“The Energetic Wave of the Future”

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File E340499       Project Number  4786194205

Product Information
PLEASE READ THIS SECTION CAREFULLY!
IT CONTAINS VERY IMPORTANT INFORMATION
ABOUT YOUR RECENTLY PURCHASED HARDWARE.

CLASSIFICATIONS
In Accordance with IEC 60601-1
The NeuroField X3000 is classified as:
• Class I and internally powered equipment.

• Type B Applied Part complying with requirements for protection against electric shock. Equipment not suitable for direct cardiac application.

SPECIFICATIONS
• Input Voltage = 12v DC
• Maximum Power Consumption = 1.5 Amps
• Storage transport temperature = 0 – 120 degrees Fahrenheit
• Storage transport humidity = up to 95%, noncondensing
• Operating humidity = up to 95%, noncondensing

INSTRUCTIONS FOR USE
Read and follow these instructions when connecting and using the X3000.
• Read these instructions.
• Keep these instructions.
• Heed all warnings.
• Follow all cautions.

⚠️ Warnings:
These are potentially harmful situations that may cause injury to a patient or operator:

Electric Shock and Flammability hazard

• Power off the X3000 before cleaning or servicing.

Failure of Operation

• It is possible for any device to malfunction, therefore, always verify unusual data by performing a formal patient assessment.

Operator and Patient Safety

• Do not use this device near water.
• Only use the specific power supply provided by NeuroField, Inc. for the X3000 device.
• Use only attachments/accessories specified by manufacturer.

Patient Safety

• Do not test or perform maintenance on the X3000 while using it on a patient.
• Device is optically and magnetically isolated for patient safety.
• Do not place X3000 attachments over the heart.

Data Validity

• Conditions that may cause inaccurate readings include interfering substances, excessive motion, low signal strength, and incorrect placement of patient applied parts.

⚠️ Cautions:
These are conditions that may lead to equipment malfunction or damage.

Cleaning

• Clean with mild detergent and water only
Use cleaning solution sparingly. Do not immerse the X3000 in liquid. Excessive cleaning solution may flow into the device and damage internal components.

Do not use petroleum-based solutions or solutions containing acetone, Freon, or harsh solvents. These substances may damage the X3000 and cause a malfunction.

**Maintenance and Repair**

- There are no serviceable parts. NeuroField equipment is designed to provide years of service without the need for maintenance or calibration. There is no need for routine service or adjustment.

**Disposal**

- This device contains lead solder. When the unit has reached the end of its service life, the product described in this document and its accessories must be disposed of in accordance with local procedures and regulation.
- As you use the X3000 you will acquire solid wastes that require proper disposal or recycling. These include power supplies, patient applied parts, and packaging materials.

⚠️ **NOTICE: Special Instructions**

**Responsibility of the Manufacturer**

NeuroField, Inc. is responsible for the effects on safety, reliability, and performance of the equipment only if:

- It is used in an area of normal room temperature and humidity, and unit is not subjected to excess moisture, vibration, dust, or shock.
- It is used in accordance with instructions in the “User Manual”.

**Transport of Equipment**

- Any transport of equipment should be done with the proper protection to prevent equipment from unnecessary jarring and movement within its container.
SECTION 1

X3000, Q20 & QCheck
I. Introduction

What Is NeuroField?

“I am convinced that the therapy of the future will employ heat, light, electricity and agents yet unknown. Toxic drugs shall cede their place to physical agents, the employment of which at least has the advantage of not introducing any foreign body into the organism.”

------- Arsene D’Arsonval, 1896

The use of energy to address human ailments has been a source of exploration for centuries, beginning with the use of electric eels, to the use of static electricity, to various forms of magnetic therapies that used stones, ore, and the laying of hands to heal those afflicted with various illnesses (Kellaway, 1946; Payne, 1990; Quinn & Strelkauskas, 1993; Quinn, 1984, 1992; Krieger, 1975). In the past 30 years there have been many different types of energy techniques offered as a form of valid therapy. One of these modalities is known as transcranial magnetic stimulation, or TMS.

TMS was originally developed by Anthony Barker at the University of Sheffield in 1985. Barker demonstrated an evoked motor response (thumb movement) by applying an electromagnetic stimulation (EMF of 1-2 Tesla) over the motor cortex of humans (Barker, Jalinous, & Freeston, 1985). As the technology evolved it became possible to give multiple pulses to people which gave rise to repetitive or rTMS. Since that time a great deal of research has been conducted strongly suggesting that rTMS has clinical value for the treatment of depression and other psychiatric conditions (Pascual-Leone et al., 1999; Arns, M., Spronk, D., & Fitzgerald, P. B. (2010); Avery, D. H., Holtzheimer, P. E., Fawaz, W., Russo, J., Neumaier, J., Dunner, D. L., et al.(2006); Brakemeier, E. L., Wilbertz, G., Rodax, S., Danker-Hopfe, H., Zinka, B., Zwanzger, P., et al. (2008).

rTMS protocols are known as either being high frequency (HF-rTMS, EMF stimulation 5Hz or greater) or low frequency (LF-rTMS, EMF stimulation 1 Hz or less). The EMF frequency and site of stimulation is theorized to have clinical effects that can have either an excitatory or inhibitory impact on neuronal cellular activity. However, due to the high intensity of EMF, giving stimulation faster than 20-30 Hz at intensities >1 tesla for long durations can result in the generation of heat which can damage tissue. As a result, rTMS protocols are typically given in short pulses with an ‘on’ and ‘off’ time that prevents tissue damage, but it also limits the frequency range in which the therapy can be given. The safety of rTMS therapy was deemed safe by the FDA in 2008 and approved for the treatment of depression in the United States.

The notion that low intensity pulsed electromagnetic (pEMF) stimulation could be of clinical value was one of the driving forces behind the development of the NeuroField technology. Unlike rTMS, which forces a depolarization of the neuron, NeuroField pEMF stimulation is ‘copied’ or ‘mimicked’ by the brain. In this way the brain can be ‘driven’ at different speeds depending on the clinical needs of the person. The NeuroField X3000 Plus is a four channel frequency generator that is capable of generating
pEMF frequencies ranging from 0.31 – 300,00Hz. The X300 Plus is capable of generating a low intensity electromagnetic pulse ranging from 1-400 milligauss which is 10,000,000 times weaker than an EMF pulse given by rTMS devices. Since the output of NeuroField is so low, it is possible to give pulsed EMF stimulation faster than 10Hz, at long durations, without the concern of generating heat and causing tissue damage.

The Q20 EEG is a 19-channel DC coupled EEG amplifier. The Q20 EEG utilizes the Neuroguide (www.appliedneuroscience.com) Z-score normative database in order to determine the response of pEMF on the brain. In this way NeuroField is the only pEMF device in the world to use normative data in order to guide the brain to a more functional state. The Q20 EEG can also be used with the Neuroguide platform to run 19 channel surface and/or 19 channel LORETA Z-score neurofeedback.

The NeuroField system was initially evaluated by 10 beta testers around the United States in 2008. All of which are licensed health care professionals. It was determined that the system is safe and has clinical utility. Dr. Nicholas Dogris has written well over 50 experimental protocols for the system that have been rated by NeuroField users as having clinical value. The inflammation reduction protocol has been given the highest ratings with more than 30 NeuroField users confirming observed inflammation reduction in their clients. The XX3000\X2000 is currently in the process of obtaining electrical certification as a medical device from Underwriters Laboratories and is slated for FDA 510K registration in 2013.

References


II. Hardware Setup – X3000, Q20 & QCheck

NOTE!!!!!! This document assumes that you have installed or upgraded to the latest version of the NeuroField software. If you have not, please STOP NOW!!!!!! and download the “NeuroField Installation Guide” from the downloads page of the NeuroField website. There you will find instructions that walk you step by step through the process of installing the latest NeuroField software.

➔ For Hardware Setup instructions using the HRV unit or tACS/tDCS unit, see Sections 3 and 4 later in this manual.

The X3000 NeuroField System kit includes:
- X3000 Device
- RJ45 Ethernet Cable
- CANBus USB Adapter
- Velcro cap
- 200 Wind Coils
- D25 Connector Cable
- Medical Grade Power Supply or Field Replaceable Battery

The Q20 NeuroField System kit includes:
- Q20 Device
- RJ45 Ethernet Cable
- CANBus USB Adapter (if purchased without the X3000 device)
- Medical Grade Power Supply or Field Replaceable Battery

The QCheck NeuroField System kit includes:
- QCheck Device
- RJ45 Ethernet Cable
- CANBus USB Adapter (if purchased - sold separately)
- 9v Battery – not connected

EEG electrodes, Nu-Prep, 10-20 electro-paste and EEG sensors are not included with either the X3000 or Q20 system. An Electrocap from Electrocap International is required to run full cap EEG and/or QCheck Impedance Checking. The cap must have drop reference and be Lexicor compatible. You can obtain these items from several sources, but NeuroField, Inc. recommends that you purchase them from (http://bio-medical.com/) Bio-Medical products. See “Using and Connection a Cap” later in this chapter for cap ordering details.

When setting up the NeuroField hardware, there are several different types of connections. The following is an overview and a few things to note when connecting and/or “daisy chaining” these devices:

➔ The Q20 on its own is not a Stim Unit and will not be recognized in NeuroField as such without the X3000 attached. However, you can use it as a stand-alone amp in either NeuroField or Neuroguide to collect EEG data. See Chapter III “Setting Up the Q20 in Neuroguide” later in this document.
You can connect the Q20 to the X3000 and use it to run RTZ (Real Time Z-Scores).

When you connect the Q20 to the X3000 for RTZ and/or Stim Only (and HRV if you have it/or X2000 and Plus unit), you have what is called a “daisy chain,” where multiple devices are wired together in sequence. As a result, it is recommended to plug the CANBus into the Q20 and turn on the devices in this order:

- Q20 first
- X3000 second
- HRV third (if purchased)

This will ensure proper communication with the units when launching the NeuroField software.

The X3000 on its own is can be used for Stim-Only, Dehab and Nogier. The X3000 device is identical to the X2000 with a Plus unit, except now, with the X3000, the plus device is built in and the power supply has been updated.

Two X3000 units can be hooked up together to Stim with 8 coils rather than the standard 4 coils. This is known as “The Octopus”.

The Q20 and X3000 or X2000 plus unit can be hooked up with 2 separate CANBus to be used simultaneously with NeuroField for Stims and Neuroguide for operant conditioning.

The QCheck can be hooked up with a separate CANBus and used as a standalone unit for Impedance checking. The NeuroField software program will recognize it as a separate hardware device. You can also daisy chain the QCheck to other NeuroField devices, say an X3000, and both units will be recognized at startup by the NeuroField program.

The instructions in this portion of the manual will walk you through configuring the hardware for the following three types of setups:

**Basic Setup:**
- Q20 as stand-alone device; X3000 as stand-alone device
- Q20 and one X3000 unit or one X2000 with plus unit
- QCheck as a standalone device

**Octopus Setup:**
- Q20 and two X3000 units
- Two X3000 units (no Q20)
- One X3000 unit and one X2000 unit (no Q20)

**Combo Setup:** (NeuroField in combination with Neuroguide)
- Q20, one X3000 unit and two CANBus
- Q20, one X2000 plus unit and two CANBus
- Q20, two X3000 units and two CANBus
Basic Setup – The Q20 and One X3000

Again, **BEFORE PROCEEDING** with setting up your hardware, be sure you have installed the NeuroField software. To do so, download the “Software Installation Guide” from the NeuroField website “Downloads” page for step-by-step instructions.

**To Connect CANBus USB Adapter (Q20 or X3000 as a Stand-Alone Device)**

1. Plug the RJ45 Ethernet cable into the CANBus USB adapter. **Note:** The max length Ethernet cable that may be used is 6 feet.

2. If hooking up a single device (either Q20 for Amp only or X3000 for Stim only/Dehab):
a. Plug the other end of the CANBus RJ45 cable into *either port* of the NeuroField Q20 or the X3000. There are two RJ45 input ports, and you can select either port to plug in the device as pictured below:

**To Connect the Q20 and the X3000**  
If you want to use the Q20 and the X3000 together for RTZ training, you will need to connect them with a separate RJ45 jack supplied in your NeuroField X3000 kit. Then, power on the Q20 first and X3000 second, and you’re all set up and ready to launch the software. **Note:** Plug the CANBus RJ45 cable into the Q20 rather than the X3000. This way it is ready to use as a stand-alone acquisition device. To do this:

1. Plug one end of the RJ45 jack into *either port* where designated, “CANBus” on the X3000 unit.
2. Plug the other end of the RJ45 jack into *either port* where designated “CANBus” on the Q20 unit. The units are now connected and can be used for pEMF and Z-Score training together. **NOTE:** When using the Q20 and the X3000 together for Stim and RTZ, CONNECT ONLY 1 CANBus USB adapter!!!! See picture above to the right which shows a single CANBus adapter.

**To Connect the Coils**

1. Plug the coils cable into the back of the NeuroField X3000 or X2000 Plus unit where designated, “Coil Drive”.  
2. Gently tighten the screws on the connector to ensure that the coils are secured.
Basic Setup – QCheck

The QCheck is an electrode impedance checking instrument supplied by NeuroField, Inc. that can be used to read the:

- **Contact Impedance Levels** (Kohms) at the skin/electrode interface for each site to determine if there is noise and a reduction in (Kohms) is required.
- **Contact Potential Levels** (mVolts) for each electrode wired in the cap to determine if there is a deviant/broken wire and a sensor replacement may be required.

Once an E1-LEX cap has been connected to the D25 pin connector (see instructions in “Using and Connecting a Cap” later in this Chapter), you can then use the QCheck software option from the NeuroField Main Program Side Bar to easily evaluate where there is noise between the electrode and the scalp and/or whether or not you may have a bad electrode/broken wire. Detailed instructions for running the “Impedance Checker” software are provided in “III. Software Basics” later in this Section of the manual.

**Note:** The following instructions are for setting up and running the QCheck as a standalone device prior to running the NeuroField Q20 device in Neuroguide (or any Amp that uses the standard Lexicor pin out matching the E1-LEX cap and is supported in Neuroguide) for data acquisition and training sessions.

**To Connect the QCheck 9V Battery**

Before you can setup the QCheck, you must connect the 9V battery that comes with your device. To do this:

1. On the bottom of the QCheck, open the battery compartment. Notice that the battery is laying inside, but the wires are not yet connected.
2. Peel off the protective covering on the 9v battery clip and connect the clip/wires to the battery.
3. Close the battery compartment cover and turn the power switch to “On”. The green power light should come on.
4. Power off the QCheck and you are ready to connect the device.

**To Connect the CANBus to the QCheck**

The CANBus for the QCheck is sold separately. If you are using multiple NeuroField devices, you can easily switch the CANBus between devices or “daisy chain” them together as described earlier in this Section. However, if you do not have a CANBus, or you would like to use a dedicated CANBus for your QCheck, you will need to purchase one from NeuroField, Inc. To connect your QCheck do the following:
1. Plug one end of the RJ45 Ethernet cable (Yellow Cable shown in the picture above) that came with your device into the CANBus USB adapter.

2. Plug the other end of the RJ45 cable into either port of the NeuroField QCheck. There are two RJ45 input ports, and you can select either port to plug in the CANBus.

3. Insert the USB Connector on the CANBus into an empty USB port on your computer. Your QCheck is now connected and you are ready to power it on. Go to “powering On the Devices” at the end of this “Hardware Setup” section.
**Octopus Setup – Using Two X3000 Units Simultaneously**

To Connect two X3000’s and the Q20 – Octopus Setup

If you want to setup your Q20 amplifier with two X3000 units to run 8 coils Stims with NeuroField protocols (known as “the Octopus”), you will need two RJ45 jacks. Use the RJ45 jacks supplied in each of your NeuroField X3000 kits and connect them to each other and to the Q20. Power on the Q20 first, one X3000, and then the other X3000, and you’re all set up and ready to launch the software. You can also setup one X3000 and an X2000 Plus with the Q20 as well.

**Note:** If you are not using a Q20 and want to do a “Stim Only” using the “Octopus”, instructions are also below.

---

**Connecting two X3000 units & a Q20 with 8 Coils - 2 RJ45 Jacks**

To do this (as displayed in the photos above):

1. Using the top X3000 unit, plug one end of the RJ45 jack #1 (Orange jack) into either port where designated “CANBus”.
2. Plug the other end of RJ45 jack #1 (Orange jack) into the 2nd X3000 unit using either port where designated “CANBus”.
3. Using the 2nd X3000 unit, plug one end of the RJ45 jack #2 (Purple jack) into the remaining empty port where designated “CANBus”.
4. Plug the other end of the RJ45 jack #2 (Purple jack) into the Q20 using either port where designated “CANBus”.
5. Using the CANBus adapter, plug one end of the CANBus (Yellow jack) into the remaining empty port on the Q20 where designated “CANBus” and the USB connector at the other end into your Computer. The units are now connected and can be used for pEMF and Z-Score training together.

**Note: USE ONLY 1 CANBus CONNECTOR for this setup!**

6. Attach the two sets of coils by plugging each set of four coils into the back of each X3000 Stim Unit where designated “Coil Drive”. NeuroField will generate Stims from all eight coils.

---

**To Connect two X3000 Units – Octopus Setup**

If you want to setup the Octopus using two X3000 units without a Q20 for Stim Only (or an X3000 and an X2000 w/ Plus Unit), you will only need one RJ45 Jack. See pictures below.
To do this (as displayed in the photos above):

1. Using the top X3000 unit, plug one end of the RJ45 jack (Purple jack) into either port where designated “CANBus”.

2. Plug the other end of RJ45 jack (Purple jack) into the 2nd X3000 unit using either port where designated “CANBus”.

3. Using the CANBus adapter, plug one end of the CANBus (Orange jack) into the remaining empty port on the bottom X3000 where designated “CANBus” and the USB connector at the other end into your Computer. The units are now connected and can be used for pEMF Stims using 8 coils.

   **Note: USE ONLY 1 CANBus CONNECTOR for this setup!**

4. Attach the two sets of coils by plugging each set of four coils into the back of each X3000 Stim Unit where designated “Coil Drive”. NeuroField will generate Stims from all eight coils. See photo below displaying the 2 sets of coils connected where designated “Coil Drive” on the X3000 and X2000 w/ Plus Unit.
**NeuroField/Neuroguide Combo Setup - 2 CANBus for X3000 and Q20**

The NeuroField system allows you to have two separate CANBus plugged in, one plugged into the Q20 and the other plugged into the X3000. This setup allows you to run the Q20 with Neuroguide on one CANBus and run the X3000 with NeuroField on the other CANBus. You can put both programs, together side-by-side on your monitor and run them simultaneously on one computer. **Note:** This requires version 2.4.8.1 or greater. Refer to the “NeuroField Installation Guide” for detailed instructions on how to upgrade and or install this version.

**To Connect 2 CANBus using the Q20 and the X3000:**

If you want to use the NeuroField and Neuroguide simultaneously, you will need to connect one CANBus directly to the Q20 and the other CANBus connected directly to the X3000. **Note:** Power on the Q20 and launch Neuroguide first and then power up NeuroField and the X3000 second. To do this:

1. Plug the CANBus Adapter RJ45 jack #1 (Yellow jack) into the NeuroField X3000 unit using the empty port where designated “CANBus”.
2. Plug the other end of the Yellow CANBus jack #1 into an empty USB port on your computer.
3. Plug the CANBus Adapter RJ45 jack #2 (Orange jack) into the Q20 unit using the empty port where designated “CANBus”.
4. Plug the other end of the CANBus jack #2 (Orange jack) into another empty USB port on your computer.

You are now ready to connect the cap and power on the hardware. **Note:** Notice that there is not an RJ45 jack connecting the X3000 to the Q20. You must not “daisy chain” the two devices together or the “Combo” setup won’t work. Each unit must be operating independently of each other.
**Using and Connecting a Cap**

NeuroField supports the use of a cap for 19-Channel training and uses the Lexicor D25 pinout on the Q20 and QCheck units. If you own caps with this connector, they will work! **Note:** EEG amps can have different pinouts on the D25 connector. Only the caps noted below for ordering are approved for use with the Q20 and QCheck. Any other Cap must be evaluated and approved for use with NeuroField devices. Please contact NeuroField, Inc. for further information on cap evaluation and approval.

**To Order a Cap and Ear Electrodes**


1. When ordering you must ask for a specific type of cap and ear electrodes. The caps and ear electrodes that work with the Q20 are coded as:

   - **Cap Code#** = E1-LEX-L, M, or S. The L, M or S designates the size of the cap so you need to choose one of those letters for each cap size you order.

   - **Ear Electrodes Code#** = E5-9S DROPS. These are very short “drop-down” ear electrodes and are important to order over the longer ones as they help to minimize noise.

     **Note:** If you own a Deymed Cap, Electro-Cap will make a Converter for you so you do not have to buy all new caps.

**To Connect the Cap - Q20**

1. Once you have your cap, attach the D25 pin connector to the front of the Q20 labeled “Cap”.

**To Connect the Cap - QCheck**

1. Once you have your cap, attach the D25 pin connector on the front of the QCheck.

**Powering On the Devices**

These instructions assume you have your devices connected to one another and the CANBUS Adapter hooked up. If not go to the beginning of this chapter, “II Hardware Setup.”
To Power on the Q20 only:

Using Power Supply:

1. Plug in the Q20 Power Supply that came with the device into the “Power” slot in the back of the device.
2. On the power supply itself, set the “On and Off” switch on the power supply to “On”. The Device is now receiving power.

Using Battery and Universal Smart Charger:

1. Unplug the power supply from the “Charger” slot in back of the Q20. Note: the light on the Universal Smart Charger will be Green when the battery is fully charged.
2. On the back of the Q20, set the “On / Off” switch to “On”. The Device is now receiving power.
   
   Note: Special care must be taken to ensure the optimal lifetime of the Battery. If the Battery in the Q20 is allowed to fully discharge, it can cause significantly reduced Battery life or may cause early failure of the Battery not covered by warranty. It is suggested that the:
   
   - Q20 be used throughout the day without charging. This will allow the battery to discharge the recommended amount.
   - Power Switch on the unit be turned to “Off” at the end of each day.
   - Universal Smart Charger be plugged into the Q20 overnight. The Smart Charger light should shift from a green light to a red light when charging after use each day.
   - Q20 remained plugged into the Smart Charger during extended periods of time of non-use.

To Power on the Q20 and X3000 (And HRV if purchased)

When these devices are all connected together, they form a “daisy chain”, and it is important to power them on in this sequence:

1. First turn on the Q20 so this device is receiving power as described in the area above.
2. Turn on the X3000 Second. Plug in the X3000 Power Supply that came with the device. Set the “On and Off” switch on the power supply to “On”. The Device is now receiving power.
3. If you have an HRV device, Power it on Third. You are now ready to launch the NeuroField Software!

To Power on the Q20 and X3000 Neuroguide/NeuroField Combo

Once your Q20 and X3000 have been setup to run a Combo session as described earlier in this Section, refer to the beginning of Chapter V. “NeuroField pEMF / Neuroguide Combo” later in this Section for detailed instructions on the specific sequence to power up the devices and launch the software to run a Combo session.

To Power on the QCheck

Once the Qcheck has been setup and you have connected your cap, you are now ready to power it on:

1. Turn the switch on the side of the QCheck unit to the “On” position. A green light will appear and your device is now receiving power.

You are now ready to launch the NeuroField software and run the Impedance Checker. Go to “III. Software Basics – Using the Main Program Side Bar” for detailed instructions on using the Impedance Checker software.
Note: Once the QCheck is powered on and the software is launched, NeuroField will recognize the QCheck in the “Devices Found” window as seen in the screenshot below.
III. Software Basics

This Chapter is meant to teach you the basic information that is needed to use the NeuroField software. However, it is necessary to attend a formal training by Dr. Nicholas Dogris in order to learn how to use the system for clinical purposes.

For Software Basics using the HRV unit or tACS/tDCS unit, see Sections 3 and 4 later in the manual.

Starting the Program

In order to run 19 channel training you must have a Q20 EEG device and a X3000 Plus/DDS or X2000/X1000 with a Plus unit. All the units must be properly connected. Be sure to turn on the Power for each device as described in the “Powering on the Devices” above before starting the program. If the unit has been disconnected or is not on when starting the program, you must power up your NeuroField device and be sure your CANBus adapter is plugged into the device before proceeding. See Chapter II “Hardware Setup” for further details.

When you are ready to start the program, you will need to select a database, query the CANBus to ensure the units are found, and then select your protocol.

To Launch NeuroField, Select a Database and Start the Program:

1. Click on the NeuroField icon located on your desktop to launch the NeuroField application. The main NeuroField screen will appear with the “Continue” button greyed-out.
Note: During installation, the NeuroField shortcut placed on your desktop is set to “Run as Administrator.” If you are having problems launching the program some operating systems may cause this to get reset. If this is the case, check the shortcut setting. To do this:

a. Right-click on the NeuroField Icon.
b. Select “Properties”
c. Select the “Compatibility” Tab
d. Under the “Privilege Level” area make sure the “Run this program as Administrator.”

2. Select your desired database from the drop-down menu and the “Continue” button will activate.

Note: The “NeuroField DB” option is listed by default but not selected. If you want to use this database, you still need to select it from the drop-down menu.

3. Click on the “Continue” button and the Query Screen will appear with the “Click to Continue” button activated and highlighted in red.

4. Click on the “Click to Continue” Button. An initialization process will query the system to display what NeuroField hardware is connected to the computer.
5. When devices are found, the “Click to Continue” button changes to “Devices Found”. NeuroField displays Devices Found as follows:
   - If there is one Stim unit attached, it will be discovered as the Primary unit
   - If there are 2 Stim Units, say two X3000 or an X3000 and an X2000 Plus, they will be discovered as both the Primary and Secondary Units.
   - If you have hooked up 2 or 3 CANBuses, say to use the Q20 with Neuroguide, or the tDCS/tACS Unit, those modules found will be listed as well.

Once devices are found, the “CANBus Selection window appears.

6. Click on the “CANBus #x” button to make your selection and the “Stim Launch Pad” appears where you can now select your protocol.

**Troubleshooting**

If the Unit was not detected an error message will appear:
1. Check to be sure that the:
   a. Hardware is powered on and connected to the computer correctly
   b. USB CANBus adapter is plugged in and the drivers were installed correctly.
   c. NeuroField was connected and powered up when the program was started up.
**Backing up the Patient Database**

Once the “Start Program” button has been clicked, NeuroField will present a prompt to Backup the patient database. The NeuroField Backup is “Intelligent Backup” and only updates the database if changes are detected since your last backup. If you have not made any changes to your patient database since your last backup, the database will not get updated and thus the time stamp for your patient database file will not change.

**To Backup the Patient Database:**

1. At the “Database Backup” prompt, Click on the “Yes” button and the “Database Backup” successful prompt will appear.

   ![Database Backup](image1.png)

   ![Database Backup Successful](image2.png)

2. Click on the “Ok” button to continue to the Stim Launch Pad.

The backup data is stored in the Patient.mdb database located in the C:/NFDBBackup folder. **Note:** You can select “No” to cancel backing up your database, however, it is important to routinely backup your patient data to prevent losing your data, especially during product upgrades. You can also click on the “Backup Databases” button at any time within NeuroField to manually perform a backup.
**Entering and Selecting a Patient**

NeuroField was designed to store patient data quickly and efficiently AND to be paperless. To begin treatment, you will need to first enter the new patient into the database, and then select that patient from your list.

**To Enter a New Patient:**
1. On the left side of the screen you will see a set of buttons. Click on “Select Patient” to enter a person’s name into the database.
2. Click on the “Add New Patient” button to enter a new patient name.
3. Enter the first and last name of the person in the designated boxes.
4. Once their name has been added, you can enter comments about them in the “Comments Box”.
5. Click on the “Update Patient Info” button. This will store the data in the database and you will see the patient name on the list. Names are stored in alphabetical order.

**To Select a Patient for Treatment:**
1. Click on the small box to the left of the patient name and an arrow icon will appear to show it has been activated.
2. Click on the “Select Patient and Close Window” button. The patient ID number will be displayed at the top of the screen and your patient is ready for treatment. After a treatment all of the patient information will be stored under this ID number. **Note:** if you want to view previous treatment data, Click on the “Select Patient and Show Treatment History” button.
Networking Your Patient History

If you are running patient sessions from multiple rooms in your office, NeuroField can now save your Patient History to a “Central Location” on a Network Path and easily access it from a “Local Computer” in any one of your rooms. So, for example, if you run a Patient session on a computer in Room1 the first day and then want to use a computer in Room2 on the second day, you do not have to go to the computer in Room1 to review the session protocols from the day before. You can now store your Patient’s History on a designated computer in one room in your office and view it from any other room running NeuroField sessions. Note: This feature requires that the computers in each room be networked appropriately with Shared drives. If you do not know how to setup a Network in your office, you will need to have your Network/IT employee come in and set this up or hire a professional to do this for you.

In order to proceed with the directions below, designate one of your Shared computers as the central location to store your Patient History data. It’s a good idea to pick a computer with a lot of free disk space. For the examples below, it will be Computer Name = “MAIN” located in Room5.

To Setup Your Patient History on a Network:

Once your office is setup as a Network, do the following on each computer running NeuroField:

1. Launch NeuroField from a computer in Room1
2. Click on the Load Database button
3. Navigate to the Shared computer on your Network that you chose as the central location to store your Patients History i.e. “MAIN” located in Room5 and go to MAIN C:/NeuroField/NeuroFieldData/PatientData/
4. In the “PatientData” folder on “MAIN”, Click on the “Patients.mdb” file to select it and then Click on “Open”. The pathname to your Patients History database will now be written to a text file on your local computer (i.e. Computer in Room 1).
5. Double check this by navigating to the text file at C:/NeuroField/NFNetworkPath.txt on the local computer and double-click on it to open it up.
6. Confirm that the Path listed in the file points to the correct Computer/Path i.e. MAIN C:/NeuroField/NeuroFieldData/PatientData/Patients.db

From now on, any session data conducted on the computer in Room1 will get stored and can be accessed from the Computer in Room5.

7. Go to Room2 and repeat these steps for the next computer running NeuroField on your shared network. Continue with this process until the “NFNetworkPath.txt” files on all the computers in each room have been updated to point to the designated central location (i.e Computer in Room5).

Note: These directions ONLY apply if you have a Network setup with Shared drives. If you do not have a network setup, the default path to store your Patient History is correctly setup for you in the C:/NeuroField/NFNetworkPath.txt file. It will automatically store your Patients History data on each local computer at C:\NeuroField\NeuroFieldData\PatientData. No change is required, thus you are good to go!
Using the Stim Launch Pad

The “Stim Launch Pad” is where you will work most of the time. **Note:** If you have tDCS/tACS unit attached as part of your system, the Stim Launch Pad will also contain a “tDCS Manual Control” button. For more information on the “Manual Control” button and using it with the NeuroField System, refer to Section 4 – Chapters I – VIII later in this User Manual for specific instructions on using the tDCS/tACS unit. If you do not have the tDCS unit attached, your “Stim Launch Pad” will appear as seen in the screenshot below.

On this page you can run a number of different types of treatments: Standard Treatment, HRV Treatment, and EEG & RTZ Treatments (HRV/EEG/RTZ). At the bottom of the Treatment Page you will see seven buttons: Standard, Dehab, SDNN Hit, EEG Hit, Z-Score Hit, Start Standard Treatment, and Close. You can navigate to any part of the program using these buttons.

**To Select a Protocol and Run Standard Treatment:**

A Standard Treatment can be run without any EEG and/or HRV connected to the person. To do this you simply:

1. Place the Velcro cap on the patient’s head and attach the coils to the Velcro strips.
2. Click on the “Select Protocol/Treatment Setup Button” on the Stim Launch Pad. The “Protocol Selection” screen will appear.
3. Select the protocol that you want to use for your treatment. These protocols are selected based on the QEEG data and requires training in order to do this correctly. For example, if your client’s presenting symptoms are Anxiety and the QEEG data confirms that, you will want to run a slow wave protocol i.e. “1 – 4 HD” or “1 – 4 HD Rocking” or “1-4/40-80 CHIRP”.

**Note:** When selecting a protocol, you will see information as to the amplitude, duration and amount of stim cycles. The lower the amplitude (e.g. 1 volt versus 5 volts), the weaker the pEMF emitted from the coils. For sensitive clients it is important that you assess sensitivity and reactivity so as to make a determination regarding treatment amplitude.

4. Set the number of loops. In the “Looping Setup” area of the Protocol Selection screen, enter the number of Loops you want to run during your session. The “Total Protocol Run Time:” automatically calculates and displays the time it will take to run one loop, and the “Total Treatment Time:” automatically calculates and displays the amount of time it will take to run the full designated number of loops. If need be, adjust the number of loops so the “Total Treatment Time:” is equal to the desired length of time the session.

5. If you are using the Q20 and running an RTZ session, you have the option of using the “Auto Abort Time:” area of the Protocol Selection screen. When enabled this tells the system to abort after the designated period of time. This is useful during an RTZ session when the system sticks with a specific frequency instead of continuing to cycle through the frequency range and complete the loop. When checked, it will now automatically abort after a certain period of time without you having to manually hit the “Abort Process” button.

