ME931C-RJ11

MAIN MODULE

ME931C-RJ11

- Power
- -TD
- -RD
- -Cntrl In
- -Cntrl Out

TEST

Line: RJ-11

Serial: DB25 CONN.

INTERFACE MODULE (REAR CARD)

ON

1 2 3 4 5 6 7 8

SW1

TEST SWITCH

MAIN MODULE (FRONT CARD)

JB2
1 2 3

JB3
1 2 3

JB4
1 2 3

INTERFACE MODULE (REAR CARD)

RJ-11 CONN.

DB25 Female Connector
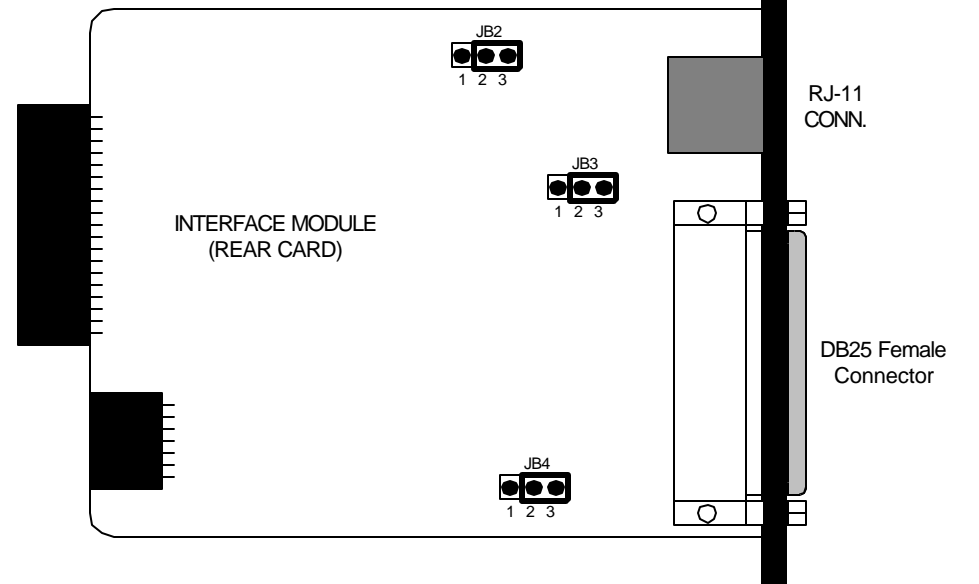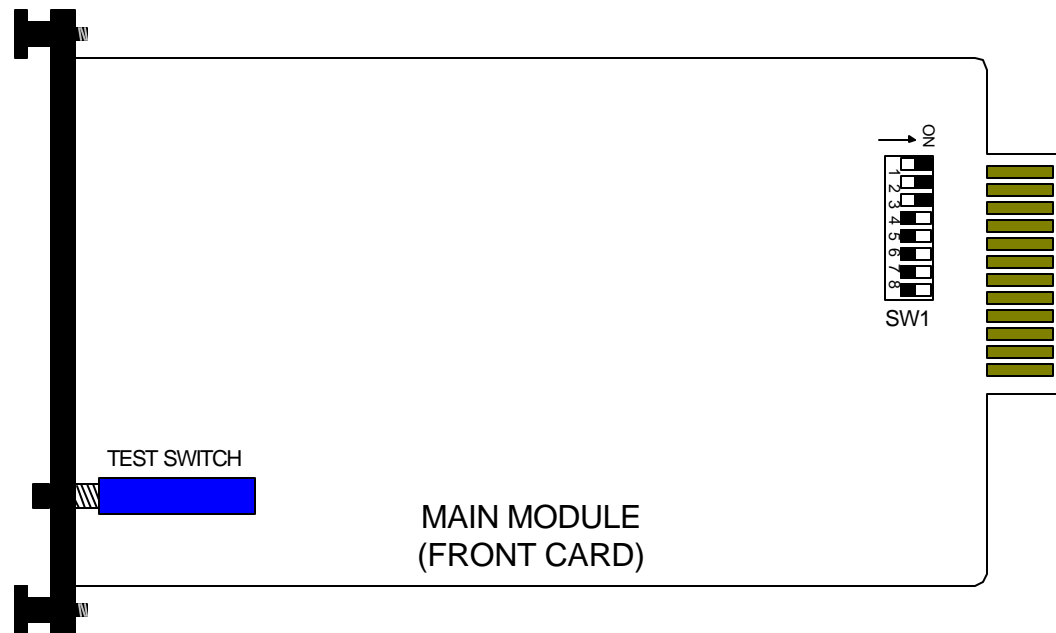
SPECIFICATIONS:

Transmission Format: Asynchronous

External Interface: RS-232C/CCITT V.24 connection via DB25 female; twisted-pair connection via RJ-11

Internal Interface: Connection to the rack chassis (part # RM202, RM204, RM208, RM216) via 50-pin male card edge.

