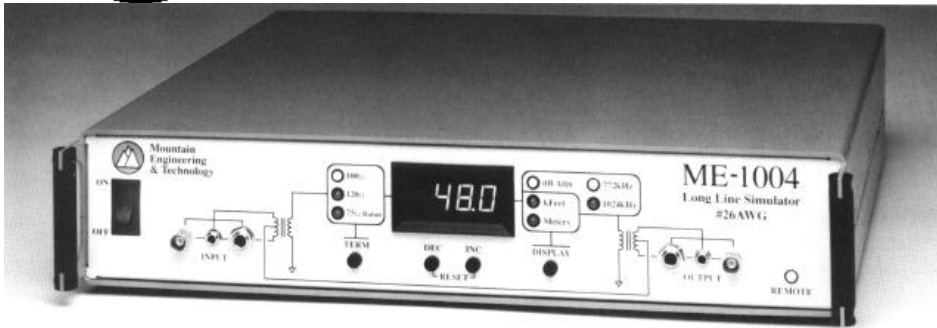
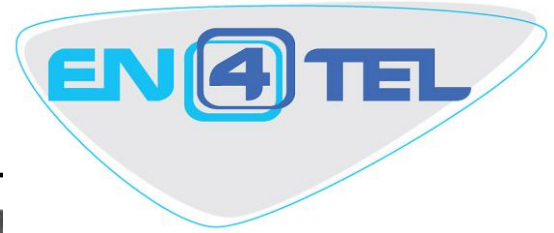




Mountain  
Engineering  
& Technology

**ME-1004**  
Long Line Simulator, #26AWG



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## Features

- Simulates #26AWG (0.41mm) PIC twisted-pair telephone transmission line
- Selectable attenuation levels 0dB to -48dB @ 772kHz (1.544 Mb/s) in 1dB steps and from 0dB to -55.7dB @ 1024kHz (2.048 Mb/s) in 1.16dB steps
- Selectable line impedance: 100Ω, 120Ω, or 75Ω BALUN
- Accurate over a 3 decade frequency range, from 10kHz to 10MHz
- Convenient front panel controls and displays, calibrated in kFeet, Meters, and dB of Attenuation at 772/1024kHz
- Remote control of all functions via standard RS-232 port
- Accepts standard BNC, Bantam, and 310 connectors

## Compatibility

- US and European AMI-PCM codes:
  - T1 - 1.544Mb/s
  - T1C - 3.152Mb/s
  - T2 - 6.312Mb/s
  - CEPT - 2.048Mb/s
  - CEPT - 8.448Mb/s
- ISDN primary rate standards, 1.544 Mb/s and 2.048 Mb/s
- Japan's CMI code standard, 2.048 Mb/s
- Manchester coded data from 100 kb/s to 10 Mb/s

## Applications

- Design and evaluation of serial data receivers and repeaters
- Replaces 7.2kft (2.2km) of transmission line in laboratory experiments
- Allows automated testing of telecommunications, PBX, and LAN equipment

## General Description

The ME-1004 is a highly accurate, programmable filter designed to simulate the attenuation versus frequency characteristics of the #26AWG (0.41mm) unshielded twisted-pair transmission wire commonly used in long distance telephone trunk lines in the US and around the world. The same wire is also found in office buildings and industrial complexes where it forms the backbone of PBX and LAN communication systems. By simulating 7.2kft (2.2km) of transmission line in 150ft (46m) increments, the ME-1004 offers a convenient and practical method of developing and testing communications equipment intended for use on this wire.

Easy to use front panel controls set the ME-1004's simulated line length displayed in kFeet, Meters, or dB of Attenuation at either 772kHz for 1.544Mb/s applications or 1024kHz for 2.048Mb/s applications. Input and output line terminations are also user-selectable to correctly match the characteristic impedances of either 100Ω or 120Ω twisted-pair wire systems. A 75Ω BALUN connection is also provided. All ME-1004 functions can be computer controlled via a standard RS-232 serial port for automated test applications. Options include battery back-up and an internal noise mixer.

