DESCRIPTION

Of the Integrated Switch of Magnet Flux (INCOMP)

Patent application number 109554 / 22.05.2006

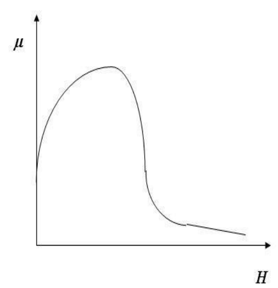
1. Application area

INCOMP is used in all devices where switching or aggregation of magnetic fluxes of permanent magnets or electromagnets is or is necessary. INCOMP expands the spectrum of types and types of electromagnetic devices, and also extends the possibilities of using permanent magnets, such as power supplies in autonomous electromagnetic devices, as well as generating electricity.

2. State of the art

Numerous attempts have been made to solve the problem of the commutation of a constant magnetic flux from a permanent magnet or an electromagnet for use, but as a pulsating magnetic flux, for further energy conversion. All these experiments in concentrated form find application in the so-called MEG, patented by Thomas Berden in the United States (Thomas E. Bearden, U.S. Patent No. 6,362,718 B1 / 26.03.2002) in a team with others. There are other developments in this area, but all of them have a common feature and solution - interacting in one way or another with countercurrent magnetic fluxes in a common conductor with that of the executive device

3. Техническа същност



It can be seen from the graph that in the general case it first increases with the increase of H, then decreases, with large induction branches at = 1

From equaTION

$$B = mu\ H$$

it is evident that the only parameter that can be changed is the magnetic permeability of the material. Based on the above, INCOMP can be considered as a non-linear quadruple (Figure 1), in which the magnetic impedance is changed by law, contrary to the change law of 0, at the input of which input voltage is applied.

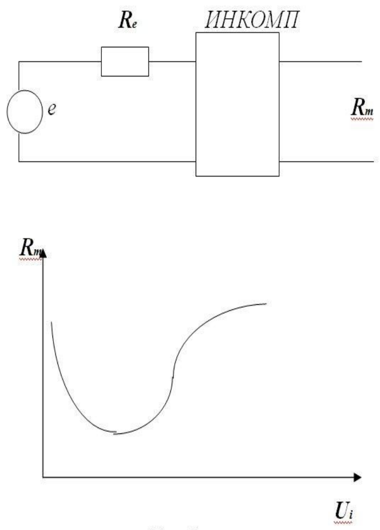


Рис.1

The mathematical expressions for determining the magnetic permeability variation characteristics are set forth above. The magnetic resistance of INCOM is determined according to the expression

Rm = lmed / (mu S)

The attached drawings show different design solutions of INCOMP with different shaped shunts, depending on the the purpose of the device — ordinary, straight, toroidal, double shunt. In all shown cases the shunt is also a magnet with a corresponding one coil on it.

Of interest is the toroidal core shunt that has two control coils included to create a circular magnetic flux. The principle of INCOMP is based on the induction of ferromagnetics in deep saturation mode with the help of the control coils, with the process of magnetic amplifiers.

INCOMP core (cores) are calculated and assembled according to the engineering design methodologies of such devices.
During operation, the power consumption in the control coils of INCOMP is dissipated as heat.
The magnetic resistivity characteristics of INCOM enable it to be defined as an electrically conductive magnetic non-linear element capable of carrying out a variety of magnetic flux transformations in magnetic circuits. As the INCOMP input has no inductance, it is permissible to use a variety of control voltages (current).
Another feature of the toroidal shunt is that it allows the complete separation of the switched magnetic flux and isolation of the executive device from the effects of the switching fields.
In the most general case, switching operation based on the method of varying the magnetic resistance by changing the magnetic permeability of the magnet is reduced to two main duty cycles:

Cycle # 1, in which the magnetic resistor Rms of the shunt is much less than the magnetic resistance of the Rd executive device and the switched magnetic flux is closed through the shunt of the switch.
Cycle # 2, in which the magnetic resistor of the Rms shunt is much greater than the magnetic resistance of the Rd executive device, as a result of which the switched magnetic flux is redirected through the actuator

Cycle # 1 - Rms Rd

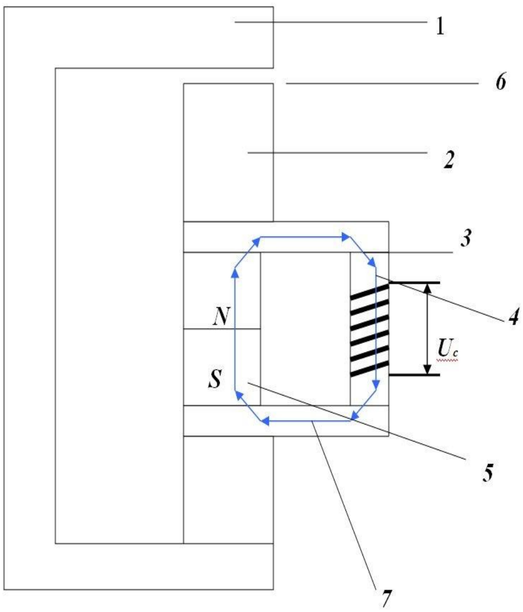


Fig. 1
1 - core of the executive device; 2- poles of INCOMP; 3- Magnets of the shunt; 4- electromagnet of the shunt; 5- permanent magnet; 6 - a working slot for adjusting the magnetic impedance; 7 - magnetic flux of the permanent magnet at Uc = 0.

4. A description of the attached figures
In the attached drawings, embodiments of INCOMP are shown depending on the functional purpose - as a magnetic flux surge or as a permanent magnet flux separator and switch.
In Fig.1 and Fig.2 are given examples of INCOMP, whose purpose is to sum up and switch the magnetic flux of a permanent magnet, Fig.1 reflects the process before the supply voltage Uc,
A in Figure 2 - when such a control impulse is given.
Said exemplary device comprises a magnet shunt (3), a coil (4), a permanent magnet (5), poles of INCOMP (2), a conductor of the actuator (1) and a working slot for adjusting the magnetic resistor (6). In this case, the INCOMP shunt core (3) is prismatic rather than toroidal.

