Research Article

Microcomputer relay protection system design of low voltage power grid based on CAN bus

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ABSTRACT

Based on the defects of traditional communication mode, this paper put forward the coal mine based on CAN bus design method of microcomputer relay protection system and respectively from the hardware and software fully illustrates the design idea of the system

Key words: coal mine, The microcomputer relay protection system, CAN bus, Design method
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INTRODUCTION

Electricity is a major power, modern coal industry plays a very important position in coal production. The coal mine power supply system is composed of generators, transmission and distribution lines, transformers, lot of electrical equipment, make the coal mine power supply system of various components and equipment not only subjected to damp, aging, fracture, damage and other natural and man-made destruction, the equipment and instruments in installation, manufacture and maintenance, will most likely leave some hidden dangers and operation problems arised in the running process, aging etc, lead to the power supply system to produce all kinds of fault and unsafe running state. Of the coal mine power supply system failure or abnormal running state can cause the system part which all normal damage, the coal mine of microcomputer relay protection is a kind of element can timely reflect the system fault and not run normally, by microcomputer can let the circuit breaker tripped or the signal of a device. Now mostly use microcomputer relay protection equipment is generally through the relevant parameter acquisition circuit hardware circuit, then its and setting value of contrast decided that the line fault in the presence of. The traditional method on the anti-interference and reliability of the transmission needs to improve and improve.

The coal mine based on bus microcomputer relay protection work has the following significant advantage controller in the main way, each node in the network are able to access by bus priority depends on the message identifier, competition by means of non-destructive bitwise arbitration structure and then transmit data to the bus and agreement getting rid of the station address coding based on communication data coding, it can make different node receives the same data at the same time, each of these features make by the bus of the real time data communication between the network nodes, easier to form a redundant structure, make the system's reliability and flexibility is greatly increased. Can bus controller interface chip output end and output end and the physical bus connection. In addition in the bus under the situation of serious mistakes, all nodes have the function that automatically shut down output, make the other nodes on the bus is not affected by its operation, to ensure that there will be no problems because of a node, the bus is in a state of "dead lock". Has perfect communication protocols, communication can be realized by controller chip and interface chip, thus can lower the difficulty of system development, shorten the development cycle.

This paper puts forward a kind of coal mine based on bus design of microcomputer relay protection system,

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compared with the traditional microcomputer relay protection device, good real-time, transmission time is short, high transmission reliability.

EXPERIMENTAL SECTION

Low voltage power supply system is relatively complex, large, of which the main components for transformer, generator and transmission lines, this paper design of the coal mine based on the bus the principle of microcomputer relay protection system is shown in figure 1.
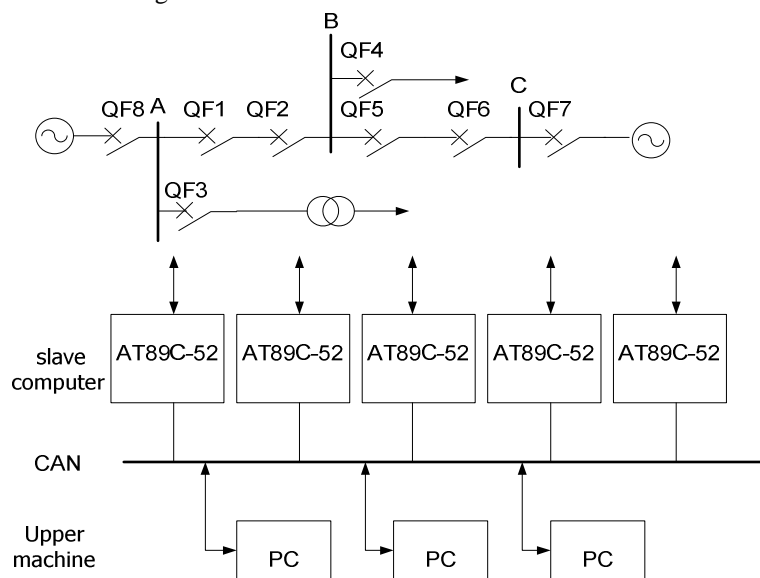

Fig.1 The principle diagram of the system

Low voltage power grid of microcomputer relay protection system mainly consists of three units: information measurement unit - lu - execution units. Among them, the information measurement unit is measured transform components, acquisition and related data and parameters in measuring coal field; Logic unit is via a communication line transmission access to relevant electric parameters, then through the related software and optimization algorithm accurately determining coal mine power supply system of the circuit is normal; From execution unit is processed after the protective device of command, then through protective device for specific operation in which each unit of communication is by bus.

The composition of the system is mainly the input module, protection measurement module, bus module, management module, output module and other modules. Input module is to put the sensor acquisition circuit of current and voltage signal into a corresponding voltage signal, and send samples values to protect measuring module; Protect the measurement module to complete sampling and related parameter calculation, etc.

The CAN bus module mainly is to realize the direct communication between the various modules; PC management module for related communications and man-machine dialogue, etc; Output module is the control of the corresponding protection device.

