

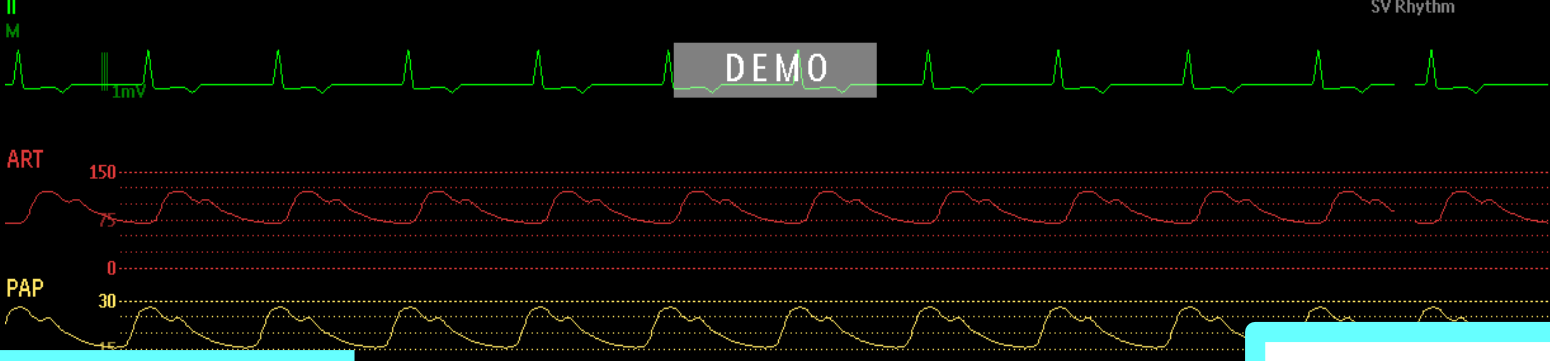
# Lead Troubleshooting (C EEG)

If you lose the waveform in one of your 4 channels, go through the following steps:

- A. Examine the electrode impedance
- B. Replace problem electrodes
- C. Assess for lead failure

# A. Evaluate Electrode Impedance

Unsupported LAN



HR 110/50 **60**

Pulse **60**

PVC 0

ART Sys. 120/70 (91)

Mean (91)

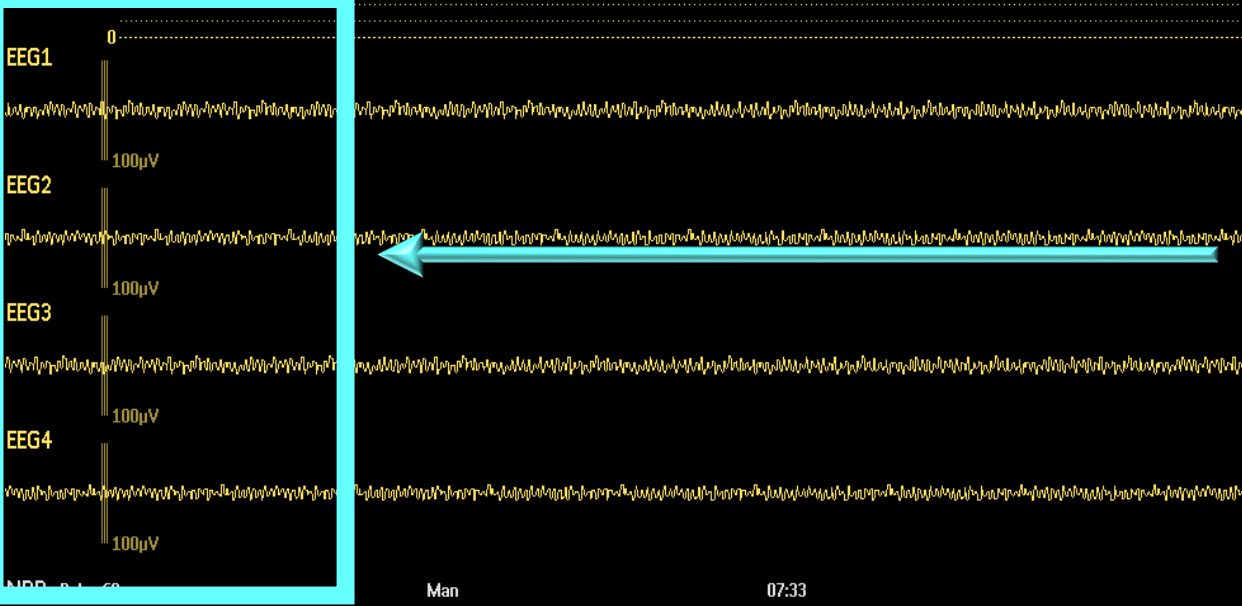
PAP Sys. 28/15

ST-I 0.0 ST-aVR 0.0

ST-II -0.1 ST-aVL 0.0

ST-III -0.1 ST-V2 0.2

CVP **(9)**



To find the CEEG Montage, touch the change screen and select the EEG waveform display. The 4 waves will be displayed as shown here.

