THE LOGICAL SCHEME OR-NOT IN THE NETWORK RECTIFIER CONTROL SYSTEM

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A new scheme of a semi-controlled network rectifier for a secondary supply of an inverter type where a complicated rectifier control system is replaced by a simplified control system executed as a logic scheme «OR-NOT» consisting of three optoelectronic pairs and a transistor key and an impulse-phase control system is offered.

Keywords: an impulse-phase control, a logic scheme, optoelectronic pairs, a transistor key

Single-phase secondary power supplies containing a network rectifier with a filter condenser at the output and a one or fuo-stroke inverter connected with it have bound a wide application both in installations of small and big (up 10 kw) capacity (inverter werding devices, single- phase plasmotrones, special electric drives etc).

It is know that at the voltage of 200 V according to the restriction rule of rectified voltage pulsations (the range is 10 ± percent) the capacity of a filter condenser should be about 1000 mf per 1 kw of capacity [1]. At such capacities it is necessary to restrict the charge current of a filter condenser when a power supply is switched on. Two methods are usually applied to restrict the charge current: resistor in series with a filter condenser switched on during a charging time with its subseguent shunting; condenser charging by a semi-operated rectifying bridge with a phase control. For single charging of a filter condenser from a network of ~200 V the energy $W = C\,\frac{\left(U\cdot\sqrt{2}\right)^2}{2}$ is reguired, at the capacity of 1000 mf it will make:

$$W = 10^3 \cdot 10^{-6} \cdot \frac{\left(220\cdot\sqrt{2}\right)^2}{2} \approx 48\ Dg.$$

It is obvious that at capacities above 1 kw the second method is preferable from the economic point of view. Besides, in emergencies locking out of a rectifier is necessary but is feasible only for an operated or semi-operated network rectifier.

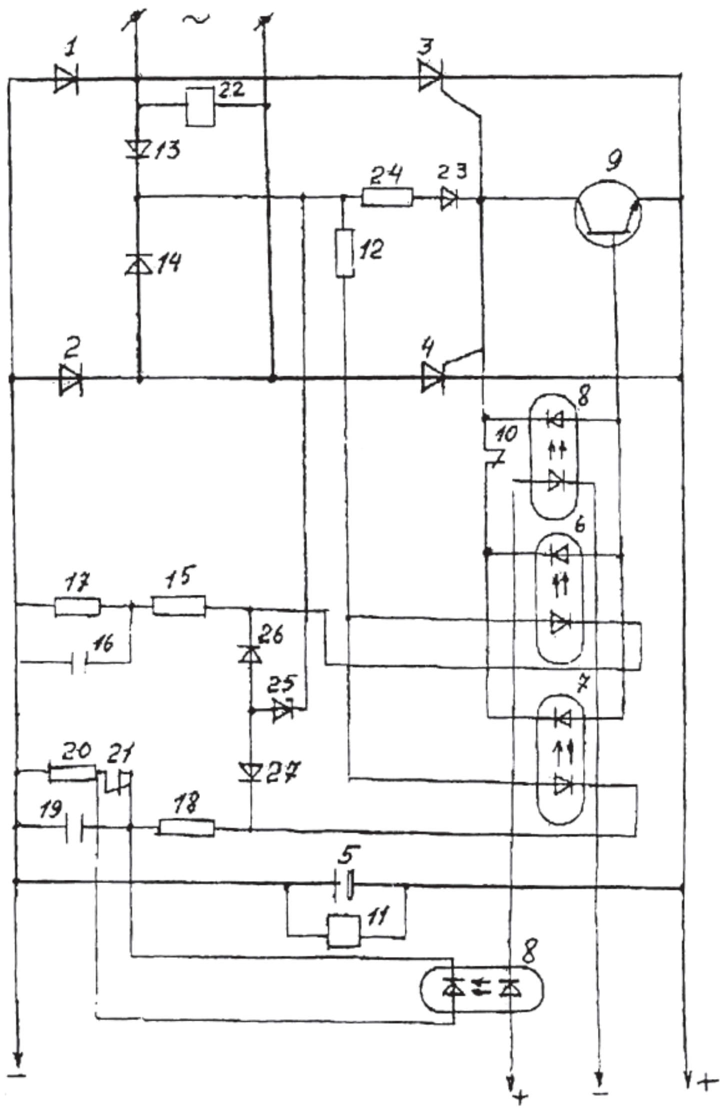
A semi-operated network rectifier in common schemes is supplied by means of an impulse-phase control systems and secondary power supply protection and the necessary rate of filter condenser charging is set by a forming R-C circuit at the input of an impulse-phase control system. To provide the supply of an impulse-phase control system and synchronize it with the supply network the network rectifier control system in addition to an impulse – phase control system contains power and synchronization units. It complicates the secondary power supply as a whole.