6. If you have an X3000 DDS Unit, select the waveform you want to use to Stim your client. (See “About X3000 DDS Waveforms” below for more info.)
7. Enter your Coil Placements. **Note:** If you are using 1 X3000 you will see Coil Placement selections for Primary Stim Generator only. If using 2 X3000’s you will see Coil Placement selections for both Primary and Secondary Stim Generators as seen in the screenshot above.

8. Press the “Select and Close” button and you will return to the Stim Launch Pad.

9. Press the “Start Standard Treatment” button. The protocol will start to run and you will see the “On/Off” status ‘light up’ green each time a Stim Cycle is run. Again, if you are using 1 X3000 you will see “On/Off” for Primary Stim Generator only. If using 2 X3000’s you will see “On/Off” selections for both Primary and Secondary Stim Generators as seen in the screenshot above.

10. Proceed to the following Sections/Chapters of this manual to learn more about setting up the software for RTZ, Stim-Only Standard / CFC, or tDCS/tACS sessions. If you want to run a:
    - Stim Only session using either the X3000 or X2000, proceed to Section I Chapter IV
    - NeuroField pEMF / Neuroguide Combo, proceed to Section 1 Chapter V
    - 19 Channel RTZ session using the Q20, proceed to Section 2 Chapter I
    - 1 to 4 Channel RTZ session using the Q20, proceed to Section 2 Chapter II
    - 2 Channel RTZ Session using the X2000, proceed to Section 2 Chapter III
    - HRV Body Protocols, proceed to Section 3 Chapters 1 - III
    - tDCS/tACS Setup and Software Basics proceed to Section 4 Chapters I - VIII

**To Abort a Protocol and Exit Program:**

1. Click on the “Abort Process” button on the main menu sidebar.
   **Note:** The abort process will not always happen immediately. The protocol will be aborted as soon as the current stim cycle that was in process when the button was clicked is completed.

2. Click on the “Exit Program” button on the main menu sidebar.
Using Sweep Control

In the Protocol Selection Screen, you will see an area called “Sweep Control”. Here you can apply a dithering or sweep effect to the frequencies for protocols located in any NeuroField database. For example, a sweep of 5Hz applied to a fixed protocol number of 10 Hz would result in NeuroField sweeping through the fixed frequency, making 10Hz the median number in the sweep and giving stims beginning at 8Hz and ending at 12Hz.

In addition, the Sweep Controls can be a nice short cut to change the amplitude and duration values of pre-set protocols in NeuroField. This saves an enormous amount of time and makes giving specific patient-oriented treatments efficient. Values entered here will override the pre-set protocol settings, so protocols can be adapted on-the-fly to the needs of the patient. For example, if there is a protocol you want to use that is pre-set to 5 volts (i.e. “T001 --> 0.31 - 1 Hz, 5 v, step 0.01”) and your patient is showing signs of sensitivity, you can change the Amplitude to 2.5 volts in the sweep controls and a 5 volt protocol now becomes a 2.5 volt protocol.

To Use Sweep Controls:
1. From the Stim Launch Pad, click on the “Select Protocol/Treatment Setup” button and the Protocol Selection screen appears.
2. In the “Sweep Control” area of the Protocol Selection screen, click on the “Enable” radio button and the controls will become visible.
3. Enter the “Total Sweep” value you would like to use and the protocol will sweep through additional frequencies. In almost all cases the most you would want to sweep will be between 3-5 Hz. You can also leave the frequency value at zero for the purpose of simply customizing pre-set protocols’ duration and voltage only. Note: The Total Sweep is hardly ever used since the HD protocols do such a good job, but it is there if you want it.
4. Enter the “Duration”. This can be between 100 msec to 60000 msec. Values must be entered in milliseconds. Note: 1,000 msec equals one second, 3,000 msec = 3 seconds etc.
5. Enter the “Voltage”. This can be between .00008 (800 microvolts) to 5 volts. Note: The higher the voltage the stronger the EMF produced in the NeuroField coils.

To Customize a Pre-Set Protocol:
The Sweep Controls can be used to easily customize NeuroField’s pre-set protocols to adapt to the needs of the patient receiving the treatment. To modify a pre-set protocol on-the-fly for your patient:
1. Click on the “Enable” radio button and the controls will become visible.
2. Leave “Total Sweep” at 0.
3. Change “Duration” to a new Stim time. For example, when using a preset protocol with a 1 second stim, change the “Duration” to 3,000 msec to make it a 3 sec Stim protocol.
4. And/Or Change the “Voltage” to what better suits your patient.

The values changed here will override the preset values in the protocol you are using. Also, NeuroField will give you an error if you go below the minimum capabilities of the system. If you give it a 5hz sweep on .311hz protocol, you will get an error message. If you are going to sweep through something make sure the room is there to be able to do it.
Using the X3000 – DDS (2015 & Later)

If you have purchased an X3000 unit year 2015 or later, this device comes with a DDS chip installed in it which is a “smart chip”. When launching the NeuroField software on an X3000 DDS, if a DDS chip is detected a version of the NeuroField software will load with an additional option in the “Protocol Selection” window to pick the waveform you want to use to Stim the client.

About X3000 DDS Waveforms:
With an X3000 DDS unit attached, the waveform options in the “Protocol Selection” window are:
- Square Wave (Current default)
- Sinusoidal (Sine) Wave
- Triangle Wave

Square waves are what has traditionally been used and is the default option in the NeuroField software. However, the body naturally makes Sine Waves. So, if you put a Sine Wave into the brain you are putting what the brain considers to be one of its own, and will treat it as such. Whereas, when a Square Wave goes into the brain, the brain knows that it is not one of its own. The thinking is that the brain will follow or mimic a Square Wave for a while, habituate to it, and eventually will realize it’s not one of its own and stop listening to it. However, no matter what wave form goes into the brain, the brain still has the ability to decide not to follow it.

In general, if you have patient who is sensitive and you have a DDS unit, try doing the 4-8/40-80 CHIRP protocol with the Sine wave activated. If you don’t have a DDS unit it will automatically give square wave. Note: Data gathering on this subject is ongoing and theories may change over time.
Using the Main Program Side Bar
There are several buttons on the side bar on the left side of the main program screen.

View History Button:
Once your protocol has finished running, you can then open the Patient Treatment History window and view details for any patient and any one of their NeuroField sessions. Here you can write comments about your client and/or the session, as well as create and print a Report.

1. Click on the “View History” button after the protocol is complete and the “Patient Treatment History” window will display with the “Summary Setup” radio button selected by default in the “Treatment History Viewing Options”. Here you can see all the treatment history for your selected patient.

2. Highlight any one of the treatments listed in the “Patient Treatment History Table” and select any one of the NeuroField treatment tabs to see all the session details, including:
   a. Treatment Summary Tab – Treatment Details, Comment Entry, Report Creator
   b. Stimulation Tab – Stim Parameters, Coil Placement, Waveform used, Sweep Controls
   c. HRV Tab – HRV Setup Details
   d. EEG Sensor Tab – EEG Sensor and Setup Details
   e. Z Score Tab – Pairs Assigned, ZAP/ZCO/ZPH Thresholds, and Logic mode selected

Whenever you review the treatment history for any given patient, all of this information will be instantly available to you.
3. When the Treatment Summary tab is active you can enter post treatment comments and then Click on the “Update Treatment Comments” button. This will save your comments and link them to the selected patient and session.

4. Click on the “Generate Treatment Report Button, and a NeuroField Progress Notes report is generated.

**Note:** This Report includes an area for tDCS Manual Control Setup which pertains only if you have purchased a tDCS/tACS unit. For more information on Manual Control Setup refer to Section 4 – Chapter VI later in this document.

5. Click on the “Print Progress Notes Pages” button and a report for the selected patient will print out.

6. Click on the “Measured Data” radio button in the “Treatment History Viewing Option” area of the screen and the RTZ measured data will appear.
7. Select any one of the NeuroField Measurement tabs to see all the RTZ session data details, both Pre and Post Treatment for all 19 channels and all Coherence/Phase Pairs, including:
   - ZScore ZAP Measured Data Tab – Absolute Power Z-Score results
   - ZScore ZCO Measured Data Tab – Coherence Z-Score results
   - ZScore ZPH Measured Data Tab – Phase Z-Score results
   - Amplitude Data (uVrms) Tab – Amplitude results
   
   **Note:** In the “Data Set” area of the screen, click on either “Pre” or “Post” to view the desired data.

8. Click on the “Generate Z-Score Report” button, and a NeuroField Z Score Progress” report is generated. This report will contain all of the data for your RTZ session for both Setup and Results, including:
   - Sensor Placements
   - Pair Assignments
   - Threshold Setups for Absolute Power, Coherence, and Phase
   - Logic Mode selected
   - Pre and Post Measured Values for Absolute Power, Coherence, and Phase
9. Click on the “View Page X” Tabs at the bottom of the report to toggle between Pre and Post results for Absolute Power, Coherence, and Phase.

10. Click on the “Print Z-Score Report Page” button and a report for the selected patient will print out.

The “Load Database” Button:
This allows you to load different databases including the Provider and other user databases. To load a database:

1. Click on the “Close” button located on the lower right corner of the “Stim Launch Pad” if it is open, and it will Close.

2. Click on the “Load Database” button on the Main Menu Side Br. A message box will open instructing you to close all open windows.