Sys. 140

Mean 90

100

60

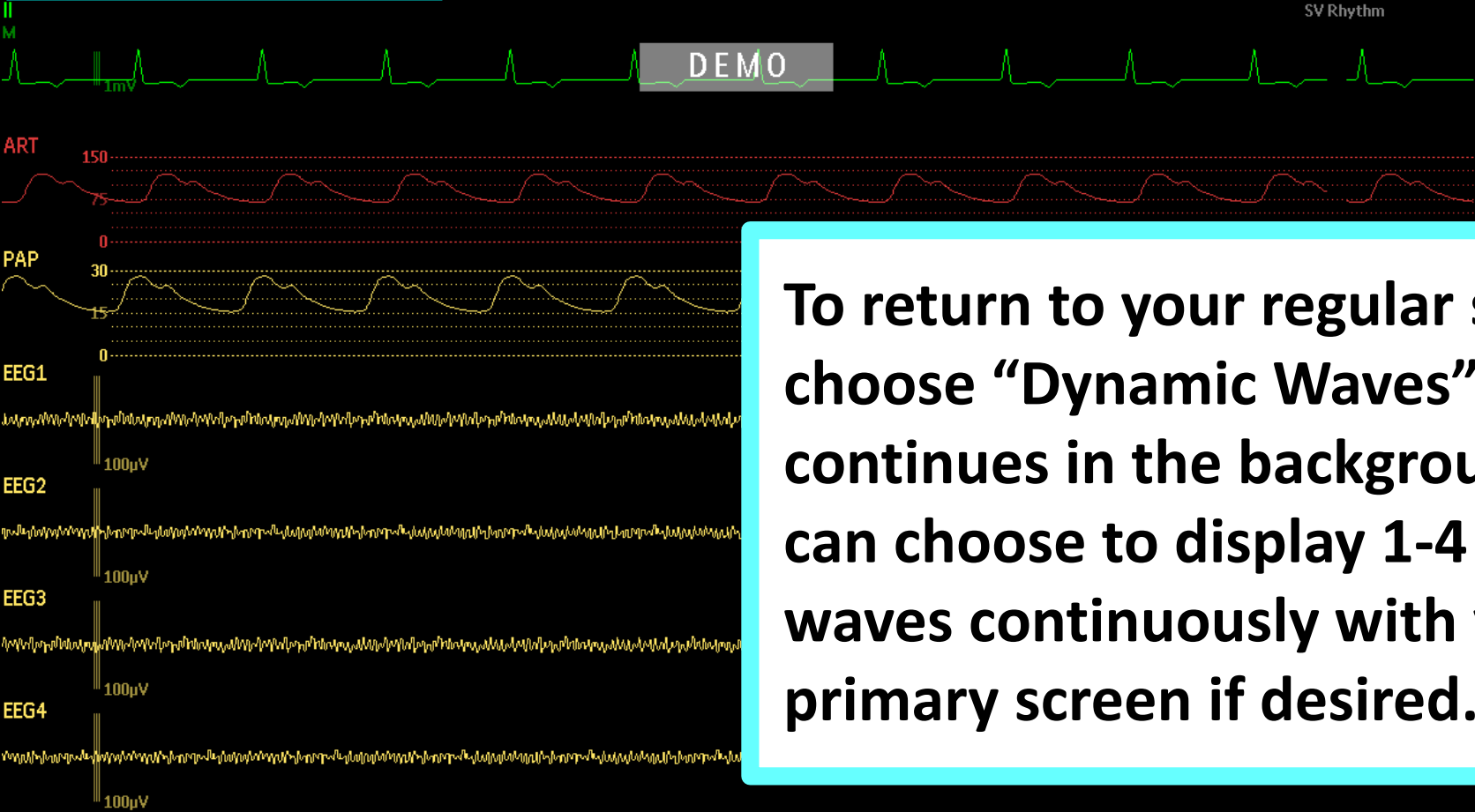
**120/80 (90)**

Man 07:33

|      |      |      |      |        |      |
|------|------|------|------|--------|------|
| SEF1 | 24.0 | SEF3 | 24.0 | Beta1  | 92.5 |
| MDF1 | 22.0 | MDF3 | 22.0 | Delta2 | 2.0  |
| PPF1 | 23.5 | PPF3 | 23.5 | Theta2 | 3.0  |
| SEF2 | 24.0 | SEF4 | 24.0 | Alpha2 | 2.0  |
| MDF2 | 22.0 | MDF4 | 22.0 | Beta2  | 93.0 |
| PPF2 | 23.5 | PPF4 | 23.5 | Clock  |      |

**7:34**

Unsupported LAN



HR 110/50 **60**

ART Sys. 120/70 (91)

Pulse **60**

PVC 0

ST-I 0.0 ST-aVR 0.0

ST-II -0.1 ST-aVL 0.0

ST-III -0.1 ST-V2 0.2

CVP **(9)**

ICP Mean **(9)**

etCO<sub>2</sub> 50/30 **40**

imCO<sub>2</sub> 0

awRR 30/8 **20**

RR **15**

To return to your regular screen, choose "Dynamic Waves". CEEG continues in the background. You can choose to display 1-4 CEEG waves continuously with your primary screen if desired.

NBP Pulse 60 Man 07:33

Sys. 140

Mean 100

60 **120/80 (90)**

|      |      |      |      |
|------|------|------|------|
| SEF1 | 24.0 | SEF3 | 24.0 |
| MDF1 | 22.0 | MDF3 | 22.0 |
| PPF1 | 23.5 | PPF3 | 23.5 |
| SEF2 | 24.0 | SEF4 | 24.0 |
| MDF2 | 22.0 | MDF4 | 22.0 |
| PPF2 | 23.5 | PPF4 | 23.5 |

