The Vestibular System
Although the overt function of our ear’s vestibular system is the maintenance of our dynamic balance by sensing linear and rotational acceleration, our brain has evolved to become dependent upon this “evidence of movement.” No other physiologic system provides such rapid information about our body’s upcoming energy requirements. And because man evolved in motion, the assumption of days spent moving – with constant signaling from our vestibular system – has been deeply incorporated into the maintenance of our neuronal and hormonal systems. There is a reason why children love to swing and elderly people enjoy rocking chairs. It’s innate.

Researchers are just beginning to appreciate the power of vestibular stimulation for the maintenance of health. This experimental system provides a safe and practical vestibular stimulation system which may confer multiple health benefits.
Transcranial Neural Stimulation
Via Ear Clips and Earlobes

There is nothing particularly magical about our earlobes. They are just flaps of skin. But they serve as convenient attachment points for double-sided ear clip electrodes whose purpose is to pass a weak, but neurologically relevant, electrical current between our ears... and thus through our inner ear’s vestibular system and the regions of our brain that lie between.

Changing the battery
GRC’s experimental transcranial neural stimulator (TNS) is powered by a long-lasting 9 volt “transistor radio” battery. In fact, it lasts so long that it’s easy to forget about it. Although it will last for many months of daily use, sooner or later it will become exhausted. If the stimulator is unable to deliver the desired current, its center light will flash rapidly and emit a periodic chirp to call attention to itself. If both ear clips are solidly affixed and both lead wires are plugged into the top of the device, the most likely cause of trouble is a tiring battery. You may access the battery’s compartment by carefully removing the silicone rubber outer sleeve, turning the device over, and sliding the battery compartment door open to reveal and replace the battery.

Care of the connecting wires
When not in use, it is best not to leave the wires plugged into the device and wrapped back around (as shown to the right). Instead, gently unplug them from the device, loop them in a large limp loop, and store them in the inner compartment lid of the supplied case. Avoid putting strain on the wires where they emerge from the plugs as earlier units have suffered internal breaks where the wires were bent at a sharp angle. We can replace the wires if they do break, but you’ll be without the device until then.

The stimulation current
GRC’s TNS device produces a user-controllable, safe and biologically compatible weak (sub-sensory threshold) stimulating micro-current ranging from 200uA (200 millionths of an ampere) to 2000uA, in ten uniformly increasing 200uA steps. Since you will definitely feel the novel effects of this device’s stimulation current, every session starts at the lowest setting (level 1). You may then manually increase the current as you become comfortable and adjusted to the unique and strange feeling created by having your inner ear’s and brain’s neurons deliberately stimulated in novel ways.

What level of stimulation current to use?
The short answer is that we don’t know yet. No one knows. Some early users have reported improvement after using only the lowest level (200uA) twice a day for 20 minutes for four weeks. And a growing number of people “rocking the box” at higher power levels have experienced significant relief from constant hunger, chronic pain, an increase in resting metabolic rate, and a dramatic reduction in blood pressure and body weight. In one notable case, an ex-professional NFL football player was able to shed 100 undesired pounds.

We don’t yet know what stimulation power level is required to drive these changes. And it may vary from person to person. So the best advice is to use as much power as you feel you can comfortably
accommodate. When sufficient Ten20 adhesive paste is used, the ear clips should never “sting.” And as you become more familiar with the “swaying” feeling (which we call “rock-a-bye”) induced by the device over the course of several days, you will probably grow more comfortable with the feeling induced at higher power. Everything about the device has been designed to make the experience as comfortable as possible. You should be having a good time… or at least never a bad time.

**Session duration and frequency:**
Experience has demonstrated that a single session’s benefits will be reduced or eliminated past 20 minutes. So no single session should last longer than 20 minutes, and the stimulator will automatically end the session by shutting off after 20 minutes. We also believe that, counterintuitive though it may be, even a single 20-minute session once per day should be sufficient to drive long-term benefits. Time-of-day does not appear to be a factor, though some people report being “rev’ed up” by a session, which might interfere with sleep. So avoiding late in the day sessions may be advisable until you become accommodated to the stimulation.

If a more potent effect is desired, multiple 20-minutes sessions may be used so long as they are spaced well apart. So, for example, a first session early in the morning, another around mid-afternoon, and a third before bed (once you know you will not be kept awake.)

**The overall action of this transcranial neural stimulation appears to be restorative.** This stimulation appears to bring back into balance multiple brain hormonal and neuronal signaling systems that may have drifted a bit off course. There is a definite accommodation phase the beginning, where you may find your nighttime dreaming to be quite vivid and memorable the following day. This is normal and expected, and will likely diminish in strength as compensating systems within your brain adjust to the daily stimulation.