3. Click “Ok” and the “Database Selection” window will open.

4. Select the database that you want to use and Click “Ok”. The database will load and take you back to the “Stim Launch Pad”.

```
The “Backup and Restore Database” Buttons:
The “Backup Database” button allows you to save your Patient database into a folder on your hard drive located at C:\NFDBBackup. This is for backup purposes only. Should you lose your database you can then Restore it back into your working NeuroField folder by selecting the “Restore Database” button. However, in order for Restore to work, you must have first backed up the database.

19 Ch EEG Acquire Button:
This button will open up an EDF Creator Tool which allows you to acquire 19 channels of EEG directly into NeuroField. This feature is helpful if you want to analyze the EEG using software platforms other than Neuroguide. When you save your acquisition files in EDF format, you can now import the EEG directly into any program that supports this file format to further review the data. To create an EDF File:

1. After you have put the cap on your client and set impedances, click on the “Select Patient” button and select your patient. **Note:** This is important because the acquired EEG is saved in a file and placed in the selected patient’s folder.
2. Click on the “19 Ch EEG Acquire” Button on the Main Program Sidebar. The EDF File Creation screen appears with the “EDF” radio button selected by default.
3. Enter a number in the “Total Record Time” box to tell NeuroField how long you want to record the EEG. The default is set to 1 second. You can make it either 6 minutes or 10 minutes etc., but the time must be entered as seconds. For example, if you want 6 minutes of acquired EEG, then enter 360 seconds (60 seconds X 6) as your recording time.
4. Notice the “Record Length” is 6 seconds. This is how many seconds get displayed in Linked Ears mode on each scan. You can enter any number from 1 – 9. It is recommended that you leave this set to the default of 6 seconds. This allows you to watch the EEG as it is acquired.
5. Click on “Start Record”. NeuroField will automatically grab the EEG and start to record it. If you are getting a good signal, “Signal Okay” will display Green.

6. When done the “Recording” area of the screen will update to “Completed Full Recording” and will save the EDF file in the Patient Folder for the selected patient. This file can now be imported into the software of your choice to conduct further analysis on the data.

7. Click on the “Close Window” button to Exit out of the 19 Ch Acquisition screen.

**Impedance Checker**
After you have connected an approved cap to the QCheck device and your unit is powered on, you can now check impedances. This button will open up the Impedance Checker software for use with the NeuroField QCheck device. To use this feature:

1. Click on the “Check Impedances” button from the NeuroField Main Program Side Bar and the “NeuroField Impedance Meter” screen will appear.

2. Click on the “Start QCheck” button and the software will read the Impedance in Kohms by default for each site/electrode on the cap. The impedance will tell you the level of noise between the electrode and the scalp.

3. Notice the color for each site. The color coding is as follows:
   - Green = < 10 ohms
- Yellow = < 15 ohms
- Red = > 15 ohms

Ideally, you want all the impedance numbers to be similar, usually an impedance at 10 ohms or less. It is a good rule of thumb to get as many sites to turn green as possible. Make adjustments as needed for a given electrode until you are happy with the reading.

4. When the numbers/colors are to your liking, click on the “Stop QCheck” button. You are now assured that you have good connections at all the required 10/20 sites.

5. Notice that there is another option for displaying QCheck data. You can click on the “Show Contact Voltage” checkbox to switch the measurement values to read in mVolts rather than Kohms. This tells you the contact potential levels for each electrode and is useful in two ways:
   - If you have completed a standard Impedance Check in Kohms and you were having trouble correcting a specific site, say you get a value that is very high i.e. over 30 impedance or you could not turn a level from red to yellow or green. Looking at the contact voltage levels will show you whether there’s a number that is deviant from the group, signifying that there may be a bad or broken wire in that particular electrode.
   - You may simply be interested looking at the contact potential levels for each electrode as well as contact impedance levels. Checking this box will give you a quick reading to determine if the numbers are relatively the same or if one is beginning to deviate. You can keep your eye on that electrode as it may be going bad.

6. Click on the “Close” button and click on the “Exit Program” button from the NeuroField SideBar.

7. Flip the power switch on side of your QCheck device to the “Off” position. Note: This is an important step! You want to be careful not to run-down the battery inside the Qcheck unit.

You are now ready to acquire data/run a session using your Q20 in Neuroguide.

**The Abort Process and Exit Program Buttons:**
The “Abort Process” button allows you to stop a session before it is complete, and the “Exit Program” button closes down the device connections and closes the software application.

**The Remaining Buttons:**
The “Detailed Spectrum”, “HRV Summary”, “Z Score Summary”, “EEG Hit List”, and “Z Score Interface” buttons open different NeuroField interfaces, allowing you to view data quickly and easily. You can maximize and minimize each of these windows as needed. Each of the windows will be minimized when the EEG or HRV functions are used.

**The Main Menu Bar – Reaction Timer:**
The Main Menu Bar just above the Sidebar contains a series of Options with drop-down menus that allow you to easily access the various screens in the NeuroField software. At the bottom of the “NeuroField Interfaces” drop-down, you will find the “Reaction Timer”. To use this feature:

1. Click on NeuroField Interfaces/Reaction Timer and the Reaction Timer screen will appear.
2. Click on the Start button and NeuroField will begin a reaction time test:
   - Client will follow the instructions displayed as the program runs.
   - Client will click on a button each time they see a specific color matching the instructions.
   - Reaction time will be posted in milliseconds in the Status window.
If the instructions are not followed correctly the test will be dismissed. Software will make several runs and then automatically stop. This feature allows you to measure reaction times and administer a pre/post test to determine if you were able to speed up a client’s reaction time. This is specifically useful for athletes who are working on obtaining faster reaction times.

**Using the Dehabituator**

The "Dehabituator" is a random number generator that allows you to give four random frequencies simultaneously per stim cycle. The purpose of the Dehabituator is to dis-entrain deregulated absolute power, coherence and phase in the brain. This allows the brain to re-calibrate itself in an effort to correct pathological brain states. The Dehabituator can be used as a stand-alone treatment or as a ‘priming’ tool to prepare the brain for EEG Neurofeedback.

When using the Dehabituator the:

- Number of Stim Cycles, Frequency, Duration, and Amplitude can all be set to:
  - Fixed Values or
  - Random Values
- Maximum amount of Stim cycles that can be randomized per session is 10,000.
- Frequency range is limited to .31-300,000Hz.
- Duration range is limited to 100-60,000 milliseconds.
- Amplitude range is limited to 0.0008-5 volts.

**Note:** The Dehabituator has many uses and settings. It is recommended that you attend an advanced training to learn these advanced treatment techniques.

**To Start the Dehabituator – Using Fixed Values:**

1. Click on the “Dehab” button on the Stim Launch Pad and the Dehabituator Page will appear. It contains:
   - Boxes at the top of the screen with 2 columns labeled:
     - “Fixed Value”
     - “Check to Randomize”

   **Note:** The page loads in Fixed Value mode with the “Fixed Value” column set by default.

2. Enter the values you wish to give in the boxes at the top of the screen. Try it! Using the “Fixed Value” default settings, Click the “Start Dehabituator Treatment” button at the bottom of the page. A table will be created using those values as pictured below.
To Start the Dehabituator – Using Random Values:

1. Click on the “Dehab” button on the Stim Launch Pad and the Dehabituator Page will appear with “Fixed Value” column set by default.

2. Decide which values you want to randomize. You can randomize either one or all of the settings for the Number of Stim Cycles, Frequency, Duration or Amplitude.

3. In the “Check to Randomize” column at the top of the Dehabituator Page, check the box next to the setting you would like to Randomize. For example, to randomize only the frequency, check the box next to “Frequency’ and leave the rest of the random settings unchecked, thus Fixed. The “Frequency” box will disappear from the “Fixed Value” column and will re-appear under the “Random Lower Limit” and Random Upper Limit” columns.

Once any one of the settings in the Randomize column has been activated, ”Random Lower Limit” and “Random Upper Limit” boxes will appear on the upper right side of the page for that setting, as pictured below.
Note: the Optimal Randomized Settings are as follows:
- The “Stim Cycle” option remains Fixed, so enter a value between 100 – 1000 cycles.
- Randomize “Frequency” by clicking on its check box.
- Set the Frequency. By default, Lower Limit is 1 and the Upper Limit is 8. Set upper limit higher, i.e. 20 for more sensitive clients.
- Randomize the "Duration" by clicking on its check box.
- Set the Duration. By default, Lower Limit is 1000 and the Upper Limit is 5000.
- Randomize the “Amplitude” by clicking on its check box.
- Set the Amplitude. By default, Lower Limit is 3.0 and the Upper Limit is 5.

Again, it is recommended that you attend an advanced training to learn these advanced treatment techniques.

Setting Up the Q20 in Neuroguide
The NeuroField Q20 amplifier can be setup in the Neuroguide software Version 2.7.7 or later to generate a QEEG. To Setup the Q20 in Neuroguide:

1. Launch Neuroguide and it will Open to the default Neuroguide window.
2. Click on “Collection” from the Main Neuroguide menu.
3. Go to “Hardware Selection”.
4. Select the “NeuroField Q20” amplifier. The menu will close and the Q20 is now available to use.
5. Continue in Neuroguide and Click on “Collection” from the Main Menu.
6. Select “Setup and Monitor”. If the Q20 is connected correctly you will see the following screen:

You are now ready to setup any one of several NeuroField session options.
IV. Stim-Only using CFC & Standard Protocols

NeuroField Stim-Only can be run using the X3000 Plus, the X2000 with a Plus Unit, the X1000, and/or either of those units connected to the Q20 as a simultaneous interface with Neuroguide. The Stim-Only procedures described below are very powerful tools and have proven to be effective both as a primer to or in conjunction with operant conditioning. Note: These protocols can be used in conjunction with a tDCS/tACS unit if you have purchased one. See Section 4 for more details on using tDCS/tACS with the NeuroField Stim units.

When planning a Stim-Only session for your client, you can choose between the following treatment options:

- **Standalone Treatment** using a Standard Protocol, say 1 – 4 HD, with a traditional 4 coil setup.
- **Standalone CFC Treatment** using a Cross-Frequency Coupling Protocol, say 1-4/40-80 Chirp, with a stacked 4 or 8 coil setup.
- **Combo Treatment** using either one of the Standalone options while connected to Neuroguide via the Q20, giving you the opportunity to interchange NeuroField Stim-Only with Neuroguide Operant Conditioning…. in real-time. See Chapter V. “NeuroField pEMF / Neuroguide Combo” for further details.

Giving Standalone Stim-Only treatments, is an effective strategy in regulating the brain on its own without the aid of Operant conditioning. However, in many situations it is also important that learning take place, so using NeuroField Stim-Only with Standard or CFC protocols in combination with LORETA 19 Channel Neurofeedback via the Q20 can be even more effective.

Knowing when and how to do so is crucial, and it is strongly recommended that you participate in a training class before using the Stim-Only or any of the NeuroField techniques. Dr. Dogris offers several trainings per year in different locations around the United States. He also offers Webinars and online mentoring consultations to learn these skills and procedures. Dr. Dogris uses the Neuroguide QEEG software to acquire and analyze EEG data for protocol selection. You can learn more about Neuroguide by going to the [www.appliedneuroscience.com](http://www.appliedneuroscience.com) website.

In addition, please remember one simple rule with this and any NeuroField procedure. This process takes a lot of energy from the body and will deplete your client. Imagine running on a treadmill for long periods of time without eating or drinking fluids to maintain your strength. You will run out of gas and will not be able to work out. The same goes for this treatment. It is important to encourage people to eat healthy protein and drink plenty of water pre and post sessions. This gives the brain the energy it needs to stabilize itself.
Understanding CFC Protocols and Network Hubs

CFC (Cross Frequency Coupling) and the Gamma Frequency:

Recent studies in the field of Cognitive Neuroscience have revealed that not only can examining brain activity in each single frequency band guide us in understanding brain function, but the relation and interaction between oscillations in different bands can be extremely informative as well. This interaction between several oscillations is known as Cross-Frequency Coupling (CFC).

Cross-Frequency Coupling has shown to have an extraordinary effect in regulating cognitive processing, and has been linked to both learning and memory. As a result, the NeuroField program has evolved to include Cross-Frequency Coupling Protocols, and a separate CFC database can be selected and accessed when launching the software. In this database you will find a number of preset CFC protocols to use during NeuroField training sessions. In addition, you can also create your own customized CFC Protocols using the NeuroField Protocol Creator. Note: Again, this is an advanced skill and attending a NeuroField training is highly recommended before creating your own custom CFC protocols.

At the center of Cross-Frequency Coupling is the use of the Gamma frequency, for it is the key to stabilizing the brain and allowing the different Network Hubs in the brain to talk to one another. The protocols contained in the CFC database are built around the use of Gamma, both Lo Gamma from 40-80hz and Hi Gamma from 80-150hz. The goal when creating and applying these protocols is to not only utilize the Gamma frequency, but to utilize it in the most effective way possible. Research has shown that, yes, Gamma is the thread that sews the Network Hubs of the brain together, and it is what makes the Network Hubs talk to one another. But, research has also shown that Gamma can’t operate alone. Gamma cannot travel through the brain, say from the front of the brain to the back of the brain by itself. For example, if you Stim Gamma at Fz, it will only propagate at Fz. But, if you want Gamma to help stabilize communication between Fz and Pz or Front (Anterior Cingulate) to Back (Posterior Cingulate) of the brain, it cannot do that on its own.

However, if Gamma is linked to a slow frequency waveform and phase/amplitude matched to that waveform, it can propagate from one end of the brain to the other. As long as a slower frequency is present and the frequencies are phase/amplitude matched, Gamma can ride on its back and get carried throughout the brain, making it more effective while propagating over a wider area. A good analogy is to think about the bottom of the ocean where the largest wave is created. As this wave moves through the ocean floor, it is going to carry everything else in its path. Similarly, if you don’t have a slow frequency wave during a Gamma Stim, then you basically have “flat water” and the Gamma can’t affect as wide an area as you would like. Linking Gamma with a slow frequency waveform solves that problem. As you see in the provided CFC protocols, along with the Gamma frequency, they also contain phase matched Delta, Theta, Alpha and/or SMR frequencies as well. This is known as “nesting” or “coupling” the frequencies.
The “Rich Club”:
Research has also shown that another key to maintaining the efficiency of the human brain is a set of large, highly connected network hubs known as the “Rich Club”. When using NeuroField with the CFC protocols you are now thinking in terms of training a group of network hubs, rather than simply training a single Brodmann Area or 10/20 site. When this large and densely packed network of neurons, known as the “Human Connectome”, is functioning properly you will see Theta/Gamma nesting occur from the Anterior Cingulate to the Posterior Cingulate, and you should see specific kinds of nesting/coupling behaviors within all areas of the “Rich Club”. When these hubs are talking to one another, then everything works together, not just a part of the brain, but the whole brain.

As a result, it has come to light that this intricate system of networks in the brain needs to be online and functioning as a primary strategy when working to return the brain to its optimal state. The importance of this lies in the notion that if this hub system isn’t working the way that it is supposed to, then the brain cannot properly and efficiently regulate itself. If any two sets of hubs are out, the rest of system is going to be out. But, most importantly, it will affect a person’s ability to respond to Neurofeedback training. In other words, if the Posterior Cingulate is not talking to the Anterior Cingulate and there is evidence of either hyper or hypo-coherence, it makes brain regulation using RTZ or Z-Score Operant Conditioning more difficult to achieve. **Note:** It’s not that you can’t get results with Neurofeedback, you can, but the level of results and how quickly you get results is affected.

For detailed information about the “Rich Club”, refer to the Rich Club.doc located in the “NeuroField Documents” folder that is automatically installed on your desktop when the NeuroField software is installed. The full title of this document is “Rich-Club Organization of the Human Connectome”. It is strongly advised to read this document and further understand the research that has been conducted regarding the “Rich Club”.

**Understanding the “Paradigm Shift”**
The advent of NeuroField CFC Protocols and the whole notion of using Cross-Frequency Coupling (CFC) to train specific areas of the “Rich Club” has caused a paradigm shift in the way that training strategies are prioritized. In general, training methods have predominantly been focused on thinking in terms of Amplitude training, giving a Stim in a certain frequency in order to bring up or calm down a specific area of the brain. For instance:

- If a person is low in Delta, give them Delta,
- If they are low in SMR, give them SMR.
- If the brain is completely and tightly locked, dehabituate them and then give them the frequency that is most deregulated according to the QEEG and the client’s presenting symptoms.

Although standard strategies are important and certainly have their place in your training plan, it is important to now think first in terms of overall communication and ensuring that the Network Hubs are
talking to one another, and then proceed with additional training strategies. The paradigm shift looks at Network Configuration and Network Optimization utilizing the Gamma frequency as a key to subsequently getting a good response in Neurotherapy. With this in mind, as a primary focus before anything else, you would now ask yourself:

- Is the Default Mode Network online?
- Do I see the Rich Club working the way it is supposed to?
- Do I see hyper or hypo-coherence there?
- If so, how do I get those areas to talk to each other?

**“Rich Club” Locations:**
So how do you get these hubs to begin talking to one another if they are off line? By giving NeuroField Stims using Cross Frequency Coupling (CFC) Protocols, and placing the NeuroField stacked coils in the area of the “Rich Club”.

The Brodmann Areas included in the “Rich Club” are:

- Frontal Lobe = BA 9, 10
- Anterior Cingulate = BA 24, 32, 33
- Posterior Cingulate = BA, 23, 29, 30, 31
- Superior Parietal Cortex/Precuneus = BA 5, BA 7
- Visual Cortex = BA 17, 18, 19
- Hippocampus/Medial Temporal Lobe = BA 27, 28, 34, 35, 36, & 48
- Insula = BA 13

**Stacked Coils and Harmonics:**
When using CFC protocols and nesting the frequencies, you must stack the coils. This means that you place one coil on top of another coil instead of placing each one separately on the cap. Refer to the Segment below titled “To Stack and Place 4 or 8 Coils” for detailed information on how to stack coils. When you stack coils in this manner you can run two separate frequencies simultaneously to create the carrier effect for Gamma, using 1 coil (at the bottom of the stack) for the slow wave frequency and the other coil (at the top of the stack) for the Gamma frequency.
Again, what research has shown is that if the frequencies are phase matched, if they are in the same phase, and they have the same amplitude, then the slow frequency wave will become the carrier. The high frequency waveform (Gamma) will naturally match it and get carried right with it over a wider area. Frequencies are phased matched if they are harmonically matched. The two go hand-in-hand. 40 Hz Gamma is a harmonic of 5 Hz Theta (it is 8 sets of 5). If you actually draw those wave forms next to each other, you would see how they actually click in and they phase match. This is a key component to making CFC training work. The CFC protocols are all designed with the harmonics carefully calculated to be phase/amplitude matched.

To generate the harmonics every wave form is calculated by itself. So, if you have 5 Hz Theta, you would multiply it by sets of 5 to get its specific set of harmonics, or 6 Hz, multiply it by sets of 6 and you will come up with the equal harmonics. You can do the same for say, 7hz, 8hz etc. So, 5hz and Theta will ring out harmonics at the following frequencies:

<table>
<thead>
<tr>
<th>Alpha / Beta Range</th>
<th>Gamma Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz (5x2)</td>
<td>40 Hz (5x8)</td>
</tr>
<tr>
<td>15 Hz (5x3)</td>
<td>45 Hz (5x9)</td>
</tr>
<tr>
<td>20 Hz (5x4)</td>
<td>50 Hz (5x10)</td>
</tr>
<tr>
<td>25 Hz (5x5) etc.</td>
<td>55 Hz (5x11)</td>
</tr>
</tbody>
</table>

In the case of the CFC Theta Gamma / Alpha Gamma Protocol, for example, it efficiently utilizes the Gamma frequency by using Theta as the carrier and building harmonics of Theta in the Lo Gamma frequency range (40-80Hz). So, the protocol starts with Theta 5 Hz in Coil 1 (CH1), ringing out harmonics starting at 40hz Gamma in Coil 2 (CH2). As the protocol steps through the Theta Band (6hz, 7hz, 8hz), harmonics within the Gamma range are created for each of the Theta Frequencies. See “Stim CH1 Frequency” and “Stim CH2 Frequency” columns below.
The same holds true for the Alpha Gamma portion of the protocol. It starts with Alpha 9 Hz in Coil 3 (CH3), ringing out harmonics starting at 45 Hz Gamma in Coil 4 (CH4). As the protocol steps through the Alpha Band (9 – 12Hz), harmonics within the Gamma range are created for each of the Alpha Frequencies. See “Stim CH3 Frequency” and “Stim CH4 Frequency” columns above. **Note:** Placement of stacked coils for each CFC protocol is crucial and is something that is taught by Dr. Dogris at workshops and/or Webinars.

**Phase Reset Dynamics and CFC Protocols:**

When CFC Protocols are run targeting the “Rich Club”, it influences Phase Reset dynamics. Phase Reset is a combination of Phase Lock and Phase shift. The brain will go through a Phase Lock for a period of time and then go into a Phase Shift for a period of time. The two together are known as Phase Reset. The brain has to do this to communicate effectively between each of these hubs. When the hubs can talk to each other, they can regulate each other. Research is showing that the:

- Length of a Phase Shift is correlated with levels of Intelligence
  - Neurons are calling out for resources / talking to each other
- Length of a Phase Lock is associated with Pathology
  - Neurons are running independently / not talking to one another
- There is an optimum range of Phase Reset that when it’s achieved, the whole system runs well.
  - Don’t want Phase Lock or Phase Shift to be too short
  - Don’t want either of them to be too long

So, the Posterior Cingulate has to be able to talk to the Anterior Cingulate, and if it can then the whole brain will operate optimally. For example, let’s say you are in a room full of people that are all members of the Rich Club, and your one goal is to match the volume of your voices. In order to do that, in order for you to speak at the same volume as another person, you have to be able to hear them long enough. There has to be enough communication between the two of you in order for you to make an estimation about how loud you need to speak to get the job done. If you can get that information, you can actually match it and regulate your voice at the same volume as their voice and every other person in the room.

If you can’t, if the communication is too short, such as in hypo-coherence or hypo-phase (deep blue lines in the QEEG representing short communication), there is not enough time for you to hear the person across the room, and if you can’t hear them, you can’t make an estimation of how to match them to get the job done and confusion ensues. Or, if it is hyper-coherent or hyper-phase (deep red lines in the QEEG), then you may be able to listen to one other person and only match their volume level, but you get stuck there and you are not going to be able hear what is going on with anyone else around you.

The same is true with network hubs. When they are in hyper or hypo mode they cannot effectively listen to the rest of the system and they will not and cannot operate efficiently. Then again, confusion ensues.
Reviewing the QEEG

It is important to know that acquisition of the QEEG data and having a brain map is essential in making the proper decisions on what NeuroField protocols to use and what areas of the brain to train with either NeuroField or Neuroguide. However, as we discussed above, simply knowing where the brainwave excesses and deficiencies are to determine your overall training strategy, while important, it is no longer the first line of attack. With the advent of NeuroField pEMF training using CFC Protocols, it is now crucial to first and foremost determine if the “Rich Club” is offline or showing signs of poor communication, and if so, train to regulate it first. Then go ahead and train the overall amplitudes and/or Z-Scores according to the QEEG.

To Check for “Rich Club” Dysregulation and Choose CFC Coil Placement:
There are several large hubs within the “Rich Club” which can easily be seen in the following diagram:

Rich-club regions and connections.


1. Generate a QEEG and take a look at the Coherence and Phase Lag in the Z-Score Surface Maps. Then compare them with the large hubs depicted in the diagram above to determine if there are any Hyper-Coherences/Phase Lags and or Hypo-Coherences/Phase Lags in a frequency band. Any one of these markers represents dysregulation in the “Rich Club”.
2. Further identify how well the “Rich Club” is communicating for a given client, generate a LORETA Z-score Coherence Bitmap analysis file to take a look at areas in the “Rich Club” and see how they are communicating with the rest of the brain. Specifically, you would want to look at BMA 24 which is the Anterior Cingulate and see how it is communicating with the Posterior Cingulate or BMA 23, 29, 30, 31.

Refer to the example below where you can see BMA 10 and BMA 24, both Rich Club areas, are having problems communicating with other “Rich Club” areas, they’re either hyper or hypo. This is a prime case to run CFC Protocol training first to get the Network Hubs online and properly communicating and then proceed with using either NeuroField Standard Protocols, as described in the next segment below, and/or other Neurofeedback training methods.

3. If there are any dysregulations in any one of these areas, say to yourself, “I need to regulate the Rich Club first and then I can go to other training strategies!” Strategies meaning, NeuroField RTZ, Stim-Only, LOR Z-Scores, Amplitude Training or LENS. The data being generated now
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strongly supports that if you get the “Rich Club” working first, you will facilitate the efficacy of these Neurofeedback technologies exponentially.

4. Next, make a note the 10/20 site and/or Brodmann Area locations of the dysregulation. This will guide you when identifying the coil placement. Refer to “Rich Club Locations” earlier in this Chapter for detailed information. In the QEEG example above, we see that the “Rich Club” is indeed not properly communicating:

- In Coherence, the Anterior to Posterior Cingulate shows Hyper-Coherences, especially in the Delta and Theta Frequency bands, and in Phase Lag the Anterior to Posterior Cingulate connections show Hypo-Phase lags.
- Protocol selection would be Theta Gamma / Alpha Gamma and the “Rich Club” CFC Coil placement in the example above would be Fz to Fpz (Anterior Cingulate) for Stacked Coils 1 and 2 Theta-Gamma and Pz to Oz (Posterior Cingulate) for Stacked Coils 3 and 4 Alpha-Gamma.

5. Generate subsequent post training maps and compare them to pre-training maps to identify the changes in the “Rich Club” connectivity.

Once you know whether or not/how well the Network Hubs or “Rich Club” is communicating, you can then proceed and further develop your training plan. This may include reviewing the QEEG for excessive or deficient frequencies and using NeuroField with Standard Protocols to regulate those frequencies as described next.

To Check for Frequency Dysregulation and Choose Standard Coil Placement:

Before continuing, it is important that you have received the proper training, and that you use the QEEG data along with the presenting symptoms from your client to guide you in protocol frequency selection and coil placement. There are several ways to look at a QEEG map.

1. In the QEEG map, go to the “Z Scored FFT Summary Information” page.
2. Look for excessive frequencies (orange and red areas) or deficient frequencies (light blue and dark blue areas). In the example below, you can see an excess in the High Beta frequencies.
3. Go to the “Z Scored FFT Absolute Power” page.

4. Look at each of the 1hz bins to further explore the excessive or deficient areas determined in Step 2 above. In the example below, you can confirm that the High Beta moves across the 21 – 30 hz bins and can see that the excess High Beta is for the most part centered around the 10/20 sites F7/F8, F3/F4, and C3/Cz/C4. This identifies the coil placement and confirms that since the presenting symptom is anxiety and High Beta frequencies are associated with anxiety, the treatment should be a protocol that gives stims in the low frequency range. This will drive the brain at those frequencies and reduce anxiety.
Attaching the Coils and Starting NeuroField

Once you have determined coil placement you are ready to attach them to the head. On the back of each coil is a Velcro strip which attaches to the black cap supplied in your NeuroField kit. Next you will attach the coils to the head and then start the software program. The following instructions walk you through attaching 4 coils, 4 coils stacked, and 8 coils stacked. Note: Correct coil placement is crucial and it is advised to attend a workshop or webinar given by Dr. Dogris.

To Attach the 4 Coils:
1. Cover the head with a surgical cap.
2. Place the black NeuroField Velcro Cap over the surgical cap.
3. Attach the Coils to the Velcro strips on the NeuroField cap at the 10/20 sites you identified from the QEEG. Note: When removing the coils only do so by firmly holding the coil box (NOT THE WIRE) and gently pulling the coil away from the Velcro cap.
To Stack and Attach 4 Coils:

Each coil is marked with a number and/or colored tape: 1 (Black), 2 (Red), 3(Yellow), and 4(Blue).

1. Take Coil #2 (Red) and put it on top of Coil #1 (Black). Even numbers on top. This is your first set of stacked coils and it is going to produce Stims from Channel 1 and Channel 2. For example, if using the Theta Gamma / Alpha Gamma CFC Protocol, the frequencies generated by this protocol would stim using the stacked coils with Theta (CH #1-bottom coil) and Gamma (CH #2-top coil) **Note:** The slower frequency (Theta) is positioned on the bottom of the stack and the faster frequency (Gamma) is positioned on the top of the stack. For more detailed information, see “Stacked Coils and Harmonics” earlier in this Chapter.

2. Take Coil #4 (Blue) and put it on top of Coil #3 (Yellow). This is your second set of stacked coils and it is going to produce Alpha (CH #3) on the bottom of the stack and Gamma (CH #4) on the top of the stack. **Note:** if you choose Alpha/Gamma Alpha/Gamma Coils generate the same frequencies.

3. Place Stacked Coils #1 and #2, for example, at the Anterior Cingulate (Between Fz and Fpz)

4. Place Stacked Coils #3 and #4, for example, at the Posterior Cingulate (Between Pz and Oz)

To Stack and Attach 8 Coils (The Octopus):

If you have setup 2 Stim units as described in Chapter II “Octopus Setup” earlier in this manual, you can now use a total of 8 coils. To do so, follow the same steps listed above for stacking your 2nd set of coils, and continue setting up from where you left off by doing the following:

1. Place the 2nd set of stacked coils #1 and #2 next to the 1st set of stacked coils #1 and #2 described in Step 1 or they can be placed Central/Temporal – Left (C3 and T3) as pictured above.

2. Place the 2nd set of stacked coils #3 and #4 next to the 1st set of stacked coils #3 and #4 described in Step 2 above, or they can be placed Central/Temporal – Right (C4 and T4) as pictured above.

**Note:** Again, correct placement of stacked coils for each CFC protocol is crucial and is something that is taught by Dr. Dogris at Workshops, in Webinars, and/or through his Mentoring program.

To Start NeuroField:

1. Launch NeuroField

2. Choose your database.

3. Click on the “Query CANBus” button to connect with the adapter/driver, and the “Stim Launch Pad” window will appear.

4. Select your patient.

   **Note:** For detailed instructions on starting NeuroField and selecting a patient, go to “IV Software Basics - Starting the Program.”

Selecting the Protocol and Setting Loops

When selecting a protocol, choose one that lists the frequencies you want to train. You can click on the “View Protocol” button to see a list of frequencies included in the protocol.
In addition, when using NeuroField - Stim-Only, you are going to need to decide how many loops to run in order to complete the session and effectively drive the brain. Loops tell NeuroField to continuously repeat the protocol until the designated number of loops is reached.

**To Select a Protocol:**

2. Select the protocol that you want to use for your treatment from the drop down list. These protocols are selected based on the QEEG data and requires training in order to do this correctly. For example, if you client’s presenting symptoms are Anxiety and the QEEG data confirms that, you will want to run a slow wave protocol i.e. “1 – 4 Rocking” or “1 – 4 HD Rocking”.

**Note:** When selecting a protocol, you will see information as to the amplitude, duration and amount of stim cycles. The lower the amplitude (e.g. 1 volt versus 5 volts), the weaker the EMF emitted from the coils. For sensitive clients it is important that you assess sensitivity and reactivity so as to make a determination regarding treatment amplitude. As a rule use short durations with sensitive clients.

The description lists the pre-set duration for that protocol. If you want to change the duration for each stim in your protocol, follow the procedures in “III Software Basics - Using Sweep Control”. It is important to give enough EMF to drive the brain, but to be careful not to over drive the system, so setting the duration is key. Again, it is a good idea to participate in a NeuroField training.
To Set the # of Loops:

1. In the “Looping Setup” area of the “Protocol Selection” screen, when you select a Protocol, the “Total Protocol Run Time” field will automatically populate with how long the selected protocol will take to run through 1 cycle. Determine the length of time you want your session to run.

2. Change the number of loops to reflect the length of time you want for your session. The “Total Treatment Time;” automatically calculates and displays the amount of time it will take to run the full designated number of loops. If need be, adjust the number of loops so the “Total Treatment Time;” is equal to the desired length of time the session. In order to:
   - Reduce Anxiety - You will select a lower frequency protocol such as “1-4 HD Rocking” or if using CFC, “1-4/40-80 CHIRP”, to drive the brain in that direction, away from higher frequencies over the treatment area.
   - Improve Attention - You will select a higher frequency protocol such as “15-19 HD” or if using CFC, “15-19/40-80 CHIRP, to drive the brain in that direction, away from slower frequencies over the treatment area.

In this example, there is a great deal of High Beta, so we will select the “1 – 4 HD Rocking” protocol to lower high beta. Again, to get a good working knowledge of the NeuroField protocols, it is a good idea to participate in a NeuroField training.

Important Note: DO NOT USE OR DELETE the Dehbituator Protocol. You will never need to select the Dehbituator protocol. It is in there only because it is required in order to use the Dehbituator itself and store the random number. You run the Dehbituator only from the Dehbituator tab.

3. Enter your coil placements. Note: If 1 X3000 is detected you will only get coil placement selection options for Primary Stim Generator. If 2 X3000’s are detected, you will get coil placement options for Primary and Secondary Stim generator.

4. Notice that you can enable the “Sweep Controls” here for your session. For step by step instructions for Using the Sweep Controls go to “IV Software Basics - Using Sweep Controls” earlier in this manual.

5. Once you have selected your Protocols, set the number of loops, and entered Coil placements, click on the “Select and Close” button and you will return to the Stim Launch Pad.

6. Click on the “View Protocol” button. This will show you the number of frequencies and the exact details on each stim per channel. Note: When a Protocol Name contains a “step” description such as “step 0.1” or “step 0.01”, this tells NeuroField to step through each frequency by 0.1 or 0.01 increments when giving a stim. The screenshot below shows the “1-4/40-80 CHIRP” protocol.
Running a Stim-Only Session - CFC or Standard Protocols

When the protocol has been selected, and the number of loops has been calculated, the protocol is ready to go.

To Run Stim-Only:

1. Click on the “Start Standard Treatment” button. The Stim cycle begins and you can view the status of each stim. NeuroField tells you:
   - What Stim Cycle you are on.
   - The time you started the Protocol.
   - How many seconds have elapsed since you started the protocol.
   - The “Running Protocol Loop Number” will list the current loop number and the “Present Loop Number” box will also reflect current loop for the session.

2. When the Protocol is over, the NeuroField Stim status indicators will disappear. You can then click on the “View History” button on the Menu Sidebar to see your treatment details and patient information which is saved electronically. You can also add session notes.

   Note: Running a CFC or Standard Stim-Only in combination with Neuroguide operant conditioning is a very powerful tool. Proceed to “Chapter V” later in this Section for detailed instructions.

Reviewing the CFC Protocol Stim-Only Results

How do we know whether we are affecting Phase Reset? The following is a case with an anxiety disorder. Post training the client reported feeling very relaxed, noticing immediately that she felt...
different. In the LORETA Z Scores Phase Lock Durations screenshots below you can see the effects of this Nested Frequency training.

The Pre-Treatment QEEG on the Left is showing that excessive Phase Lock was present for the patient when they walked in the clinic. Then, after giving the client the Delta Gamma/Alpha Gamma cross-frequency coupling protocol at Fz and Pz for 20 minutes and generating another QEEG immediately, there is a “180 Flip” or a 3 standard deviation change as seen in the screenshot on the right. It is a change across the entire hemisphere, across the entire frequency band through all of the Brodmann Areas. This is 100% change.

You can create this much change in the brain in such a short time because the brain wants to change. It is a highly calibrated, super-efficient organ and it likes to be in a low powered state. When it is in a high powered state, as shown in the screenshot on the left, it is not happy because it has to use a lot of its resources to maintain that state. It doesn’t like to be in this state unless it needs to. But when you break it loose, it can begin to organize itself. It is naturally drawn to a low powered state and can now reconfigure itself and settle somewhere in the middle. When the brain has been damaged and it quarantines the system it tries to repair it, but if it can’t repair it, it adapts to it. That becomes its new normal. Now having a method to break it loose, we can swing it from one direction to the other and we can guide it with further training.

In the screenshots below, you can see the results of the Cross-Frequency Protocol Training on Coherence in the same patient as above.
What we are seeing is big changes in these major systems where it goes hypo to hyper-coherent. If you change the Phase Lock and the Phase Shift, you are going to change the Connectivity. Places that were hyper-coherence become hypo-coherent and vice versa and the brain becomes more flexible. These results show that this brain has achieved a state of greater flexibility, and if it can be this flexible it will move more easily with subsequent Neurofeedback treatment.
V. NeuroField pEMF / Neuroguide Combo

In addition to the Stim-Only procedure discussed in the previous chapter, NeuroField is also incredibly effective when used in conjunction with Operant Conditioning in either of two ways:

- Using RTZ (Real Time Z-Scores) from within the NeuroField software program and/or
- In combination with 19 Channel LORETA Z-Score from within the Neuroguide software program.

Using the RTZ procedure targets areas on the surface of the Cortex, so it is very effective when training power, phase, and surface cortical areas. See Section 2 for details on using the RTZ procedure. Using the NeuroField pEMF and Neuroguide 19 channel LORETA Z-Score Combo, on the other hand, allows you to target specific Brodmann Areas in the subcortical range. This has proven to greatly enhance training within specific Networks, especially when using the CFC Protocols to target the “Rich Club”.

When running the NeuroField/Neuroguide Combo it is highly recommended to use the LORETA Progress Report Application (LPR) to sort and view your client’s data while building Neuroguide protocols using the Symptom Checklist (SCL). For more information and/or purchase the software go to [http://www.nftools.org](http://www.nftools.org). The LPR program aids you in making treatment decisions by allowing you to sort the data in a way that effectively incorporates the best of what Neuroguide has to offer. When you fuse data from the LPR together with data generated by the Neuroguide SCL, you can easily match the client’s presenting symptoms with their most deregulated networks and get a targeted protocol for training. **Note:** NeuroField/Neuroguide Combo can be used with the tDCS/tACS. See Section 4 Chapter IX for detailed instructions.

**System Requirements**

In order to run the NeuroField / Neuroguide Combo, you have to have as a minimum requirement:

- 1 Stim unit (X3000, X2000 Plus, or X1000) and
- 1 Q20 or
  
  ---------------
- 2 Stim units (Any combination of X3000, X2000 Plus, X1000) and
- 1 Q20

You also have to have 2 CANBus USB adapters that are each connected to an empty USB slot on your computer with:

- 1 CANBus directed only to the Q20
- 1 CANBus directed only to the Stim Unit

For the Combo to work, it requires two independent connections to operate both the Q20 in Neuroguide and the Stim unit in NeuroField. If you simply attach only 1 CANBus it is not going to work, as each unit (1 X3000 and 1 Q20) has to be physically hooked up and communicating with the hardware and CANBus adapters/drivers separately. **Note:** If this procedure is not setup correctly you will get
errors. Refer to Section 1 Chapter II, “Hardware Setup”, and go to “NeuroField/Neuroguide Combo Setup...” for detailed instructions on how to correctly setup your system to run the “Combo”.

**Important!!!!!** When running NeuroField pEMF / Neuroguide Combo, it is Important to startup the software programs and connect to the hardware in the correct order:

- First you will launch the Neuroguide software and be sure it has established a connection with the Q20 using CANBus adapter/driver.
- Next you will launch the NeuroField software and establish a connection with the Q20 and Stim unit using the other CANBus adapter/driver.

The following instructions will then set you up to run a NeuroField CFC Session along with an Operant Conditioning session in Neuroguide using the Default Mode Network to target the Rich Club.

**Setting up Neuroguide and Building a Fusion Protocol**

Again, it is important when using a Combo session to setup the Neuroguide software first before running NeuroField. So, if the NeuroField software is running, close it before proceeding to launch Neuroguide and connect to the Q20 amplifier. Once you have established a connection with the Q20, the following instructions will guide you through the process of setting up a Fusion protocol using the SCL Default Mode Network in Neuroguide and the client data from the LORETA Progress Report (LPR [www.Nftools.org](http://www.Nftools.org)). The instructions below will then guide you to setup your “Session Rounds” in order to run a Combo session. **Note:** A working knowledge of all software is assumed.

**To Connect Neuroguide with the Q20**

1. With both the X3000 and the Q20 powered up and the NeuroField application closed, launch the Neuroguide software program and go to “Collection” and then “Hardware Selection”. Make sure that “NeuroField Q20” is selected as the amplifier to use.
2. Go to Collection “Setup and Monitor” and Neuroguide will now look for the Q20 amplifier and establish a connection with it. Click “Ok” once you have selected your parameters.
   **Note:** When you see the Neuroguide “Collection Parameters” screen it means that Neuroguide is communicating correctly with the Q20 amplifier and has taken control of one of the drivers on one of the CANBus. If you do not see this screen, and cannot make a connection go to Chapter II “Hardware Setup” and follow instructions in “NeuroField/Neuroguide Combo Setup” to ensure your system is setup properly.
3. Choose your Patient and the Eye Condition and click on “Ok”.

**To Setup a Fusion Protocol**

1. Go to “Collection” and choose either “Neurofeedback/LORETA Neurofeedback” or “Brainsurfer” as your training module, and setup your protocol. The instructions below will use the “LORETA Neurofeedback” option and assume a working knowledge of both Neuroguide and the LPR. For details please see the Neuroguide Manual and/or [www.neftools.org](http://www.neftools.org). To setup your protocol:
   a. Click on “Symptom Checklist” button and grab the SCL and load it.
   b. Go to the Networks tab and select a Network, for this example select the Default Mode Network. Take a look at the Brodmann Areas Neuroguide grabbed to train. If you have purchased the LPR compare the selections to the FFT data and the JTFA data, specifically Coherence in the “Rich Club”. **Note:** This assumes a working knowledge of Network
