

History of WAFERSTAR MDB Converters

Working with vending machine payment terminals put us in contact with the MDB protocol. A very special protocol that gave us some problems. For a long time now I wanted to share some of the problems we had while creating a product based around the MDB protocol. When WAFERSTAR, a hardware and software manufacturer, designed this adapter nearly 20 years ago, we did not expect that this product would become an independent and important core accessory. Especially in the past 10 years, after the rise of mobile payment and the widespread use of Android motherboards because of their abundant resources, a stable and reliable MDB adapter has become more and more important.



MDB Protocol Issues

NAMA-MDB

Vending protocol is its MDB vending machine interface designed by Coca Cola. MDB stands for **Multi Drop Bus**. Simply put this is a serial bus you can connect one master and several slaves to. The MDB protocol is widely used in vending machines and it's the way to go if you want to provide a payment terminal for vending machines.

The special thing about the protocol – or at least special for us software engineer coming from 8, 16, 32 and 64 bit environments – is that it is a 9 bit protocol. Instead of using the more common 8 data bits and one optional parity bit, it uses 9 data bits and no parity bit. The 9th bit is used to address the slaves in the beginning of a communication session. The problem is that the **UARTs** (hardware components that takes care of the serial communication on the bus) provided by standard embedded system (PCB) support 5 to 8 data bits, but 9 data bits are not supported directly. Therefore, connecting a “more intelligent” device such as a PC to a vending machine is not a plug and play kind of thing. But this is exactly what we wanted to do. Our payment software runs on linux and android and we undoubtedly wanted to keep it that way. The reasons for this I think are quite obvious and could fill another blog.

Solution: MDB Converter MDB-RS232

The only way to go forward was to design our MDB box with a 9 bit UART and a micro controller that acts as a “gateway” between the Mater and the MDB slave. The micro controller on the MDB converter takes care of all the MDB specific timing issues and uses the 9 bit UART to communication with the PCB. On the PCB side, we use a standard 8 bit UART and an internal rs232 communication protocol.



Android motherboard has a wealth of peripheral interface accessories, including display, 3G/4G networking module, USB interface, etc., so vending machine motherboard designers very much hope to use such a motherboard to design vending machine control host, because our first product is to solve the connection between Android motherboard and MDB payment device. Nearly 20 years ago, the first generation of the MDB-RS232 adapter was born. At that time, because mobile payment was not widely

popular, it was mainly necessary to connect to traditional payment terminals such as banknotes and coins. Because of the forward-looking planning of the first generation of products, and later with the development of mobile payment, the MDB-RS232 adapter has been upgraded many times, and it can also maintain compatibility with the previous version at the same time, and has been used by many vending machine manufacturers.

Solution: MDB Converter RS232-MDB

With the rise of mobile payments 10 years ago, the demand for cashless card payments surged, and the market generally used off-the-shelf MDB payment devices. Usually, the management



system of the vending machine is completed by the vending machine manufacturer, or some non-cash payment equipment manufacturers are completed. However, with the development of network and software systems, the application of vending machines is becoming more and more extensive, and many professional vending machine management companies have been born in the market, so there is a need for independent vending machine mobile payment accessories, so WAFERSTAR has designed RS232-MDB adapter. Despite the design experience of MDB-RS232, it is still very difficult to use as an adapter for slaves, mainly because of the compatibility with various brands of vending machines and the stability that must be possessed as a payment module.

Customer satisfaction

Currently, we run this solution in over 100,000 vending machines and are very happy with the solution. It gives us the flexibility we need to extend our software while still keeping up with the MDB requirements.