Fig.3 and Fig.4 show two other variants of INCOMP but with a toroidal magnet of the shunt (3). The purpose of this embodiment is to separate a magnetic flux from a permanent magnet (5) and direct it to an actuator (1), in this case a throttle. Fig. 3 reflects the moment before the supply voltage, i.e. Uc = 0, as well as the magnetic flux of the permanent magnet (Fm) closed through the toroidal shunt (3).
In Fig.4. the moment when the control voltage is supplied, i.e., when Uc 0, and the magnetic flux of the permanent magnet is already closed through the work conductor magnet (1).
Figures 5 and 6 show drawings of another type of INCOM whose task is to separate and redirect the magnetic flux of the permanent magnet (5) through the actuator (1). Again they are

reflected the moments before and after the control pulses were delivered to the toroidal shunt control coils. The difference here is that the permanent magnet (5) is located within the INCOMP toroidal electromagnetic shunt (3) using the effect of the perpendicular vectors of the magnetic flux to separate the constant magnet flux (5).

Cycle # 2 - Rms Rd

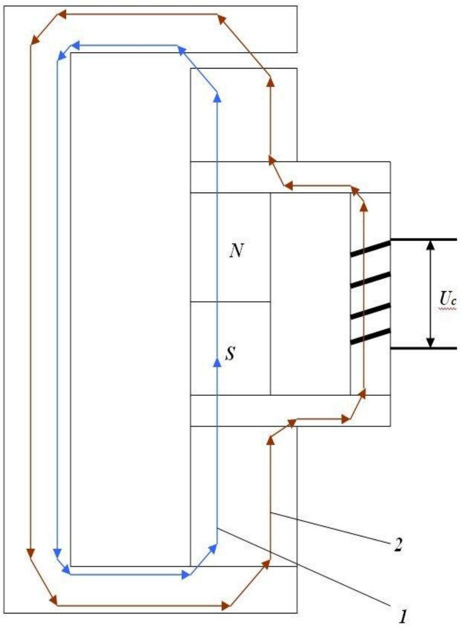
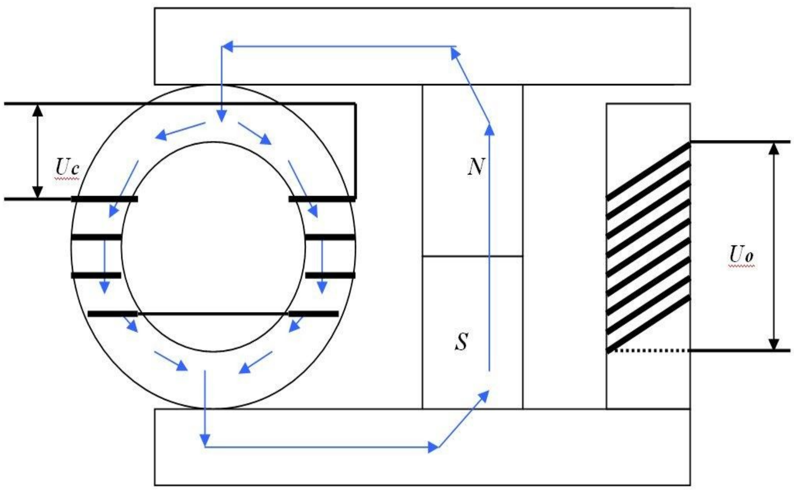


Fig. 2
1 - Magnetic flux of the permanent magnet at Uc 0
2 - magnetic flux of the electromagnet at Uc 0



