Telenetics

# Installation, Operation and Diagnostics

for your

# Communication Interface Unit

## MIU(Dial or Lease Line modem with) / 485 (RS485) ~

See MIUXXX for modem Technical Data

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## 1. PRODUCT OVERVIEW

The CIU (MIU\XXX485) is an industrial modem with an RS-232 to RS485 converter module for direct connection to industrial RS485 Interface units. Though similar to commercial modems, the MIUXXX\485 contains special features that make it particularly well suited for industrial applications. (MIUXXX is for any dial or lease line modems such as MIU14.4L)
These capabilities include:

**Environment** The CIU has been designed explicitly for use in industrial environments. In addition to an extended temperature range (-40 to +85° C), the MIUXXX\485 includes surge, shock, vibration, and safety parameters superior to those of conventional commercial modems.

**Industrial** The CIU uses standard industrial connectors for RS485 data and RS232 interfaces. These connectors allow reliable interconnect to other industrial components. Furthermore, the CIU data lines are provided at RS-232 and RS485 signal levels for both stand-alone and embedded applications.

## 2. PRODUCT DESCRIPTION

The CIU provides Dial telephone communication capabilities for the industrial environment. It can be operated stand-alone or as a component of a larger industrial system.

### 2.1 Telephone Interface

The CIU telephone interface operates over two wire lines available in North America. The telephone line interface is environmentally benign, allowing use in Class I, Division 2 applications.

### 2.2 Data Interface

The CIU data interface provides RS-232 compatible serial signaling. The data interface interconnects to industrial controllers at RS-232E, RS422 or RS485 data interface are available as options.

### 2.3 Power

The MIU accepts either regulated 48.0 to 220 volts DC, or regulated 48.0 to 220 volt AC power inputs. Unregulated 12.0 to 24.0 volt DC power input is available as an option.

### 2.4 Mechanical

The CIU consists of two printed circuit boards: A single two sided baseboard and a RS485 module is a single two sided package 5-3/8 x 4 x 1-3/8 suitable for desktop or wall mounting.

### 2.5 Surge

The MIUXXX\485 has double the surge protection of IEC801-4 voltage requirements. (5KVac)



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## 3. MIU'S LED, SWITCH & SERIAL CONNECTOR SPECIFICATIONS

The CIU/485 communicates with industrial controllers through RS-485 compatible serial signaling. The RS-485 signal levels are used to interconnect with RS-485 compatible embedded controllers. The RS-232E signal levels are used to configure the CIU. The RS-232E signal levels are also used to interconnect with RS-232E compatible embedded controllers if required.
The RS-232E is present on DB9(MIU), RS485 signal levels are available via four pins' connectors.
4.1 The following lists the CIU/485 serial interfaces. All connector definitions are described in Appendix A

**RS-232 Configuration Connector (P2)**

| | |
|---|---|
| Connector Type: | DB9, (MIU) female, straight board mounts. |
| Signal Levels: | RS-232 |

**RS485 Configuration Connector (P1)**

| | |
|---|---|
| Connector Type: | 4 pin terminal header with .138 spacing |
| Signal Levels: | RS485 |

3.2 MIU/485 LED
LED Blinks every 4 seconds with AC / DC power

3.3 MIU/485 LED & Switch 1 (internal)
S1-1 Closed (ON) LED Blinks with option CD (&C1 AT command) active
S1-2 Closed (ON) LED Blinks AC. DC Power ON Note select either 1 or 2
S1-3 Closed, option modem DTR select DB9 DTR
S1-4 Closed, option modem DTR select modem's CD

3.4 MIU/485 Switch S3 (external)
S3-2 Closed (ON) only for MIU/485 (J1) modem configuration or for RS232 embedded controllers.
S3-1,-3 &-4 Open (OFF)

S3-1 Closed (ON) only for MIU/485 (P1) RS485 connector (RS485 embedded controllers)
S3-2,-3 &m-4 Open (OFF)

3.5 MIU/485 A switch (external)
SA-1 Closed (ON) RS485 received data disable TX (Driver Output Enable)
SA-2 Closed (ON) RS485 transmit data enable TX (Driver Output Enable) + 5ms
SA-3 Closed (ON) RS485 RTS enable TX (Driver Output Enable) should be Open (OFF)
SA-4 Closed (ON) RS485 received data is disables with TXD