Hubs and the “Rich Club”. See Chapter IV for details. In this case for example, make a mental note that it grabbed:

- BMA’s 10 and 11, both Rich Club areas, but BMA 9 is noted in the LPR and is not in there
- BMA’s 19, 29, 30, 31 which are good matches to Rich Club selections
- JTFA Coherence BMA’s looking for Front BMA 9, 10 and Back BMA 19, inclusions.

c. Click on Ok and view the number of metrics Neuroguide grabbed. For instance, if 134 metrics were grabbed that is a good amount to train.

2. Begin the Fusion process:
   a. With the “Protocol” Tab active in Neuroguide, Open the LPR application and load the FFT data (.LOR file). Check for BMA’s that were not grabbed by the SCL and add them in, taking into consideration your mental notes from above. So, for example, if the LPR FFT data shows BMA’s not selected as metrics in the SCL protocol, or you saw something in the QEEG, say there is excess Hbeta on the right side, and the LPR picks it up as well, manually add all of these Areas into the protocol. For example you may add:
      - BMA 19 R HB frequency since it is noted in the Q but wasn’t chosen or
      - BMA 9 Delta Theta since those BMA and LPR frequencies weren’t included in the SCL metrics.
      - BMA’s 13 and 24 Delta and Theta are Rich Club, in the LPR, but also not selected.

   b. Check the JTFA data for BMA’s (both Absolute Power, Coherence, and Phase) that are above the LPR threshold and not grabbed by Neuroguide SCL, and add them in. **Note:** Specifically look for Coherences going from the back of the head to the front of the head, for example BMA 10 (Front) BMA 19 (Back). These are Rich Club areas that if deregulated should be included in the protocol.

When building a Fusion protocol like this remember, with Z-Scores, you are training to $Z = 0$. So if you add a BMA and it isn’t showing up as deregulated, that’s ok, as it will simply train to a normal range. **Note:** There is a limit of using 24 BMA’s. If you hit the limit, run what you have and then pull out consistently regulated sites and add new BMA’s as you go.

Your protocol is complete and you are now ready to setup your Session Rounds.

**To Setup Session Rounds and Display:**

1. Click on the “Session Rounds” tab in Neuroguide and setup the number and length of rounds for your Neuroguide session. Here you will determine how you want your “Combo” session to run. The idea being that you will want to interchange short rounds of Neuroguide operant conditioning with short NeuroField Stim cycles. There are several ways to set this up depending on your client. Try different methods to see which method causes your client to optimally respond. You can mix them however you see fits best. Several options that have shown to be effective are:
   - 5 minute Rounds followed by 5 minute Stim
   - 3 minute Rounds followed by 3 minute Stim or 2 minute Stim
- 2 minute Rounds followed by 2 minute Stim
- 1 minute Rounds followed by 1 minute Stim

Everyone is different. For some people they may require more of a Stim to get the brain to respond. For other people, less is more. Just a little bit of a Stim goes a long way, and with just a minute or 2 of priming the system, you can see their brain respond well during the subsequent round of Neuroguide. **Note:** You can start the session with a Stim cycle first if desired.

2. Set “Restart Method” to “Manual”. This gives you more flexibility than setting up a delay between rounds and “Automatically” starting the next round. There may be instances where you will want to give another short Stim before running the next round of operant conditioning. Setting to “Manual” allows you to control when the next round will begin. Remember though, when it is time to start the next Neuroguide Round, you have to go into the “Session Rounds” tab and click on the “Start Round” button.

3. Go to the “Protocol” tab and setup your Display Method. If using DVD, setup your Audio controls, but not hit “Apply” until you are ready to run the Neuroguide session.

### Setting up NeuroField

Setting up NeuroField to prepare for a Combo session is just like setting up for a Stim-Only session. You will pick your database, choose your protocol, and set the number of loops. The only difference is your number of loops will be much smaller and will depend on the Session Rounds/Stim Option you chose as described above.

### To Setup a NeuroField Stim:

1. With Neuroguide setup and running as described above, start the NeuroField software and select your database. For this example, the “CFC Database”.

2. Click on the “Click to Continue” button. NeuroField is going to look for the CANBuses that are available.

3. Nothing will be seen as being available on one of the CANBuses because Neuroguide owns one of those drivers right now. For this example, Neuroguide owns “CANBus #1”, so it will be greyed out because there is nothing to grab there.

4. Click CANBus #2 to grab the adapter/driver for NeuroField and backup your data.

5. Pick a CFC Protocol, say Theta Gamma / Alpha Gamma for this example and place the coils according to what the Brain Map dictates. For this example, use stacked coils at Fz and Pz to train front to back Rich Club areas.

6. Set the number of loops to equal the length of Stim you want between Neuroguide Session Rounds, and you are ready to run a NeuroField / Neuroguide Combo session.
Running a Neuroguide / NeuroField Combo Session

Minimize both NeuroField and Neuroguide so you can see everything running on the screen at the same time. You can switch back and forth between each program by clicking on the screens and bringing either program into focus. This Setup is Neurofeedback Gold!

There are two methods you can use to run a Combo Session:

- Run a Neuroguide Session Round and Stim with NeuroField between Rounds
- Run a Neuroguide Session Round and Stim with NeuroField during the Round

Note: Running a Stim has a direct effect on the EEG. Running a Stim between rounds is a cleaner way to run the training if you want to look at pure data, and you don’t want the Stim effect on it. However, running a Stim during a round allows you watch the effect of the Stim and see what the brain does in real time. The Instructions below will go over both methods.

To Run a Combo Session – NeuroField Stim Between Rounds:

1. Start a Stim with NeuroField.
2. Notice the EEG Streaming in Neuroguide. What you see may look muddy, but what you are actually seeing is the cross frequency coupling (CFC). It is harder to see with the scale set small.
3. Set the scale in Neuroguide to 150 in order to zoom out and get a better view of what is going on in the EEG as each Stim occurs.
4. Look at the data and you can see the:
   - Gamma oscillations and the slow frequency oscillations occurring at the same time.
   - Brain responding to each frequency Stim differently. For example, if you look at NeuroField, you can see that when giving a 1hz stimulation paring gamma to it, the EEG has a particular form. When it goes to the next frequency, say 2 hz, the oscillation response changes, and you can see the fast frequency that is coupled to it as well. You can see in real-time how the brain responds at 5 hz and 10hz vs 15 hz etc.

The only reason this can happen is because the CFC protocols have Phase/Amplitude matched each frequency with the gamma harmonic. It is an exact phase match. The amplitude is the same even though the brain may respond to it differently. Note: The faster the frequency the quicker you will run through the Gamma range because it is going to jump by multiples of the frequency. So at 13 hz it will make 13 hz jumps from 40 – 80 hz because it has to stay harmonically matched. For more information see Section 1 - Chapter IV, and go to “Understanding CFC Protocols”.

To Run a Combo Session – Neuroguide Round:

1. Once NeuroField Stim has completed, tell the client they are now training and to listen for the reward tone and/or visual que, as it will tell them that their brain is doing what it is supposed to do. As with all Neurofeedback sessions, tell the client to get out of their own way. Let their brain train itself.
2. In the “Protocol” tab, click on the “Apply” button to activate your Display method and/or audio controls.
3. Click on the “Begin Session” button and start the first round of Neuroguide.
4. Go to the Progress tab and take a look at how your client is doing. For this example, there are deregulations in power in HBeta, so we will want to watch for those Brodmann Areas.

5. Set the Threshold and Check trend line:
   a. Bring the threshold down to make the training challenging if it is set too high and scoring too much. Bring it down just below the trend line so it is not too hard or too easy. As you make it harder, this will reduce the number of rewards.
   b. Run your cursor over trend line to see where the z-scores are resting. Note the outliers you see. **Note:** It takes 10 sec for Neuroguide to calculate the slope of the Z-score.

6. Take a look at the Real-time Z-Scores. Check all of the Absolute Power numbers and the Coherences to see where the deregulations are. In this example, we would expect to see that the frontal to occipital in the Rich Club would have some issues.

7. When the Round is complete run a NeuroField Stim again. When done, click on the “Start Session” button to run the next Neuroguide round.

8. As your Rounds progress, see what changes you notice from the Stim. The idea is to use the CFC as a priming affect and see as you go from round to round how the brain is following the Stim and starting to regulate itself. Look at the:
   - Rewards and see if there is an increase.
   - Phase and Coherence data that were deregulated to see if it is now generating nice numbers.
   - Changes in the Trend line during the Neuroguide Round. Oftentimes changes are immediately noticeable.
   - Numbers rolling in real-time to see if they are coming in the normative range. **Note:** If numbers consistently come in the normal range, you can choose to pull them out and start to add JTFA data and Fuse the to facilitate a bit more movement

9. Repeat this process to equal approximately a 15 minute session. Or, follow the directions below to run a NeuroField Stim during the last few minutes of a Neuroguide Round.

**To Run a Combo Session – NeuroField Stim During Rounds:**
1. During the last few minutes of a Neuroguide round, say minute 3 of a 5 minute session round, give the client a Stim while Neuroguide is running.
2. Look at the numbers and see how the Stim is affecting the training. **Note:** The Stim will change the numbers.
3. Let the client know when you start the Stim, so they will know that the feedback and reward will be affected.
4. Give 2 minutes of Stim, and if necessary abort NeuroField if your loops go longer.
5. Let the client know that the Stim has stopped and they are now training again. Run the next Neuroguide round for the first 2 minutes without NeuroField running and at 3 minutes, start the Stim again while the Neuroguide Round is running. Each time you do this, you will see the system respond.
6. When the Round has completed take a look at the Avg Z-score per second and you can see during min 3 to 5 where you gave the stim how it was affected.
7. Run this process for a total of approximately 15 minutes of Neuroguide/NeuroField rounds.
Again, you can mix the Neuroguide / NeuroField Combo Stim/Rounds to be what you think would work best for your client. Because Neuroguide is in Manual mode, you can simply start the round when you are done with the Stim and you are ready to go with whatever method you choose.
VI. NeuroPlot

NeuroPlot is a Microsoft Excel spreadsheet program that is designed to graph the data collected from your NeuroField sessions. For example, when using NeuroPlot for data collected during an RTZ Session, you can review all 19 channels of EEG data across the 10 different frequency bands that the Applied Neuroscience .dll monitors. **Note:** To use NeuroPlot you must have Microsoft Excel installed on your computer.

With this data you can evaluate the brain’s response to stimulation at any given site and see the trend of the Z-scores throughout the session for each frequency, with the goal being to aim towards a Z-Score of Zero. Each plot graphically displays how the brain naturally tries to re-calibrate and normalize itself as it is shown how to do so with each NeuroField stim cycle.

**Opening NeuroPlot and Enabling Macros**

**To Open NeuroPlot:**
After an RTZ protocol has completed and the data has been automatically saved to a text file, the data is available for review using NeuroPlot.

1. Double click on the NeuroPlot icon installed on your desktop. This will start Microsoft Excel and display the following window:

![NeuroPlot Interface](image)

**To Enable Excel Macros:**
Often times you will get the following message when you launch NeuroPlot using Excel:
1. Click on the “Enable Editing” button next to the Protected View. This will bring up the following message:

![Security Warning](Security Warning.png)

2. Click on the “Enable Content” button next to the Security Warning. This will complete the launch of NeuroPlot.

It is possible that your version is an earlier version of Microsoft Excel and will not present the “Enable Editing” button when the software is launched. Instead you may see a security warning at the top of the page saying “Some active content has been disabled”.

1. Click on the “Options” button next to the security warning. This will open the security options window.
2. Click on “Enable this content”
3. Click “Ok”.

**Loading and Reviewing the Session Data**

**To Load the Session data - ZAP:**

1. Notice the 3 tabs at the bottom of the NeuroPlot window
   - ZScore
   - Coherence
   - Phase

   Each one of these tabs can be selected in order to Load the specific data for review

2. Click on ZScore Tab to get access to the Z-Score NeuroPlot Control Buttons. Each button gives you several Option for what you what to do with your data.
   - Load Z-Score Data
   - Print Z-Score Data
   - Print Z-Score Plots
   - Save Z-Score Plots

3. Click on the “Load Z-Score Data and Create New Plots” button.

![Load Z-Score Data & Create New Plots](Load.png)

The Patient Data folder will open with all of your Patients folders. This is located at C:\NeuroField\NeuroFieldData\PatientData, which is where all patient data is stored.
4. Navigate to the Patients folder whose data you want to review i.e. Patient ID 316 for this example. The last patient folder you treated should be at the top of the list or click on the “Date Modified” bar to easily get to the most recent patient folder.

5. Click on the PatientData folder (PID00316Data) and the “Open ZScore ZAP Data file (ZAPZScoreData_ ) will appear with a list of Data files with the Date Modified. If you don’t see Date Modified, right click on the NeuroPlot tool bar and select it from the list.

6. Click on “Date Modified” so the list is sorted with the most recent at the top:
   - ZAPZScoreData = Absolute Power Data
   - ZCOZScoreData = Coherence Data
   - ZPHZScoreData = Phase Data

   **Note:** if you ran a successive loop and then aborted the process, the 1st three files will not contain as much data as the files that were saved after a full loop. In this case selected the 2nd set of files.

7. Click on the ZAPZScoreData file you want to load and Click on the Open button. The data will load into the program and start a Plot.

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**To Review the Data - ZAP:**

1. Take a look at the plot for the data you just loaded displaying Frequency and Sites. Notice the:
   - **Sites** are all listed on the Right hand side of the window.
   - **Frequency Band ZAP** is displayed at the top of the Chart. In the plot above the Delta ZAP (Absolute Power) frequency band is displayed.
   - **Trend analysis line** through the plot. Here you can see which way the session was trending through each specific frequency. You can see the direction of the Z-Score from
the beginning of the session to the end of the session. In this particular example, you can see that at Fp1 Delta trending down. The trend has proven to be most accurate. If you run a subsequent QEEG (Pre/Post) you will see it matches the trend you see here.

- **Vertical axis** of the plot where you can see the Z-Scores with 0 in the middle and going Up into the Positive range and Down into the Negative range. This allows you to review the brain’s response to each one of the EMF stimulations received.

- **Horizontal Axis** where you can see each one of the stim cycles that were given during the session for the entire Loop.

- **Frequency Up and Down Arrows** allows you to scroll through the frequencies and look at the plot information for, say Theta or Alpha. You can see if they went Up or Down.

- **Channel Up and Down Arrows** allow you to select each specific channel, i.e. Channel 1 is Fp1 and see what happened at each site. It will give you a sense of what changes did occur.

2. Click on the “Frequency Up/Down” arrow and the “Channel Up/Down” arrow buttons to scroll through all the Frequency Bands/Sites to get a good idea of what occurred during the session for the entire brain. You will see the red highlight move to reflect the brain’s stimulation response for each specific site during the length of the session. This allows you to see what the result was as the treatment progressed.

**To Load and Review the Data - ZCO:**

1. Click on the “Coherence” Tab at the bottom of the NeuroPlot Screen and click on the “Load Coherence Data & Create New Plots” button.

   ![Load Coherence Data & Create New Plots](image)

   The Patient Data folder will Open with all the data files listed.

2. Select “ZCOZScoreData...” data file and follow the instructions above to review the data and look at the trend lines for the specific Frequency you were most interested in training. For this example, we were training High Beta which was Hypo-Coherent.
In the example above you can see that High Beta at P4-Cz trended down, so you know you want to train more in this area.

3. Now, look at the movement of the Z-Scores without the trend analysis. In the plot above notice how many times NeuroField actually brought up the Z-Score to a normal level. Although the trend doesn’t really reflect it, looking at the plotted data you can see the big changes. There were a lot of places during the session where the Coherences in High Beta came up, even though it trended down. So even though the Z-Scores may go back down again, they did get pulled up many many times which is significant. Also, you can see that none of these stims takes the brain too high the opposite direction. Over time it is possible to see this normalize.

4. Click on the “Frequency Up/Down” arrow and the “Channel Up/Down” arrow buttons to scroll through all the Frequency Bands/Pairs to get a good idea of what occurred during the session for the entire brain.

To Load and Review the Data - ZPH:

1. Click on the “Phase” Tab at the bottom of the NeuroPlot Screen and click on the “Load Phase Data & Create New Plots” button.

The Patient Data folder will Open with all the data files listed.

2. Select “ZPHZScoreData...” data file and follow the instructions above to review the data and look at the trend lines for the specific Frequency you were most interested in training. For this example, we were training Phase lag at High Beta.
In the example above you can see that there is some change in the trend for High Beta at T6-C4. Again each point in the graph is a stim cycle and we see may times at the high points where the brain normalized and the low points where the brain attempts to go back to its old pattern. The QEEG accurately captured this and NeuroField is able replicate it here.

3. Click on the “Frequency Up/Down” arrow and the “Channel Up/Down” arrow buttons to scroll through all the Frequency Bands/Pairs to get a good idea of what occurred during the session for the entire brain.
VII. Creating Protocols & Using Provider Database

NeuroField installs an empty database so you can create your own client protocols. You can either use the Protocol Wizard which guides you through the process or you can manually create a protocol on your own from scratch. The manual method is also very helpful for simply editing a protocol that you have already created. **Note:** It’s a good idea to first follow the instructions to manually create a protocol, as this Chapter walks you through the process and is a good prerequisite for using the Protocol Wizard.

NeuroField provides you with one empty database containing 50 empty tables in it. If you want to have more than one custom database, create a copy of the Provider database file before you create protocols, and you now have two empty databases. You can create as many databases as you want. **Note:** It is always a good idea to make a backup copy of your empty provider database and store it on your desktop for future use if needed.

**Creating Protocols – Manually**

**To Name a Protocol:**
1. Launch NeuroField
2. Select “Provider” database (mdb) when prompted to “Select a Database”. This database is empty and allows you to create up to 50 individual protocols.
3. Connect to your device(s) and the “Stim Launch Pad” appears.
4. Click on “Select Protocol”, and several empty protocol tables will appear listed as “Z empty table”. The Z in the protocol name puts the empty tables at the end of the list as they are sorted alphabetically.
5. Select an empty table from the list so you can name it. For this example, we will create a 1Hz EMDR protocol.
6. Click on “Update Name” and give it a name. There are several strategies you can use when naming protocols:
   ▪ In the NF Database protocols are listed as “TOO1---< “. This allows you to organize the protocols in alphabetical order. When creating the list, NeuroField will first look at the T’s and then look at the numbers, alphabetizing according to the numbers from zero on up.
   ▪ You can force NeuroField to put protocols in different positions by using any naming convention you want.
   ▪ Or, you can simply give it a name i.e. EMDR, and it will be in the E area of the list.
7. Click on “Ok” and add it will be added to the list of treatment protocols. You can put a description in at this point or you can wait until after you create the protocol when you have finalized the number of stim cycles and you know exactly what the protocol will be. **Note:** It is advisable to wait and add a description after you have built the protocol.
8. Once you are done naming your protocol, Click on “Select and Close”.

**To Create a Protocol:**
1. Click on the “View Protocol” button from the “Stim Launch Pad”. This will bring up the “Stim Cycle Setup” page.
On this screen you will see two tables. If you have:

- 1 X3000 unit hooked up, it will be reflected in the left table, representing the Primary Unit
- 2 X3000 units setup up you will also have a Secondary Unit reflected in the right table

These tables display the Frequency/Stim Cycle list as well as the Stimulation Cycle Parameters information. Any of this information can be changed and modified.

2. Most often there will be existing data in the protocol. So to begin, delete the Stim Cycles that are there. To do this, with a sideways triangle next to the first frequency, “Index 1”, in the “List of Stim Cycles” table Click on “Delete”, answer “Yes” to the Alert prompt, and it will be removed. Click on the “Delete” button for all existing Stim Cycles, however leave one row before continuing to build your new protocol. **Note:** If you have a Primary and Secondary table rows will be deleted for both.

3. In the “Primary Stim Cycle Channel Setup” window, Click on the “Check to Enable” check box in the “Frequency, Duration and Amplitude Control” table to enable (activate) the channels you want, either Channels 1, 2, 3, and/or 4. Note: They may already be checked.

4. Click in the “Frequency” box in the “Frequency, Duration and Amplitude Control” table and enter the values that you want for each enabled channel. NeuroField can give frequencies from 1Hz to 100,000Hz reliably. For the purposes of this exercise, we are making a 1Hz Protocol so enter the number “1” and Click “Update” and 1Hz will be entered in there.

5. Click in the “Duration” box for each enabled channel and enter the Duration of time that you would like the channel to be active. Time is programmed in milliseconds with 1000 milliseconds equal to 1 second. You can program time from 1-60 seconds. We want a 1 second stim so enter, “1000” milliseconds. If you wanted a 3 second stim, you’d enter “3000” milliseconds.
6. Click on the “Amplitude” box and select the Amplitude (Voltage) you want for each channel enabled. Amplitude is the amount of power or voltage that you send through the cap. It can be set from 800 (0.0008) microvolts to 5 volts. We want a 5 Volt stim, so enter, “5”.
7. Click on the “Update” button to save the setup.
8. If you have 2 units and you are setting up a Primary and a Secondary Unit, once you have completed setting up each Stim Cycle for the Primary Unit, Click on the “Load Primary Data into Secondary” button, and the Secondary Channels will auto-populate with the data from the Primary Channels.
9. Click on the “Close” button. This will take you back to the” Stim Launch Pad”.
10. Enter a description into the “Description” box.
11. Click on the “Update Description” button next to it, and Click on “Select and Close”. The Protocol is now complete and available for use.

Creating Protocols - Using the Protocol Wizard
Creating a protocol can take time and a lot of effort. An easy way to setup the basic structure of a protocol is to use the Protocol Wizard. The wizard can do a lot of the work for you.

To Use the Protocol Wizard:
1. Select an empty table in the Provider database by choosing one from the drop down menu on the “Stim Launch Pad”.
2. Click on “Update Name” and name your Protocol.
3. Click on the “View Protocol” button.
4. Check the “Enable Protocol Wizard” box. The interface will change to reveal the wizard controls.
   The Protocol Wizard allows you to select the:
   - Number of Stim Cycles
   - Start Frequency
   - Step Frequency
   - Duration
   - Amplitude
5. For instance, for the purpose of this exercise, you want to create a 1-100 protocol that: gives 100 stim cycles, at 1 hz each, step of 1, gives 1 second of stim, and gives 5 volts, you would enter for each Channel:
   - 100 into the “Number of Stim Cycles” box
   - 1 in the “Start Frequency” boxes
   - 1 in the “Step Frequency” boxes
   - 1000 in the “Duration” boxes
   - 5 in the “Amplitude” boxes.
   **Note:** A “Step Frequency” tells NeuroField how you want the protocol to change or “Step” for each Stim. If you put a 1 in there, it will add 1 to your start frequency for every stim cycle. So if you set the Number of Stim Cycles to 100, it is going to create a protocol that goes from 1 to 100. Or, if you enter 10 Stim Cycles, it will create a protocol that goes from 1 to 10.
6. Click on the “Generate New Protocol” button and the Primary table will be populated with your entry.
7. NeuroField only created the protocol in the Primary Table. If you are using the Octopus (8 Coil Setup) or you may want to later, you will need to load the data from the primary table into the
secondary table. Click on the “Load Primary Data into Secondary” button. It will automatically load in the data from the Primary table into the secondary table.

8. Click the “Generate New Protocol” button and answer “Yes” to the Alert prompt to continue and delete all stim cycles.

9. Click on the “Close” button. You now have the exact same protocol in both tables, and you are ready to go. Practice with this control and you will see how powerful it is!
I. Real Time Z-Scores (RTZ) using Q20 - 19 Channels

Another innovation in the NeuroField toolset is the Real Time Z-Score (RTZ) procedure using a combination of 19 channels of EEG with the Q20 and pEMF frequencies generated from the X3000 or X2000/1000 with a Plus unit. The RTZ procedure is a norm-referenced, pEMF biofeedback procedure in which a pEMF frequency is given, EEG is measured, and Z-Score data is generated. If the Z-Score falls within the Z-Score range set by the user, then a reward tone is sounded and the same pEMF is given again until the Z-Score no longer meets the threshold and moves to the next frequency.

The power of this procedure lies in the fact that it can be an effective combination of pEMF and Operant Conditioning that occurs close to simultaneously. How it works is the pEMF actually shows the brain what frequency it needs to replicate, the brain does it, and the response is then reinforced with a reward tone. This method has been shown to be very effective, especially when paired with “Operant Conditioning Only” training. For example, you can run RTZ for 20 minutes in a session, shut off NeuroField, and then run a LORETA NeuroFeedback session, training both methods within the same hour. Or, you can run two sessions in a day; NeuroField in the morning for 30 – 45 minutes and then NeuroFeedback in the afternoon. This combination training has proven to rapidly move people towards regulation and reduce the number of sessions required.

NeuroField uses the Neuroguide database to generate norm referenced data. The DLL used in the RTZ procedure requires a separate license that can be purchased through NeuroField, Inc. Simply call or email the office to purchase a Z-Score license. If you have already purchased a license, you must activate it with a License Key. Refer to the “Software Installation Guide” for further instructions. This is a separate document available for download from the NeuroField website where you will find “Generating the License Key”.

This procedure is an advanced skill that requires training and experience to conduct. Even though it has proven very effective for adults, if setup correctly, it can also work very well for kids. It is strongly recommended that you participate in a NeuroField training before using this technique. Dr. Dogris uses the Neuroguide Brain Atlas (www.appliedneuroscience.com) to determine which sites in the brain are deregulated. Neuroguide uses a normative database that generates Z-Score data QEEG brain maps. Through clinical analysis and the acquisition of both neurophysiological and clinical data, a set of hypotheses can be formed to determine which areas of the brain to work on. Dr. Dogris offers several trainings per year in different locations around the United States. He also offers online consultations and mentoring to learn these skills and procedures. However, there are also many other skilled professionals who also offer similar services and can be found at www.ISNR.org or www.AAPB.org as well.

Prepping for RTZ – 19 Channel

When prepping a patient for RTZ you will use a QEEG Cap. It is important that you have purchased the correct cap and ear electrodes. See “II Hardware Setup – Using and Connecting a Cap” earlier in this
To ensure you have an approved cap. It is also suggested that you attend a training to learn the proper procedures to Gel a cap, ensure there are good connections (impedances), and run a session.

**To Attach the QEEG Cap and the NeuroField Cap/Coils:**

1. Plug the D25 Din connector on the cap into the Front of the Q20 unit where the pin connector is marked “Cap.”
2. Place the Cap on the head along with ear electrodes and apply the electro gel.
3. Cover the 19 channel QEEG Cap with a surgical cap.
4. Plug the coils into the front of the X3000 or X2000 plus unit where it is marked “Coil Drive”.
5. Place the NeuroField black Velcro cap supplied with your NeuroField kit on the client’s head over the surgical cap.
6. Attach the Coils to the Velcro strips on the black NeuroField cap at the 10/20 sites you want to train with your NeuroField Protocols.

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**Setting Up the RTZ Session - 19 Channels**

There are just a few preliminary steps necessary in order to complete your protocol setup and run an RTZ session for 19 Channels. **Note:** See Section 1 – Chapter III “Software Basics” earlier in this manual for more in depth instructions on how to follow the procedures below.

**To enter RTZ mode and select Sensor Placement:**

1. Start the Program and Backup your database if you have unsaved changes.
2. **SELECT A PATIENT FIRST!!!! Note:** It is important to pick your Patient first as all the data will be stored in the RTZ folder for that patient. Make sure the top NeuroField Status bar says “Active
Patient ID =" and contains their Patient ID.

3. Click on “Enable EEG”. The “EEG Measurement and Threshold Setups” options appear.
4. Click on “Enable Z-score”. The “Patient Age / Eye Status” options appear.
5. Click on “Enable RTZ”.
6. Check the “Store Data After Each Loop” option. This option:
   - Should be left checked
   - Will automatically store the data once each loop of the entire protocol has completed.
   - Will store the data into the patient folder and this information can be loaded into NeuroPlot to see greater detail of what happened during the session.

Note: All of the Options in the Steps above must be selected in order to run the RTZ procedure.
7. Enter the patient age into the “Patient Age” box.
8. Click on the “Eye Status” drop down menu and select the Eye Status condition, i.e. Open or Closed. For slow wave protocols, they are typically run with Eyes Closed.
9. Select type of Sensor Placement by using the default, “QEEG Cap” for 19 channels. Note: Individual Electrodes for 4 Channel RTZ can also be used with a Breakout Box. See Section 2 – Chapter II “RTZ Q20 - 1 to 4 Channels” later in this manual for details. However, if you want to run Phase and Coherence using 4 channels, you will be limited to the number of pairs you can train. It is suggested to run Phase and Coherence with a full cap.

**Setting-up Phase and Coherence Pairs**

If you are planning on training Phase and Coherence you will need to pick “Pairs” to train. NeuroField provides an easy to use interface for setting this up. Pairs are selected based on the Phase and Coherence data as seen in the QEEG. To Setup pairs, in the “EEG Measurement and Thresholds” screen:

1. Click on the “ZScore Thresholds/Pairs Setup” button and the “Threshold Selection” window appears.
Here you can setup up to 10 Phase and Coherence pairs. These pairs will be identical for both Phase and Coherence when setting up Thresholds. Pick your pairs based on a QEEG brain map.

For this manual we will use the following QEEG Coherence and Phase data:

2. Take a look at your brain map and find the Coherence/Phase that are the most deviant and make a note of the Pairs. In the example Q above, notice there are hypo-coherences in Hbeta and everything is pointing at T6 and P4. The most deviant of them all is:
   - P4 and T6 to C3
   - P4 and T6 to CZ
   - P4 and T6 to C4
• Note: For Phase you could also add O1 to C3, O1 to CZ, T6 to Cz. Remember you can have a total of 10 pairs, but the more pairs the harder it is to get a “Hit”.

3. With your brain map open, enter the pairs into the “PHA/COH Pairs Selection” area of the Threshold Selection screen by clicking on the buttons that represent the sites noted above. To do this:
   a. Click on P4. The button is disabled until its pair is selected
   b. Click on C3 and the Pair is placed in the status window.
   c. Continue until all pairs are selected.

4. Notice the most deviant frequency band on your brain map for Coherence/Phase. In this example it is High Beta. This is important because this is where you will set your threshold.

5. Once you get everything setup the way that you want it, Click on the “Load and Save Thresholds/Pairs Close Window” button:
   • At the bottom of the screen, NeuroField will display “Status: Patient Specific Threshold Created for Patient ID ....“
   • The selected Pairs will be saved to the selected Patient’s folder. Be sure the ID here matches your Patient’s ID
   • You can save 1 set of pairs per patient. If you change them the previous pairs will be overwritten.

You are now ready to setup your Thresholds.

Setting-up Thresholds
NeuroField provides a number of “Canned Thresholds” for you to easily “Select and Go!” When setting up the Z-Score thresholds, you can choose to use the provided Preset Threshold setups from the drop down menu list. Or, you can customize your own setups. (See “Assessing Your Client” below.)

To Setup Thresholds – Z-Score Phase and Coherence:
1. With the same Patient selected that you used to setup your Pairs above, the 19 channels of EEG connected to the scalp, and the “QEEG Cap” option selected, Click on the “Set Z-score Thresholds/Pairs Setup” button from the Stim Launch Pad” and the “ZScore Threshold Selection” window appears.
2. Click on the “Get Patient Thresholds/Pairs” button. Both the Phase and Coherence Pairs you chose for your selected Patient will load into the “Pair Selection Window. **Note:** The “Get” button is useful you want to run this same set of Pairs/Thresholds several times in a row during subsequent training sessions. You simply select this button and the last set of saved “Thresholds/Pair Setup” for that Patient will load. This way you don’t have to re-enter the data. It will automatically load.

3. Select the Thresholds for each pair using the most deviant frequency band you determined from the Brain Map. For this example it was High Beta, so select High Beta 1 to -1 for each pair. This will set an upper Z-Score of 1 and lower of -1 for HBeta.

4. Click on the “View” button to double check that only the frequency you want to train is selected. If it is not, enter the correct data and click on “Update Threshold Setting” and “Return to......”
All Thresholds are now setup for Coherence. If you decide to train pairs for Phase they would be entered in here as well.

You are now ready to setup Thresholds for Absolute Power.

To Setup Thresholds – Z-Score Absolute Power:
1. In order to select a frequency band to train absolute power, you must look at the brain map and match what you see to the patients presenting symptoms.

In the example Brain Map above, the patient might have:
- Brain fog due to excess Theta
- Mood irregularities due to excessive Alpha
- Anxiety due to excessive Beta

You might want to train:
- Delta since in relative power it is deficient as compared to all the other frequencies, even though Absolute Power is a little high in the back of the head.
- If they are anxious, you won’t want to give them any fast frequencies, so giving Delta here is appropriate to help regulate the Beta and High Beta.
- In general if a patient is depressed, expressing brain fog, or have a history of TBI, you will want to speed up the brain and get it going faster. You would not want to give a slow frequency.

2. Per the example and all options stated above, and mapping the data with the Patients presenting symptoms, Delta in the Frontal lobes is the chosen frequency to train. Click on the drop down arrow next to the site you want to train. You will see a list of “Canned Thresholds”. NeuroField defaults to the Threshold Setup “OFF” selection. **Note:** See “Assessing Your Client” later in this Section of the manual for further details on looking at your clients Z-Scores in real-time as another way to guide the threshold selection process.

For this example select F3, F4, FZ, F8 Delta 1 to -1. During training the system will look for Delta at each of these sites to fall between 1 to -1. **Note:** If the setup you want is not listed, you will need to follow the steps in “Assessing Your Client” below to create a custom threshold.

![Image](image_url)

3. Click on the “View” button next to each one of your chosen Site Thresholds and you can examine that the proper selection criteria is set. Check the settings to be sure that the:
   - Frequency bands you selected are the only ones enabled.
   - The Upper and Lower Limits are set to what you expected. For example, 1 and -1.
4. Update them if you want and click on the “Update Threshold Setting” and “Return to Threshold Selection” button to go back to the “Threshold Selection” screen.
You are now ready to set the Logic Mode.

**To Set the Logic Mode:**

1. In the “Threshold Logic Mode” area of the “Threshold Selection” screen, select your logic mode.

   **Note:** The program defaults to the “OR” logic mode. How this works is that after a pEMF stimulation is given, the EEG is recorded and Z-scores are generated for all 19 sites. The system then determines which, if any, of the sites achieve the designated threshold. In the example above, with the thresholds set to F3, F4, Fz, F8 Delta 1 to -1, you have three choices for your threshold logic:

   - “OR” meaning that any one of the Z-Scores at the selected sites can come within threshold range to create a “Hit” or Reward tone. For example, if F3 Delta does not fall within 1 to -1, then the next site F4 is examined for Delta 1 to -1 and then to Fz Delta 1 to -1 etc. If any one of these sites achieves the threshold then NeuroField will count it as
a “Hit”. This says, if F3 Delta, or F4 Delta, or Fz Delta, or F8 Delta is 1 to -1, give it a hit. “OR” is very easy to achieve.

- “AND” meaning that all of the Z-Scores at the selected sites must come within threshold range simultaneously in order for a hit to occur. This is a more stringent threshold as it requires that all of the chosen sites/frequency bands Z-Scores must achieve whatever threshold values you chose. This says, if F3 Delta, and F4 Delta, and Fz Delta, and F8 Delta is 1 to -1, give it a hit. “And” is the most difficult to achieve as it is “All or None”.

- “Percentage” meaning 50 percentage (or whatever number is designated) of all the thresholds must be met in order for a reward tone to be given. Here you enter in the desired %. This option makes the training more along the lines of Operant Conditioning. The higher the number, the harder it is to get an award.

Note: If a hit does not occur, you will not get a reward tone and the RTZ procedure will continue and modulate to the next frequency until you do meet the Threshold Logic criteria.

To Save Patient Thresholds and Load Subsequent Sessions:
1. Once you get everything setup the way that you want it, Click on the “Load and Save Thresholds/Pairs Close Window” button:
2. Notice the Status Bar at the bottom of your screen. It says: “Status: Patient Specific Threshold Updated for Patient ID .... “.
   - The selected Thresholds (along with the selected Pairs) will be saved to the selected Patient’s folder. Be sure the ID here matches your Patient’s ID
   - You can save one set of Thresholds per patient. If you change them the previous Thresholds will be overwritten.
3. Place Coils on your patient’s head to mirror your Pair selections: For this example, Coil 1 at P3 to C3, Coil 2 at PZ to CZ, Coil 3 at P4 to C4, and Coil 4 at T6.
   You are now ready to go!!!!!
4. Now, if you want to run the very same setup for your patient for a subsequent session, Load NeuroField, enter RTZ mode, and simply:
   - Click on “ZScore Thresholds/Pairs Setup” button from the Stim Launch Pad.
   - Click on “Get Patient Thresholds/Pairs” button and it will load the last set of Thresholds/Pairs you chose for that selected Patient.
   - Be sure the “Logic Mode” is set correctly for your training session.
   - Click on the “Load and Save Thresholds/Pairs Close Window” button.
   You are now ready to go again!!!!!

It is important to monitor your session and determine if your Preset Threshold setup is effective. If you notice that the patient is finding it very difficult to (or may never) meet the Threshold criteria and get a Hit, your preset threshold is too low (or too hard). For example, if the preset Delta threshold is set to 1 to -1 limits but during the session your client consistently hits Delta of say 2.5 in the upper range, you’ll need to follow the steps to assess your clients Z-scores, create a custom threshold for F4 Delta, and raise the limits to, say 2 and -2.
Assessing Your Client

When setting up the Z-Score Thresholds, you can also scan the EEG and assess your client to double check the most deviant sites/frequencies selected above. This will allow you to get a real-time Z-Score reading and assess the client’s Z-score range for better Threshold control during the session. To do this you will run a Scan.

To Run a Scan:

1. On the NeuroField Main Menu, click “NeuroField Interfaces” and Select “NeuroField EEG Interface” and “NeuroField 20-Channel.
2. Click on the “Scan” button in the top right corner of the screen. The Z-Score 19-channel tabular will appear and EEG will be measured. All 19 channels with populate with Z-score data.
   - Every 8 seconds NeuroField scans another round of EEG until you abort the process.

Because the data is overwritten with each scan, you can see the changes in real-time. This allows you to find a consistent pattern of Z-Score outliers in a particular frequency band and make an estimation of the current Z-Score frequency band(s) you wish to threshold.

To View the Frequency Band(s) and Z-Score Ranges:

1. In the Z-Score Tabular window, find the frequencies with the most deviant Z-Scores, either Red (excessive) or Blue (deficient).
2. Within those frequency bands find the Z-Scores that are the largest outliers (highest numbers either + or -).
3. Look at your QEEG Z-Score Map data and determine if what you see in the Tabular is a consistent finding with the Q.
   - **Note:** Sometimes in mapping you get data that is not consistent. You may think that a Q is always going to be constant every single time, but sometimes it is not. However, if you have a client with a consistent pathology it should show itself consistently, or if you have a client with clearly deviant Z-Scores at the time of the session and you’re sure it’s not artifact, that’s a good place to start as well.
   - **Note:** If you are looking at the Neuroguide Maps where your client has a Z-Score of 3 standard deviations and you run Z-score Neurofeedback, you will notice that the standard deviation will be close to half of that, say usually roughly 1.5. So if you have a map of someone with 3.0 Z-scores, make the assumption that it will be around 1.5 in NeuroField when making the comparisons.
4. Make a note of the frequency band and the outlier numbers determined above. For example, if High Beta comes consistently high (red) at multiple sites and shows outliers of (1.84, 1.75, etc.):
   - **Note** High Beta as your frequency band to Threshold.
   - **Note** 1 to -1 as your upper and lower limits to Threshold
5. Click on “Abort Process” button on the bottom right of your screen to stop the EEG acquisition. **Note:** Again, you must abort the process before leaving or it will continue to scan. When you abort the scan, it will complete whatever scan is in process and then perform the abort.
After assessing your clients QEEG, you may find that preset drop down list does not contain a setup that matches your criteria. For example, you may want to train more than one frequency band at a particular site or the threshold limits appropriate for your client are not listed as a threshold. So, you can easily create a custom Threshold.

To Setup a Custom Threshold:
1. Click on the “Select Z Score Thresholds” button from the Stim Launch Pad.
2. Click on the drop down arrow next to the channel/site you want to threshold. For this example choose F4 and you will see a list of “Canned Thresholds”.
3. Scroll down to the end of the list and select the first option for “Empty”. This will bring up an empty threshold for you to customize.
4. Click on the “View” button for F4. You will now see the “ZAP Threshold Setup” screen appear. Here you can enable any of the frequency bands for a given site and set the Z-Score range anywhere between 1 to –1 and 6 to -6. Or, you can setup up more than one frequency at a particular site, for instance, Delta 1 to -1 and High Beta 1 to -1. This is a very versatile and powerful control for your thresholds.

5. First change the Name of your Setup in the “Name” field at the top of your screen. You can give it the name of your client or a more generic name for the frequency band itself. For this example we want to only change the upper and lower limits of the Delta frequency band at F4, so you will name it: “Delta 2.0 to -2.0” **Note:** You can add a description if you like. This is particularly useful if you are making a custom threshold for a specific client.
6. In the “ZAP Threshold Settings” area of the “Z-Score Threshold Setup” screen, notice that next to each frequency band is a check box that enables or disables it. If the box is not checked, it means that the frequency for the selected Channel (F4 in this example) is “Disabled”. Since the selected Threshold Setup was “Empty”, all the frequency bands are unchecked (or disabled) by default.