Фиг. 3

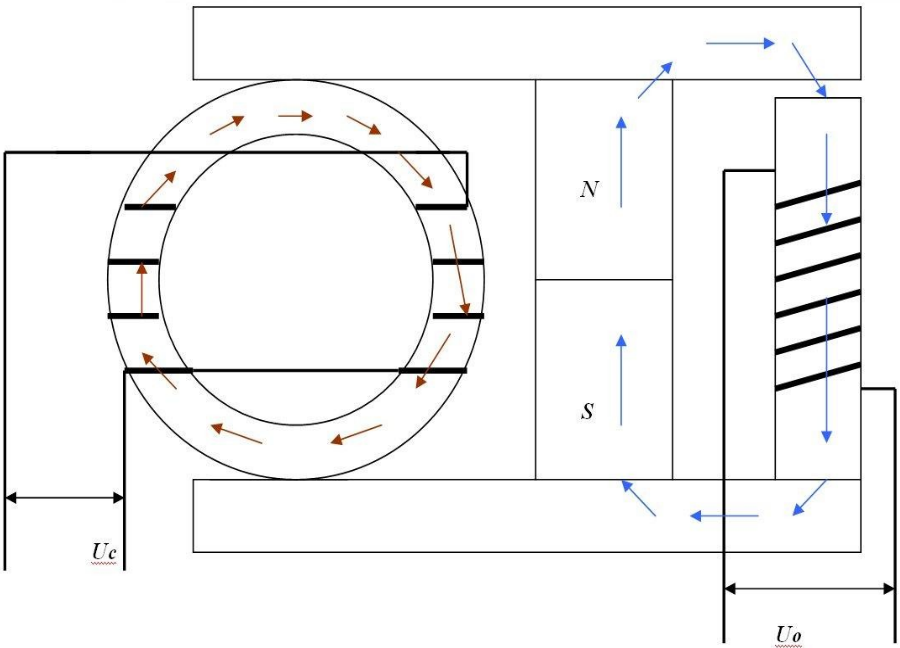


Fig. 4

Fig. 5

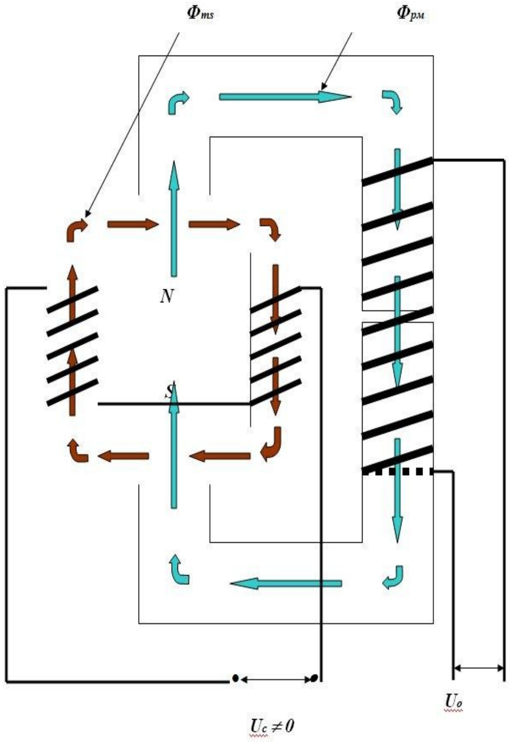


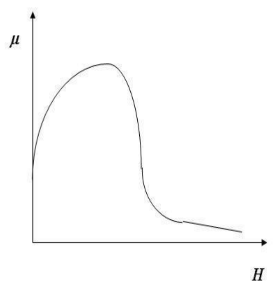
Fig. 6

5. Example of implementation
As examples of embodiments are Fig. 3, Fig. 4, wherein the purpose of INCOMP is to direct the magnetic flux of the permanent magnet (5) to the actuator (the working one by means of the magnetic flux control method by changing the magnetic permeability and the magnetic impedance)) device (1) for the purpose of performing a particular job. In this case - generation (induction) of electricity.
The toricidal magnet of the shunt (3) is chosen so that its magnetic permeability receives a minimum value () and hence the magnet resistance of the magnet (3) is inclined to a maximum value (Rms Rmsmax) at low magnetic field strength N.
The toroidal shunt windings are connected such that a circular continuous magnetic flux is formed in the toroid, i. E. connection is done as a consistent operation. It is recommended for impulse operation to have impulses to be rectangular, with a steep front and a minimum duration, consistent with the magneto-conductor's capabilities. Concrete projections for magnet conductor cross section, conductor, number of windings, etc. is performed according to the engineering method for designing pulse devices.
The characteristics of the permanent magnet used (5) are selected depending on the operating conditions and the purpose of the device.
After the control voltage (impulse) is applied, saturation of the toroid (3) occurs from the circular magnetic flux, resulting in an increase in the magnetic resistivity. The magnet resistance of the shunt becomes much greater than that of the working aperture (6), thereby causing the magnetic flux of the permanent magnet (5) is redirected in the form of a magnetic impulse through the actuator (1) and is induced e. The termination of the control pulse leads to the re-closing of the magnetic flux of the permanent magnet (5) through the toroid. The frequency of repetition of the cycles depends on the properties of the materials used.

REFERENCE

INCOMP is intended for use in various electrical devices for controlling magnetic circuits as well as for obtaining a pulsating magnetic flux from a permanent magnet without affecting the switching device on the actuator.
It is particularly useful to use it in power supplies operating in autonomous mode.
A characteristic feature of INCOM is the ability to control powerful magnetic fluxes through small changes in the magnitude of the control voltages, i. the effect of a triode amplifier or transistor is achieved, but with respect to the control of magnetic circuits. This makes its operation particularly effective in power generating devices as shown in Figures 3, 4, 5 and 6.
A particular advantage of INCOMP is the minimal impact on the executive device by the switching as well as the elimination of the impact of the anti-EE generated in the working device (1). on the permanent magnet.
INCOMP with the same success commutes magnetic fluxes of permanent electromagnets. In this case, the permanent electromagnets do not need compensating coils or other means to avoid the influence of the AC power of the actuators (1).