Delta1 2.5

Theta1 3.5

Alpha1 15

Beta1 92.5

Delta2 2.0

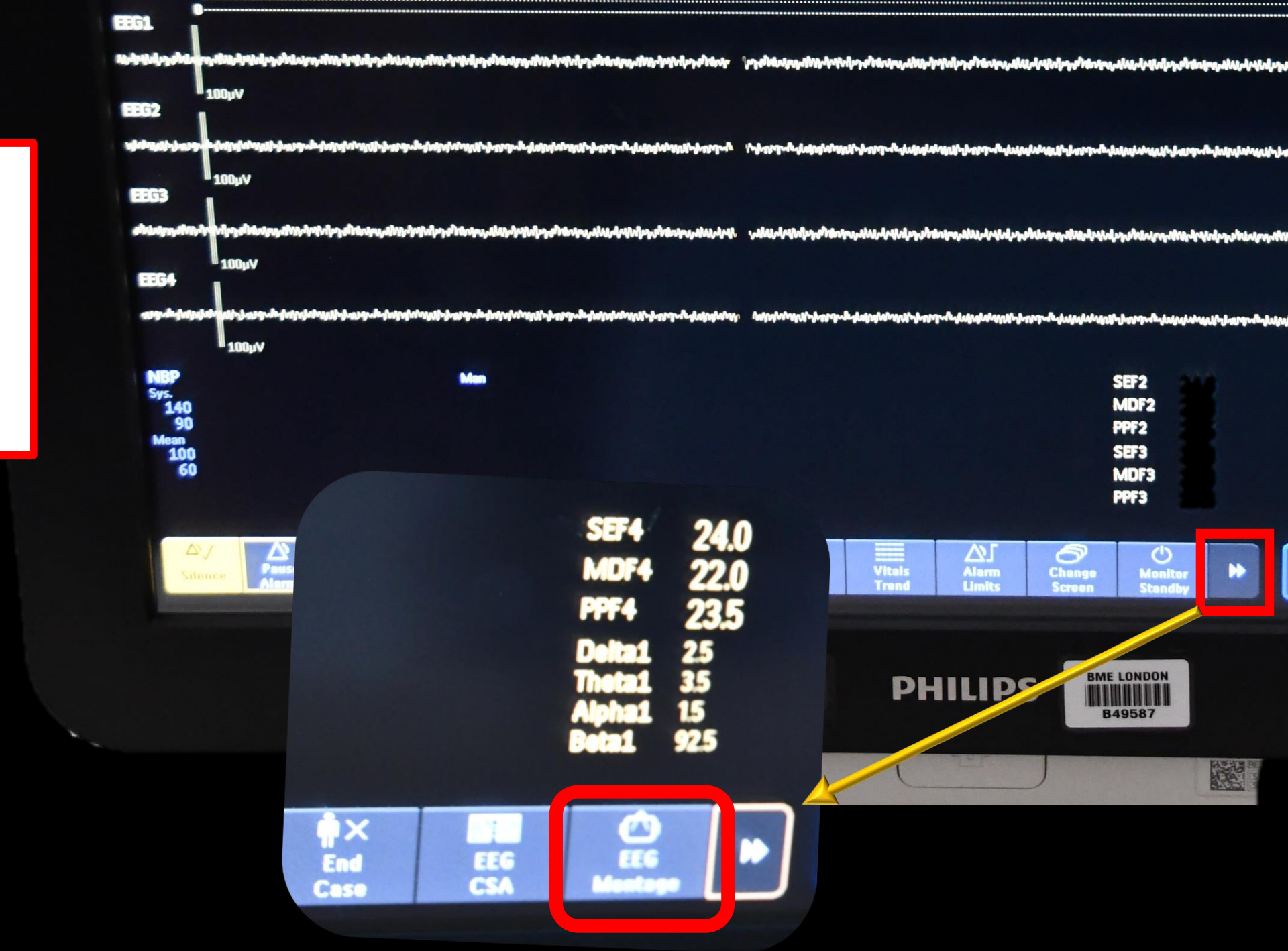
Theta2 3.0

Alpha2 2.0

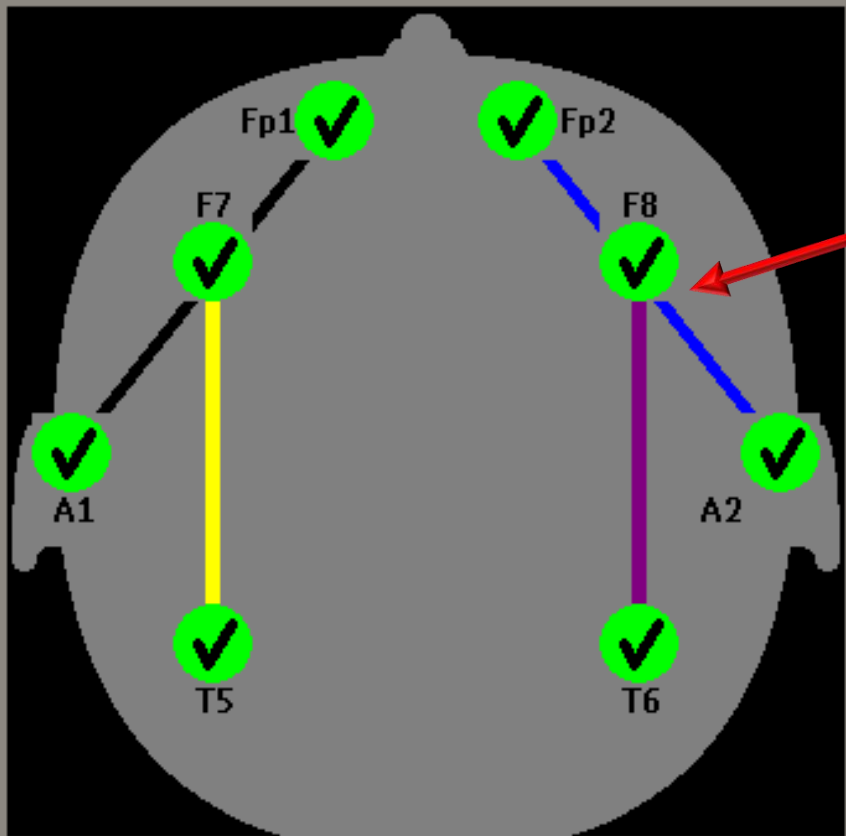
Beta2 93.0

Clock **7:34**

In the EEG screen, use the smart keys at the bottom. Scroll to the right until you see the EEG Montage option.



# EEG Impedance / Montage



Long Bipolar  
Long Bipolar  
Ipsilateral ear  
Ref Fpz  
Montage D  
Montage E

|       |     | Impedance |
|-------|-----|-----------|
| EEG2+ | Fp2 | 2kOhm     |
| EEG2- | A2  | 2kOhm     |
| EEG3+ | F7  | 2kOhm     |
| EEG3- | T5  | 2kOhm     |
| EEG4+ | F8  | 2kOhm     |
| EEG4- | T6  | 2kOhm     |

The default montage is "Long Bipolar".

This is the standard montage for critical care.

The other montages are setup and used by Neuro Critical Care.

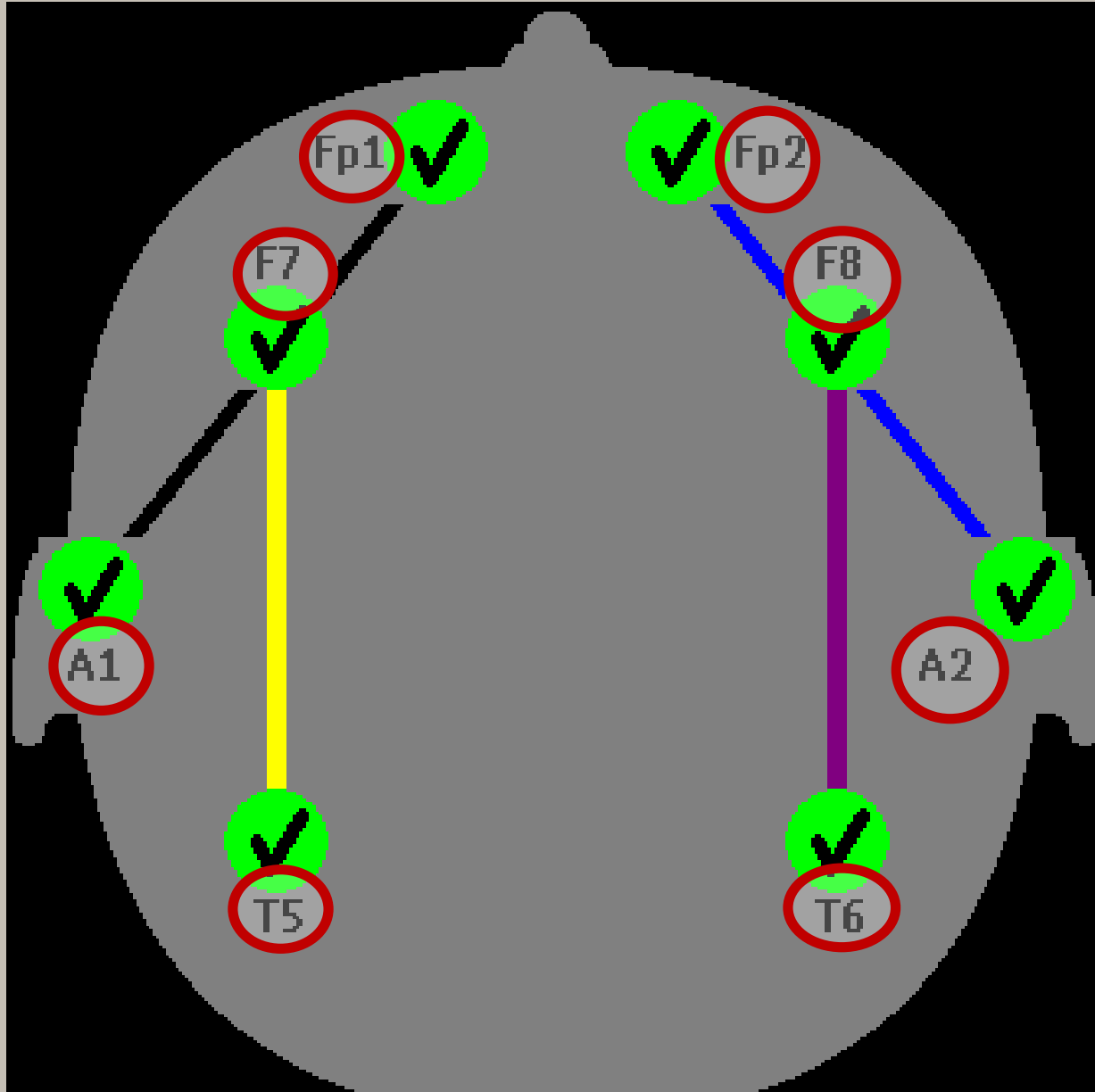
80(90)

