



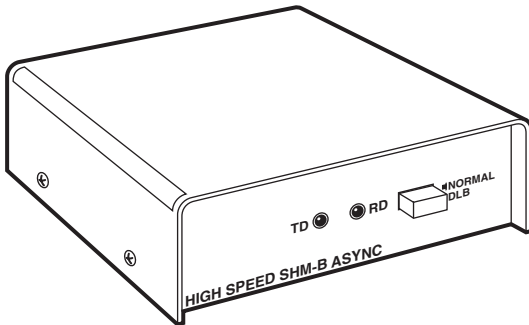
JANUARY 1995

ME802A

ME802AE

ME802C

# High Speed SHM-B Async High Speed SHM-B Async Card



---

## CUSTOMER SUPPORT INFORMATION

Order **toll-free** in the U.S. 24 hours, 7 A.M. Monday to midnight Friday: **877-877-BBOX**  
FREE technical support, 24 hours a day, 7 days a week: Call **724-746-5500** or fax **724-746-0746**  
Mail order: **Black Box Corporation**, 1000 Park Drive, Lawrence, PA 15055-1018  
Web site: [www.blackbox.com](http://www.blackbox.com) • E-mail: [info@blackbox.com](mailto:info@blackbox.com)

**FEDERAL COMMUNICATIONS COMMISSION  
AND  
INDUSTRY CANADA  
RADIO FREQUENCY INTERFERENCE STATEMENTS**

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

---

*This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.*

*Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.*

### **TRADEMARKS USED IN THIS MANUAL**

UL is a registered trademark of Underwriters Laboratories Incorporated.

*Any other trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.*

---

# Contents

<b>Chapter</b>	<b>Page</b>
1. Specifications .....	1
2. Introduction.....	4
3. Installation .....	5
3.1 Four-Wire Connections.....	5
3.2 EIA-232 Connection .....	7
3.3 Jumper Settings .....	9
3.4 Flow Control .....	9
3.5 ME800 Compatibility.....	11
4. Operation.....	12
5. Rackmount Installation .....	15
6. Troubleshooting.....	17

---

# 1. Specifications

## Transmission —

<b>Data Rate (bps)</b>	<b>Max. Distance (miles)</b>
115,200	1.5
56,000	1.7
19,200	2
2,400	4

NOTE: The transmission specifications are for 24-AWG unshielded twisted-pair cable with a mutual capacitance of no more than 15 pF/ft. Shielded twisted-pair cable will reduce the distance to one-third of the table value, because of the additional capacitance contributed by the cable's shielding. Actual distances may vary, depending on your specific operating equipment and the cable you use.

## Protocol — Asynchronous

## Operation — 4-wire, full duplex, point-to-point

**Line Interface** — Balanced current loop; Receive lines are protected through optical isolators rated at 2500 volts.

**Equipment Interface** — EIA-232/CCITT V.24 interface with hardware-handshake support. Carrier Detect (CD) true (high) indicates that the short-haul modem at the remote end of the loop is on and active. Interface is jumper selectable for DTE/DCE configuration.

**Connectors** — (1) DB25 female, (1) 4-screw terminal block

**Diagnostics** — Loopbacks provided by a front-panel switch: Analog loopback on the 4-wire loop and digital loopback on equipment interface (EIA-232).

**Status Indication** — Two light-emitting diodes (LEDs) indicate the status of the transmitter and receiver. When the LED is on, it indicates a “high” logic level is present on the appropriate RS-232 lead.