3. Техническа същност



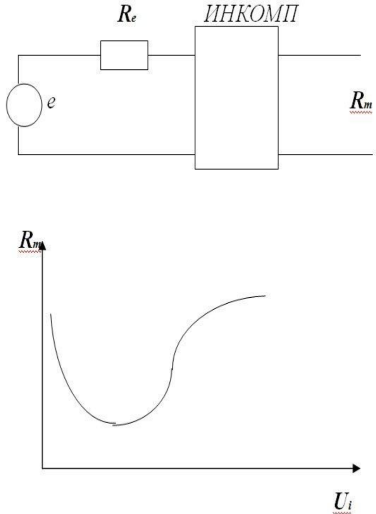
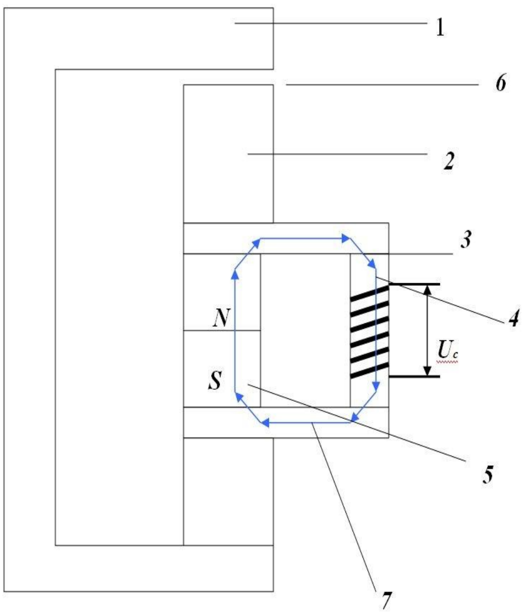
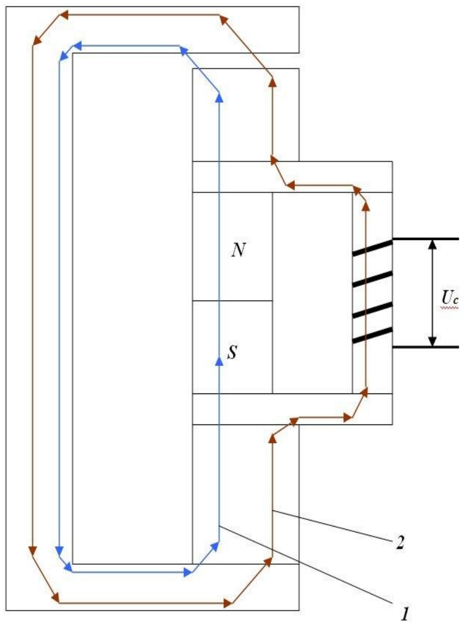
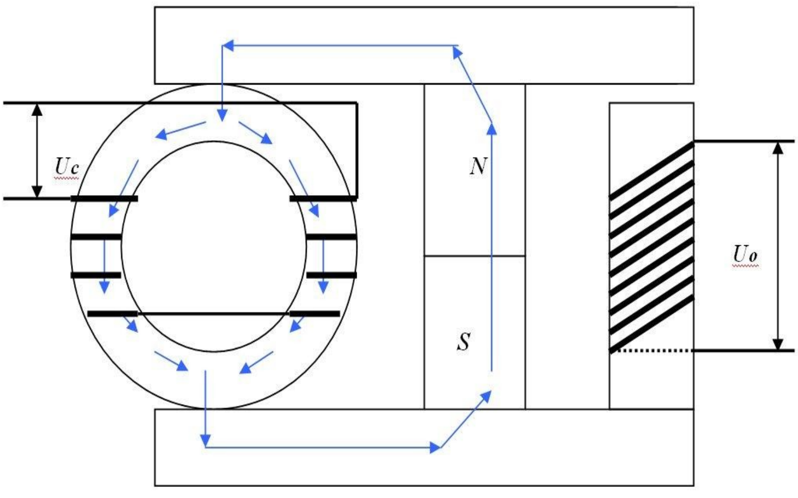


