



**"Results You Can Count On"**

**Model 458-LM-A8-36**  
**Local Loop Simulator**

0315-0360 Rev. -  
Date of Publication: 09/01/06





## Customer Support

Thank you for your purchase of the Telebyte Model 458-LM-A8-36 Local Loop Simulator, featuring 36 MHz bandwidth and 8 channels for simulation of 26 AWG PIC as specified in ANSI T1.417.

### Contact Information:

#### Telephone

General: 631-423-3232  
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## Warranty

### Included With Your Purchase

#### **One-year Warranty**

- Telebyte will furnish parts and labor for the repair or replacement of products found by Telebyte to be defective in material or workmanship during the warranty period.<sup>1</sup>

#### **One-year Calibration (where applicable)**

- One N.I.S.T. traceable calibration on the first-year anniversary of the product ship date.<sup>2</sup>
- Calibration report to ensure traceability.

### Extended Customer Care

There are two options available. Our three-year extended warranty extends the original warranty by an additional 36 months and the three-year calibration contract provides 36 additional months of calibration.

#### **Three-Year Extended Warranty**

You can extend the original one-year warranty that comes with your product by purchasing the **Three-Year Extended Warranty**.<sup>3</sup>

Features:

- Telebyte will furnish parts and labor for the repair or replacement of products found by Telebyte to be defective in material or workmanship during the warranty period.<sup>1</sup>

#### **Three-Year Calibration Contract (where applicable)**

Extended calibration is available through the **Three-Year Calibration Contract**.<sup>4</sup>

Features:

- Yearly N.I.S.T. traceable calibrations, each on the second, third and fourth anniversary of the ship date.<sup>2</sup>
- Report to ensure traceability.
- Automatic notification when calibration of your product is due.

### Disclaimer of Warranties and Other Terms and Conditions

<sup>1</sup> TELEBYTE, INC. warrants its broadband simulation equipment to be free from defects in material and workmanship, under normal and proper use and in its unmodified condition, for 12-months, starting on the date it is delivered for use. TELEBYTE'S sole obligation under this warranty shall be to furnish parts and labor for the repair or replacement of products found by TELEBYTE to be defective in material or workmanship during the warranty period. Warranty repairs will be performed at the point of manufacture. Equipment approved for return for warranty service shall be returned F.O.B. TELEBYTE factory and will be redelivered by TELEBYTE freight prepaid, except for non-continental U.S.A. locations. These deliveries will be sent COD freight and import/export charges.

<sup>2</sup> The customer is responsible for freight and customs charges when shipping products to and from Telebyte for calibration services.

<sup>3</sup> You must purchase the extended warranty at the time of purchase or during the initial warranty period.

<sup>4</sup> You must purchase the calibration contract at the time of purchase or during the initial warranty period. The above warranty is in lieu of all other warranties, expressed or implied, statutory or otherwise, including any implied warranty of merchantability or fitness for a particular purpose. TELEBYTE shall not be liable for any damages sustained by reseller or any other party arising from or relating to any equipment failure, including but not limited to consequential damages, nor shall TELEBYTE have any liability for delays in replacement or repair of equipment.



## Equipment Returns

Out of warranty equipment may be returned, prepaid, to the Greenlawn, N.Y. customer service facility. Return shipping charges will be billed to the customer. The repaired unit will have a 90-day warranty. In those cases where "no trouble" is found, a reduced charge will be billed to cover handling, testing, and packaging. Whether in or out of warranty, a Return Material Authorization number (RMA) is required and may be obtained by:

Calling customer service at 631-423-3232 or 800-835-3298

Sending a request via Fax at 631-385-8184

E-mailing us at [support@telebytebroadband.com](mailto:support@telebytebroadband.com)

Please be sure to reference the RMA number on the outside container.



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## 1.0 Introduction

The Model 458-LM-A8-36 Local Loop Simulator accurately simulates 26 AWG PIC as specified in T1.417. This plug and play line module provides bandwidth up to 36 MHz and 8 channels with loop lengths from 0 to 7,500 ft, in 500-ft increments.