**Enclosure** — Mild steel

**Compliance** — FCC Class A, Subpart J of Part 15; CSA; UL®

**Order Information** — ME802A: 115-VAC stand-alone unit; ME802AE: 230-VAC standalone unit; ME802C: Rackmount card unit; RM007: 8-card desktop rack; ME810: 16-card rack for 19" cabinets

## Temperature

**Operating** — 32 to 140°F (0 to 60°C)

**Storage** — -4 to 158°F (-20 to 70°C)

**Humidity** — 0 to 95% max., noncondensing

**Power** — ME802A, primary: 115 VAC  $\pm$ 10%,  
60 Hz;

ME802AE, primary: 230 VAC  $\pm$ 10%,  
50/60 Hz; Both, secondary: 17 VAC, 5 watts

**Size** — ME802A, ME802AE: 1.5"H x 4.4"W x 4.1"D  
(3.8 x 11.2 x 10.4 cm);

ME802C: 0.9"H x 3.9"W x 4.5"D (2.3 x 9.9 x 11.4 cm)

**Weight** — ME802A, ME802AE: 2 lb. (0.9 kg),  
including transformer;

ME802C: 0.5 lb. (0.2 kg)

## 2. Introduction

The High Speed SHM-B Async is an asynchronous full-duplex 4-wire line driver/receiver. With a pair of these devices, two EIA-232 devices can communicate at distances of up to 4 miles (6.4 km) and at data speeds of up to 115.2 Kbps. In addition to the transmitter and receiver circuits, the High Speed SHM-B Async includes EIA-232 control-line interfaces, status monitor LEDs, and a loopback switch. The High Speed SHM-B Async is available in both a standalone version (ME802A or ME802AE) and a rackmount card version (ME802C).

The High Speed SHM-B Async is designed to operate over a 4-wire metallic circuit. The best performance is obtained with twisted-pair cable (see **Chapter 1**). Most types of twisted-pair cable may be used; however, to achieve maximum performance, we recommend Level 4 or Level 5 UTP cable.

The High Speed SHM-B Async is designed for maximum operator safety. There are no voltages greater than  $\pm 9$  VDC or 17 VAC present on the circuit board of the unit. The Receive lines are protected from potential ground differences through optical isolators rated at 2500 volts.



## 3. Installation

Installation involves three steps: four-wire connections, EIA-232 connection, and jumper settings.

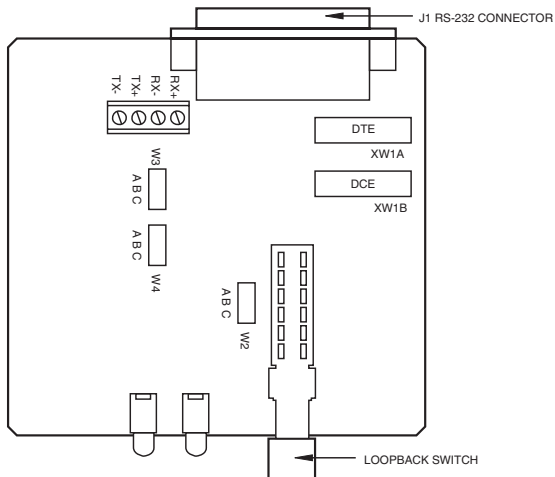
### 3.1 Four-Wire Connections

Figure 1 shows the location of the terminal block on the circuit board. Refer to Figure 2 to make the proper connections between two High Speed SHM-B Async units.

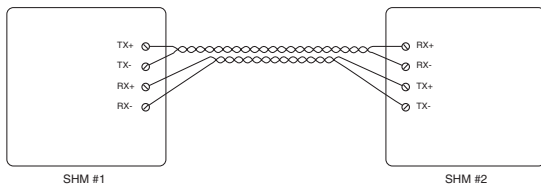
NOTE: Transmit + (TX+) on one modem is wired to Receive + (RX+) on the other modem; Transmit - (TX-) is wired to Receive - (RX-).

1. Insert the wires into the terminal strip; tighten the screw terminals.
2. After you have made all four connections, wrap the nylon cable tie (included) around the wires. Pull the tie tight around the wires to secure them to the printed circuit board. Trim the excess nylon tie with wire cutters or scissors.

