Human Intraoperative Recording Checklist

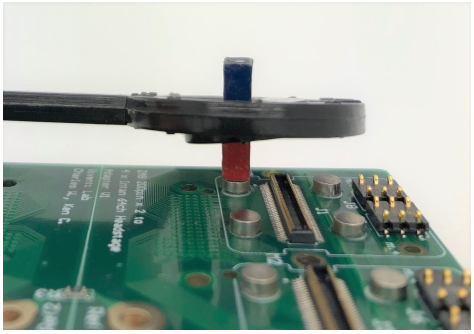
Duke Hospital sterilization center phone number: 919-681-6864

Clean + mold electrodes:

1. Swish electrode in alconox and rinse in DI water
2. Mold electrode by one of the following tutorials...
   256-1024:https://drive.google.com/file/d/1XzbP9FwIwdP26FTFb3EtDFWocb_asKtr/view?usp=sharing
   128: https://drive.google.com/open?id=1dGah_TIkZK3VsLNPG8JWZ8qmBur2N5lK
   244:https://drive.google.com/file/d/0B83h8K6u6IAwbDFsWXpBMmFzeHM/view?usp=sharing&resourcekey=0-3DRRlt3ogTSbRDmXDVn3Mw
3. Rinse molded array thoroughly with warm water

Assemble and connect headstage board

1. Check that gold GND pads have not been scratched off
2. Scratch off any visible oxide film on headstage spring connector pads
3. Visually examine gold loop spring connectors for any loose or bent springs
4. Check for loose magnets and add additional super glue for support if needed. Correct magnet orientation:



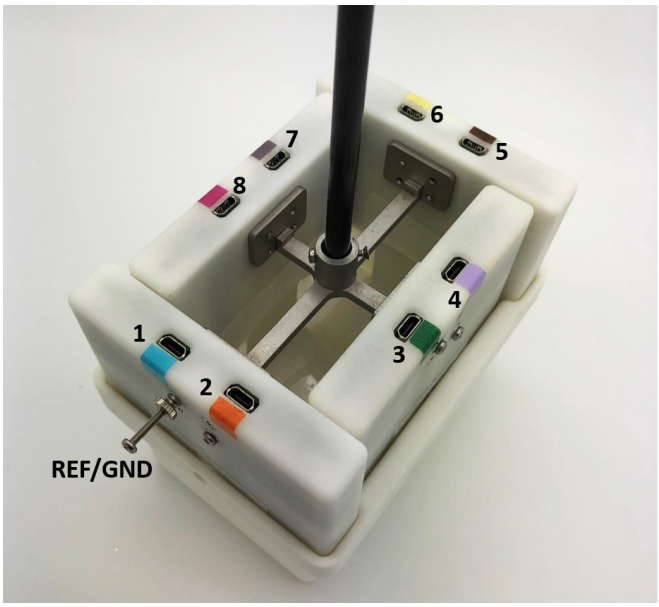
5. Tightly screw on headstages with 3D printed pieces
6. Attach electrode with ZA8 compression pads, being sure to hold screw post tightly to the back of the board and evenly compress all screws
7. Re-test electrode
   a. Compare with previous testing data
   b. If there are more high channel count impedances, check the ZA8 boards especially...may have become damaged or poorly connected
8. Re-clean electrode with DI water to remove saline residue
9. Dry the electrode completely before putting into sterilization

Clean + assemble electrode holder

1. Alconox cleaning on metal and 3D printed parts
   Alconox Cleaning Procedure (~45 minutes)
   In sonicator, put 2L DI H2O with 20g Alconox cleaning powder, mix, run for 10 min
   Time = 10min Temp = 65 Power = 1 Frequency = HIGH
   Run sonicator for 10 minutes
   *Clean out sonicator with DI H2O, fill with **ONLY** 2L DI H2O*
   *Rinse-Run 10 minutes, clean out sonicator with DI H2O, fill with **ONLY** 2L DI H2O*
   Rinse-Run 10 minutes

Let air dry

2. Assemble headstage board in holder case
    - https://drive.google.com/open?id=1oen4YRTYMhvZSba_HB-z8xK3VN-z4f_J
    - https://drive.google.com/open?id=1gQGDYH1ckPekSmJaGqzNrCumJ66-QXO8
3. Color-code ports and cables from electrode holder → Intan system



4. Photograph electrode setup
5. Test and wipe down alligator clip and connect to reference screw

Sterile Prep: Sort into blue sterilization bags with contents oriented for grabbing, place EtO test strip in each bag, place bags in metal box, wrap for sterilization

Video of Sterile Box Wrapping *Note: Wraps are one-time use

Deliver to hospital by 5PM at least 2-days before surgery, specifying date and time needed for pickup

Duke sterilization room phone number: 919-681-6864

1. Assembled Holder Set...

- ❑ Molded electrode
- ❑ Holder (encased headstages, post, cap for electrode)
- ❑ 6ft HDMI cables, plugged in and color coded

2. Referencing…

- ❑ Alligator clip
- ❑ EEG connector soldered to alligator clip for scalp needle reference

3. Extras…

- ❑ 10 ft HDMI cables
- ❑ Extra HDMI in both sizes
- ❑ Extra Alligator clips (x4)
- ❑ Extra screw driver (Medtronic marked w/ tape) + Optic Arm Clamp
- ❑ LCP array cutouts for sizing (esp if craniotomy size in uncertain)