|      |      |
|------|------|
| SEF1 | 24.0 |
| MDF1 | 22.0 |
| PPF1 | 23.5 |
| SEF2 | 24.0 |
| MDF2 | 22.0 |
| PPF2 | 23.5 |

## EEG Control

Change Name    Change Electrds    ImpLimit Down    ImpLimit Up

Main Setup



**Electrode codes are as follows:**

**F** (frontal)

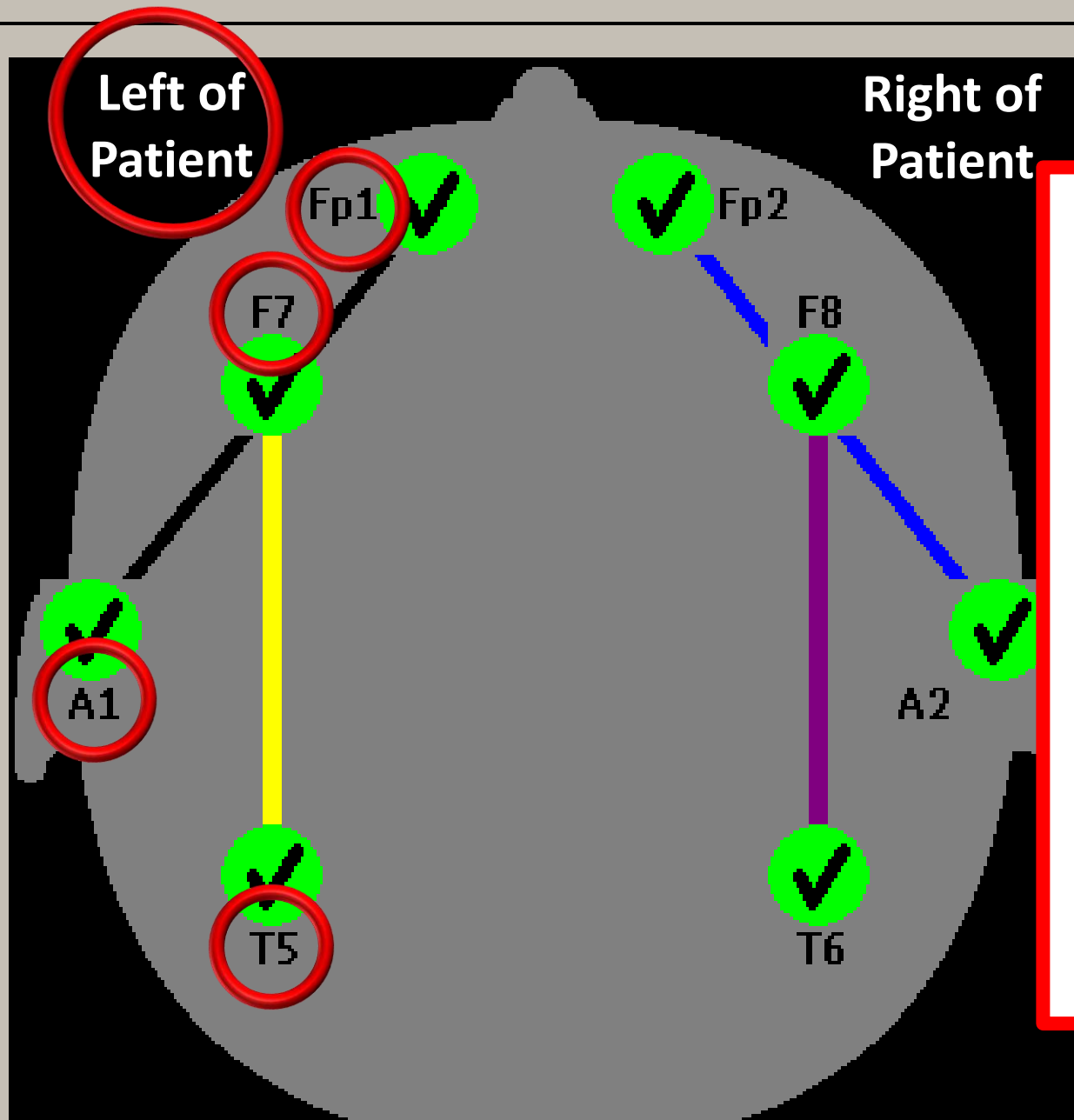
**P** (parietal)

**Fp** (frontal polar)

**T** (temporal)

**A** ("zero" or electrode on midline)

|       |     |       |
|-------|-----|-------|
| EEG1- | A1  | 2kOhm |
| EEG2+ | Fp2 | 2kOhm |
| EEG2- | A2  | 2kOhm |
| EEG3+ | F7  | 2kOhm |
| EEG3- | T5  | 2kOhm |
| EEG4+ | F8  | 2kOhm |
| EEG4- | T6  | 2kOhm |