## HIGH SPEED SHM-B ASYNC AND CARD



**Figure 1. High Speed SHM-B Async board:  
locations of jumpers and 4-screw terminal block.**



**Figure 2. Wiring diagram for two High Speed SHM-B Async units.**

### 3.2 EIA-232 Connection

Connect the High Speed SHM-B Async to your computer or terminal with a standard EIA-232 cable and DB25 connectors. Refer to your equipment's installation manual if you need information on the exact EIA-232 signals required for your equipment. Often, it is best to use only the Transmit Data (TD),

## HIGH SPEED SHM-B ASYNC AND CARD

Receive Data (RD), and ground lines if your equipment does not require the use of the control signals Request to Send (RTS), Clear to Send (CTS), Data Set Ready (DSR), etc. The High Speed SHM-B Async generates levels for the control signals if you need to use them. The table below shows the pin connections on the High Speed SHM-B Async.

**Table 1. EIA-232 Pin Connections**

<b>Pin No.</b>	<b>Signal Name</b>	<b>ME802 configured as DCE</b>	<b>ME802 configured as DTE</b>
1	Protective Ground	earth ground	earth ground
2	Transmit Data	input	output
3	Receive Data	output	input
4	Request to Send	input	output*
5	Clear to Send	output*	input
6	Data Set Ready	output*	input
7	Signal Ground	signal ground	signal ground
8	Carrier Detect	output	N/C
20	Data Terminal Ready	input	output

\* Always high

### 3.3 Jumper Settings

Refer to Figure 1 on page 6. Shunt W1 is used to select DTE/DCE operation. This eliminates the need to use a crossover cable when connecting to your data-communications equipment.

If you connect the High Speed SHM-B Async to your equipment using a straight-through cable, then W1 must be set to the opposite of your device's configuration. For example, if your device is configured as DTE, select DCE via W1.

If you use a crossover cable to connect the High Speed SHM-B Async to your equipment, then the setting for W1 will be identical to your equipment's setting. Refer to your equipment's manual for information concerning its DTE/DCE setting.

### 3.4 Flow Control

#### HARDWARE HANDSHAKING

#### (JUMPER W2 IN THE A-B [ENABLED] POSITION)

When the High Speed SHM-B Async is set for DCE operation (shunt jumper in the W1B position), DTR or RTS asserted true (high) from the attached RS-232 device activates the High Speed SHM-B Async driver circuit. When the High Speed SHM-B Async is set for DTE operation, CTS or DSR from the attached RS-232 device activates the driver circuit

on the High Speed SHM-B Async. The High Speed SHM-B Async at the remote end of the line will sense this and raise its CD lead (pin 8) when it is configured as a DCE device.

If the remote High Speed SHM-B Async is configured as a DTE device, it raises its DTR lead (pin 20) when it senses an active driver circuit on the High Speed SHM-B Async at the other end of the line.

### **X-ON/X-OFF MODE (JUMPER W2 IN THE B-C [DISABLED] POSITION)**

If X-ON/X-OFF characters are used for handshaking control, rather than hardware logic levels, move jumper W2 to the B-C or Disabled position.

Typically, units that use software X-ON/X-OFF flow control do not want RTS to affect DCD on the remote High Speed SHM-B Async. Moving jumper W2 to the B-C position disables the RTS/DCD relationship. The only thing that will force DCD low with the jumper in the Disabled position is the absence of power at either High Speed SHM-B Async, or a broken twisted-pair wire.

### 3.5 ME800 Compatibility

The High Speed SHM-B Async can be configured to operate properly with ME800 SHM-B Async units. Jumpers W3 and W4 when set in the A-B positions allow the High Speed SHM-B Async to operate at maximum speeds and distances. When jumpers W3 and W4 are set in the B-C positions, the output signal of the High Speed SHM-B Async is reduced to be compatible with the ME800 SHM-B Async. If the Jumpers W3 and W4 are not placed in the B-C position and an ME800 unit is attached, the receive circuitry on the ME800 may be damaged.

## 4. Operation

After configuring the High Speed SHM-B Async for your application, connect it to your equipment, then plug the power transformer into its power source. Check the operation of the High Speed SHM-B Async at both ends of the loop by pressing the front-panel LOOPBACK switch.

Press the LOOPBACK switch at the “local” High Speed SHM-B Async to check the connections to the attached RS-232 device. If a CRT terminal is connected to the High Speed SHM-B Async, typing characters on the keyboard should result in the same characters appearing on the CRT screen. If no characters appear, check your EIA-232 connections and the setting of the DTE/DCE jumper W1.

