TECHNICAL CHARACTERISTICS OF MICROPROCESSOR'S PROTECTION MPZ-ZIM

Dragan Todorić, *Minel-Automatika, Belgrade, Serbia*
Goran Đukić, *Faculty of Electrotechnics, Belgrade, Serbia*
Milenko Đurić, *Faculty of Electrotechnics, Belgrade, Serbia*

ABSTRACT

Expose describes all parts of microprocessor's protection MPZ-ZIM, such as unit for analog to digital conversion, digital inputs and outputs, program and data memory, memories for fault recording and settings, real time clock with memory for saving counters, communication's port and liquid crystal display with keyboard for user interface. Special attention is given to interconnections of these parts and influences of today happenings in informatics technologies on choice of applied solutions.

One part compares some units of different types of protections, which have significant differences in realization, for example fault recorder. Article analyzes possibility of apply some new technical solutions for communication, which don't request cables.

1.FOREWORD

Today on the market, many different types of microprocessor's protections become. On first look, there are very similar, but they can have very different characteristics and they can support different functions. These differences can find in following data sheets. Construction of device is represented as black box for end user, but it has major influence on performances and servicing. Because of that, it could be suitable to introduce end users with these details. On this way, these informatics technologies would be closer to users.

2.PARTS

Microprocessor's protection MPZ-ZIM is based on sixteen bits digital signal processor, which power is forty million instructions per second (picture 1). It is consisted of unit for analog to digital conversion, digital inputs and outputs, program and data memory, memory for fault recording and settings, real time clock with memory for saving counters, communication's port and liquid crystal display with keyboard for user interface.
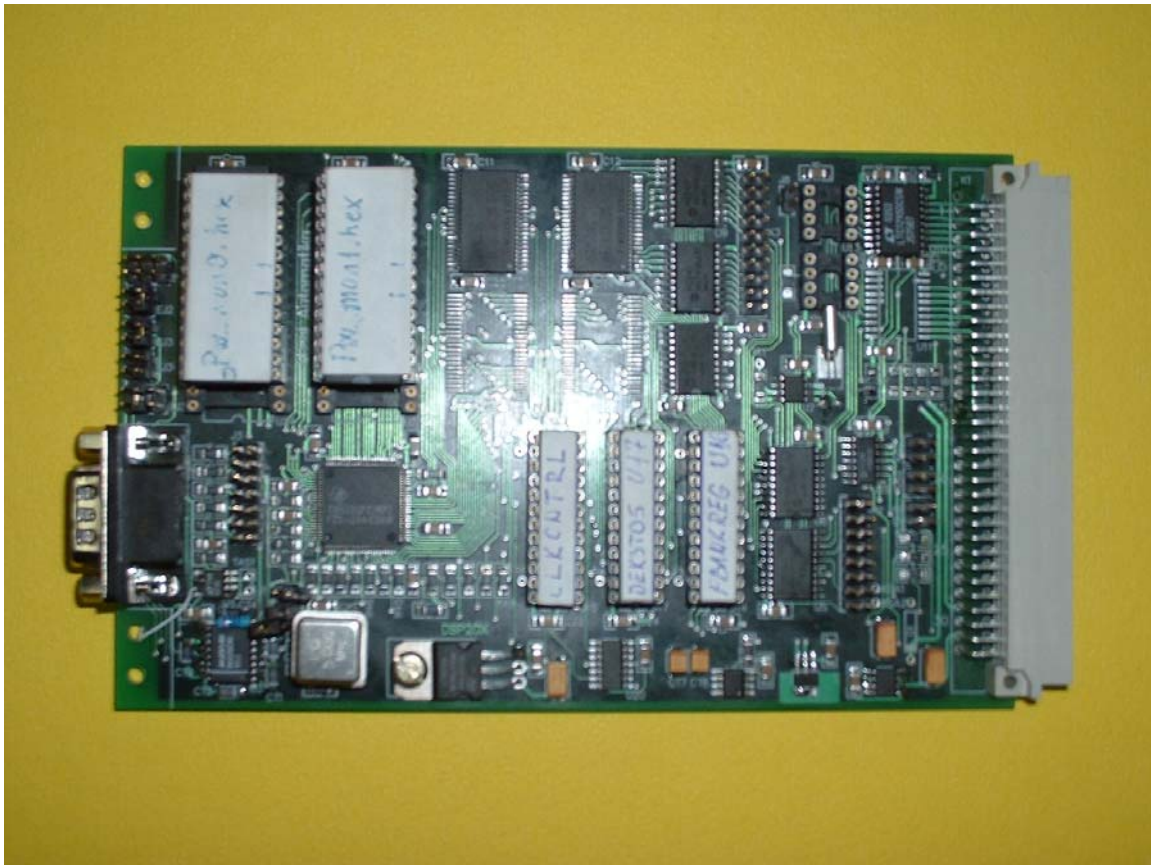

Figure 1. DSP plate of protections MPZ-ZIM

2.1.Analog inputs

Relay posses eight analog inputs with possibility of expand up to sixteen. Each input has oven sample and hold circuit. This achieves capture of sample of each measured value in the same moment, and eliminates error of calculating phase angle which cause getting sample in different moments. Analog to digital conversion does integrated circuit with sixteen bit converter, integrated octal multiplexer and synchronous serial communication.

2.2.Binary inputs and outputs

It is possible to call more then sixteen binary inputs and outputs. Approach to relays is in two steps. This method prevents accidental closing of output contacts. Relay's outputs are equipped

with fuses which prevent damage of printed circuit board as effect of short circuit on coil of power line breaker. This is not rear event in our circumstances.

