Board diagram labels:

TXA, TXB, RXA, RXB

S2 — Unterm / Term, on

W18 — A B C

W15 — A B C
W16 — A B C

W17
C — 1 ms
B — 100 ms
A — 1 sec.

50 MS
5 MS
0 ms
ON
W9

DB25 Female Conn.

XW1A DCE
XW1B DTE

W8 — HALF FULL

LOOPBACK (S1)

LEDs: Power, CTS, RTS, TX, RX

INTRODUCTION:

The LD485A-MP is an RS-232-to-RS-485 interface converter that operates in the same manner as a modem. It allows an RS-232 device to transmit data over much longer distances than is normally possible (up to 4-miles, 6.4km at 1200 bps). The advantage of the LD485A-MP over other line drivers and modems is that it can also operate in multi-point applications. Depending on the operating environment, as many as 64 devices can be linked together using twisted-pair cable.

The LD485A-MP can be jumpered for a user-selectable port time-out. After the last character is sent from one of the ports and a specified period of time passes (1 msec, 100 msec or 1 second), the LD485A-MP disables any transmission from that port. This time-out would be used in a multipoint application to prevent one port from monopolizing the line. For example, if one line driver was still enabled and no data was being sent, the other line drivers would not be able to transmit or receive data until the one driver was disabled. Thus, the line would be tied up, with no useful data communications taking place. The port time-out feature keeps the line free by disabling inactive ports.

Additional features include a manual loopback test to check the system wiring for both the RS-232 and RS-485 interfaces, and transient protection on the RS-485 interface to help prevent damage due to voltage transients on the data line.

Although designed specifically to connect to other LD485A-MP line drivers, the RS-485 port may be connected to any device with an RS-422 or RS-485 interface. For example, this would be useful in an industrial application where RS-485 and RS-422 devices would be connected to the same LD485A-MP.

INSTALLATION:

DTE/DCE CONFIGURATION: A DIP shunt is used to select DTE or DCE configuration. For the unit to appear as a DTE device, put the DIP shunt jumper in socket XW1B. For the unit to appear as a DCE device, put the DIP shunt jumper in socket XW1A.

FRAME GROUND/SIGNAL GROUND: Jumper W7 ties signal ground to frame ground. The position is left open at the factory. If signal ground is to be connected to frame ground, solder a 100-ohm, 1/2 watt resistor in location W7. A wire jumper may also be used. Care must be taken to ensure that ground circulating currents are limited to acceptable levels.

HALF/FULL DUPLEX OPERATION: Jumper W8 selects half-duplex or full-duplex operation. Set W8 to the HALF position for half-duplex operation. Set W8 to the FULL position for full-duplex operation.

NOTE:
When the jumper W9 is in the ON position and jumper W15 is in the A-B position, the RS-485 driver is always on to enable transmission of data. Therefore, half-duplex transmission cannot be performed.

CTS DELAY: When the transmitter of a device is first turned on, an unstable carrier signal is transmitted for several milliseconds. If data was sent during this period, it would be received as distorted information. Setting a CTS delay on the unit allows the communications link to settle down before data can be sent.

LD-485A-MP as DCE: When the unit is configured as a DCE device (DIP shunt in position XW1A), jumper W9 controls the amount of delay from the time RTS (jumper W18 in the B-C position) or DTR (jumper W18 in the A-B position) is received true until CTS is asserted true. To select a CTS delay period, set jumper W9 to the 0-, 5-, or 50-msec position. Regardless of the delay setting selected, when RTS or DTR goes false, CTS will immediately go false. If jumper W9 is in the "ON" position, CTS will always be held true (high).

LD-485A-MP as DTE: When the unit is configured as a DTE device (DIP shunt in position XW1B), CTS is **NOT** supported.

RS-485 DRIVER ENABLE: The unit's RS-485 driver can be set to be enabled one of three ways: by RS-232 controls signals, by data, or constantly on..

