Why you need to monitor serial communication

Background

RS232/RS422 provides 2 data lines for each data channel. One is for transmitting data and the other for receiving. Because of these two separate lines, data can be sent full duplex. This means that both ends can send and receive data simultaneously without mutual interference. But some communication protocol and **RS485** may only allow half duplex communications. Most simple protocols with external devices work with a **master-slave**, or **question-answer** configuration. One of the parties is the master, which is in charge of communications. This master sends commands and requests to the slave, which responds to them. The slave will never start a communication sequence by itself so in practice the communication is **half duplex**: There is no single moment when both sides send data simultaneously. If there were someone to violate this rule, then we may have wrong process in whole system. Because such condition may not generate problem immediately, so it is not easy for us to find the reason upon problem happened. Except that we can monitor and log such data communication procedure. One **video recorder** can play back **video image** to find problem. One **data monitor/logger** can play back **data communication sequence** to find problem. **When you need video recorder to be installed in your factory, you must have data monitor/logger in your control system.**

Why you need to monitor serial communication?

1. Monitor and logs **asynchronous** serial transmission can improve control system to reduce **unpredictable** down condition.

2. We may need to monitor and analyze data recording from **peripherals** such as printers, terminals, keyboards, mice, and card readers to find reason of problem.

3. We may need to find **data exchange protocols** for one machine without document left.

4. We may need to monitor and backup of **sensitive data** from devices like Points-of-Sale, barcode scanners, and card readers.

5. We may need to monitor and log data from **sensors**: temperature, pressure, voltage etc.

"**APLOG301-I** card", "**ULOG301-I** box", "**iLOG101** box" and other **RAYON Technology** product line can allow you to monitor and catch data exchange between an external device and another software/device.

Who needs to monitor serial communication?

Serial Port Monitor product line can be successfully used by:

- programmers
- beta-testers
- software developers
- hardware engineers

- IT support specialists
- industrial control personnel
- SCADA software engineers
- science technicians
- systems integrators, consultants
- lab experts
- University students
- Other...

Which product to use?

RAYON Technology can offer PCI card, USB box and IP box to meet target application environment.

1. For standard PC application environment we can insert **PCI card** in PCI slot to monitor/log data communication. It is easy to work in one PC as master controller or monitor equipment.
2. For dedicated Windows application environment we may connect USB cable to external **USB box** within 5 meters to monitor/log data communication.
3. For remote monitor environment we may connect **IP box** via LAN connection without distance limitation.

APLOG301-I card

APLOG301-I card is powerful intelligent monitored interface converter to support **GROUND isolated** feature and **interface type conversion** function. We can create two COM ports in PC via PCI slot connection to monitor data communication in both directions.
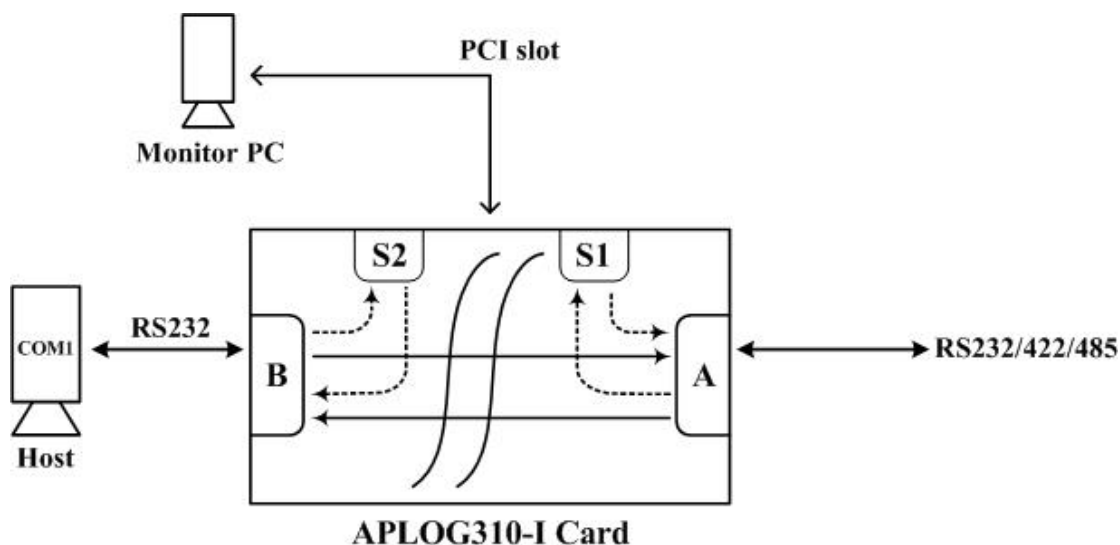
There are two DB9 connectors in APLOG301-I card. Serial port A is **GROUND isolated RS232/RS422/RS485 settable**, so you can connect with any host equipment. Serial port B is **RS232**. We can use 5V power supply in PCI slot to offer power supply for APLOG301-I card. The signal ground pin in serial port B is same as signal ground pin of 5V power supply in PCI slot. The signal pin in serial port