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3.5 MIU/485 B switch (external)

SB-1 Closed (ON) RS485 Received RX & /RX DC terminated with SB-2 Closed
SB-1 Open (OFF) RS485 Received RX & /RX AC terminated with SB-2 Closed
SB- 2 Closed (ON) RS485 Received RX & /RX terminated
SB- 2 Open (OFF) RS485 Received RX & /RX high impedance (Z)
SB-3 & 4 Closed (ON) 2- wire configuration or loopback mode
SB-3 & 4 Open (OFF) 4- wire configuration



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#### 4. POWER SUPPLY SPECIFICATIONS

The MIUXXX/485 contains a low quiescent power regulator. TheMIUXXX/485 also has a "low power" standby mode which minimizes overall power requirements when the MIUXXX/485 is used intermittently.

**4.1 Power Supply Selection (MIU)** The power supply is selected through the use of a 3-pin screw - type terminal connector.

**Power Connector P3 (MIU)**

| | |
|---|---|
| Connector Type: | 3 Pin screw - type terminal |

**Regulated Power Supply Range: 48.0 to 220 Volts AC/DC.**

| | |
|---|---|
| Standby Supply Currents: | 200uA |
| Active Supply Currents: | 8mA to 40mA plus modem current |
| In-Rush Current: | < 250mA |
| Reverse Protection Method: | Full wave Bridge Rectifier |
| Over-Voltage Clamp limits: | Zener diode |

**Regulated Power Supply Range: (12 - 24VDC) is available as an option**

| | |
|---|---|
| Standby Supply Currents: | 200uA |
| Active Supply Currents: | 35mA to 295mA plus modem current |
| In-Rush Current: | < 350mA |
| Reverse Protection Method: | Full Wave Bridge Rectifier |
| Over- Voltage Clamp limits: | Zener diode and TransZorb TVS |



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**5. RS485 SPECIFICATIONS**

MIUXXXX/485 are low-power Transceiver for RS485 and RS422 communication

Features: Point to Point or Multidrop/Multipolling
Full or Half Duplex
Drivers are short - circuit current limited & protected against excessive power
dissipation (shutdown will places the drivers in a high - impedance state).
When Drivers are disabled (by TXD), drivers will switch to high impedance state.
Note in two-wire or multi-drop/multi-polling networks TX enable by TXD should be active
Receiver input impedance is 12K ohms.
Reduced slew- rate drivers that minimize EMI and reduce reflections caused by improperly terminated cables This will allow error - free transmitted data up to 200Kbps
RS485/RS422 standard covers line lengths up to 4000 feet. For line lengths
greater than 4000 feet a line repeater can be added.
MIUXXXX/485 can drive 4000 feet of 26AWG twisted - pair cable at 200k bps into 120 ohms load.

To minimize reflections, the line should be terminated at both ends. In multi - polling/multi - drop environments (up to 32 drops) all drops off the main cable should be as short as possible.
Only the Master/Host unit and the end of cable unit should be terminated.

**Typical Speed versus Distance - (4-wire point to point 26 AWG twisted cable)**

| SPEED | DISTANCE |
|---|---|
| 1200bps | 6.0 miles(9.6 km) |
| 2400 bps | 4.5 miles (7.2 km) |
| 4800 bps | 4.0 miles (5.5 km) |
| 9600 bps | 2.5 miles (4.0 km) |
| 19,200 bps | 1.8 miles (2.9 km) |
| 38,400 bps | 1.4 miles (2.1 km) |
| 56,400 bps | 1.1 miles (1.8 km) |
| 115,000 bps | 0.6 miles (0.9 km) |

NOTE: Speed and distances will depend on actual operating environment.

## 6. ENVIRONMENTAL SPECIFICATIONS

The CIU/485 (MIUXXX\485) meets the following environmental specifications.



