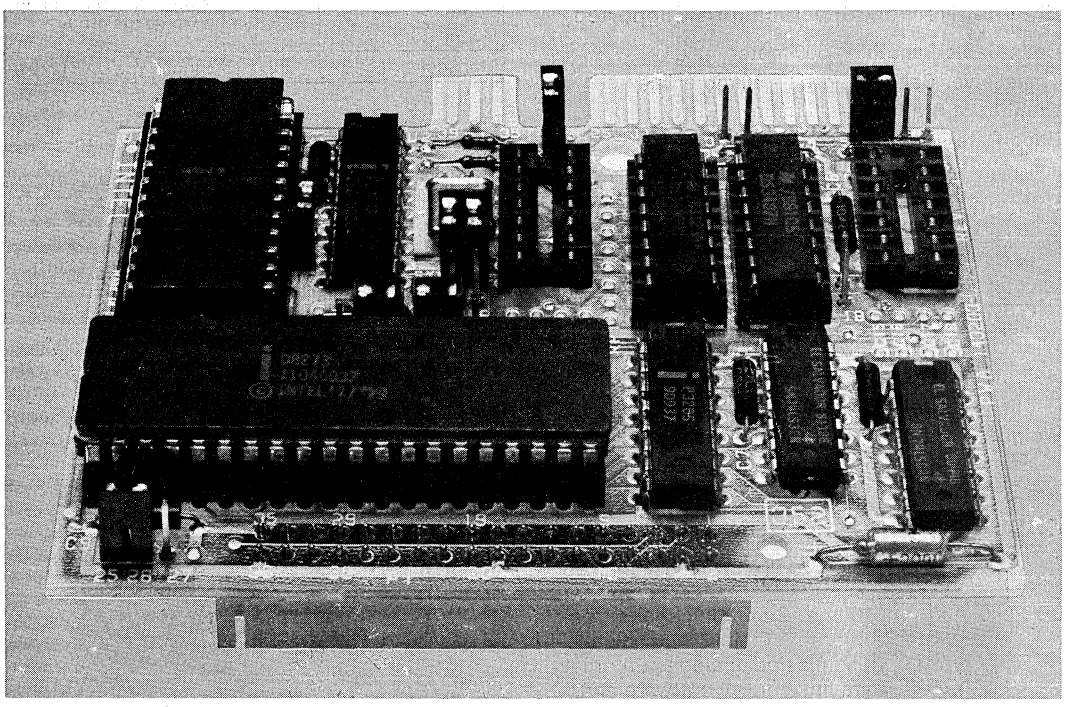
iSBX™ 352
BIT SERIAL COMMUNICATIONS MULTIMODULE™ BOARD

- **Provides an HDLC/SDLC half/full-duplex communications channel for iSBX™ bus compatible micro-computers**
- **Supports RS232C (including modem support) or RS449/422A interface**
- **Single +5V when configured for RS449/422A interface**
- **Software programmable baud rate generation up to 64K baud synchronous and 9.6K baud self-clocking**
- **Supports synchronous or self-clocking NRZI point-to-point, multidrop and self-clocking NRZI SDLC loop data link interfaces**

The Intel iSBX 352 Bit Serial Communications MULTIMODULE board offers incremental on-board I/O expansion support for ISO/CCITT's HDLC or IBM's SDLC communication. Plugging directly into any iSBX bus compatible host board, the iSBX 352 module provides one RS232C or RS449/422A programmable bit serial communications channel with software selectable baud rates (up to 64K baud for half-duplex synchronous operations). Data link interfaces supported are: synchronous point-to-point, multidrop and SDLC loop. The phase lock loop feature provides NRZI self-clocking 9.6K baud operation.



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Order Number: 210218-001

FUNCTIONAL DESCRIPTION

Communications Interface

The iSBX 352 module uses the Intel 8273 Programmable HDLC/SDLC Protocol Controller. The iSBX 352 module provides one bit-serial communications channel for iSBX bus compatible host microcomputers. (See Figure 1.) An iSBC microcomputer or MULTIBUS-based application is easily connected to an HDLC/SDLC point-to-point, multidrop, or an SDLC loop configuration.

