

A Few Relatively Simple "TENS" Circuits

Originally Created in 2002.

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I initially designed these circuits for a friend who had muscle problems and while he says: "they did work well for him",

I "DO NOT" RECOMMEND THE USE OF THESE DEVICES BY ANYONE FOR ANY REASON.

Never use these Tens Devices Above the Neck.

I ACCEPT NO RESPONSIBILITY OR LIABILITY FROM THERE ASSEMBLY OR USE IN ANYWAY.

These circuit are to be used at Your OWN RISK.

I "DO NOT" imply any medical benefit can be obtained from their use.

Some Background Info:

Tens machines are believed to provide a drug free way of removing pain and other things from your body.
(TENS stands for "Transcutaneous Electrical Nerve Stimulation".)

Frequencies in the range of 80 to 100 Hz. are believed to block the pain impulses going to the brain .

Low frequency Tens use frequencies from 2 to 4 Hz .and are believed to help the body produce its own endorphins and increase local blood flow to relieve pain.
(Presumability, this effect can last for hours.)

Even Higher Frequencies in the khz range are believed to distroy certain Bacteria or Bugs in the body.

I am Not sure I believe any of this.

I RECOMMEND YOU GET A DOCTORS ADVICE,
BEFORE CONSIDERING USING THESE DEVICES!

TEN's Circuits 1 and 2

I consider the TENS-2 as the Best and Most Versatile Circuit.

"T1" in Circuits "1 & 2" is a small audio transformer with the 8 ohm impedance winding connected to the Fet and the larger winding connected to the probe and ground.
I Recommend using a "Mode" Transformer, Part Number 60-282-0.

The Turns ratio of the transformer determines voltage output.

A small 6 or 12 volt power transformer can also be used, But it will NOT give as good of an Output.

More

I Recommend using the Mosfet in Circuits 1 & 2, But a transistor such as a 2N3055 can be substituted for the "Mosfet".

The Base connects to the Gate, the Collector to the Drain, and the Emitter to the Source.
This change will result in a "Lower Power Output", but it still works.

The PCB for the Ten-1 also has provisions for a pot to control the Frequency of the 555.
If you don't want to use this control, Just Short it out.
If you do want this control, use a 1M or 2M Pot and Change R1 (2M2) to a 1M.

TEN's Circuit 3

Tens-3 is a very low powered, lower Battery Voltage Version, using a 5 mH Choke. (No transformer)
It will light up an NE-2 bulb connected to the output, so it Exceeds 60 Volts Output.
The Battery Voltage MUST be 3 Volts Minimum.

Probably Better is to Use 4.5 Volts.
And with 4.5 Volts the 100 Ohm Resistor can be Increased to a 1K5 to give better Control on the Output.

For Informational purposes only:
Their are also Low powered versions of these types of device are used by some Accupuncturists.
Typically they are Just a 555 Oscillator, powered by a 9 Volt Battery and Without any Coil or Transformer.
So the Output is Less than 9 Volts.
This is NOT Enough voltage to Break through the Skin Resistance.
So instead of pads, the signal is applied to the needles, giving a Very Localized Effect.

On All these TEN's Circuit, Different timing capacitors and resistors can be used for different effects.

Schematic of Circuits 1.

PCB for Circuits 1.

Schematic of Tens-2.

PCB for Tens-2.

Picture Overlay for Tens-2.

A Comment from one Person

Hi Gary,
I have been checking specs on professional tens units and find the specs to be in the following range.
Pulse frequency 2 - 120 Hz
Pulse width 40 - 250 uS
Is it possible to get any where near what the professional units specs are of 2-120Hz and
pulse width 40-250uS, using your design assuming resistor capacitor values are changed.
The current design appears to operate in the 2K - 6K HZ range.
I was hoping to be able to come down in frequency using this design.
Cheers, Victor

Here is the Schematic I Offered him.
And This is Probably the Best Version.

Here is this Picture Overlay.

Circuit 3, A "Low Voltage C-MOS" circuit.

PCB for Circuit 3.

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