i.e. C: Temp/_User_Data/Woods)
18. Select scan folder that you want to import
19. This loads the images/sequence to the patient browser
20. You can now export raw data or import sequences into your viewing card
21. When you are done, go to Computer right click on the drive you mapped and click disconnect - this will log you out

Export and Save Raw Data Files (.RDA and TWIX Raw)

How to Map a Non-Dicom Network Folder on the Scanner Console

1. Click control and click escape key
2. Click Advanced User and input password if not already logged in (contact techs for the password)
3. Click control and click escape key
4. Click Computer
5. Disconnect any other MRIFILE drives that may still be mapped – right click on the drive and choose disconnect
6. Click on “Map Network Drive” on the top tool bar
7. When the box pops up choose an available drive, Z drive is the default, if it is being used choose the next available letter (i.e. Y, X, W etc) – DO NOT use drive M
8. Under “Folder” choose the path \\10.2.0.98\ MRIFILE or enter the path name manually if this is your first time mapping the drive
9. Choose your group folder
10. This drive will allow you to save raw data etc into the network folder instead of on a usb drive
11. Click on “Connect using different credentials" then click finish
12. Log in with your NRB credentials (don't forget the \bmap) before your name
    - bmap\username
    - Password
13. When you are done close the non-dicom folder windows
14. Right click on the drive you mapped and click disconnect - this will log you out
15. If your non-dicom NRB account is not working – save the raw data on the C: Drive in Temp/_UserData/LabName/ParticipantID folder
16. Note – please remember to periodically delete saved data from your non-dicom folder and scanner console temp folder – data is not meant to stay in these folders indefinitely as there is limited space

How to Create a Spectroscopy .RDA File

1. Enable the advanced user mode (contact techs for the password)
2. Click control and click escape key
3. Pull the scan back from the server if necessary
4. Go to the spectroscopy tab
5. Click the file browser
6. Load the spectrum of interest in the spectroscopy tab
7. Then click on the spectrum you want to create an .rda file for
8. Click options on the tool bar
9. Then click export raw data
10. Copy and paste these files into a temp folder on the C drive - typically your group will have their own temp folder
11. You can then move/copy it to a flash drive or a non-dicom folder
12. This data does not get overwritten as long as you have the scan data

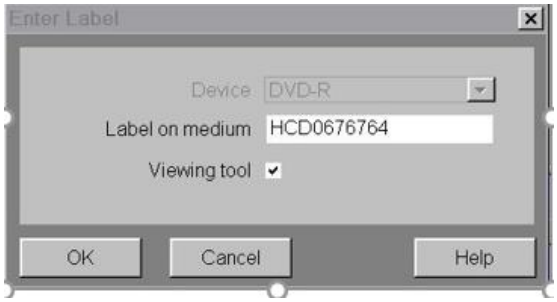
13. Data needs to be manually deleted from the temp folder and non-dicom folder

How to Transfer Raw Data Using TWIX Software

1. Enable the advanced user mode (you will need a tech for this step)
2. Click control and click escape key
3. Open the command terminal
4. Type: TWIX - then press enter
5. All raw data will be listed
6. Select the raw data you wish to save by choosing the correct participant ID and sequence
7. Right click on it and choose the top option "copy total raid file"
8. Copy and paste these files into your non-dicom folder (preferred method) or to a temp folder on the C drive (typically your group will have their own temp folder)
    - Temp files can then be copied to a non-dicom folder (preferred) or flash drive
9. Data needs to be manually deleted from the temp folder (within a few days) and non-dicom folders (within a few months)

How to Burn a CD From The Scanner Console

1. Open the second disc drive on the scanner desktop computer and insert a blank DVD or CD (must be –R)
2. Open the patient browser on the console once the blank CD has loaded (takes about 30sec)
3. Highlight the participant's parent level folder for the whole scan or any individual sequences you want to burn (use CTRL to highlight multiple seq at once)
4. Click Transfer and then Export to… (if Export is grayed out the CD hasn't loaded yet)
5. Choose DVD-R then click Export
6. Name the CD and make sure the viewing tool check box is checked
7. Click OK
8. When it is done click Transfer at the top of the patient browser and Eject DVD-R



Prisma Cleanup Procedures

General Cleanup Guidelines

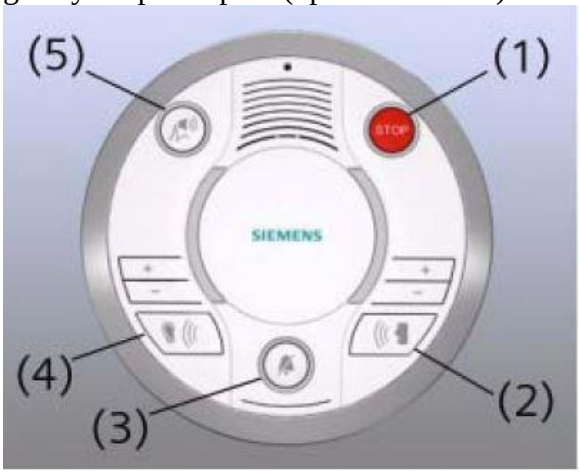
CLEAN ANYTHING THAT YOU OR THE PARTICIPANT TOUCHED

1. Put the head coil away in the coil cabinet with the top attached
2. All cables should be untangled and placed on the appropriate hooks completely off the ground to prevent being stepped on (please see below pictures)
3. All equipment (headphones, button box, squeeze ball, coil etc) that you used should be wiped down with Saniwipes to disinfect
4. The button response box should be disconnected and store in the appropriately labelled drawer
5. The squeeze ball should be coiled at the end of the bed
6. One sandbag should be left on the white cart
7. The white head cushion should be left on the bed or cart
8. The Opto box should be turned off at back of box
9. The Opto audio cable should be unattached from audio source and coiled up in the bungie hook
10. The trigger, LCD HMDI and EPI cables should be coiled and stored
11. The LCD switch box should be turned off
12. Everything is labelled for your convenience
13. Note: the top of the cart is a suitable place to set the top of the coil and/or mirror when you are setting up your participant

Squeeze Ball/Button Alarm

What to do when the Squeeze Ball/Button Alarm Goes Off

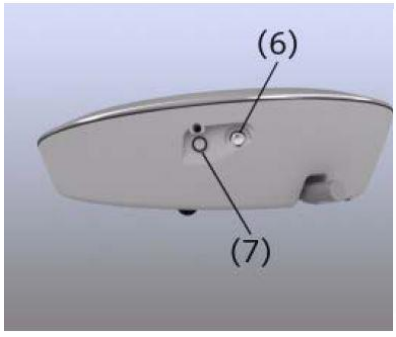
1. Stop the scanner using the mouse and clicking the stop icon in the lower left on the console screen
2. To clear the alarm, press the talk button on the intercom associated with the squeeze ball - Siemens (#2 talk or #3 alarm
3. Talk to your participant through the intercom system associated with the headphones you gave your participant (opto or siemens)



4. **DO NOT** press the "Stop" button (#1) on the Siemens Talk Box
5. If you press this, you will need to reset the table
6. To reset the table follow the below instructions

Reset the Table

1. Press the (#7) button on the side of the intercom box
2. Go into the scanner room and simultaneously press the Table Up and Table Down button



How to Run the Stability Warmup

Setting up the Phantom

1. This is no longer required before scanning
2. Place the phantom and phantom cushion inside the either the 20, 32 or 64 channel head coil (round end at top of coil)
3. Secure the top half of the head coil by clicking it in and plugging in cable(s) if necessary
4. Raise the table
7. Turn on the laser light and set the landmark
8. Slide the table fully into the scanner
9. Close and flip the air seal on the scanner door

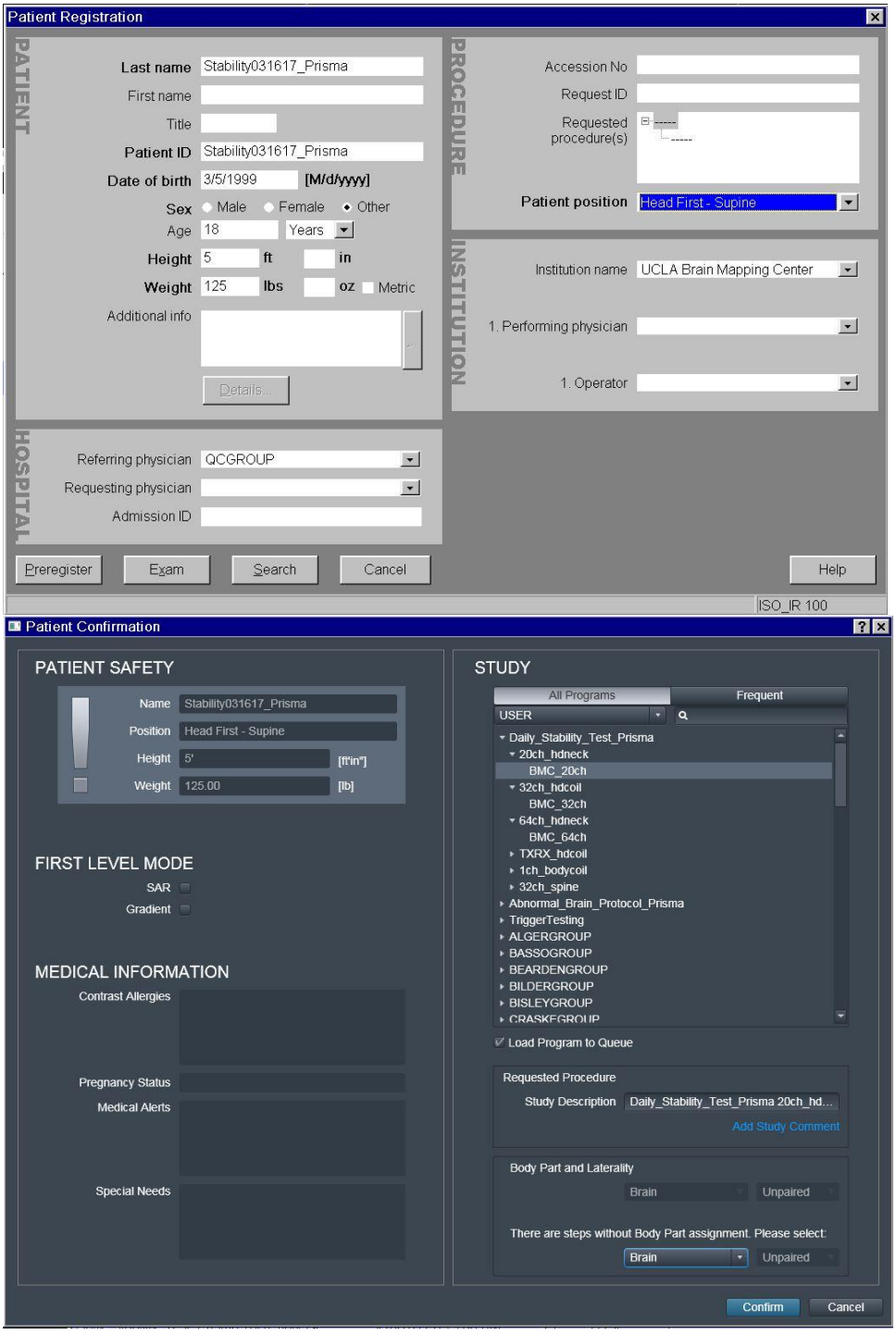
Register Phantom

1. Press the "little person" key on the keyboard to bring up the registration screen
2. Enter phantom information (all required fields are indicated in **bold** except required data destination= Referring physician)
    - **Last Name =** enter information in the following format – Stability-date-of-scan_name-of-scanner.
    - e.g. "Stability082609_Prisma"
    - **Patient ID =** copy the information from the **Last Name** field to the **Patient ID** field.
    - **Sex =** "other"
    - Age = "18"
    - **Height** = "5ft"
    - **Weight =** "125 lbs"
    - Referring Physician = select "QC Group"
    - **Patient Position =** select "Head First Supine"
3. Click "Exam"
4. Another box will pop up
    - Choose Study = Daily_Stability_Test _Prisma
    - Choose stability sequence based on the head coil you used (BMC_20ch, BMC_32ch or BMC_64ch etc)
    - Click "Confirm"