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| | |
|---|---|
| Operating Temperatures | -40 to 85°C |
| Storage Temperature | -55 to 100°C |
| Relative Humidity | 0 to 95% is non-condensing. |
| Altitude | 20,000 ft (operating), 40,000 ft (shipping). |
| Vibration Effect | Withstand 10 to 500 Hz at 1 g on any axis per SAMA PMC-31-1 without damage or impairment. |
| ESD susceptibility | Field connected circuits meet the requirements of IEC 801-2 for ESD withstand capability up to 10 KV. |
| EMI susceptibility | Withstand 27 to 1000 MHz per IEC 801-3 level 1 (1v/m) without damage or impairment. |
| EMI radiation | Meets FCC Rules Part J, Subpart 15, Class A for radiated emissions. |

## 7. APPROVALS

The CIU/485 meets the following approvals:

| | |
|---|---|
| Telephone: | FCC Part 68 |
| Emissions | FCC Part 15 |
| Environment | UL listed (pending) for use in Class I, Division 2, Groups C and D hazardous locations. |



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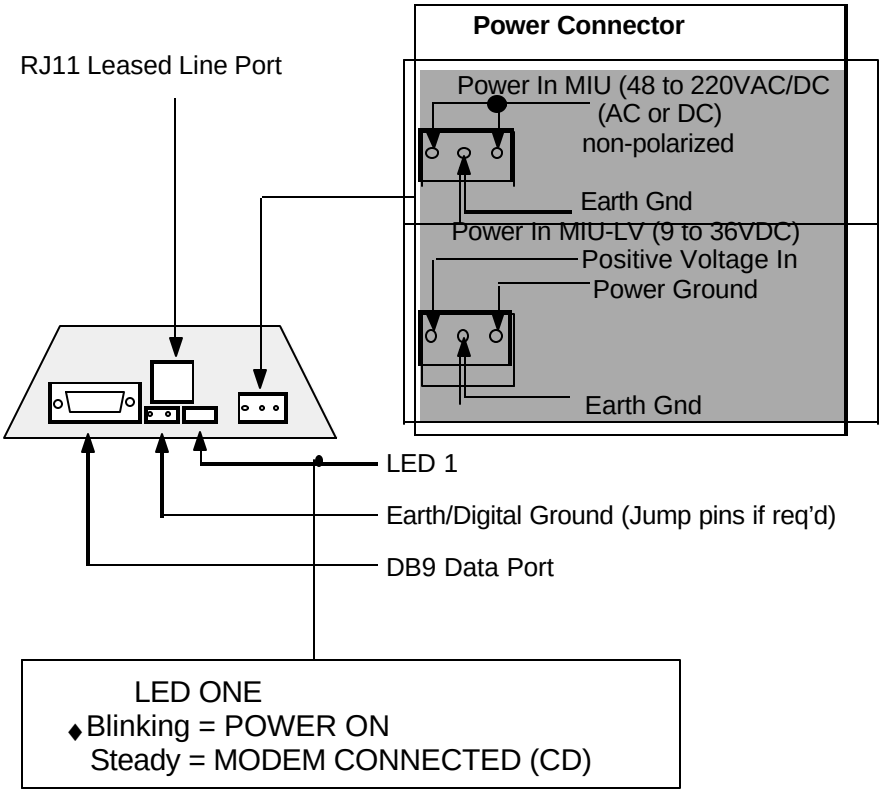
## MIUXXX\485 Power Connection



