

SPEED CONTROL SYSTEMS OF THE ELECTRICAL MOTORS WHICH ARE DRIVING THE MECHANISM OF THE ERC PORT-WHEEL EXCAVATORS

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ABSTRACT

Due to the constructive complexity of the ERC 1400 excavators, the number of the electrical driving and their diversity is very large.

In the technological process from open pits of lignite exploitations, the excavating process takes an important role. Until the present, the most reliable ways of excavation were the excavators with port-grab wheel, which are equipments with continuous driving.

The fact that in a technological line, line composed from ERC - TMC – MH (excavator with large capacity belt rotor-conveyor – dump machines) from a day exploitation, the ERC excavator with port-wheel is the basic element, makes his safe functioning to have a primordial importance and for the other

equipments from the technological line, found in downstream from the excavator.

In table 1 are indicated some of the technical characteristics of the ERC, used in the lignite mineshafts from the Oltenia's coal basin.

Table 1

Nr. crt.		U/M	Excavator Type			
			SRS 470	SRS 1300	SRS1400	SRS 2000
1.	Theoretical capacity	mc afin/h	1690	2800-3500	3280-3860	4600-6000
		mc viu/h	1200	2000-2500	2340-2750	3280-4280
2.	Maximum cutting force	daN/cm	70/50	75/60	85/65	95/60
3.	Length of the device	m	58	125	121,2	147
4.	Optimal width of the excavation block	m	18	40	45	55
5.	Excavation height	UP	15	26	30	30
		DOWN	m	3,5	3,5	7
6.	Nr. of unloads – minimum		60	67/84	39/46	70/91
7.	Total weight	tone	680	2010	2050	2933
8.	Ground specific weight	daN/cmp	1,15	1,10	1,07	1,13
9.	Power supply	kV	6	6	6	20
10.	Rotor installed power	kW	400	500	630	2x500
11.	Maximum admitted slope - during work		1:30	1:33	1:25	1:33
		- in movement	1:20	1:20	1:20	1:20
12.	Total installed power	kW	1275	2540	2950	5110

The component parts of an excavator with a wheel with grabs are indicated in figure 1

The excavation device at ERC (the wheel with grabs) is droved in present with asynchronous motors with the wired rotor (with rings), with starting metallic rheostat in 3-4 steps, motors with the following characteristics: 630 kW, 6 kV, 71 A, 988 rot/min. The tuning scheme with the best results, used for this mechanism, is presented in figure 2

The working program of the pivoting excavator's pivoting mechanism with the port-grabs wheel is characterized by repeated rotations and variable rotation speeds.

In the present, for driving the pivoting mechanism, are used the following electrical engines:

- continuous current motors, in generator-motor system (figure 3) and in rectifier-motor system (figure 4);
- asynchronous motor with rotor in short-circuit (figure 5)