7. Enable the Frequency Bands you want to customize for your RTZ session by simply checking the box next to the desired band. You can check multiple bands if desired, but remember the more bands you choose the more difficult it will be to meet the criteria and get a “Hit”. If you make multiple selections here really evaluate the most effective Logic mode and you may want to use the “Percentage” option. For this example, we will only enable Delta.

8. Change the ZAP Upper and Lower threshold settings to 2 to -2 by entering a number in each of the respective boxes. Note: You don’t have to enter a lower range. If the QEEG shows that there is no deficiency, you can leave the setting at 0.

9. Click on the “Update This Threshold Setting” button and now the threshold is enabled.

10. Click on the “Return to Threshold Selection” button. Your custom threshold setup will now appear in the “Z-Score Thresholds Setups” drop down list for F4. You can then View it and see your Setup.

11. Repeat Steps 1 – 10 above for additional sites or follow the same procedure for building custom Coherence and Phase protocols.

You have now completed setting up your custom ZAP Thresholds for RTZ training.

**Running an RTZ Session – 19 Channels**

When running an RTZ Session, it is important to get the patient comfortable and coach them into a relaxed state to fully experience the powerful combination of pEMF and Operant Conditioning in action!

Before running the RTZ session, tell patients to:

- Have feet on the floor
- Eyes looking forward or relaxed if closed
- Jaw loose and tongue floating (not pressed against roof of their mouth)
- Adults sit silently, look straight ahead and listen for the tone. When you hear the tone, you may identify a feeling. Go with the feeling.
- Do not try to push the tone to come. If you try to force it, it doesn’t work. Let go, don’t think don’t try, just relax.
- Breathe and swallow normally and get out of your own way. Let your brain do the work because it knows how to do it better than you do.
- When you hear the tone, notice it. Tell yourself “good job.” If you don’t hear the tone, don’t worry about it. It is okay!

Note: Keep in mind that these protocols can take anywhere from 20 – 45 minutes to complete. It is important that after the treatment has started, you monitor the session. It is recommended to check in
with the client every 10 minutes as the protocol commences. If the person reports any discomfort, abort the procedure and stop the session.

**To Select a Protocol, Understand Gamma, and Start the RTZ Session:**

1. Click on the “Select Protocol/Treatment Setup” button from the “Stim Launch Pad” to select a protocol. The general rule is if the person is too:
   - fast give them slow waves such as Delta
   - slow give them faster waves such as 12-15hz SMR or Lo Beta from 15 – 19hz

There is also the Gamma frequency. It is not commonly used in Neurofeedback because Gamma is such a small frequency band. But, with pEMF therapy, you can increase the amplitude of Gamma during training and effectively influence the brain in a positive way. There is research around the efficacy of Gamma, as it appears to be a key frequency band in the regulation of coherences. If there are hyper-coherent sites, Gamma brings them down to a coherent level and if there are hypo-coherent sites, it brings them up to a coherent level. In the NeuroField Database there are several gamma protocols:
   - 43 – 46HD Gamma range
   - Alpha, Theta, Gamma Ultra Low. Gives Alpha, Theta, and Gamma and .31 to .4 and weaves it in with Gamma. This has a profound effect for people with depression, anxiety, and Peak Performance.
   - Gamma Jump – Inserts Gamma from 44-45hz in between each one of the frequency bands.

2. Based on the example brain map, click on the “Select Treatment Protocol” drop down and Select 43-46 HD protocol.

3. Select the number of Loops. In this example selecting 10 loops will run for 25 minutes. Even if you don’t use all the loops that is okay. The program may lock into a specific frequency, and may not run all ten of the loops within the allotted time frame. The idea is to keep the software running so it does not stop in between the loops. **Note:** This is a new procedure as previously with RTZ, the Loop would have been set to 1. Looping the program has proven over time to be an effective technique.

4. Click on the “Select and Close” Button and the program is ready to go.

5. Click on the “Start Standard Treatment” button and the:
   - EEG starts to stream across the screen.
   - First set of Z-Scores populates the tables.
   - Various Status updates appear at the bottom of the screen.
   - First Stim is then given.
   - Client should start getting a “Hit” when the Z-Scores threshold criteria is met.

**To Monitor the Session – Time and Hits:**

As the Session proceeds it is very important to keep an eye on what is going on. You will want to monitor:
- **Time** – Clock a 30 minute RTZ session which seems to have a very good clinical effect. With hardier folks or folks that are difficult to move, you can go a little longer, say 45 minutes max, but for most people 30 minutes is good. You don’t want to go too long, so make sure to keep an eye on the time.

- **Hits** – Your client should be to get 5 to 10 hits per minute. If they are watching a video make sure that the volume is below the sound of the Hits, so that the client can “compliment themselves” for achieving a hit. REMEMBER, make sure the client doesn’t get down on themselves for no Hits. Let them know it doesn’t matter. That is part of the process.

Determine if your Client is not getting a Hit at all or is constantly getting a Hit. This means that the criteria in the Threshold Setup is too difficult (no Hits) or is too easy (constant Hits). If this is the case, Abort the Process, adjust the Threshold/Logic mode, and start the session again. If you assessed your client above, you will most likely not have to make many changes right away. There are a couple of places to monitor the Hits:

1. To monitor Hits, notice the Status update at the bottom of the screen. In this example Percentage Logic mode was used:

   ![Status update example](image)

   This tells us that 6 out of 10 thresholds were hit for a percentage of 60%. As a result, a feedback tone will be heard. If not, NeuroField will modulate to the next frequency.

2. Notice the “Loop Number” in the “Loop” area of the Stim Launch Pad. It says “Loop Number 1”. Even though the Protocol was setup to run for 10 Loops, after 13 minutes it is still on Loop 1. That is okay because the patient is responding to treatment and getting Hits.

3. Notice the “RTZ Hit Count” in the “Loop” area of the Stim Launch Pad. It will update each time a Hit occurs and accumulate a running total. In this example “RTZ Hit Count = 44” which means that during this session 50% of the thresholds were met 44 times. This is good and what we typically want to see. To generate a Hit during an RTZ session, NeuroField:
   - **Gives an EMF pulse**
   - **Measures 4 seconds of EEG**
- Plugs that EEG into the Z-Score DLL
- Returns all of the Z-Scores. **Note:** During this stage, if the eyes are open, the Neuroguide database will automatically artifact the data. It will look for eye blinks and EMG, and remove them.
- Sounds a “Hit”, or Tone if all of the Z-Scores fall between the set upper and lower threshold limits (1 and -1) in each of the 19 channels. This means the criteria is met and the brain likes that frequency. **Remember:** If “AND” logic mode is selected, more than one frequency band/site is selected, and the chosen limits are lower, the more complex the criteria and the harder it is to get a Hit.
- Automatically gives that same frequency again. For example, let’s say the hit was at 24 Hz, NeuroField automatically gives you 24 Hz again, reinforcing the same frequency with an EMF that brings your brain toward the desired state that you setup in your threshold.
- Keeps giving a Stim, reinforcing the same frequency again and again, pushing you towards a normative state until it no longer returns a Hit and stops doing it.
- Modulates on to the next frequency and repeats the process depending on how many loops were set. If you made the criteria difficult, you won’t get that many repeats and the session will go faster. But, if you set the threshold just slightly below the target Z-scores, then you are going to be driving the brain down into that range, and it will keep on repeating to stabilize the brain.

**To Monitor Z-Scores using the Tabular:**

You can monitor the Z-Scores in real time and observe the changes in the Z-Scores every time a stimulation is given.

1. Notice “Z Score Tabular” screen. There are 4 tabs:

   - ZAP = Z-Score Absolute Power
- ZPR = Z-Score Power Ratio
- ZRP = Z-Score Relative Power
- Phase/Coherence Pairs

Also notice each one of the thresholds that you set up are highlighted. You can Click on the “Phase/Coherence Pairs” button and see the thresholds and data there as well.

2. Review the Data in each column of the table. Every 8 seconds a new EEG scan pass will occur and the Tabular will populate with the Z-Scores. You will see Red, Blue, and Green data. The color coding is as follows: Note: With each scan the previous data gets overwritten.
- Green = Z-Score between 1 and -1
- Red = Z-Score Excessive or above 1
- Blue = Z-Score Deficient or less than -1

In this example as we run the RTZ session while giving the Gamma frequency, we can visually see in real-time as the brain begins to lock in, which of the highlighted Coherence pairs turn Green and start to regulate. We can also see in real time where the brain doesn’t move or tries to go back to a hypo-coherent state which is its familiar deregulated pattern. When it does, NeuroField will modulate and give it another frequency and the brain will respond. You will then see the Coherences start to go into a normal range, a reward tone will sound and the new Z-scores will be posted.

3. Notice the “20 Channel EEG Data” screen. Here you can see:
- Individual EEG data for each site.
- Double-Click on the window and it will zoom into the data.
- Select the “View Zoom” button to view individual plots.
- Select the “EEG Zoom” to zoom in and look at the EEG from another perspective.

To Monitor Sessions When Using the HD or HD Rocking Protocols:

1. When you select say the:
   a. “T062 -- > 9-12 HD” protocol for someone who is deficient in Alpha, it starts at 9 Hz and steps through to 9.1, 9.2, 9.3 etc. all the way to 12.
   or 
   b. “T015 -- > 1-4 HD Rocking” protocol for someone who is deficient in Delta, it starts at 1 Hz and steps through to 1.1, 1.2, 1.3 etc. all the way to 4 and then goes back down 3.9, 3.8 or 3.7 all the way back to 1. This is method instills flexibility and is not as jarring as going straight back to 1 after hitting 4.

2. Be patient during the session when monitoring the HD protocols. These protocols have the ability to really “tease out” what frequency will get the brain to where you want it to go. By stepping thru each frequency in small increments, you are ticking through each one of those pieces of the frequency band and eventually you will start hearing Hits. However, you could go for quite a while without getting a hit and then bam, the brain locks on to a frequency and the hits start coming.

3. Notice at this point that the brain will start replicating that frequency rhythm to correct the Z-Score and NeuroField will continue reinforcing it. If you get a Hit at 9.4 it will give 9.4 again. If you get another Hit, it will give 9.4 again. The client could then go 20 minutes and only get through a small portion of the frequency band, but it is the most effective piece. At some point, it will then stop producing a normative Z-Score and move on.
Ending and Saving Session Data

To Complete and Save an RTZ Session:

1. When the Loop is done the Stim cycles will stop and Loop Number will update. At this point you can elect to end the session or continue to run the next loop, depending on the number of minutes you want the session to run for.

2. Notice the Status at the bottom of the screen when the Loop ends. The session data will be saved a “File Created Successfully....” Message will appear.

3. If all Loops have completed, the session will end automatically. If you do not want to run all of the designated Loops, click on the “Abort Process” button. **Note:** Even when Aborting the process, NeuroField will save the session data that had completed prior to Aborting into a new set of files. This way you never lose your session data.

The session data has automatically been saved, and if you want to view the session data or Plot it out using NeuroPlot, you must Load the Session data into the software. With NeuroPlot you can chart each one of the specific frequency bands and view how the session progressed. For Instructions on how to do this go to Section 1 - Chapter VI “NeuroPlot”.
II. Real Time Z-Scores (RTZ) Q20 - 1 to 4 Channels

Real Time Z-Score (RTZ) procedure can be used with 1 - 4 channels of EEG using the Q20. The RTZ protocol is a norm-referenced, pEMF biofeedback procedure in which a pEMF frequency is given, EEG is measured, and Z-Score data is generated. If the Z-Score falls within the Z-Score range set by the user, then the same pEMF is given again until the Z-Score no longer meets the Z-Score previously set. In essence, the RTZ procedure guides the brain to a regulated level of functioning using norm referenced Z-Score data. **Note:** NeuroField uses the Neuroguide database to generate norm referenced data.

The DLL used in the RTZ procedure requires a separate license that can be purchased through NeuroField, Inc. Simply call or email the office to purchase a Z-Score license. If you have already purchased a license, you must activate it with a License Key. Refer to the “Software Installation Guide”. This is a separate document available for download where you will find “Generating the License Key”. NeuroField also supports the use of a cap for 1-4 Channel training. See “V RTZ using Q20 – 19 Channels” for instructions on using a cap.

**Prepping for 1 – 4 Channel RTZ**

When prepping a patient for RTZ using individual electrodes, it is important that you clean the sites where the sensors are placed and correctly connect the electrodes to the Q20 device.

**To Clean Sites and Attach Sensors to Head:**

1. Take a cotton swap and apply a small amount of NuPrep to the swab.
2. Clean both ear lobes and the two sites were you intend to place electrodes with the NuPrep.

**To Attach the “Breakout Box”:**

1. Plug the white “Breakout Box” that came with your kit into the “Cap” slot on the front of the Q20 device.
2. Note the color-coded connectors on the Breakout Box and their purpose:
   - Four Red Connectors = Active Electrodes
   - Two White Connectors = Reference Electrodes
   - One Black Connector = Ground Electrode

**To Connect Electrodes to the Q20 and Attach Sensors:**

1. Plug the Ear Clip electrodes into the two white connectors on the Breakout Box and attach one to each ear. These are the Reference electrodes.
2. Plug a standard electrode for the Ground into the black connector on the Breakout box and attach to a grounding site on the head. **Note:** Often times a site approximately \( \frac{1}{2} \) inch from Fz towards the Nasion is used as a grounding site.

3. Plug the electrodes you will use for training into the red connectors on the Breakout box and one on each 10/20 site to train. These are the Active electrodes. Channel 1 is the red connector furthest to the left, then channel 2, 3 and channel 4 which is next to the white connector.

**Attaching the Coils**

On the back of each coil is a velcro strip which attaches to the black cap supplied in your NeuroField kit. Next you will attach the coils to the head and then start the software program.

**To Attach the Coils:**

With the EEG sensors placed on the head and connected to the unit as described above, cover the head and sensors with a surgical cap. **Note:** It is advisable to cut small squares of paper towels, place one over each electrode, and push down with a pinch and twist of the paper towel and electrode. This will secure the electrode to the scalp and provide another layer of protection between the electrodes and the surgical cap.

1. Place the black NeuroField Velcro Cap over the surgical cap.
2. Attach the Coils to the Velcro strips on the NeuroField cap at the 10/20 sites you are training

**Setting Up the RTZ Session – 1 to 4 Channels**

There are just a few preliminary steps necessary in order to complete your protocol setup and run an RTZ session for 1 to 4 Channels. **Note:** See “III Software Basics” earlier in this manual for more in depth instructions on how to follow the procedures below.

**To enter RTZ Mode and select Sensor Placement:**

1. Start the Program and Backup your database if you have unsaved changes.
2. Select a patient. **Note:** It is important to pick your patient first as all the data will be stored in the RTZ folder for that patient. Make sure the top NeuroField Status bar says “Active Patient =” and contains their Patient ID.
3. Click on “Enable EEG”. The “EEG Measurement and Threshold Setups” window appears.
4. Click on “Enable Z-score”. The “Patient Age / Eye Status” options appear along with Electrode Site selections.
5. Click on “Enable RTZ”.
6. Check the “Store Data After Each Loop” option. This option:
   - Should be left checked
   - Will automatically store the data once each loop of the entire protocol has completed.
   - Will store the data into the patient folder and this information can be loaded into NeuroPlot to see greater detail of what happened during the session.

   **Note**: All of the Options in the Steps above must be selected in order to run the RTZ procedure.
7. Enter the patient age into the “Patient Age” box.
8. Click on the “Eye Status” drop down menu and select the Eye Status condition, i.e. Open or Closed. For slow wave protocols, they are typically run with Eyes Closed.
10. Select the four Sites you want to train.

**Setting-up Phase and Coherence Pairs – 4 Channels**

If you are planning on training Phase and Coherence you will need to pick “Pairs” to train. NeuroField provides an easy to use interface for setting this up. **Note**: if you want to run Phase and Coherence using 4 channels, you will be limited to the number of pairs you can use. 4 Channel Phase and Coherence is full supported but it is suggested to run with 19 Channels.

Pairs are selected based on the Phase and Coherence data as seen in the QEEG. To Setup pairs, in the “EEG Measurement and Thresholds” screen:

1. Click on the “ZScore Thresholds/Pairs Setup” button and the “Threshold Selection” window appears.
2. Go to Section 2 - Chapter I earlier in this manual and navigate to “Setting up Phase and Coherence Pairs”.

Follow Steps 1 – 5 to setup your pairs for 1 – 4 Channel RTZ and return here to continue.

**Setting-up Thresholds 1 - 4 Channels**

NeuroField provides a number of “Canned Thresholds” for you to easily “Select and Go!” When setting up the Z-Score thresholds, you can choose to use the provided Preset Threshold setups from the drop down menu list. Or, you can customize your own setups.

**To Setup Thresholds – Z-Score Phase, Coherence, and Absolute Power:**

1. Click on the “Set Z-score Thresholds” button and “Z-Score Threshold Setup” window appears with Channel 1 (Fp1), Channel 2 (Fp2), Channel 3 (F3), and Channel 4 (F4) you selected.
2. Go to Section 2 – Chapter I earlier in this manual, navigate to “Setting up Thresholds” and “Assessing Your Client”. Follow the instructions as they are the same for both 4 Channel and 19 Channel. Return here to continue.

**Running an RTZ Session 1 – 4 Channels**

1. Click on the “Select Protocol/Treatment Setup” button from the “Stim Launch Pad” to select a protocol. The general rule is if the person is too:
   - fast give them slow waves such as Delta
   - slow give them faster waves such as 12-15hz SMR or Lo Beta from 15 – 19hz

   There is also the Gamma frequency. It is not commonly used in Neurofeedback because it is such a small frequency. But, with pEMF therapy we can give Gamma and increase its amplitude during training and effectively influence it in the brain. There is research around the efficacy of Gamma, and it appears to be a key frequency band that regulates coherences. If they are hyper-coherent it brings them down to a coherent level and if they are hypo-coherent it brings them up to a coherent level. In the NeuroField Database there are several gamma protocols:
   - 43–46HD Gamma range
   - Alpha, Theta, Gamma Ultra Low. Gives Alpha, Theta, and Gamma and .31 to .4 and weaves it in with Gamma. This has a profound effect for people with depression, anxiety, and Peak Performance.
   - Gamma Jump – Inserts Gamma from 44-45hz in between each one of the frequency bands.

2. Based on the example brain map, Click on the “Select Treatment Protocol” drop down and Select 43-46 HD protocol.

3. Select the number of Loops. In this example selecting 10 loops will run for 25 minutes. Even if you don’t use all the loops that is okay. The program may lock into a specific frequency, and may not run all ten of the loops within the allotted time frame. The idea is to keep the software running so it does not stop in between the loops. **Note:** This is a new procedure as previously with RTZ, the Loop would have been set to 1. Looping the program has the same effect and works very well.

4. Click on the “Select and Close” Button and the program is ready to go.

5. Click on the “Start Standard Treatment” button and the:
   - a. EEG starts to stream across the screen.
   - b. First set of z-scores populates the tables.
   - c. Various Status updates appear at the bottom of the screen.
   - d. First Stim is then given.
   - e. Client should start getting a “Hit” when the Z-Scores threshold criteria is met.
6. Go to Section 2 – Chapter I earlier in this manual and navigate to “Running an RTZ Session – To Monitor Session”. Follow the instructions to:
   - Monitor an RTZ Session
   - End a Session and Save the RTZ Data for View in NeuroPlot
The instructions for 19 Channel RTZ training apply to 4 Channel training as well.
III. Real Time Z-Scores (RTZ) – X2000 with 2 Channels

NeuroField RTZ can also be run for 2 Channel training if you have an X2000 with a Plus Unit. This hardware combination will engage the client in operant conditioning at the same time the brain is receiving the pEMF frequency, but at two channels only rather than the 4 channels supported with the Q20 and a Breakout Box or 19 channels with the Q20 and a cap. With this setup you simply attach the sensors and coils, load the proper protocol, set up the threshold, and the number of “Hits” will determine the length of the session.

The DLL used in the RTZ procedure requires a separate license that can be purchased through NeuroField, Inc. Simply call or email the office to purchase a Z-Score license. If you have already purchased a license, you must activate it with a License Key. Refer to the “Software Installation Guide”. This a separate document available for download from the NeuroField website where you will find “Generating the License Key”.

**Note:** When connecting the Q20 to the X2000 and Plus unit, **ONLY USE ONE CANbus USB Adapter!!!!** You can plug the CANbus Adapter into either device, preferably the Q20 shown below, as it will then be ready to use as a stand-alone amp when needed.

![Image of NeuroField equipment]

**Prepping the Site**

As with any Neurofeedback procedure it is important to clean the site and properly attach the sensors to ensure good connections.

**To Clean Sites and Attach Sensors to Head:**

1. Take a cotton swap and apply a small amount of NuPrep to the swab.
2. Clean both ear lobes and the two sites were you intend to place electrodes with the NuPrep.
3. Apply a pea-sized amount of the 10/20 Paste to each sensor and the 2 ear clips.
4. Place the active sensors on the head at the 10/20 sites you want to train and the ear clips on each ear lobe.
**Note:** It is advisable to cut small squares of paper towels, place one over each electrode, and push down with a pinch and twist of the paper towel and electrode. This will secure the electrode to the scalp and provide another layer of protection.

**To Connect the Sensors to the X2000 - True Linked Ears:**
1. With a pea-sized amount of 10/20 paste on each sensor and ear clip, attach them to the head and ears:
   - 2 active sensors on the 10/20 sites you will be training
   - 1 ground sensor on the grounding site
   - 2 ear clips, one on each ear
2. Plug the active sensors on the head into the ports labeled A1 and A2 on the back of the X2000 unit.
3. Plug the mastoid sensor into the port labeled GND.
4. Remove the white linker if it is attached.
5. Connect one ear electrode to the port labeled REF1 and the other ear electrode to the port labeled REF2.
   This creates a true linked ear connection with NeuroField.

**Attaching the Coils**
On the back of each coil is a Velcro strip which attaches to the black cap supplied in your NeuroField kit. Next you will attach the coils to the head and then start the software program.

**To Attach the Coils:**
1. With the EEG sensors placed on the head and connected to the unit cover the sensors with a small piece of
2. Cover the head and sensors with a surgical cap.
3. Place the black NeuroField Velcro Cap over the surgical cap.
4. Attach the Coils to the velcro strips on the NeuroField cap at the 10/20 sites you are training.

**Setting Up the RTZ Session – 2 Channels**
There are just a few preliminary steps necessary in order to complete your protocol setup and run an RTZ session for 2 Channels.

**To Enter RTZ Mode and Select Sensor Placement:**
1. Start the Program and Backup your database if you have unsaved changes.
2. Select a patient. **Note:** It is important to pick your patient first as all the data will be stored in the RTZ folder for that patient. Make sure the top NeuroField Status bar says “Active Patient ID =” and contains their Patient ID.
3. Click on “Enable EEG”. The “EEG Measurement and Threshold Setups” window appears.
4. Click on “Enable Z-score”. The “Patient Age / Eye Status” options appear along with Electrode Site selections.
5. Click on “Enable RTZ”.
6. Check the “Store Data After Each Loop” option. This option:
   - Should be left checked
   - Will automatically store the data once each loop of the entire protocol has completed.
   - Will store the data into the patient folder and this information can be loaded into NeuroPlot to see greater detail of what happened during the session.

   **Note:** All of the Options in the Steps above must be selected in order to run the RTZ procedure.

7. In the “Sensor Placement” screen, enter the patient age into the “Patient Age” box.
8. Click on the “Eye Status” drop down menu and select the Eye Status condition, i.e. Open or Closed. For slow wave protocols, they are typically run with Eyes Closed.
9. Click on the “Individual Electrodes” radio button to select the type of Sensor Placement and the “Electrode Site Selection” will appear.
10. Select the two Sites you want to train.

### Setting Up Thresholds and Running an RTZ Session – 2 Channels

When running RTZ with 2 Channels, the process from here on out is the same as running 4 Channels, however you will pick Thresholds etc. for only 2 sites rather than 4. Refer to Section 2 – Chapter II “Real Time Z-Scores 1-4 Channels” for step-by-step instructions. Here you may also be referred to Section 2 – Chapter I “Real Time Z-Scores - 19 Channels” instructions for further details. Between Chapter 1 and Chapter 2, you should find everything you need to know about Setting up and Running 2 Channel training.
SECTION 3
NeuroField HRV
I. NeuroField – HRV & Body Protocols

The NeuroField system was designed to run protocols for the body as well as the brain. It can be used to target specific frequencies that effect changes in the body relating to pain, bone injury, inflammation etc. Using NeuroField in this way allows you to work with the whole person not just the brain, and often times it has been shown that when you stabilize the body, especially the gut, then the brain all of sudden begins to regulate itself. This has also been shown to facilitate better tolerance of subsequent neurofeedback training. In this Section of the NeuroField manual we will discuss how to use HRV with Nogier Frequencies and how to make FEW water as a means to run protocols for the body. **Note:** NeuroField HRV can also be used with the tDCS/tACS device. See Section 4 Chapter X for detailed information.

**About Nogier Frequencies**

One effective means to influence the body as well as the brain is to run protocols using the Nogier Frequencies. Paul Nogier was a physician in France who in the 1950’s and 1960’s developed a system of frequencies based on what he coined “Auricular Therapy” or acupuncture treatment on the ear. Nogier spent 30 years of his life devising a system of seven basic frequencies that correspond to every chakra system in the body. These frequencies, some of which have proven to be very effective for pain, have been tested over the last 50 years and have been shown to be extremely safe and effective.

There are two types of body protocols that can be built when using the 7 Nogier Frequencies in NeuroField: Custom Protocols and Built-in Protocols. A Custom Protocol uses the HRV sensor device to muscle test the heart. This is not HRV variability training, but rather a procedure to build protocols from the Nogier database that are customized for a particular client. This is done by first measuring the body's responses to receiving stimulations using the HRV sensor and then running the Nogier frequencies the body likes the most. The idea behind this is that if the body wants a particular frequency then the heart rate variability will increase. And, if the body gets the particular Nogier frequency that it wants, this facilitates clients finding relief from their symptoms.

With the second type of protocol, Built-in Protocols, you can simply use an existing protocol from the Nogier database on the body in the area of complaint, for example bone, tissue, nerve, or inflammation. A very common use of built-in Nogier protocols on the body is “B – gastrointestinal and metabolic (Low)” over the gut. Nogier linked 4.75 hz to the gastrointestinal and metabolic system in the body. If this frequency is given over the gut, it can help relieve toxins and a number of different ailments such as autoimmune issues, asthma, allergies. Research has also shown that 4.75 hz inserted over the gut stimulates a serotonin release. This facilitates a neurotransmitter release and clients have reported feeling better as a result of just getting this protocol. **Note:** This procedure is an intermediate to advanced skill that requires training and experience to conduct. It is strongly recommended that you participate in a NeuroField training before using this technique.
Building Custom Nogier Protocols – An Overview

Heart rate variability (HRV) is the variation in the time interval between heart beats and it is calculated by measuring the standard deviation from normal to normal beats (SDNN). It is theorized that the HRV system is measuring energy that the body wants, as evidenced by increases in the SDNN. A pEMF frequency can be delivered and heart rate variability measured via either of the following NeuroField systems:

- Q20 with a breakout box, an X3000, and a stand-alone HRV unit or the
- X2000 and Plus unit with HRV built-in

The process for building a custom protocol using HRV can be broken down into three parts. The following is an overview (or summary) of each of those parts. Note: Step by Step instructions to setup HRV and build custom protocols follow this overview.

Overview: Part 1 – To Select the Nogier Protocol

Nogier frequencies respond to every major energy system in the body. So, for instance, if a client has a bad shoulder, coils are placed over the shoulder, a protocol containing all seven Nogier frequencies is run, and stims are given to the body for each frequency. After each stim cycle, NeuroField measures 4 seconds of HRV and then moves on to the next frequency. When all seven frequencies have been given, they are reviewed by the clinician, and the frequency with the highest variability is chosen as the frequency the body wants. That frequency is then matched to a corresponding protocol in the Nogier database and selected as the protocol to run for that particular client. Note: Step-by-step instructions on how to select and run a Nogier protocol are documented in detail below.

Overview: Part 2 – To Scan the Nogier Protocol for “Hits”

Next, the selected Nogier protocol is fine-tuned even further and customized for the client by running it for just 1 loop to determine which of the specific frequencies within that selected Nogier protocol the body wants. NeuroField takes the first frequency, gives a stim and measures heart rate variability changes. If HRV goes up 10 milliseconds above baseline, then it is considered a “hit” or a “yes” response from the body. Then that frequency causing the variability change is put into a table, and NeuroField moves on to the next frequency. This process is repeated until the entire Nogier protocol is run for 1 loop and a table with all the hits is generated.

Overview: Part 3 – To Run the Nogier Protocol with only the “Hits”

Lastly, only the “hits” or the frequencies that the body responded to are given. The number of loops is set (depending on the number of frequencies included in the table) to as many loops as necessary to give a session for 30 – 50 minutes. Note: The HRV portion of NeuroField is for working with the body only. And, it may be used on any part of the body except for the heart. Do not run NeuroField over the heart.

In addition, there are some people for whom HRV, even on the body, is not an appropriate modality. Clients with any type of heart condition, especially if they are wearing a pacemaker which is designed to take control of pacing the heart, should not receive an HRV treatment. You can work with clients who...
have high blood pressure, but don’t put the coils over the heart. Work with the brain instead to bring down high beta which usually causes blood pressure to drop. With other clients who have very low blood pressure or have a weak heart, it may be difficult to get a heartbeat at all and HRV may not work for them. There are also some people with very thick skin, and the heartbeat will not break through. This is rare, but it does happen.

Before actually building a custom Nogier protocol, you will first need to hookup the HRV sensor, verify the heartbeat, and calibrate the PPG Sensor.

**Hooking-Up the HRV Sensor & Loading the Nogier Database**

The NeuroField software installs the NeuroField database by default. However, the Nogier database is also included and is copied to your database folder during the installation process. The Nogier database is provided to be used with the NeuroField HRV system and contains several different protocols:

- a single protocol with all seven Nogier frequencies, one for low and one for high
- several individual protocols that corresponds to each of the Nogier frequencies A thru G both low and high

You will need to first load the Nogier database so that these specific protocols options are available when selecting your protocol. **Note:** If you need more detailed instruction from what is provided below, please refer to “IV Software Basics – Starting the Program” earlier in this document.

**To Connect the PPG Sensor to the Unit:**

1. Turn off NeuroField before using the HRV system.
2. Connect the PPG sensor that came with your system firmly into the plug labeled “HRV Sensor on the rear panel of the HRV unit. (If you have an X2000, plug it into the slot marked “HRV”.) This is a standard PPG sensor purchased from HeartMath. X3000 and Stand-Alone HRV Box

![Image of NeuroField equipment]

3. Turn the system back on and start the software. **Note:** It is important to power down the unit before either plugging in or removing the PPG sensor. This will prevent damage to the unit.
To Launch NeuroField and Load the Nogier Database:
1. Click on the NeuroField icon located on your desktop to start NeuroField, and answer “Yes” to the User Account Control” alert.
2. The main NeuroField 9.x.x screen will appear. Select “Nogier.mdb” for the HRV session and Click on “Continue”.
3. Click on the “Click to Continue” button and it will change to “Devices Found”.

You should see the HRV module found listed. In this case it is showing as found on the X2000 module. If it is not listed, follow instructions detailed in “To Connect the PPG Sensor to the Unit” listed above.

4. Select your CanBus and answer “Yes” to Backup your Database and you will arrive at the “Stim Launch Pad”.

Attaching Sensor/Coils and Verifying the Heart Rate
Once you have connected the sensor to the unit and launched the software, you will need to:
- Prep the patient
- Place the coils
- Attach the sensor
- Verify you are getting a good heart beat

To Ensure a Good Signal and Attach the Sensor/Coils:
There are a few hints and tricks you can follow when setting up the HRV Sensor to ensure that you will get a good signal.
1. Prep the client. The PPG sensor has to be able to permeate the skin. Oil or lotion will prevent the sensor from picking up a good signal. With some clients you will get a heart rate very easily and with others you won’t, so to ensure a good signal you should:
   a. Clean the Finger or Ear before attaching the sensor.
   b. If using the finger sensor, put it on snugly but not too tight because it will squeeze the finger and prevent blood from getting in.
c. Rub the ear or finger a bit to get the circulation going.

d. Avoid putting the ear sensor directly over a pierced hole on the ear, move it up a bit towards the ear opening. Moving it up a bit is also a good idea even if there are no piercings and you want to get a better signal.

e. Make sure the sensor is clean.

2. Place the PPG sensor on the ear or finger (depending on which one you use) and check the heart rate.

3. There are different options for placing the coils. You can place all four coils over the gut, two coils over the gut and two coils over the knees, or place the coils on the area of complaint. If they have a bad knee, place them on the knee or stomach problems, place them on the gut. If they have a bad back, place the coils on the area of discomfort.

To Verify You Are Getting a Good Heart Rate

1. With the sensor attached, Click on the “Enable HRV” option from the “Stim Launch Pad”.

2. Click on the “Continuous Scan” button and the HRV window will open. It will turn on the HRV and continuously scan.
3. Notice that you will get a heartbeat on the screen. You just want to be able to catch the edge across the yellow line. To ensure you have enough of a heartbeat to calibrate. If you are not getting a good heart rate signal:
   - Move the sensor around on the finger or ear until a heart rate appears.
   - Sometimes there is noise from computers, monitors, iPhones etc. Move the client away.
   - Put an EEG ear electrode on the client and plug it into the Ground slot on the back of the Q20 breakout box or X3000 NeuroField device.
   - Use a small amount of NuPrep and clean the surface of the ear.
   **Note:** This does not have to be perfect as, again, this process is not HRV variability training. You are simply using the heart as a muscle testing tool. If there is enough heart beat to catch the edge it is good.

4. Once you see the heart rate is good, select “Abort Process” and you are ready to continue on. It will finish its last scan and then abort. **Note:** Continuous Scan will continue to scan until you tell it to stop or abort the process.

**Calibrating the PPG Sensor**

Before running a session, the PPG sensor needs to be calibrated. This ensures that the heart beats are being captured correctly. You can either run a calibration automatically, letting the program determine the control settings, or you can run it manually. See the Chapter III “HRV Advanced Mode – Calibrating Manually” later in this Section.

**To Run the Calibration - Automatically**

1. Instruct the client to close their eyes and breathe normal. They should remain still, and not talk, hold their breath or meditate. You want them calm, quiet and alert and to breathe normally. This helps to prevent artifact from skewing the calibration process. The calibration process takes 32 seconds.

2. Next press the “PPG Sensor Cal” button right under the “Continuous Scan” button on the “Stim Launch Pad”. The “Measurement Device Data” screen will appear and the HRV unit will begin to display the heart rate and the collected data.

3. Look at the photo diode level on the HRV screen. It should read between 0.5-2 volts. If you are not getting a good signal, it usually means the client is not grounded. Try to eliminate noise from the environment. The PPG sensor is very sensitive to room noise and light which can cause the heart rate signal to become distorted and difficult to calibrate. Low room light helps, but if you continue to see distortion you can:
   - Have the Client cover their ear during calibration.
   - Place one hand on the Client and the other hand on the Computer to create a ground.
   - Purchase an Electro-Static Discharge Band (ESD Band). Then rest the metal piece on the client’s skin and attach the alligator clip to a piece of metal like the computer box. This will act as a ground and remove the noise, turning a “dirty” HRV signal into a “clean” HRV signal and greatly improving the functionality of NeuroField HRV. An ESD Band can be purchased at Radio Shack or any electronics store.
Note: Be careful not to continually remove and insert the plug as this could harm the unit.

4. During the Calibration process the sensor calibration will take several scans to ensure that NeuroField is catching the heartbeat. It will do four 8 second passes:
   - First Pass: The data is thrown out.
   - Second Pass: Sets the threshold bar. NeuroField calculates where the threshold should be and the threshold bar will automatically move to capture the edge of the heartbeat. The “First Derivative” window will show the heartbeat and threshold level.
     - The yellow line is your threshold bar
     - The vertical edges are the heartbeat. They mirror the heart rate in the box above it.
     - The horizontal squiggly lines are the heart rate signal or the “noise”.
   - Third Pass: Captures the heartbeat. When a vertical edge crosses the threshold, it is recognized as a heartbeat and it gets captured by the computer. In the “Final Heart Rate Edge” window, a little rectangle box shape will appear when the heart beat is captured correctly. One will pop up for each heart beat and they will line up evenly spaced. This is called the “picket fence”. When you see the picket fence spaced out evenly like it is in the image above, with the start of each rectangle lined up with an edge of the heartbeat, then you have a good calibration. Says you are calculating the heart correctly. Note: If you are missing pickets then it is not catching the edge. As a result, you don’t have a good calibration and you will have to do it manually. Read the Chapter III “Advanced Mode- Calibrating Manually” later in this Section.
   - Fourth Pass: Sets the “Hold Off”. On the last pass, it will start to calculate a hold-off time. This tells the computer how long to wait before looking for another edge. When NeuroField captures an edge it holds off looking for another beat for a few milliseconds until the rectangle is complete in order to prevent artifact. It has to wait to detect a heartbeat. The Hold Off can be set manually as well. We want a heartbeat between 750 – 1000 milliseconds typically, but it varies.

5. When the calibration is over, Click “OK” in the “Congratulations, HRV Calibration Complete!” message window. Note: This doesn’t mean that the calibration is correct. It just means the calibration is done, next you must visually check to be sure the calibration is good.

To Check the Calibration:
1. Notice the "Final Heart Rate Edge" graph:
• Again, if you see the threshold just below the signal, all the vertical edges crossing the threshold, and the picket fence lined up with each edge of the heartbeat, then the calibration is good. There should be spaces in between each box and most importantly, none of the “pickets” should be missing, as pictured below.

• If the threshold is just below the signal, but an edge did not come down enough to cross the threshold, it wasn’t captured by the computer as a heartbeat. As a result, the picket fence will be missing pickets, and it is considered a bad calibration, as pictured below. You will need to run the calibration process again.

or

• If the picket fences have no space between them and they are right next to each other, it means that NeuroField was catching one continuous edge. It wasn’t actually tracking the heart successfully.

2. Notice that the “Threshold Level’ and “Holdoff Time” boxes in the “PPG Sensor Calibration” area of the “Stim Launch Pad” have been automatically populated with the appropriate settings once the calibration has completed:
   a. Threshold Level is a negative number
   b. Holdoff Time is between 400 – 500 msec

If this is not the case or you are having trouble getting a good calibration, again, the numbers can be set manually as detailed in the Advanced Mode below. **Note:** it is suggested to read “The Advanced Mode” to get a better understanding of the HRV settings and calibration process.

You are now ready to run a Select the Nogier protocol and run a Session. The session will be divided into 3 separate steps. A summary of the full process is as follows:

• Step 1 - Run a protocol with all 7 Nogier frequencies.
• Step 2 - Determine which of the 7 Nogier frequencies the body liked the most and select the corresponding Nogier protocol that was designed for that frequency.
• Step 3 – Run the Nogier protocol chosen in Step 2 and run it to see which frequencies within that protocol the body liked the most and were registered as Hits.
• Step 4 – Run the “Hits” only from Step 3 for approximately 30 minutes.

Selecting the Nogier Protocol – Step 1
Once the sensor is attached and calibrated, you can go ahead and determine which of the Nogier protocols is appropriate for a particular client. In this portion of the process you will give the client a full set of all 7 Nogier frequencies and let the heart make the choice for which particular Nogier frequency the client needs.

To Run Nogier “Low Frequencies All”:
1. Click on the “Standard” button and from the NeuroField “Stim Launch Pad”, Click on the “Select Protocol/Treatment Setup” button.
2. Click on the “Select Treatment Protocol” drop down menu. This loads up all seven of the Nogier frequencies. Note: Nogier Database should be loaded. If not follow instructions in previous step for “Loading the Nogier Database”.
3. Scroll down towards the end of the Nogier Protocols listed and select the Protocol, “Low Frequencies all”. The 7 Nogier frequencies will be loaded. These are the original Nogier frequencies. Note: The “High Frequencies All” protocol contains the harmonics of the low frequencies. Harmonics can be described as a “ringing” out of the original tone that exponentially grows larger the further out it gets. These frequencies are bigger and faster than the low frequencies and typically used in Lasers.
4. Make sure it is set for 1 loop and Click on the “Select and Close”
5. Place the coils on the gut or on any other area of concern. With the sensor still on the ear, have the client close their eyes and breathe normally. Click on the “Start Standard Treatment” button and the HRV will start running the protocol and plotting the SDNN data for you.

The first thing NeuroField will do is take a baseline for 4 seconds and place the number in the “Running SDNN” window. Then it will give the first Stim for 5 seconds and measure the heart rate for 4 seconds, placing a red graph in both the SDNN and RMS windows. After that it will then give the 2nd Stim and measure for 4 seconds and so on. It will do this for all seven frequencies until the protocol is complete.

6. During the treatment notice the two bottom scales:
   - 1st ones shows the RMS or the Amplitude or strength of the pulse. Is it weak or does it get stronger.
   - 2nd one shows the SDNN or Standard Deviation from Normal to Normal heartbeat variability.