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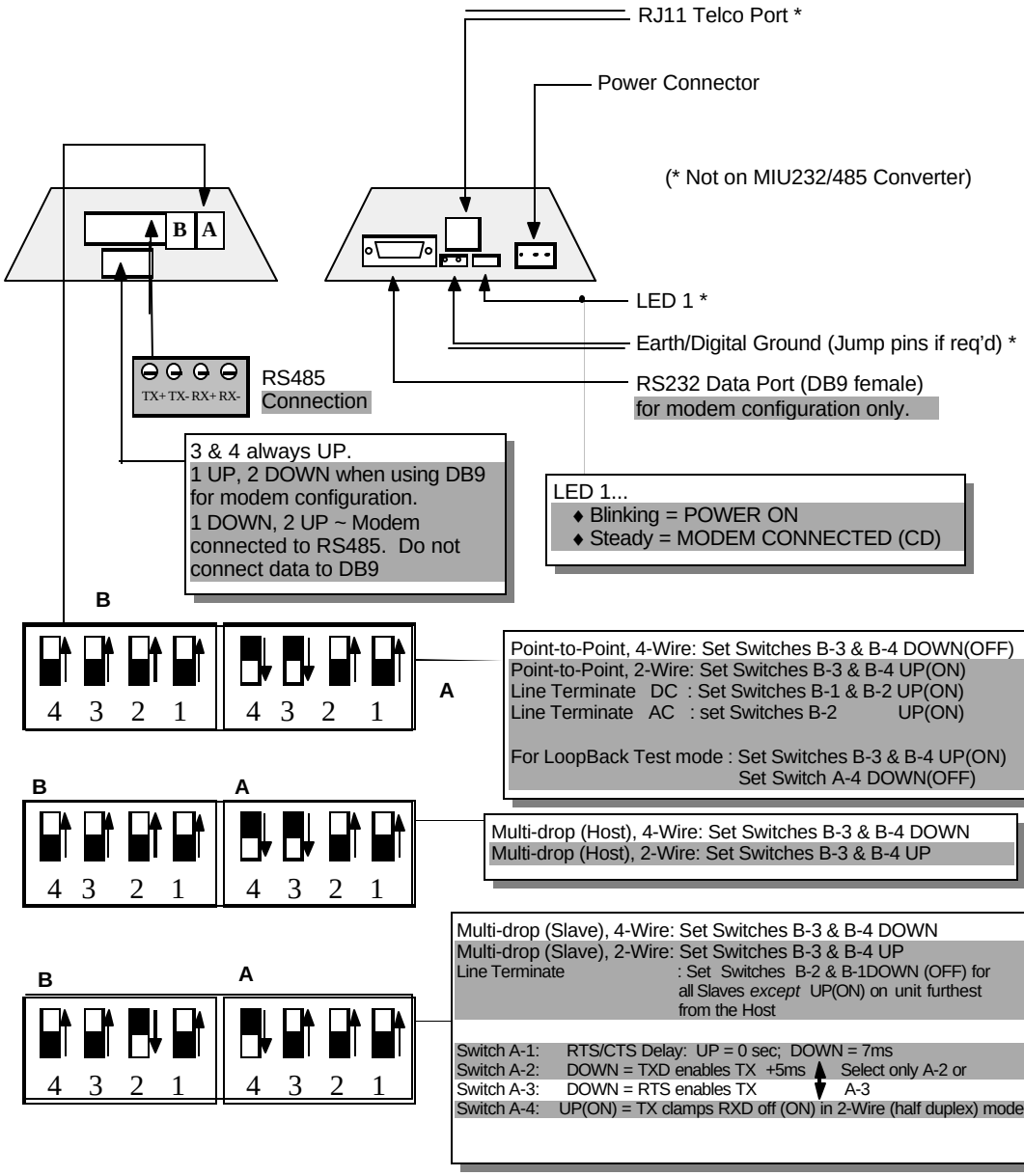


MIUXXX/485 DIP SWITCH SETUP



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## APPENDIX A. CONNECTOR PIN DEFINITIONS

### CONNECTOR P2: RS-232 Configuration Connector (DB9) MIU

| | | | | |
|---|---|---|---|---|
| DCD | 1 | data carrier detect | from | MIUXXX\485 |
| RD | 2 | receive data | from | MIUXXX\485 |
| TD | 3 | transmit data | to | MIUXXX\485 |
| DTR | 4 | data terminal ready | to | MIUXXX\485 |
| GND | 5 | ground | | |
| DSR | 6 | data set ready | from | MIUXXX\485 |
| RTS | 7 | request to send | to | MIUXXX\485 |
| CTS | 8 | clear to send | from | MIUXXX\485 |
| RI | 9 | ring indication | from | MIUXXX\485 |
| PGND | shield | protective ground | | |

### CONNECTOR P1: RS-485 Configuration Connector 4 Positions header with .138 spacing

**Interface to 4 positions Plug-in Terminal Block**

| | | | |
|---|---|---|---|
| TXY | 1 | transmit data (+) | from MIUXXX\485 module |
| TXZ | 2 | transmit data (-) | from MIUXXX\485 module |
| RX | 3 | receive data (+) | to MIUXXX\485 module |
| /RX | 4 | receive data (-) | to MIUXXX/485 module |