Transmission Line: 4-wire, unconditioned twisted-pair, 19-26, 20 pF/ft. or better.

Data Rates: 0 to 57.6 kbps.

Controls: Carrier constantly on or controlled by RTS.

Applications: Point-to-Point or multipoint.

Indicators: Bi-level LED indicators (two each) for Transmit Data, Receive Data, Control In and Control Out; bi-level indicators (one each) for Power and Test.

Diagnostics: Local and remote analog loopback, activated by front-panel pushbutton.

Receiver Optical Isolation: 150 VAC.

Surge Protection: Silicon avalanche diodes, 600 watts RMS power dissipation @ 1 ms, with response time of less than 1 pS.

Power Supply: Rackmount power supply is switchable between 120 VAC and 240 VAC; rack chassis supplies 10 VAC to the card, typical Card consumption is 700 mW.

Fuse: 400 mA for 120 VAC applications; 200 mA for 240 VAC applications.

INTRODUCTION:

DESCRIPTION:

The Async MP Line Driver Card operates full duplex over two unconditioned twisted pair wires. supporting data rates to 57.6 kbps, the Card has a maximum range of 14 miles (22.5 km) at 1200 bps over 19 AWG wire). It passes one control signal in each direction, and features both optical isolation and Silicon Avalanche Diode surge protection on the data line side.

The Card actually consists of two cards: a front "brains" card and a rear "interface" card, and mounts in a 19" rack chassis (part number RM202, RM204, RM208, or RM216). This 16-card chassis has a switchable 120/240-volt power supply and mounts cards in a mid-plane architecture.

The Card has two built-in diagnostic tools: local and remote loopback test. There are also bi-level LED's on the Card's front panel to allow you to visually monitor communications.

CONFIGURATION:

This section describes the location and orientation of the Async MP Line Driver Card's configuration switches and provides detailed instructions on setting each of the switches. The Card uses a set of eight DIP switches that allow configuration to a wide range of asynchronous applications. You can access these DIP switches by sliding the card out of the rack chassis. Once configured, the Card is designed to operate transparently, without frequent reconfiguration.

Switch Locations and Orientation:
The eight DIP switches on the Card allow you to specify control-signal pin assignments and carrier-control method. Page 1 shows the orientation of the DIP switches with respect to "ON" and "OFF" positions. The table below summarizes the switch settings, including the factory-default settings.

Quick Setup Instructions:
For most applications, you will not need an in-depth knowledge of the Card's capabilities to get up and running. The following quick-setup DIP-switch configurations cover most Async MP Line Driver Card operating environments.

Point-To-Point Applications:
If you are installing these units in a point-to-point application with a computer, printer or terminal, configure the DIP switches on both Cards as follow:

Switch Number:	1	2	3	4	5	6	7
Positions	OFF	OFF	OFF	ON	ON	ON	OFF

Multi-Point Applications:
If you are installing these units in a multi-point application, configure the DIP switches for master and slave units as follows:

Switch Number:	1	2	3	4	5	6	7
Master positions	ON	ON	ON	OFF	OFF	OFF	OFF
Slave positions	ON	ON	ON	OFF	OFF	OFF	ON

Special Configuration:
If your installation requires special configuration of the Card, use the table below as a guide. It shows all possible Card switch settings. Following the table are brief descriptions of the Control Input, Control Output, +Voltage Output and Carrier Controlled by (C in) parameters shown in the table.