Running Scans

1. Press the green play button to start the first localizer
2. First stability sequence will open itself – center the box on the phantom and then click "the green check"
3. The other stability sequences will automatically copy the slice locations from the first stability sequence and will automatically start (you will not need to click continue)
4. When scanning is complete, remove the phantom/holder and place them securely in the phantom cabinet bin

Registration Pictures

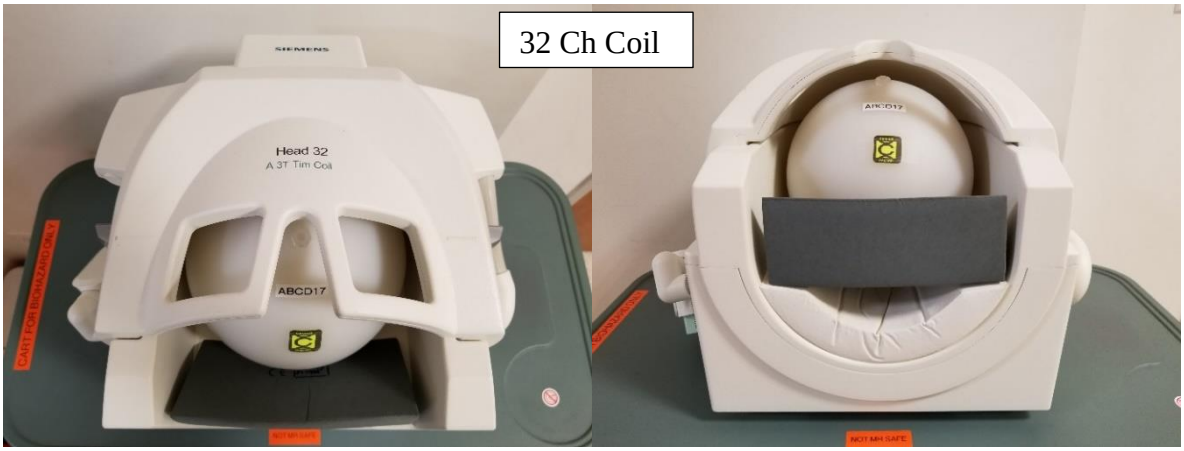


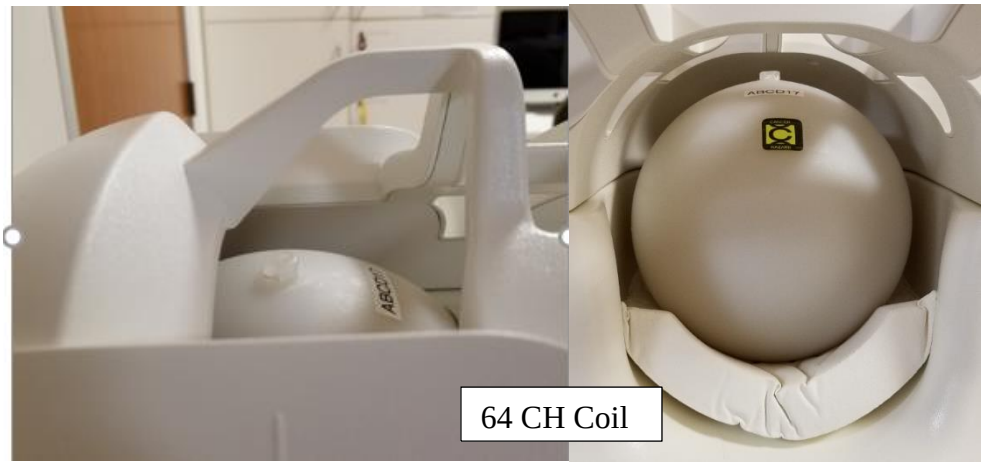
How to Run the ABCD Phantom QA

The ABCD phantom should be run at least once per week. The full version takes 29min and the quick version takes 16min.

Setting up the Phantom

1. Place the spherical ABCD phantom inside 32 (ABCD/HCP protocols) or 64 (Other) head coil on top of the white cushion
2. Place the gray cushion in front to secure the phantom (32ch coil only)
3. Cushions are located next to the phantom in the bin
4. The cap of the phantom should be center as if it were the nose – it should line up with the laser landmark line on the coil
5. Secure the top half of the head coil by clicking it in and plugging in cable(s) if necessary
6. Raise the table
7. Turn on the laser light and set the landmark to run through the cap
8. Slide the table fully into the scanner
9. Close and flip the air seal on the scanner door



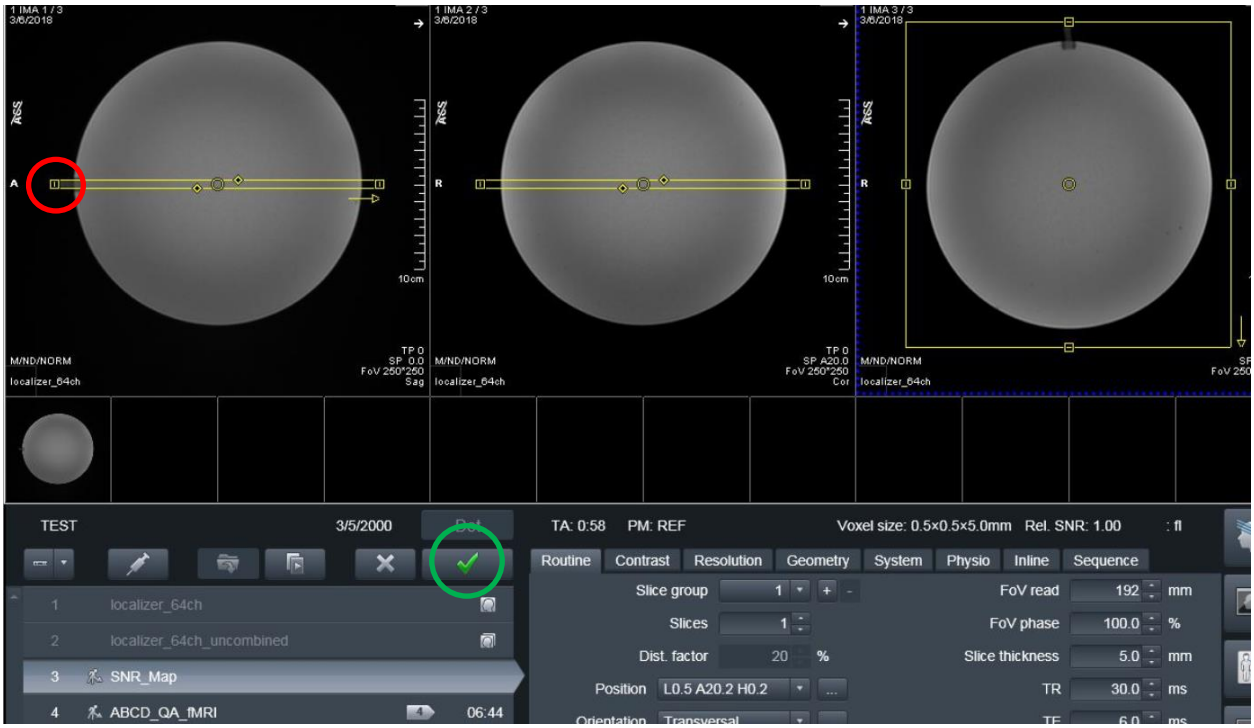


Register the Phantom

1. Press the “little person” key on the keyboard to bring up the registration screen
2. Enter phantom information (all required fields are indicated in **bold** except required data destination= Referring physician)
    - **Last Name =** ABCDPhantom017_32CH **or** ABCDPhantom017_64CH
    - **Patient ID =** copy the information from the **Last Name** field to the **Patient ID** field.
    - **Sex =** “other”
    - Age = “18”
    - **Height** = “5ft”
    - **Weight =** “100 lbs”
    - **Referring Physician** = select “ABCDPHANTOMGROUP”
    - **Patient Position =** select “Head First Supine”
3. Click “Exam”
4. Another box will pop up
    - Under ABCD choose the appropriate protocol:
        - ABCD_QA_full__32ch (29:04min)
        - ABCD_QA_quick__32ch (15:36min)
        - ABCD_QA_full__64ch (29:04min)
        - ABCD_QA_quick__64ch (15:36min)
    - Click “Confirm”