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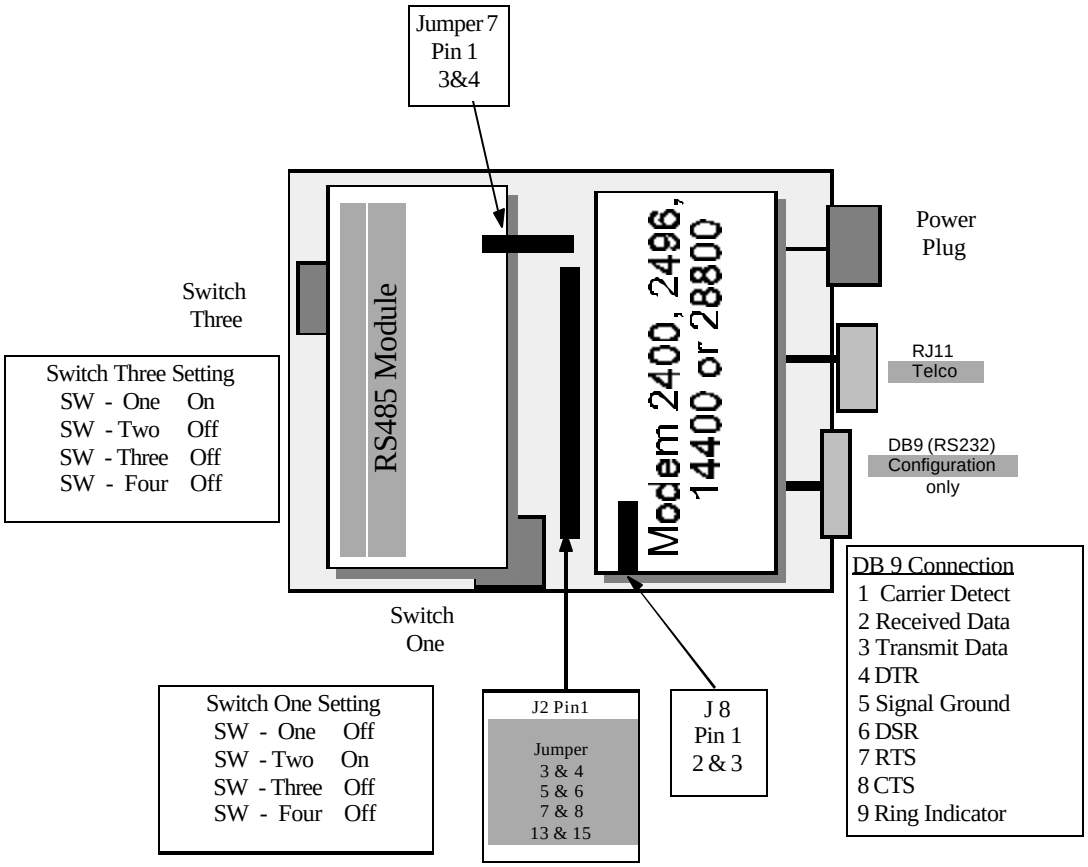
In order to configure the MIUXXX/485 to remote RTU, Meter or Scada terminals the following setup is required for 2w or 4w (RS485) networks

See Fig ONE for MIUXXXX/485 layout and dip switch setting




Final Factory Configuration (MIUXXXX/485) for PEXXX modem module
No, Power saving modes, No Auto Reset mode
Switch two ON Switch one, three and four are OFF.

MIU S3 (external)

SW-2 Closed (ON) MIU is configured for DB9 interface to
Modem interface connection.
SW-1, -3 & -4 Open (OFF)



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1:AT Command (MIU2400/485) (Dial) configuration is:

ATE0Q1&C1&D0S0=1&W0

- E0 Echo Command disables (no "AT" response to terminal)
- Q1 Result Codes disable (no result codes return to terminal ring)
- S0=1 Auto Answer active (first ring modem will go OFF- Hook and start answer sequence)
- &C1 Carrier Detect is always True (MIU LED will be ON all the time when Carrier Detect is ON.
- &D0 DTR is ignored

2: AT Command (MIU2496/485, MIU14.4/485 & MIU28.8/485)

ATE0Q1&C1&D0&Q6S0=1&W0

- E0 Echo Command disables (no "AT" response to terminal)
- Q1 Result Codes disable (no result codes return to terminal ring, Connect XXX)
- &Q6 Normal mode (speed buffering)
- S0=1 Auto Answer active (first ring modem will go OFF- Hook and start answer sequence)
- &C1 Carrier Detect is always True (MIU LED will be ON all the time when Carrier Detect is ON.
- &D0 DTR is ignored
- &K0 No flow control