Mode: (DCE/DTE)	Control Input (C in)	Control Output (C out)	+Voltage Output (V out)	Carrier Controlled by (C in)	Switch Settings:						
					1	2	3	4	5	6	7
DCE	4	8	6	Disabled	ON	ON	ON	OFF	OFF	OFF	OFF
DCE	4	8	6	Enabled	ON	ON	ON	OFF	OFF	OFF	ON
DCE	4,11,20	8	6	Disabled	OFF	ON	ON	ON	OFF	OFF	OFF
DCE	4,11,20	8	6	Enabled	OFF	ON	ON	ON	OFF	OFF	ON
DCE	4	6	8	Disabled	ON	OFF	OFF	OFF	ON	ON	OFF
DCE	4	6	8	Enabled	ON	OFF	OFF	OFF	ON	ON	ON
DCE	4,11,20	6	8	Disabled	OFF	OFF	OFF	ON	ON	ON	OFF
DCE	4,11,20	6	8	Enabled	OFF	OFF	OFF	ON	ON	ON	ON

Rear Card Configuration:
The Async MP Line Driver Card comes with an interface card with DB-25/RJ-11 connectors. It supports one RS-232 connection and one 4-wire connection (the RS-232 port is the lower port on the interface card.) The illustration on the page 1 shows both modules (front and rear). Before installation, you will need to examine the rear card by setting straps on the PC board.

DB25/RJ-11 Strap Settings:
On page 1, shows the strap locations for the DB25/RJ-11 rear card. These straps determine various grounding characteristics for the RS-232 and twisted-pair lines. The table below provides an overview of strap functions for the DB25/RJ-11 card. Following this overview is a detailed description of each strap's function.

Strap	Function	Position 1 and 2	Position 2 and 3
JB2	Line Shield and FRGND	Connected	Open
JB3	DTE Shield (Pin 1 & FRGND	Connected	Open
JB4	FRGND & SGND	Connected	Open

Line Shield and FRGND (JB2):

This strap pertains to the line interface. In the connected (closed) position, it links RJ-11 pins 1 and 6 to frame ground. You can use these pins as connections for the twisted-pair cable shield. In the open (disconnected) positions, pins 1 and 6 remain connected to each other, but are "lifted" from the frame ground.

JB2

Position 1 & 2 = Line Shield and FRGND Connected
Position 2 & 3 = Line Shield and FRGND Not Connected

DTE Shield (Pin 1) and FRGND (JB3):

In the connected (closed) position, this strap links DB25 pin 1 and frame ground. In the open (disconnected) position, pin 1 is "lifted" from frame ground.

JB3

Position 1 & 2 = DTE Shield (Pin 1) and FRGND Connected
Position 2 & 3 = DTE Shield (Pin 1) and FRGND Not Connected

SGND and FRGND (JB4):

In the connected (closed) position, this strap links DB25 pin 7 (Signal Ground) and frame ground. In the open (disconnected) position, pin 1 is "lifted" from frame ground.

JB4

Position 1 & 2 = SGND (pin 7) and FRGND Connected
Position 2 & 3 = SGND (pin 7) and FRGND Not Connected

INSTALLATION:

This section describes the functions of the Rack Chassis (part number RM216), tells how to install front and rear cards into the chassis, and provides diagrams for wiring the interface connections correctly.

The Rack Chassis:

The Rack Chassis has sixteen short-range modem card slots, plus its own power supply. Measuring only 3.5" (8.9 cm) high, each Async MP Line Driver Card is designed to occupy only 2U in the 19" Rack Chassis. Sturdy front handles allow the Chassis to be extracted and transported conveniently.

The Rack Power Supply:

The power supply included in the Rack Chassis uses the same mid-plane architecture as the modem cards. The front card of the power supply slides in from the front, and the rear card slides in from the the rear. They plug into one another in the middle of the rack. The front card is then secured by thumb screws and the rear card by conventional metal screws.

Switching the Power Supply On and Off:

The power supply on/off switch is located on the front panel. When plugged in and switched on, a red front panel LED will glow. Since the Rack Chassis is a "hot-swappable" rack, you don't need to install any cards before switching on the power supply. You may switch the power supply off at any time without harming the installed cards.

Replacing the Power Supply Fuse:

The Rack Chassis power supply uses a 400 mA fuse for 120-volt AC circuits, and a 200 mA fuse for 240-volt AC circuits. The fuse compartment is located just below the AC socket on the rear card. To replace the fuse, follow these steps:

1. Using a small screwdriver, pop the compartment open; it will slide open like a drawer. Depending on the exact part used, the drawer may slide completely out of the fuse holder or it may stop part way out.
2. Two fuses are in the drawer: the front fuse is the spare, and the rear fuse is the "active" fuse.
3. If the active fuse appears to be blown, remove it from the clips and replace it with the spare from the front compartment. Note the size and rating of the blown fuse before discarding it.
4. Replace the fuse.

