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EXPLOSIVE GENERATOR FOR ELECTRICAL SURGERY TECHNOLOGY

Nowadays, electrosurgery (destruction of biological tissues using alternating current up to 200 kHz to 5.5 MHz) is the most used procedure in the operating room. With the help of a high-frequency current, cutting of biological tissues and coagulation of blood vessels are performed.

In the world, there is a AEHF in almost every operating unit, which is used in all areas of surgery, both in the hospitals and in the offices of private doctors.

There are a number of devices for electrosurgery on the market, among them there is the electrochemical high-quality apparatus EPHCH-E81M "FOTEK" (frequency 440 KHz), Surginon EMC electrosurgical radio-frequency apparatus (frequency 4 MHz).

Electrosurgical equipment is widely used in general surgery, gynecology, cosmetology, dermatology, dentistry, urology, otolaryngology, oncology and proctology.

The basic principle of electrosurgery is the transformation of high-frequency current into thermal energy. The spark generator is a generator of high-frequency pulses with voltage 1.5-3 kV. Modes of its work are characterized by different power, which can be regulated by the change of duty ratio, which determines the relationship between the peak and the average power pulses.

In this paper, it is proposed to develop sources of high-frequency, high-voltage pulses - a spark generator for constructing the structure of an electromagnetic circuit. 1

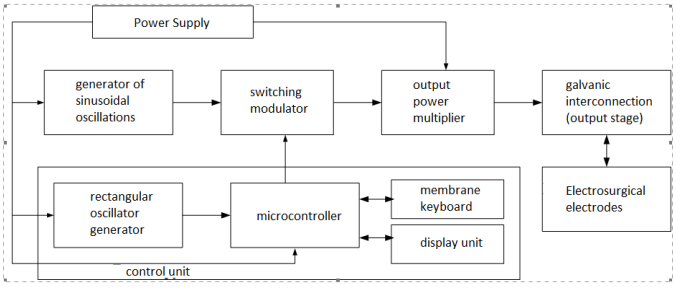

Figure 1 - The block diagram of the spark generator

The example works in the following way: a high frequency sine wave generator generates a signal of a given frequency, which enters the signal input of the switching modulator. The operating time of the switching module is given by a control unit built on the microcontroller, which also provides for the choice of operating modes of the spark generator and its indication. This signal exceeds the output power, which generates an output signal of maximum power for a given operation and through the output stage of electronics for electrochemistry.

Using the microcontroller allows you to simplify pulse-rate control, since it does not require additional delay line design for other modes of operation.

The power supply is a PWM source with control of the output voltage and power, as well as the level of isolation from the 5 kV network (in accordance with the State Standard). This unit, together with the output voltage multiplier, generates an output signal according to the specified parameter control unit.

The generator of sinusoidal oscillations is based on the ATmega8-16AC chip. This microcontroller is based on 8-bit CMOS, based on the RISC AVR architecture. By completing one full instruction per cycle, ATmega8 achieves 1 MIPS per MHz, allowing you to achieve the optimal ratio of productivity and energy that is consumed. Modulation of oscillations will occur with a transistor.

The display unit for monitoring the voltage and current values during operation contains a digital voltmeter and an ammeter. The seven-segment display shows the selected operating mode.

The output cascade represents a bridge high-frequency converter of a constant voltage in the variable with a given frequency of conversion of 440 kHz and the level of output voltage according to the chosen mode of operation.

Thus, the proposed device provides the formation of the normalized output power and expands the functionality of a variety of medical applications.