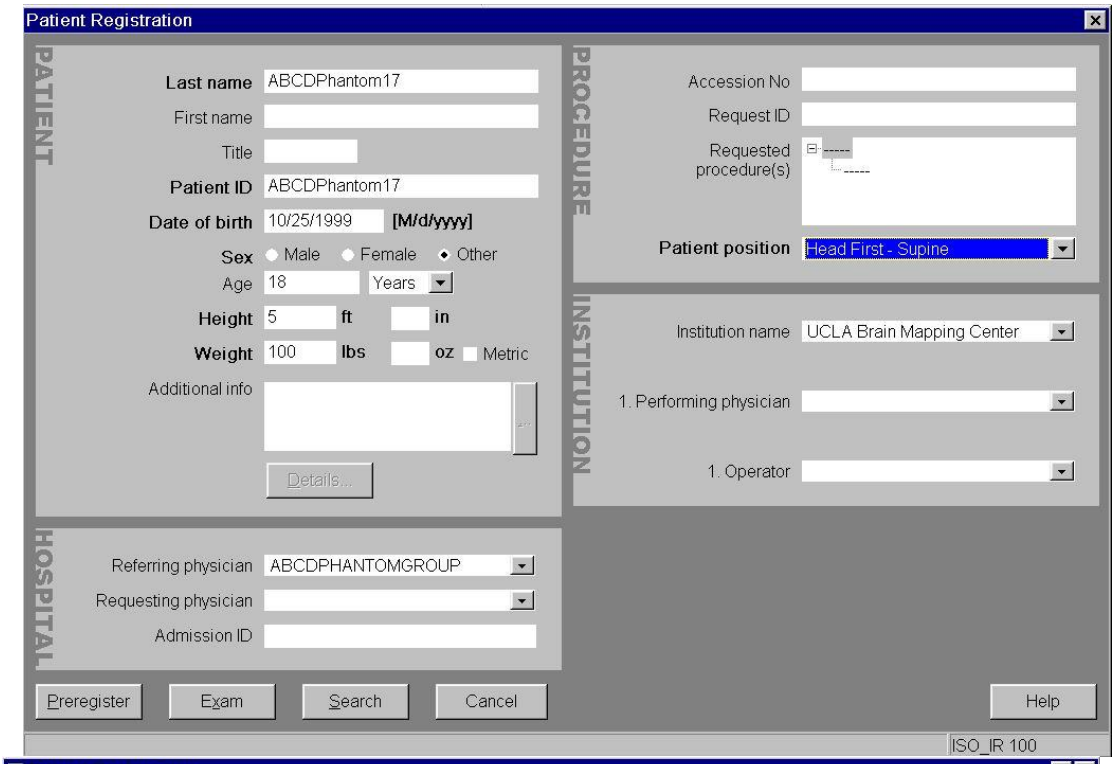
Running Scans

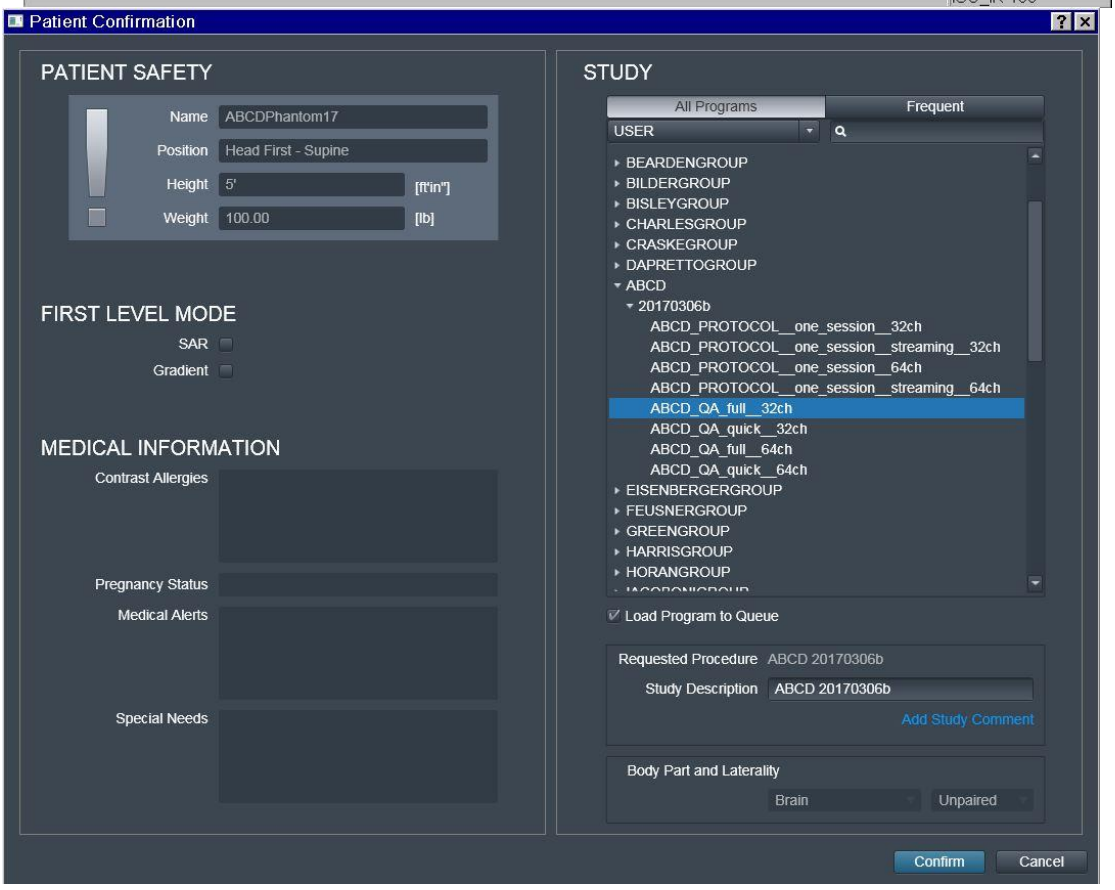
1. Press the green play button to start the first localizer
2. Set up sequence #3: SNR_Map by centering the yellow box on the phantom – it should be placed right through the cap (the cap is circled in red below) then click the green check (green circle)



3. Set up sequence #4 by centering the yellow box on the phantom – click the green check
4. Press ok to the "Stimulation Monitor Warning" that will pop up after #3 finishes running – you can step away to let the sequences auto run after this step
5. The rest of the sequences will automatically copy the slice locations from #4 and run automatically
6. When scanning is complete, remove the phantom/cushions and place them securely in the phantom cabinet bin

Registration Pictures





How to Trigger Test Stimuli/Tasks

Setting up the Phantom

1. Place the phantom and phantom cushion inside the 20ch head coil (round end at top of coil)
2. Secure the top half of the head coil by clicking it in and plugging in cable(s) if necessary
3. Raise the table
10. Turn on the laser light and set the landmark
11. Slide the table fully into the scanner
12. Close and flip the air seal on the scanner door

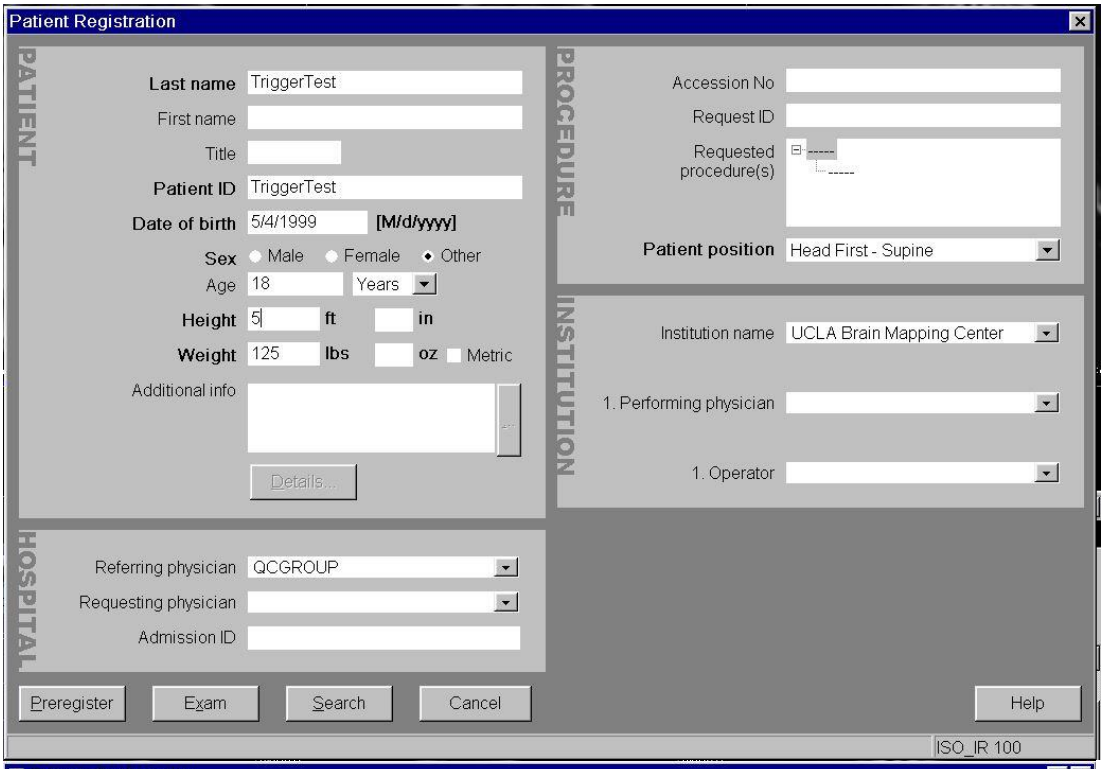
Register Phantom

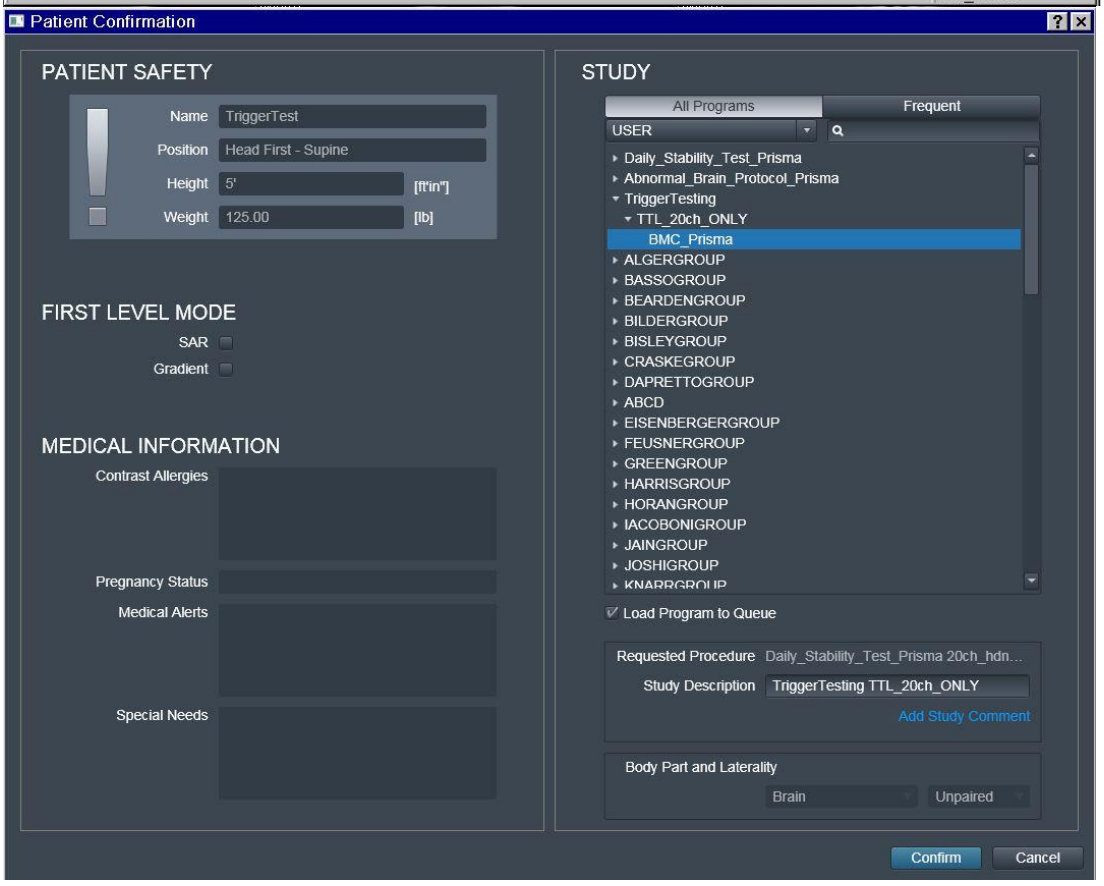
1. Press the "little person" key on the keyboard to bring up the registration screen
2. Enter phantom information (all required fields are indicated in **bold** except required data destination= Referring physician)
    - Last Name = *TriggerTest*
    - **Patient ID =** copy the information from the **Last Name** field to the **Patient ID** field.
    - **Sex =** "other"
    - Age = "18"
    - **Height** = "5ft"
    - **Weight =** "125 lbs"
    - Referring Physician = select "QC Group"
    - **Patient Position =** select "Head First Supine"
3. Click "Exam"
4. Another box will pop up
    - Choose Study = TriggerTest
    - Click "Confirm"

Running Scans

1. Double check the sequence to open and then click the "the green check" to start the shim
2. When you are ready to trigger your task please the continue button
3. Don't forget to plug the trigger cable into your computer
4. When scanning is complete, remove the phantom and place it securely in the phantom cabin

Registration Pictures





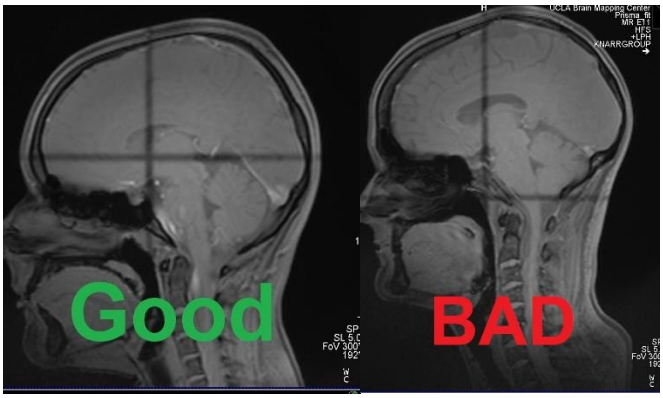
Quality Assurance: How to Check Your Scan Data

EVERY sequence should be checked after completion for quality assurance. They can be opened in the viewing tab or 3D tab for T1 and T2 sequences.

The techs will try to show everyone how to properly QA data as it is collected. Next time you are scanning please feel free to ask for a lesson. Good scanning technique means reviewing every sequence as you collect them!