**The stimulation itself:**
The TNS device restores key neurological and hormonal balances by inducing a slowly alternating polarized electrostatic field across a number of inner ear and midbrain structures; specifically the hypothalamus and the pituitary (the primary “HPA axis” organs), and structures in the brainstem known as the locus coeruleus and dorsal raphe nucleus… where almost all of the brain’s norepinephrine and serotonin is produced.

Since the electrodes are attached to the user’s outer ear, this flowing micro-current passes through the inner ear and creates a sense of shifting balance equilibrium because our sense of balance originates in our ears.

*IF YOU WALK WHILE USING THIS DEVICE, DO SO VERY SLOWLY AND CAREFULLY. YOU WILL FIND THAT IT MAKES YOU “WEAVE” AS THOUGH HIGHLY INTOXICATED!!*
As can be seen in the voltage versus time chart on the preceding page, the stimulation current is slowly increased (ramped up) to maximum, held there for the majority of the time, then returned to zero. The cycle then repeats with the opposite current polarity. This waveform results in a balanced, net zero current flow which neutralizes any net chemical (ion) flow. This device’s characteristic “trapezoidal” waveform is one of its several innovations and is unlike any other commercial or experimental CES device. By gradually ramping the current up and down, a significantly greater total electric field can be established and held without (literally) shocking the user.

Although many users of this technology actively enjoy its pronounced rocking effect, others strongly dislike it. If you tend toward nausea you can reduce the device’s stimulation intensity. You may also find that focusing your attention or trying to work while “zapping” increases your nausea because your ears and your eyes are sending different messages to your brain (like getting car sick while reading rather than keeping one’s eyes on the road). So rather than working, consider taking a brief 20-minute “time out to zap”. Lie down with your eyes closed and enjoy the sensation of gentle side-to-side rocking in a hammock.

You may notice a feeling of relaxation during or immediately after the stimulation session. But for the most part these once or twice daily sessions are intended to rehabilitate and rebalance your autonomic hormonal and neural systems over time. The effects tend to accumulate over the course of several weeks, settling down only after several months of daily use. So you should not expect to experience immediate results.

At higher stimulation currents you may also experience some scalp or ear muscle contraction experienced as a “pull.” This is normal and is due to the fact that the majority (about 57%) of earlobe-applied current does not travel through the brain, but instead travels around the outside skin, over the skull from ear to ear. Only approximately 43% of externally applied current penetrates the scalp, skull, and cerebrospinal fluid to enter and pass through the brain. So some facial muscles may also be triggered.

**Is this safe?**

Yes. In 1974, the FDA commissioned a safety study “An Evaluation of Electroanesthesia and Electrosleep” which found that no harm could result from electrical currents applied to the scalp of 4 milliamps or less. This device’s maximum current is 2 milliamps – half the amount of current that was found to be safe and significantly more than most people use. Since the early 1970’s, tens of thousands of people have used commercial FDA-approved CES devices which use similar current. University researchers are conducting brain research approved by their ethics and safety boards with similar FDA-approved commercial “tDCS” (Transcranial Direct Current Stimulation) devices which use stimulation currents up to 4 milliamps. And these GRC TNS stimulators have been used by many people for several years without a single adverse effect.

**Button Controls Guide**

- **Briefly press and release** **BLACK** to start a standard 20-minute session, or to increase the power level stepwise from 1 to 10. When the device is already at maximum intensity further button presses will be ignored.

- **Briefly press and release** **RED** to decrease the power level. When the intensity has been reduced to its minimum level 1, further button presses will be ignored.

- **Depress and hold** **BLACK** to alternatively pause or resume a session. Sessions may be paused for up to 15 minutes per pause, after which the device will assume it’s been forgotten and will shutdown to end the session.

- **Depress and hold** **RED** at any time to completely stop and end a session. This is not necessary since sessions are self-timed and will automatically stop after 20 minutes.
Hooking Up!

A TNS Session Walkthrough

The Ten20 paste assures the creation of a safe and high quality electrical connection. It spreads the electrical current evenly across the skin surface to eliminate “hot spots” and prevents the ear clips from slipping off. Ten20 paste should always be used, and the stimulator should never be used without the Ten20 paste. Each jar of Ten20 should last for years, and you may obtain more from us or directly from Amazon.