### Features:

- Bandwidth to 36 MHz
- Accurately simulates attenuation and impedance
- 8 channels per line module
- High channel-to-channel and line card-to-line card repeatability
- Plugs into our 458-2SL (2-Slot Chassis), 458-3SL (3-slot chassis) and 458-CC (16-slot chassis)
- Independent control of each channel
- Ability to open loop at either end of any channel
- MAE <1 dB



*Figure 1: Front View of Model 458-LM-A8-36. Both the front and rear of the line module have 8 RJ-45 connectors.*



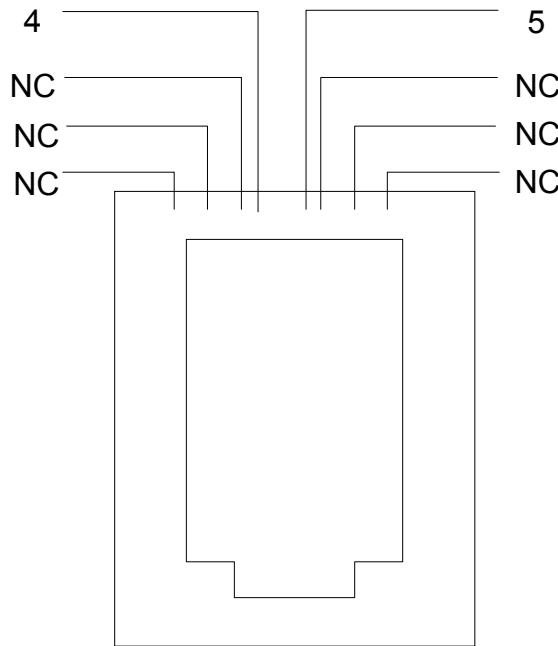
## 2.0 Specifications

Product Specifications	
<b>Simulation</b>	<ul style="list-style-type: none"><li>• Accurately simulates attenuation and impedance</li><li>• Full bi-directional operation at all specified frequencies</li><li>• 26 AWG PIC as specified in ANSI T1.417</li></ul>
<b>Bandwidth</b>	DC to 36 MHz
<b>Attenuation Accuracy (when source and load impedances are 100 ohms)</b>	MAE < 1 dB 25 kHz to 36 MHz
<b>Maximum Attenuation</b>	> 90 dB
<b>Impedance Accuracy</b>	Typically +/- 10% 25 kHz to 36 MHz
<b>Maximum voltage tip – ring</b>	200 V
<b>Maximum current</b>	130 mA
<b>Connectors</b>	8 RJ-45's on front, 8 RJ-45's on back

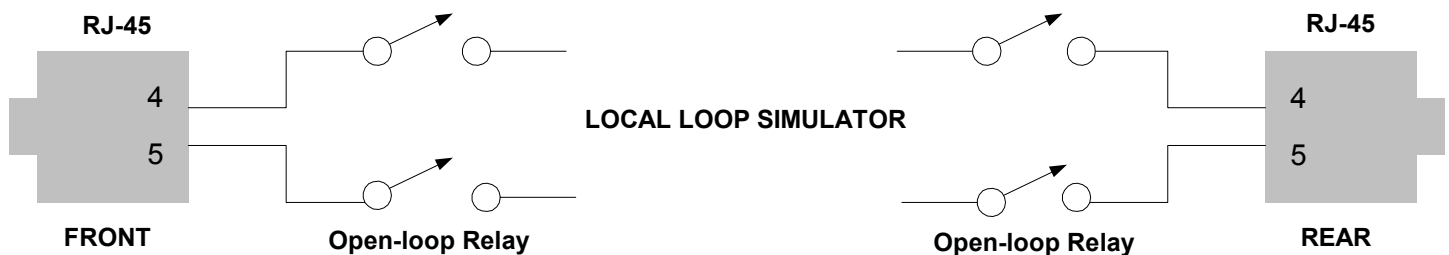
### 3.0 Connections

The input and output ports are interchangeable (i.e., the unit is bidirectional). The cable pair is accessible through the RJ-45 jacks on the front and rear of the line module. The two center contacts, Tip and Ring (pins 4 and 5), of each RJ-45 are supported.