Driver Enabled by RS-232 Control Leads: If your equipment raises CD DTR or RTS, you can set the RS-485 driver to be enabled by one of these leads. If your equipment does not have he capability to raise CD DTR, or RTS, you will need to set the RS-485 driver to be enabled by data or constantly enabled. In order for an RS-232 control lead to enable the RS-485 driver, W15 must be in position A-B and W9 must be set for 0, 5, or 50 msec. When the RS-232 port is selected as DTE, the RS-485 driver will be enabled when CD goes high (true). When the RS-232 port is selected as DCE and jumper W18 is in the A-B position, DTR enables the RS-485 driver. When jumper W18 is in the B-C position, RTS enables the driver.

Driver Enabled by Data: The RS-485 driver can also be enabled without requiring an RS-232 control lead to be asserted. When jumper W15 is placed in the B-C position, the driver is enabled when data is received on the RS-232 port of the unit. As soon as the first bit of the first character is received at the RS-232 port, the RS-485 driver is enabled and an internal timer is started. Each time a low (0) to high (1) transition occurs in the data, the timer is reset. When the timer times out, the RS-485 driver is disabled. Jumper W17 allows this timeout delay to be set for 1 msec, 100 msec. or 1 second.

SPECIFICATIONS:

Interface: (1) Asynchronous RS-232 DTE/DCE port selectable; (1) Asynchronous RS-485 port.

Connectors: (1) DB25 female-RS-232 port; (1) four-wire terminal block (TB1)-RS-485 port.

Operation: Point-to-Point or Multi-point; Full- or Half-Duplex Transparent to data. Selectable RTS-to-CTS delay, DTE or DCE configurable RS-232 port, Normal or loopback operation.

Timeout Delay: 1 msec, 100 msec, or 1 sec. (for the RS-485 driver enabled by data feature)

Pins Supported: RS-232 port: TD,RD, RTS, CTS, CD, DTR, DSR, SG, AND FG; RS-485 port: TXA, TXB, RXA, RXB

Data Rate: 0 to 64 Kbps, transparent to data.

Indicators: (5) LED's: TX, RX, RTS, CD and PWR.

Power: Input - 115 VAC, 60 Hz, 8.5 watts. Output - 17 VAC CT, 700 ma.
Power Supply part # PS154

SPEED	DISTANCE
1200 bps	4 mi. (6.4 km)
2400 bps	3 mi. (4.8 km)
4800 bps	2.3 mi. (3.7km)
9600 bps	1.7 mi. (2.7km)
19,200 bps	1.2 mi. (1.9km)
38,400 bps	.9 mi. (1.4km)
64,000 bps	.75 mi. (1.2km)
NOTE: Speed and distances will depend on actual operating conditions.	

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Driver Constantly Enabled : The RS-485 driver can be constantly enabled by setting jumper W9 to the "ON" position.

HALF-DUPLEX TURNAROUND DELAY: When operating in half-duplex mode (jumper W8 in the Half position), the unit adds a small delay each time it stops transmitting data and prepares to receive data. This delay allows the RS-485 interface and transmission line time to stabilize, thus reducing the possibility of garbled data being received at the end of a message.
When jumper W16 is in the A-B position, 5 msec of delay is added. This amount of delay is sufficient for most applications. If you have a long transmission line or many LD485A-MP devices connected in a network, you may need to place W16 in the 50 msec (B-C) position.

RS-485 INTERFACE TERMINATED or UNTERMINATED: Some distortion on the twisted-pair line may be caused by impedance mismatch from the different devices connected to the line. To help eliminate this type of distortion, the RS-485 interface can be terminated with a resistor network at the receiver input pins (RXA and RXB) via switch S2. When S2 is placed in the "TERM" position, the resistor network is connected across the line. When S2 is placed in the "UNTERM" position, no connection to the resistor network is made and the line is not terminated.

POINT-to POINT: When only two devices are connected to the line in a point-to-point application, each device should have the termination network connected to the line. Set switch S2 to the "TERM" position.

MULTI-POINT: For multi-point applications, switch S2 should be in the "UNTERM" position on all of the units in the network EXCEPT for the two units at the extreme opposite locations on the line. The extreme opposite devices are the two devices that have the greatest cable length between them, which may not necessarily be the devices that are physically located the farthest apart. These two units should be set in the "TERM" position. If any of the other units were configured as "terminated", the amount of distortion could increase, possibly causing errors in the data being transmitted.