2.3.Memories

Together with program memory, device has random acces memory of two mega words capacity for storing samples and fault recording. Content can preserve during missing of auxiliary supply with help of battery. Settings are stored in EEPROM. For their saving, battery is not necessary.

2.4.Real time clock and counters

Chip with real time clock has very small consumption. Even with battery of 35 mAh, it should work ten years. It has free memory locations too. They are used for storing counter's variables, such as number of manipulations, cumulative current of faults, active and reactive power and so on. This circuit is connected with digital signal processor over so called I^2C bus.

2.5.Communication's port

Device is equipped asynchronous serial port which enables connection with other computer by electrical or optical way.

2.6.Liquid crystal display and keyboard

User interface is realized with alphanumerical display with sixteen times four characters and keyboard with twenty four keys (picture 2).

2.7.Supply

Protection is equipped with supply with power factor control (PFC). Differently from classical pulse width modulation, it can work on direct and alternating voltage. This can be useful during fault of battery or rectifier. In this case, is possible safely crossing on voltage from home transformer or voltage measuring transformers. Because it pull sine current from alternating source, it entirely satisfy the newest regulative which restrict so called pollution of net.

3.INTERCONNECTIONS

With increase of complexity of microprocessors, number of wires between processor and peripherals enlarge too. This complicates design of printed circuit board and decrease reliability. Modern trend is decreasing of number of wires. Because of that, versatile kinds of serial communication between components are in use more and more.

Analog to digital converter and EEPROM are connected with digital signal processor over the Synchronous Serial Port Interface (SSPI), while real time clock is connected through I^2C bus. Other peripherals are mapped in address space.
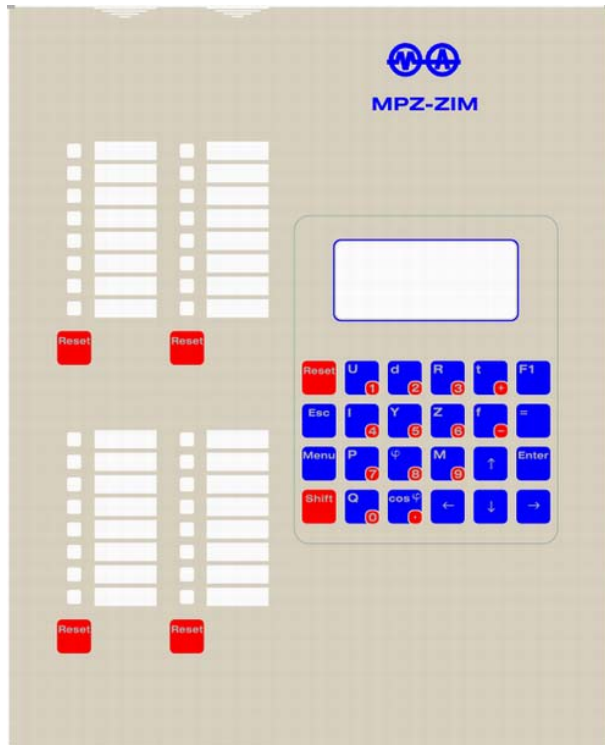
Figure 2. *View of front panel relay MPZ-ZIM*

4.COMPARISON OF SOME SOLUTIONS

Some functions of microprocessor's protections are realized on different way.

4.1.Fault recorder

Format of fault record depends of number of samples and number of bits in analog to digital converter. They are two ways of saving data during missing of auxiliary supply: by battery supply of RAM, or by copping content of RAM in flash memory.

None of these ways are perfect. Possible disadvantages of solution with battery are well known and are related with capacity and permanence, but on the other side, some problems with flash memory are ignored. This solution complicates hardware and software additionally, demands much processor's times during coping of data. From user manual can not see does protection work properly during coping. Some types need user's demand for writing on flash. Maximal number of write cycles declared from manufacturer is significantly bigger than number of faults we expect, but in real exploitation's condition, because of high temperature and other inappropriate factors this number can reduce drastically.

4.2.Communication

For full use of microprocessor's protection, the most important is choice of communication link and protocol. State of present distant stations must take in count. Need or wish for equipment of

different types and manufacturers increase complexity. Additional equipment, such as protocol's converters should avoid, if it is possible, because it increase cost and enlarge difficulty.

Nowadays on the market is great versatility of communication's protocols. No one standard is widely accepted. Because of that, the greatest attention must give to this part during the choice of protection.

4.3. User interface

On the first look, the least important is user interface. Before choice of relay, display, number and order of keys seam as matter of appropriate design, but on the beginning of work, their real meaning become visible. This is the most related with procedure for writing of settings. Bigger number of keys can confuse new users, but achieve faster manipulation for users with experience. On the other side, minimal number of keys causes painful incrementing and decrementing to set up settings on right value. For models of protection with great number of settings, duration this procedure is very long. Therefore it is inefficient and almost unusable. Applying of user interface practically is reduced on turning-on, turning-of, and inspection of measuring and single-line wiring diagram with position of operating mechanisms. Efficient writing of settings, in this case, requires use of note book computer with appropriate software.

5. NEW TRENDS

Modern trend in area of computer's networking is wireless communication. The most popular technologies now are transfer of data with infra red light (IR) and with small area radio signal (Blue Tooth). Blue Tooth is widely applied in automotive industry and small local area networks. It is big probability that some similar technology apply for connections of microprocessor's protection and station computer soon.

6. CONCLUSION

New microprocessor's protections give a plenty of possibilities. Their right selection is more delicate than earlier generations of devices because much more parameters must analyze.

7. REFERENCES

[1]Commercial and technical documentation of manufacturers