Check Your Localizer

1. If you are running HCP/CMRR localizers, it is very helpful to review the **first** localizer (not the one called localizer aligned) to confirm a good head position within the magnet

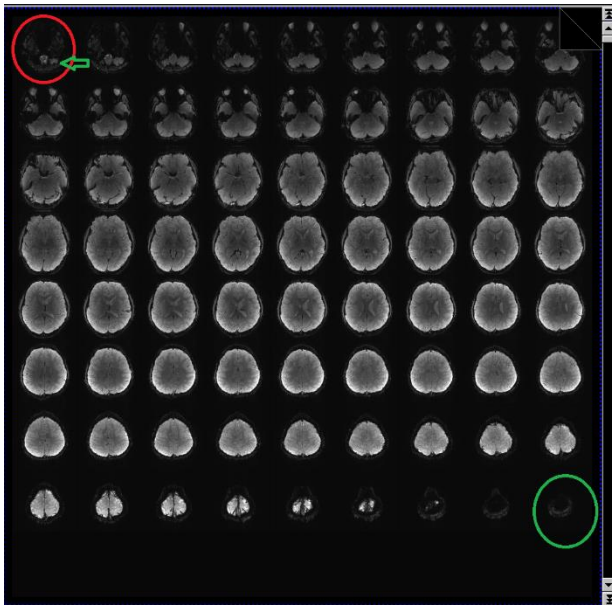


2. If you think of the brain as a full circle, the cross hair should be roughly in the middle. A little off top to bottom is ok, but it should not be outside of the brain
3. If it is outside the brain, then the participant was not "landmarked/lasered" properly
4. If this happens stop the scan as soon as you see the issue (should be within first min of scanning), re-laser, close the participant, re-register at second folder level and start again
    - It is important to re-register so you don't get autoalign issues from running a second localizer
5. The laser line should be roughly at the participant's eyebrows
    - This position should correlate, if possible, with the line on the side of the coil
    - If the participant's anatomy can't be matched up with the line due to a short neck etc, then laser to the participant's eyebrows only (not to the coil line)
    - BUT do your best to match them both up by having participant move up or down accordingly if possible

Verify Full Coverage of the Brain

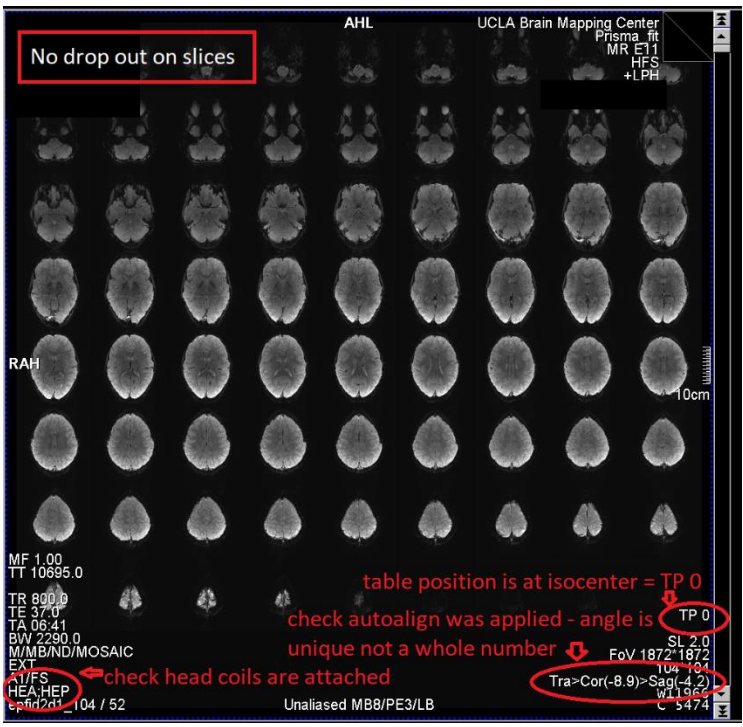
1. After loading your sequences into the viewing tab, verify that you have full brain coverage from the top of the head to cerebellum
2. To do this review the first and last slice
    - If the participant moved up or down too much you will start to lose either the top slices of the brain or the bottom slices (cerebellum)

- If the participant moves to the point where you are cutting off the top or bottom structures, stop scanning and fix the positioning
- If the position is only slightly off, you can just rerun your ‘localizer block’ to update autoalign
- If they have moved a lot, then you will need to go in the scanner room and reposition/re-laser them in the coil
- IMPORTANT: With either method you MUST re-register your participant at the second folder level to avoid the autoalign glitch
- After you re-register repeat all 5 localizer scans if using HCP/CMRR sequences (loc, autoalign, loc aligned and 2 spin echoes)
- Then delete any sequences you have successfully completed and continue where you left off
- In this picture, you will see the bottom slice (red circle) still has a little bit of cerebellum in it
    - Ideally there would be only brain stem showing, but this is usable
    - The top slice (green circle) should be basically empty



Check for Dropout in Your Slices

1. Verify there is no dropout/fading throughout your slices
2. If using CMRR/HCP sequences always check your SBref for dropoff and stop and repeat the scan if you encounter dropout
    - A bad sbref scan will contaminate the rest of the sequence



Check to Make Sure Your Head Coils Are Attached

1. 32 ch: HEA HEP
2. 64 ch: HC1-7 or HC1-7;NC1,2 if using neck elements
3. 20ch: HE1-4
4. More info on head coil warnings

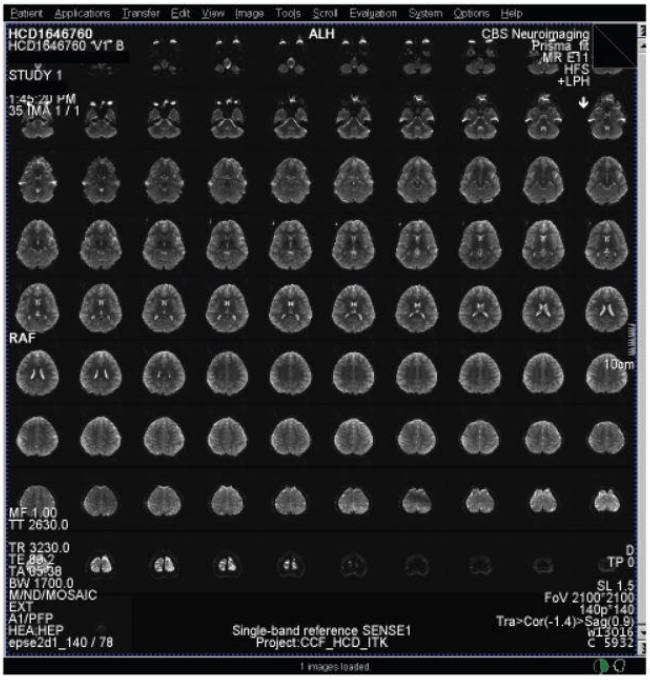
Check That the Table is at Isocenter

1. It should say TP 0

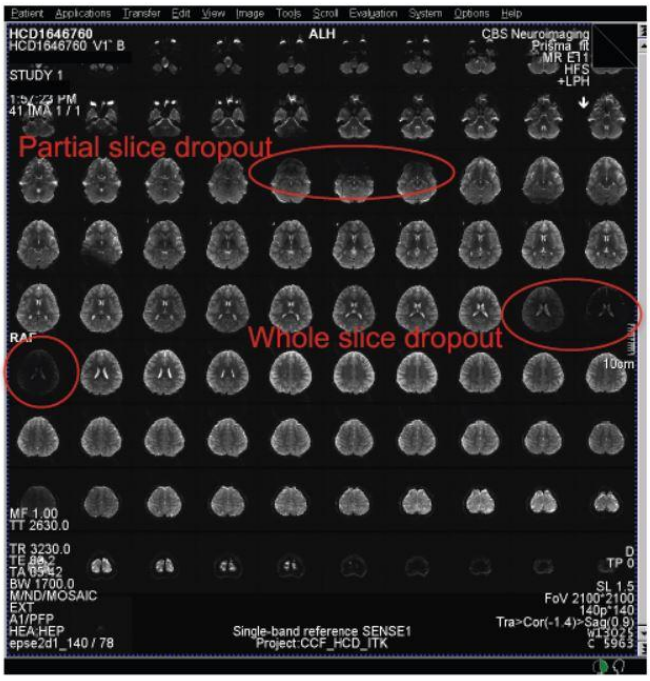
Check Your AutoAlign Angle

1. Angles should be check for all sequences except localizers and spectropscopy
2. It should show a unique angle like Tra>Cor (-8.9)
3. If it says sag/sagittal or transverse or T>C -16 then autoalign was not properly applied as these are default values

Good SB Ref



Bad SB Ref

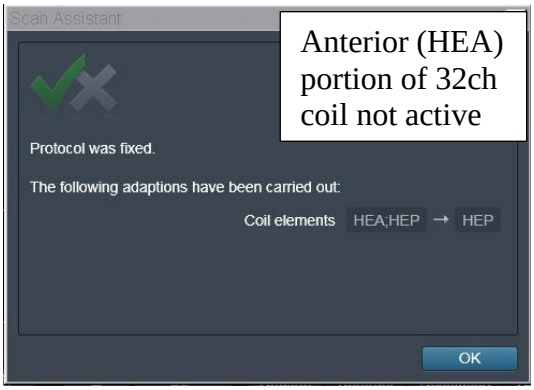


Coil Warnings - Protocol Was Fixed

If you see warning messages while scanning, please read the message and address the issue. **DO NOT** just click "OK". Ask a tech for help if you are uncomfortable with resolving the issue on your own. Please be vigilant, as we do not refund scans for this type of error.

Main Reasons for Coil Warnings

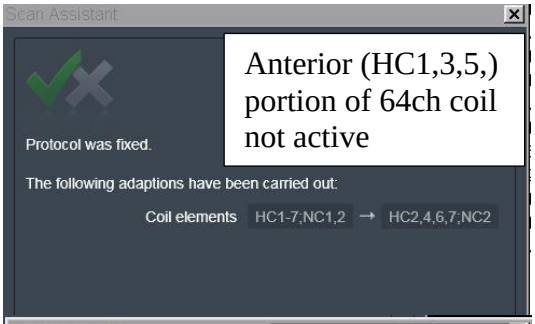
1. The coil wasn't plugged in at all or properly
2. The participant was registered and the protocol was loaded into the exam card before plugging in the coil
3. You put the wrong coil on the table



Anterior (HEA) portion of 32ch coil not active

Anterior or Posterior Protocol Fixed Warning Messages

1. The pop-up message will let you know that it is turning off the elements that are not plugged in properly
2. If you click "OK", you will be approving this change and you will lose signal from that part of the coil
3. Data collected in the manner will be suboptimal and most likely unusable



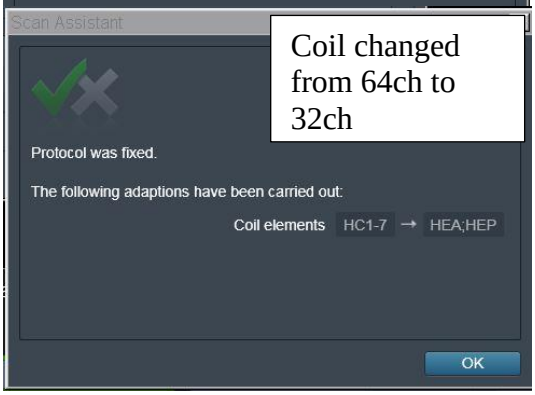
Anterior (HC1,3,5,) portion of 64ch coil not active

Resolution

1. Check the coil plugs
2. Reseat the plug if necessary
3. Make sure the LCD screen displays the anterior and posterior elements
4. Close your patient
5. Re-register the participant and try again

Wrong Coil Protocol Fixed Warning Messages

1. The wrong coil was put on the scanner bed
    - The message will let you know that it is changing the coil to the one you put on the scanner bed
    - Your data will not be "bad" per se, but you won't be using the proper coil for your study
    - **Resolution:** change the coil, close and re-register your participant
2. The protocol was not setup for the correct coil
    - The message will let you know that it is changing the coil to the one you put on the scanner bed
    - **Resolution**: this is the only scenario where it is ok to click "OK" and proceed
    - Let a tech know your protocol is setup with the wrong coil so it can be fixed



Coil changed from 64ch to 32ch

- Check which coils are turned on in the system card of the sequence after the system auto detects the new coil to make sure they are correct
- Note – if you are using the 20ch or 64ch coils the neck elements “NC” do not need to be on unless your study requires neck imaging

Prisma VE11C Software Bugs

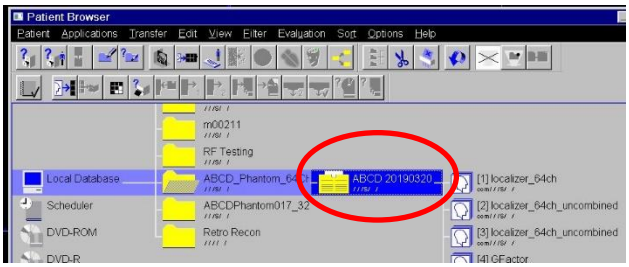
This is a list of known software bugs/glitches. If you encounter any other suspected issues, please report them to bmctechs@mednet.ucla.edu and during study reporting.

