

# ME540A-ST

## SPECIFICATIONS:

**Protocol:** Asynchronous

**Speed:** Transparent through 20 Kbps on 20-mA current loop port, 64 Kbps on RS-232 port, 128 Kbps on RS-485 port.

**Maximum Distance:** 5000 ft. (1524 m) on 62.5 micron

**Operation:** Network or master/slave mode, multipoint half-duplex (NOTE: A software protocol is required); Point-to-Point line driver operation, full duplex.

**Number of Drops:** 64

**Interface:** RS-232 DCE/DTE, RS-485, 20-mA current loop--active or passive transmit and receive, fiberoptic transmit and receive.

**Connectors:** (1) DB9, (4) ST, (1) 4-screw terminal block.

**Indicators:** (10) LED's: 232, 485, 20 mA, NETWORK, MASTER, SLAVE, PORT B TXD, PORT B RXD, PORT A TXD, PORT A RXD.

**User Controls:** (1) Push-button: Pressed in enables DLB (Digital Loopback) mode, and fully extended enables Normal mode.

**Link Budget:** 50-125u cable: 2.5 dB; 62.5-125u cable: 6 dB; 100-140u cable: 11.5 dB.

**Fiber Launch Power:** -14 dB

**Receiver Sensitivity:** -25 dB

**Wavelength:** 820 nm

## INTRODUCTION:

With the FOM Line Driver, you can use an RS-232, RS-485, or 20-mA digital current-loop device in a multi-drop half-duplex or point-to-point full-duplex environment using fiber optics as the transmission media. The Driver is user-configurable in any of these operating modes: network mode, master/slave mode, or full-duplex point-to-point configuration.

### Ports:

The FOM Line Driver has a single RS-232 DB9 female connector. TX and RX are parallel with a 20-mA current-loop and RS-485 interface sharing a common terminal block with a switch to select the desired interface. This will let you connect an RS-232, RS-485, or current-loop device to a fiberoptic link. There are also two sets of fiberoptic receivers and transmitters with ST connectors supporting standard fiber cable through 200 microns (multimode).

### Speed and Distance:

The Line Driver runs at up to 20 Kbps on the 20-mA current-loop port, up to 64 Kbps on the RS-232 port, and up to 128 Kbps on the RS-485 ports. Maximum distance is 5000 feet (1524 m).

## CONFIGURATION:

There are three operating modes you can choose from: network mode, master/slave mode, or point-to-point configuration. In network mode, all of the units are configured. If you want on Line Driver configured as a master and the others as slaves, you need to be in master/slave mode. Finally, point-to-point configuration is a full-duplex modem where both FOM Line Drivers are configured as masters.

### Network Mode:

In this mode, data sent to the transmitters (TX) of the RS-232 DB9, 20-mA current-loop, or RS-485 terminal block is passed out to both optical transmitters (TX). Data received from either optical receiver (RX) is passed through to the opposite optical port's transmitter (TX), to the receiver (RX) of the RS-232 DB9, the 20-mA current-loop, or the RS-485.

### Master/Slave Mode:

When the master sends data to the transmitter (TX) of the RS-232 DB9, the 20-mA current-loop, or the RS-485 terminal block, the data is passed through to the master's B optical port. From there, it is daisychained to each slave's B optical RX. As each slave receives the data, it is passed through to the DB9 RX and the receive (RX) terminal block. When the data reaches the slave that needs to respond, it will send data to the optical A TX port and out to the next daisychained slave in the direction of the master. The information is retransmitted and travels from daisychained slave to slave in the direction of the master until it reaches the master's Port A. Although the information is traveling through the other slaves, slaves don't "see" data from other slaves. This keeps the slaves from having to stop working in order to translate another slave's information.

### Point-to-Point:

The Line Driver can run in full-duplex mode across the fiber connecting an RS-232, RS-485, or 20-mA current-loop device to another RS-232, RS-485, or 20-mA current-loop device. **In Point-to-Point Applications, Both units must be configuration as masters.**

## INSTALLATION:

### Setup:

Factory-default settings are marked with asterisks. Determine which interface should be active, and set XW2 accordingly.

RS-232 ----- XW2A\*  
RS-485 ----- XW2B  
20-mA Current Loop ----- XW2C

Determine the mode in which you want the Line Driver to operate. If you want all of the Line Drivers to be configured, choose 0 (on S1, position 1) for Network Mode. If you want the Master/Slave Mode (for either a half-duplex mode where one Line Driver is the master and the others are slaves or for point-to-point, the full-duplex mode where both Line Drivers are configured as masters), choose 1.

S1, Position 1: Mode Select.  
0 = Network Mode  
1 = Master/Slave Mode

If you choose to operate in Master/Slave Mode, you need to designate whether this Line Driver will be a master or a slave. On S1, set position 2 to 0 if you want the Driver to be a master and 1 if you want it to be a slave. If you choose Network Mode above, you do not need to set S1, position 2.

S1, Position 2: Master/Slave Select.  
0 = Master\*  
1 = Slave

### NOTE:

**To use the following switch positions appropriately, you should have a firm understanding of your network requirement.**

S1, Position 5 and 6 are used as a pair to bias the Line Driver's receivers and must be moved together. S1, Positions 3 and 4 are used as a pair to bias the Line Driver's TX pair and must be moved together. In most RS-485 applications, you would bias your RX (S1, Positions 5 and 6) ON or closed.

