

VOLTAGE CONVERTER WITH POWER 12VDC/220VAC 250W.

Inverter is designed to allow the power system equipment 220V AC power supplies in a power failure or situations where there is no access to it. People appreciate the advantages of inverter spending holidays in a tent or camping.

The converter has been tested in practice and has worked successfully with the following receivers:

- Television and radio receivers,
- light bulbs, fluorescent lamps,
- Circulating pump furnace CO
- power tools (drills, sanders)
- computers
- Power.
- sanders)
- computers
- Power.

PRINCIPLE

Schematic diagram of Fig.1 shows the inverter. Voltage 220VAC obtained by keying przemiennemu transformer windings TS1. As the keys are working two power MOSFET transistors with channel n-type - T2 and T3. These transistors are controlled directly by the integrated circuit US3 (SG 3524). This layout is PWM generator circuit designed for use in voltage converters. The frequency at which the work is fairly well wide and is in the range from 10 Hz to 300 kHz.

In the case described here, the inverter frequency is 50Hz, which is corresponds to the frequency grid. This frequency is determined by with components C6 and R15. Adjustable pulse width generated by the arrangement of US3 was used for voltage stabilization 220VAC output.

One of the voltage stabilization circuits are elements of D6, D7, and the divisor Resistance R12 and R13, which voltage signal reaches the amplifier input Error (tip-IN) of US3. This voltage is compared with a suitably divided reference voltage available at terminal V_{ref}

. This allows

"Tuning" the generator to the voltage present at the battery terminals.

The second circuit stability are the elements of D8, R6, PR1, US2, R7, R8, and C4, which are responsible for providing the feedback signal, proportional to tension prevailing in the output of the inverter.

Converter without stability would provide the output voltage-dependent load power and battery power level. This tension in wahałoby ranging from 170V to 270V. With the stabilization of the said circuits, the voltage the inverter output in virtually any environment should be 220 V.

Assuming the most unfavorable situation, which may be a partial discharge battery and to order the full power inverter 250 output voltage is not should drop below 220 V.

Kluczujące transistors T2 and T3 are blocked capacitance C8 and C9, whose task is to reduce the overvoltage impulses arising in disable keys when T2 and T3. The additional protection is also existing structures of MOSFET reverse diode.

Loads the power inverter 200W or 250W in a row, the transistors Final significant currents flow. They can cause a temperature rise of connectors to dangerously high temperatures. Therefore, the inverter is equipped with with an active cooling. If the heatsink temperature reaches 40 ° C (which roughly means that the temperature structure is 70 ° C), the sensor temperature - which is PTC - will increase. This will cause the comparator US5 output changes state on the opposite wysterowywując same transistor T4 in which the circumference of the collector was placed cooling fan mounted on heatsink.

Converter system is protected against improper connection battery terminals. This protection was achieved by using diodes D1 in the control relay PK1. This circuit is also used as collateral against excessive battery discharge. If the value of the input voltage supply drops below 10.5 V at the tip 6 US1 voltage appears power, thereby blocking the work of the transistor T1, and Consequently, disconnection relay PK1.

LED D5 indicates the drive to work, while the D4 inform that the battery is excessively discharged.

Deliberately abandoned here with inverter protection circuit against overload, as in most cases the system operates with only one load, whose power is adjusted accordingly. However, security short circuit in the form of fuses, B1 and B2 should be sufficient.

INSTALLATION AND STARTING SYSTEM

WARNING! The inverter generates 220V AC voltage, which is so as dangerous to life and health as voltage grid. Therefore, it is necessary to run the system with special precautions. Preferably in the presence of another person who is able to switch off equipment and first aid.

Converter system is mounted on a printed circuit board, which is shown in Fig.2. Fig.3 shows the arrangement of elements.

Kluczujące transistors T2 and T3 are not mounted on the plate but mounted on a suitable heat sink and connected to the transformer. Mounted directly on the heatsink and PTC. A similar situation looks when it comes to fuses B1 and B2, which are accessible from the outside. The inverter is built with efficient components should work right away after connecting the battery. The whole control system refers to a setting potentiometers PR1 and PR2. With the help of PR1 is set at the output inverter voltage of 220V. It should be noted problem of correct measurement of the RMS voltage of the inverter 220. As the conduct of the output is close to sinusoidal, but rectangular,

Some devices may have problems reading the value of the effective output voltage. Therefore, to measure the voltage meter is best used with a Transmitter **True RMS** ", or use the oscilloscope.

The second potentiometer PR2 set so that the heat sink temperature of about 40 ° C

working fan.

Transformer used is a toroidal transformer with two voltage symmetrical 10 V (secondary winding) and a 220 V (primary winding). Inverter no-load current should draw about 300mA. If the current shall be much higher it may indicate that asymmetry transformer windings TS1 or different time-key opening of transistors T2, T3.

At the end of a few words about cooperation with the battery inverter. Selecting the battery to the inverter should pay particular attention to two parameters. The first is the maximum current drawn from the battery, which depends on the equipment supplied by the inverter. Each 10 W load inverter current consumption is 1A with the battery. The second element is battery. Time inverter must take this important parameter of the battery.