The High-Level Data Link Control (HDLC) is the International Standards Organization (ISO) standard discipline used to implement X.25 packet switching communications. The Synchronous Data Link Control (SDLC) is an IBM communication protocol used to implement the System Network Architecture (SNA). Both protocols, HDLC and SDLC, are bit oriented, code independent, and support full-duplex operations.

Data Link Interface

The control lines, serial data lines and signal ground lines are brought out to the double edge connector of the iSBX 352 module and are configurable for RS232C or RS449/422A interface (see Figure 2).

Addressing an iSBX 352 board by using a port address, the program performs the 8-bit data transfer required, using buffered or non-buffered transmit/receive and abort sequences.

Serial data transfer control is provided by the 8273 controller of the iSBX 352 module which interfaces the parallel iSBX bus to the serial channel. During a transmit sequence, the iSBX 352 module accepts data and commands from the iSBX bus interface, translates and formats the data into HDLC/SDLC protocol formats, provides the proper RS232C or RS422A interface control signals, and passes data onto the serial channel. The receive operation is the inverse of the previous sequence.

Data Link Configurations

The supported data link configurations are shown in Table 1. The following example configurations provide an overview and a figure for five typical data link configurations:

Table 1. iSBX™ 352 Supported Configurations

Connection	Synchronous		Asynchronous	
	Modem	Direct	Modem*	Direct
point-to-point	X	X	X	X
multidrop	X	X	X	X
loop	NA	NA	X	X

* Modem should not respond to a break.