A 20-minute TNS session is simple and straightforward:

1. **Prepare your earlobes:** Ear piercing hardware must be removed during the stimulation and the stimulator ear clips must never be used over any cuts, wounds or abrasions of either earlobe. Your earlobes should be clean and free from excess dirt or grease.

2. Open the Ten20 jar and smear a coating of paste onto a forefinger. Then rub your forefinger on both the front and back sides of the earlobe to transfer the paste to both sides of your earlobe over the area where each ear clip will be attached. The ear clips should be placed as close to your head as convenient. The Ten20 paste is skin-protective so using more is better than using too little.

3. Repeat the process with the other hand and other earlobe so that both the front and back of both earlobes are uniformly and liberally covered with the Ten20 conductive paste.

4. Rinse the remaining water soluble paste from your forefingers. Then carefully attach each ear clip to each earlobe over the freshly pasted skin.

5. Choose a location to sit down where you can comfortably remain for 20 minutes. Until you become familiar with the “rock-a-bye” balance/sway effect induced by this stimulation you should not attempt to walk or perform any complex tasks during the stimulation session. The swaying effects will cease immediately upon the end of the stimulation.

6. Plug each of the ear clip’s lead wires into the green receptacles at the top end of the stimulator. There is no difference between the left and the right connections, so the “polarity” of the connection is completely unimportant.

7. **You are now ready to start:** To start a 20-minute session, briefly depress and release the BLACK “Start” button. The TNS device should acknowledge your button press and the left-most of the three red lights should begin flashing. The device “knows” when and if someone is connected so it will do nothing when the black button is depressed if you are not first connected. If the electrode-to-skin connections are not properly prepared, the device may refuse to start, or the center red light may flash rapidly to signal either a poor connection or that the device’s battery needs replacement. If this occurs, check all of the connections at each end of each wire.

8. At any time during the session, the stimulation intensity may be increased or decreased by briefly pressing and releasing the black and red buttons to increase or decrease the stimulation current, respectively. (See the Button Control Guide on the previous page.) We do not yet have sufficient evidence-based guidance for the required stimulation strength. But it should probably be sensed to be effective and it cannot cause damage. So turning the intensity up to a comfortable level which you can also clearly sense is probably most useful.
9. As the session proceeds, the flashing lights will slowly advance, filling-in from the left, until all three are
flashing at once near the session’s end. See the diagram below for the pattern of the lights. After 20
minutes, the device will signal its completion with a longer series of chirps and the session will end.

10. If something interrupts – such as a phone call – the session may be paused (placed on “hold”) at any
time by pressing and **holding** the black button. This will pause the stimulation and the session timer
until the session is either abandoned or resumed by again pressing and holding the black button.

11. The session may also be terminated at any time by pressing and holding the red button until the device
acknowledges your stop-session request.

12. After a total of 20 minutes of stimulation, the “trill” will sound again and the session will end.

13. **Cleaning up afterward:** Unplug the wires from the device. Then gently open and remove each ear clip.
    Each side of each ear clip should be gently rinsed with water and dried to remove any residual paste.
    Your earlobes should also be rinsed and dried. Gently loop the wires several times and store them in
    the lid of the TNS case until next session. (TNS sessions should be performed at least once everyday.)

**What might go wrong?**
The stimulator continuously monitors the electrical connection through its user’s head. It will not start if the
user is not connected to both ear clips or if the lead wires are not firmly plugged into the device.

If an ear clip becomes dislodged and detached while the session is running the stimulator will begin flashing
its middle light rapidly and will chirp to call attention to the problem. Simply reattach the loose ear clip to
resume.

Over the course of many months of disuse the device’s battery will very slowly discharge. So if the
stimulator has not been used in some time its battery may have become exhausted. For this reason, if the
stimulator will not be used for an extended period its battery should be disconnected during storage.

If the stimulator will still not start with a fresh battery, the ear clips are connected to earlobes, and the lead
wires are attached to the stimulator, try disconnecting the battery and pressing the black button to start the
stimulator. This will reset the device’s microprocessor. When you reconnect the battery you should be
greeted with the familiar “trill” to confirm that the stimulator is ready to go.

**The progress lights:**
To provide an indication of the session’s progress, the lights will flash in seven different patterns. You can
think of them as “filling-in” from the left to the right, and changing every 1/7th of the total session duration,
as shown below:

- ••• - during the 1st 7th of the session
- •• - during the 2nd 7th of the session
- ••• - during the 3rd 7th of the session
- • - during the 4th 7th of the session
- •• - during the 5th 7th of the session
- ••• - during the 6th 7th of the session
- ••• - during the 7th 7th of the session

~ To Everlasting Health ~