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The best things are for free: mother Earth, Linux, nature, love...

1 | P a g e   **2018-10-21 |** v e r s i o n   **b i o Z A P** i n t e r p r e t e r   h t t p : / / b i o t r o n i c s . e u

bioZAP interpreter is used to edit and support user-generated therapy. bioZAP has been implemented in open, free devices used in energy-information medicine and spiritual self-development.

The database of therapies and device construction descriptions, supporting the bioZAP interpreter can be found at: http://biotronics.eu

Open license: https://github.com/biotronika/bioZAP/

The **green** device name means that it supports the described command. **Gray** is used when the function is supported in a limited way. In the case of a future implementation **blue** color was used. **Red** text means deprecated functions.

>

| **freePEMF** | **multiZAP** |

Prompt in direct mode. The interpreter is ready to enter the command. The command should be confirmed with the end of line (#10). Press Enter on the keyboard. Blank lines are ignored. The command will be executed immediately. Example of entering an empty line.

```
>
>
```

.

| **freePEMF** | **multiZAP** |

In the case of a longer execution time of the command, the interpreter print the *dot* character every 1 second. Example of generating a 7.83 Hz signal for 10 seconds.

```
>freq 783 10
..........OK
>
```

[comment]

| **freePEMF** | **multiZAP** |

Comment line. The line is ignored by the interpreter. Use only ASCII characters without specific language characters. Comments have been saved in EEPROM memory with therapy program.

```
# One minute therapy
freq 783 60
```

mem [|address|@]

| **freePEMF** | **multiZAP** |

Redirects the commands to the memory of the device EEPROM. The maximum length of the memory program is 1000 characters. Use one statement in one line only. End line with CR-LF or LF (#13#10 or #10). The @ sign exits from the memory write mode or exceeding the buffer capacity (512 freePEMF, 128 multiZAP characters) or exceeding the program length (1000 characters).

You do not have to delete the previous program before loading a new one. By default, the program takes up memory from address 0. If you specify [address], EEPROM memory overwrites from this point. Insert @ sign as address if you want to append therapy program from the end of existing script memory.

```
>mem
freq 783 120
freq 1179 120
@
>
```

ls [|-n]

| **freePEMF** | **multiZAP** |

Display the list of script therapy program stored in EEPROM memory. The **-n** parameter is used to display the addresses of program lines. The end of occupied memory is marked with @ sign. See **mem [address]**.

```
>ls
freq 783 120
freq 1178 120
>
```

exe [|1-9]

| **freePEMF** | **multiZAP** |

Execute program stored in EEPROM / fixed memory. The command works in direct mode only. An empty parameter means running a user-therapy script or a default program when there is no user-therapy.

```
>exe
................................OK
Second part
................................OK
>
```

Therapy program stored in EEPROM memory:

```
# user-therapy
freq 783 30
print Second part
freq 1179 30
```

As parameter, you can enter the program number sewn into the device. freePEMF has four scripts, and all multiZAP versions have nine *factory* therapies.

An example:

```
>exe 1
```

restart

| **freePEMF** | **multiZAP** |

Execute therapy program from the beginning. It can be used inside the therapy program. See **exe**. The command resets the label counters and sets the default values to all parameters.

Water molecules structurator works every one hour. For more see link [2018-10].

```
#water structurator
freq 783 30
#stop for 1h
wait 3600000
restart
```

rm

| **freePEMF** | **multiZAP** |

Remove the program from EEPROM memory. Clear the memory.

```
>rm
OK
>
```

freq [frequency] [time]

| **freePEMF** | **multiZAP** |

Generate a signal with a given frequency. The frequency is prompted in hundredth of Hz. E.g. 1Hz prompt as 100. Time is given in seconds. Providing time in negative values means a milliseconds.