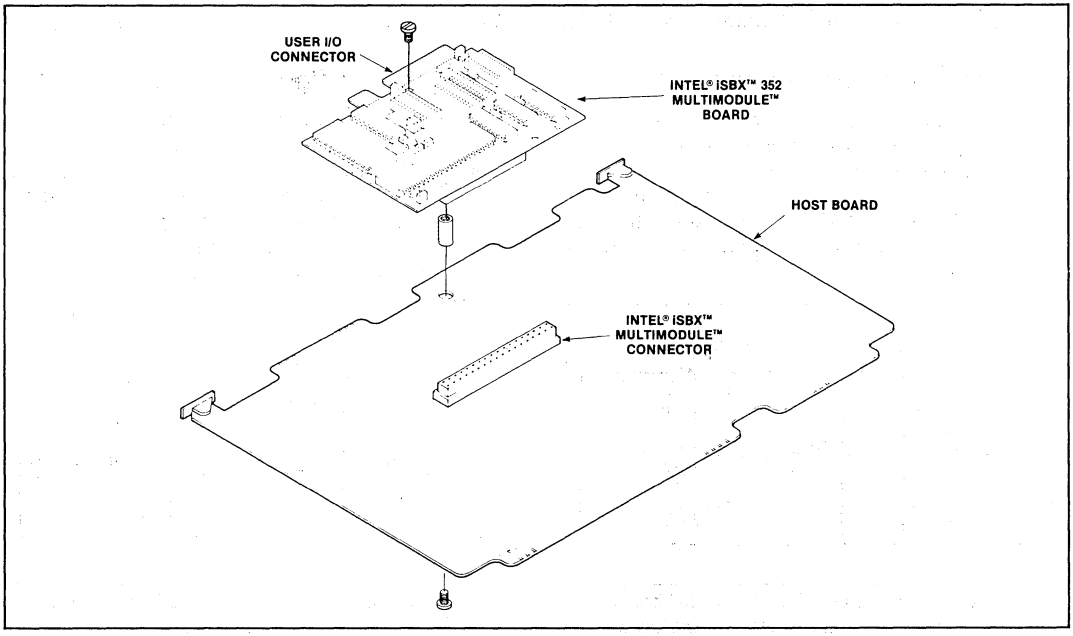


Figure 1. Installation of iSBX™ 352 MULTIMODULE™ Board on a Host Board

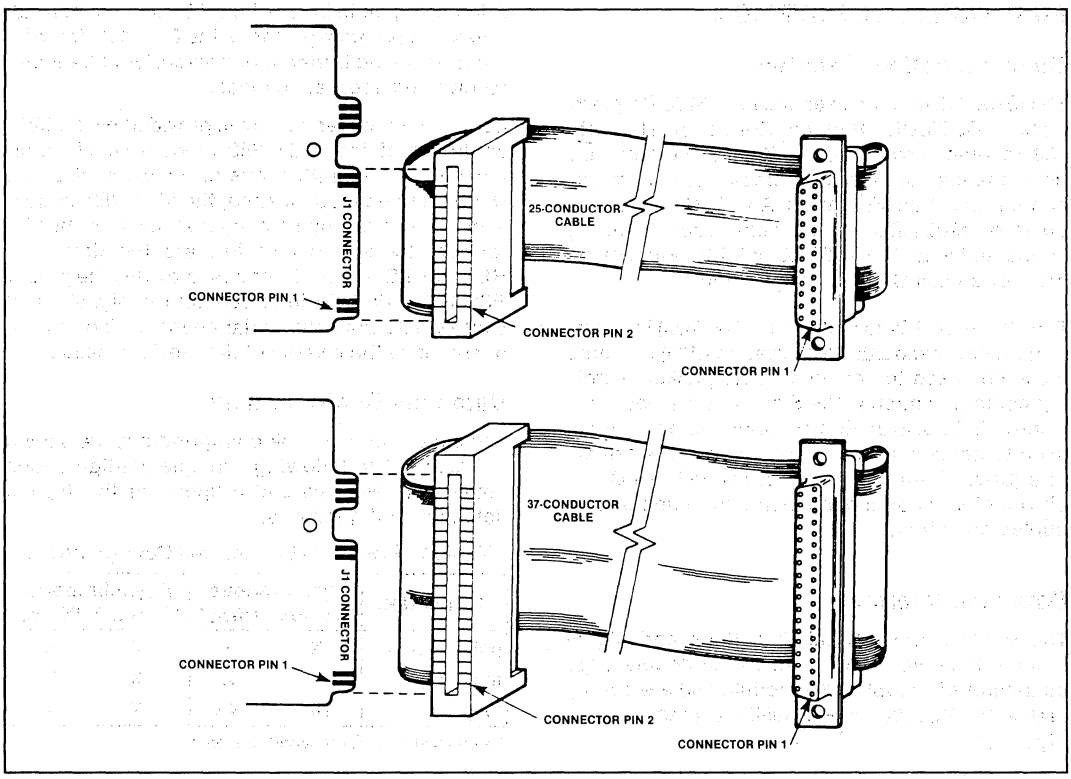


Figure 2. Cable Construction and Installation for RS232C and RS449/422A Interface

SYNCHRONOUS POINT-TO-POINT INTERFACE

Figure 3 shows a synchronous point-to-point mode of operation for the iSBX 352 module. This RS232C example uses a modem for generation of the receive clock for coordination of the data transfer. The iSBX 352 module generates the transmit synchronizing clock for synchronous transmission.

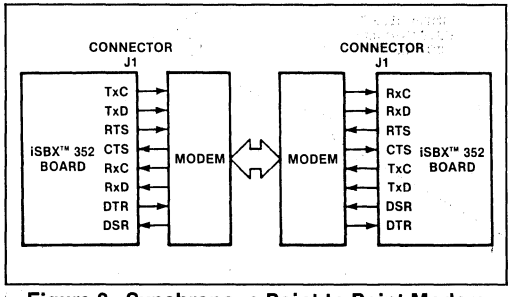


Figure 3. Synchronous Point-to-Point Modem Interface Configuration Example - RS232C

SELF-CLOCKING POINT-TO-POINT INTERFACE

The iSBX 352 module is used in an asynchronous mode interface when configured as shown in Figure 4. The point-to-point RS232C example uses the self-clocking mode interface for NRZI encoding/decoding of data. The digital phase lock loop allows operation of the interface in either half-duplex or full-duplex implementation with or without modems.