AutoAlign Re-Run Failure

This glitch **ONLY** happens if you run a second autoalign localizer/scout OR when you bring over new sequences from the program card after already loading your protocol, but before running your autoalign sequence. For example, if the subject had to come out to use the restroom or be re-positioned etc. OR you need to bring over another sequence from another session etc.

- ***This is a siemens software glitch – all sequences that use autoalign are susceptible (it is not limited to CMRR/HCP sequences)***
- **Siemens has been informed of this AA glitch and reported they will not be fixing it, so we will have to be vigilant in order to collect quality data.**
- For those of you who have scheduled breaks built into to your study we highly recommend that you turn on or make sure the working man is turned on for all post break sequences
- The below linked SOP was made specifically for the HCP study, but it will give you an idea of what to look for in a more detailed layout
    - AutoAlign Glitch SOP

Re-register workaround if you need to rerun a localizer:
If you require an attentional autoalign scout for any reason you **MUST** re-register your subject at the **second folder** level



1. Close your patient
2. Open the browser
3. Find your participant and click/highlight the second folder tree
4. Then press the registration button on the keyboard
5. This will repopulate your participant info except for patient position – choose that and then proceed as normal
6. After you re-register repeat all 5 localizer scans if using HCP/CMRR sequences (loc, autoalign, loc aligned and 2 spin echoes)
    - If using non-HCP/CMRR just rerun any localizers or spin echoes that you use
    - If must rerun spin echoes or field maps at the new position or they will not match your data's new localization
    - Note: T1 and T2s generally should be collected at the same localization block
    - Note: Pairs of DTI or Tasks (AP/PA) should be collect at the same localization block
        - This means, if you rerun locs after DTI_AP but before DTI_PA you will need to rerun AP as well
7. Delete any sequences you have successfully completed before the rerun and continue where you left off

Workaround for adding additional sequences after you have already loaded the queue

1. Examples of adjustments you may need you make:
    - Adding additional sequences from the program card after the initial load
    - Appending sequences to make a copy
    - Making a copying a sequence in the queue
    - Using re-run from here in some cases
- If you need to do any of the above, the easiest way to avoid this specific glitch is only make edits to your protocol queue after you finish running the autoalign scout sequence
- If you bring over/edit sequences before you start scanning or after the initial localizer, but before the autoalign scout you may be vulnerable to encountering the autoalign glitch

AP/PA Copy Reference Issue

If you are using Siemens product sequences with different phase encoding directions (e.g. AP then PA), you MUST NOT use the copy reference option. This glitch will change your second PA sequence to RL. This glitch does not affect CMRR, HCP or ABCD sequences as the phase encoding direction is controlled on the special card instead of the routine parameter card.

Workaround:

1. You must manually input the angle for each sequence if you are manually prescribing your FOV
2. If you use autoalign and DO NOT manually adjust your FOV in any way then your scans will not be affected and there would be no need to use copy reference

    ***This glitch has been reported to Siemens, but there is no way to know when and if there will be a fix.

Reconstruction Error (aka Blob error)

This intermittent issue causes the data to not reconstruct. The scanner will acquire the data and it will even show up in the inline display, but it does not create the reconstructed saved images.

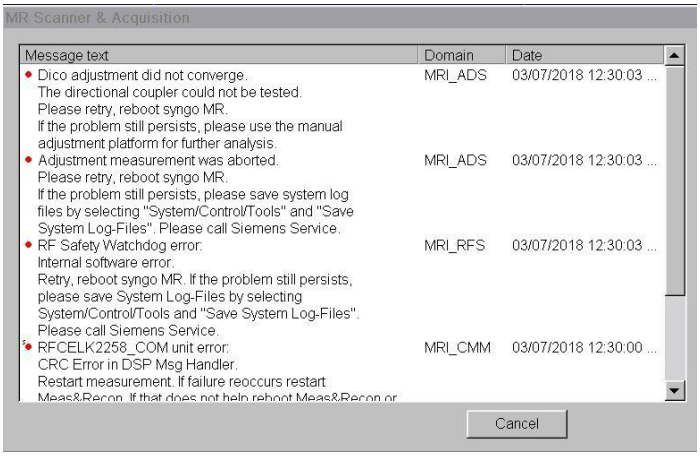
Workaround:

1. The only way to confirm that the data has reconstructed is to review your data in the browser
2. If it populates in the browser then it should be ok, however, as good general practice we also recommend pulling it into the viewer to QA each sequence
3. This glitch has only happened 3 times so far at BMC, but it has happened at many other prisma sites as well, so please be sure to check your data as you are acquiring
4. If this error does occur, you must stop scanning and do a standby shutdown on the scanner to fix the glitch
5. Note, this will not recover the data so it is important to check each sequence as you go

    ***This glitch has been reported to Siemens, but there is no way to know when and if there will be a fix. This issue has not occurred since Dec 2017.

Prisma VE11C Scanner Warnings/Messages/Errors

Adjustment Measurement Was Aborted

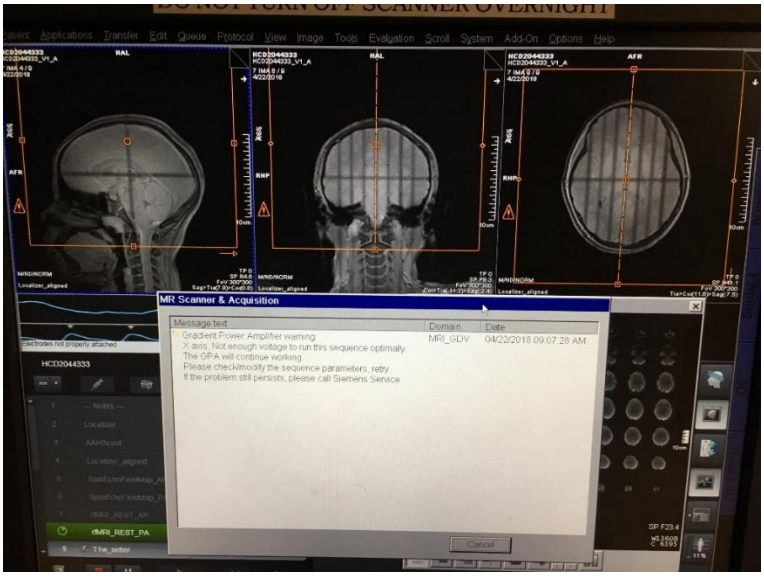


- If you ever encounter any kind of adjustment error try to see if the scanner will let you continue scanning by clicking ok on the error and re-running the sequence
- You can also try running a simple sequence like a localizer first, removing and re-plugging the coil and then re-lasering the participant
- Make sure you re-registered after if you try these methods
- If you still can't continue then perform a standby shutdown which takes about 5-7 min
- Some examples are show below
- Please submit the issue as an equipment failure during study reporting
    - Critical if you weren't able to collect some or all of your data and
    - Minor if you were able to complete the scan after fixing

Gradient Power Amplifier Warning

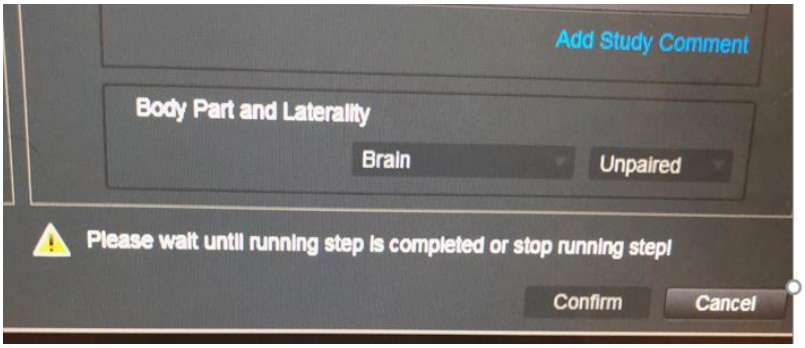
If you ever seen the below warning/orange FOV box,

1. Check your first localizer to ensure the participant's brain is positioned correctly at isocenter – the cross hair should be center in the brain in the head to foot direction (see below pic)
2. If it is, then it is safe to continue scanning as is, but please alert bmctechs@mednet.ucla.edu
3. If it is not, stop scanning, re-laser your participant to their eyebrows, close the patient, re-register and start again

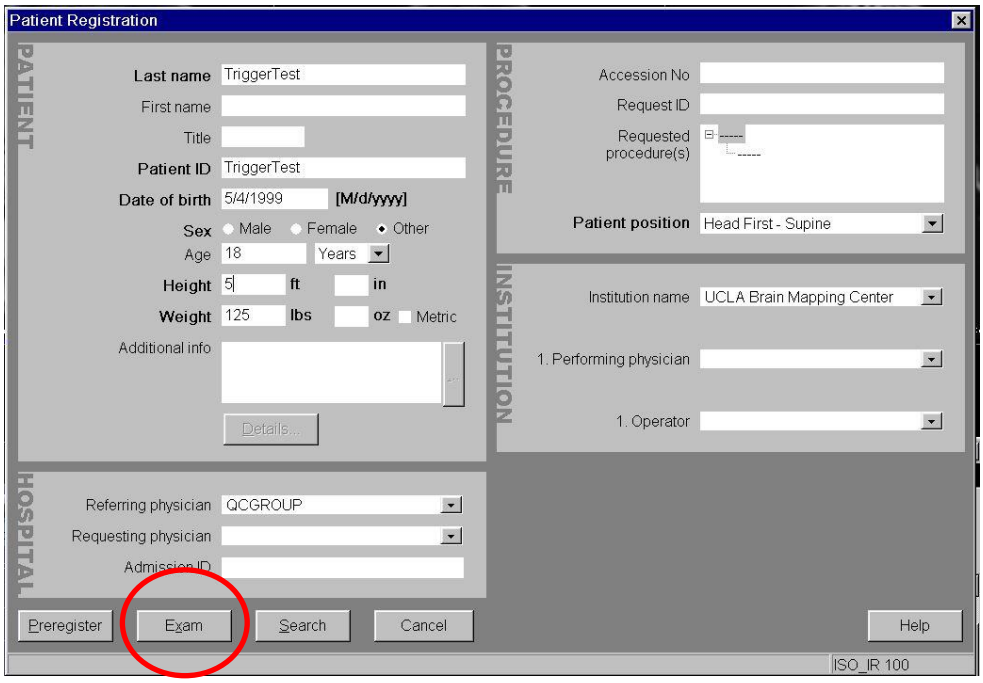


Participant Registration Errors

1. You cannot confirm your registration due to the below error
    - This happens when there are still active sequences in the Exam Card
    - Go back to the Exam card and stop (red square) or Skip (>) the remaining sequences in the queue
    - This happens when a participant aborts a scan early or the group runs out of time and stops scanning before their protocol is complete
    - Also note, you will not be able to close the patient on the Exam card until the sequences are stopped, skipped and/or deleted



