Using *Liteway*® Fiber Optic Transmission Systems with Optical Fiber of Various Sizes

All ***Liteway Inc.*** fiber optic transmission systems are specified for operation with one of two "industry standard" optical fiber sizes. Units with the suffix -1 and -3 are intended for use with multimode optical fiber having a core diameter of 62.5 microns and a cladding diameter of 125 microns. These fibers are usually referred to as "62/125" or "multimode fiber". Units with the suffix -7 or -9 are intended for use with single- mode optical fiber having a core diameter of 8 to 10 microns and a cladding diameter of 125 microns. These fibers are usually referred to as simply "single-mode fiber".

Because the diameter of multimode fiber is much larger than that of single-mode fiber attempting to use a multimode system with single-mode fiber will result in very little light being coupled into the single-mode fiber. This will cause poor, erratic or in most cases no operation of the system at all. Conversely, trying to use a single-mode system with multimode fiber will almost always result in optical overloading of the receiver. Although this will not normally damage anything, signals will be distorted and the system will not operate properly.

Multimode systems can be used with other multimode fiber sizes however if the user understands that the amount of light coupled into the fiber at the transmitter, or at a junction of two fibers is a function of the diameter of the light-carrying core of the fiber. The chart below shows the relationship of optical power coupled into all existing common sizes of fiber using industry standard 62.5 micron fiber as a baseline. Single-mode fiber is shown for informational purposes.

Core/cladding diameter and typical coupled light (in dB)

50/125	-3.2 dB
62.5/125	0 (reference)
85/135	+1.6 dB
100/125	+3.0dB
9/125 single-mode	-17 dB

If one simply adds or subtracts the above parameters from the published optical loss budgets of a particular system the results will be the "new" optical loss budget of the system. This means that a multimode system with a published optical loss budget of 10dB (with 62/125 fiber) will only have an optical budget of 6.8dB when used with 50/125 fiber. Obviously single mode fiber will have too much loss to operate properly with multimode transmission systems.

Note that this tabulation assumes that the optical wavelength of the light at both the transmitter and receiver is what the system was designed for. A system designed to work with 850nm light will not operate at 1310nm or 1550nm regardless of the size of the fiber used. Similarly a system designed to operate at 1310nm or 1550nm will not work properly at 850nm.