An example of generating a 7.83 Hz signal for 2 minutes.

```
#in seconds
freq 783 60
#in milliseconds
freq 783 -60000
```

sin

| | **multiZAP** |

Switches signal mode to sinusoidal. See **vmin** and **vout** that are minimum and maximum of the signal envelope. For the electrodes terminals circuit in multiZAP **sin** mode is the default and only mode.

rec [frequency] [time]

| **freePEMF** | **multiZAP** |

Generate square (rectangular) signal with the given frequency in hundredth of Hz. Time is given in seconds. Output of an 7.83 Hz output generator for 1 minute. Command is deprecated and not recommended for use. See **freq**.

pwm [1-99]

| **freePEMF** | |

Pulse Width Modulation. Percentage of filling square pulse in the coil circuit. Default value is 50 (50%). In the case of all multiZAP versions, the pulse duty cycle is regulated analogically by potentiometer on the module.
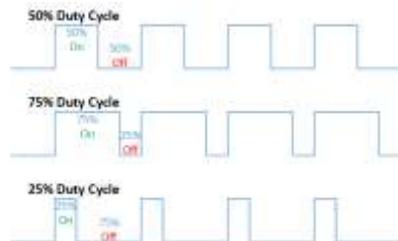
Picture source: wiki [2018-10]

The example presents two 3 minutes situations in which increasing edge (the most important to biological effect) of the pulse works the same way (polarity) but different is magnetic field behavior after the edge.

```
pwm 1
freq 783 180
pwm 99
freq 783 180
beep 200
off
```

wait [time]

| **freePEMF** | **multiZAP** |

Stop script program for [time] in milliseconds. Dot character be provided every one second.

Wait 1 minute:
```
wait 60
```

chp [0|1|~]

| **freePEMF** | |

Change polarity of coil output signal. The default value after switching on is set to 0 which means terminal (4) is positive, and (2) is negative. For the value 1 the polarity of the terminals is changed. Use ~ sign to invert polarity direction.

```
freq 783 120
chp 1
freq 783 120
chp 0
freq 1178 120
```

vout [0-120]

| | | **multiZAP** |

Set the voltage at the output. The command without a parameter returns the level of the output voltage. Values are given in tenths of Volt. An example of a 9.0V voltage setting.

```
>vout 90
OK
>vout
90
```

vmin [0-40]

| | | **multiZAP** |

Sets the lower value of the signal voltage (voltage minimum). The command without a parameter returns the level of the output voltage. Values are given in tenths of Volt. An example of setting a minimum voltage of 0.2V:

```
>vmin 2
OK
>vmin
2
```

out [0|1|~]

| **freePEMF** | | |

Turns the signal to the coil on or off. The ~ sign means a high-to-low change and vice versa.

An example of 1 Hz alternating square signal generator:

```
#1Hz alternating square signal – 60 seconds
:1 60

out 1
wait 500
out 0
chp1

out 1
wait 500
out 0
chp 0

jump 1
```

scan [target_frequency] [time] [|steps]

| **freePEMF** | **multiZAP** |

Scan that is change the frequency from the last set to the **[target_frequency]**. Scanning the all band will take a **[time]**. If start frequency was not set by **freq** command, 0.01 Hz is assumed. If the start value is higher than the target value, the device will gradually decrease the frequency. The number of **[steps]** describes how many intervals the scanned range should be divided. Maximum is 65535. By default, in the case of an empty parameter, the number of intervals is 100.

An example of scanning from 15Hz to 20Hz. It will take 2 minutes.

```
freq 1500 1
scan 2000 120
```

bat

| **freePEMF** | **multiZAP** |

Show battery level. The voltage value is returned. Divide the result by 10. In the example the measured battery voltage is 12.5V.

```
>bat
125
>
```

cbat [90-140]

| **freePEMF** | |

Battery voltage measurement calibration. The measured voltage at the power terminals should be given as a parameter. In the device, measure the voltage between (1) and (5) the coil socket pin. The voltage is given after multiplication by 10. Function is deprecated. Software from before 2018 supports this feature only.

```
>cbat 123
>OK
```

off

| **freePEMF** | **multiZAP** |

Turn off. It is not possible to turn the device off, if the USB port is connected to an on-board PC. In the example before switching off, the device will generate a short voice signal.

```
beep 200
off
```

beep [time]

| **freePEMF** | **multiZAP** |

Generate an audio signal at a specified time in milliseconds. Example of 0.2 second sound signal generation.

```
beep 200
```