A is different and isolated with serial port B and PCI slot. So we can remove the ground loop between the device to connect with serial port A and device to connect with serial port B.

Some application software may be fixed to use PC's standard COM1/COM2 port only. But the interface type for PC's COM1/COM2 is RS232 only and don't offer GROUND isolated feature. So it is not safety for such PC to be used in rigid environment. Then we may need to use external RS232 to GROUND isolated RS232/RS422/RS485 converter box with power adaptor to offer power. It is not easy to use structure. Fortunately we can use APLOG301-I card to solve this condition. When we connect standard PC's COM1/COM2 port to serial port B of **APLOG301-I card** via NULL MODEM cable, then serial port A of APLOG301-I card can be worked as COM1/COM2 port in RS232, RS422 or RS485 environment with GROUND isolated feature.

When APLOG301-I card is connected with PC via PCI slot. There are two COM ports created in PC. The first COM port will transmit and receive data in serial port A. The second COM port will transmit and receive data in serial port B. In normal condition we will not transmit data in COM port and we just receive data in COM port. Then APLOG301-I card is just worked as **normal interface converter box**. But all data transmission in this interface converter will be monitored in PC without any interruption. If there were any problem in application environment, then we can analyze such received data in COM port to find possible reason. Maybe we can disconnect one device connected to serial port A or serial port B. Then we can use COM port as simulated device to communicate with the other device. So we can know the problem in equipment or connection cable. **RAYON Technology** can offer one utility software package "**RAYREAL**" to show two COM ports' data in one display window. The data received from both serial ports will be shown and analyze. So it is very easy for us to find possible problem. All the source files for RAYREAL software are included in CD. User can use these source files and modify to meet target application environment.

We can use **APLOG301-I** card as full-duplex **RS232** to **GROUND isolated half-duplex RS485** interface **converter**. So we will set serial port B in RS232 interface type and serial port A in RS485 interface type (**DIP Switch bit 1 in OFF location and bit 2 in ON location**). Now we can let one RS232 device to be used in RS485 network safety. The **ADDC** (Auto-Data-Direction-Control) feature will handle data transmit/receive function automatically.

We can use **APLOG301-I** card as full-duplex **RS232** to **GROUND isolated full-duplex RS422** interface **converter**. So we will set serial port B in RS232 interface type and serial port A in RS422 interface type (**DIP Switch bit 1 and bit 2 in ON location**). Now we can let one RS232 device to be connected with RS422 device in remote site.

We can use **APLOG301-I** card as full-duplex **RS232** to **GROUND isolated full-duplex RS232 Isolator**. So we will set serial port B in RS232 interface type and serial port A in RS232 interface type (**DIP Switch bit 1 and bit 2 in OFF location**). Now we can let one RS232 device to be connected with another RS232 device safety.