- ⓘ Do not exceed the maximum ratings as listed in section 2.0, “Specifications.” For best accuracy, the I/O cables should be limited to 3 m or less.



RJ-45 Configuration



The Open-loop Relays are controlled by the “Connect Mode” part of the Set Length command. Refer to that command for options available.





## 4.0 Control

The Model 458-LM-A8-36 can be controlled by RS-232 Remote Commands using a serial or Ethernet interface, IEEE488 Remote Commands, or a Telebyte GUI interface. In addition, manual control is provided through the LCD display and controls on the front panel of the Model 458-2SL (2-Slot chassis), 458-3SL (3-Slot chassis) and 458-CM (control module for our 458-CC 16-Slot chassis).

- ① If the line module is plugged into the Model 458-3SL, RS-232 commands may be sent over an Ethernet connection, and therefore, a LAN, using a terminal emulation program on a remote PC. To use this feature, it must be enabled on the chassis. Refer to the Model 458-3SL manual for detailed information.

### 4.1 Remote Commands

- ① All Set card lengths, English/Metric mode and Echo enable/disable are maintained during power off. Manual control is enabled at power on.

#### 4.1.1 RS-232/Ethernet Remote Commands

The remote commands listed in this section may be used with a serial or Ethernet interface where available).

**md**

**Disable manual control**

Disable manual setting of lengths or configuration (does not apply to 458-CM)

**me**

**Enable manual control**

Enable manual setting of lengths or configuration (does not apply to 458-CM)

**id**

**Identify model no. and rev.**

Read model no. and software revision code

**re**

**Read last error**

Read description of last error



**ee**  
**Echo enable**

Echo all inputs and format output for terminal display

**ed**  
**Echo disable**

Inputs not echoed and format output for user control program

**h**  
**Help RS232 command list**

Read RS232 command list

**cs:BR**  
**Configure serial**

Where BR = 300, 600, 1200, 2400, 4800, 9600 or 19200

**cp:ADD**  
**Configure 488**

Where ADD = 1, 2, ... 29, 30 (No leading zeroes used)

**Set Length command**

**sl:LM:H:LE,C**

Where:

LM = Module slot number → 01 - 02 (458-2SL) 01 – 03 (458-3SL) or 01 – 16 (458-CM)

H = Channel number → 1 - 8

LE = Length (in feet)



C = Connect mode:

- N = connect both CO and CPE ends.
- P = connect CPE only CO is open.
- O = connect CO only CPE is open.
- Z = open both CO and CPE ends

Example: SL:01:1:2000,N sets channel 1 to 2000 ft for a line module in slot 1.

The connect mode may be used to create an “open loop” condition at either the CO or CPE ends, or both.

### **Set all channels on all boards in the system command**

**sl:all:LE,C**

Example: sl:all:2000,n sets all channels in the system to 2000 ft

### **Set all channels on a range of boards command**

**sl:LM-LM:LE,C**

Example: sl:01-03:2000,n sets all channels on boards 1, 2, and 3 to 2000 ft.

### **Set all channels on one board command**

**sl:LM:a:LE,C**

Example: sl:01:a:2000,n sets all channels on the board in slot 1 to 2000 ft.

### **Read Length command**

**rl:LM:H**

Example: rl:01:1 reports the length of channel 1 on the board in slot 1.

### **Read the Lengths of all channels on one board command**

**rl:LM:a**

Example: rl:01:a reports the lengths of all channels on the board in slot 1.