2. The registration exam button is grayed out so you cannot click it
    - This means you have forgotten to complete a required field
    - Required fields are in bold
    - NOTE: “Date of Birth” is bold, but we use “Age” instead – please do not input a DOB – once you input the age a general DOB will be generated
    - NOTE: Referring Physician is not bold but is required to access your data



Preparation Scans (aka dummy time)

Preparation Scans (dummy time) for CMRR/HCP Multiband Sequences

Dummy time for CMRR/HCP MB sequences is always 10 sec

Preparation Scans (dummy time) for Regular BOLD Sequences

1. To ensure that a steady-state magnetization is achieved when multiple averages or measurements are acquired, a number of preparation scans are performed at the start of the measurement
2. The number of preparation scans is set within the sequences, and chosen so that the preparation time is longer than 3 seconds

    - TR = 500 ms 7 preparation scans
    - TR > 501 ms 6 preparation scans
    - TR > 601 ms 5 preparation scans
    - TR > 751 ms 4 preparation scans
    - TR > 1001 ms 3 preparation scans
    - TR > 1501 ms 2 preparation scans
    - TR = 2000 ms 2 preparation scans
    - TR = 2500 ms 2 preparation scans
    - TR = 3000 ms 2 preparation scans
    - TR > 3001 ms 1 preparation scan

3. The preparation scans result in a longer scan time for the first measurement in a time-series acquisition, which should be taken into account when performing BOLD imaging
4. The sequence does not send external trigger pulses when performing these preparation scans, so that they do not have to be considered when triggering external devices for stimulus presentation in BOLD imaging studies
5. This formula does not apply to multiband bold sequences
6. Turning iPAT on will add 1 additional prep scan
7. Turning introduction “on” will add 1 additional prep scan

Slice Timing for BOLD Sequences and other BOLD Questions

1. When EPI slice are collected in a mosaic/volume, are they interleaved or sequential?
    - Interleaved (that is the default)

2. When collected interleaved, are all the odd numbered slices collected first?
    - It depends on the number of slices in the group
    - If there are an even # of slices then even numbered slices are collected first
    - If there are an odd # of slices then odd numbered slices are collected first

3. Is slice #1 always at the “lowest” part of the brain and the last slice at the top?
    - The default “image numbering” in the transversal/axial plane is F>H - so the bottom slice is acquired first

4. Regarding the timing of slices, is the scanner set to collect slices in an equidistant fashion within the TR time or as fast as possible?
    - Within the TR time

How to Manually Trigger Stimuli

The below video will show you how to manually trigger your stimuli if the auto trigger fails to work.

https://uclahs.box.com/shared/static/zycfw0utds7eibdq2t4z9gpowqftoih9.mp4

Current Designs Button Box and Trigger Setup (FORP 932)

There is no on/off switch and this device does not need to be unplugged

Device Selection

1. **DO NOT** set the interface settings until you plug in the button box inside the scanner room – the button responses will not work
2. Note - you do not need to plug in a box if you only need a trigger – just choose your interface setting with appropriate trigger (5s or Ts)
3. Click dial in once and scroll to yes in “change modes” menu and click dial once
4. Scroll to “autoconfigure” and click dial once
5. Scroll to “usb” and click dial once
6. Below is a list of available devices – autoconfigure will automatically choose the box that is connected in the scanner room
    - HHSC - 1X4-L - buttons straight in a row
    - HHSC - 2X2 - split boxes, you may use just one box if applicable
        - Left box sends dnwe or 9876
        - Right box sends bygr or 1234
    - HHSC – 2x4 - curved row of buttons, you may use just one box if applicable
    - HHSC Joy-1 joystick (older model than what is on the current designs website)
    - HHSC TRK-1 trackball
7. You may see other devices listed that are not available, contact BMC Techs for more info
8. Once you have selected your device, you will see the “Response Settings” menu

Response Settings

1. Scroll to applicable setting and click dial once
2. "KEY" sends the button press signal as soon as the button is pressed but ***stops sending the button press signal immediately after sending it once***
    1. HID KEY BYGRT - use this for letter responses and T is the trigger
        - this is the same as 0 setting on previous interface box
    2. HID KEY 12345 - use this for number responses and 5 is the trigger
        - this is the same as 4 setting on previous interface box
3. "NAR" sends the button press signal as soon as the button is pressed but ***keeps sending the button press signal until the button is physically released***
    1. HID KEY NAR BYGRT - use this for letter responses and T is the trigger
        - this is the same as 2 setting on previous interface box
        - this setting is often required for psycho tool box in matlab
    2. HID KEY NAR 12345 - use this for number responses and 5 is the trigger

4. HID KEY 1-9 No 5 - for MacStim users: no trigger will be sent, must manually start scan
5. On the small screen you will see the "setting description" which includes the device selected as well as the response setting selected
6. Be sure to plug in the trigger cable before starting your stimuli
7. Set the interface back to the "autoconfigure" menu after scan

Troubleshooting

Button Response and Trigger Interface Box

A. Button responses are not coming through
   1. If the button response lights (red circle above) on the interface are visible, but your computer is not receiving the responses then
      - Check to make sure the trigger cable is plugged into your computer
      - Check to make sure you have chosen the correct response setting (12345 or bygrt)
   2. If the button response lights (red circle above) are not visible on the interface
      - Check to make sure the correct button box is plugged in inside the scanner room
      - Make sure your participant is pressing the buttons

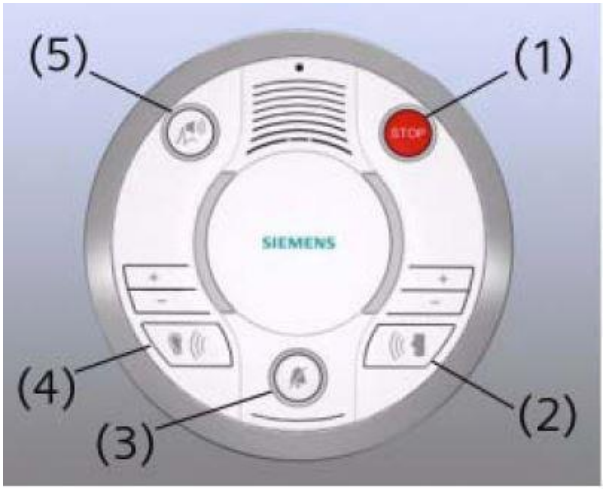
B. The task is not triggering
   1. Make sure the trigger cable is plugged in to your computer
   2. Make sure the interface is set to the appropriate trigger value in your script (5 or T)
   3. Make sure you started the scan and waited long enough for the dummy time to complete– the trigger light (green square above) on the interface will blink once triggers are being sent so you can watch for the signal
   4. Make sure you are on the correct screen on your computer for the task to begin (sometimes you may need to advance to another screen)
   5. Check your script
   6. Check the trigger cable connection on the interface box to make sure it is secure
      - the blue circle on the below picture shows where it connects in the back of the interface box – it does not lock in place or screw in, so just push on it gently to make sure it is seated on the connector
      - the yellow square is the other end of the connection – this should not come loose as it screws in, but you can also check it to make sure it is connected
      - BE VERY careful not to unscrew/loosen anything else – DO NOT remove box from velcro

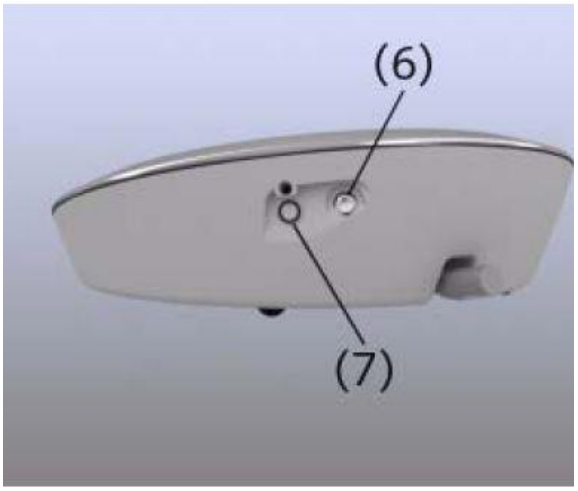
C. USB is flashing on the interface LCD screen
   1. This indicates the USB trigger cable is not plugged into your computer

D. It looks like buttons are being held down because the button interface lights are on
   1. Check the interface settings first – it is likely that the interface is set for the wrong box (i.e. 2x2 instead of 1x4 etc)
   2. Ask the participant if they are pressing/holding down the buttons
   3. Check the actual button box to see if something is pressing against the buttons

E. Interface Menu Issues
   1. If you get “lost” in the menu, just scroll down to “back” until you get to the proper men

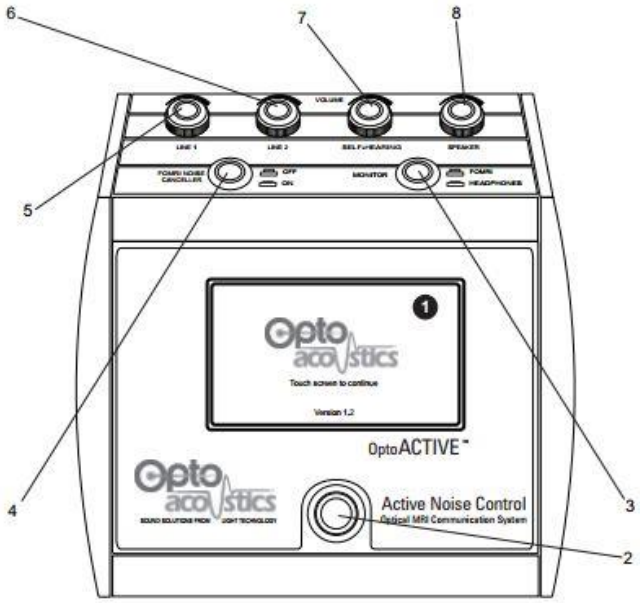
Siemens Talk Box Setup





1. You must use the Siemens talk box to talk & listen to your participant if you are using the Siemens headphones, inner ear headphones or no headphones
2. You must also make sure that the volume on the scanner's control panel is turned up so the participant can hear the stimuli computer
3. Press the "ear" button (#4) to hear the participant
4. This is the sound that comes from bore speaker - you can use this to listen even if you are using the opto headphones
5. Make sure the sound is turned up
6. Press the "talk" button (#2) to talk to the participant
7. Make sure the sound is turned up
8. For music, plug in the extra audio cable (hanging in the bungie to the left and behind the console computer) to the port labelled (#6)

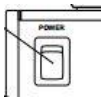
Optoacoustics Headphone and Microphone Setup



Positioning the Participant

1. You may use the Opto headphones with or without earplugs
2. Position the headphones on the participant and be sure to use pads or paper towels to take up the extra space between the headphones and coil (this is especially important if you are using the active noise cancellation feature)
3. Position the microphone if applicable - be sure it is almost touching the participant's lips

Setting up the Opto Console

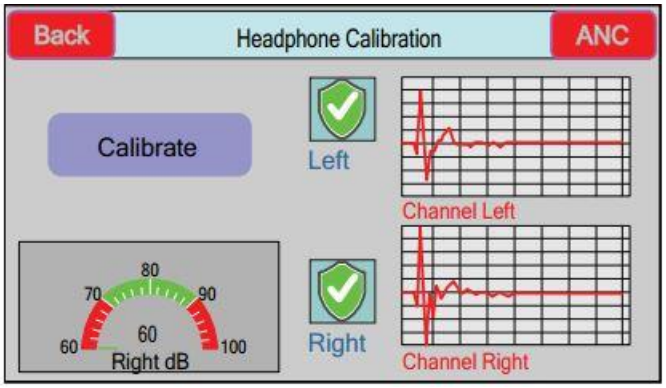


1. **AFTER** moving the participant into the bore, turn on the Opto control box using the black switch on the back right side of the console
2. Touch the screen to continue
3. If you are playing audio (movie, music or an audio task) connect the audio cable to either the green connection inside the white drawer for the desktop computer or to a laptop port – the other end of this should be connected at the back of the Opto console in "line 1"
4. The line 1 (#5) knob controls the volume of this audio
5. The left button (#4 FORMI NOISE CANCELLER) on the Opto console should always be pressed down "On"
6. The right button (#3) should always be up (in the FORMI position) when talking to the participant - otherwise feedback will be generated
7. During the movie or task you can press the right button down (#3 headphones position) to hear what the participant is hearing – just don't forget to put it back up before talking to the participant
8. To talk to the participant press the bottom silver button (#2)
9. Use the Siemens talk box to listen to your participant's responses

