RS-485

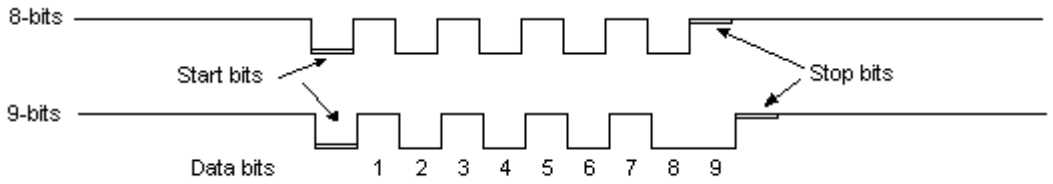
This standard provides for 4-wire full- and 2-wire half-duplex serial communication using 0 to 5 Volt differential signals. There is one master station and up to 256 slave stations. A personal computer is normally used as the master station and small microprocessor controllers or sensors are normally the slave stations. The master station can communicate with slave stations thousands of feet away at rates of up to 10 Mbaud. The maximum communication distance is limited by a combination of transmission rate and wire capacitance that causes the received signal to fall below the standards' minimum signal value of ± 200 mV.

Protocol

The master station selects a slave station by sending the slaves' one-byte address, 0 to 255, as a 9-bit transmission. All slaves are interrupted by a 9-bit transmission and compare the received address to their own address. If the addresses do not match, any following communication is ignored. When the addresses do match, then that slave stays on the line and replies to the master by sending back its address as an 8-bit transmission. The master and the selected slave then continue communicating using 8-bit bytes. The non-selected slaves ignore the communication until the master station issues the next 9-bit address byte. The master stations can initiate a transmission but the slave stations can not, they can only respond.

9-bit Transmissions are required to select one of the slave stations

Most personal computers have 8-bit serial port hardware, and can be tricked into performing a 9-bit transmission by setting the UART for 8-data bits then selecting odd parity or even parity to force the ninth bit to a '0'. Some software allows you to simply specify that the parity bit is always stuck to a '0'. The address '55' is shown below as both an 8-bit and a 9-bit transmission. (The first bit on the left is the start-bit and the last bit on the right is the stop-bit.)



Note that there is no way that an 8-bit transmission can cause a '0' in the ninth bit. Also note that in the 9-bit transmission, if the ninth bit was a '1' , then it could be mistaken for an 8-bit transmission. Therefore, 9-bit transmission with the ninth bit a '0' is the unique situation that is used to send the address byte to the slave stations.

RS-232/RS-485 Converters

These devices make it easy to implement RS-485 communication on personal computers that have an RS-232 serial port. The currently popular 2-wire half-duplex RS-485 networks use inexpensive RJ-11 connectors and 4-conductor telephone wire. Pin 1 is ground and pins 2 and 3 are the 'A' and 'B' lines, respectively. Pin 4 may be used to supply external power to the slave stations. The 'A' signal is high or low (+5V or GND) to match the RS-232 signal high or low level (+12V or –12V). The 'B' signal is the compliment of the 'A' signal.

The master station drives the 'A' and 'B' lines when it transmits, then disables them and allows the slave station to drive them. The converters use their own timer or the PC serial port RTS signal to enable or disable drive to the 'A' and 'B' lines. A resistor normally holds the 'A' line at ground and the 'B' line at +5V when no one is transmitting. A 'turn-around' delay is required to allow the master and the slave hardware to take turns driving the 'A' and 'B' lines.