GMX SAB-9D
RS-232 Serial Adapter Board
With 9-Pin "D" Connectors

User's Manual

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Revision History

Revision A   02/24/86   First general release
Revision B   01/07/87   Add info on single supply
                                version (Rev. B boards).

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CONTENTS

This manual contains information on the initial setup and and operation of the GMX SAB-9B, 9-Pin RS-232 Interface Adapter Board.

The board provides level-shifting between TTL level and standard RS-232 signal levels for up to 4 serial I/O ports. Separate 9-pin, D-type connectors provide access to each port.

The "D" connector pinouts are arranged so that an off-the-shelf cable (a standard IBM PC AT communications cable) can be used to adapt the 9-pin connectors to the 25-pin "D" connectors used on most RS-232 devices.

Three of the four connectors have fixed pinouts, arranged so that the adapter cable can be connected to a standard RS-232 terminal or other device configured as Data Terminal Equipment (DTE).

The fourth connector has programmable pinouts, and the same adapter cable can be used for either DTE or Data Communication Equipment (DCE). This connector also has additional signals available for modem control, etc.

A 50-pin ribbon cable connects the board to the serial I/O connector on a host such as the GMX Micro-20 SBC or SBC-8S 8-port Serial Board. This ribbon cable carries the TTL level I/O signals as well as the supply voltages required by the board.

The RS-232 inputs and outputs meet the RS-232C specifications. The negative supply voltage, required by the standard, is generated on-board by the interface parts themselves.

********** CAUTION **********

Early revisions of the SAB-9D (Pre-Revision 'B') are subject to damage from improper power supply sequencing. The RS-232 driver/receivers can be damaged if the +12 Volt supply is applied before the +5 Volt supply. To minimize the chances of damage to the board, never connect or disconnect the SAB-9D from the GMX Micro-20 while power is applied to the board. Revision 'B' and later versions of the board use a single power supply and are not subject to this problem.

User Notes

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The connectors used are standard, 9-pin male D-type connectors. Refer to Appendix B for the locations of the connectors.

1-1: Fixed Pinout Connectors (P1, P2, and P3)

Figure 1-1 shows the pinout of 9-pin connectors P1, P2, and P3 and the pinout of the DB-25 connector when the 9-pin to 25-pin adapter cable described below is used. All pins not listed in the table are unconnected.

Connector Pinouts for P1, P2, and P3 ①

9-pin pin #	25-pin pin # ②	Signal	Direction
2	3	Transmit Data (TX)	From Computer
3	2	Receive Data (RX)	To Computer
4	20	Flow Control (CTS)	To Computer
5	7	Signal Ground	Both
8	5	Flow Control (DTR)	From Computer

Notes:

① If JA-1B is configured as shown in Fig. 1-4, P4 also matches this pinout.

② 25-pin pinout is obtained by using the 9 to 25-pin adapter cable described in the text and in Figure 1-2.
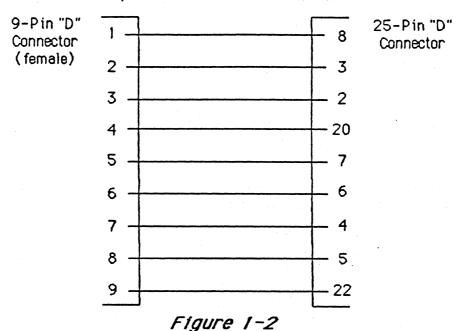
Figure 1-1

The pinout of the 9-pin connectors was chosen so that an off-the-shelf cable assembly can be used to adapt them to the 25-pin "D" connectors used on most serial devices. This cable allows P1 through P3 to be connected directly to a terminal or other device configured as Data Terminal Equipment (DTE). Figure 1-2 shows the configuration of the cable, which is available from a variety of sources as an "IBM PC AT Communications Cable" (IBM part #6450217, or equivalent).

Note: Although this cable is referred to as a "communication" or "modem" cable in its normal application, the pinout of connectors P1, P2, and P3 on the SAB-9D is arranged so that the cable can be connected directly to a terminal or other device configured as DTE.

Adapter Cable Wiring

This cable can be used to connect terminals to
P1-P3, or a terminal or modem to P4.