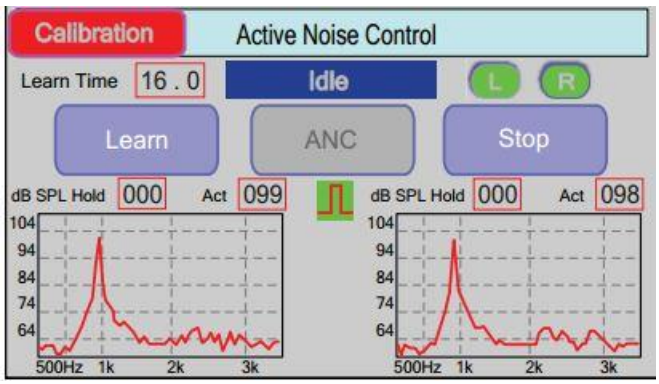
10. The speaker knob (#8) controls the volume that you hear in the control room
11. Note: there is no volume control for the volume of your voice to the participant – please manually adjust your voice volume if need be

Using Active Noise Cancellation

1. Only proceed to the below steps if you are using the active noise cancelling (ANC) feature
2. Press "Start" then "Calibrate" – you should get two green check shields – participant must be inside the bore during this step and there should be no sound playing or talking



3. When you are ready to calibrate for your BOLD runs, press the red "ANC" button in the top right corner
4. Unplug the audio cable – this eliminates the possibility of accidentally transmitting sounds during the calibration step
5. Press "Learn" then start your calibration scan – this takes 16 sec – it is very important to not transmit any auditory stimuli/movie during the learn mode

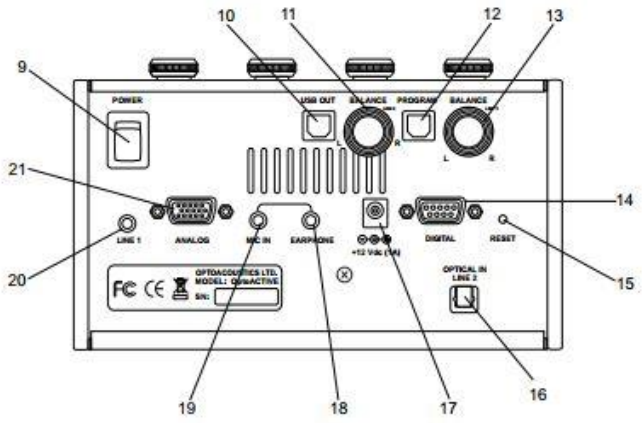


6. NOTE: if you remove you participant from the bore for any reason you will need to repeat steps 2-5
7. You are now ready to start your task

Troubleshooting Tips

1. If you are using the active noise cancellation and get a “out of range” error this means your volume was too high – press the “Stop” wait a couple seconds and then press “ANC” again to reactivate the noise cancellation
2. To reboot the system, turn off the power switch on the back of the console – wait **at least 20s** – then turn it back on
3. If the participant can only hear out of one ear, check the balance nodes (#11 and # 13) on the back behind the line 1/line 2 knobs – make sure it is balanced in the middle
4. If the participant can’t hear the movie or auditory stimuli check the following:
    a. the correct audio cable is connected to the correct port/computer
    b. the sound on the computer is not muted in VLC player or system volume
    c. there are no faults on the opto box (see #5 below)
    d. line 1 on the opto dial is turned up
    e. volume output is set to speakers/headphones. Sometimes the audio defaults to BOLDscreen 24 instead of speakers/headphones – BOLDscreen 24 is the WRONG setting! If it is wrong:
        - Go into sound settings and change it back to speakers/headphones
            - On PC left click on the volume icon in bottom left corner – click the up arrow and choose speakers/headphones
            - On Mac go into settings – click sound – click output – choose MacBook Pro Speakers
5. If everything is ok reset the system (step#2) to try to resolve the issue
6. If the participant can’t hear you, you will see a “Laser Fault” icon (see icon list below) on the screen that says “Start” – this is the first screen after “touch screen to continue” – try to reset the system (step#2) to resolve the issue

7. If the participant can hear “talking” during the scans (not from the movie) there was probably sound playing or talking during the calibration setup – any noise during this step will be dubbed into the headphones during scans – rerun calibration



Console Touch Screen Icons

	Laser Fault Laser is not connected or otherwise not functional
	Checking headphone channel prior to calibration
	Calibration has succeeded for this headphone channel
	Calibration has failed for this headphone channel
	TTL Synchronizing (when the icon is moving)
	Connection is good Communication with System DSP has been established
	Connection is bad Communication with System DSP has not been established
	VU Meter Panels (Left and Right) Measures signal from reference SPL microphone located inside the optical headphones
	Monitored Signal (Left and Right) Shows source and treated audio signals during the scan, after ANC function has been started

BOLDScreen LCD

Specifications

1. Resolution: 1920 x 1200 (60Hz)
2. 24” screen
3. 52cm wide
4. 151cm from the participant’s eyes to the screen

Turning on the LCD

1. For laptops: plug the LCD HDMI cable into the laptop using an adapter if needed (the desktop is always plugged in and active)
2. Flip the power switch (red circle on picture) on the front of the black “LCD” switch box to turn the system on
3. Use the select button (green circle on picture) to choose “L” for a laptop computer
4. Use the select button (green circle on picture) to choose “D” for the Dell Desktop computer
5. The monitor labelled “LCD” is a duplication of what is being projected to the participant’s screen
6. Note - the LCD takes a couple seconds to display after the switch box is turned on – it will also start dark and lighten up automatically within seconds
7. You **MUST** turn off the switch box after your scan to allow the screen to go to sleep so the static computer image does not “burn” into the display
8. Note – after turning off the LCD switch box the LCD screen will stay on for about 5 min before going into sleep mode – this is normal

Positioning the Participant

1. Select the mirror frame and mirror for the coil you are using
2. Place the mirror frame onto the anterior portion of the coil
3. Snap the mirror onto the frame – the curved side of the mirror should point in the direction of the participant’s feet
4. Position the mirror so that the participant can see the whole LCD screen without straining their neck or eyes
5. Laser landmark the participant per usual (if you have trouble marking the laser with the mirror on you may laser the participant before attaching the mirror – be sure you have the participant close their eyes)

6. Prescription lenses are available if needed – they range -6 to +6 and are kept in the cabinet above the participant lockers

Troubleshooting Tips

A. The LCD is not displaying the laptop screen, but you can see the desktop computer screen
   1. Select “L” on the black LCD switch box
   2. If the switch box will not let you select “L” that means the laptop is not plugged in properly
   3. Check the HDMI connection cable
   4. If you are using a mini displayport adapter ensure it is not plugged in upside down

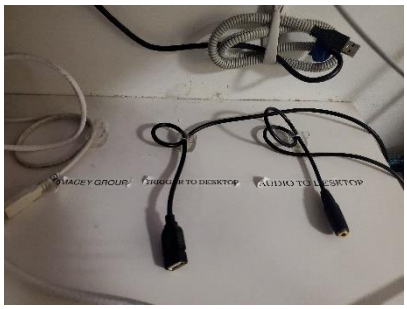
B. The LCD is not displaying the laptop or desktop computer
   1. Make sure you turned on the black LCD switch box
   2. Make sure the connections at the back of the LCD box are plugged in and not loose – there should be 4 cables plugged in
   3. Reboot the black LCD switch box
      - Turn off the power - wait 5 sec then turn it back on
      - Use the select button to choose “D” or “L”
   4. If you are using the desktop, switch to the BMC laptop to see if it is working
      - If the laptop is working, then check the HDMI cable in the back of the dell desktop tower
        - please be careful not to unplug anything
        - do not pull the tower out, but rather look behind it in its current position to avoid unplugging cables
   5. If you are using a laptop, switch to the BMC desktop to see if it is working
      - If the desktop is working, then check the HDMI connection on the laptop (see A above)

C. The LCD control room Dell monitor is displaying random colors, but the scanner room LCD looks fine
   1. Cycle the power to the control room LCD Dell monitor by unplugging its power cable
   2. The power cable is located in the power strip to the left of the BMC MAC laptop on the counter – it is labelled LCD monitor in orange label tape
   3. Simply unplug it and then plug it back in – the computer screen should appear within a few seconds

How to use E-Prime with the Desktop Computer and LCD

Duplicate/Mirrored Display with E-Prime

1. Setup the display to work with a duplicate display E-Prime task
    - You do not need to touch the desktop switch box
    - Turn on the black LCD switch box and use the select button to choose "D"
    - The LCD and the “LCD” monitor should turn on
2. Plug in Cables
    - Plug the audio cable into the port labelled "AUDIO TO DESKTOP"
    - Plug the trigger cable into the port labelled "TRIGGER TO DESKTOP"
3. Run task
4. After tasks, unplug the “Trigger”



Extended Display with E-Prime

1. Setup the display to work with an extended E-Prime task
    - Turn on the dell desktop monitor (lower right corner)
    - Turn on the black LCD switch box and use the select button to choose "D"
    - The LCD in the scanner room and the “LCD” monitor should turn on
    - Change to extended display using the extend shortcut on the desktop or
        - Right click on the desktop and click "Display settings"
        - Under "Multiple Displays" choose "Extend these displays"
2. Plug in Cables
    - Plug the audio cable into the port labelled "AUDIO TO DESKTOP"
    - Plug the trigger cable into the port labelled "TRIGGER TO DESKTOP"
3. Run task
4. After tasks, "Unplug the “Trigger”

Switching from Extended Display to Duplicate/Mirrored Display

1. Turn on the black LCD switch box and use the select button to choose "D"
2. Turn on the dell desktop monitor (lower right corner)
3. Use the duplicate shortcut on the desktop or
    - Right click on the desktop of the EXTENDED monitor and click "Display settings"
    - Under "Multiple Displays" choose "Duplicate these displays”

Siemens Physiological Device Setup

ECG/Respiratory Setup

1. The ECG/Respiratory device **MUST** be placed into the gray holder for safety reasons– this module should never directly touch the participant's skin as it can heat up

Pulse Setup

1. The finger pulse device should be placed on the left ring finger – nail polish remover is available in the scanner room drawer labelled HCP if needed (note the remover will not work on gel nail polish)
2. The pulse device should be placed in one of the gray holders – this holder is not a safety requirement, but rather a stability aid
3. If the pulse is not working properly (e.g. there is no pulse signal or it is erratic) check the signal and receiver elements inside the finger cuff – these elements sometimes get twisted so they are not showing properly through the cutouts

How to Use FIRMM to Monitor Motion during BOLD scans

Quick Overview

Register Participant → FIRMM_session_start → Localizer → Start FIRMM Software

Setup the Scanner Console

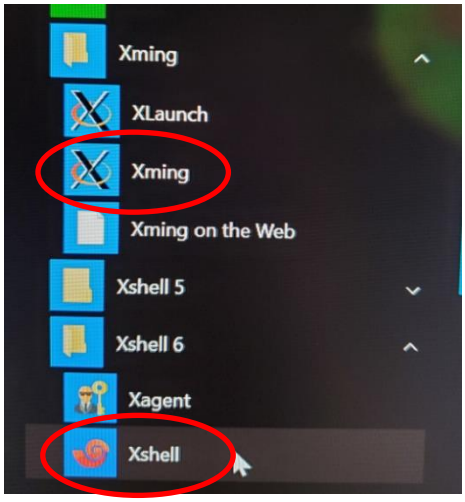
Follow these steps every time you run an MR session
**Note – you do not need to be logged into *Advanced User* to run FIRMM