3: AT Command (MIU14.4L/485) Lease Line

ATE0Q1&C1&D0&K0&Q6\M0\H1&Z3=XX&W0
Recycle power (OFF ON)
Wait 5 seconds for DSR to switch ON
Enter AT\S1 <CR>
AT&W0 <CR>
Within 45 seconds

- E0 Echo Command disables (no "AT" response to terminal)
- Q1 Result Codes disable (no result codes return to terminal ring, Connect XXX)
- &Q6 Normal mode (speed buffering)
- \M0 Answer mode (for Remote (Slave unit) local (Master) set for originate \M1
- \H1 Lease Line mode

\S1 Security mode (if remote RTU is a dumb unit - TxD is always ON



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&Z3=XX Password to exit security mode
&C1 Carrier Detect is always True (MIU LED will be ON all the time when Carrier Detect is ON.
&D0 DTR is ignored
&K0 No flow control

4: AT Command (MIU9.6L/485) Lease Line

ATE0Q1&C1&D0&K0&Q6\M0\H1W0
E0 Echo Command disables (no "AT" response to terminal)
Q1 Result Codes disable (no result codes return to terminal ring, Connect (XXX)
&Q6 Normal mode (speed buffering)
\M0 Answer mode (for Remote (Slave)unit) local (Master) set for originate \M1
\H1 Lease Line mode
\S1 Security mode (Not available for MIU9.6L)

&C1 Carrier Detect is always true (MIU LED will be ON all the time when Carrier Detect is ON.
&D0 DTR is ignored
&K0 No flow control

Note &Q5 error detection and data compression can be used
If the host software will support EC

Switch Setting (MIUXXX/485) (Typical)

**MIU S3 (external**)

SW-1 Closed (ON) MIU is configured for RS485 Module (RS485 RxD (Output) to Modem TxD (input))
SW-2, -3 & -4 Open (OFF)

**2- Wire Configuration on PE485 module**

SB-1 Closed (ON) DC Termination Open (OFF) AC Termination
SB-2 Closed (ON) Line Termination
SB-3 & -4 Closed (ON) 2- Wire

SA- 1 Open (OFF)
SA- 2 Closed (ON) TxD (transmit data) enables TX (Driver Output Enable) + 5ms
SA- 3 Open (OFF)
SA- 4 Closed (ON) Received data is disable with TX enable (TxD)

**4- Wire Configuration for PE485 module**



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SB-1 Closed(ON) DC Terminated
SB-2 Closed (ON) Line Termination
SB-3 & -4 Open (OFF) 4- wire

SA-1 Open (OFF) RTS follows CTS no delay
SA-2 Open (OFF)
SA-3 Closed (ON) RTS (always ON by MIU internal J7 (1/2) setting) enables TxEN)
SA-4 Open (OFF) TxD will not disable RxD

MIU S3 (external)
SW-1 Closed (ON) MIU is configured for RS485 Module (RS485 RxD (Output) to Modem TxD (input))
SW-2, -3 & -4 Open (OFF)

SA2 & SA3 can be configures for TxD enable TxEn signal if there are several master locations in the network.
SA2 is Closed (ON) TxD (transmit data) enables TX (Driver Output Enable) + 5ms
SA3 is Open (OFF) TxD will not disable RxD

MIUXXXX/485 Final Connection
Ensure that MIUXXXX/485 J7 (internal jumper) 1/2 is connected

## APPENDIX C. CONNECTOR DIAGOSTICS

## RS485 CONNECTION FAILURE



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To test RS485 module set switch SB-3 & -4 Closed (ON) to loopback data to the host modem. This test is for RS485 2- wire and 4- wire configurations.

**Connect MIUXXXX/485 TXY (+) and TXZ (-) to the embedded controller RS485**

## DIAGNOSTICS

### RS485 CONNECTION FAILURE

To test RS485 module set switch SB-3 & -4 Closed (ON) to loopback data to the host modem. This test is for RS485 2- wire and 4- wire configurations.
Connect MIUXXXX/485 TXY (+) and TXZ (-) to the embedded controller RS485 connection

MIUXXXX/485 + ---------- + RS485 embedded controller
- ---------- -

In some applications RS485 TXY (+) and TXZ (-) may have to be connected to RS485 embedded controller in the following setup

MIUXXX/485 + ---------- - RS485 embedded controller
- ---------- +



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