```
<table>
<thead>
<tr>
<th>Running Waveform RMS Levels</th>
<th>Baseline = 0.078</th>
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<tr>
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<td></td>
</tr>
<tr>
<td>0.08 -</td>
<td></td>
</tr>
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<td></td>
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<td>6</td>
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```
<table>
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<th>Baseline = 12.64</th>
</tr>
</thead>
<tbody>
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<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>
```

NeuroField takes the baseline, for example 12.64 and posts it at the top of the SDNN graph window. Each time the heart rate is measured NeuroField will plot the information. You can watch to see how the client responds to each stim and what happens to the variability. If the variability or SDNN increases by 10 milliseconds or more above the baseline, example 22.64, that is considered a “yes” response from the heart and it is noted as a “Hit”. If it doesn’t increase by 10 ms, it is not considered a “Hit”.

7. When complete the “Stim Summary and HRV Scan Data” window will appear. Keep this window open. **Note:** If you don’t see the Stim Summary window, move the Stim Launch Pad window as it may be hiding behind it.

If the client did not respond well to the “Low Frequencies all” and none of the frequencies came in at 10msec above baseline, there are two options:
   a. Run this process again this time selecting the “High Frequencies all” protocol described above.
   b. Lengthen the duration of each stim which will give a longer time period for the body to figure out what it is getting and the heart to determine how it will respond. Instead of
giving a 5 second Stim you can use the Sweep Control to give a 10 second Stim instead. See “Software Basics – Using Sweep Control” earlier in this manual for detailed instructions.

To Choose the Frequency the Body Liked the Most:
There are two ways to check the results and determine which frequency shows the greatest variability. At this point have the client open their eyes while you go ahead and review the results.

1. Review the “Running SDNN” window at the bottom of the screen to see how the heart responded:
   a. Again make a note of the baseline. If the baseline was 12.64 wherever the variability is 10 msec above baseline (22.64 or higher) there will be a Hit.
   b. Look to see which frequency had the greatest variability denoted by the red graph that is the highest. Jot down or make a mental note of this number. Note: The Frequency X axis starts at 0. If the highest variability (noted by the red graph) falls between 1 and 2, use the number on the right. In this case it would be Frequency number 2. Note: You can also look at the RMS graph. If the Amplitude gets stronger, that is also considered to be a response the body liked.

2. Review the actual “Hits’ data:
   a. Look at the “SDNN Hits” button on the “Stim Launch Pad”. (Don’t Click on the Button just yet!) When there is a change in the variability of 10 milliseconds or higher from the baseline, it is recorded as a “Hit” and “(Found)” will be noted on the “SDNN Hits” button. If there are no Hits, it will not be noted on the button.
   b. Review the Stim Summary and HRV Measurement Scan Data.
      b. Look at the “SDNN” Column. The highest number and the corresponding stim cycle will tell you frequency the body liked the most. Stim Cycle 0 is the baseline. In this example, it is Stim Cycle 1.
   c. Again, Jot down the Stim Cycle with the highest SDNN. This number will be used next to choose a specific Nogier Protocol. Click on the “Close Window” button.
To Choose the Nogier Protocol:

You are now ready to choose the specific Nogier protocol which corresponds the stim cycle that you noted above and that registered the greatest degree of variability. However, here is where your clinical expertise can influence this decision. If number 1 had the greatest variability, but the client is complaining of back pain, you can choose 6 instead of 1, especially if it was included in the “Hits Table”. Note: In the NeuroField Documents folder placed on your desktop during the installation process, there is a document named “Nogier Frequencies”. You can review this document for a description of Nogiers’ work and his explanation of each of the Nogier protocols/frequencies.

1. With the “Stim Launch Pad” active, Click on the “Select Protocol/Treatment Setup” button and then Click on the “Select Treatment Protocol” drop down. A list of Nogier Protocols with their corresponding letters will appear. The Nogier Protocols are listed from A – G, both high and low versions. Using the stim cycle number selected above, pick the Nogier Protocol that corresponds to that frequency number. To do this, match the frequency and protocol as follows:
   - 1 = A tissues
   - 2 = B gastrointestinal and metabolic
   - 3 = C locomotor
   - 4 = D laterality
   - 5 = E pain and nerve
   - 6 = F brain and bone
   - 7 = G cerebral cortex

2. Using the example that 1 was the selected Nogier Stim with the greatest variability, select “A - tissues” as your protocol to load, keep the loop set to 1, and Click on “Select and Close”. Note: If you used “All Frequencies Low” choose the Low version of the protocol, if you used “All Frequencies High” use the High version of the protocol.

Scanning the Protocol – Step 2

Now that you have selected the Nogier Protocol to use specific to your client, you will now fine-tune it or “zero-in” on it even further by running a scan of each frequency in that protocol for 1 loop and finding which frequencies here the body responds to the most. These will be noted as “Hits”.

Note: This will take a little longer. NeuroField has to scan frequencies below it and above it because Nogier said there is variability in every human and not everybody is going to hit 18.25 exactly, the range will vary 30% above or below. So you have to scan to find the exact frequency that will work for the client. Nogier felt, “you have to find the lock and key.” Everybody is going to have a different response and you want to find where there is going to be the best response for that particular client.

To Scan the Nogier Protocol and Find the Hits:

1. With the HRV Sensor still attached and HRV enabled instruct the client to close their eyes to reduce external distractions. Then, select “Start Standard Treatment” button.
2. Run a single loop of the chosen Nogier Protocol. NeuroField will take a baseline and then step through each of the frequencies in the protocol and give them one at a time for 5 seconds and measure the HRV. Make a note of the baseline, say 17.11.

Note: You can change the default 10 milliseconds baseline setting. See “HRV Advanced Mode – Adjusting the HRV Settings” and “Set Threshold Level” later in this chapter. Also, NeuroField has its own built-in artifact rejection. If anything goes above 125 milliseconds, that variability is immediately rejected. Most humans don’t have variability this high. The exception may be runners and athletes who have really large variability, so you can also change this setting to say 150 or 175. See “SDNN Rejection Control” in the “HRV Advanced Mode – Adjusting the HRV Settings” Chapter later in this Section.

3. When done the “Stim Summary” table appears where you can see all of the data. Some of the frequencies may not be there as a result of artifact rejection and NeuroField pulled them out. If there are any “Hits” that went above the baseline, the “SDNN Hits” button includes “(Found)”.

Note: You can dump this data to a file to view it in NeuroPlot and see a single trend line.

4. Click on the “Close Window” button. You are now ready to run the protocol and give only the frequencies that were a hit.

Running a Session – Step 3
Now that you have determined what frequencies the body liked within the specific Nogier Frequency, you will now run a full session using only the frequencies within the Nogier protocol that are “Hits”.

To Run the Nogier Protocol – Hits Only Full Session:
1. You now have your treatment protocol and you are done with the HRV measurement process. You have muscle tested the heart and pulled the frequencies you want out of the protocol. With
the coils placed on the body you are now ready to run a session, giving only the frequencies that are “Hits”. Click on the “Standard” button if you are not already at the “Stim Launch Pad”.

2. On the Stim Launch Pad click on the “Disable HRV” radio button to disable HRV and remove the HRV Sensor. You will now run a regular NeuroField session.

3. Click on the “SDNN Hits (Found) button. The “Results Table” page will appear listing the Stim Cycles that were registered as a Hit or a “Yes” response from muscle testing the heart. In this table you can see which ones came in as a Hit. These are all the frequencies that the body wanted. Again, some are not there and got removed as part of the artifact rejection described above. Note: There may be several or there may only be two.

4. Notice that the HRV Loops will default to 1 and tell you how long it will take to run 1 loop. The traditional amount of time for running Body protocols is typically 30 to 50 minutes.

5. Increase the number of loops to equal the amount of time you’d like for the session, at least 30 minutes.

6. Click “Start SDNN Peak Treatment” button. It will continue to loop through only the few frequencies that are “Hits” for 30 minutes. During this time you can give the client a magazine or a movie. Or, you can talk to them. During therapy a person will start to relax and talk about what is going on. Often times they will feel more disinhibited and more willing to get into an open state.
7. Once the session has completed, instruct the client to drink a lot of water and make sure they hydrate well. Their body may detox and eliminate toxins from the gut, however do not make any suggestions such as that they may suddenly have strong eliminations because it doesn’t happen with everybody. Also, if it does most people can handle it.

**Quick Start – Using HRV-Nogier Body Protocols:**

**To Quickly Setup and Run HRV-Nogier Protocols:**

1. Make sure the ear and finger are clean and attach the Sensor to person. **Note:** Plug HRV PPG Sensor into NeuroField X2000 or HRV Unit **FIRST BEFORE** turning on the device. Otherwise you may harm the electronics.
2. Select the Patient.
3. Instruct Client to close eyes, breath normally and to stay still.
4. Enable HRV.
5. Click on Continuous Scan and check to be sure there is a good heart rate. Abort Process.
6. Click on PPG Sensor Cal to automatically calibrate.
7. Examine Sensor Cal outcome and if HRV is not being tracked correctly, make manual adjustments (described in Step 12 Below).
8. Run Nogier “Low Frequencies All” and note the frequency the body liked the most from the Stim Summary table.
9. Choose the Nogier Protocol that matches the frequency noted in Step 8.
10. Run the chosen Nogier Protocol for 1 loop scanning for “Hits” within the specific Protocol.
11. Run the “Hits only” from the Nogier Protocol for a full session, looping for 30 – 50 minutes.
12. Manual Adjustment Tips: (For details see Chapter III “HRV Advanced Mode – Calibrating Manually” later in this Section.)
   - The Threshold Level will ALWAYS be a NEGATIVE Number.
   - To LOWER the Threshold change the threshold level to a larger negative number.
   - To RAISE the threshold change the threshold number to a smaller negative number.
   - The Hold off time should be around 400-500 msec. If the auto calibration process produces a hold off time of 150-200 it is probably incorrect.
• When the calibration is correct you will see the ‘picket fence’ on the Final Heart Rate Edge graph.
• Setup HRV measurement durations. Using the defaults is efficient for most cases.
• Setup SDNN Threshold Level. Using the defaults is efficient for most cases.
• Setup SDNN Rejection Control. Using the defaults is efficient for most cases.
• Run Protocol.
• When HRV Protocol is complete look at the SDNN Peak Button. If there are hits it will tell you so.

Using HRV Custom vs Built-in Nogier Protocols

Using HRV to pin point the exact frequency and run a custom protocol that the client’s body responds to the most is one way to run body protocols in NeuroField. The other very effective treatment is to simple choose a built-in Nogier protocol that Paul Nogier determined to be effective for a specific body complaint. Even though the HRV method does drill down to build a custom frequency protocol, it also extends out the time to run just one protocol. So when choosing between the two methods, keep that in mind. There is a certain amount of time management that you have to balance when working with a client and it does takes a while to find the frequency, get the hits and run the hits.

Once you get good at using body protocols, however, you can go and directly use a specific built-in Nogier protocol. There are a lot of times where you will get a big bang for the buck by simply using these protocols. If you know a person has gut issues then you don’t need to do a screening of all 7 frequencies. Just go to the Nogier database and choose“ B–gastrointestinal and metabolic (low)”. If a client talks about a bone or joint issue, you can use either the “E-pain and nerve” or the “F-brain and bone” protocols that are both good for pain. For more detailed information on the use of built-in Nogier protocols, refer to the “Nogier Frequencies” document located in the NeuroField Documents folder placed on the desktop during installation.

But, if you are not really sure what to do, introduce all 7 frequencies and see what the heart does. One suggestion is to find the HRV custom protocol for your client as part and of their initial intake or on the first day of training so you have that information in your tool box to use as needed. Run it a couple of times to see how it does and then switch to built-in Nogier protocols as needed.
II. HRV Advanced Mode - Adjusting the HRV Settings

Once the sensor is attached and calibrated, you can use the default settings or you can go ahead and manually change the settings as needed.

Adjusting HRV Stim Options

To Adjust HRV Stim Options:

1. In the “HRV Setup” on the Left side of the “Stim Launch Pad” choose your “HRV During Stim Options”, either “Pre and Post HRV” or “Full Stim Cycle HRV”:
   - “Pre and Post HRV” – Enables pre and post protocol monitoring. It works as follows:
     - HRV is measured.
     - Full protocol is given.
     - HRV is measured again after the entire Protocol has completed.
   - “Full Stim Cycle HRV” – Enables stim by stim monitoring. It works as follows:
     - HRV baseline is taken.
     - Stim is given for the 1st frequency.
     - HRV is measured briefly.
     - Stim is given again for the next frequency
     - HRV is measured briefly. This continues to the next frequency until the entire protocol is completed.
     - Another Baseline taken again.

Note: “Disable HRV/EEG” option simply disables the HRV module and is the default setting when the program loads.

Adjusting Measurement Duration and Threshold Level

To Adjust Duration and Thresholds:

1. In the “HRV Setup” area of the “Stim Launch Pad”, set the “HRV Measurement”. This is the amount of time to use for measuring baseline and increases in HRV. The default settings typically used are:
   - Pre-Stim = 4 seconds (this is the baseline)
   - Inter-Stim = 4 seconds
   - Post-Stim = 4 seconds

2. Set the “Threshold Level (msec)” in the “SDNN Threshold Control” box. The default setting typically used is a 10 msec increase. This is the amount of time HRV must increase above the baseline for the frequency to be interpreted as a “yes” response by the body or a “Hit”.

Note: The Threshold Level can only be seen in the “HRV Setup” area when the “Full Stim Cycle HRV” option is enabled.

After the baseline is taken during Pre-Stim, NeuroField begins to look for increases in HRV above the pre-treatment baseline. This is done by calculating the SDNN or Standard Deviation from
Normal to Normal heartbeat. If SDNN increases above the baseline by the amount set in the “Threshold Level”, then the frequency is registered as a “Hit”, meaning the body liked that frequency. Frequencies that register a “Hit” are then saved in a table called the “SDNN Hit” table.

For example, when using the default values, in order to accept a frequency as a "Hit", the SDNN must be 10 milliseconds or greater than the Pre-Stim baseline SDNN:

- If Pre-Stim baseline is 25.35 msec and the
- Threshold level is set to 10 msec, add the two together
- A “Hit” is registered when the Heart Rate Variability is 35.35msec or greater.

You can change the threshold and make the “Hit” responses more or less stringent by setting the threshold to monitor increases or decreases in the SDNN:

- To monitor increases in SDNN set the threshold using positive numbers above zero.
- To monitor decreases in SDNN set the threshold to negative numbers below zero (for example, -10).

**To Setup SDNN Rejection Control:**

1. The default setting is 125 milliseconds. This is the amount of time allowed before a measurement is rejected by the system.

Some clients may move and create an artifact that causes an increase in the SDNN or they may hold their breath which causes the SDNN to go higher and forces the heart to become variable. Normal range has been found to be:

- 10 or 15 - 90
- Athletes tend to have a higher SDNN between 150 - 175
- 125 is an upper-end number that has been found to work for most people

You can also uncheck, “Clean Up Missed Beats” and it will turn off Rejection Control.
III. HRV Advanced Mode – Calibrating Manually

Running the Calibration – Manually

If automatic calibration has trouble getting a good calibration, you can run the calibration manually. In the “PPG Sensor Calibration” area of the “Stim Launch Pad”, the numbers correspond to the HRV “Measurement Device Data Screen” as follows:

- “Threshold Level” = Yellow Threshold bar in the “First Derivative” window.
- “Holdoff Time” = “Final Heart Rate Edge/Holdoff Period” window.

About The Threshold Level

The number in the “Threshold Level” box should always be set to a negative number. The value set here:

- Determines the position of Yellow Threshold bar on the vertical axis in the “First Derivative” window.
- Lowers the Threshold bar when set to a higher negative number.
- Raises the Threshold bar when set to a number closer to zero or a lower negative number.

The closer the bar is set to zero, the closer it is to the “noise” associated with the heart. You only want to capture the peak of every heartbeat which is where SDNN is measured. So the Threshold Level should be set where the bar is just below the main signal (noise) and the vertical edge of the heartbeat just crosses over the bar. If the Threshold Level is set either too high or too low you will not get a correct calibration. **Note:** Again, the Threshold Level must always be set to a negative number. If set:

- Too high the Threshold Bar will get raised so far into the heart rate signal that NeuroField will not be able to see the difference between the heartbeat edge and the actual signal of the heart, making calibration impossible. If this happens you will see all the boxes lined up right next to one another, side by side as shown below:

![First Derivative PPG Sensor Slope vs. Time, HRV Threshold = 5.278](image1)

- Too low, the Threshold Bar will get lowered below the heart rate signal and NeuroField will not be able to see the edge or pick up any heartbeats at all. If this happens you will not see any boxes as show below;

![Final Heart Rate Edge Holdoff Period vs. Time, Heartbeats Processed = 15](image2)
About Holdoff Time

The Holdoff time is usually set between 400 – 500 msec. The number in the “Holdoff Time” box:

- Tells the computer how long to wait before it looks for another heartbeat edge and prevents NeuroField from looking for another heartbeat until done with the current one.
- Narrows the width of the boxes when set to a lower number and thus waits for a shorter amount of time. For example, if you change the value from 468 to 156 msec the boxes in the “Final Heart Rate Edge/Holdoff” window will appear narrow.
- Widens the width of the boxes when set to a higher number and increases the wait time.
- Reduces errors and gets the computer to accurately measure heart rate variability when set correctly.

To Calibrate Manually:

To begin the manual calibration process, you want the threshold bar to drop below where NeuroField can see a signal so you can gradually raise it into a good range and capture the heartbeat.

1. Set the Number in the “Threshold Level” box to a high negative number, for example from -2.77 to -3.277.
2. Click in the “Threshold Time” box to get the computer to accept the new setting and then click on the “Continuous Scan” button. In the HRV “Measurement Device Data Screen”:
   - The Yellow Threshold bar will drop to the value you set in Step 1 above, -3.277 and rest below the heartbeat edge.
   - The “Final Heart Rate Edge” window will not display any boxes.

Note: NeuroField will continue to scan the Heart Rate Variability until you select the “Abort Process” button in the lower right hand portion of the screen.
3. Start raising the bar:
a. Lower the negative number in the “Threshold Level” box toward zero, for example, from -3.277 to -2.277.

b. Click in the “Threshold Time” box to accept the new setting and notice the Yellow Threshold bar in the “First Derivative” window. When it gets to the end of the scan, it will check for the value in the “Threshold Level” box and the Threshold bar will raise up to -2.277 on the vertical axis. As NeuroField continues to scan, the Threshold can be changed “on the fly”.

c. Continue to lower the “Threshold Level” number to raise the bar until NeuroField captures the heartbeat when the vertical edges cross over the threshold and boxes begin to appear in the “Final Heart Rate Edge” window. For example, set it to -1.277 and then to -0.277.

4. Click in the “Hold-Off Time” box to change the number here to be between 400-500 msec.

5. Abort the Process once you have a “Picket Fence” on the “Final Heart Rate Edge” graph and the pickets are spaced appropriately. When it gets to the end of a scan, NeuroField will abort and you are ready to run a session.

Calibration should not take more than 2 or 3 minutes. If it is taking longer than that, then something is wrong. Either, there is too much noise in the room, the client is not grounded correctly, there is some kind of debris on the finger or the ear, or you may have a person who is not appropriate for HRV.
IV. FEW Water (Frequency Enhanced Water)

Another effective means to influence the body as well as the brain is to charge water using the Inflammation Reduction Protocol and have your client drink the pEMF charged water. FEW has been shown to not only reduce inflammation in the body but to also change the inflammation effects that appear in the QEEG. Note: It is advised to attend a NeuroField training as using FEW is an advanced procedure.

Making FEW (Frequency Enhanced Water)

Before adding FEW water to your treatment processes, there are a few things to know, as this is still an experimental procedure:

- Never charge your clients money for the water
- Have your client sign an informed consent
- Refrain from using FEW with clients on medication for medical conditions as it may change the effect of the medication
- Not advised for use with children
- Advised to not drink water past 6:00 as it does energize the system

To prepare for and effectively create and maintain your FEW:

- Use a glass container to charge the water and cover the glass with a dark cloth or brown paper bag. This is to prevent color and light (especially UV light) from effecting the charge.
- Place a cap on the glass container to hold in the charge.
- It is advised to use Tap water rather than distilled water. This has proven to be more effective for holding a charge and effecting change.
- Once the Protocol has finished, transfer the FEW to either an amber or cobalt container to deliver and store the water. This also prevents light from subsequently affecting the charge. Have your client store the water in a cool dark place. Never refrigerate the water.

There are several standards that have been set forth when creating FEW. As a general rule the water will get charged for 3 hours per gallon of water:

- 3 gallons = 9 hours or 540 minutes
- 2 gallons = 6 hours or 360 minutes
- 1 gallon = 3 hours or 180 minutes

Note: As this is an experimental process, check back in future manuals for updates and added info.

Regarding your container for making FEW water, you can purchase:

- A glass beverage dispenser with a spigot on Amazon
- Rolls of Velcro to place around the container to attach the coils

To Make FEW:

The recipe is as follows:
1. Use the “Inflammation Reduction 2.5v” protocol located in the database, “Nicks Database”.
2. Enable the Sweep control and make the following changes:
   a. Duration = 10000 msec
   b. Volts = 5 volts
3. Set the loops to:
   - 3 gallons = 125 loops (541 mins 40 secs)
   - 2 gallons = 84 loops (364 min 0 secs)
   - 1 gallon = 42 loops (182 min 0 secs)
4. Place the coils on your glass container and let it run overnight.
SECTION 4

tDCS/tACS/tRNS
I. Overview

Thank you for purchasing the NeuroField tDCS/tACS/tRNS unit. This is a very powerful device that provides you with a tremendous amount of clinical application for your clients. It’s important at this point to go slow and take your time to get acquainted with it. This document will help you to get started, but is not a supplement for training. Here we touch on all the basics of the tDCS/tACS/tRNS system and help you to get setup and running as effortlessly as possible. However, it is highly recommended that you attend a formal training by Dr. Nicholas Dogris in order to learn how to use this device for clinical purposes. Be rest assured you will soon experience for yourself what a great addition this new unit is to your NeuroField System.

System Setup

Let’s review what you have received with your new unit and how things connect together:

- **tRNS**
  The NeuroField tDCS/tACS device now includes the ability to give tRNS or “Random Noise Stimulation”. There is no additional setup required as tRNS is built into the new units and can be added to existing units for free. Note: If you currently own a tDCS/tACS unit, you will need to send it in to NeuroField, Inc. and get an upgrade for free. NeuroField software v10.0 supports the use of tRNS.

- **CANBus Adapter**
  The USB CANBus plugs into the back of the unit using the end of the adapter that looks like a telephone jack. The other end of the cable, which is a USB connector, plugs into the port in your computer. If you have installed the software at this point, the CANBus will be recognized by your PC and the driver will be loaded automatically.

- **Field Replaceable Battery**
  There is an ion lithium battery that can be inserted into the back of your unit. You will see a little ribbon that you can grab to pull the battery out of the unit. There is an LED indicator on the battery itself, which when the button is pushed, will light up telling you the current charge of the battery:
  - If the indicator lights up all the way and all the LED lights turn on, then you have a full charge.
  - If you only see one LED, then it means that your battery is almost dead.

Battery hygiene is important, as batteries have a lifespan and will eventually die. However, if you take good care of it, a battery can last a long time. Typically it can last one year, maybe two if you treat it right. This means discharging the battery appropriately, and establishing good memory for it. Yes, batteries do have a memory, so:
  - When you turn the unit on, keep it on all day or for approximately 8 – 10 hours.
  - Shut it off at the end of the day.
  - Do this whether you are using the battery or not.

Following this procedure will allow you to extend the life of your battery for as long as possible by creating a long “memory” of run time.
The battery is field replaceable, meaning that you can replace it at any time. You can also purchase additional batteries from NeuroField and have a supply of batteries on hand as a backup to ensure you are ready to go at any given moment with zero downtime. This new battery solution is also available for the Q20 EEG amplifier.

- **Daisy-Chain or 3 Units to 1 CANBus**
  Just like all other NeuroField products, the unit not only plugs in to the CANBus adapter, but it also has the ability to be daisy-chained directly into the existing NeuroField system. You can plug a separate RJ45 cable into the back of the unit and then use it to connect (or daisy-chain) your tDCS/tACS/tRNS unit to other NeuroField devices such as the X3000 and the Q20.

When you plug the CANBus into the back of the unit, you will see there are two RJ45 ports. Either one can be used as they are both inputs and outputs. You can daisy-chain from either slot to another unit. However there are some rules:

- You can only chain together 3 units at one time, meaning that you can only have one X3000, one tDCS/tACS/tRNS, and/or one Q20 on one bus.
- You cannot have two X3000 units and the tDCS/tACS/tRNS on the same bus. Currently the software doesn’t support that configuration. This may change in the future, but this is the way it is now, so make sure you configure the system correctly. Otherwise you may have problems with the software.

- **Anode and Cathode / Touch Proof Connector**
  If you look on the front of the box, you will see two touch-proof connectors. They are both inputs and one says “Neg” and one says “Pos”, meaning Negative and Positive. In the tDCS world, the:
    - Positive is associated with the Anode
    - Negative is associated with the Cathode.

This is important when you are running the unit in tDCS or Direct Current (DC) mode because DC stimulation is only one polarity. It is either positive or negative. The energy goes in through the Anode and out through the Cathode, representing the direction in which the power flows:

- tDCS = unidirectional or one direction.

**Note:** There is no frequency associated with tDCS, only voltage.

If you run the unit in tACS or Alternating Current (AC) mode then the energy will flow in through the Anode and out through the Cathode, but then also go back in through the Cathode and out through the Anode. In other words:

- tACS = bidirectional

It doesn’t matter where you actually have the Anode or Cathode because it is bidirectional and inter-changeable for each connection.

The inputs on the tDCS/tACS/tRNS unit are identical to EEG electrode connectors used for standard EEG applications. With this you are able to plug in regular EEG electrodes into the front of the unit for the purposes of giving site specific stimulation.

- **ECG Electrodes Small vs large**
The unit ships with two bags of ECG electrodes. You will see that there are two different sizes. These electrodes are designed to snap onto the cables that come in the package and they peel off and expose a little foam hydro gel that is sticky. You can place these directly onto the skin where it is able to make a good connection.

When choosing which size of electrodes to use take the following into consideration:
- With the small electrodes, the dispersion of the electrical field is more focused, but it can be more “prickly” and intense for a person.
- With the large electrodes, the electrical field is more dispersed over a larger area and can be easier to tolerate for some people.

**RNS what is it?**

With this unit you have tRNS or transcranial Random Noise Stimulation capabilities.

- RN = Random Noise

tRNS is a transcranial random noise stimulator that outputs “White Noise”. The definition of White Noise is random frequencies of equal intensity across a defined frequency spectrum. What makes White noise unique is that unlike a regular waveform, it creates all the frequencies in the spectrum simultaneously. It will give every frequency at equal intensity randomly. This creates noise in the system that has the ability to saturate every neuron in the brain. In essence, think of the tRNS as another kind of Dehabituator. The random nature of the noise disrupts and disentrains the brain.

The top end of tRNS in Neurofield is 4096, but you can define the top end of the spectrum. For example, you can set the top end to its max of 4096 or set it to 1,000 or 100 or 50 and it will create random noise of equal intensity within the spectrum that you define. **Note:** The feeling is markedly different in each range that you set, and it is suggested that you experiment with different ranges.

**Important!!!!** Be sure you have installed the latest version of the NeuroField software and followed the instructions in the Installation Guide to update your Patient Database to the latest version in order for the program to function properly. Again, you will need to send your unit in to NeuroField and get a hardware upgrade for free to access the tRNS feature.

**AC vs DC what is it?**

With this unit you also have both AC and DC transcranial stimulation capabilities:

- AC = Alternating Current
- DC = Direct Current

AC is given via a waveform. With the NeuroField system you have the capability of assigning a sinusoidal or sine wave, a square wave, or a triangle wave. These waveforms are going to alternate from Positive to Negative polarity and again the Anode and Cathode are bidirectional. So the current will go in thru the Anode and out thru the Cathode, back into the Cathode and out through the Anode. So it will alternate in polarity.

DC is not a waveform, thus you will not setup a frequency to run in DC mode. It is simply a polarity which is
either going to be positive or negative. Again, it is unidirectional in terms of the current. It goes in thru the Anode and out thru the Cathode only.

A good deal of research currently exists on tDCS, and there is some research now on tACS or Alternating Current and tRNS as well. Here at NeuroField, Inc., we tend to use Alternating Current more so than DC current, but there are some cases when DC current is preferable. We find that in the majority of cases, AC seems to be more effective for a lot of different reasons. We also tend to use tRNS much like the Dehabituator as random noise has shown to positively effective phase and coherence. As this device is used more and more, we will, in all probability, continue to see the very powerful effects it has on people. Note: It is important to attend a NeuroField workshop to learn more about choosing tACS vs tDCS vs tRNS for a particular case.

As of this writing, what we understand the difference between using Anodal vs Cathodal to be is:

- Anode stimulates the area.
- Cathode inhibits the area.

We are still working to understand exactly what this means because in our preliminary studies where we have examined these new modes, we have seen significant connectivity changes with Alternating Current stimulation. With Alternating Current you are giving a stimulatory and an inhibitory effect from each location. This appears to change Connectivity and Phase quite dramatically, as does giving Random Noise stimulation.

**Placements**

We have been trying different kinds of placements with the unit. The placements we have mostly been using are associated with the Mastoid. For example, we would choose in some cases:

- Mastoid to Mastoid, going straight across hemispheres between those two placements.

In other cases we would use:

- Left Mastoid to Fp1 which would direct the current to the left hemisphere.
- Left Mastoid to Fp2 which would cross the current over to the right hemisphere
- Fp1 to Fp2, F3 to F4, F7 to F8

All of these are available skin areas that you can typically put the foam electrodes on.

**High Definition tDCS/tACS & Research**

One of the things that is coming out in the research now is HD tDCS/tACS, referring to when an electrode is placed directly on a specific 10/20 location. One of the studies located in the NeuroField Documentation folder, installed on your desktop with the most recent software, talks about “Fluid Intelligence” and how to increase Fluid Intelligence. What the researchers did was place the anode at P3 (Parietal 3), and the Cathode on Fp2. The results of the study suggest that Fluid Intelligence improves with this specific electrode location. So you can use electrodes and go directly over 10/20 locations as well to improve functionality.

One of the things we have been working on with the Autistic kids who come into the NeuroField office is:

- Left Mastoid to Fp1
- F3 to T5 in order to hit both Wernicke and Broca areas.

You can start targeting regions and start tying them together essentially using the DC, AC, or RNS.
Also, in the NeuroField Documentation folder that’s installed on your desktop with the newest version of the software, there is a document called “tDCS.pdf”. It is highly recommended that you read through it. There is a lot of great information on stimulation technology, the evolution of stimulatory technologies, and specific chapters on DC and AC. It will give you a lot of good information to help you understand this new piece of the NeuroField System.

Anxiety and Depression
Two of the major areas we have seen almost an immediate application, and the research shows this as well, is with Depression and Anxiety patients.

DC Stimulation
People with Depression respond very nicely to DC stimulation where you place the:
- Anode = F3
- Cathode = Fp2.

The same can also be said for Anxiety. It has shown to be greatly changed by the use of DC stimulation as well, placing the:
- Anode = F3
- Cathode = F4

AC Stimulation
Or, for Anxiety, you could also do Alternating Current at F3/F4 and get a significant response as well. We have seen that Anxiety patients have been greatly changed by the use of AC Stimulation, giving Sine Wave at the 1-4 or 4-8 Hz range, and placing the:
- Anode = F3
- Cathode = F4