The list of items

Resistors:

R1 - 470 Ω
R2 - 1 kohm
R3 - 10 k
R4 - 820 Ω
R5 - 1 kohm
R6 - 130 k
R7 - 5.1 kOhm
R8 - 2 k
R9 - 2 k
R10 - 2 k
R11 - 4.7 kohm
R12 - 10 kohm
R13 - 5.1 kohm
R14 - 6.8 kohm
R15 - 130 k
R16 - 6.8 kohm
R17 - 2 k
R18 - 10k
R19 - 10k
R20 - 10 kohm
R21 - 10 kohm
PR1 - 220 k
PR2 - 10 kohm

Capacitors:

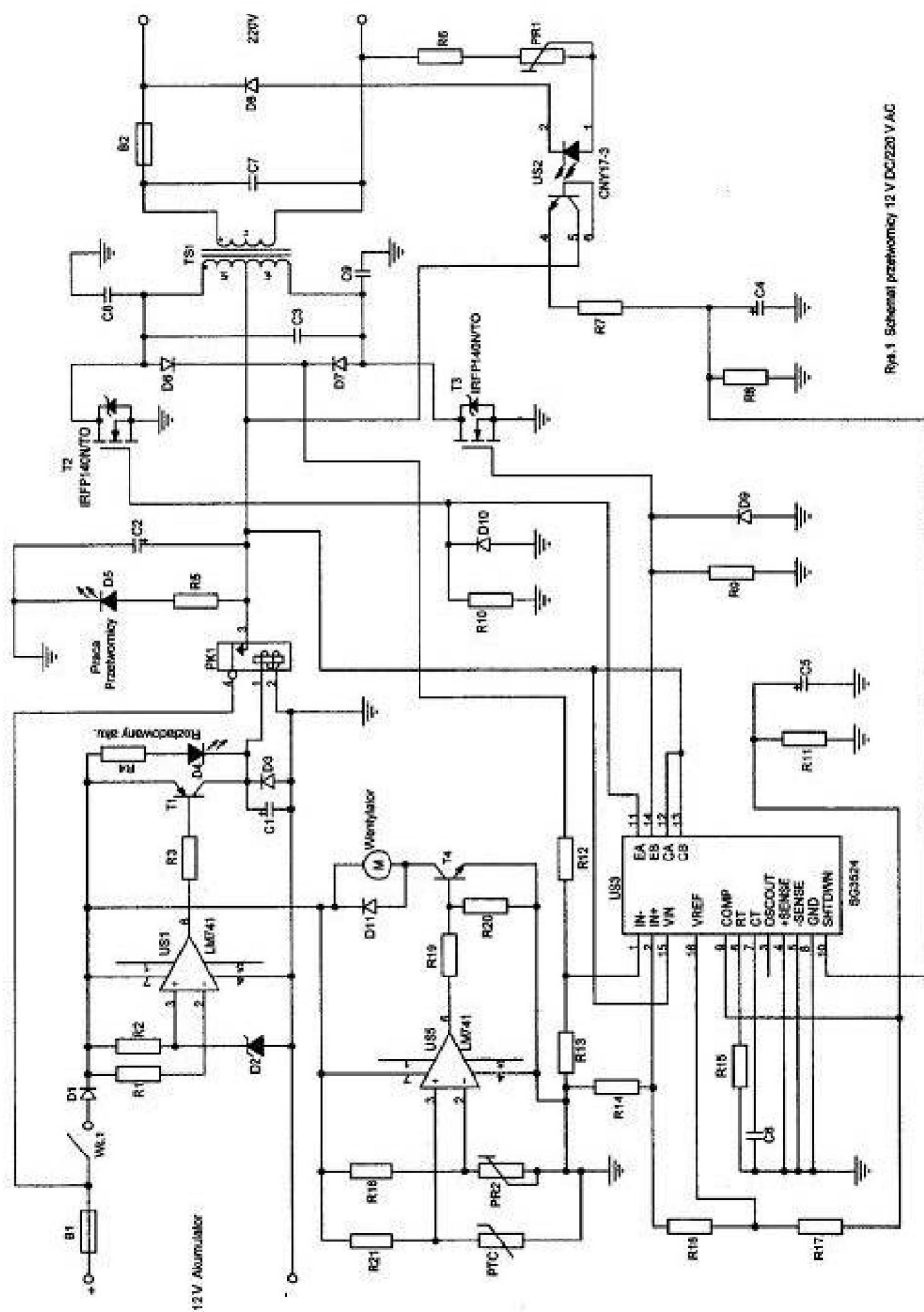
C1 - 100 μ F / 16V
C2 - 220 μ F/16V
C3 - 100 nF
C4 - 47 μ F/16V
C5 - 4,7 μ F
C6 - 100 nF/63V
C7 - 100 nF / 400V
C8 - 100 nF / 100V
C9 - 100 nF / 100V

Semiconductors:

US1 - LM741
US2 - CNY17
US3 - SG3524
US5 - LM741
T1 - BC308
T2 - 240 IRFP
T3 - 240 IRFP
T4 - 337 BC
D1 - 1N4007
D2 - Zener Diode C10V
D3 - 1N4007
D4 - LED (red)
D5 - LED (green)
D6 - 1N4007
D7 - 1N4007
D8 - 1N4007
D9 - 1N4007
D10 - 1N4007
D11 - 1N4007

Other items:

PK1 - RM 83Z
B1 - 30A (Automotive)
B2 - T2A/250V
TS1 - U
Sec = 2x10V, pri= 220, P = 250VA
PTC - 10k thermistor
On - Off
M - 12VDC Fan



Rys. 1 Schemat przetworcy 12 V DC/220 V AC