: [label|1-9] [|0-65536]

| **freePEMF** | multiZAP |

The name of the label starts with the colon sign and consists of 8 characters or less without any space or numbers from 1 to 9. Only English characters or numbers are allowed. multiZAP supports only numbered labels 1-9. Up to 9 labels can be declared in the therapy script. Second parameter is the initial value of the jump counter. Each time when the interpreter jumps to the label, the counter is lowered by 1. If the counter drops to zero, the jump will not be executed. If you ignore that parameter or enter the value 65536, the jump to the label will always be performed. The parameter set to 0 will ignore any jump to the label.
An example of 150 seconds program (5 times 30s).

```
:9 5
freq 783 30
jump 9
```

jump [label|1-9]

| **freePEMF** | **multiZAP** |

Jump to the label. Each label consists of a name with no spaces up to 8 characters or number from 1 to 9. The size of the characters is significant, e.g. the letters: *A* and *a* are different. The time of performing jump function is about 6 milliseconds.
An example of 10 minutes program ended with a sound signal.

```
:start 10
freq 783 30
chp 1
freq 783 30
chp 0
jump start
beep 500
```

hr

| **freePEMF** | **multiZAP** |

Show current user heart rate. The result is returned in the number of heart beats per minute.

```
>hr
48
>
```

hrm

| **freePEMF** | **multiZAP** |

Displays the heart rate matrix calibration table. The reference value 0 is fixed and means 20 beats per minute.

```
>hrm
0: 20
1: 42
2: 46
3: 50
4: 54
5: 58
6: 63
7: 66
8: 70
>
```

chrm [min] [max]

| **freePEMF** | **multiZAP** |

Calibrate (calibrate heart rate matrix) and save heart rate matrix reference values. Values must meet the condition: 20 <min <max <255. Calibration procedure is described in the device instruction.

```
>chrm 42 70
OK
>
```

jump [label|1-9] [min] [max]

| **freePEMF** | **multiZAP** |

Jump to the label after reaching the appropriate heart rate level measured by the biofeedback device. The jump is executed when the value of the user's heartrate is between the specified **min <= hr <= max**. Label counter has matter. See label command. The pulse levels min and max can take values from 20 to 255. Numbers from 0 to 10 indicate the heart rate reference values stored in the EEPROM memory during device calibration. 0 always means heart rate of 20 beats per minute. See the **chrm** pulse calibration function.

njump [label] [min] [max]

| **freePEMF** | **multiZAP** |

Do not jump (no jump) to the label after reaching the right level of heart rate measured by the biofeedback device. See **jump**.

```
freq 1179 120
chp 0
# if heart rate less than 2 level jump to delta label
jump delta 0 2
beep 200
off

:delta
freq 100 120
chp 1
freq 100 120
beep 200
off
```

pin3 [hr|1wire|in|0|1|~]

| **freePEMF** | **multiZAP** |

Command configure terminal (3) pin. The heart rate meter, **hr** is the default mode. **1wire** mode now is not supported. In the operating mode, as an **in** input, there is external support for conditional jumps of the therapy script. See **jump3**. The output mode is reserved for operating an external terminal. The changeover takes place via the command of state low **pin3 0** or high: **pin3 1** or the status change sign on the opposite state **pin3 ~**.
An example of generating a quadrature (rotating) field by 4 coils connected to a terminal expanding the capabilities of a device.

```
:start 30

chp 0
pin3 0
freq 783 5
pin3 1
freq 783 5

chp 1
pin3 0
freq 783 5
pin3 1
freq 783 5

jump start
```

jump3 [label|1-9] [0|1]

| **freePEMF** | **multiZAP** |

Jump (jump based on pin3 state) to the label when coil terminal (3) state is reached. The second parameter is the value at which the jump occurs. Parameter 0 means 0V and 1 means high state - 5V. 0 is default. Pin (3) should be configured as input *in*. See **pin3**. The label counter maters.

Sample therapy scripts:

```
# Earth rhythm
# 8 minutes
beep 200
freq 783 120
chp 1
freq 783 120
chp 0
freq 1179 120
chp 1
freq 1179 120
beep 200
off
```

```
# Bone growth stimulator for Ti dental implants 60min.
beep 200
pwm 50

# 1h of 10Hz burst = 60x60x10
:1 36000

#20 impulses of 250us/50% pwm duty cycle = 20kHz/10ms
freq 200000 -10

wait 84
#jump needs ~6 ms
jump 1

beep 200
off
```