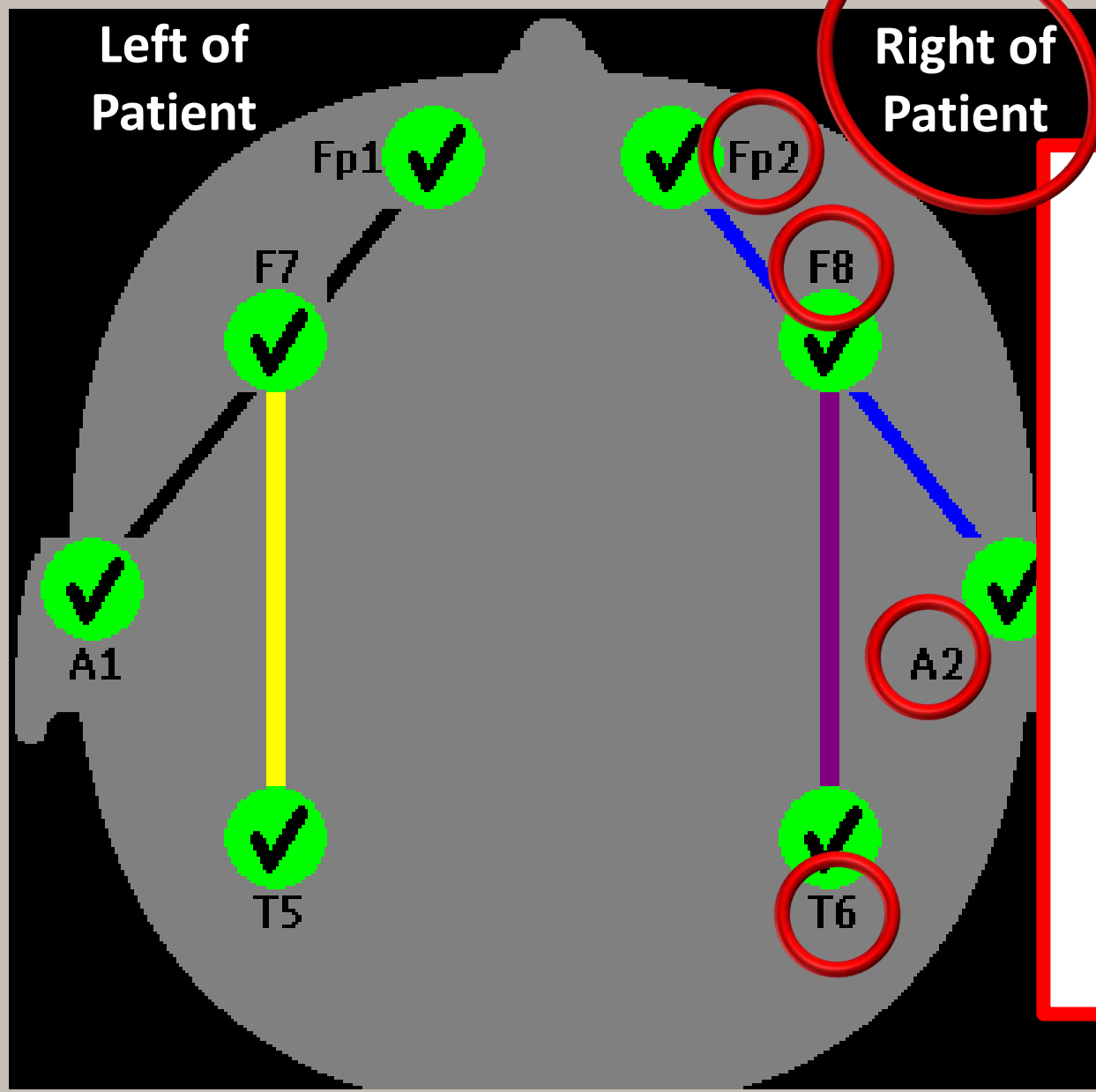
Long Bipolar



## Electrode Positions:

- Odd numbered leads are on the left





Long Bipolar

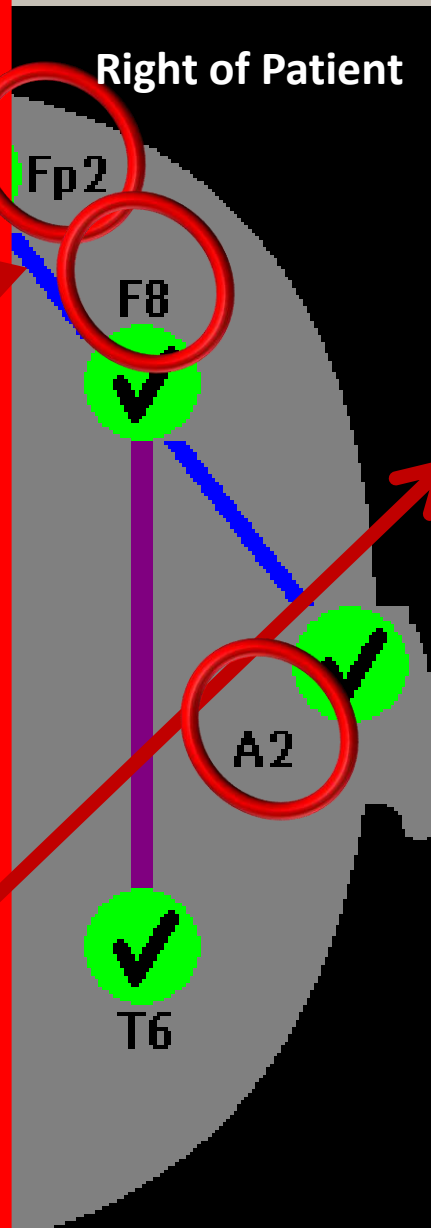
**Electrode Positions:**

- Even numbered leads are on the right



## Electrode and Channels

- Notice the colored line that connects two or more leads (**blue line** in this example).
- The **blue square** that matches the line color tells you which ECG waveform corresponds to these collective leads (**EEG2**)
- Both sections show you the **3** leads that must be working on the right (Fp2, F8 and A2)



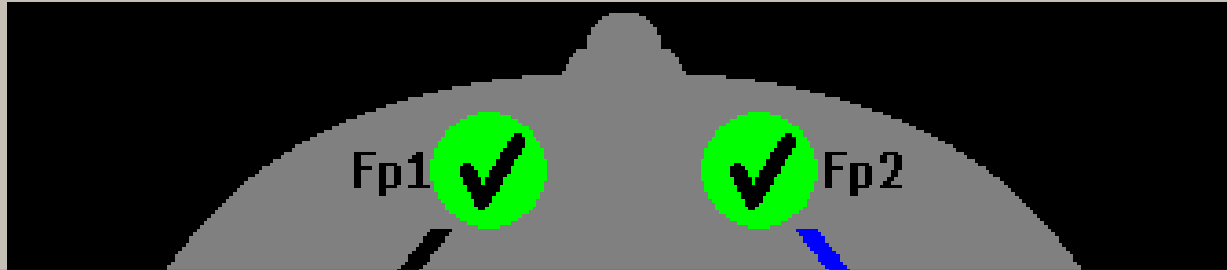
Long Bipolar

Impedance Limit:

5kOhm

|        |        |
|--------|--------|
| ■ EEG1 | Fp1-A1 |
| ■ EEG2 | Fp2-A2 |
| ■ EEG3 | F7-T5  |
| ■ EEG4 | F8-T6  |

| Channel | Impedance |
|---------|-----------|
| EEG1+   | Fp1       |
| EEG1-   | A1        |
| EEG2+   | Fp2       |
| EEG2-   | A2        |
| EEG3+   | F7        |
| EEG3-   | T5        |
| EEG4+   | F8        |
| EEG4-   | T6        |