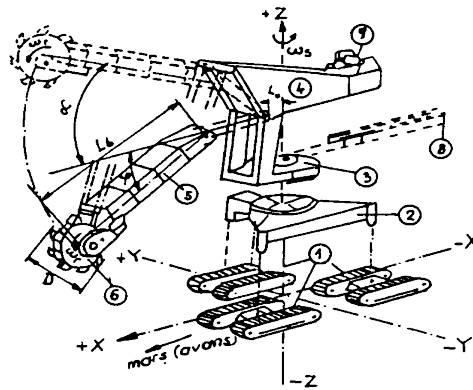


Figure 1

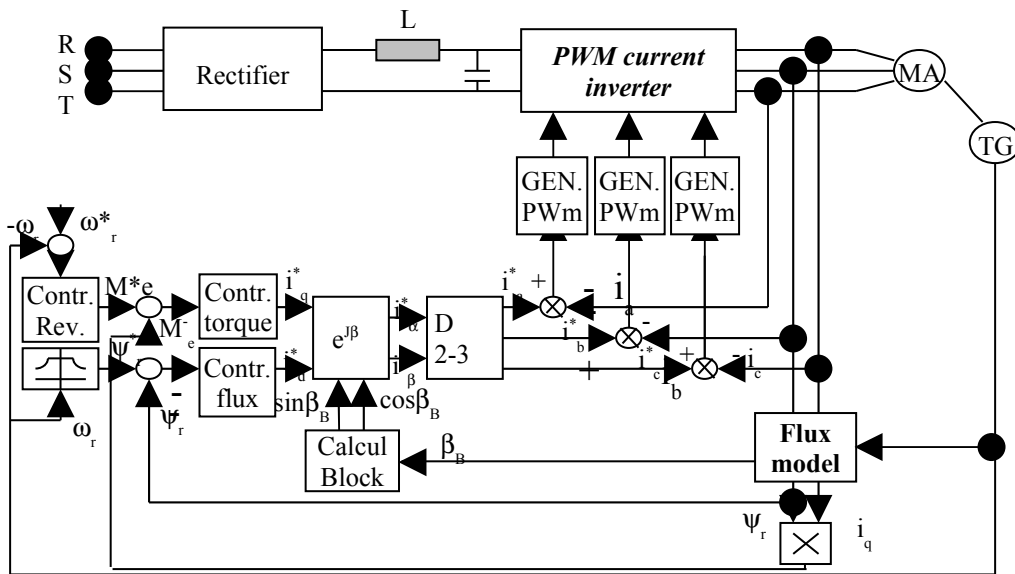


Figure 2

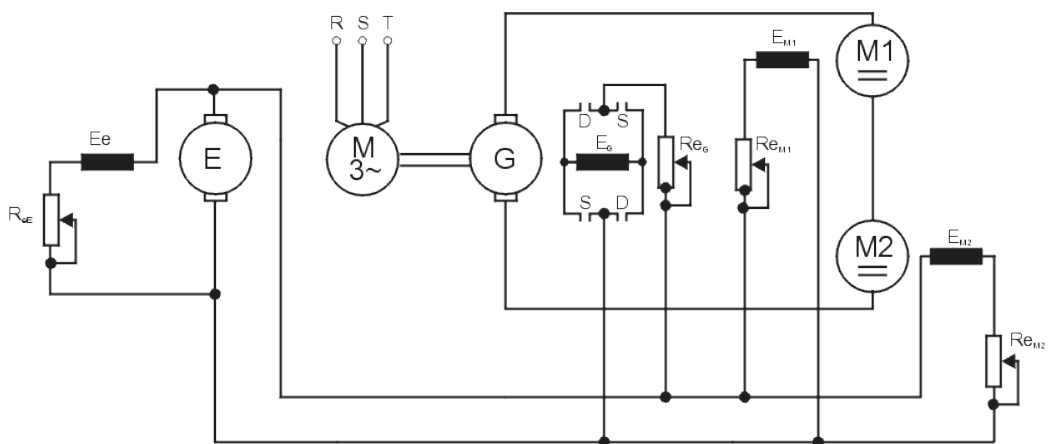


Figure 3

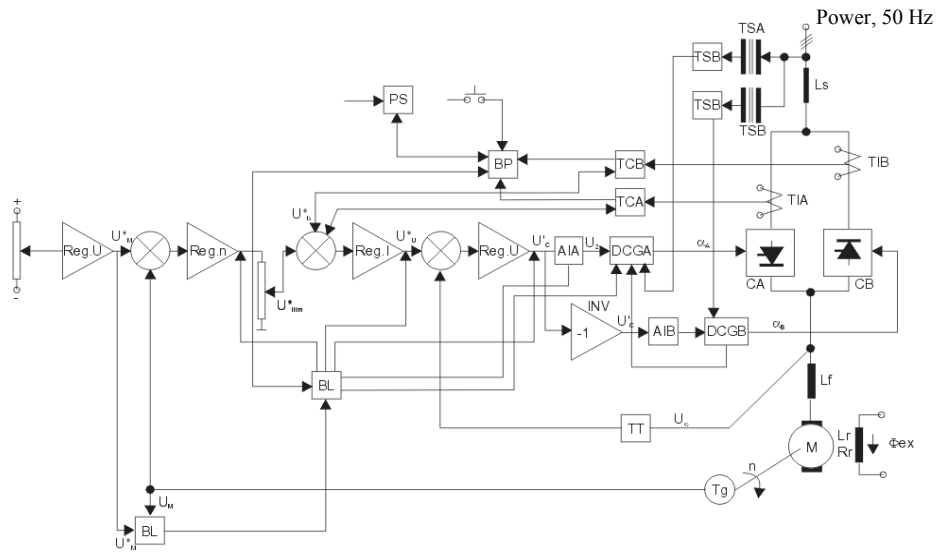


Figure 4

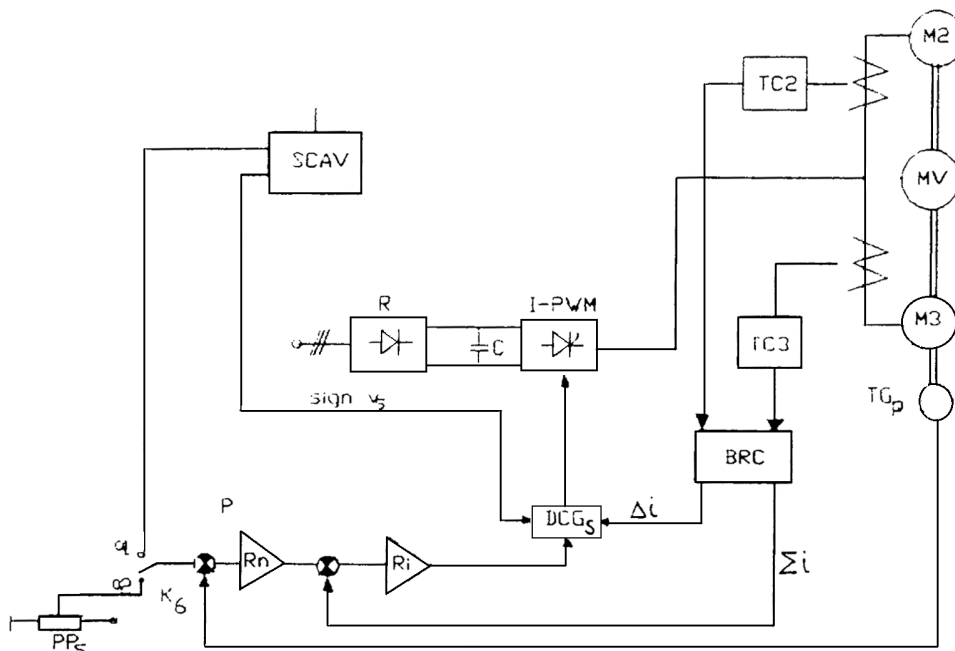


Figure 5

In the case in which is proposed the problem of maintaining a constant rapport between the grabs wheel speed and the pivoting speed, is used the electrical scheme from figure 6, where the tuning of the two speeds can be realized with the help of the two potentiometers pp_s respectively pp_r , or in

automatically mode, by passing the switches K_5 on the position a_1 and K_6 on the position a_2 , case in which the wheel with grabs driving motor and the superstructure driving motor will adjust the speed according with the command law of the command equipment.

