THE RS-485 APPLICATION "CHEAT SHEET" by B&B ELECTRONICS

Use It Anywhere

The EIA/TIA RS-485 communications standard, an upgrade of RS-422, supports 32 devices (driver/receiver pairs) in a party line or multi-drop mode, on a cable of up to 4,000 feet for balanced differential signal transmissions at a common-mode voltage (Vcm) of -7 to +12 V.

You can internally or externally configure RS-485 devices. Four-wire connections, which require an additional ground, require a 'master' node (e.g., a PC) that communicates to all others, called 'slaves,' which in turn can only communicate with the master.

To Terminate, or Not to Terminate?

The RS-485 spec says to use termination. For high baud rates and long cable runs, this is true. In most equipment though, with max speeds of 115kbit, it is unnecessary. Adding termination dramatically increases power consumption and requires that the network be re-biased, which is rarely done. Termination complicates system design and rarely solves problems when used in the kilobit data range.

Extend the Network Easily

By adding repeaters, you get longer distances- each 'refreshed' signal can drive another 4,000 feet of cable- and 31 more RS-485 loads (driver/receiver pairs) per repeater.

Long networks are especially vulnerable to grounding and surge problems. This is easily addressed by isolating the nodes. Use optically isolated repeaters and isolated converters to attach the nodes of your network and you'll have reliable long-distance applications.

Tips for Best Performance

Check the converter data sheet to see how the receiver's 'enable' function is connected.

Test the interval after the last bit is transmitted to ensure complete transmission. A too-short interval causes missed parts of each character being sent. A too-long interval may cause the system to switch the data line from transmit to receive.

Select appropriate isolation or shunting for protection against surges. When in doubt- isolate!

Add a fuse-type device to shunting-type suppression to protect against short circuits to power conductors.

Use appropriate signal grounds- a must-have- and shielded cable- desirable- for safety.

Check signal types and related issues before writing or purchasing software protocols.

Device communication characteristics must be checked before completing system design.

Get a schematic of each serial port to assist in troubleshooting and repairs.