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DESCRIPTION

The PC–485 is a serial adapter card that converts the serial port on an IBM PC from RS–232 to RS–485. You can connect up to 32 units on a multidrop RS–485 network. However, only one transmitter can be active at a time. Although no wire type or maximum wire length is specified in the EIA 485 specification, the EIA 422 specification (which is very similar) lists a maximum length of 4000 ft.

OPERATING PRECAUTIONS

The transmitter and receiver are not optically isolated. Consequently, you must avoid ground loops. You should only send signals through the RS–485 lines, not power or power grounds. Power grounds cannot be used as a reference ground for RS–485 signals. You will need to establish a common ground reference before implementing your RS–485 network. The maximum common mode voltage output is +/–7V. Refer to the EIA 485 specification for details on grounding and safety procedures (202–457–4966).
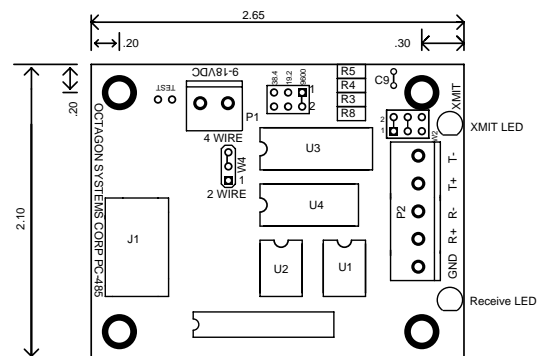

Figure A—PC–485 Component Diagram

BAUD RATE

The PC–485 supports three jumper selectable baud rates: 9600, 19.2 KB or 38.4 KB. By changing the resistor and cap values at locations R3, R4 or R5 and C9, the PC–485 can also support 300, 1200, 2400, 4800, 76.8 KB and 115 KB baud. The following table shows the baud rate jumper pins and corresponding resistor location. For example, if you want to

change the baud rate from 9600 to 76.8 KB, you would change the resistor at R3 from a value of 27 KB to a resistor with a value of 3.3 KB. See the Baud Rate and Transmitter ON Time table for resistor and cap values.

Baud Rate Selection: W1	
Pins Jumpered	**Baud Rate Resistor**
[1-2]*	R3
[3-4]	R4
[5-6]	R5

* = default

DUPLEX MODES

The PC–485 may be configured for full or half duplex. Four wire communication is full duplex and two wire communication is half duplex. Using two wire communication, the receiver is disabled during transmission.

Receiver Enable/Disable: W4	
Pins Jumpered	**Description**
[1-2]	Receiver disabled during transmission (2 wire)
[2-3]*	Receiver enabled during transmission (4 wire)

* = default

TRANSMISSION TIMING

The transmitter automatically turns ON when a start bit is detected by the PC–485. It remains ON until the last bit is sent plus some additional time. When two or more devices share the transmit "bus" with the PC–485, the software must take this additional time into account so that a second transmission does not take place until the first has timed out. Figure B shows the timing relationship from the first transmission by the PC–485 to the second transmission by another device on the network.
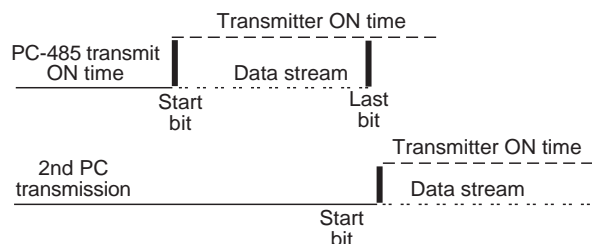

Figure B—Transmitter ON Time

The length of time the transmitter remains ON depends upon the baud rate and the value of data transmitted. It will remain ON for the longest period of time when a 7EH data byte is sent. The following table shows the minimum and maximum ON time for various baud rates.