The complexity of the network rectifier control systems for a secondary power supply of an inverter type is not justified as regulation functions of output coordinate (voltage, current) are usually performed by an inverter and control over a network rectifier as was stated above is necessary only for smooth charging of a filter condenser and locking out of a network rectifier in emergencies.

Simplification of a control systems is achieved by means of a logical scheme OR-NOT consisting of three optoelectronic pairs and a fransis for key instead of a power and synchronization unit and an impulse-phase control system.

The logical scheme in the control system is given in Figure.

The new control systems is executed as a logical scheme OR-NOT containing three optoelectronic pairs 6, 7, 8, and transistor key 9, the latter being included in a conducting direction between controlling electrodes of thiristors 3, 4 of a network semi-operated bridge rectifier and common cathodes of these thiristors, the controlling electrodes of thiristors mentioned above 3 and the controlling input of transistor key 9 are shunted in a non-conducting direction by photodiodes of optoelectronic pairs 6, 7, 8, mentioned above ,so that photodiodes of the first and second optoelectronic pairs 6, 7 are connected to shunted points via opening contacts 10 of voltage control relay 11 at filter condenser 5, and one of two photodiodes of the third doubled optoelectronic pair 8 is connected directly to shunted points, the coil of voltage control relay 11 at filter condenser 5 is included in parallel to a filter condenser, photodiodes of the first and second optoelectronic pairs 6, 7 are connected by means of anodes via ballast resistors 12 to the plus output of a diode bridge , formed by two diodes 1, 2 with common anodes of a network semioperated bridge rectifier and two additional diodes 13, 14 with common cathodes ,photodiodes cathodes of first 6 and second 7 optoelectronic pairs are connected each to its own forming R-C circuit ,the first forming R-C circuit contains resistor 15 and condenser 16 in series with ,the condenser is shunted by discharge resistor 17, the second forming R-C circuit also contains resistors 18 and condenser 19 in series with it, the condenser is shunted by its discharge resistor 20 via parallel opening contacts 21 of network voltage control relay and the second photodiode of the third doubled optoelectronic pair 8,network voltage control relay coil 22 is included into the power network, and free terminals of condensers 16, 19 and discharge resistors 17, 20 are united with the common minus output of the diode bridge mentioned above and network semi-operated bridge rectifier 3, 4, both photodiodes of the third doubled optoelectronic pair 8 are in series with the corresponding output of the device protection system, and the common point of the controlling electrodes of network semioperated bridge rectifier thiristors 3, 4 is connected with the cathode of cutting diode 23, the anode of with via additional limiting resistor 24 is connected with common cathodes of the diode bridge mentioned above 1, 2 and with stabilectrone cathode 25, the anode of which is



united with the anodes of two untying diodes 26, 27, each attached to one of the forming R-C circuit by cathodes.

It has allowed to simply essentially the control systems as a whole by replacing the power and synchronization unit as a whole as the system of impulse phase control by a simple logical scheme.

References

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