1. On the scanner console computer, register a new patient
2. Then press Ctrl-Esc
3. Click FIRMM_session_start
    - Any scans that are acquired after this will be sent to the FIRMM computer
4. Start your scanning protocol – i.e. run your localizer

Setup the Computer to View FIRMM

PC Dell Desktop

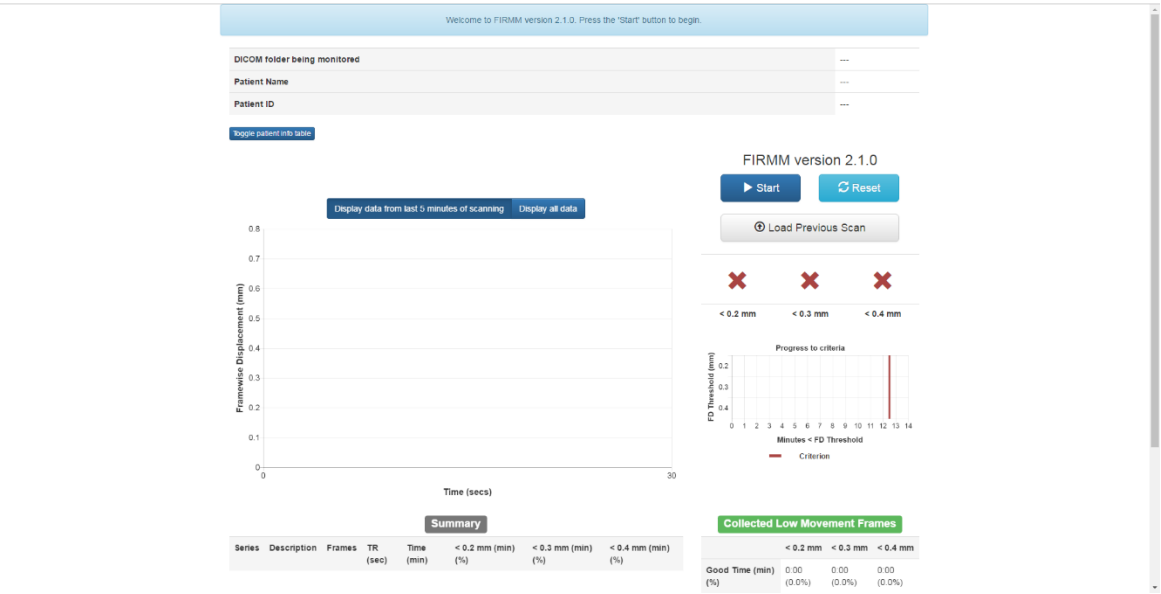
1. Turn on the dell desktop monitor (lower right corner)
2. Log in with NRB account
3. Click the Xming and then the Xshell shortcuts on the bottom task bar
   ***If the shortcuts are missing:*
    a. Click the Microsoft windows icon on the bottom left corner of the screen
    b. Scroll down through the programs until you find Xming
    c. Click the Xming folder and then click Xming
    d. Repeat a-c Xshell 6



4. If Xming gives a "fatal error" message that means you either clicked it twice or it is open in someone else's account. If you didn't click it twice then
    - Press control+alt+delete
    - Choose Task Manager
    - Click More details at the bottom if you can't see tabs at the top
    - Click the Users tab
    - Right click on any user name besides your own and click Sign out
    - Click yes to proceeding
    - Repeat this for any other user names that are still signed in
5. A Xshell terminal and session window will open automatically **No windows/terminals will open for Xming at this time

6. Click Connect in the Xshell session pop up window
7. Then type FIRMM (all caps) in the pop-up terminal to start the software
8. The software will take a moment to load
9. Username and password should be saved in your account if they are not
    - Username: firmmproc
    - PW: !@firmmuser

When FIRMM starts, an Xming terminal should open and you should see a screen like this:



Using FIRMM

1. To decrease the size of the FIRMM window press CTRL on the keyboard and scroll down with the mouse wheel (67% is usually a good size) then use the mouse cursor to make the window thinner from the side – resizing is not required but will allow you to view FIRMM and the camera simultaneously
2. Before clicking start make sure you have run at least one localizer
3. Click the Start button at the top right of the FIRMM GUI window to begin monitoring for DICOMs
4. Choose your participant from the pop-up list then click Run
5. If the participant ID does not appear in the list close popup and try again after some DICOMs have been sent for your current session – make sure you have started FIRMM on the scanner console and acquired at least one sequence
6. Once FIRMM has been started, it will process each bold sequence
7. There is about a 40sec delay before data is generated for each bold – the data will start to stream from FIRMM around the same time that the inline display shows images
8. To restart, close FIRMM and relaunch the program - make sure you have collected at least one sequence before you press start again
9. To reload graphs from previous participants, click the Load Previous Scan button and choose the participant

10. Close out all open windows on the dell desktop computer when you are done using FIRMM and turn off the "ext" button on the switch box

HCP Guidelines (see full HCP SOP for more details)

1. STOP and REPEAT SCAN in the first 60 sec if the **[< 0.4 mm section score] is 50% or less** (green square above)
   → 0.4 mm < 50% in first 60 sec = high motion = stop and repeat scan
2. GIVE FEEDBACK ONLY – let the participant know that their last scan showed "high motion" if the **[< 0.3 mm section score] is 75% or less** (orange square above)
   → 0.3 mm < 75% = high motion = give participant feedback (do not stop scan)
3. In general, a scan with
   → 0.3 mm < 75% = high motion ☹
   → 0.3 mm > 90% = low motion ☺

After the Scan is Complete

1. On the scanner console computer press Ctrl-Esc
2. Click FIRMM_session_stop
   - Note – sessions will also automatically stop when a new participant is registered so this step is optional

How to Use the MR Camera

Quick Overview

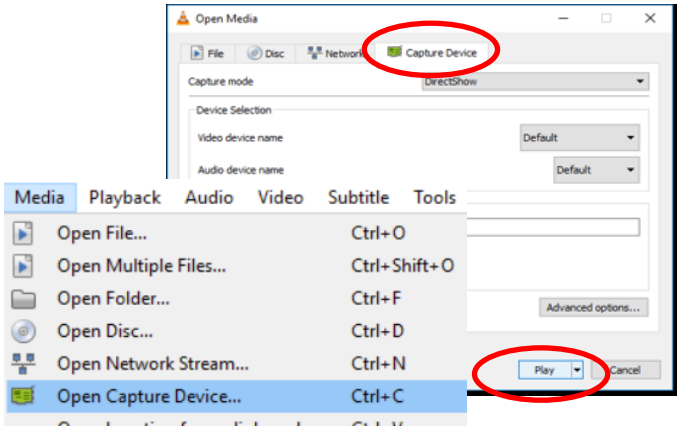
Open VLC → Press Ctrl+C → Play

Equipment

1. Head coil
2. Head coil mirror frame
3. MReyes cameras (mounted in the back of the bore)
4. Desktop Computer

Camera Setup

1. Turn on the monitor (small button on bottom right corner of monitor)
2. Click the VLC icon on the bottom task bar of the desktop computer or click the windows button in the bottom left corner then scroll to find VLC in the program list
3. Pres Ctrl+C (shortcut) **OR** click Media then Open Capture Device
4. Make sure you are in the Capture Device tab
5. Click Play



6. Select either the HR camera (custom) or regular camera on the small switch box on top of the dell PC tower – the regular camera has a more zoomed out FOV
7. If you use the desktop computer for movies or fixation – you must switch it to extended display to use the camera – use the extend desktop shortcut or
    - Right click on the desktop and click Display settings
    - Under Multiple Displays choose Extend these displays
    - Drag your fixation cross or movie to the LCD monitor so you can display the camera on the extended monitor
8. Note – the camera cannot be used
    - During your task stimuli if you use the desktop computer for the task in duplicate display mode

Participant Setup

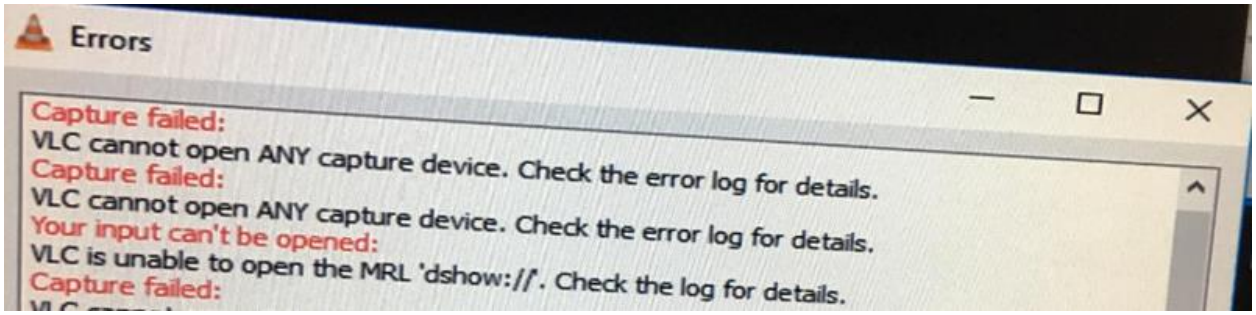
1. Position your participant
2. Position the mirror so the participant can see the whole LCD screen
3. Landmark the participant and move them into the bore
4. Verify camera positioning
5. If needed, get a tech to adjust the camera (in the back of the bore) to see the participant's eyes through the mirror – this step should not need to be done unless someone has accidentally moved the camera
6. Turn the room lights to the HCP LCD setting

Camera Cleanup

1. Close VLC
2. Turn off the dell monitor (lower right corner)

Troubleshooting Tips

1. If the camera will not stream through VLC and you get the below error then:
    - Unplug and replug the USB cable in the back top right side of the PC desktop tower – labelled MREyes
    - Close VLC and try again



Equipment Manuals

Hard copies of manuals are located on the Prisma tech desk

Current Designs Button Box and Trigger Manual - Forp 932
ViewPoint Eyetracker User Guide*
ViewPoint Eyetracker Data Analysis Guide*
Optoacoustics Manual
MRI Safety Manual

*available online only – no hardcopy

Movie List

- A Bug's Life
- Almost Famous
- Big Hero 6
- Cheaper by the Dozen
- Corpse Bride
- Crouching Tiger Hidden Dragon
- Daddy Daycare
- Despicable Me
- Elf
- Endless Summer II
- Finding Nemo
- Forrest Gump
- Frozen
- Harry Potter and the Sorcerer's Stone
- Howl's Moving Castle
- In Search of Santa
- Incredibles
- Inside Out
- Lion King
- Lord of the Rings Fellowship
- Maleficent
- Napoleon Dynamite
- Planet Earth – Caves, Deserts, Ice Worlds
- Planet Earth – Seasonal Forests and Deep Ocean
- Planet Earth – Pole to Pole, Mountains, Fresh Water
- Planet Earth – Great Plains, Jungles, Shallow Seas
- Planet Earth – Saving Species, Into Wilderness, Living Together
- Predator
- Princess Bride
- Princess Mononoke
- Riding Giants
- SNL Chris Farley
- SNL Will Farrell
- Sandlot
- Seinfeld
- Shrek
- Shawshank Redemption
- Sisters
- Sponge Bob
- Stars Wars - The Phantom Menace
- Tangled
- Timeline
- Total Recall
- Toy Story
- The King's Speech
- The Matrix
- The One Jet Li
- The Rock
- The Wizard of Oz
- Up
- Winged Migration

ALSO ON THE BMC MAC LAPTOP