In **RS232 application environment** we can use one **APLOG301-I card** to let any equipment worked in. You can let one RS232 device to be worked in RS485 network. What you need is to prepare one APLOG301-I card in stock. Don't need to prepare RS232 to RS485 **interface converter**. Don't need to prepare RS232 to RS422 **interface converter**. Don't need to prepare RS232 to RS232 **Isolator** box. **Save your cost in stock. Support your function in emergency requirement.**

ULOG301-I box

ULOG301-I box is powerful intelligent monitored interface converter to support **GROUND isolated** feature and **interface type conversion** function. We can create two COM ports in PC via USB connection to monitor data communication in both directions.
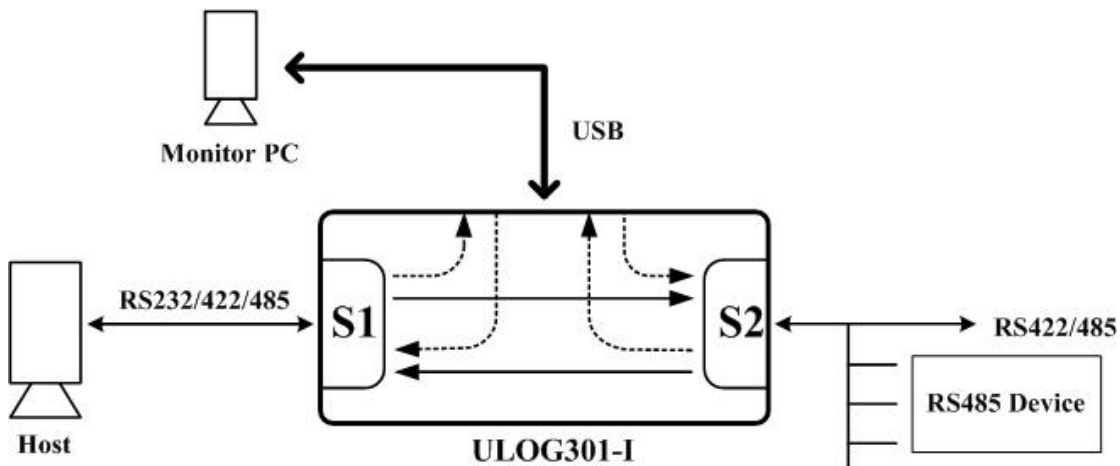
There are two DB9 connectors in ULOG301-I box. Serial port 1 is **RS232/RS422/RS485 settable**, so you can connect with any host equipment. Serial port 2 is **GROUND isolated RS422/RS485** settable. We can use USB bus power mode or use external 5V power adapter to offer power supply for ULOG301-I box. The signal ground pin in serial port 1 is same as signal ground pin of 5V power adapter and USB bus. The signal pin in serial port 2 is different and isolated with serial port 1 and USB bus. So we can remove the ground loop between the device to connect with serial port 1 and device to connect with serial port 2.

When ULOG301-I box is connected with PC via USB cable. There are two COM ports created in PC. The first COM port will transmit and receive data in serial port 1. The second COM port will transmit and receive data in serial port 2. In normal condition we will not transmit data in COM port and we just receive data in COM port. Then ULOG301-I box is just worked as normal interface converter box. But all data transmission in this interface converter will be monitored in PC without any interruption. If there were any problem in application environment, then we can analyze such received data in COM port to find possible reason. Maybe we can disconnect one device connected to serial port 1 or serial port2. Then we can use COM port as simulated device to communicate with the other device. So we can know the problem in equipment or connection cable. RAYON Technology just offer one utility software "RAYREAL" to show two COM ports' data in one display window. The data received from both serial ports will be shown and analyze. So it is very easy for us to find possible problem. All the source files for RAYREAL software are included in CD. User can use these source files and modify to meet target application environment.

We can use ULOG301-I box as **full-duplex RS232** to GROUND isolated **half-duplex RS485** interface **converter**. So we will set serial port 1 in RS232 interface type (DIP Switch bit 1 and bit 2 set in OFF location) and serial port 2 in RS485 interface type (DIP Switch bit 3 in OFF location and bit 4 in ON location). Now we can let one RS232 device to be used in RS485 network safety. The **ADDC** (Auto-Data-Direction-Control) feature will handle data transmit/receive function automatically.

We can use ULOG301-I box as **full-duplex RS422** to GROUND isolated **half-duplex RS485** interface **converter**. So we will set serial port 1 in RS422 interface type (DIP Switch bit 1 and bit 2 set in ON location) and serial port 2 in RS485 interface type (DIP Switch bit 3 in OFF location and bit 4 in ON location). Now we can let one full-duplex RS422 device to be used in half-duplex RS485 network safety.