Long Bipolar

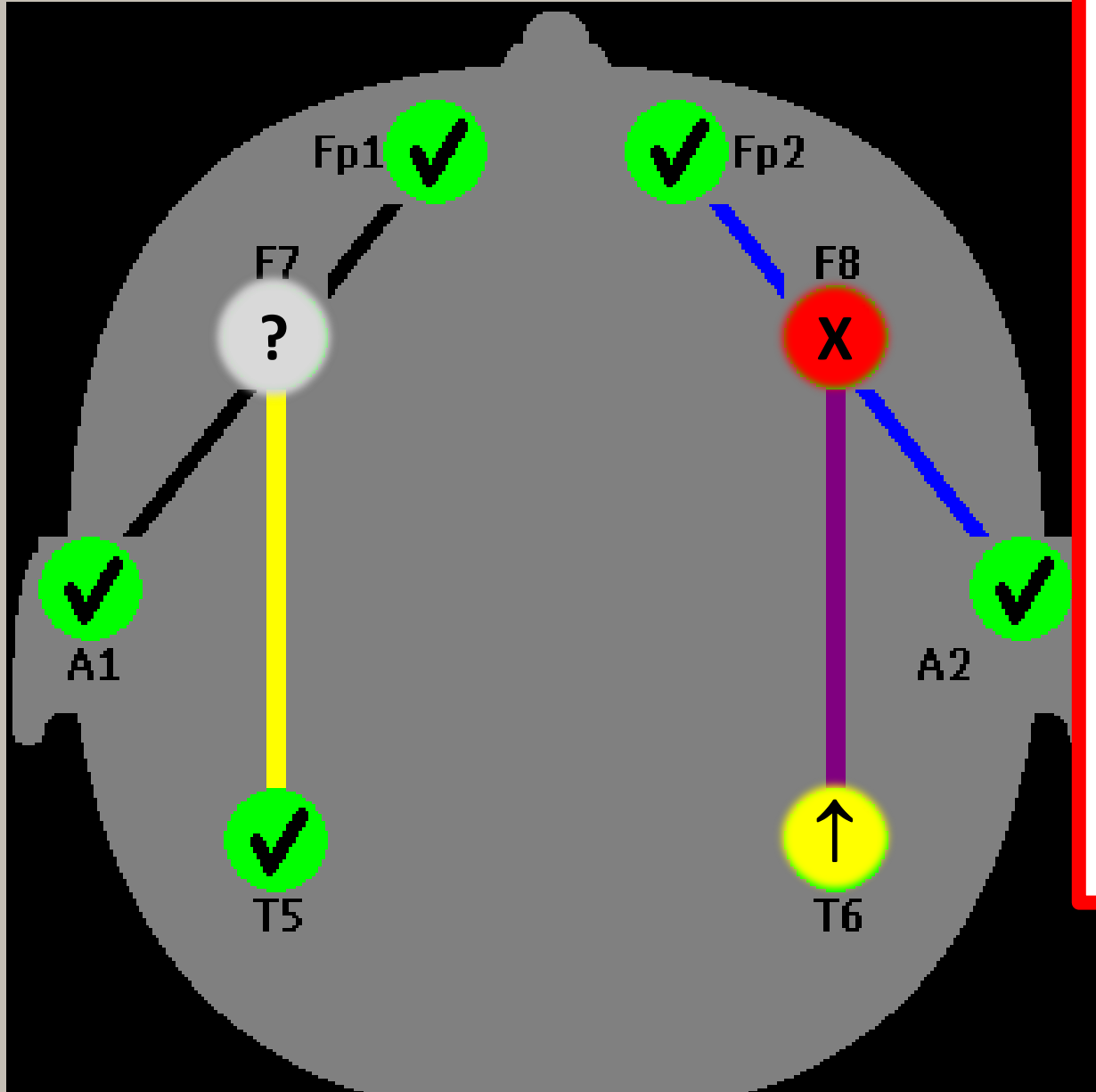


## Impedance:

- Measures electrode-to-skin impedance continuously
- Individual electrode impedance is shown in lower table
- Impedance measurements **require at least 2 electrodes.**
- Impedance should be less than 5 kOhms

Limit: 5kOhm  
Fp1-A1  
Fp2-A2  
F7-T5  
F8-T6

|     | Impedance |
|-----|-----------|
| Fp1 | 2kOhm     |
| A1  | 2kOhm     |
| Fp2 | 2kOhm     |
| A2  | 2kOhm     |
| F7  | 2kOhm     |
| T5  | 2kOhm     |
| F8  | 2kOhm     |
| T6  | 2kOhm     |



## Impedance Code:

- ✓ impedance within range (< 5 kOhm)
- X electrode disconnected or faulty
- ↑ impedance above limit
- ? noisy signal

5kOhm  
 Fp1-A1  
 Fp2-A2  
 F7-T5  
 F8-T6

| Impedance |
|-----------|
| 5kOhm     |
| 5kOhm     |
| 5kOhm     |
| 5kOhm     |
| 5kOhm     |
| 5kOhm     |
| 5kOhm     |
| 2kOhm     |
| 2kOhm     |

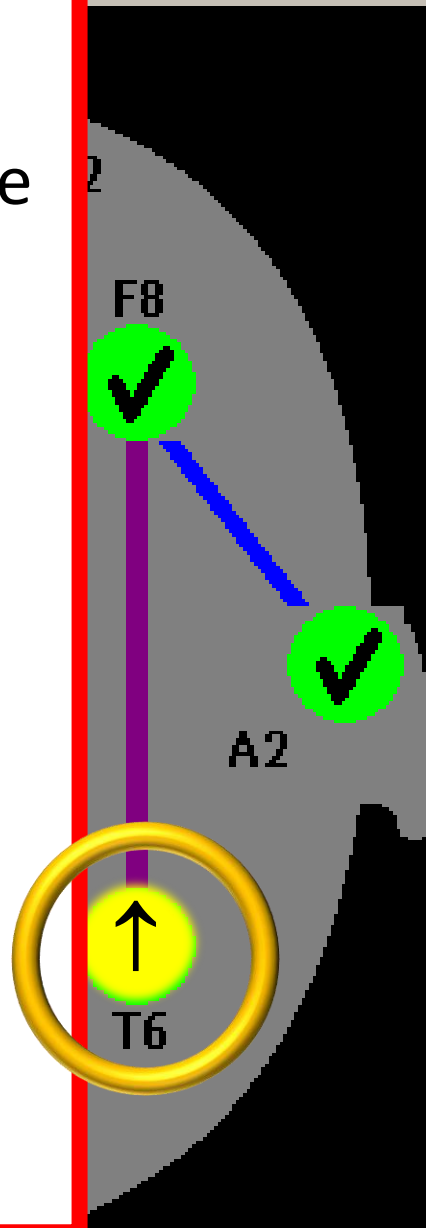
EEG4+ F8  
 EEG4- T6

## Correcting Problem

### Electodes:

Use the diagram and table to identify the electrode that requires attention. Example: T6 is  $> 5 \text{ k}\Omega$  and is yellow.

Change T6 electrode (electrode behind right ear). If this does not correct the problem, change the “partner electrode” (F8).