For example, say you have an RS-485 network in an idle condition with all nodes in the receive mode. Since the drivers are tri-stated, the line voltage could be either positive or negative—there's no way to know for sure. If the voltage level at the TB1-2 and TB1-1 inputs is less than 200mv, the logic level at the output of the RX will be the last bit received. To force the line into an idle condition, you'd need to set the switch S1, Position 5 and 6, which will add resistors.

S1, Positions 3 through 6 -- RS-485 Failsafe/Biased Line.  
0 = No Bias  
1 = Biased

If you selected RS-485 as your interface, you'll need to set S1, positions 7 and 8, for termination. The physical ends (the first and last Drivers) must be terminated and the ones in between are unterminated. Positions 7 and 8 must be set in pairs (both terminated or both unterminated). Note that a star topology will not work with these Line Drivers.

S1, Positions 7 and 8 -- RS-485 Termination.  
0 = Unterminated  
1 = Terminated

### RS-232:

Follow these instructions to set up the RS-232 interface.

1. Set XW1. XW1A sets the Driver for DCE. XW1B sets the Driver for DTE.  
XW1A = DCE\*  
XW1B = DTE

### DB9 Pinouts:

DCE	DTE
2 - TX Data	2 - RX Data
3 - RX Data	3 - TX Data
7 - RTS Input	7 - RTS Held High
4 - DTR Input	4 - DTR Held High
8 - CTS Output	5 - Signal Ground
6 - DSR Held High	8 - No Connect
1 - CD Held High	6 - No Connect
5 - Signal Ground	1 - No Connect

2. **Set W3.** If you selected XW1A (DCE), Position AB will enable DTR (DTR controls CTS). In position BC, RTS controls CTS. If you selected XW1B (DTE), all handshake leads are ignored, and W3 will have no effect. It's not necessary to set W3.

If XW1A was selected, Position AB ----- DTR\*

or

If XW1A was selected, Position BC ----- RTS loops back to raise CTS.

or

If XW1B was selected, W3 has no effect.

3. **Set W2.** W2 sets the delay of CTS assertion with the raising of DTR or RTS. 0 means there will be no delay. 10 gives you a 10-millisecond delay, and 30 is a 30-millisecond delay.

0 ----- No Delay

10 ----- 10-msec. delay

30 ----- 30-msec. delay

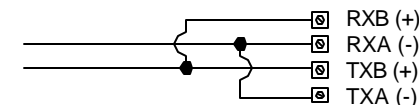
### RS-485

Follow these instructions to set up the RS-485 interface.

1. **Connect the wire to the terminal block.** Set the wire to TB1 (the 4-wire terminal block) as indicated below for 4-wire RS-485 applications:

Position 1 ----- Receive B (+)  
Position 2 ----- Receive A (-)  
Position 3 ----- Transmit B (+)  
Position 4 ----- Transmit A (-)

For 2-wire RS-485 applications, tie Transmit A (-) to Receive A (-) and Transmit B (+) to Receive B (+). See the illustration below.



2. **Set S5.** Move S5 to the RS-485 position, B\*. S5 determines which circuit is tied to TB1.

3. **Set W4, W5, and W6.**

*For 4-wire operation:* W4 and W5 are in the A-B position (as shipped). When configured for 4-wire, W6 is not used.

*For 2-wire operation:* Move W4 and W5 to the B-C position. W6 is now used to set the time the driver will remain enabled after the transmission of the last data bit (see below).

A ----- 7-msec. delay

B ----- 2-msec. delay

C ----- 0.7-msec. delay

D ----- 0.15-msec. delay

4. **Set S1.** If the RS-485 receiver needs to be terminated, move S1 positions 7 and 8 both ON. Note that both switches must either be ON or OFF simultaneously.

*To Terminate:*

Position 7 ----- 1 (terminated)

Position 8 ----- 1 (terminated)

*Not Terminated:*

Position 7 ----- 0 (unterminated)

Position 8 ----- 0 (unterminated)

5. Biased, Failsafe Operation (S1, positions 3 through 6). S1 positions 3 through 6, when in the 1 or ON position, switch in a 1 K pull-up resistor to the A input/output and a 1 K pull-down to the B input/output. 0 is the OFF position.

In almost all 2- or 4-wire RS-485 applications, positions 3 and 4 should be OFF and positions 5 and 6 should be ON. Note that positions 3 and 4 and positions 5 and 6 should always be moved in pairs, either both open or both closed.

#### **20-mA Current Loop (Point-to-Point)**

**NOTE:**

**To use the following switch positions appropriately, you should have a firm understanding of your network requirements.**

1. Connect the wire to the terminal block. Set the wire to TB1 (the 4-wire terminal block) as indicated below for 4-wire current-loop applications:

Position 1 ----- Receive B (+)

Position 2 ----- Receive A (-)

Position 3 ----- Transmit B (+)

Position 4 ----- Transmit A (-)

2. **Set S5.** Move S5 to the Current Loop position, A. S5 determines which circuit is tied to TB1.

3. **Set S2 and S3.** To configure the current loop transmitter and/or receiver as active or passive, set S2 and S3 as shown below.

*S2 ----- 20-mA Current-Loop Receive*

A ----- Active

B ----- Passive

*S3 ----- 20-mA Current-Loop Transmit*

A ----- Active

B ----- Passive