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# ME-1004

## Operating Specifications

(Valid at all attenuation settings, test signal (fo)=772kHz and 0°C < T<sub>AMBIENT</sub> < 50°C unless otherwise stated)

### Input

Terminating Impedance ..... 100Ω/120Ω /75Ω, ±5%  
 Recommended Frequency Range ..... 10kHz to 10MHz  
 Maximum Balanced Input Voltage  
     Zero to Peak ..... ±6V  
 Maximum Balanced DC Input Current  
     Input Center-Tap to Output Center Tap ..... 70mA

### Output

Sourcing Impedance ..... 100Ω/120Ω /75Ω, ±5%  
 Maximum Rise/Fall Time At 0dB,  
     V<sub>IN</sub> = 3 V<sub>PEAK</sub> ..... < 40nsec  
 Maximum Overshoot At 0dB  
     V<sub>IN</sub> = 3 V<sub>PEAK</sub> ..... < 10%  
 Short Circuit Tolerance ..... Continuous

### Attenuation Characteristics

Attenuation range at f<sub>O</sub> with display setting:

f<sub>O</sub> = 772kHz ..... 0dB to -48.0dB  
 f<sub>O</sub> = 1024kHz ..... 0dB to -55.7dB

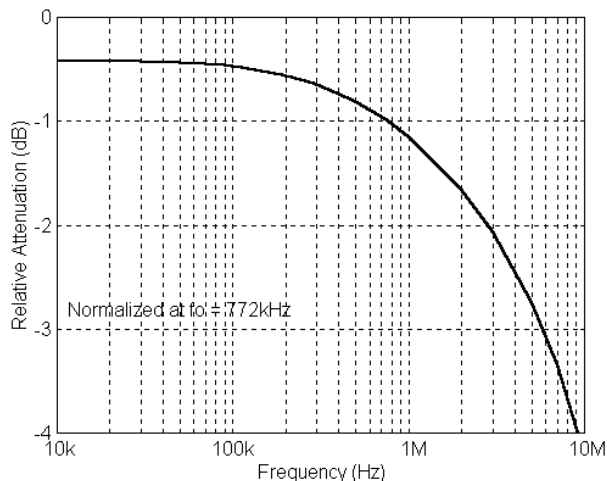
Frequency dependent attenuation simulates that of #26AWG (0.41mm) unshielded twisted-pair wire at 20°C. The following indicates the relative attenuation (A<sub>R</sub>) versus frequency normalized at f<sub>O</sub>=772kHz.

Freq. (kHz)	10	20	30	50	70	100	200	300
A <sub>R</sub> (dB)	.415	.420	.425	.434	.446	.470	.560	.650
Freq. (MHz)	.500	.772	1.024	2.0	3.0	5.0	7.0	10.0
A <sub>R</sub> (dB)	.805	1.0	1.16	1.65	2.07	2.74	3.34	4.20

The attenuation at any frequency, A(f), can be calculated as a function of the attenuation setting at f<sub>O</sub> = 772kHz as follows:

$$A(f) = A_R(f) \times A(f_O)$$

f<sub>O</sub> = 772kHz ..... 1.00dB  
 f<sub>O</sub> = 1024kHz (Displayed to nearest 0.1dB) ... 1.16dB



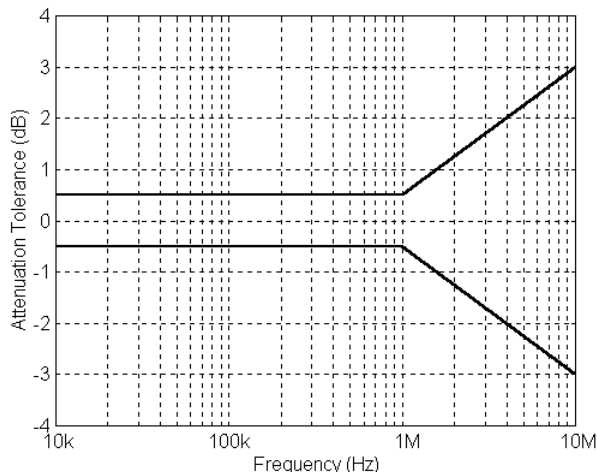
Attenuation adjustment step size with display setting:

### Attenuation Accuracy

Attenuation range at fo with display setting:

fo = 772kHz ..... ± 0.25dB  
 fo = 1024kHz ..... ± 0.30dB

Attenuation tolerance at all other frequencies relative to is given by the following graph:



### General Specifications

Power input voltage: Option A ..... 103V to 132V  
                           Option B ..... 210V to 250V  
                           Option J ..... 90V to 110V  
 Power input frequency..... 45Hz to 66Hz  
 Power Consumption.....10W  
 Dimensions (w x h x d in inches)..... 17 x 3.5 x 14  
 Weight ..... 13 lbs  
 Storage Temperature..... -40°C to 85°C

### Ordering Information

Transmission Line Simulator: ME-1004-A-1CD  
 Options: A - 120V supply \_\_\_\_\_  
           B - 240V supply \_\_\_\_\_  
           J - 100V supply \_\_\_\_\_  
           1 - Bench-top chassis \_\_\_\_\_  
           2 - Rack-mount chassis \_\_\_\_\_  
           C - Battery back-up \_\_\_\_\_  
           D - Noise mixer \_\_\_\_\_