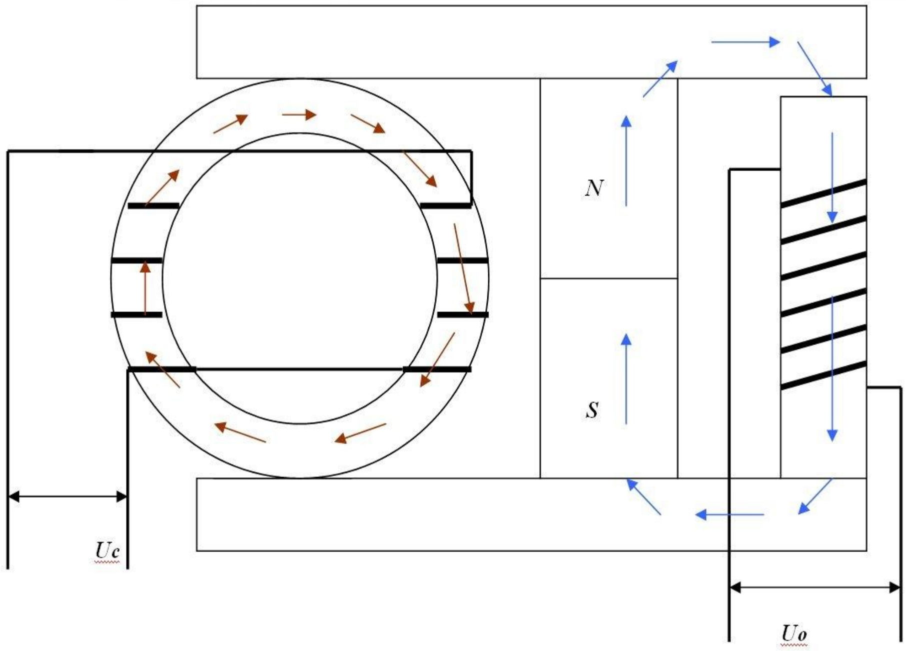
Рис.1







Фиг. 3


N
S
Uc
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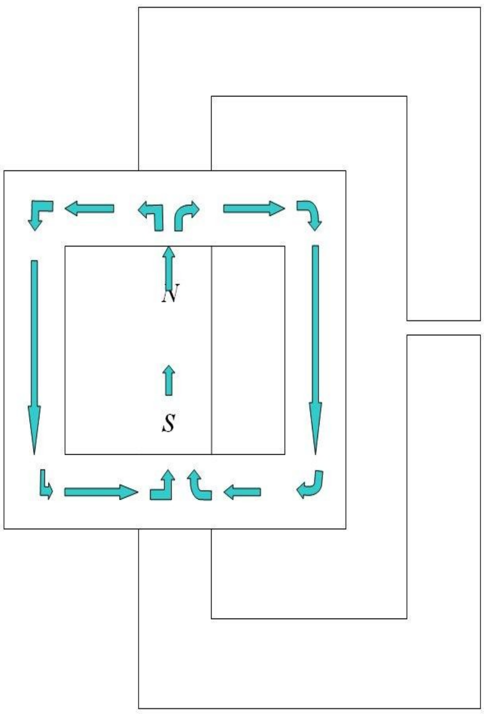
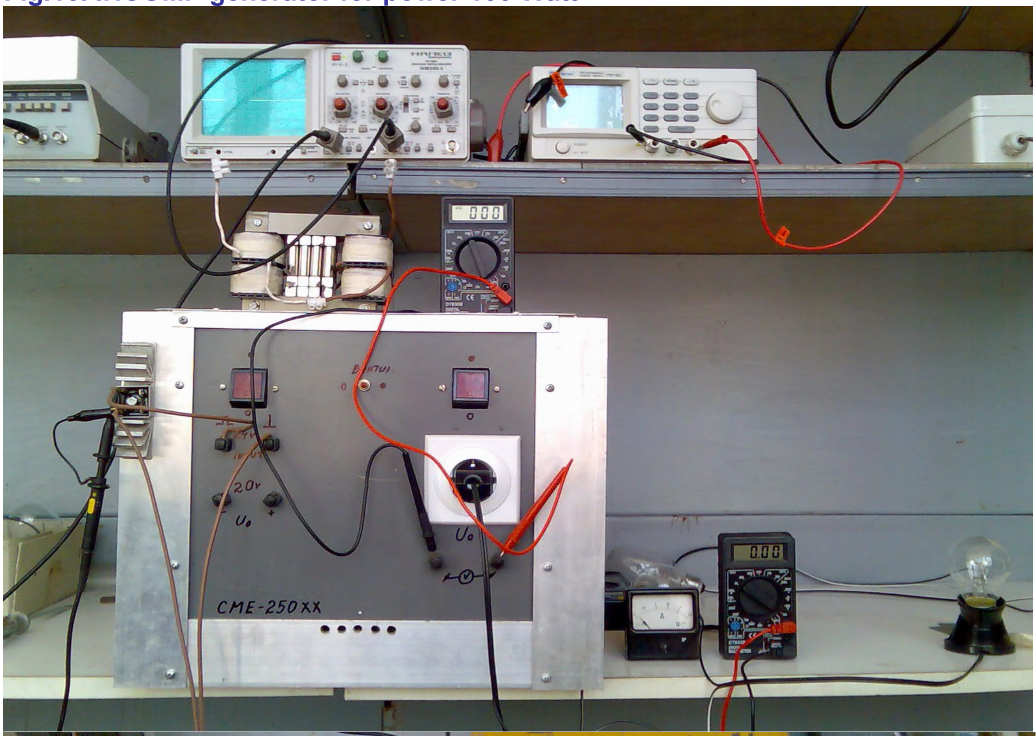
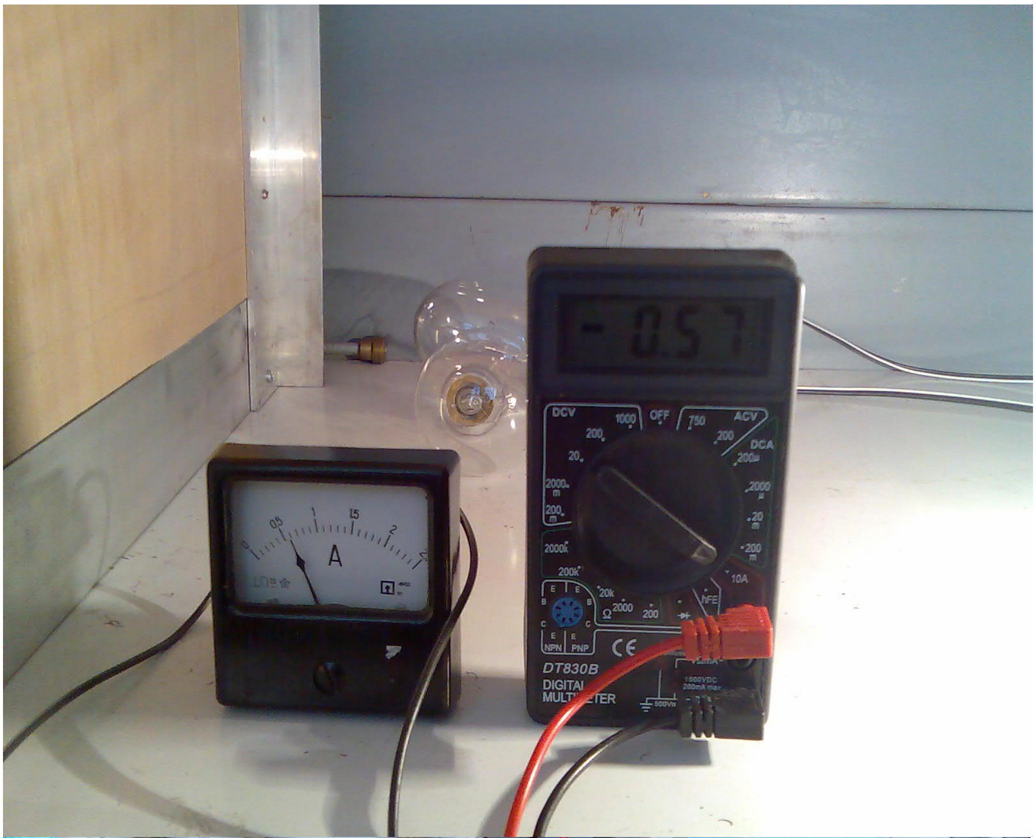

N
S

Fig.2 Ammeter for measurement of input current for control in INCOMP
Fig.3. Ammeters measuring the output current through the load (lamp 220B / 100W)
Fig.4 Voltmeter that measures the output voltage on the load (constant voltage)
Fig.5 An ammeter that measures the input current of the control pulse
Fig.6 Overview of the working generator

(Fig.7, reading the duration and amplitude of the control pulse amplitude at a voltage of 17 volts, duration of impulse - 2 milliseconds)

Fig.8 Appearance of INCOMP switch for output power 100 watts
Fig. 9. Example of execution of INCOMP generator for Output power 100 Watt
Fig.10. INCOMP generator for power 100 Watt

