

PROFIBUS COMPETENCY CENTRE, AUSTRALIA TECHNICAL SERIES		
DATE: Feb, 09	ORIGINATOR: GRANT WEYMAN	DOCUMENT REF: 09/011
SUBJECT: RS485 TRANSMISSION		

RS485 Transmission can be used to connect up to 32 devices in a single segment. This 32 device limitation is overcome by use of fibre optic links or repeaters to link segments together in to a larger network.

RS485 uses shielded twisted pair cable. Allowing communication at up to 12Mbit/s. The allowable segment length depends upon the bit rate, allowing 100m maximum at high speed to 1000m maximum at low speed. RS485 is a *balanced* two-wire transmission system.

Let's explain **unbalanced** transmission first. An "Unbalanced Transmission" is where we use a signal and a zero volts reference wire:

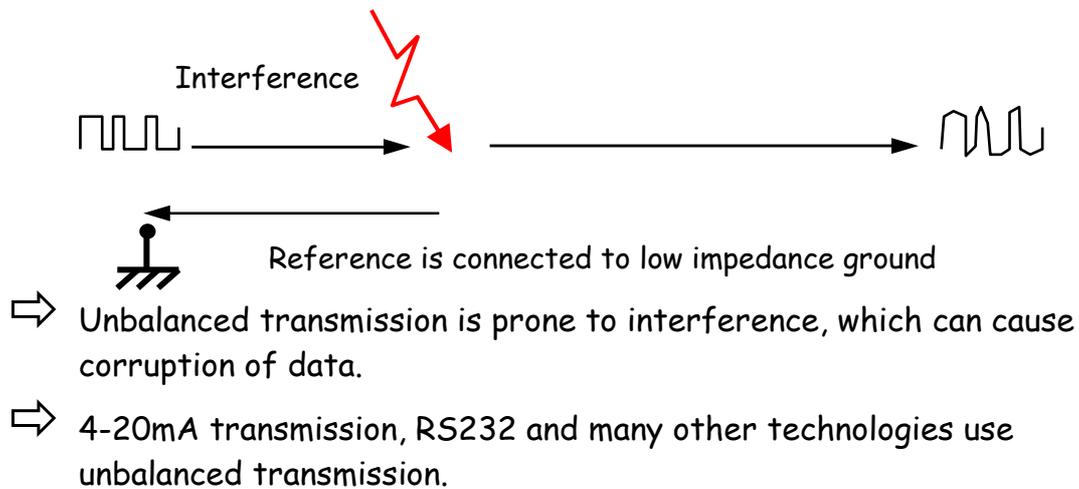
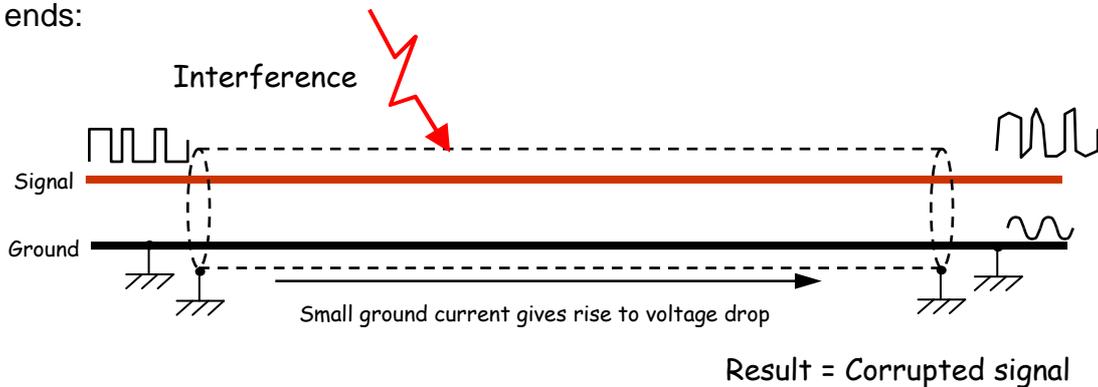


Fig. 1 Unbalanced Transmission<sup>1</sup>

## Automation

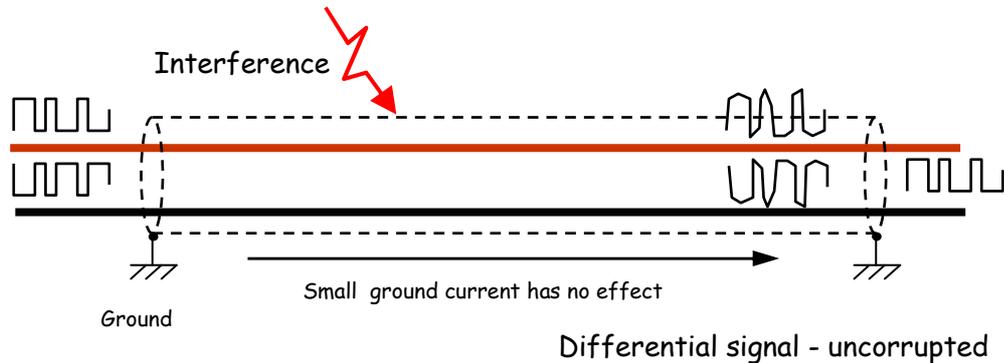
Earthed screening can reduce electrostatic pickup. But, unbalanced transmission can give rise to "Earth Loops" if the reference is earthed at both ends:



⇒ Thus, unbalanced systems are best wired with the Reference (and shield) earthed at one end only!

Fig. 2 Unbalanced Transmission with Screening

**Balanced** transmission is where both wires carry the signal; one positive and one negative. The differential signal carries the information and so any pickup tends to cancel out:



⇒ Thus, balanced systems are best wired with the shield earthed at both ends!

Fig. 3 Balanced Transmission

### References:

<sup>i</sup> CPIC Presentation L02 Verwer Training & Consultancy Ltd.  
The New and Rapid Way to PROFIBUS DP, Manfred Popp

<http://www.profibuscentre.com.au>  
<http://www.profibus.com/>