Because of what has been seen in some of the literature and in some of the patients here at NeuroField, Inc., where changes in Coherence and Phase are quite dramatic, we are expecting in the future to see some good results with Autism, Asperger, Alzheimer, TBI and Learning Disorders.

A Few Words of Caution
- **Seizure and Epilepsy**: Don’t use this unit with a seizure disorder patient or anyone with epilepsy. At this point is may be too powerful for a sensitive seizure patient and may have the possibility of causing a seizure. We may change this approach in the future, but for now it is strongly suggested to NOT use this unit with people who have seizure or epilepsy.
- **Pacemakers**: The tDCS/tACS/tRNS has a 2.5 milliamp maximum output. It may not have a negative effect on a person with a pacemaker, but this is not a theory that has been have tested at this time. So it is recommend that you do not use the unit with a patient who has a pacemaker.
- **TBI or Stroke**: For someone with a TBI or a Stroke it is suggested that you give them a minimum of 4 weeks of post stroke recovery before trying either tDCS, tACS, or pEMF stimulation. It is always a rule of thumb to give the brain time to go through its healing process. If that process is interrupted, the brain could get stressed or be pushed in a way that may make it more difficult for a person to
recover. So give the brain time to heal. After four weeks it is appropriate to start treatment. Gently and slowly. Starting any type of NeuroField too early is premature, as the tissue needs time to heal.

- **Voltage Selection:** When beginning treatment with this unit, always begin at a very low voltage. The database starts at .5 milliamps but for some people, even that is too strong. You may need to override the output and make it 0.1 milliamps. The unit has the capability of going down to .01 milliamps and as high as 2.5 milliamps. It is a good idea to start at .1 mA, see how they tolerate the “prickly” feeling, and then work your way up to .5.

When you pick a protocol, if you want to test the waters, you can find a level that works with a person and then increase it to where you are getting a clinical effect, but it is not too intense. Intensity can be felt via a visual “Shutter” effect. Some people may see what looks like a blinking light or a strobe light. It may mean that you are using a stimulation between 10 and 20 cycles per seconds which can have a strobe effect and be uncomfortable for a person. If they have that response, it is important to lower down the voltage so that it is tolerable for them. For other people they may feel a “pins and needles” type of feeling or a slight discomfort right under the electrode. Again this may mean they are sensitive and you should lower the stimulation. Sine wave is the easiest for people to tolerate while square is the most jarring. It is suggested that you start with sine wave.

For children, it is mandatory to start at .1 milliamps or even lower than that if you want. You could start at .01 milliamps to where they say they don’t even feel anything. That also will have a clinical response but it won’t be overwhelming for a little one. So, always start with low voltage.
II. What’s New in NeuroField

The tACS/TDCS Database
All versions of the software from v9.5.2 include a tDCS/tACS database. In addition to new protocols built specifically for the tDCS/tACS unit, you will also find CFC Protocols as well as some standard 1 – 4 Hz, 1 – 8 Hz, 12-15 Hz, 15-19 Hz Protocols have also been included. There are over 30 Protocols that have been compiled into this database, and it will no doubt grow as different combinations of stimulations are tested out.

This means that with this new database you can use the tDCS/tACS as a standalone unit or in combination with other NeuroField devices. However, if you have an X3000 linked to the system, the software will see that it is connected, which will allow you to give pEMF stimulations while simultaneously giving tACS stimulation. This is very powerful when you pair these different stimulations together.

Manual Control

Using tDCS/tACS
The Manual Control sets up the tDCS/tACS session.

This allows you to simply select a patient and input a single frequency to be given. Here you can run it in three different modes:
- Continuous Alternating Current
- Pulsed Alternating Current
- DC Mode to go either Positive or Negative Polarity

It’s from this Manual Control screen that you Start and Stop a tDCS/tACS stimulation. For more detailed information see Chapter VI “Manual Control” later in this Section.

Using tRNS
As of NeuroField Software v10.0, the Manual Control now also includes setup options to run tRNS.
Here you can run tRNS in three different modes which will simply determine the amount of power (or level of intensity) that will be generated. The three modes are tRNS:

- **High** (Meaning High Power)
- **Medium** (Meaning Medium Power)
- **Low** (Meaning Low Power)

It’s from this Manual Control screen that you “Start” and “Stop” a tRNS session using the “Start / Stop tDCS/ACS” controls. When you select the a tRNS mode, the number “4096” will automatically be entered into the frequency box. You can change this number. **Again**, it is important to experiment with the power (levels of intensity) because “less is more” with some people.

**Note:** You can enable tRNS in the Protocol Selection window as well as here in the Manual Control.

**Waveforms**

Within each mode of Continuous and Pulsed tACS, you can choose between Sine, Square, or Triangle waveforms. It is important to realize that the most aggressive treatment you can give is a Square wave in tACS mode. The waveforms can be rank ordered, in terms of intensity, as follows:

- **Square wave** – The highest output / strongest stimulation
- **Triangle wave** - The next highest output
- **Sine Wave** – The least amount of output. It is a nice smooth stimulation, and is one of the waveforms that is most often used because people can tolerate it well. It can move a person very quickly and easily with very little discomfort.

It is suggested to use Sine Wave, however, with other people that are really depressed you may need the power of a square wave in order to move the brain out of a depressive state.

**tRNS (Random Noise)**

Because tRNS gives you the option to choose between High, Medium, and Low power, you can control the power of the treatment. The strongest treatment you can give is “High” power at 2.5 mA and 4096 Hz. The random noise max settings are as follows:
- **Power** = tRNS High
- **Frequency** = 4096 Hz max
- **Intensity** = 2.5 mA max

For example, with a setting of 2.5 mA and 4096 max Frequency, the Intensity is set at 2.5 mA and the Frequency is set fixed at its top level of 4096. This means that the unit will generate random noise frequencies from 1-4096 Hz at equal intensity across the spectrum. The frequency number can be changed from 0 to 4096 Hz. Doing so will tell NeuroField to generate tRNS starting at 0 Hz to whatever value that you choose between 1 to 4096 Hz.

**tDCS/tACS & Dehabituator**

We have added the ability to run the tDCS/tACS with the Dehabituator. You can set a range as you normally would with a Dehab treatment and run it, however, when the Dehabituator is hooked up to the tACS system the rules are as follows:
- **Frequency** = 1 Hz to 1000 Hz. You can choose between those ranges.
- **Voltage** = .01 to 2.5 milliamps as the amount of stimulation or intensity in voltage.
- **Duration** = 100 milliseconds all the way up to 60 seconds if you want.

It is suggested that you use short pulses. Anything over 10 seconds is really too long. The brain habituates to it and it doesn’t have as good of a clinical effect. It is recommended to use anywhere from 100 milliseconds to 5 seconds which is usually long enough for the Dehabituator.

**tDCS/tACS & RTZ (Real Time Z-Score)**

We added the ability to use this new unit with the RTZ procedure. So now if you want you can run EEG synchronized with the tDCS/tACS and the Q20 where:
- A stimulation is given
- EEG is read for 4 seconds
- Z-Scores are generated
- If the brain is generating Zscores that fall within the threshold that you set, then a reward tone is generated.

Like the previous pEMF stimulation procedure, we are now using that with the tDCS/tACS system. It is all synchronized in the very same way. The cases that should respond really nicely to this are people with Depression and Anxiety. Or, people with really severe Hyper/Hypo Coherence or really severe Phase Lag issues.
III. tDCS/tACS/tRNS Benefits

**Pulsed Mode**
One of the things we are noticing is there seems to be a significant clinical effect using the Pulsed tACS and the Continuous tACS. Pulsed mode gives a little break between stimulations which gives the brain a break or a little bit of time to recover. When you run it in manual mode, you will see how this works where a pulse is given, and then it shuts off, and then another pulse is given, it shuts off etc. There is time in between each of the pulses. The RTZ procedure naturally has that break built into it, so if you give 4 or 5 seconds of stimulation and it shuts off for 4 or 5 seconds to read the EEG and generate the Zscores, this gives the brain time to respond and recover from the stimulation. There is a really powerful clinical effect associated with that.

**Generating a Learning Paradigm**
The RTZ procedure is also creating a learning regiment for the brain to adhere to. The pEMF stimulations and all the tDCS/tACS stimulation technologies are wonderful, and by themselves they will have a certain amount of clinical utility. For some people, it does the trick and they are good to go. But, for other people you need to generate a learning paradigm that allows the brain to learn how to establish these new pathways and to remember how to maintain the configuration that we are creating with the stimulation technology. That is why the RTZ procedure is really effective, because it is a learning operant conditioning paradigm.

With people who have a poor pre-morbid history, this procedure is particularly good. So, if you have somebody, for instance a child with Autism or Asperger where they have never really had a good period of functioning, their pre-morbid history is poor. This means that the brain doesn’t know how to reorganize itself after it has been dis-entrained. It has to be shown how to entrain. The RTZ procedure can not only do just that, but it can also generate the learning necessary to deepen the effects and get longer term results.

**Running Neuroguide**
Another option is to run Neuroguide while having the electrodes either on the Frontals and the Mastoids or through the Mastoids directly. You can set really slow frequency stimulations at 0.1 or 0.1 cycles per seconds that don’t get picked up by the EEG because they are below the high pass filter which will cut off at .5 cycles per second. This means that the EEG won’t be corrupted and you can generate real Zscores and real EEG in real time and get some significant changes. But, what you are doing essentially is using polarity shifts at real slow frequencies to off-set the brain or dis-entrain it. This changes phase dynamics and enhances the training effectiveness.

**tRNS and Tinnitus**
Tinnitus is the perception of a sound in the absence of an external sound stimulus. This phantom sound has been related to plastic changes and hyperactivity in the auditory cortex. Tinnitus affects 5–15% of the western population and between 6 and 25% of the affected people report symptoms that are severely debilitating. Neuroimaging and electrophysiological studies indicate that excessive spontaneous activity in
the central auditory nervous system and changes in the tonotopic map of the auditory cortex are associated with the presence of tinnitus.

Traditionally neuromodulating techniques such as transcranial magnetic stimulation (TMS) and transcranial direct current stimulation (tDCS) have been used to try to reduce tinnitus symptoms. Most recently, however, pulsed electrical stimulation using weak currents such as transcranial alternating current stimulation (tACS) and transcranial random noise stimulation (tRNS) have also shown significant neuromodulatory effects. In a recent study comparing tDCS, tACS, and tRNS in 11 tinnitus patients, the results showed that tRNS induced the largest suppressive effect on tinnitus loudness and the tinnitus related distress.

For further details, read “Tinnitus tRNS.pdf” located in your “NeuroField Documentation” folder placed on your desktop during installation. This case study supports the superior effects of tRNS as a method for tinnitus suppression, especially when set at 1 – 100 Hz and 100 – 640 Hz.
IV. Case Studies

**Case #1 – 22 Yr. Old Female**

Pre and Post maps for the most part show significant changes in Coherence and Phase lag as seen in the illustration below. On the left is the Pre-Map and on the right is the Post-Map.

The focus of this treatment was to change Connectivity. Over the course of 1 hour the following was given:
- Alternating Current on the Mastoids at 10 Hz
- 2 – 2.5 milliamps
- 6 minutes was given at a time then it would be turned off so the brain could rest
- Turned back on again for another 6 minutes

**Connectivity**

The feedback from this patient was that she no longer experiences anxiety, it has largely abated, and the hopelessness and depression reduced. If you look at the Connectivity change, you can see these massive Hyper-Coherences in Theta, Beta, and High Beta have pretty much resolved.

**Phase Lag**

Below the Connectivity in Phase Lag there are significant Phase changes as well. What is really important to note is that Phase underlies the entire function of the EEG. If you can change Phase you change everything above it essentially. What you can see in this example is that there are big Phase changes, and we start to see the Phase Lag in Alpha really begin to present itself, particularly in the Frontal lobe where the Alpha has increased. This person did receive 10 Hz, so what we’d expect to see over a period of 72 hours would be a regulation of that Alpha in a subsequent EEG.

**High Beta**

You can see in the Pre-Map that High Beta is locked in a high mode and it is at least two standard deviations above the norm, probably higher because this is the Summary page and things get averaged out. Also, the Zscores are set from 4 to -4, so the yellow really does represent 2 standard deviations at the Anterior and Posterior Cingulate and at P3. In the Post-Map we see that this has pretty much resolved which is really quite significant. It broke loose and it regulated itself. 10 Hz was given and it was given through the Mastoid...
so T3, C3, Cz this area has increased in Alpha which again, this would be a temporary effect and we should expect to see the brain regulate itself.

**Case #2 – 52 Yr. Old Male**

He reported brain fog and had hit the right side of his head in his early twenties. His treatment consisted of:

- 1 session using Alternating Current
- 15 – 19/40-80 CFC CHIRP protocol which means at 40 – 80 Hz Gamma is only on for just approximately 100 milliseconds.
- Session length was 20 minutes

Again, the Pre-Map is on the left and the Post-Map is on the right, taken within the same hour. He said that he felt really good afterwards, more awake, alert, more energized. You can see at 7 Hz on the Left map, you can see that at T4 it is 4 standard deviations above the norm where he sustained the injury. And, if you take a look at the Post-Map it is completely gone.

This is a protocol where the coils and the tACS were both used to regulate the excessive Theta. The unit can work this quickly. When you pair it with pEMF you get an exponentially stronger effect. However, it can be used as standalone as well.
V. Software Basics – v10.0

Selecting the tDCS/tACS Database and Running the Software

To Select the Database and Get Stim Launch Pad:
The first thing you will see in the latest version of the software is the addition of the tDCS Database.

1. Select the tDCS database.

1000 CPS Max
If you have a tDCS unit connected to the computer and powered up, you will have to run the tDCS database.

If you try to load another database, the software will recognize that you are attempting to do so and will not allow you to. NeuroField will through up the above Alert and automatically select the tDCS.mdb database. This is done specifically because stimulations given above 1000 cycles per second are not suggested due to the fact that it is going to generate a great deal of heat. The faster the spin, the more heat is generated which could lead to tissue damage. In other NeuroField protocols the pEMF stimulation can be given above 1000 Hz, and at this point in time it is not advisable to allow those protocols to run. This is a way to protect the patient from getting overexposed to stimulation. So anything longer than 1000 CPS is not provided.

Infra Slow Frequencies
On the slow end you can go down to really infra slow frequencies and actually generate them. This can take you down to .001 CPS which is a very long stimulation that can be given with this system.

2. Click on the “Continue” button and then Click on the “Click to Continue” button.
Devices Found

Once the tDCS database has been selected, as you can see in the screenshot above, the tDCS Stim unit has been discovered as the Primary Stim Unit along with any other devices that are hooked up i.e. the Q20 was also found. If there was an X3000 connected to this chain and powered on, it would be discovered as a Stim Unit as well.

3. Select which CANBus you want to use, answer “Yes” to backup your database, and the Stim Launch Pad appears.

Stim Launch Pad

When a tDCS/tACS unit is connected to the system and it is powered up, you will see a button on the Stim Launch Pad that says “tDCS Manual Control”. This is also the control for the tACS as well.
4. Select a Patient. **Note:** As of v9.5.2 a significant amount of improvements have been added to the Patient Database i.e. ability to write Notes etc. For more information see “Section 1” earlier in this manual and go to “Chapter III Software Basics – Using the Main Program Sidebar – View History Button”.

5. Click on the “Manual Control” button, and if you missed Step 4 and haven’t selected a patient yet, a prompt will appear telling you to do so. The tDCS Manual Control Screen will appear.
VI. Manual Control

Using Manual Control - tACS

To Select Sites and Prep Patient
1. Prepare your Patient before you setup and run tACS. You must:
   a. Select your sites. For example, if you want to work on Executive Function and you want to
give stimulation between F3 and F4, you could do that.
   b. Clean the skin at those Sites and attached the electrodes to the skin
      ▪ Snap the foam pads onto the electrodes.
      ▪ Remove the backing to the foam pad which will reveal a sticky gel.
      ▪ Stick the electrode right onto the skin Note: It is important to ensure that the
        system is off before attaching any electrodes to the patient.
        If you do not have it connected right, you won’t see the appropriate waveform get created
        on the measurement graph. So, cleaning and good connections are very important. Now
        you are ready to setup your system.

To Choose the Waveform
2. Click on the “tDCS Control and Monitor” drop down. You will see available to you:
   • 3 tACS Pulsed waveforms
   • 1 tDCS Continuous DC waveform
   • 3 tACS Continuous waveforms
   Select tACS Continuous Sine. This will give a Continuous Alternating Current Stim and it will be a
Sine wave. Next you will pick your Frequency and desired Output.

To Enter Frequency Register Info
3. As in this example, we want to improve Executive Function, so in the “Frequency Register” area of
the Manual Control, select 15 cycles per second as the “Frequency Hz”. This will increase the low
Beta.
4. For the Output, you could set it to .5 mA, but in an ideal situation you would want to set it at .1 and work your way up.

5. Once you have made these changes to the voltage, you have to click on the “Update Frequency/Amplitude” button. If you take a look at the “Calculated Output (mA)” box, you will see that it says 2.5. Right now it doesn’t know the changes you have made, so you will need to click this button to re-calculate it to what you have setup. Your “Frequency Register” selections should look like the screenshot below:

6. You are now setup and ready to go, so click on the “Start tDCS/tACS” button.

Run a Session - tACS

When the system is on you will see the Green LED in the software turn on telling you that tDCS/ACS is on and running. The unit will automatically start to generate the waveform, and the Scan or Measurement window will open up, showing whatever voltage you have chosen. In this case it is a voltage of 0.1 as shown by the waveform in the screenshot below.

About the WaveForm

On the Vertical Axis in the “Current Scan” window, you can see numbers from Negative 4 to Positive 4. This is a milliamp (mA) voltage scaling. If it is:

- 0 to 4 = Positive mA
- 0 to -4 = Negative mA
This is Alternating Current, so the waveform alternates between positive and negative polarity. In this example, it is oscillating at 15 cycles per second. The unit is measuring the amount of voltage that actually makes it through the head, so what you are seeing in the “Current Scan” window is an actual measurement, it is not a simulation. With this type of scan method you actually know what is going into the patient. You can see it and you can verify it. When starting a session verify the stimulation by checking this screen.

If you Stop it and increase the voltage from 0.1 to say 1 mA and then start it again, you will see the waveform change as shown in the screenshot directly above. On the scaling it is 1 to -1 and this is what you should see if a person is hooked up correctly.

If the unit wasn’t plugged in or connected correctly, you wouldn’t see this waveform. You would see a straight line as shown in the screenshot below.

If it looks like the voltage is lower than 1 to -1, it means that either the area wasn’t cleaned well enough, the electrode wasn’t attached correctly, or the unit isn’t plugged in. So for instance, if you unplug the unit, the circuit gets broken and the waveform will look more like a flat line.

**Session Length**
The current session times should range between ten and thirty minutes maximum. It isn’t advisable to go any longer than that, unless you are using Pulsed stimulation where you give pulses for five minutes and stop it and let the person rest for 2 or 3 minutes, talk to them for a little bit and then give them another set of pulses. As long as there is some downtime in between, you can give a series of pulses that are very beneficial. Do not, however, do it continuously for more than 30 minutes.

**Session Clock**

<table>
<thead>
<tr>
<th>Treatment Status</th>
<th>Start: 3:55:38</th>
<th>Stop:</th>
<th>Total: 1 min. 43 sec.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loop</td>
<td>of 100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As it is running you will see the Session Clock on the Stim Launch Pad is clicking away. It is counting the time for you. This allows you to look in and see how long a session has actually been running.

The “Scan Count” on the Manual Control is telling you how many times it has run the scan through the Measurement page.

**To Stop the Session**

1. When you are all done, Click on the “Stop tDCS/ACS” button to stop the session. It will then shut off the system, the scan screen will disappear, and the green LED light turns off. **Note:** It is important to shut the system off before removing anything from the patient.

**Using Manual Control – tDCS**

**To Setup for tDCS:**

To set the system in Direct Current mode, go to the “Manual Control” window and:

1. Select the “tDCS Continuous DC” option from the “Control and Monitor” drop down.
2. Set the “Output” to 1 mA
3. Click on “Update Frequency”
4. Click on the “Start tDCS/ACS” button and the scan will appear.

Unlike Alternating Current, Direct Current isn’t a waveform. It is simply current running at a specific mA output. As you can see in the screenshot below, it is roughly 1mA and it is positive. So, it would go in through the Anode and out through the Cathode.

5. Click on the “Stop” button

If you want to invert this, you could change the Output from 1 mA to -1 mA, click update Frequency, and then Click “Start”. It will now run at a negative frequency as you see in the screenshot below.
Using Manual Control — tRNS

To Setup for tRNS:
To set the system to run “Random Noise”, go to the “Manual Control” window and set your parameters. For example, if you want the max settings:

1. Select the “tRNS - High” option from the “Control and Monitor” drop down. “4096” will automatically populate the frequency box.
2. Set the “Output” to 2.5 mA
3. Click on “Update Frequency”
4. Click on the “Start tDCS/ACS” button and run your session.
5. Click on the “Stop” button to end the session.

Using Manual Control — tACS Infra-Low

To Setup for Infra-Low Training:
Another thing that you can do is set the system up for Infra-Low training. To do this:

1. Select “tACS Continuous Sine”
2. Set the Frequency = 0.1 Hz
3. Set the Voltage = 1mA
4. Click on the “Update Frequency” button
5. Click on the “Start” button

Now what it will do is create a waveform at .1 cycles per second. Once you start the stimulation, it will begin to oscillate from 1mA to -1mA at a very slow rate as seen in the screenshot below.
That polarity shift is what is typically trained in Infra-low training, except here the actual waveform can be generated during the training. When you train using this you are essentially bumping the brain out of a stuck state which will change the Phase and Coherence in the EEG.

**NeuroField / Neuroguide Combo**

While you are giving an Infra-Low frequency, you could also have the Q20 running on another CANBus, and while you are giving a Stim run Neuroguide along with it. Remember at 0.1 the EEG will not get affected by the stimulation, so this is a very powerful combination.

6. Click on the “Stop” button.

**Using Manual Control – Pulse Mode**

**To Use 2 Pulses at 15 Hz**

You can also do Pulse modes and vary the number of pulses. To do this:

1. Select “tACS Pulsed Sine”
2. Set the Frequency to 15 Hz
3. Set the Output to 1mA
4. Click on the ‘Update Frequency” Button
5. Notice the “Pulse Mode Setup” area on the “Manual Control” screen.

Leave the “Pulse Interval” set at 2000 msec and the “Num Cycles” or Pulses at 2 for each interval.

6. Click on the “Start” button and notice the waveform.
What you see here is the system is only going to give that pulse every 2 seconds and it gives just a very brief pulse. It is giving two cycles, so you can see two 15 Hz cycles appear with a 2 second interval between them. This Pulsing has a powerful effect on the brain in terms of moving it out of a stuck state. There is a natural pause that is built in between it.

7. Click the “Stop” button.

To Use 10 Pulses at 15 Hz

You can also set it to do 10 Pulses. To do this:

1. Select “tACS Pulsed Sine”
2. Set the Frequency to 15 Hz
3. Set the Output to 1mA
4. Click on the ‘Update Frequency” Button
5. Notice the “Pulse Mode Setup” area on the “Manual Control” screen.

6. Change the “Num Cycles” to 10 to give 10 pulses and leave the “Pulse Interval” set at 2000 msec or 2 seconds of an interval in between pulses. 
7. Click on the “Start” button and notice the waveform.

What you see here is the system is pulsing for longer periods of time with a 2 second interval in between them. This can have a very powerful effect on changing the brain.

8. Click on the “Stop” button.
To Use 10 Pulses at 40 Hz (Gamma Chirp)
You can also set it to do 10 Pulses at say 40 Hz and see the Gamma Chirps. To do this:
1. Select “tACS Pulsed Sine”
2. Set the Frequency to 40 Hz
3. Set the Output to 1mA
4. Click on the “Update Frequency” Button
5. Set the “Num Cycles” to 10 to give 10 pulses in between and set the “Pulse Interval” at 2000 msec or 2 seconds.
6. Click on the “Start” button and notice the waveform.

Here you see little Gamma bursts being given. Again, you can bring down the amount of cycles from 10 to however many cycles you want to give, more or less. For this example we are just giving 10. With Gamma Cross Frequency Coupling research, it is exciting when you can burst or “Chirp” Gamma and see the waveform.
7. Click on the “Stop” button.
Reviewing the Protocol List

When you click on the “Select Protocol” button from the Stim Launch Pad, the “Protocol Selection” screen will appear. From the “Select Protocol” dropdown menu, you can see all of the Protocols contained in the tDCS/ACS Database. It is quite comprehensive. You can select either:

- CFC Protocols brought in from the CFC Database (As seen in Screenshot #1 above)
- CHIRP Protocols brought in from the CFC Database (As seen in Screenshot #2 above)
- Standard and Rocking Protocols brought in from the NeuroField Database (As seen in Screenshot #3 above)

You are also going to find some new Protocols as shown in the screenshot above. These Protocols were recently developed, for example the Protocol, “tDCS/ACS, CFC 0.1-1/40-43”. With this Protocol you can take a really slow wave such as 0.1 tACS stimulation and pair it with 1 Hz and also pair it with Gamma at 40-43 Hz. This is another way of creating a harmonic coupling between Network Hubs.

Selecting and Setting up a Protocol - tDCS/ACS 5/40-80

To Setup the Protocol:

As an example,

As you can see in the screenshot above, the Protocol will run for 27 seconds and the number of loops is 1.

2. Select the Sinusoidal (Sine) Waveform. **Note:** The software defaults to a Square Wave. Again, Square Wave is the most intensive Waveform, particularly with tDCS/tACS. So, the tendency is to use Sine Wave more often than not.

3. Pick your placements. The “Primary Stim Generator” area is where you want to enter your tACS Stim electrode placements, so for this example, select “Mastoid” for both Ch1 and Ch2. Leave Ch3 and Ch4 as “None”.

If you have an X2000 or an X3000 connected to the system, a “Secondary Stim Generator” will appear on the “Protocol Selection” screen. There you can select sites where you want to put the coils. **Note:** You will see in the “Primary Stim Generator” dropdown list of placements that now includes the Mastoid as an option, as well as Oz, Fpz, and Fp1 and Fp2 for electrode placements.

**tDCS Amplitude Override:**

4. Notice the “tDCS Amplitude Override” area on the “Protocol Selection” screen. If there is tDCS unit hooked this will appear as seen in the screenshot above. It will contain:
   - **Enable** check box which is associated with the amount of mAmp output. If this box is checked, it will activate the tDCS Amplitude Override.
   - **Out (mAmps)** box which allows you to change the Output mAmps to whatever you want from .01 to 2.5 mA and override the canned protocol (if Enable is checked).
   - **Enable DC Mode** check box which allows you to override the Alternating Current Waveform.
and simply give a DC stimulation at whatever mAmp output you desire.

5. Click on the “Select and Close” button.

**Viewing a tDCS/tACS Protocol**

**Simulation Cycles - tDCS/tACS CFC 5/40-80 Protocol**

As seen in the screenshot above please note:

- Primary Signal Generator = Data for the tDCS/tACS unit
- Secondary Signal Generator = Data for a pEMF unit (X3000) if hooked up

**Important!!!!** In the “List of Stimulation Cycles for Primary Signal Generator” area of this screen, the tDCS/tACS only looks at Channel 1. Channels 2, 3, and 4 are not used for the tDCS/tACS unit. So whatever numbers are listed in the Primary Stim Generator, only the frequencies you see in Channel 1 are used. Channel 1 in the screenshot above, shows 5 Hz all the way down, so all that is going to be given for this protocol is a Stim of 5 Hz. This is representative of the protocol selected for this Example, CFC 5/40-80.

If a pEMF unit was hooked up, you could look at the Secondary Stim Generator and see that 5 and 40 are given. And it keeps 5 Hz constant, but it is switching the gamma frequencies to harmonically pair them.

**Primary Stim Cycle Generator**

Using the same example Protocol, if you look at the first Stim Cycle in Channel 1 in the “Primary Stim Cycle Channel Setup”, you will see:

- Frequency = 5 Hz
- Duration = 3000 msec
- Amplitude = 0.5 mAmps

This is what is given using this protocol for tDCS/tACS. It will continue to do this unless you change it or select an Override, as explained above. All of these canned Protocols are changeable. You can go in and change any setting.
Using the Protocol Wizard

You can also change or create a new protocol using the Protocol Wizard.

This tool has been expanded so that you can now step through the frequency, duration, and voltage level. If you want to create protocols you can do so any way you like and override what has been created for you in the NeuroField software canned Protocols. The only caveat is you must follow the three simple rules as discussed earlier in this document:

- Low end for frequency = .001
- High end for frequency = 1,000 Hz
- Voltage for the mAmps = .01 to 2.5 mA

All these rules are important to take into consideration when creating protocols.

Note: When you are creating a Protocol for just the tDCS/tACS unit you are really only concerned with Channel 1, but you do want to have values in Channels 2, 3, and 4 because if there is any 0’s in the table, the program will give you an error. Right now you simply need to plug in any numbers in Channels 2, 3, 4 and they will be ignored and not used in any other way.

So as seen in the Protocol Wizard screenshot above, the Primary Generator = 5 Hz and the Secondary Generator is 5 Hz and Gamma from 40-80.
VIII. tDCS/tACS with the NeuroField System

Using tDCS/tACS with pEMF (CFC)

To Start the Treatment:

1. Select your Patient and Click on the “Start Standard Treatment” button.

The Unit will automatically give each one of the stims and keep on cycling through each stim cycle. You will see the predicted frequency with the voltage displayed in the Stim Launch Pad. Remember, Channels 2, 3, and 4 are not in here. It will cycle through until it is done and everything shuts off.
To View History

If you view the Patient History you can see what was actually given.

1. Click on the “Stimulation” tab and you can see the following:
   - Waveform = Continuous Sine Wave
   - Primary Stim Coil Placement = Mastoid for Channel 1 and Channel 2
   - Protocol = tDCS/ACS CFC 5/40-80

2. Click on the “Treatment Summary” tab and you can write notes and associate them with each one of the protocols.

Using tDCS/tACS with an X3000

When an X3000 is hooked up you will notice, as seen in the screenshot above, that the NeuroField software sees both a tDCS/tACS unit and an X3000 unit.

To Make Treatment Selections

1. Select the same Protocol used in the examples above, tDCS/ACS CFC 5/40-80.
You can now see now that there are Coil Placements for both a Primary and a Secondary unit.

2. Select “Sine”
3. Leave Coil Placements as is
4. Uncheck “Enable” in the Override area if it is checked.
5. Click on the “Select and Close” button.

**To Run the Protocol:**

1. Select a Patient
2. Click on the “Select Standard Treatment” button and run the Protocol.

The stimulation is now being given. **Note:** the Primary Stim Generator will always be the tDCS/tACS unit. No matter which Device is found as the Primary unit when you launch the system, the NeuroField software will always read in and display the tDCS/tACS unit as the Primary Unit on the Stim Launch Pad. The X3000 that is running simultaneously with it, it will then always be the Secondary unit. You can see here that as a Stim is given the software will all work the same way that it has in the past.

**Using tDCS/tACS with RTZ**

These instructions assume an Advance knowledge of running the NeuroField software. For detailed instructions, please refer to the “The NeuroField System User Manual”.

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To Setup for RTZ, Select Pairs and Protocols:

1. With a Q20 hooked up, click on the options to setup the RTZ procedure from the Stim Launch Pad.
2. Using your QEEG brain map, Setup your Threshold Pairs.
3. Select your Protocol. For this example, we will use the same protocol, tDCS/ACS CFC 5/40-80 and Start the procedure.

To Review the Onscreen Data

Note: There is nothing hooked up, thus the noise in the EEG portion of the screenshot above. It will run through the same procedure as it always does:

- Starts with the initial scan and save/display the Zscore data.
- Gives a tACS pulse along with a pEMF pulse.
- When it is over it will immediately scan the EEG.
- Generates the Zscores.
- If the Threshold values are met then a Reward tone is played.
- If the Threshold values are not met, it modulates to another frequency.

Running RTZ with tDCS/tACS adds a whole other layer to Operant Conditioning by tying in Direct Current stimulation, Alternating Current Stimulation, and pEMF stimulation!

When this is done, the Data gets saved and you can run it through NeuroPlot where there are a lot of different ways you can review the session.

**Using tDCS/tACS with the Dehabituator**

The Dehabituator is also available for use with the tDCS/tACS unit. You can run pEMF as well if you have a Secondary unit hooked up. Remember, you have to follow the rules described earlier in this document in terms of voltages.

To Setup for Dehab:
1. Set # of Cycles = 100
2. Set Frequency = 1-8 Hz
3. Duration = 1000 to 5000 msec
4. Voltage = .5 to 2.5
5. Be sure the RTZ options are disabled.
6. Click on the “Start Dehabituator” button

The screenshot above shows the Dehabituator running. Be cautious! If you set a range at 2.5 mA, it may start choosing random frequencies between .5 and 2.5, so some of these might be pretty strong and jarring to a person. It is suggested to set the ranges a bit lower so you don’t over stimulate the person.

To be safe, you could set the Amplitude to 0.5 to 1 mA as seen above, and then start it again. It will start choosing different random waveforms for different amounts of time and sizes. Again, this is the actual stimulation that is being given and measured, it is not a simulation.