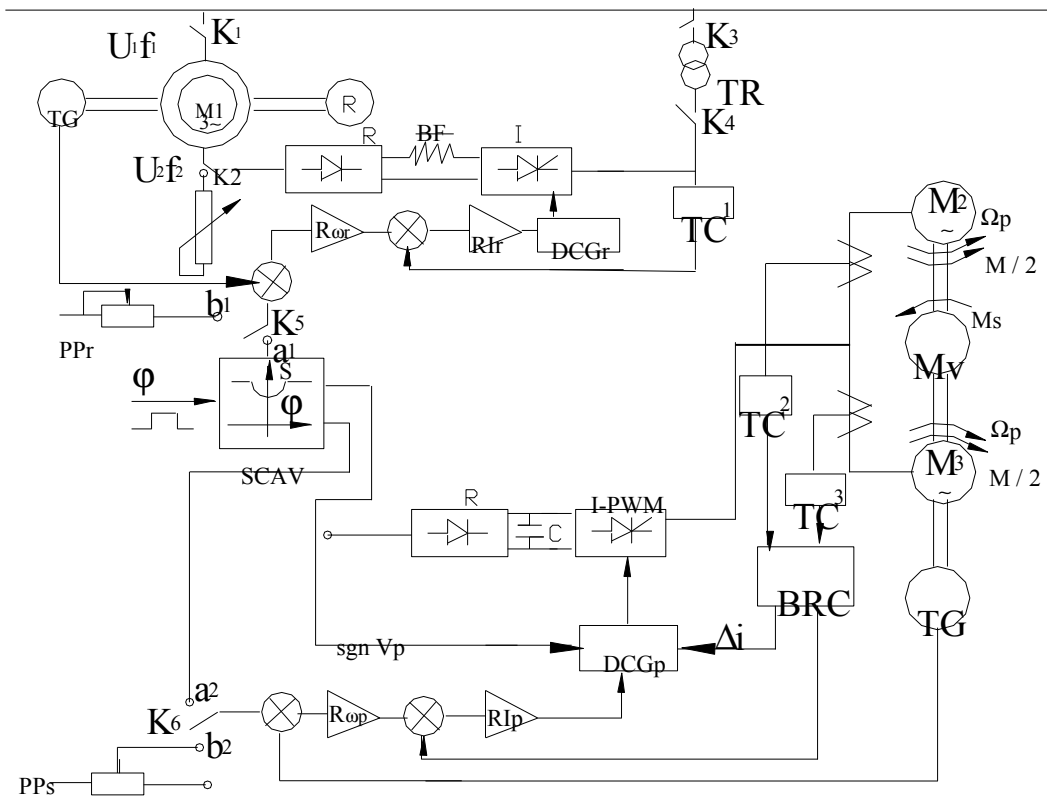


Figure 6

The lifting and descending winches of the rotorical arms from the excavators and of the halting belts at are driven by

asynchronous motors with the wired rotor with metallic rheostat starting in 3 – 4 steps (figure 7), with the driving period of 60%.

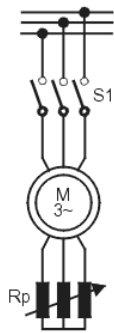


Figure 7.

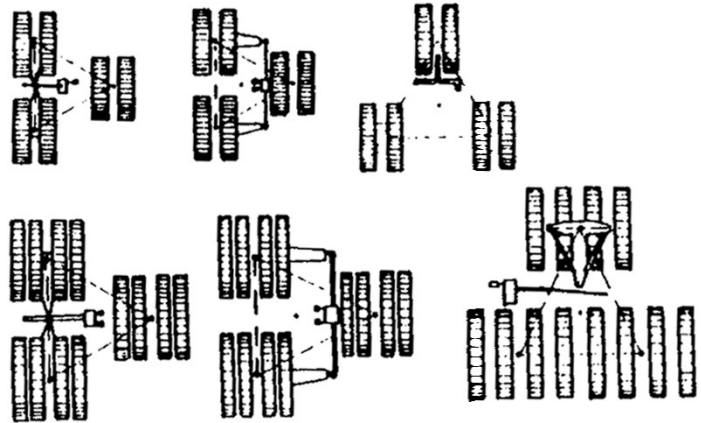


Figure 8.

According with the capacity (productivity) of the excavator (respectively of the machine), the movement system can be with two or more caterpillars groups, each of them having his own driving motor (motors) (figure 8).

The movement mechanisms at excavators with medium and large capacity rotors are driven with continuous current motors, in generator-motor system (figure 3), and at the small capacity excavators, with asynchronous motors with wired rotor and metallic rheostat starting in 3 – 4 steps (figure 7) with $P_N = 90$ kW, $U_N = 380V$.

CONCLUSION

The port-grabs wheel excavator is the “leading” element in a technological line, line which also contains TMC, MH, of which functioning is depending the good functioning of all the downstream equipments.

To realize a maximum productivity with minimum power consumption is necessary to maintain a correlation between the grab wheel speed and the pivoting mechanism. To realize this desideratum is imposed to use static frequency conveyors, to supply the asynchronous motors.

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