9-Pin "D"
Connector
(female)

25-Pin "D"
Connector

9-Pin	25-Pin
1	8
2	3
3	2
4	20
5	7
6	6
7	4
8	5
9	22

Figure 1-2

    Custom cables can also be constructed, using Figure 1-2 as a
guide. A minimum cable configuration requires both transmit and
receive data, as well as signal ground (pins 2, 3, and 5 on the DB-9
connector). The function of the two flow control lines is determined
by the software being used and flow control (handshaking) may or may
not be supported. Refer to the appropriate software documentation for
information on flow control. Generally, CTS line (pin 4) controls
output from the computer to external devices, and the DTR line (pin 8)
controls output from external devices to the computer.

1-2: Programmable Pinout Connector (P4)

    Connector P4 can be configured so that the adapter cable shown in
Figure 1-2 can be used for either a terminal (DTE) or a modem (DCE,
Data Communications Equipment).

    Jumper area JA-1B is used to program the pinout of connector P4.
Figure 1-3 shows JA-1, which is divided into two sections: JA-1A and
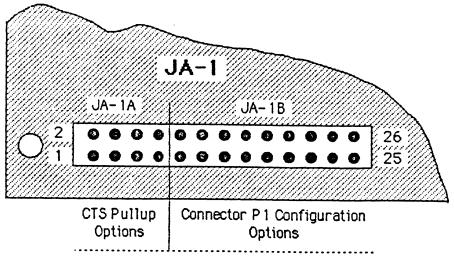JA-1B.

Figure 1-3

If JA-1B is configured as shown in Figure 1-4, the pinout of connector P4 matches the pinout of connectors P1, P2, and P3. See the section on P1-P3 for more information on this configuration.
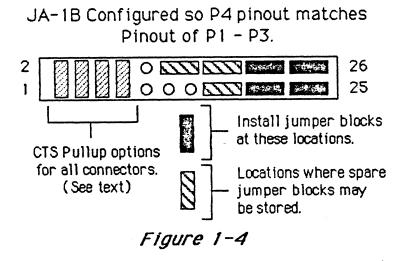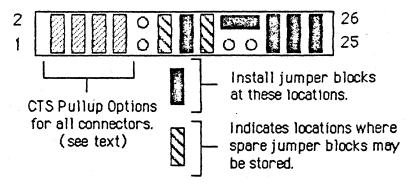

Figure 1-4

Figure 1-5 shows a typical JA-1B configuration, and the resulting 9 and 25-pin connector pinouts, for connecting a modem or other device configured as DCE to P4.

Typical JA-1B configuration
for connecting a modem to P4.

CTS Pullup Options for all connectors. (see text)

Install jumper blocks at these locations.

Indicates locations where spare jumper blocks may be stored.

Connector Pinouts

9-pin pin # ①	25-pin pin # ②	Signal	Direction
1	8	Modem Control (DCD)	To Computer
2	3	Receive Data (RX)	To Computer
3	2	Transmit Data (TX)	From Computer
4	20	Modem Control (RTS)	From Computer
5	7	Signal Ground	Both
8	5	Flow Control (CTS)	To Computer

Notes:
① P4 only.
② 25-pin pinout is obtained by using the 9 to 25-pin adapter cable described in the text and in Figure 1-2.

Figure 1-5

Connector P4 provides signals not available on the other three connectors. These signals are used for modem control or other special applications.

Note: The function of the modem control signals is determined by the software being used. When connecting a modem, refer to the software documentation to determine what functions are supported by the software.

Figure 1-6 shows the pinout of jumper area JA-1B. By installing jumper blocks and/or wire jumpers at JA-1B, P4 can be arranged to connect any of the I/O signals to any of the available connector pins.

Jumper Area JA-1B Pinout

I/O Connector Pins

25-pin pin no. see note	P4 Pin no.	JA-1 Pin no.
6	6	10
22	9	11
8	1	14
4	7	17
20	4	20
5	8	21
2	3	24
3	2	25

Port 3 I/O Signal Pins

JA-1 Pin no.	Name	Function	Direction
9	IP5	Undefined	To Computer
13	DCD	Modem Control	To Computer
18	RTS	Modem Control	From Computer
19	DTR	Flow Control	From Computer
22	CTS	Flow Control	To Computer
23	TX	Transmit Data	From Computer
26	RX	Receive Data	To Computer

Note: 25-pin connector pinout applies when the 9 to 25-pin adapter cable described in the text and in Figure 1-2 is used.

Figure 1-6

Note: Pin 5 of connector P4 is permanently connected to signal ground.