IX. NeuroField tACS 0.1Hz & 14Hz / Neuroguide Combo

In order to run a NeuroField tACS Combo session with Neuroguide, you must have two CANBus connected to your computer, one from the Q20 for use with Neuroguide and one from the tDCS/tACS unit for use with NeuroField. For detailed instructions on how to connect the hardware, see “Section 1 Chapter II Hardware Setup – Q20 and X3000” and go to “NeuroField/Neuroguide Combo Setup” at the beginning of this document. The NeuroField tACS / Neuroguide Combo setup is the exactly the same as using the NeuroField X3000 / Neuroguide Combo, you will just be setting up the tDCS/tACS unit instead of the X3000.

Important Overview!!!!! In this Combo you will set NeuroField tACS to run at 0.1Hz. Neuroguide’s low threshold only detects down to 0.5Hz. As a result, you will be able to run the tACS session at the same time as Neuroguide without affecting the operant conditioning. Next you will set NeuroField tACS to run at 14Hz. The 14Hz is given without Neuroguide running since 14Hz would affect the operant conditioning. This strategy is based off of the research on “Calcium Theory” and if it is accurate, what this is doing is firing up the Glial layer. For further information see “ncomms10340.pdf” found in your NeuroField Documentation folder that was placed on the desktop during the Software Installation process. Note: The NeuroField Q20 amp is designed to handle this amount of electrical input. It is not known how other amps will handle it, so if you are running this technique with another amplifier, be aware of this and do so “at your own risk.”

Important!!! The Startup must be done in this order:

- Step 1 – Activate Neuroguide and the Q20: Startup the Neuroguide software program so it is connected to the CANBus/Q20 and the active EEG is displayed. At this point Neuroguide has control of the Q20.
- Step 2 – Activate tDCS: Startup the NeuroField software program and it will connect to the 2nd CANBus. NeuroField will now have control of the tDCS unit

Once you have completed Step 1 and 2 above, you are ready to run the Neuroguide/NeuroField tACS Combo technique. The process is summarized as follows: (Step by Step instructions are listed later in this section.)

- Manually Start Round 1 of Neuroguide
- Run NeuroField tDCS/tACS simultaneously with Neuroguide
- Monitor the NeuroField session Live during the Neuroguide Session
- Post Round 1, change the NeuroField tDCS/tACS frequency to 14Hz and run for 2 minutes
- Change the Frequency back to 0.1Hz and Run NeuroField
- Manually Start Round 2 of Neuroguide with NeuroField running in the background
- Repeat 14Hz for 2 minutes then Change Frequency back to 0.1Hz and lower the voltage to 2.5 mA. This prevents habituation and gives the brain a chance to learn on its own
- Manually Start Round 3 of Neuroguide with NeuroField running in the background
- Repeat as long as needed

It is recommended that you attend a NeuroField workshop in order to run this advanced technique. The instructions below assume a good working knowledge of the NeuroField system.
Using tACS 0.1Hz with Neuroguide

To Startup Neuroguide
With CANBus #1 connected between the Q20 and your computer, do the following:
1. Cap your client as you would normally.
2. Click on “Collection/Hardware Selection” and be sure that the Q20 is selected.
3. Click on “Setup and Monitor” and this will tell Neuroguide to “Find my Q20”. When it finds the Q20 the “Q20 Collection Parameters” screen will appear. This means that Neuroguide took control of one of the CANBus and is controlling the Q20 exclusively. NeuroField is no longer able to grab that CANBus because that Bus/Driver is controlled by Neuroguide.
4. Once Neuroguide has found the Q20, select your Patient, and Eye Condition and you are ready to run Neuroguide. Do not start the session yet.
5. Go to NeuroField and startup the program.

To Startup NeuroField
With CANBus #2 connected between the tDCS/tACS unit and your computer, do the following:
1. Attach the foam Sensors using Mastoid to Mastoid placement, going straight across hemispheres between those two areas.
2. Click on the NeuroField icon on your desktop.
3. Select the tDCS/tACS database and click on the “Continue” button.
4. Click on the “Click to Continue” button and NeuroField will look for additional connections. Select the available CANBus that appears and you will enter the NeuroField program. Note: Even though an error message pops up, there isn’t an error. This just means that it first tried to grab the CANBus driver for the Q20 and since Neuroguide has control it couldn’t connect to it. It then found the CANBus that is available.
5. Select a Patient or Add a New Patient and now you are ready to run NeuroField.

To Run NeuroField tACS at 0.1Hz
1. In NeuroField, click on the “tDCS Manual Control” button from the “Stim Launch Pad” to open the “tDCS Manual Control” window.
2. In the tDCS Control and Monitor section of the window, click on the drop-down arrow and select “tACS Continuous Sine” from the options listed. There are different options:
   - Pulsed - Square, Sine, and Triangular
   - Continuous – DC, Square, Sine, and Triangular
3. In the “Frequency Register”, set the “Frequency (Hz)” to “0.1 hz” and leave the output at “0.5 mA”. Note: If your patient is sensitive you can start at 0.1 mA and work up to 0.5 mA. It has been found that 0.5 mA is a good place to start and can be tolerated fairly well. For some people it is too much for them in one way or another and you can start low and work your way up to 0.5 mA.
4. Click on the “Update Frequency/Amplitude” button.
5. Set “Scan Time” to 10000 msec or 10 sec.
6. Click on the “Start tDCS/ACS” button to get NeuroField Running. While it is running in the background, you will now run Neuroguide.

To Run Neuroguide Round 1
1. Go to Collection/Neurofeedback/LORETA Neurofeedback.
2. In the “Protocol” tab, click on “Symptom Checklist” and open the SCL file.
3. Go to “Networks” tab and select the Network appropriate for your patient based on their Map and/or the LORETA Progress Report (LPR).
4. Set the Method to be “All or None” and Set the Threshold and Sound for training.
5. Click on the “Session Rounds” tab and set the number of rounds, ideally 4 or 5
6. Set “Restart Method” to “Manual” after you set your rounds. This is important!!!!!! If set to “Manual”, when Neuroguide finishes a Round, it won’t automatically go to the next round. This allows you to check in with the client to see how they are doing, and to change the Frequency in NeuroField to 14 Hz. You will want to ask:
   • How are you feeling
   • Are you getting the “boat” effect i.e. that rocking queasy feeling
   You can manually click on “Start Round” and control when Neuroguide starts the next round.
7. Click on the “Progress” tab and set “Display Type” to “Min/Max”.
8. Click on the “Protocol” tab and click on the “Apply” button.
9. Click on “Begin Session” and adjust Threshold to find the “Sweet Spot” usually between 60 to 80% reward.

To Monitor NeuroField Waveform Live
1. Bring the NeuroField software window forward.
2. There is Live Monitoring with the tACS/tDCS unit. Notice what the frequency of the waveform looks like when the tACS unit is running. If a client wasn’t hooked up or a waveform wasn’t being given then you wouldn’t see the waveform moving. So you know that the current is actually going through. Since it is only at 0.1 hz the waveform is making a gentle slope down and then back up. It is making a slow 10 second sine wave. Note: The frequency is set to 0.1 which is below the 0.5 low Threshold that Neuroguide will see. As a result you can run them both simultaneously without affecting the operant conditioning rewards in Neuroguide.
3. Notice the voltage of the waveform. It is set at 0.5 mA so you can see it going up to .5 above and below the 0 line on the Vertical axis.

Using tACS 14Hz with Neuroguide

To Run NeuroField tACS at 14Hz and Reset to 0.1Hz
1. With Neuroguide in “Manual Mode” and your first Round of NeuroField 0.1Hz / Neuroguide Combo complete, bring the NeuroField software window forward and in “Manual Control” change the Frequency to 14Hz. Leave it set to 0.5mA
2. Click on the “Update” button and Start NeuroField.
3. Look at the signal and see the 14hz Sine wave getting passed through the system at .5mA. During the combo, you hit the system at 0.1 cycles per second for one 5 minute round, now you are giving 14Hz for 2 minutes.
4. Check the Timer on the “Stim Launch Pad” in the “Total” section of the . Make sure you don’t go too long, i.e. go for approximately 2 minutes. Be sure not to walk away. Note: On the NeuroField Manual Control, each time you start it there is a built in “fail safe” and it will stop after 25 minutes and shut off by itself.
5. Look at the EEG signal coming from Neuroguide. You can see how the 14Hz is effecting it. It is actually overloading the Amp, but the Q20 is designed to handle it. It can tolerate that amount of input of electricity. Note: Again, it is not known if other amplifiers are equipped to handle this. So
performing this technique with another amp is “at your own risk”. It shouldn’t be a problem but there is the potential to blow out the amp.

6. Click on the “Abort Session” button to stop NeuroField 14Hz and notice how the EEG signal returns to normal.

**Repeating tACS 0.1Hz & 14Hz with Neuroguide Rounds**

You will now repeat alternating using 0.1 Hz during Neuroguide Round 2 and Round 3 with 14Hz being given in between Rounds. However, once you get to Neuroguide Round 3, you will now lower the mA in NeuroField from 0.5 to 0.25. There are two theories for this; one is that the brain has habituated to .5mA and will respond to something different, either higher or lower, and it reduces fatigue. The other theory is that by giving the 14Hz in between Rounds, the calcium ion channels have met their electrical potential, so the brain may not need as much of a “kick” and can start to work more on its own.

This process can be repeated for Round 4 and 5 or as long as the patient can tolerate it.

**To Repeat NeuroField 0.1Hz Session**

1. In NeuroField “Manual Control” change the frequency back to 0.1Hz and leave it at 0.5mA and Click on “Update”.
2. Start NeuroField.

**To Run Neuroguide Round 2 and Repeat NeuroField 14Hz**

1. Bring Neuroguide forward. It is set to ‘Start Manually” so, click on the “Start Manually” button and begin Round 2 with NeuroField running in the background.
2. Notice the Inter-Session data for Round 2. In most cases you will see in “Real-Time” that the outliers are getting better and the “in-range” numbers are holding firm.
3. When Round 2 is done, Neuroguide will automatically stop and you can change NeuroField from 0.1 Hz back to 14Hz at 0.5Hz.
4. Run 14Hz for another 2 minutes and Abort the NeuroField Session.

**To Reset NeuroField 0.1Hz at 2.5mA and Run Neuroguide Round 3**

1. In NeuroField “Manual Control” change the frequency back to 0.1Hz but this time set it to .25mA and Click on “Update”.
2. Start NeuroField.
3. Bring Neuroguide forward. It is set to ‘Start Manually” so, click on the “Start Manually” button and begin Round 3 with NeuroField running in the background at only .25mA.
4. Repeat. Alternate giving 14Hz .25mA between Rounds and running NeuroField at 0.1Hz 2.5mA during Round 4 and 5 or as long as the client can tolerate it.
5. Check the rewards and the outliers during the session to notice the changes.

**X. Interval Training – Neuroguide, tACS, pEMF, & Task**

The theory behind this procedure is to promote calcium ion surge while you are training the specific areas of the cortex appropriate for your client. The goal is to get it moving.
Important!!! The Startup must be done in this order:

- Step 1 – Activate Neuroguide and the Q20: Startup the Neuroguide software program so it is connected to the CANBus/Q20 and the active EEG is displayed. At this point Neuroguide has control of the Q20 and CANBus #1
- Step 2 – Activate tDCS/X3000 units: Startup the NeuroField software program and it will connect to the 2nd CANBus. NeuroField will now have control of the tDCS unit

Once you have completed Step 1 and 2 above, you are ready to run the Neuroguide/NeuroField tACS Combo technique. The process is summarized as follows: (Step by Step instructions are listed later in this section.)

Collect the EEG for a minute and see what he look
XI. NeuroField tACS with HRV – Parasympathetic Protocol

**Hooking-Up the HRV Sensor & Loading the tDCS/tACS Database**

When a tDCS/tACS unit is installed, the NeuroField system installs the NeuroField tACS/tDCS database by default. Within this database are several NeuroField protocols that can be used with the NeuroField HRV system. For this exercise we are going to use the Parasympathetic Protocol. It is best to attend a NeuroField training to ensure that you are comfortable using these advanced tools. **Note:** If you need more detailed instruction from what is provided below, please refer to “Section 1 Chapter III Software Basics” earlier in this document.

**To Connect the PPG Sensor to the HRV Unit and Connect the Devices:**

1. Turn off the NeuroField system before using the HRV system.

![tDCS/tACS Unit and X2000 Plus HRV Setup](image)

2. Connect the PPG sensor that came with your system firmly into the plug labeled “HRV Sensor” on the rear panel of the HRV unit. (If you have an X2000 Plus as shown above, plug it into the slot on the back marked “HRV Sensor”.) This is a standard PPG sensor purchased from HeartMath.

3. Plug one end of the RJ45 Jack/Ethernet Cable that came with your device into the CANBus slot on the tDCS/tACS unit and connect the other end to either one of the free CANBus slots on the HRV unit (or the X2000 Plus). Your devices are now connected and can run HRV and tDCS/tACS together.

4. Plug the RJ45 end of the CANBus /USB cable into the 2nd CANBus slot on the tACS/tDCS unit and plug the USB end into your computer.

5. Turn the system back on and start the software. **Note:** It is important to power down the unit before either plugging in or removing the PPG sensor. This will prevent damage to the unit.

**To Launch NeuroField and Load the tACS/tDCS Database:**

1. Click on the NeuroField icon located on your desktop to start NeuroField, and answer “Yes” to the “User Account Control” alert.

2. The main NeuroField 9.x.x screen will appear. Select “tDCS/tACS.mdb” and Click on “Continue”.

3. Click on the “Click to Continue” button and it will change to “Devices Found”
You should see the HRV module found listed and the tDCS/tACS listed. In this case it is showing the X2000 module as the Primary Stim Unit. If the HRV unit is not listed, follow instructions detailed in “To Connect the PPG Sensor to the Unit” listed above.

4. Select your CanBus and answer “Yes” to Backup your Database and you will arrive at the “Stim Launch Pad”.

**Attaching the Sensors, Verifying the Heart Rate, & Calibrating the Sensor**

Once you have connected the sensor to the unit, and launched the software, you will need to:

- Prep the patient
- Attach the Electrodes
- Attach the HRV Sensor
- Verify you are getting a good heart beat
- Calibrate the PPG Sensor

**To Ensure a Good Signal and Attach the HRV Sensor and Electrodes:**

1. Prep the client. The PPG Sensor and Stim Electrodes have to be able to permeate the skin. Oil, lotion or hair will prevent the HRV sensor from picking up a good signal and the Stim Electrodes from making a good connection. With some clients you will get a heart rate very easily and with others you won’t, so to ensure a good signal and/or stable mastoid connection you should:
   a. Clean the Finger or Ear before attaching the HRV sensor.
   b. Clean the Mastoids thoroughly before attaching the Stim Electrodes.
   c. If using the finger HRV sensor, put it on snugly but not too tight because it will squeeze the finger and prevent blood from getting in.
   d. Rub the ear or finger a bit to get the circulation going before attaching the HRV Sensor. Stop for a minute and come back and take a look at it. The ear should be pink. If you put the HRV sensor on cold, you might not get a good heart beat.
   e. Avoid putting the ear HRV sensor directly over a pierced hole on the ear. There is a beam emitted from the sensor and if it is over a hole, the beam gets interrupted. Move it up a bit towards the ear opening. Moving it up a bit is also a good idea even if there are no piercings and you want to get a better signal.
   f. Make sure the HRV sensor is clean.
2. Snap the Stim Electrodes together until you hear a click, pull the tab to reveal the gel, and then place the electrodes on the Mastoid of each ear. To ensure it is secure, grab a hold of the bottom with your thumb and forefinger while twisting and pressing the electrode down against the mastoid. You are ready to use the NeuroField Stim.

3. Place the PPG sensor on the ear or finger (depending on which one you use) and you are ready to check the HRV signal.

**To Verify You Are Getting a Good Heart Rate and Calibrate the PPG Sensor:**

1. With the sensor attached, Click on the “Enable HRV” option from the “Stim Launch Pad”.

   ![HRV Interface Setup](image1)

   The “HRV Setup” Controls will appear.

2. Click on the “Continuous Scan” button and the HRV window will open. It will turn on the HRV and continuously scan.

   ![HRV Setup](image2)

   ![PPG Sensor Calibration](image3)

3. Notice that you will see a heartbeat on the screen in the “First Derivative” window. You will want to watch the scan and see what the heart rhythm looks like, and check that it lines up with the “Final Heart Rate Edge Holdoff” screen. Specifically, you would want to see that the:
- Yellow threshold line catches the edge of the Heartbeat in the “First Derivative” screen. This will ensure you have enough of a heartbeat to calibrate.
- The first side of Holdoff Rectangle in the “Final Heart Rate Edge” screen lines up with the edge of the Heartbeat as seen in the two images above.
- The Holdoff Rectangles are lined up and look like a “Picket Fence”.

(For further details see Section 3 HRV earlier in this document.) If you are not getting a good heart rate signal:
- Move the sensor around on the finger or ear until a heart rate appears.
- Sometimes there is noise from computers, monitors, iPhones etc. Move the client away.
- Use a small amount of NuPrep and clean the surface of the ear.

**Note:** NeuroField has a Holdoff time of 4 seconds after the first measurement before it looks for another edge. So if some of the noise in the heartbeat between edges crosses the threshold line, it is not going to influence the measurement because NeuroField is not taking a reading until the next edge appears at 4 secs.

4. Notice the “HRV Scan” window.

You can see that the wave form of the heart is going up and down. This is the Valsalva wave. The heart is a big DC potential and you will see this waveform drift up with Positive polarity and down with Negative polarity. At times the wave may appear to drift out of the window. This is normal and what the heart should be doing.

5. Check the Diode in the NeuroField software to ensure you are getting a good signal.

It should read between 0.5 – 2 volts. Manipulate the sensor if need be to ensure a good signal. The blue bar on the Diode should be going up and down. If not, then it means the sensor is not on correctly. If so, you are ready to verify that you have a good heart rate.
6. Once you see the heart rate is good, select “Abort Process” and it will finish the last scan and then abort. You are now ready to continue on and calibrate the PPG Sensor. **Note:** Continuous Scan will continue to scan until you tell it to stop or abort the process.

7. Click on the “PPG Sensor Cal” button to calibrate your sensor. During the Calibration process the sensor calibration will take several scans to ensure that NeuroField is catching the heartbeat. For detailed instructions on how to calibrate the PPG Sensor, go to “Section 3 HRV” earlier in this document.

8. When the calibration is over, Click “OK” in the “Congratulations, HRV Calibration Complete!” message window. **Important!!!** This doesn’t mean that the calibration is correct. It just means the calibration is done. Next you must visually check to be sure all edges of the Heart rhythm were detected and there are no “Pickets in the Fence” missing. If this is the case, the calibration is good.

9. Notice that the “Threshold Level’ and “Hold-off Time” boxes in the “PPG Sensor Calibration” area of the “Stim Launch Pad” have been automatically populated with the appropriate settings once the calibration has completed:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold Level</td>
<td>-0.026</td>
</tr>
<tr>
<td>Threshold (msec)</td>
<td>11.719</td>
</tr>
<tr>
<td>Holdoff (msec)</td>
<td>468.75</td>
</tr>
</tbody>
</table>

- Threshold Level is a negative number
- Holdoff Time is between 400 – 500 msec

If this is not the case or you are having trouble getting a good calibration, for detailed instructions on how to check the calibration, again go to Section 3 HRV” and see “Chapter 1 - Calibrating the PPG Sensor” earlier in this document. Also, the numbers can be set manually as detailed in the Advanced Mode in the Section 3 - HRV. **Note:** it is suggested to read Chapter 2 “The Advanced Mode” in “Section 3 – HRV” to get a better understanding of the HRV settings and calibration process.

**Selecting and Setting Up the Parasympathetic Protocol**

Once the sensor is attached and calibrated, you are ready to go ahead and select the Parasympathetic Protocol in the tDCS/tACS database and then determine which of the Parasympathetic frequencies are “Hits” for a particular client. In this portion of the process you will give the client 1 loop of the Parasympathetic protocol, running through each of the 27 frequencies, and let the heart make the choice for what frequencies the client responded to. The frequencies used in this Protocol are:

- Parasympathetic = 0.14 to 0.4 hz (high frequency)

**To Select and Setup a Parasympathetic Protocol:**

1. From the Stim Launch Pad, scroll down the Protocol list for the tDCS/tACS database until you see “tDCS/tACS 0.14-0.4 Hz Parasympathetic” Protocol and Select this Protocol.

2. Change the waveform to “Sinusoidal”.

---

**Waveform Selection and Coil Placements**

<table>
<thead>
<tr>
<th>Waveform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square Wave</td>
</tr>
<tr>
<td>Sinusoidal</td>
</tr>
<tr>
<td>Triangular</td>
</tr>
</tbody>
</table>
Note: if you know that a person is sensitive, you do not want to use a Square Wave which is more disruptive. It is a good rule of thumb to start with a Sine wave. If you need to move somebody fast or it is a “Right Now” type of situation, use a Square wave.

3. Look at the “tDCS Amplitude Override” section of the screen.

<table>
<thead>
<tr>
<th>tDCS Amplitude Override</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable iout (mAmps):</td>
</tr>
<tr>
<td>0.1</td>
</tr>
<tr>
<td>Enable DC Mode</td>
</tr>
</tbody>
</table>

Here you can change the output of NeuroField to be whatever mAmps is inserted in this box, and override what is pre-set in the Protocol. For example, the default voltage for the Parasympathetic Protocol is set at .5 mA, but you may not want that strong of a voltage for a particular client. Insert whatever mA is appropriate. You may want to start at 0.1 and gradually move up to 0.5 mA.

4. Look at the Primary Stim Generator section of the Stim Launch Pad. You will see Channel 1 and Channel 2. Make a selection for where you want to put the sensors. For this protocol we will be using the Mastoid, so select “Mastoid” for both Channel 1 and Channel 2 if it is not already selected. Note: The Primary Stim Generator will always be the tDCS/tACS unit. Regardless of which Device is found as the Primary unit when you launch the system, the NeuroField software will always read in and display the tDCS/tACS unit as the Primary Unit on the Stim Launch Pad.

5. Leave the “# of Loops” set to “1”. 1 Loop of the Protocol will take 4 min and 30 secs. But, it will actually take longer because there is a 4 second HRV scan in between each stimulation. NeuroField checks the heart each time it is stimulated with each one of these frequencies and NeuroField will then look for variability in the heart. If Heart Rate Variability increases 10 milliseconds above the baseline, NeuroField notes that as a “Hit” or a “Yes” response from the heart and stores it in a “Hit” table.

6. 

7. Click on the “Select and Close” button.

All of the Setup selections you made will get saved to the patient database. If you want to run the same protocol next session, you will have a full record of your setup, including where you placed the electrodes.

Running an HRV / Parasympathetic Session

Once the Electrodes are attached to the Mastoid of each ear, the HRV sensor has been attached and calibrated, and you have selected your protocol, you are ready to run 1 loop of Parasympathetic Protocol along with your HRV Session.

To Run an HRV/Parasympathetic Session:

1. Have your client close their eyes. This removes any exterior stimulation and helps to keep the eyes still. It is also makes it easier for the client to relax and get into Parasympathetic mode.

2. Select your Patient and Click on the “Start Standard Treatment” button to begin the session and notice the Running SDNN Baseline on the “HRV Spectrum” screen. NeuroField will run through each
of the 27 frequencies in the Parasympathetic protocol, generate a stim, read the Heart Rate and make note when there is a “Hit”.

3. Watch the Notch in the HRV.

4. When 1 loop of the protocol has completed, the Summary Page will appear at the end of the last HRV scan.

5. Take a look at the Summary. It tells you what the Vrms values were as the protocol ran and what the SDNN was. SDNN is the Standard Deviation from Normal to Normal Beats. You can look at the variability and see if there is changes in it. In order for NeuroField to say it is a “Hit”, it takes the baseline and adds 10 seconds to it. If any SDNN is greater than baseline plus 10, it is considered a Hit, or a “Yes” response from the Heart. It means that the heart liked that particular frequency.

6. Go down the list. Note the frequencies that are within the “Hit” range. For example, say the baseline was 24.26, you would look for anything that was 34.26 or higher. Also, in the Running SDNN graph, note the Vertical axis is scaled from 0 – 40 milliseconds and you can see the points that are 34.26 milliseconds or higher.

   **Note:** NeuroField has built in artifact rejection that removes anything over 125 milliseconds, so if someone moves or coughs or talk etc. it will get rejected. Normally most Heart Rate Variability is 30 milliseconds to 90 milliseconds. You want to see variability in the heart which means the heart is elastic and can deal with stress.

7. Now that the scan is done, click on the “Close Window” button from the Stim Summary and check the “SDNN Hits” button on NeuroField Launch Pad. It will display (Found) to signify NeuroField registered Hits from the Session. If the word “(Found)” is not listed it means that NeuroField did not find any hits and you may need to find an alternate Stim solution. You are now ready to give a straight NeuroField Stim using only the Hits Found.

### Running a Parasympathetic “Hits” Only Session

**To Run a Parasympathetic “Hits” Session:**

1. Click on the “Disable HRV” button and take the HRV Sensor off of your client. You don’t need to use HRV anymore as NeuroField has found Hits/Frequencies the heart responded to. Leave the Stim Electrodes on the Mastoid.

2. Tell the client to sit back and relax. They can watch a movie, read a magazine, but most often it is suggested to put on meditation music, close their eyes and get into a meditative state. Breathe simply and relax.

3. Click on the “SDNN Hits” button and you can see that NeuroField has automatically built a table containing just the hits. Notice the number of Hits, say in this case there are 6 “Hits”. They are, .21, .23, .25, .28, .33 and .37.

4. Go to the “Global Chanel Control” section of the “SDNN Peak” screen. This screen allows you to override the built-in protocol selections, specifically, you can set custom values for Amplitude and Duration. For the Parasympathetic protocol we are using in this example, say the client is a bit sensitive, so change the Amplitude to 10,000 milliseconds or 10 seconds per stim and the voltage to 0.2 mA.
5. Click on the “Do For All” button. NeuroField will go through each one of the Hits and set the mA and Duration for each. **Note:** If there is a frequency in the table that looks like artifact that is high, but below the rejection number of 125, say you knew the person yawned or moved, you can:
   a. Highlight the row
   b. Click on the “Delete Selected Peak Generated Stim Cycle” button and it will be deleted.

6. Go to the HRV Loops and Runtime area of the screen and notice the Runtime for 1 loop. Set the number of HRV loops to create the runtime or session length you want. For this example, the current number of hits built into this table will run for 1 minute per loop. In order to give the client a typical 30 minute session, set it to 30 loops which will run for 30 minutes.

7. Click on the “Start SDNN Peak Treatment” button and give your client the Parasympathetic frequencies their Heart selected!
SECTION 5
APPENDIX
I. NeuroField Contraindications

Most people who use NeuroField have no side effects. Since 2008 over 50 licensed health care professionals have evaluated the NeuroField effect which has resulted in the following list of indications and contraindications for treatment:

1. The most common reported effect from NeuroField is a person becoming ‘wired’ or ‘tired.’ A person may feel an abundance of energy or may feel compelled to sleep after a treatment. It is important that the person is informed of this potential side effect and that they do not operate heavy machinery or drive a motor vehicle immediately after a treatment. Most people who have this side effect feel it within an hour after treatment. This effect is usually short lived and resolves itself in one to two hours.

2. NeuroField can cause capillary dilation which can feel like a headache. This effect usually resolves itself within one to two hours after a treatment. However, if it does not do so then a person is directed to take over the counter pain reliever such as Tylenol. This effect has not been reported to occur longer than 24-72 hours. Should this occur longer than 72 hours then the person should be directed to see their physician.

3. As a rule beginning NeuroField users should NOT give treatment to people diagnosed with seizure disorder unless they have clinical supervision with an experienced NeuroField provider and have attended an advanced training. You can use NeuroField on people with seizure but you MUST NOT give stims less than 10 Hz otherwise you may trigger a seizure. The 15-100 or 10-100 protocols work best with this population.

4. Do NOT use NeuroField on pregnant women.

5. Do NOT use NeuroField on people with Pacemakers.

6. Do NOT use NeuroField on people who have any metal attached to or inserted on or in the head.

7. Do NOT use NeuroField on children less than 3 years of age until you have practiced with the system on clients for at least one year and have attended one basic and advanced training along with seeking professional supervision with an experienced NeuroField provider.

8. Do NOT use NeuroField on anyone if they have the flu, a cold or any type of acute bacterial infection.

9. Be mindful of people who are taking medications. NeuroField can have an impact on medication effectiveness making them stronger and more potent. Most people who take medication respond with no problems to NeuroField treatment. However, it has been reported that people who take blood thinners have experienced a more potent effect from the medication.

10. People who have a history of PTSD may have an abreaction. Make sure to assess this and be ready to intervene should the need arise. This may require a referral to a licensed therapist who is trained in EMDR or similar traumatic disorder treatment.

11. People with significant personality disorders may respond to NeuroField with intense mood changes. This may require a referral to a licensed therapist who is trained in EMDR or similar traumatic disorder treatment.

12. Do NOT give NeuroField for more than 50 minutes per day on the head. You can use it on other parts of the body up to three times a day.

13. Do NOT EVER attach the NeuroField cap to the scalp with electro paste. You will inject electricity into the person with the potential of causing harm.
II. Legal

NeuroField is not a medical device. NeuroField is not intended to be used for the diagnosis of medical problems and does not diagnose medical problems. NeuroField is intended for the use of stress reduction and relaxation. NeuroField, Inc. does not make any claims that this device can cure, heal, or medically treat disease. It is critical that you DO NOT ATTACH THE CAP TO ANYONE USING CONDUCTIVE PASTE, ELECTRO GEL, OR BY ANY OTHER MEANS. Attaching the cap to a person using conductive paste could cause serious harm to the person and may damage the NeuroField System. Attaching the cap will result in your warranty being invalidated and is not supported in any fashion by NeuroField, Inc. Using NeuroField outside of the methods explained in this manual may result in a suspension of the license granting usage of the NeuroField system.

There is limited testing completed on this device and it should be considered experimental with clients signing an informed consent form indicating that they understand the experimental status of NeuroField. People who have pacemakers should not be treated with the NeuroField System. NeuroField is only made available to licensed professionals for experimental use.

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You hereby acknowledge that you have read and understand the foregoing license agreement and agree that the action of installing or using the Software is an acknowledgment of your agreement to be bound by the terms and conditions of the license agreement contained herein.

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IV. Shipping Policy

GOODS WITHIN THE U.S.A. – All goods posted within the U.S.A. are delivered to you via Federal Express 2-Day Air, unless otherwise specified.

All goods are SECURELY packaged to minimize the risk of damage. Any damage that does occur is the responsibility of Federal Express, and you can contact Federal Express for satisfaction concerning the cost involved.

GOODS SHIPPED INTERNATIONALLY – In 2004, the European Parliament passed the Restriction of the Use of Certain Hazardous Substances (RoHS) directive to “protect human health and the environment by restricting the use of certain hazardous substances in new equipment” and to complement the Waste Electrical and Electronic Equipment (WEEE) regulations. This Directive bans the placing on the EU market of new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants.

NeuroField X1000 is completely RoHS compliant and therefore can be sold both nationally and overseas to (EU) European Union customers.
V. Warranty/RMA Policy

NeuroField, Inc. uses FedEx as the primary shipment carrier. If your system was damaged in transit or is missing components please notify NeuroField, Inc. immediately. Failure to do so will result in the customer paying for parts, repairs, and/or damages.

Shipping Coverage

NeuroField, Inc. offers replacement on damaged or non-functional items within thirty (30) days of purchase provided that damage was caused by either freight transport or factory defect. There is a service/repair charge for items returned after thirty (30) days of purchase.

Equipment Coverage

NeuroField systems have a one (1) year warranty from the time of purchase. This warranty covers factory defects only and does not cover damage caused by the customer. Any damage incurred can be repaired by NeuroField, Inc., charge estimates dependent on inspection of damaged hardware.

Battery Coverage

Specialized Batteries (Internal batteries and Field Replaceable Smart Batteries) from NeuroField, Inc. carry a three (3) month warranty through NeuroField, Inc. against factory defects.

Misc

There are no review periods upon purchase of the NeuroField system. All sales are FINAL. No refunds will be offered regardless of the request.

Return/Repair Procedures and Policies

All returns must be accompanied by a return merchandise authorization number (RMA#). The RMA number may be obtained by contacting NeuroField either via e-mail or by calling our office. We will provide you with return instructions.

1. NeuroField, Inc. is not responsible for any packages sent back without an RMA#.
2. The customer is responsible for paying for the return shipping.
3. We recommend sending any return items to NeuroField, Inc. via a traceable source.
4. Please insure your return packages for any package losses or any damages in shipping. NeuroField, Inc. is not responsible for any damages incurred in shipping.
5. Please legibly write the RMA# on the outside of the returned package. Please provide return address and telephone number in the package.
6. Ship all RMA’s to:
   NeuroField Inc.
   RMA#
   386 West Line St.
   Bishop, CA 93514
7. Original shipping charges are non-refundable.
8. NeuroField, inc. cannot accept returns on any consumable products, electrodes, or cables.
9. Please allow 7-10 business days for repair.
10. If the system is being repaired on warranty the customer is not responsible for return shipping.
    If the system is being repaired/upgraded outside of warranty the customer must pay for return shipping.
11. NeuroField, Inc. is not responsible for any loss of revenue on the part of the customer as a result of conducting repairs.
12. Should the customer wish to expedite repair and/or return shipping an additional fee will be charged.
V. Contact Information & Troubleshooting

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Fax 760-873-8007

Official NeuroField Website: www.NeuroField.com