RS485 REPEATER EXTENDS SYSTEM CAPABILITY

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RS485 data communications are specified for distances of up to 4000 feet. This limit is the consequence of losses in the twisted pair used to carry the data signals. Beyond 4000 feet, skin effect and dielectric losses take their toll, attenuating the signal beyond use.

If greater distances must be covered some means of repeating the data is necessary. One method is to terminate a long run of cable with a microprocessor-based node capable of relaying data to yet another length of cable.

A more simple solution* is shown in Figure 19. Two RS485 transceivers are connected back-to-back so as to relay incoming data from either side to the other. A pair of cross coupled one-shots furnish a means of "flow control" so that one and only one transmitter is turned on at any given time. Incoming data is sensed by detecting a 1-0 transition at the output of either idling receiver. The first receiver to spot such a transition triggers its associated

one-shot, which, in turn, activates the opposite transmitter and ensures smooth data flow from one side to the other. At the same time the one-shot locks out the other receiver/transmitter/one-shot combination so that only one data path is open.

The one-shot is retriggered by successive 1-0 transitions and start bits, holding the data path in this configuration. The one-shot time constant is set slightly greater than the interval between any two start bits. When the received data stops, the line idles high, producing a 1 at the receiver's output. The one-shot resets, returning the opposite transceiver to the receive mode—ready for any subsequent data flow.

In order to allow adequate time for the one-shot to reset, the software protocol must wait one word length after the end of any data transmission before responding to a call or initiating a new conversation. As shown, the repeater is set up for 100kBd data rates and an 8-bit word length (plus start and stop bits).



Figure 19. RS485 Repeater Schematic Diagram