We can use ULOG301-I box as RS485 to GROUND isolated **RS485 Bridge**. So we will set serial port 1 in RS485 interface type (DIP Switch bit 1 in OFF location and bit 2 set in ON location) and serial port 2 in RS485 interface type (DIP Switch bit 3 in OFF location and bit 4 in ON location). Now we can let one RS485 device to be used in different RS485 segment safety. We can increase the area for RS485 network and total number of RS485 equipment.

We can use ULOG301-I box as **full-duplex RS232** to GROUND isolated **full-duplex RS422** interface **converter**. So we will set serial port 1 in RS232 interface type (DIP Switch bit 1 and bit 2 set in OFF location) and serial port 2 in RS422 interface type (DIP Switch bit 3 and bit 4 in ON location). Now we can let one RS232 device to be connected with RS422 device in remote site.

We can use ULOG301-I box as **full-duplex RS422** to GROUND isolated full-duplex **RS422 repeater**. So we will set serial port 1 in RS422 interface type (DIP Switch bit 1 and bit 2 set in ON location) and serial port 2 in RS422 interface type (DIP Switch bit 3 and bit 4 in ON location). Now we can extend the range for one RS422 device to be connected with another RS422 device safety.

We can use ULOG301-I box as **half-duplex RS485** to GROUND isolated **full-duplex RS422** interface **converter**. So we will set serial port 1 in RS485 interface type (DIP Switch bit 1 in OFF location and bit 2 set in ON location) and serial port 2 in RS422 interface type (DIP Switch bit 3 and bit 4 in ON location). Now we can let one RS485 device to be connected with RS422 device safety.

In **RS485 application environment** we can use one **ULOG301-I** box to let any equipment worked in. You can let one RS232 device to be worked in RS485 network. You can extend your RS485 segment to support more equipments and wide range. What you need is to prepare one ULOG301-I box in stock. Don't need to prepare RS232 to RS485 **interface converter**. Don't need to prepare RS422 to RS485 **interface converter**. Don't need to prepare RS485 to RS485 **Bridge** box. **Save your cost in stock. Support your function in emergency requirement.**

ULOG310-I box

ULOG310-I box is powerful intelligent monitored interface converter to support **GROUND isolated** feature and **interface type conversion** function. We can create two COM ports in PC via USB connection to monitor data communication in both directions.
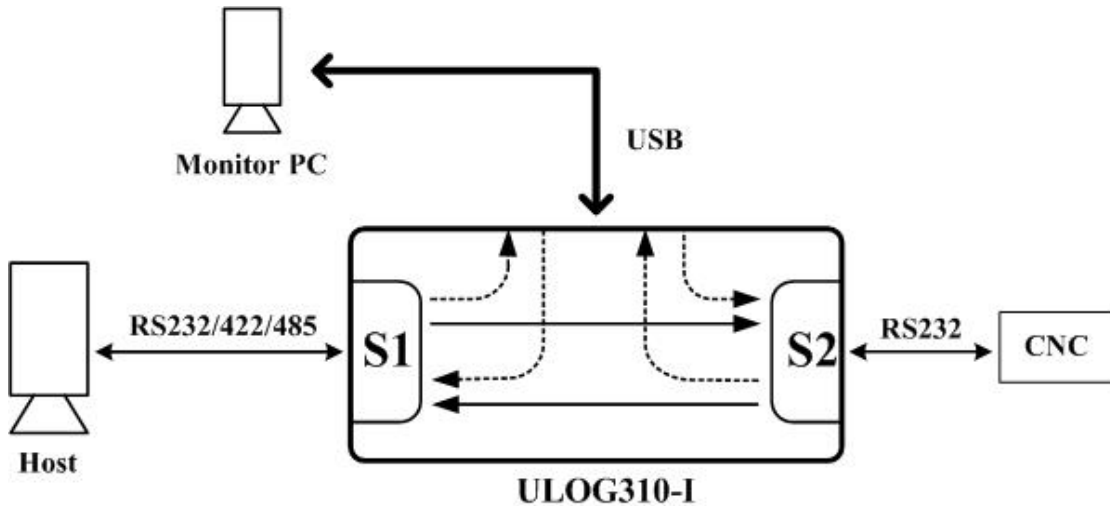
ULOG310-I