1-3: CTS Pullup Options

The CTS flow control (handshake) input is normally used to start and stop output from computer to an external device. When CTS is asserted (high), output is enabled; when it is deasserted (low), output is inhibited. CTS is normally driven by the RTS or DTR output from the receiving device to prevent the computer from transmitting when the device is unable to accept input.

Jumper area JA-1, section JA-1A provides the option of connecting a pullup resistor to the CTS input of each of the four serial ports. Figure 1-7 shows the position of the jumpers at JA-1A for each of the four ports.
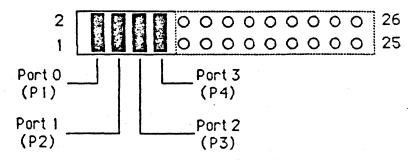
JA-1A CTS Pullup Jumpers

Figure 1-7

When a jumper is installed, a pullup is connected to the CTS line of the associated port. This will force CTS to the high (asserted) state; unless it is driven low by an external device connected to the line. When no jumper is installed, the CTS will be forced to the low (deasserted) state, unless it is driven high by an external device connected to the line.

If a particular port is being used without flow control (CTS not connected), then the CTS pullup jumper for that port must be installed to assert CTS and enable transmission from the port.

If a port is being used with flow control (CTS connected), then the CTS pullup jumper for that port may be installed or removed as desired. Depending on whether or not the jumper is installed, the port will react in one of two ways. If the jumper is installed, transmission from the port will be enabled even if the external device is turned off or disconnected from the computer. If the jumper is removed, transmission from the port will be inhibited when the device is disconnected or turned off.

Note: The presence or absence of the CTS pullup jumper does not affect normal flow control (handshake) function when an external device is connected to the CTS line.

SECTION 2: I/O CONNECTOR PORT ASSIGNMENTS

Each 9-pin "D" connector is assigned to one serial I/O port on the host board. Figure 2-1 shows the port assignment for each of the four connectors. Refer to Appendix B, the component layout, for the location of the connectors.

Serial I/O Port
Connector Assignments

Port 0	Connector P1
Port 1	Connector P2
Port 2	Connector P3
Port 3	Connector P4

Figure 2-1

When the SAB-9D is connected to the serial ports on a GMX Micro-20 SBC, connector P1 (port 0) is used for the system console terminal.

SECTION 3: HOST INTERFACE

3-1: Host Connections

A 50-pin ribbon cable and connector, soldered to the adapter board, mates with the serial I/O connector on the host board and carries signals and power to the SAB-9D. When connecting the cable to the host, be sure to observe proper polarity (pin 1). Refer to Appendix B for the location of pin 1 on the SAB-9D host connector (P5).

If additional cable length is required, an extender cable with the appropriate connectors may be used with the supplied cable; however, the cable length should be kept as short as possible to prevent noise pickup and minimize cable loading effects. Special versions, with longer or shorter cables, are available on special order for quantity users. Contact GMX Inc. for price and availability.

3-2: SAB-9D Power Requirements

Since the SAB-9D Serial Adapter Board draws its power from the host board, the current requirements of the SAB-9D should be considered when calculating the total power requirements of the host system. Several different versions of the board have been manufactured. Boards with no revision letter following the part number etched on the solder side of the board (e.g. 24-0092), and those with the letter 'A' (i.e. 24-0092A) use both +5 Volt and +12 Volt supplies. Their current requirements are typically under 10 ma. for the 5 Volt supply, and under 50 ma. for the +12 Volt supply. Boards with revision letter 'B' (i.e. 24-0092B) or higher use only the +5 Volt supply. Rev. B and later boards generate both the +12 and -12 volt supplies required by RS-232 on-board. Supply current requirements for these boards are typically under 100 ma. on the +5 volt supply.

SECTION 4: MOUNTING THE ADAPTER BOARD

Appendix A shows the dimensions and locations of the connectors and mounting holes. A typical panel cutout for the "D" connectors is also shown. Other cutouts can be used, as long as sufficient clearance is provided so that the connectors can be fully mated.