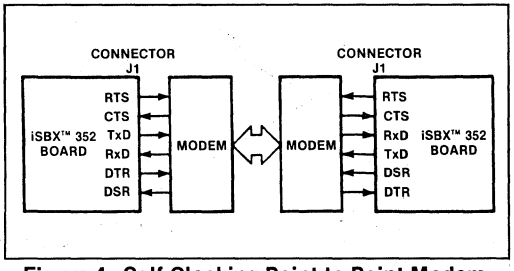


Figure 4. Self-Clocking Point-to-Point Modem Interface Configuration Example - RS232C

SYNCHRONOUS MULTIDROP

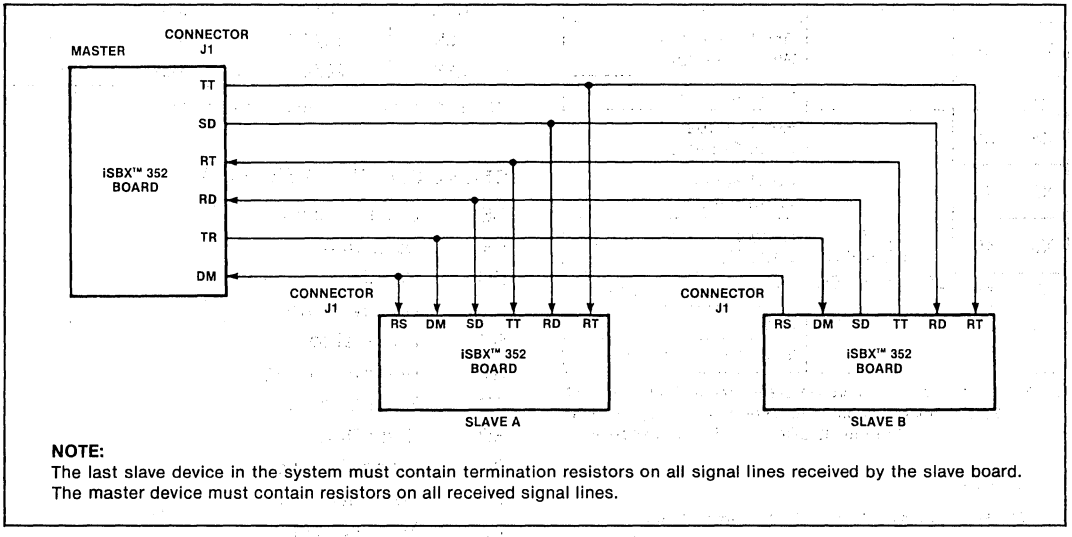
The iSBX 352 MULTIMODULE is used as both a master and a slave node in the RS449/422A example shown in Figure 5. This synchronous multidrop application is effective for high-speed data transfers between slave stations and a central master station.

ASYNCHRONOUS SELF-CLOCKING MULTIDROP

The iSBX 352 MULTIMODULE example in Figure 6 shows a master and multiple slaves in a multidrop configuration. This self-clocking example uses the 8273 digital phase lock loop and NRZI data encoding.

SDLC Loop

The SDLC self-clocking loop configuration shown in Figure 7 permits longer networks since each secondary slave station is a repeater set in one-bit-delay mode. The data sent out by the primary station (the loop controller) are relayed bit-for-bit through each secondary station and finally back to the master station.



NOTE:
The last slave device in the system must contain termination resistors on all signal lines received by the slave board. The master device must contain resistors on all received signal lines.