Once you have checked the connection to the attached RS-232 device, release the LOOPBACK switch on the “local” High Speed SHM-B Async and press the LOOPBACK switch on the “remote” High Speed SHM-B Async. If a CRT terminal is connected to the “local” High Speed SHM-B Async, typing characters on the keyboard should result in the same characters appearing on the CRT screen. If no



characters appear, check the 4 wire connections between the two High Speed SHM-B Async units for improper polarity or broken wires. See Figure 3 for an illustration of the loopback mode.

When the loopback tests are completed, return both High Speed SHM-B Async units to normal mode. Data transmission between the two modems should now be possible.

If you have problems communicating between the two High Speed SHM-B Async units, refer to **Chapter 6** to help diagnose the problem.

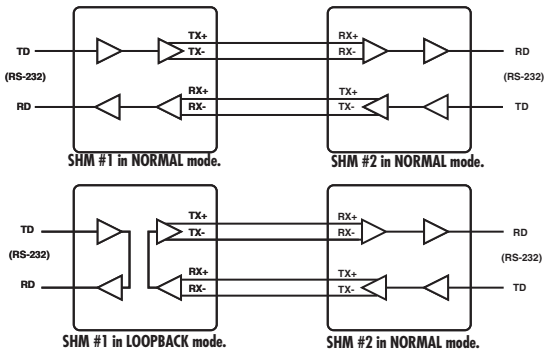


Figure 3. Activating the LOOPBACK switch.

## HIGH SPEED SHM-B ASYNC AND CARD

The TD and RD LEDs on the front panel of your High Speed SHM-B Async indicate the status of the High Speed SHM-B Async transmitter and receiver, respectively. The TD LED will light when data is transmitted out of the RS-232 port on the High Speed SHM-B Async; the RD LED will light when data is received.

## 5. Rackmount Installation

The High Speed SHM-B Async Card (ME802C) is a rackmount unit that installs in a standard 19-inch (48.3-cm) panel rack. (You can use the SHM-B Rack [ME810], which can hold up to 16 cards.) The SHM-B Async rack will occupy 5.25 inches (13.3 cm) of vertical rack space, and is 9 inches (22.8 cm) deep.

To install the SHM-B Rack, first remove the acrylic front panel by pulling out the six plunger latches on the front of the panel, then pulling on opposite-side plungers to loosen and remove the panel.

Locate the four 10/32 Phillips-head screws that were shipped with the SHM-B Rack. Use these screws to fasten the SHM-B Rack to your rack cabinet.

### CAUTION

Do not attempt to use screws that are not countersunk, since this will result in damage to the plastic front panel when it is installed.

Wire each SHM-B board according to Figures 1 and 2. It is easiest to first feed all of the wires and cables through the rack. Then you can make the necessary circuit-board connections with the circuit boards

positioned in front of the rack; this allows for the easiest access to the terminals, switches, etc.

After a High Speed SHM-B Async Card is wired, it can then be inserted into an open slot in the SHM-B rack. Be certain that the circuit board has mated with the power pins on the SHM-B rack before applying force to fully seat the board; otherwise you may damage the board and power pins.

When all boards have been wired and plugged into the rack, plug the wall transformer into its power source. You should be able to communicate as described in **Chapter 4**. When all channels are operating, attach the SHM-B Rack front panel by first aligning the plunger latches with their respective holes in the rack. Press on the top and bottom of the panel to properly seat it, then firmly press in all six of the plunger latches to retrain the panel.

## 6. Troubleshooting

The following information will help you troubleshoot your installation if problems develop. If your particular situation isn't listed here, call Black Box for assistance. Have ready a description of the problem with your installation, your DTE equipment make and models, your equipment's DTE/DCE configuration and flow control type (hardware or software), your EIA-232 cable pinouts, and what (if anything) you have already done to correct the situation.