WARNING:
To protect against fire, replace only
with the same type and rating of fuse.

Switching the Power Supply Between 120 and 240 volts:

Although the Rack Chassis is shipped from the factory with a customer-specified power supply configuration, you may change the configuration yourself. Follow these steps to switch the configuration of the power supply between 120 and 240 volts AC:

1. Remove the front power supply card and locate the position switch near the back of the card. Slide the switch to the desired voltage.

NOTE:
The actual values on the switch may be "110/220" or "115/230"

2. Replace the existing fuse with one of the correct value.
3. Replace the power supply cord, if necessary.

Installing the Card in the Chassis:

The Card consist of a front "brains" card and a rear "connections" card. The two cards meet inside the rack chassis and plug into each other via mating 50-pin card-edge connectors. Use the following steps as a guideline for installing each Card into the Rack Chassis:

1. Slide the rear "connections" card into back of the chassis along the metal rails provided.
2. Secure the rear card using the metal screws provided.
3. Slide the "brains" card into the front of the chassis. It should meet the rear card when it's almost all the way into the chassis.
4. Push the front card gently into the card-edge receptacle of the rear card. It should "click" into place.
5. Secure the front card using the thumb screws.

NOTE:
Since the Chassis allows "hot swapping" of cards, you don't
need to power down the rack when you install or remove a card.

Wiring the Card:

The rear interface card has one RS-232C port (DB25 female) and one 4-wire twisted-pair port (RJ-11 female).

RS-232 Connection:

The Async MP Line Driver Card connects the RS-232 interface to your computing hardware via a DB25 female connector. The DB25 is pinned according to the RS-232C/V.24 interface standard.   The Line Driver Card is wired to connect to a DTE. If your RS-232 output device is DCE, call Black Box Technical support at 724-746-5500 for specific installation instructions.

Twisted-Pair Connection:

The Async MP Line Driver Card operates over two twisted pairs. In all applications, the twisted-pair wire must be 26 AWG or thicker, unconditioned, dry, metallic wire. Both shielded and unshielded wire yield favorable results.

NOTE:
The Async MP Line Driver Card can only communicate in a closed data circuit
with another Async MP Line Driver Card. The Card will NOT work with dial-up
analog circuits, like those used with a standard Hayes-type modem.

Point-to-Point Twisted-Pair Connection:

The 6-position RJ-11 jack for the Async MP Line Driver Card is prewired for a standard telco wiring environment. To connect a 4-wire twisted-pair circuit between two or more Cards, you'll need a crossover cable as shown below.

Signal	Pin#		Pin#	Signal
GND	1		6	GND
RCV-	2		4	XMT-
XMT+	3		5	RCV+
XMT-	4		2	RCV-
RCV+	5		3	XMT+
GND	6		1	GND

1 2 3 4 5 6

RJ-11
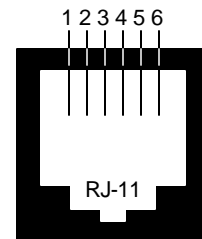
Multi-point Twisted-Pair Connection:

The Async MP Line Driver Card supports multipoint applications using a star topology. Maximum distance between the units will vary based upon the number of drops, data rate, wire gauge, etc.

OPERATION:

Once you have configured each Async MP Line Driver Card and connected the cables, you are ready to operate the units. This Chapter describes the LED status monitors, the power-up procedure and the built-in loopback test modes.

LED Status Monitors:
The Async MP Line Driver Card features ten front-panel status LED's that indicate the condition of the modem and communication link. The figure on the first page shows the relative front-panel positions of the LED's. A description of each LED's function follows.
- The green PWR LED glows when power is applied to the Card through its mid-plane chassis connection.
- The green TD and RD indicators blink to show positive-state data activity. The red TD and RD indicators blink to show negative-state data activity. Solid red indicates a connection in an idle state.
- The green "Control In" and "Control Out" indicators glow solid to show the control signal is on. The red "Control In" and "Control Out" indicators glow solid to show the control signal is off. When the card is connected to a DTE, "Control In" will glow green for an incoming RTS signal on RS-232 pin 4. "Control Out" will glow green for an incoming signal from the line, and an outgoing CD signal on RS-232 pin 8.
- The green TEST LED will glow when the loopback test modes are activated.