The Microcomputer protection device is mainly input system, data acquisition system and PC management system and switch output system, its structure is shown in figure 2.
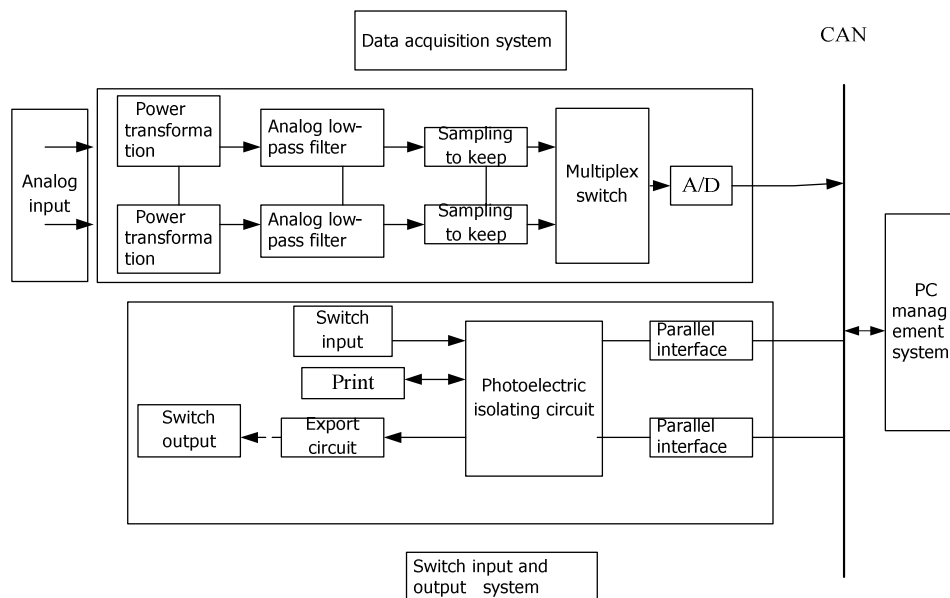
Fig.2 hardware design

Measure the electrical parameters of voltage, current signal for analog, voltage and current value is big, value range is not in the system logic judgment of rated voltage current value range, in addition the electrical parameters of the transmission isn't in the transmission range of electrical, communications by voltage transducer and current transducer transformation.

The PC management system is the system to measure part, execute part, communication part and coordination work, in addition, the power supply is needed to protect the CPU itself work.

The communication interface circuit consists of AT89C - 52 and the CAN controller. CAN bus communication control module selects the SJA1000 chips, AT89C - 52 is responsible for the SJA1000 initialization, and by controlling the SJA1000 send and receive data. SJA1000 internal structure as shown in figure 3, the function module mainly includes: the CAN core module, logical management interface, send buffer, receiving filter and receive the FIFO queue. With CAN2. Based on the agreement of 0B CAN core module of CAN frame to send and receive function; Use logical management interface and single chip microcomputer connection; SJA1000 send buffer CAN store a complete message, when the microcontroller start message transfer, logical management interface to be able to make the CAN core modules according to CANZ. 0B protocol for sending buffer to send data to read. When received the complete message, CAN the core control module of the continuous into standard data storage, and data is received the strainer, experienced yards, acceptance of shielding registers for data filtering and processing, and data that meet the requirements of the sign bit into the receiver FIFO queue.
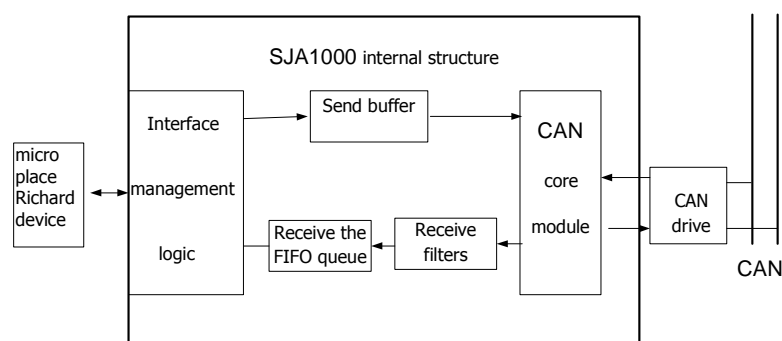
Fig. 3 CAN controller structure

Switch signal mainly includes: the state of the circuit breaker closing and opening, the relay of the absorption and release, external blocking signal and external reset signal input, etc. These signals after photoelectric isolation type microcomputer system.

Software part of the device is mainly composed of fault detection processing procedures, bus communication, display and other components, as shown in figure 4, fault detection, processing is used, it is the main part of the device and the corresponding software according to quickly and accurately to accomplish fault detection and judgment, processing, alarm and parameter display, etc, in order to achieve real-time requirements.
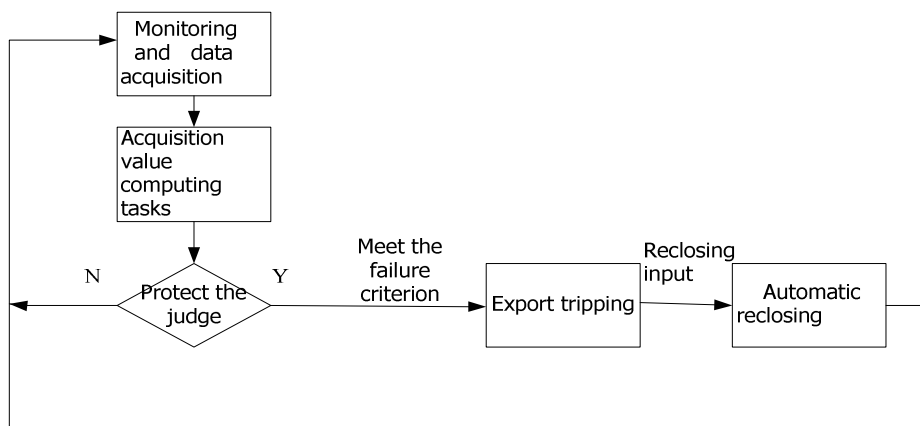

Fig. 4 main photo software process

CONCLUSION

Using CAN bus microcomputer relay protection system of the coal mine has the transmission distance is far, anti-interference performance is good and reliable communication advantages, CAN effectively meet the reliability of the coal mine power supply system, selectivity, quick, the sensitivity requirement, effectively guarantee the safety of the coal mine coal mine personnel.

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