Baud Rate and Transmitter ON TIME				Transmit ON Time	
Baud	**Char Time***	**Baud Rate Resistor**	**C9 Value**	**Data=0**	**Data=7E**
300	33 mS	129 KB	1.0	42.3 mS	64 mS
1200	8.3 mS	27 KB	1.0	9.5 mS	16.2 mS
2400	4.2 mS	13 KB	1.0	4.4 mS	7.4 mS
4800	2.1 mS	8 KB	1.0	2.5 mS	4.09 mS
9600	1.04 mS	39 KB	0.1	1.4 mS	2.3 mS
19.2 KB	521 μS	19.1 KB	0.1	640 μS	1.06 mS
38.4 KB	260 μS	11.8 KB	0.1	370 μS	580 μS
76.8 KB	130 μS	4 KB	0.1	135 μS	170 μS
115 KB	87 μS	3.1 KB	0.1	105 μS	160 μS

* = character time: 8 data bits, 1 starbit, 1 stopbit, no parity

LEDS

Two LEDs show the status of communication activity — amber indicates transmission and green indicates receive.

DC POWER

The PC–485 requires 9–18 volts DC. + and – may be connected to either terminal on P1. An internal circuit to the PC–485 automatically switches the voltage to the correct polarity for the on–card circuits.

TERMINATION NETWORK

Jumper block W2 installs or removes the termination network. A termination network **must** be installed at the last receiver of the network. Failure to do so may cause spurious oscillation on the receive line and corrupt incoming data.

Termination Jumpers: W2	
Pins Jumpered	**Baud Rate**
[1-2]*	Termination installed (R-)
[3-4]*	Termination installed (R+)
[3-5]	Termination not installed
[4-6]	Termination not installed

* = default

INSTALLATION

1. Insert the DB–9 connector on the PC–485 into the serial port on your PC. If the serial port has a DB–25 connector, use an adapter.

2. Connect your wiring to the PC–485 via the five–position screw terminal block (P2).

3. Connect your power supply via the two–position screw terminal block (P1).

4. Use your programming commands in the same manner as with RS–232 serial devices.

The following tables describe the terminal block signals when communicating in a PC–485 to PC–485 network or a PC–485 to MTB–485 network.

PC-485 to PC-485 Termial Block Connections: J2	
Sending	**Receiving**
T+	R+
T-	R-
R+	T+
R-	T-
Gnd	Gnd

PC-485 to MTB-485 Termial Block Connections: P2	
PC-485 Sending	**MTB-485 Receiving**
T+	R-
T-	R+
R+	T-
R-	T+
Gnd	Gnd

NOTE: The PC-485 inverts the RS-232 signals coming from a PC port.