There are two DB9 connectors in ULOG310-I box. Serial port 1 is **RS232/RS422/RS485 settable**, so you can connect with any host equipment. Serial port 2 is **GROUND isolated RS232**. We can use USB bus power mode or use external 5V power adapter to offer power supply for ULOG310-I box. The signal ground pin in serial port 1 is same as signal ground pin of 5V power adapter and USB bus. The signal pin in serial port 2 is different and isolated with serial port 1 and USB bus. So we can remove the ground loop between the device to connect with serial port 1 and device to connect with serial port 2.

When ULOG310-I box is connected with PC via USB cable. There are two COM ports created in PC. The first COM port will transmit and receive data in serial port 1. The second COM port will transmit and receive data in serial port 2. In normal condition we will not transmit data in COM port and we just receive data in COM port. Then ULOG310-I box is just worked as normal interface converter box. But all data transmission in this interface converter will be monitored in PC without any interruption. If there were any problem in application environment, then we can analyze such received data in COM port to find possible reason. Maybe we can disconnect one device connected to serial port 1 or serial port2. Then we can use COM port as simulated device to communicate with the other device. So we can know the problem in equipment or connection cable. RAYON Technology just offer one utility software "RAYREAL" to show two COM ports' data in one display window. The data received from both serial ports will be shown and analyze. So it is very easy for us to find possible problem. All the source files for RAYREAL software are included in CD. User can use these source files and modify to meet target application environment.

We can use ULOG310-I box as **full-duplex RS232** to GROUND isolated **full-duplex RS232** interface **Isolator**. So we will set serial port 1 in RS232 interface type (DIP Switch bit 1 and bit 2 set in OFF location) and serial port 2 in RS232 interface type (DIP Switch bit 3 in OFF location and bit 4 in OFF location). Now we can let one RS232 device to be used in rigid RS232 environment safety.

When we use ULOG310-I box as RS232 isolator, we will exchange TXD/RXD, RTS/CTS and DTR/DSR signal in both serial ports. All control signal are isolated.

TXD←--------------------→RXD

RXD←-------------------→TXD

RTS←-------------------→CTS

CTS←------------------→RTS

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DTR ←------------------→ DSR
DSR ←-----------------→ DTR
DCD ←-x          x-→ DCD
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We can use ULOG310-I box as **full-duplex RS422** to GROUND isolated **full-duplex RS232** interface **converter**. So we will set serial port 1 in RS422 interface type (DIP Switch bit 1 and bit 2 set in ON location) and serial port 2 in RS232 interface type (DIP Switch bit 3 in OFF location and bit 4 in OFF location). Now we can let one full-duplex RS422 device to be used in rigid RS232 environment safety.

We can use ULOG310-I box as RS485 to GROUND isolated **RS232 Interface Converter**. So we will set serial port 1 in RS485 interface type (DIP Switch bit 1 in OFF location and bit 2 set in ON location) and serial port 2 in RS232 interface type (DIP Switch bit 3 in OFF location and bit 4 in OFF location). Now we can let one RS485 device to be used in rigid RS232 environment safety. Or one RS232 device can be used in RS485 network safety.

In **RS232 application environment** we can use one **ULOG310-I** box to let any equipment worked in. You can let one RS232 device to be worked in RS485 network. You can let your RS232 device to be used via RS422 connection. What you need is to prepare one ULOG310-I box in stock. Don't need to prepare RS232 to RS485 **interface converter**. Don't need to prepare RS422 to RS232 **interface converter**. Don't need to prepare RS232 to RS232 **Isolator** box. **Save your cost in stock. Support your function in emergency requirement.**

