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(12) **United States Patent**
Wang

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(54) **METHOD OF HALF-DUPLEX SERIAL SIGNAL CONTROL WITH MULTI-BAUD RATE AND MULTI-CONFIGURATION**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(52) **U.S. Cl.** **710/315**
(58) **Field of Search** 370/466, 467, 370/468, 293, 297, 296, 295, 279, 419, 423, 463; 375/220, 222; 710/313, 314, 315

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,884,287	A *	11/1989	Jones et al.	375/377
5,197,083	A *	3/1993	Gandini et al.	375/225
5,257,289	A *	10/1993	Jopson	375/257
5,390,038	A *	2/1995	Cecchini	359/113
5,539,787	A *	7/1996	Nakano et al.	375/377
5,956,523	A *	9/1999	Chen	395/882

* cited by examiner

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(57) **ABSTRACT**

A method and a device for half duplex serial signal control with multiple baud rates and multiple configurations comprises RS-232 interface circuit, RS-485 interface circuit, power circuit, protective circuit, and logical control circuit. A brand new controlling method is applied to the receiving/transmission signal control wire on the RS-485 interface circuit so that the programmable logic controllers (PLCs) in the two-wire RS-485 network can be set at different baud rates and different configurations for RS-232 communication. That is, programmable logic controllers (PLCs) from different manufacturers, using different communication speed can connect one another as well as a personal computer. A signal converter transforms the RS-232 interface signal to the RS-485 interface signal for each PLC, passes through the RS-485 signal in the two-wire RS-485 network, and finally transforms the RS-485 signal to RS-232 signal for the connected computer. A PC can therefore connect to PLCs from different manufacturers, using different communication speed. When the distance between each PLC is far apart, the two-wire RS-485 signal repeater in the present invention can extend the network and increase signal strength so that long distance communication is allowed.

12 Claims, 10 Drawing Sheets