TECHNICAL SPECIFICATIONS
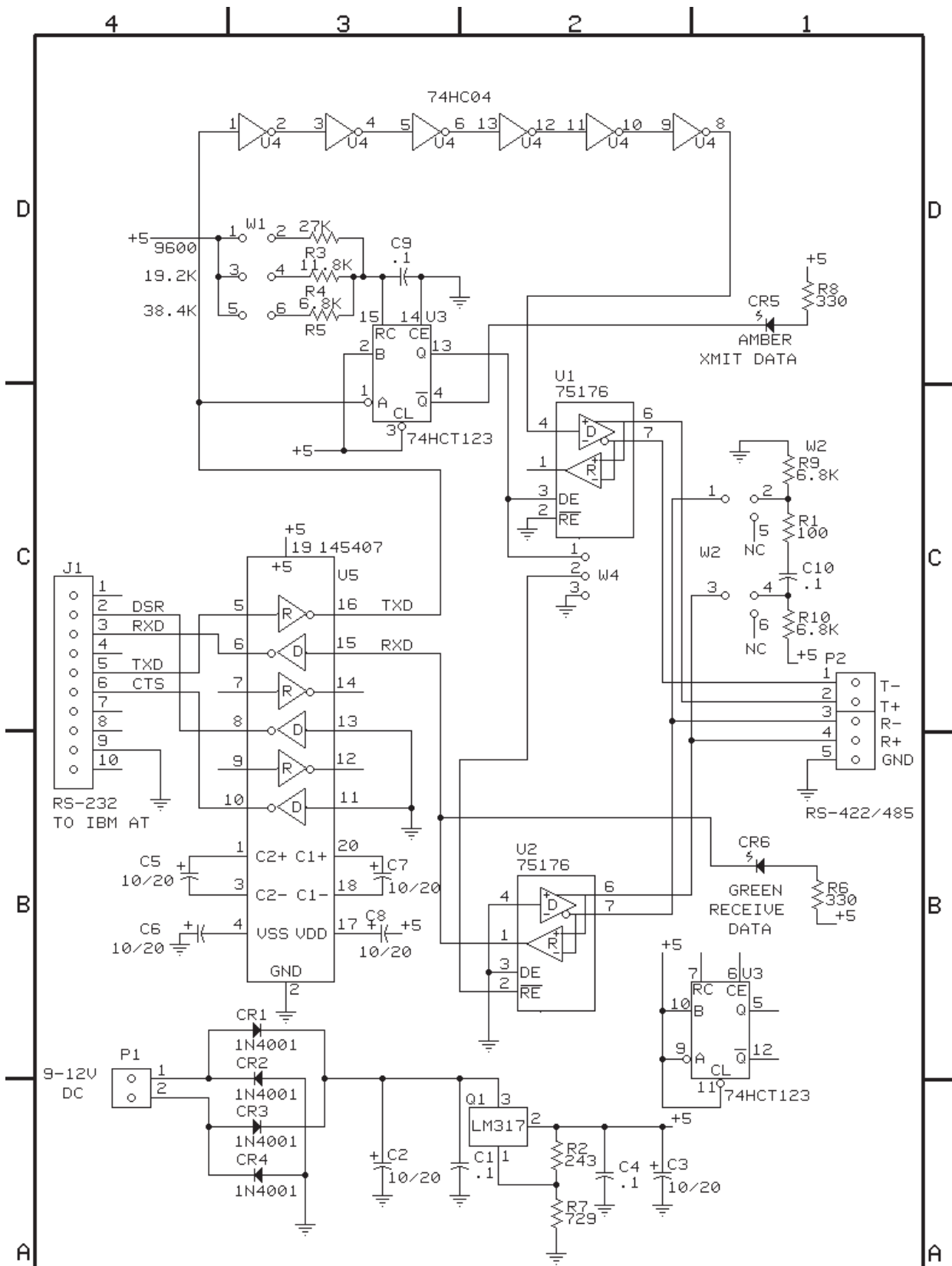
Power Requirements

9 VDC minimum
18 VDC maximum
12 VDC nominal
160 mA operating minimum
185 mA maximum

Temperature

–40° to 80°C operating
RH 9% to 95% noncondensing

Size

2.10 in. x 2.65 in.

74HC04

1 2 3 4 5 6 13 12 11 10 9 8
U4 U4 U4 U4 U4 U4

+5 9600
W1 27K
R3
19.2K 11.8K
R4
38.4K 6.8K
R5

C9 .1

+5
R8 330
CR5
AMBER
XMIT DATA

RC CE U3
B Q 13
A Q 4
CL
74HCT123
+5

U1 75176
D 6
7
R
DE
RE

W2
R9 6.8K
R1 100
NC
W2
C10 .1
NC
R10 6.8K
+5 P2

+5 19 145407
+5 U5
DSR 5 R 16 TXD
RXD 6 D 15 RXD
TXD 7 R 14
CTS 8 D 13
9 R 12
10 D 11

J1
1
2
3
4
5
6
7
8
9
10
RS-232
TO IBM AT

1
2 W4
3

1
2
3
4
5
T-
T+
R-
R+
GND
RS-422/485

C5 10/20 C2+ C1+ 1 20 C7 10/20
C2- C1- 3 18
C6 10/20 VSS VDD 4 17 C8 10/20 +5
GND 2

U2 75176
D 6
7
R
DE
RE

CR6
GREEN
RECEIVE
DATA
R6 330
+5

+5 U3
RC CE
B Q 5
A Q 12
CL
74HCT123
11

CR1 1N4001
CR2 1N4001
CR3 1N4001
CR4 1N4001
P1 1
2
9-12V DC

C2 10/20
C11 .1
Q1 LM317
R2 243
C4 .1
C3 10/20
+5
R7 729

REV 1.2 - UPDATED VALUES AT R3-R5
AND C2 4-10-92

REV 1.1 - CORRECTED TERM CONF
REVERSED T+,T- & R+,R-
6-11-91 DCF
REV 1.0 - PROD RELEASE

FOR REFERENCE ONLY

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SCHEMATIC, PC-485 INTERFACE

D PC485 REV 1.2
DATE: 12-7-90 SHEET 1 OF 1