iLOG101 box

iLOG101 box is intelligent monitored RS232 to ground isolated RS422/RS485 converter:
This is used in traditional requirement in RS232 to ground isolated RS422/RS485 converter application environment. Because we may have RS232 interface in standard PC's COM port, so we may need to convert RS232 interface to RS485 interface to connect with PLC (ex, S7-200 PLC may use RS485 serial port). We can use iLOG101 box between PC's COM1 port and PLC's RS485 serial port. This GROUND Isolated feature will prove safety in rigid environment. We can use two serial ports created in iLOG101 box via IP network to monitor data transmission between PC and PLC. Except monitor feature in iLOG101 box we can also simulate as PC to send command to PLC or simulate PLC to send data to PC. So we can check the signal path between iLOG101 box and PC or PLC.
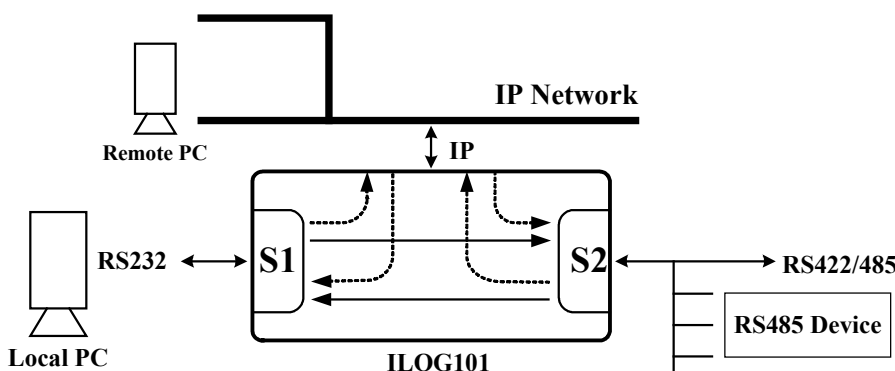
iLOG110 box

　iLOG110 box is intelligent monitored RS232 isolator:

This is used in traditional requirement in RS232 GROUND isolated feature environment. Because RS232 is common mode data transmission signal, so we may have same signal ground to be connected in both RS232 devices. When we may have big ground bounce problem in rigid environment, we may need to separate signal ground in both RS232 devices. Then we need to use RS232 isolator between both RS232 devices. ILOG110 box can offer such function and support intelligent monitor capability in both data transmission direction. Except monitor feature in iLOG110 box we can also simulate as one RS232 device to send command to target RS232 device. So we can check the signal path between iLOG110 and target RS232 device OK or not.
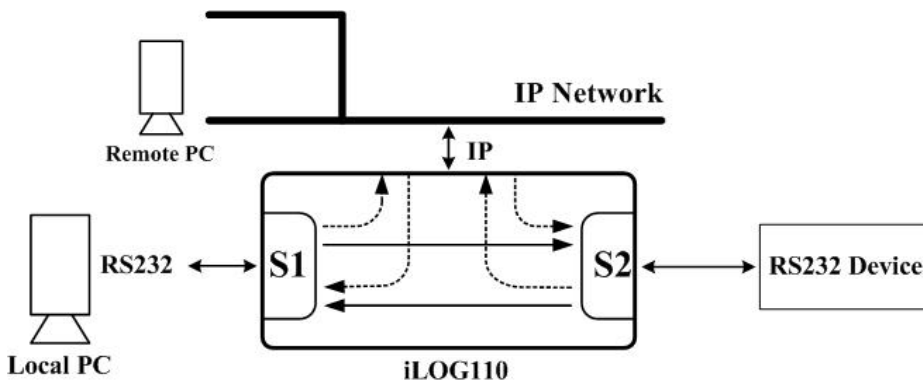
More solution from RAYON Technology

　Cost and profit are key issue in control system builder. To use APLOG301-I card in your PC can improve your IPC solution's value. For system integrator One PC with COM port to run your application software is standard configuration without extra value. But One PC with PLOG301-I card can offer extra value to reduce your cost for unpredictable down condition. GROUND isolated feature can protect your serial communication in hardware issue. Monitor/log feature can protect your serial communication in software issue. It is easy to solve hardware problem. But t is not easy to find software problem. RAYON Technology offer you valuable and profitable service. When cost is key issue in your project, we can provide less expensive APLOG301-I card alliance solution. We can remove GROUND isolated feature and dedicated for RS232 or RS422/RS485 only product. Please send mail to rayon@ms1.hinet.net or info@rayontech.com.tw for support.