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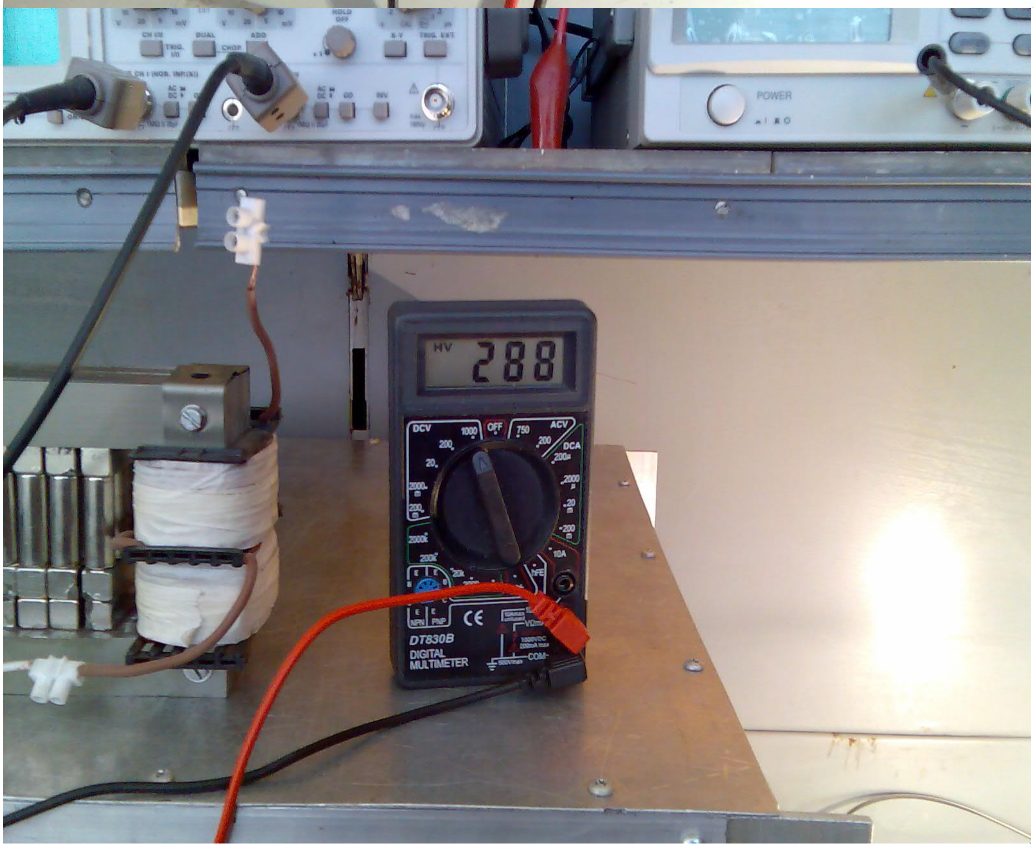
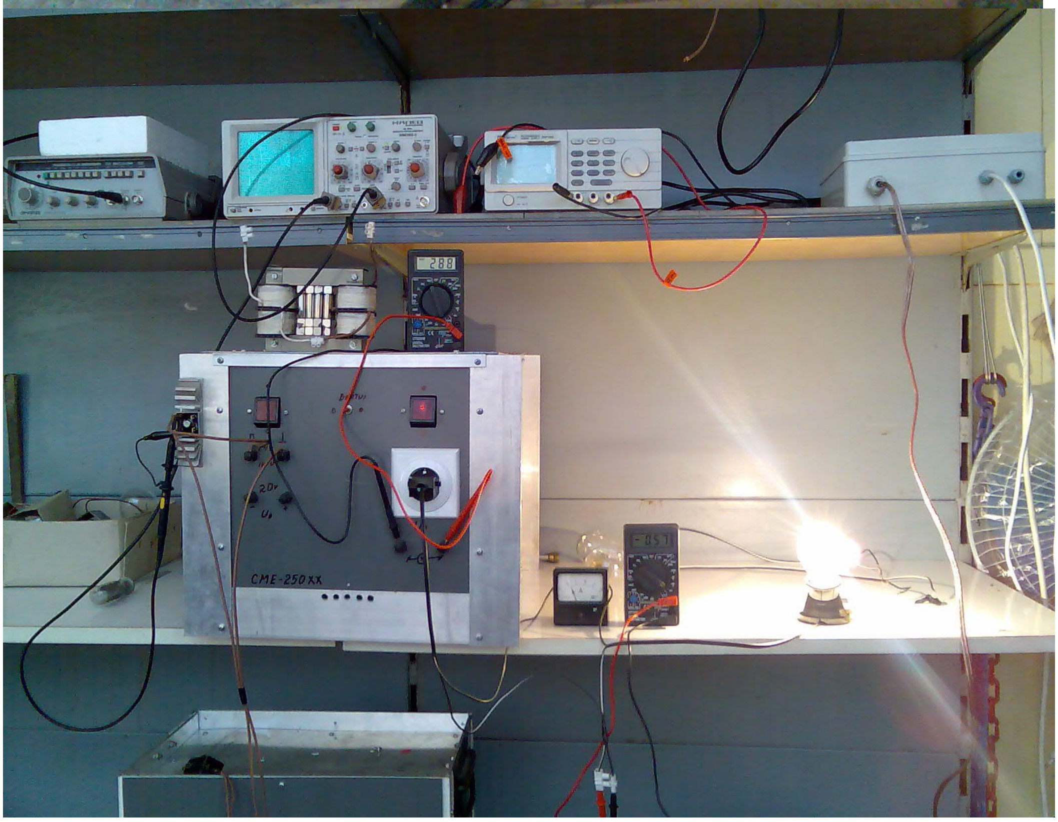
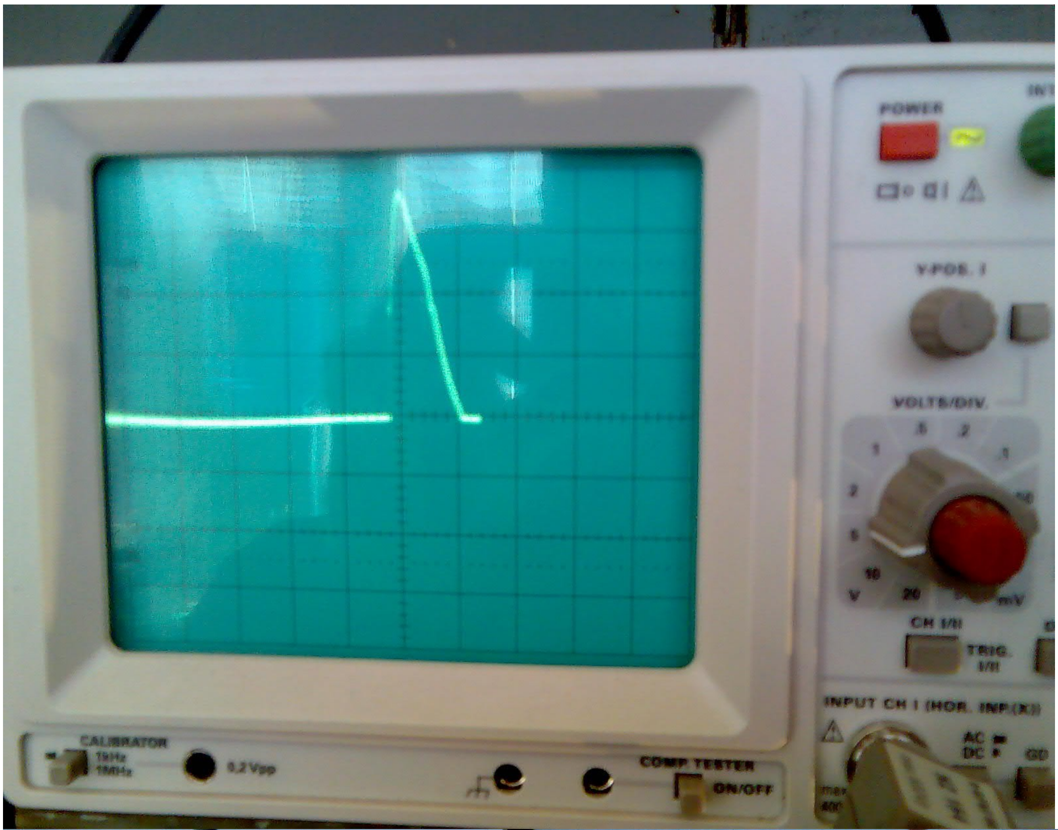
OFF
ACV
DCA
10A
A
DT830B
DIGITAL