The DB-9 connectors have 4-40 threaded inserts and jackscrews for securing the mating cable connectors. The jackscrews can also be used to mount the board to a cabinet or panel.
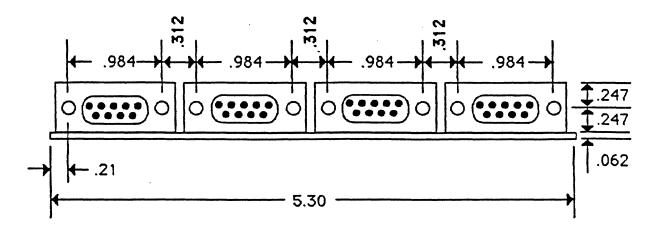
Two mounting holes (in the rear corners of the circuit board), along with the holes used to mount the 9-pin connectors to the board, can be used two provide additional support or to mount the board parallel to a flat surface.
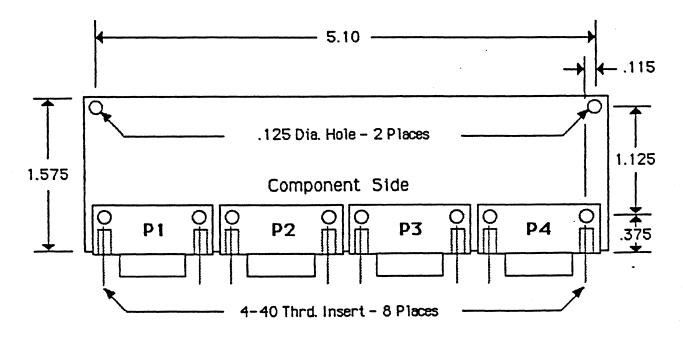
The maximum recommended panel thickness, when mounting the board with the supplied jackscrews, is .062 inches. Thicker panels may prevent full connector insertion unless screws with shorter heads are used. For thinner panels, washers under the screw heads or screws with longer heads may be needed.
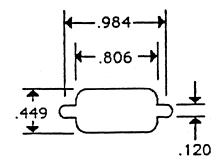
Regardless of the method used to mount the adapter board, it should be fastened securely to a rigid surface to prevent flexing of the circuit board during connector insertion and removal.