### **Read the lengths of all channels on all boards command**

**rl:all**

Example: rl:all reports the lengths of all channels on all boards

### **Read the serial number of one line module command**

**rs:LM**

### **Read the serial numbers of all cards command**

**rs:all**

## **4.1.2 IEEE 488 (GPIB) Remote Commands**

**:manual:disable**

**Disable manual control**

Disable manual setting of lengths or configuration

**:manual:enable**

**Enable manual control**

Enable manual setting of lengths or configuration

**:lasterror**

**Read last error**

Read description of last error

**\*idn?**

**Identify model no. and rev.**

Read model no. and software revision code

**\*esr?**

**Event Status Register read**

Read IEEE esr



**\*sre?**  
**Status Request Enable read**

Read IEEE sre

**\*stb?**  
**Status Byte register read**

Read IEEE stb

**\*ese?**  
**Enable Status Event read**

Read IEEE ese

**\*sre xx**  
**Status Request Enable write**

Write IEEE sre xx

**\*ese xx**  
**Enable Status Event write**

Write IEEE ese

**:cs:BR**  
**Configure serial**

Where BR = 300, 600, 1200, 2400, 4800, 9600 or 19200

**:cp:ADD**  
**Configure 488**

Where ADD = 1, 2, ... 29, 30 (No leading zeroes used)

*SRExx	Enables Status Bits as defined by the numerical value of the bits following the command.
*SRE?	Used to read the Enabling Bits in the Status Register.
*STB?	Reads the Status Register
*ESExx	Enables Event Status Bits as defined by the numerical value of the bits following the command.
*ESE?	Used to read the Enabling Bits in the Event Status Enable Register.
*ESR?	Reads the Event Status Enable Register.



Status Byte Register			
Bit	Value	Set	Operation
0	1	0	Not Supported
1	2	0	Not Supported
2	4	0	Not Supported
3	8	0	Not Supported
4	16	1	Enable Message Available bit (MAV)
5	32	1	Enable Event Status Bit (ESB)
6	64	1	MSS this bit is always enabled
7	128	0	Not Supported

Event Status Enable Register			
Bit	Value	Set	Operation
0	1	1	Operation Complete
1	2	0	Not Supported
2	4	1	Query Error
3	8	0	Not Supported
4	16	1	Execution Error
5	32	1	Command Error
6	64	0	Not Supported
7	128	1	Power On

### Set Length command

**:setcard:length:LM:H:LE,C**

Where:

LM = Module slot number → 01 - 02 (458-2SL) 01 – 03 (458-3SL) or 01 – 16 (458-CM)

H = Channel number → 1 - 8

LE = Length (in feet)

C = Connect mode:

N = connect both CO and CPE ends.

P = connect CPE only CO is open.

O = connect CO only CPE is open.

Z = open both CO and CPE ends

Example: :setcard:length:01:1:2000,n sets channel 1 of the line module in slot 1 to 2000 ft.



### **Set all channels on all boards in the system command**

**:setcard:length:all:LE,C**

Example: :setcard:length:all:2000,n sets all channels on all boards to 2000 ft.

### **Set all channels on a range of boards command**

**:setcard:length:LM-LM:LE,C**

Example: :setcard:length:01-03:2000,n sets boards 1, 2 and 3 to 2000 ft.

### **Set all channels on one board command**

**:setcard:length:LM:a:LE,C**

Example: :setcard:length:1:a:2000,n sets all channels on the board in slot 1 to 2000 ft.