POWER
288
DCV
OFF
ACV
DCA
10A
DT830B
DIGITAL
MULTIMETER


266 CLAMP METER
ACA
EXTERNAL UNIT
OFF
05.0
COM
1000V
750V
MAX


CME-250XX


POWER
Y-POS. I
VOLTS/DIV.
CH I/II
TRIG. I/II
INPUT CH I (HOR. INP.(X))
AC
DC
GD
CALIBRATOR
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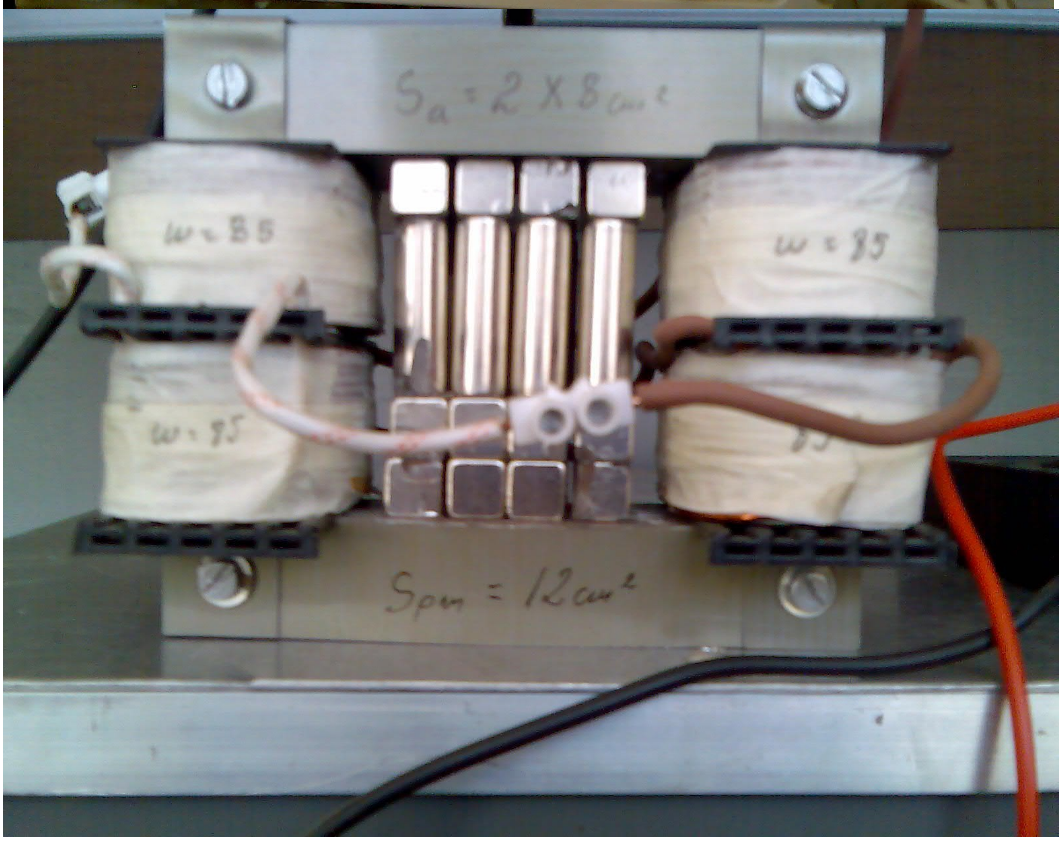
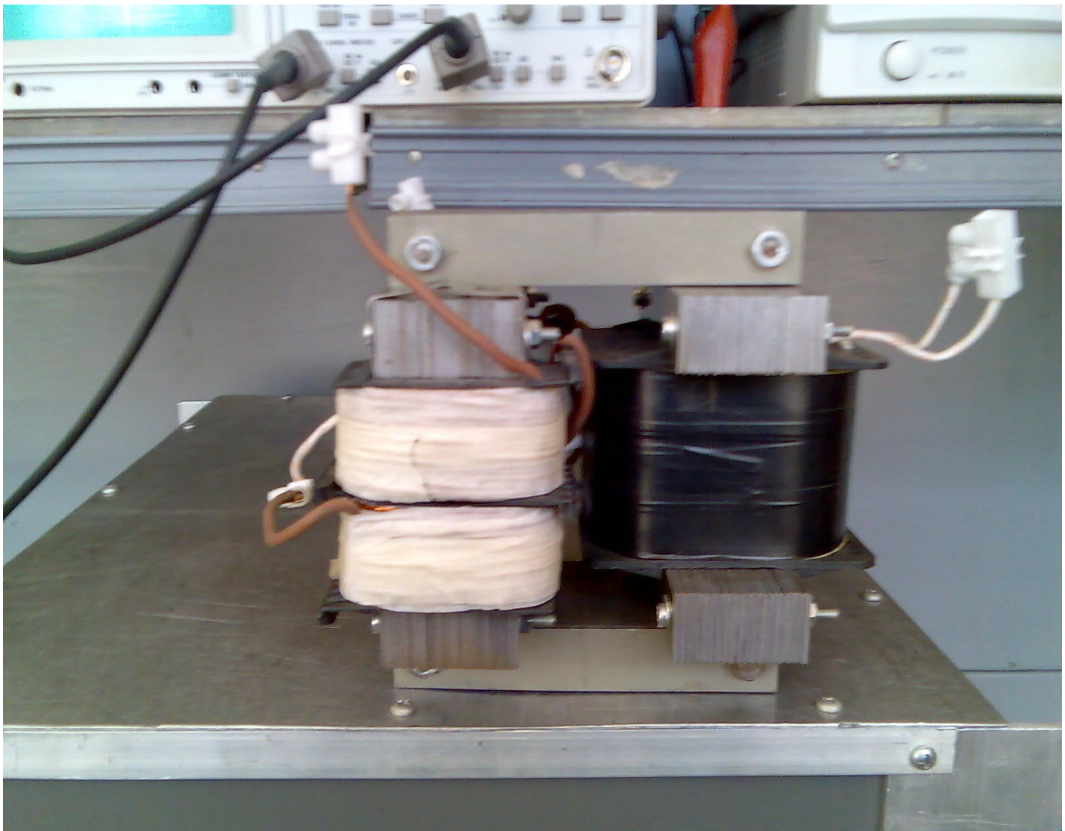
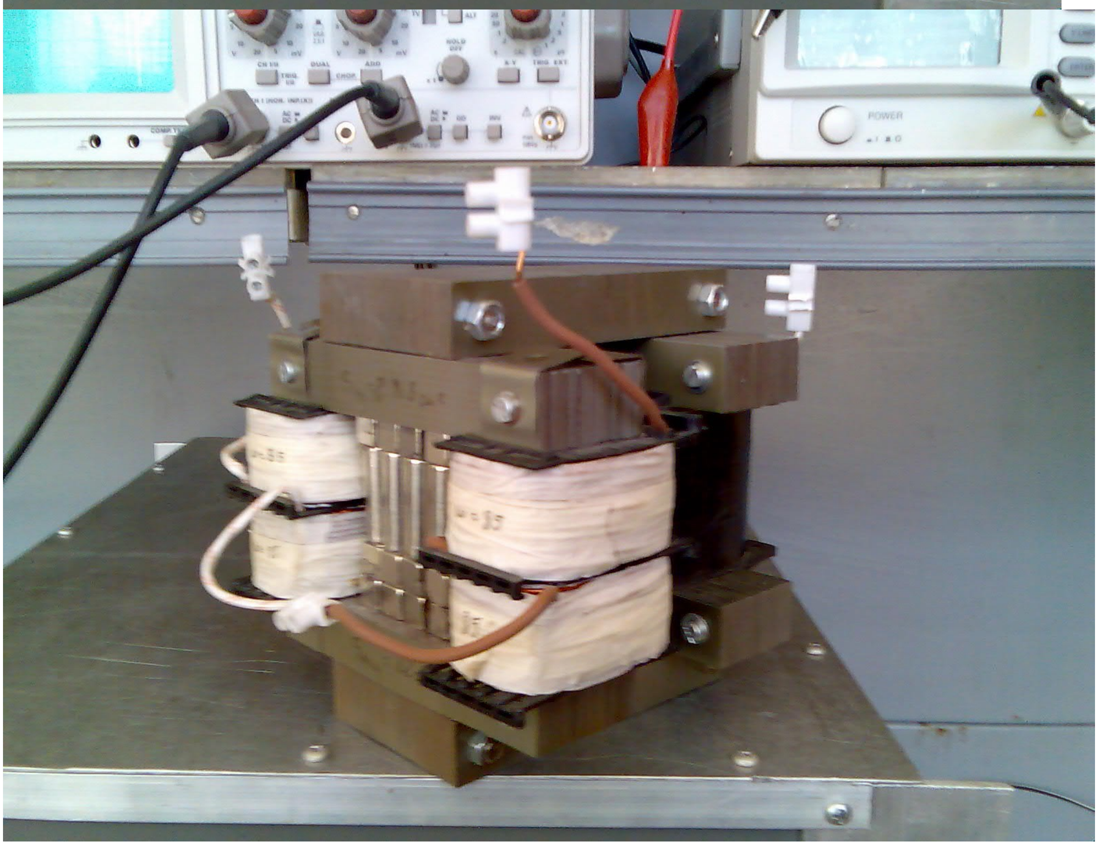
1MHz
0,2 Vpp
COMP. TESTER
ON/OFF


Sa = 2 X 8 cm²
w = 85
w = 85
w = 85
Spm = 12 cm²




POWER