When mounting the board, be sure that there is sufficient clearance around the mounting screws, brackets, panels, etc. to prevent short circuits to the PC board or components.
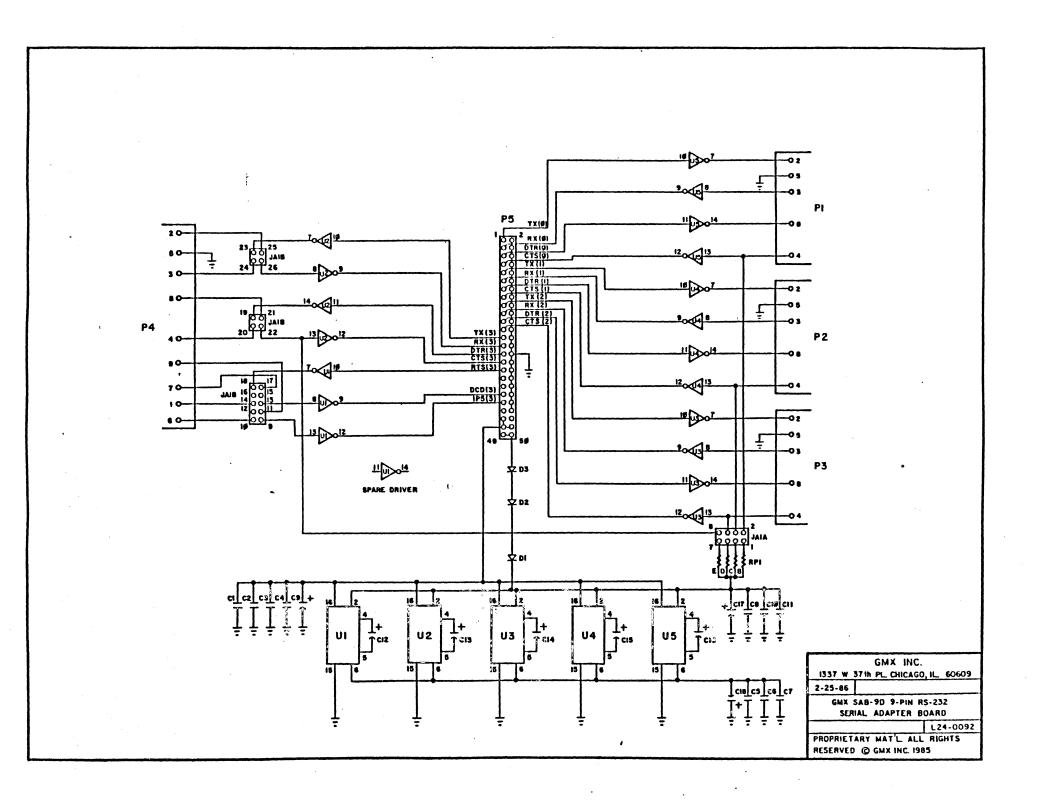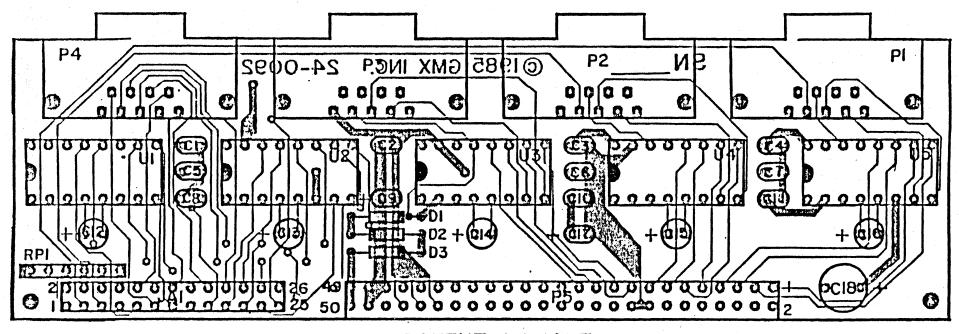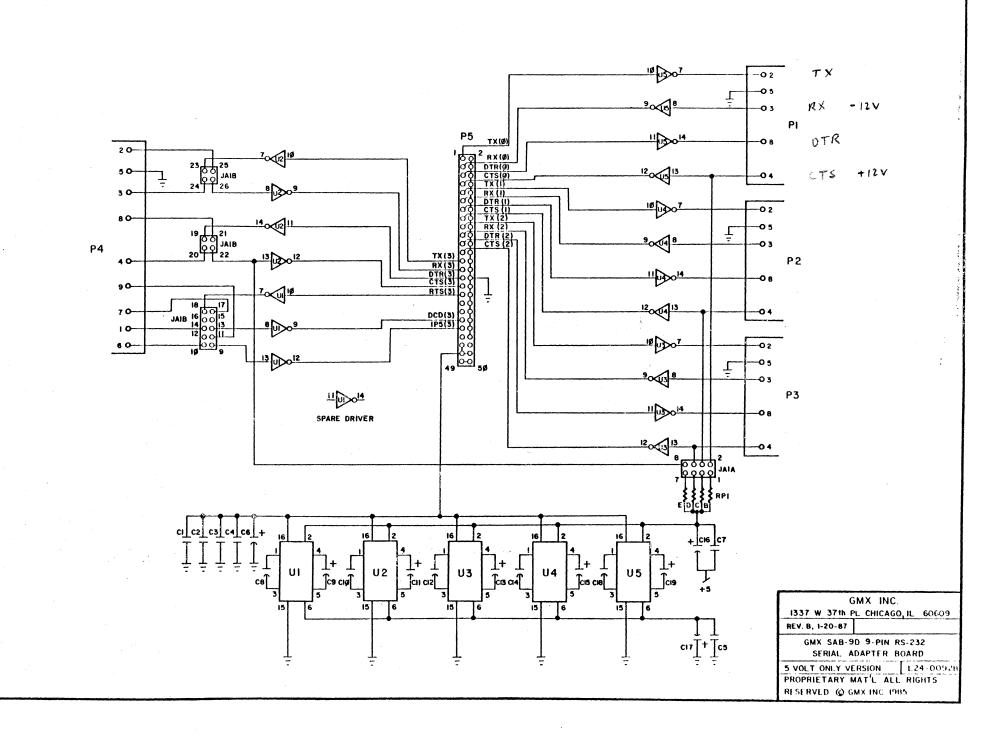
SAB-9D Mounting Dimensions

.312 .312 .312

.984 .984 .984 .984

.247

.247

.062

.21

5.30

5.10

.115

.125 Dia. Hole - 2 Places

Component Side

1.575

1.125

.375

P1 P2 P3 P4

4-40 Thrd. Insert - 8 Places

.984

.806

.449

.120

Typical Panel Cutout

SPARE DRIVER

COMPONENT LAYOUT

P4   P3   P2   PI

U1   C1   U2   C2   C3   U3   C4   U4   C5   C7   U5   C6

+ C8 + C9

RP1

+ C10 + C11   + C12 + C13   + C14 + C15

C16 + C17

2
1   JA1   26 49   P5   1
            25 50   2   + C18 + C19

COMPONENT LAYOUT