### **Read Length command**

**:readcard:length:LM:H**

Example: :readcard:length:01:1

### **Read the lengths of all channels on one board command**

**:readcard:length:LM:a**

Example: :readcard:length:01:a

### **Read the lengths of all channels on all boards command**

**:readcard:length:all**

### **Read serial number of one line module command**

**:readcard:sn:LM**

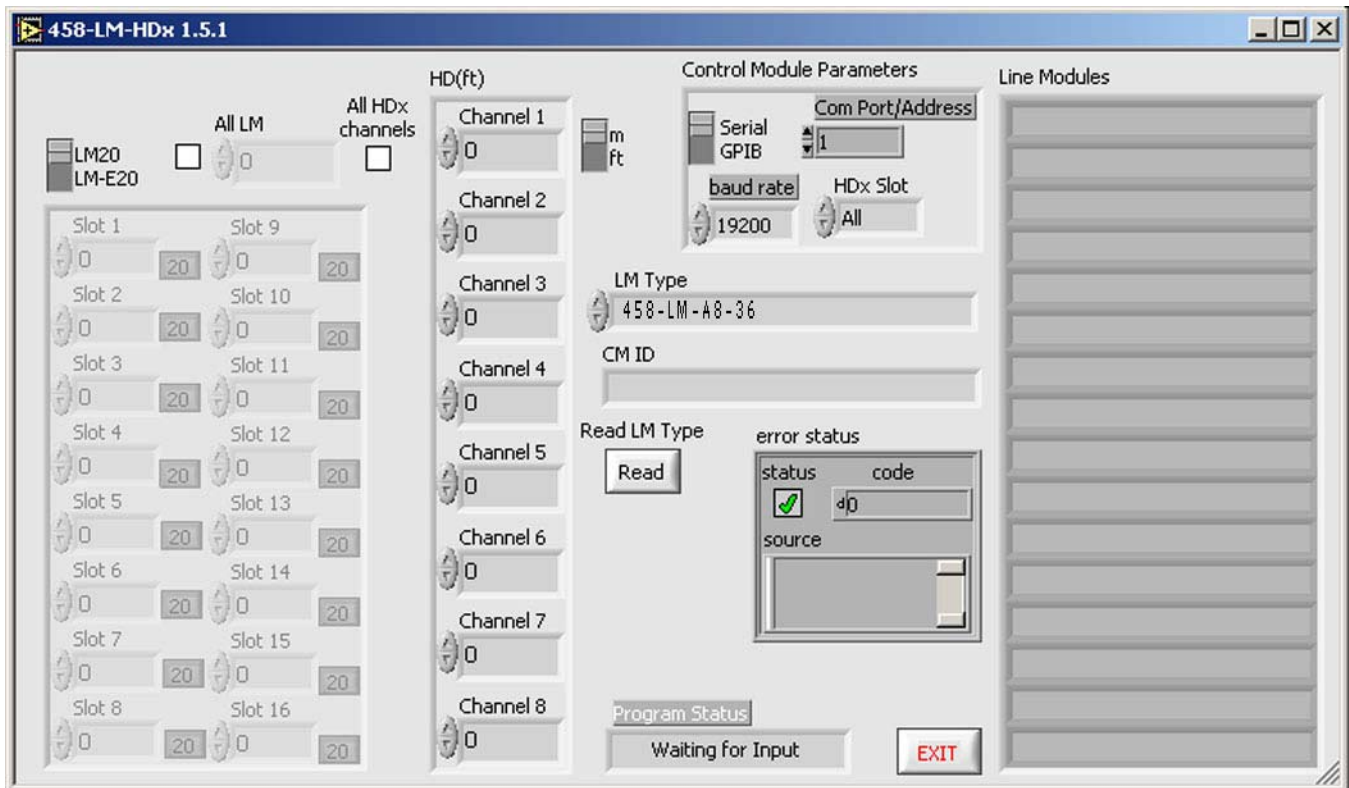
### **Read all serial numbers command**

**:readcard:sn:all**



## 4.2 Graphical User Interface

The 458-LM-HDx Graphical User Interface (GUI) can be used to control the Model 458-LM-A8-36. The following are brief instructions for working with the GUI using a typical set up. If required, a copy of this software can be obtained by going to [www.telebytebroadband.com](http://www.telebytebroadband.com) and clicking on the support/software options.



### 4.2.1 Set Control Module Parameters

#### Suggested Settings:

##### Control Module Parameters

Serial/GPIB: **Serial**  
Com Port/Address: **1**  
Baud Rate: **19200**  
HDx Slot: **All**

##### Set Channels

All HDx Channels: **checked**





## Scan Line Modules

Click **Read LM Type** to scan the chassis for installed line modules. The slot, serial number and line module type are displayed in the **Line Modules** section. Please note that, while line modules other than the 458-LM-A8-36 may be installed, and therefore displayed, those line modules may not necessarily be able to be controlled by the 458-LM-HDx software.

## Working with Channels

The main settings that control channel lengths are **All HDx Channels**, **Channel 1**, and **HDx Slot**.

**All HDx Channels/Channel 1:** when All HDx Channels is checked, Channels 2-8 are populated with the value in Channel 1. If not checked, channel fields may be set independently.

**HDx Slot:** indicates which slots in the connected chassis are affected.

The following is a sample of the settings variations available. For illustrative purposes, Channel 1 lengths are set to 1000.