Long Bipolar

Impedance Limit:

5k $\Omega$ m

■ EEG1

Fp1-A1

■ EEG2

Fp2-A2

■ EEG3

F7-T5

■ EEG4

F8-T6

| Channel |     | Impedance     |
|---------|-----|---------------|
| EEG1+   | Fp1 | 2k $\Omega$ m |
| EEG1-   | A1  | 2k $\Omega$ m |
| EEG2+   | Fp2 | 2k $\Omega$ m |
| EEG2-   | A2  | 2k $\Omega$ m |
| EEG3+   | F7  | 2k $\Omega$ m |
| EEG3-   | T5  | 2k $\Omega$ m |
| EEG4+   | F8  | 2k $\Omega$ m |
| EEG4-   | T6  | 60 $\Omega$ m |

## B. Change Problem Electrodes

## B. Change Leads

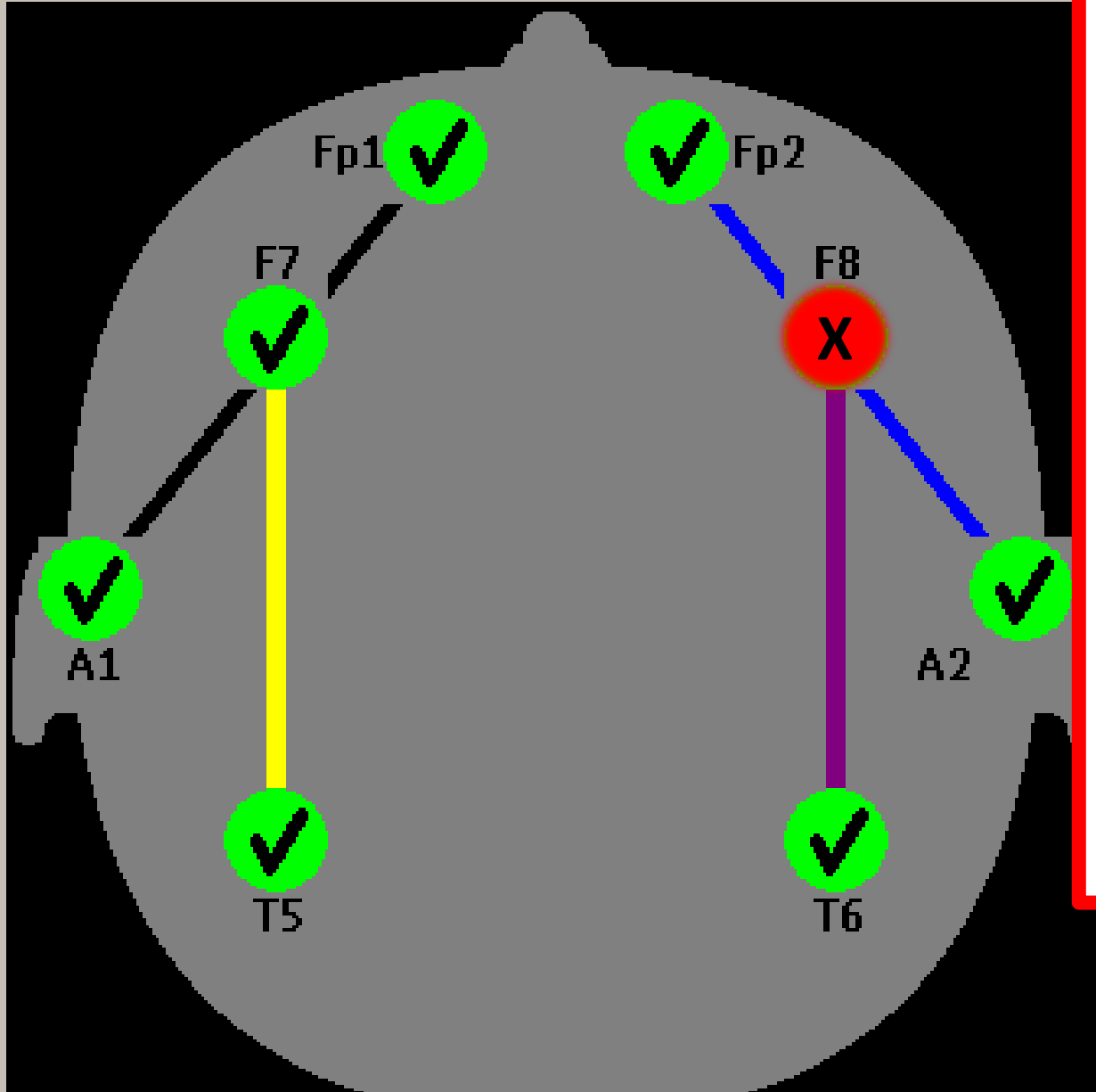
1. Wet a washcloth with warm water (**NO soap, cleanser or alcohol**) and scrub area where electrode will be placed
2. Rub vigorously with a dry washcloth or towel (to remove residue and roughen epithelial cells)
3. Rub a small amount of Nuprep\* into the skin on all areas where electrodes will be applied
4. Remove all traces of Nuprep with a dry washcloth

\*a mild abrasive gel that reduces impedance, improves conductivity and reduces artifact