Power-On:
There is no power switch on the Async MP Line Driver Card: Power is automatically applied to the Card when its card-edge connector makes contact with the chassis' mid-plane socket, or when the chassis' power supply is turned on.

NOTE:
The Async MP Line Driver Card is a "hot-swappable" card--it will not be
damaged by plugging it in or removing it while the rack is powered up.

When the local and remote Cards are both powered on, and are passing data normally, the LED's will indicate the following:
- PWR = green
- TD and RD = flashing red and green
- Control In and Control Out = green
- TEST = off

Test Modes:
The Async MP Line Driver Card offers two diagnostic modes: local analog loop and remote analog loop.

Local Analog Loop:
The Local Analog Loop test mode causes any data sent to the local Card by the local RS-232 device to be echoed back to that RS-232 device. For example, characters typed on the keyboard of a terminal will appear on the terminal screen. If characters are not echoed back, check the connection between the local RS-232 device and the local Card. Test all Async MP Line Driver Cards in the system.

Remote Analog Loop:
The Remote Analog Loop test mode causes any characters sent from the remote Line Driver Card to the local Card to be returned to the remote device. Start the test by pressing the Test button on one of the Cards. Then send data from the other card (which must be in normal operating mode). If the data is echoed back to the card in normal mode (for example, if characters you type appear on your screen), the link to the Card in loopback mode is working.
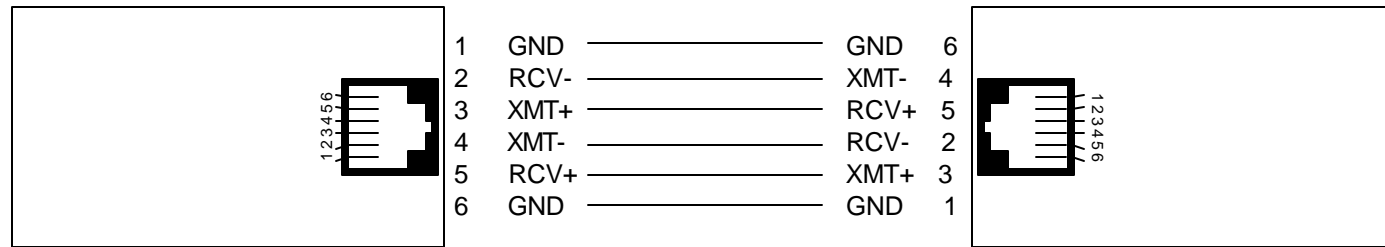
NOTE:
Only one Async MP Line Driver Card should be in test mode. The other
Card should be in "normal" operating mode or the test will not work.

If no characters are echoed back, check the wiring between the two Cards.

WIRE GAUGE	CABLE CHARACTERISTICS	
	CAPACITANCE	RESISTANCE
19 AWG	83 nf/mi or 15.7 pf/ft.	.0163 W/ft.
22AWG	83 nf/mi or 15.7 pf/ft.	.0326 W/ft.
24 AWG	83 nf/mi or 15.7 pf/ft.	.05165 w/ft.

Data Rate in (bps)	MAXIMUM CABLE DISTANCES (mi)		
	19 AWG	22 AWG	24 AWG
57,600	2.5	1.8	1.3
38,400	3.7	2.3	1.7
19,200	5.1	3.4	2.4
9,600	6.7	4.6	3.7
4,800	9.4	6.6	5.3
2,400	11.5	9.3	7.6
1,200	14.0	12.0	9.6

4-WIRE POINT-TO-POINT APPLICATION

1	GND	———————	GND	6
2	RCV-	———————	XMT-	4
3	XMT+	———————	RCV+	5
4	XMT-	———————	RCV-	2
5	RCV+	———————	XMT+	3
6	GND	———————	GND	1

4-WIRE MULTIPOINT APPLICATION

2	RCV-	XMT-	4
3	XMT+	RCV+	5
4	XMT-	RCV-	2
5	RCV+	XMT+	3

XMT-	4
RCV+	5
RCV-	2
XMT+	3

XMT-	4
RCV+	5
RCV-	2
XMT+	3