Non-Sterile Prep: DAQ Cart

- ❏ Intan Recording Controller
- ❏ uHDMI/SPI green converter box
- ❏ SPI cables (color coded)
- ❏ Yellow ethernet cable
- ❏ uHDMI/HDMI converters
- ❏ Blue USB cord (DAQ → Laptop)
- ❏ Battery Banks (x2) + Black USB/power cords → *Fully charge!*
- ❏ Laptop + Charger → *Fully charge! Pause all updates!*
- ❏ Re-sterilization bags + ETO strips (for electrode after surgery) (x3)
- ❏ Lab Camera → *Fully charge! Clear memory!*
- ❏ Extra BNC connectors (x4)
- ❏ Extra HDMI cables + connectors + converters
- ❏ Extra SPI cables (x2)
- ❏ Extra tweezers, screw driver (phillips head), sharpie, and velcro wraps
- ❏ Rat electrode + ZIF/P4 adapter board w/ GND wire + headstage on glass slide for noise test
- ❏ EEG gel and wipes for cleaning rat electrode
- ❏ Backup gloves
- ❏ Scissors
- ❏ Blue tape
- ❏ Bag for carrying back sterilization box

Non-Sterile Prep: Audio Presentation Cart

- ❏ BNC couplers (x2)
- ❏ 10 ft BNC cables (x2)
- ❏ 25 ft BNC cables (x2)
- ❏ Laptop
- ❏ Photodiode, photodiode cable/holder
- ❏ Microphone and cable
- ❏ Speakers

Other Prep

- ❏ Check for scrub access at scrub machines in hospital
- ❏ Confirm optical arm has been sterilized (not needed for DBS)
- ❏ Test ethernet connection between acquisition and diagnostic laptop

  (Control Pannel → Network & sharing center → Ethernet → Properties → Internet protocol version 4 → Properties → "Use the following IP/DNS" → enter the corresponding addresses)

IP:	192	168	1	2*
Subnet:	255	255	255	0
Gateway:	192	168	1	1*
Preferred DNS:	208	67	222	222
Alternate DNS:	208	67	220	220

  (Right Click folder → Give Access To → Everyone → Add → Done)

  **These numbers are swapped for the recording laptop*

OR Setup - Non-Sterile

- [ ] Pin = 1212
- [ ] Microsoft account - dropbox@tneuro.com, jocHAliontimicro
- [ ] Disconnect acquisition laptop from wifi and bluetooth
- [ ] Create a new subject folder on the desktop and open a note file
- [ ] Open software, selecting '20kHz' sampling rate
- [ ] Load default settings for the correct channel count
- [ ] Ensure that all ports are recognized (drop down menu, bottom left)
- [ ] Check that hardware filter upper cutoff is 0.1Hz to 10kHz
- [ ] Check that both analog ports are enabled
- [ ] Connect speakers, microphone, and photodiode between presentation laptop and Intan
  (Photodiode BNC → Intan System, Analog In 1)
  (Microphone BNC → Intan System, Analog In 2)
  (Presentation laptop password = ieeg)
- [ ] Run noise test using 64-channel electrode in EEG gel
  (Diagnostic test: quantify noise from PSD)
  (Microphone & photodiode test in Intan software)
- [ ] Use +/- keys for voltage scale, </> keys for time scale
- [ ] Hover over traces for voltage scale
- [ ] Change File Base Name → "S##_date", keeping 1 min file lengths (default)
- [ ] Load default settings for the correct channel count, confirming bandwidth and analog ports again
- [ ] Note heart and breathing rate from monitoring system

---- When surgeon is ready to go ----

- [ ] Retest microphone and trigger connection
- [ ] HDMI cables from surgeon → uHDMI converters → green SPI converter box
- [ ] Rescan ports, checking for all headstages
  If they aren't all recognize, unplug and replug cables and restart Intan software
- [ ] Choose 'Configure' and 'Manual' and check delay values…
  6ft HDMI cables – delay 6
  10ft HDMI cables – delay 7
  If they need to be adjusted, select the check box by 'Manual' and reset the values
- [ ] Measure + save impedance as csv
- [ ] Begin recording (Press the red circle for "record", not the green arrow for "run").
  For tumor mapping cases…
  - [ ] Record 5 minutes, then swap location
  - [ ] Re-record impedance, record another 5 minutes

  For speech cases…
  - [ ] Start speech task
    (Connect the microphone closer to the patient)
    (Run MATLAB code for 'phoneme_sequencing' or 'lexical no_delay')
  - [ ] Run diagnostic tool on first minute of task recording
    (Visualize High Gamma z-score and spatial map)
    (If no significant z-score, pause task and provide feedback to the surgeon)

- [ ] Confirm that surgeon has marked coordinates for BrainLabs visualization (except DBS)
- [ ] Collect the electrode for sterilization, sealing in a blue sterilization bag with a detection strip

OR Setup - Sterile (for surgeon to complete)

- [ ] If needed, attach optic arm to surgical set
- [ ] Remove electrode protection holder
- [ ] Place array with a wet cloth on the backside of the electrode
- [ ] Hand off uHDMI cables (other ends) to research team
- [ ] Ground to patient connection (fish hook, canula, etc) using alligator clip
- [ ] Electrode visualization
  (BrainLabs for epilepsy & tumor; CT for DBS)

Post-OR

- [ ] Using gloves, clean the setup in the OR with wipes available from the nurses
- [ ] Send electrode setup/cabling back through sterilization
- [ ] Clean electrode setup and any cabling, wiping away residues and sonicating cases
- [ ] Dispose of used alligator clip and clean-up materials in a sealed ziploc bag in the regular lab trash
- [ ] Upload recording files to media drive and Duke Box
  To reinstate network connection through ethernet: Settings → Network&Internet → Ethernet → select network to connect to → IP Settings → Edit → Automatic → Save