## C. Identify Lead Failure





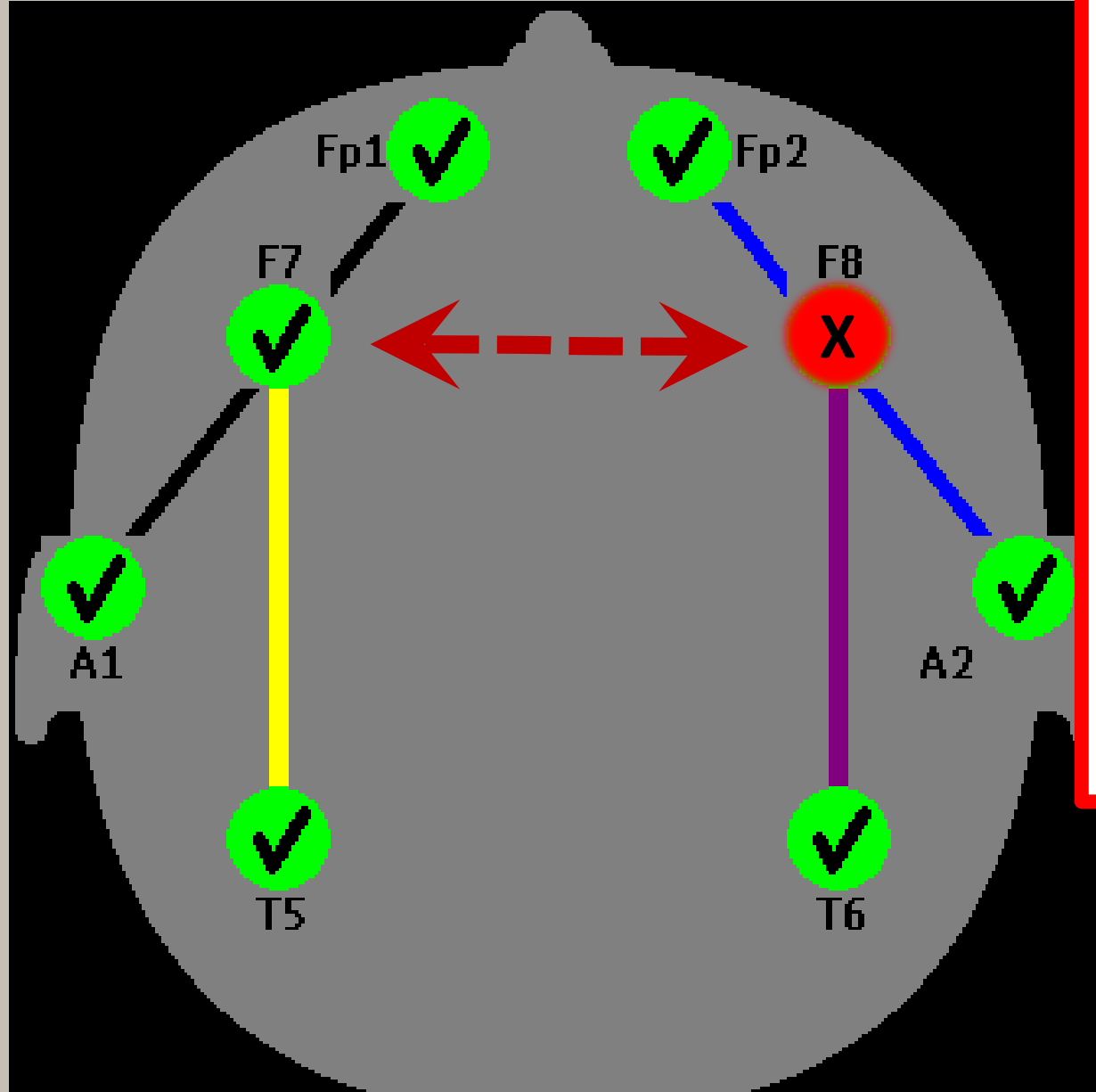
## Persistent Problem

If you get a red indicator that persists despite changing the electrodes, check for lead failure.

5kOhm  
 Fp1-A1  
 Fp2-A2  
 F7-T5  
 F8-T6

| Impedance |
|-----------|
| 5kOhm     |
| 5kOhm     |
| 5kOhm     |
| 5kOhm     |
| 5kOhm     |
| 5kOhm     |
| 5kOhm     |
| 2kOhm     |
| 2kOhm     |

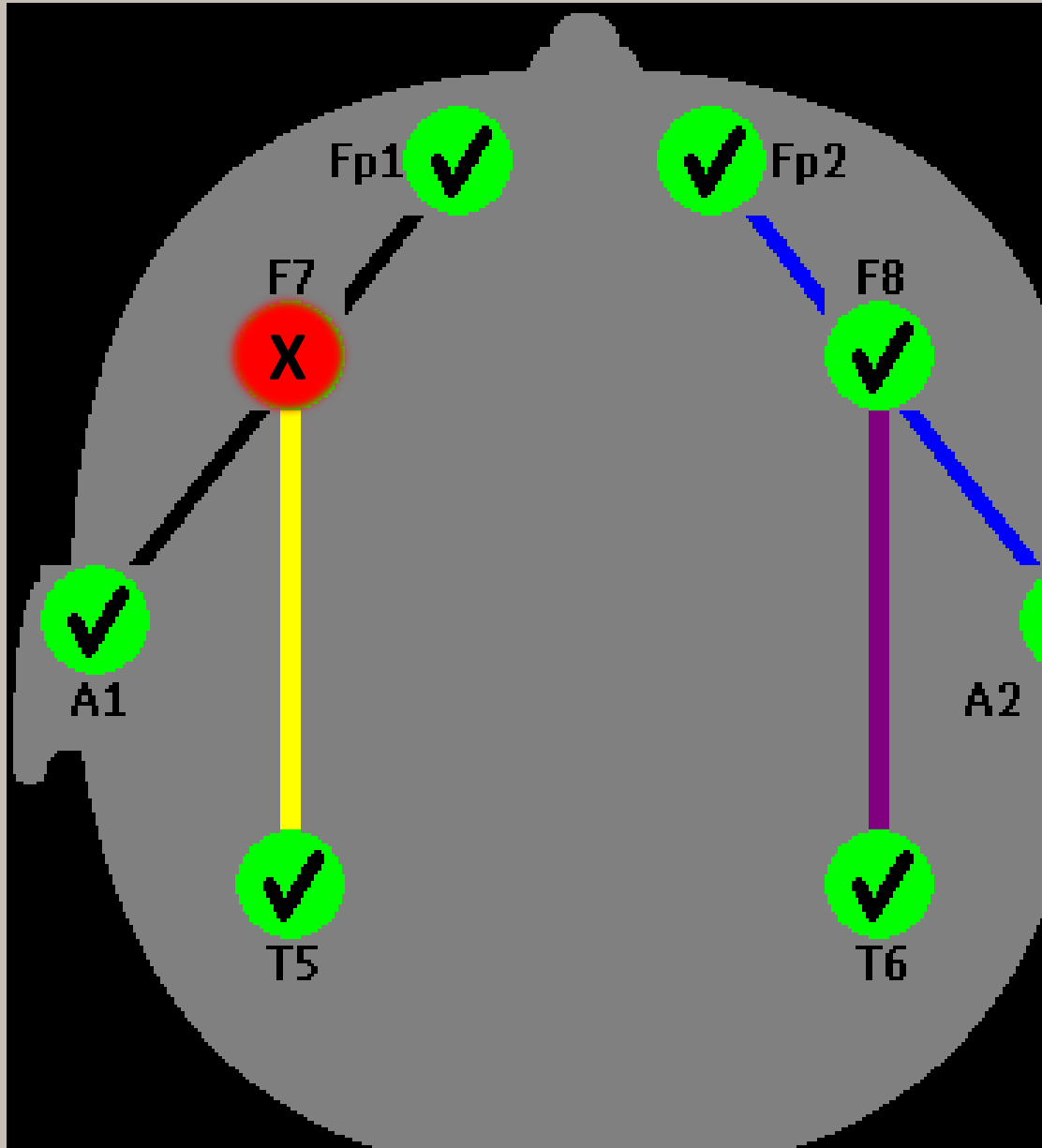
EEG4+ F8  
 EEG4- T6



## To Check for Lead Failure

Switch the leads for the “problem” electrode (F8) and its corresponding electrode on the opposite side (F7)

|       |    |       |
|-------|----|-------|
| EEG3+ | F7 | 2kOhm |
| EEG3- | T5 | 2kOhm |
| EEG4+ | F8 | 2kOhm |
| EEG4- | T6 | 2kOhm |



## To Check for Lead Failure

If the problem electrode is now F7 (the problem stayed with the lead), you have a faulty lead. Make note of the color of the lead that is faulty.

Obtain a new CEEG lead set. Leave the damaged set for biomedical with a note identifying the faulty color.