All HDx Channels	Slot	Channel 1	Channel 2-8	Result
Y	All	1000	Same as Ch1	All channels, in all slots containing a 458-LM-A8-36 are set to 1000.
Y	1	1000	Same as Ch1	All channels, in slot 1, if an 458-LM-A8-36, are set to 1000.
N	All	1000	2000, 3000, etc	The channels in all slots containing an 458-LM-A8-36 are set to the individual lengths entered for each channel.
N	3	1000	2000, 3000, etc	The channels in slot 3 are set to the individual lengths entered for each channel.



## 4.3 Manual Chassis Controls

### 4.3.1 LCD/Rotary Encoders (458-2SL)



*The Model 458-LM-A8-36 installed in the Model 458-2SL (2-Slot Chassis)*



*Close up of the LCD display, showing the board and channel on the top and the line length and communication settings on the bottom.*

## Rotary Encoder Functions

Top encoder (1): Selects module number and channel (LCD shows module number and channel)

Bottom encoder (2): Selects length (LCD shows line length and connect mode). Used with the Config button to adjust communication setting values

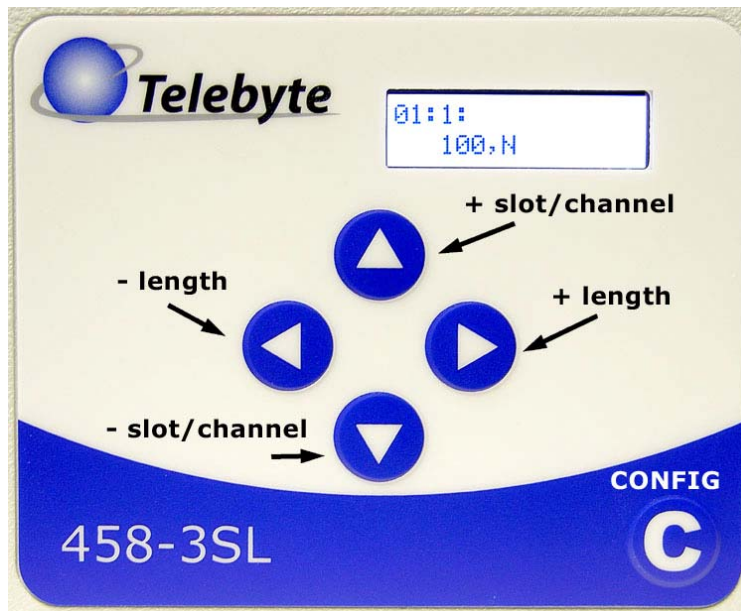
Config button: Used to access a second menu on the front panel. The bottom of the LCD displays the communication settings used. The bottom encoder adjusts this value between GPIB address 1 and GPIB address 30, as well as RS-232 baud rates 19200, 9600,4800,2400,1200 and 600.



### 4.3.2 LCD/Keypad (458-3SL/CM)



The Model 458-LM-A8-36 installed in the Model 458-3SL (3-Slot Chassis)



The sample screen above shows how the keypad controls on the 458-3SL/CM are used. The LCD displays the slot, channel, length and configuration type. In this example the length for slot 01:channel 1, is set to 100.



## Keypad Controls

Up Arrow: increase slot/channel number

Down Arrow: decrease slot/channel number

Left Arrow: decrease length

Right Arrow: increase length

C: Config switch used to access second menu for communications settings such as RS232 baud rates, GPIB addresses, etc.

Baud Rates: 19200, 9600, 4800, 2400, 1200, 600

GPIB Addresses: 1 – 30

## General example of usage

1. Turn on power. The LCD displays the chassis model (and firmware revision number on the 458-3SL) and then displays the current board, channel, line length and connect mode.
2. Turn rotary encoder 1 (458-2SL) or press the Up arrow (all others) to increment the channel number for the current board and, when it reaches the final channel, display the next board number.
3. Turn rotary encoder 2 (458-2SL) or press the Right arrow (all others) to increment the allowable line length for a given board:channel combination. The connect mode displays automatically.

## Allowable lengths (feet)

All Channels: 0 to 7,500 ft in **500-ft** increments.