**SYMPTOM: No data transfer in one or both directions (to, from, or to and from the High Speed SHM-B Async).**

1. Monitor the TD LED on the sending-end modem while you send some data. The light should flash with data. If not, check the DCE/DTE jumper on that unit. Once you get a TD LED flashing on that unit, the RD LED should flash simultaneously on the other High Speed SHM-B Async unit. If not, go to step 2.
2. Inspect the wiring between the two modems. Have the wires been properly installed? Transmit + (TX+) on one modem must be wired to Receive + (RX+) on the other modem;

also, Transmit - (TX-) must be wired to Receive - (RX-). Refer to Figure 2 during your inspection of the four-wire circuit.

3. Try a local test using the Loopback mode (see **Chapter 4**). If there is no transfer, check the wiring of your EIA-232 cable and the setting for jumper W1 (DTE/DCE select).
4. The EIA-232 control signals may be at the wrong levels. If jumper W2 is in the A-B position, try moving it to the B-C position to internally enable the driver circuit on the High Speed SHM-B Async unit. If data transfer now occurs, either an EIA-232 control signal supplied to the High Speed SHM-B Async by the attached RS-232 device was not at the correct level, or jumper W2 was improperly set for your application. Refer to **Section 3.4** to determine which flow-control leads are needed to support your application.
5. If pin 8, Carrier Detect (with jumper W1 in the XW1B position), or pin 20, Data Terminal Ready (with jumper W1 in the XW1A position), is low, this indicates:
  - a defective transmission line or connection
  - a defective High Speed SHM-B Async
  - a High Speed SHM-B Async without power

**SYMPTOM: TD and RD LEDs indicate data activity, but data communication doesn't exist.**

1. Check the wiring of the EIA-232 port (see **Section 3.2**).
2. Check the setting of the DTE/DCE jumper (see **Section 3.3**).

**SYMPTOM: Transmitted and/or received data is full of errors (garbled data).**

1. Check for reversal of polarity on the four-wire connection. Refer to **Section 3.1** and Figure 2.
2. Check word structure and speed settings on your computing equipment for consistency.
3. Wire the High Speed SHM-B Async units back-to-back, eliminating the twisted pair; see if you still have errors.
  - If you do have errors, then test each High Speed SHM-B Async individually in the following way. Loopback one High Speed SHM-B Async's Transmit-to-Receive by using two short pieces of wire. Connect that High Speed SHM-B Async to a dumb terminal and key-in characters; look for a good loopback. A good loopback verifies a High Speed SHM-B Async in proper working condition.

- If you don't have errors, you should suspect a problem with the twisted-pair cable.

### **SYMPTOM: Occasional data errors.**

1. The transmission distance/data rate capability may have been exceeded. Refer to **Chapter 1** for information about valid data transmission distances and data rates.
2. There is a poor-quality loop (four-wire circuit). Try using a different four-wire circuit, or rewire the existing circuit.
3. Check the path of your four-wire circuit for potential sources of interference (fluorescent lighting, electrical motors, etc.). Such sources of electrical noise can provide an environment in which unwanted signals are induced onto your four-wire circuit. Also, check to see if an adjacent four-wire cable carrying a separate data stream is creating crosstalk. It may be that the data signal is jumping from the adjacent cable onto the four-wire circuit between the two High Speed SHM-B Async modems (another type of induced signal).



4. While you are checking your cable for sources of noise and crosstalk, check the cable for irregularities in the shield. Also, reconsider the cable's ratings for attenuation, capacitance, and impedance. You may need to install a higher-quality cable for your particular installation.
5. Your AC power source may be the culprit. Check your AC power at the wall socket and confirm that it is within the range given in **Chapter 1**.
6. Check the settings for jumpers W3 and W4 to ensure that you have selected the A-B positions unless you are connected to an ME800 unit.

**SYMPTOM: TD or RD indicator is steadily on with no data attempting to pass (no DTEs attached).**

Check for reversal of polarity on the four-wire connection.



© Copyright 1995. Black Box Corporation. All rights reserved.

---

1000 Park Drive • Lawrence, PA 15055-1018 • 724-746-5500 • Fax 724-746-0746