NORMAL/LOOPBACK OPERATION: The Normal/Loopback switch (S1) is a two-position push-button switch extending through the front panel. The Normal position permits normal operation of the LD-485A-MP. The Loopback position allows data coming into the unit to be sent back out the same port. This is for testing the connection between the unit and the device attached to each port.
NORMAL: When this switch is in the normal mode, data is passed through the LD-485A-MP from the RS-232 port to the RS-485 port and vice versa.
LOOPBACK: When set to the loopback mode, any data received at the RS-485 port will be transmitted back out the RS-485 port and any data received at the RS-232 port will be transmitted back out the RS-232 port.

DCE JUMPER SETTINGS:	
FUNCTION	JUMPER REQUIREMENTS
1. Configure RS-232 port as DCE	XW1A position
2. Signal ground connected to frame ground. CONNECTED	W7 is IN (solder your own 100-ohm, 1/2 watt resistor in place)
NOT CONNECTED	W7 is OUT
3. Half- or Full-Duplex Operation. FULL-DUPLEX	W8 in FULL position (4-Wire)
HALF-DUPLEX	W8 in HALF position (2-Wire)
4. CTS delay. YES	W9 in 0-ms position W9 in 5-ms position W9 in 50-ms position
NO	W9 in ON position (no delay, CTS follows RTS)

5. Enable RS-485 driver.
    a. RS-485 driver enabled by RS-232 control leads
        by DTR
	W15 in A-B position, W18 in A-B position *and*
	W9 in 0-ms position
	W9 in 5-ms position
	W9 in 50-ms position

by RTS	W15 in A-B position, W18 in B-C position *and* W9 in 0-ms position W9 in 5-ms position W9 in 50-ms position
b. RS-485 driver enabled by data. Disable timeout delay	W17 in A position = 1-msec W17 in B position = 100-msec W17 in C position = 1-sec
c. RS-485 driver constantly enabled	W9 in "ON" position

DCE JUMPER SETTINGS (continued)

6. Half-Duplex turnaround delay. 5-msec turnaround delay	W8 in Half position *and* W16 in position A-B position
50-msec turnaround delay	W16 in position B-C position
7. RS-485 interface terminated or unterminated TERMINATED	S2 in the TERM position
UNTERMINATED	S2 in the UNTERM position
8. Normal or Loopback Operation. NORMAL MODE	S1 in Normal position
LOOPBACK MODE	S1 in Loopback position

DTE JUMPER SETTINGS:

FUNCTION	JUMPER REQUIREMENTS
1. Configure RS-232 port as DTE	XW1B Position
2. Signal Ground connected to Frame Ground Connected	W7 in IN (100-ohm, 1/2 watt resistor soldered in place)
Not Connected	W7 is OUT
3. Half- or Full-Duplex Full-Duplex	W8 in FULL position (4-Wire)
Half-Duplex	W8 is HALF position (2-Wire)
4. CTS Delay	CTS not supported

DTE JUMPER SETTINGS (continued)

5. Enable RS-485 driver. a. RS-485 driver enabled by RS-232 lead CD	W15 in A-B position *and* W9 in 0-ms position W9 in 5-ms position W9 in 50-ms position
b. RS-485 driver enabled by data Disable time-out delay	W15 in B-C position *and* W17 in A position = 1-msec W17 in B position = 100-msec W17 in C position = 1-sec
c. RS-485 driver constantly enabled	W15 in A-B position *and* W9 in "ON" position
6. Half-Duplex Turnaround Delay. 5-msec turnaround delay	W8 in HALF position *and* W16 in A-B position A
50-msec turnaround delay	W16 in B-C position
7. RS-485 Interface Terminated or Unterminated. Terminated	S2 in "TERM" position
Unterminated	S2 in "UNTERM" position
8. Normal or Loopback Operation. a. Normal Mode	S1 in "Normal" position
b. Loopback Mode	S1 in "Loopback" position