Figure 5. Synchronous Multidrop Network Configuration Example - RS422A

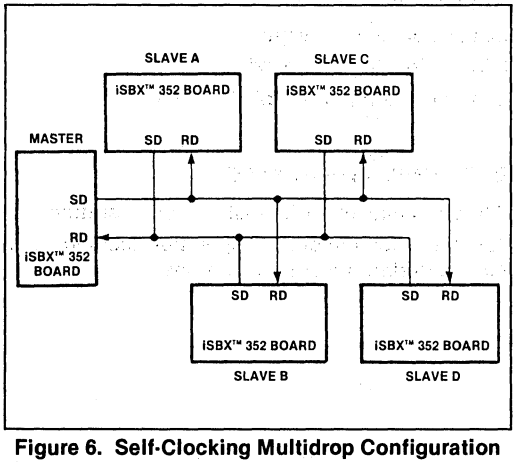


Figure 6. Self-Clocking Multidrop Configuration Example - RS422A

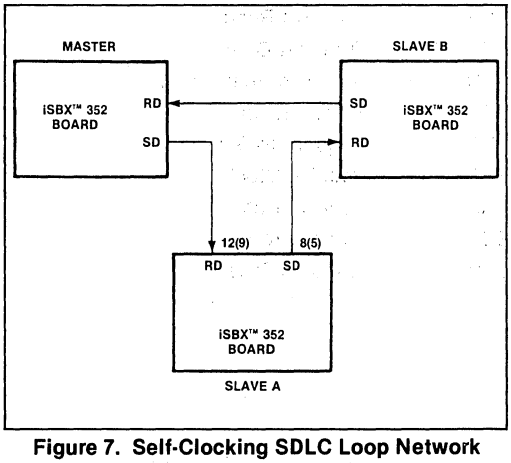


Figure 7. Self-Clocking SDLC Loop Network Configuration Example

SPECIFICATIONS

Data Size

8 Bits

I/O Port Addresses

Port Address		Device Selected	Function Performed
8-bit	16-bit		
X0	X0	8254-2 PIT	Read Counter 0 Write Counter 0
X1	X2		Read Counter 1 Write Counter 1
X2	X4		Read Counter 2 Write Counter 2
X3	X6		Write Control
X4	X8	8273 HDLC/SDLC CONTROLLER	Read Status Write Command
X5	XA		Read Result Write Parameter
X6	XC		Read Transmit Interrupt Write Reset
X7	XE		Read Receive Interrupt
Y0	Y0		Read Receive Data
Y4	Y8		Write Transmit Data

NOTE: Refer to the Hardware Reference Manual for your host iSBC™ microcomputer to determine the upper digit (either X or Y) of the MULTIMODULE™ port address.

Interfaces

iSBX™ BUS — All signals TTL compatible

SERIAL RS232C SIGNALS

CTS	Clear to Send
DSR	Data Set Ready
DTE TXC	Transmit Clock
DTR	Data Terminal Ready
FG	Frame Ground
RTS	Request to Send
RXC	Receive Clock
RXD	Receive Data
SG	Signal Ground
TXD	Transmit Data

RATE GENERATOR FREQUENCIES

Baud Rate bits/sec	8254-2 Divide Count		
	Synchronous	Self-Clocking	
64K	125	TX Clock	32X Clock
56K	143	—	—
48K	167	—	—
19.2K	417	—	—
9.6K	833	833	26
4.8K	1,667	1,667	52
2.4K	3,333	3,333	104
1.2K	6,667	6,667	208
0.6K	13,333	13,333	417
0.3K	26,667	26,667	833

NOTE: All numbers are in decimal notation.

SERIAL RS449/422A SIGNALS

CS	Clear to Send
DM	Data Mode
RC	Receive Common
RD	Receive Data
RS	Request to Send
RT	Receive Timing
SC	Send Common
SD	Send Data
SG	Signal Ground
TR	Terminal Ready
TT	Terminal Timing

OPERATING SPEEDS

24 MHz on-board crystal
8 MHz clocking of the 8254-2 PIT
4 MHz clocking of the 8273 Device

DATA THROUGHPUT SPEED

64K baud maximum for half-duplex operation

48K baud for full-duplex operation issuing commands during transmit operations

SERIAL INTERFACE CONNECTORS

Configuration	Mode[2]	MULTIMODULE™ Edge Connector	Cable	Connector
RS232C	DTE	26-pin[5], 3M-3462-0001	3M[3]-3349/25	25-pin[7], 3M-3482-1000
RS232C	DCE	26-pin[5], 3M-3462-0001	3M[3]-3349/25	25-pin[7], 3M-3483-1000
RS449	DTE	40-pin[6], 3M-3464-0001	3M[4]-3349/37	37-pin[1], 3M-3502-1000
RS449	DCE	40-pin[6], 3M-3464-0001	3M[4]-3349/37	37-pin[1], 3M-3503-1000

NOTES:
1. Cable housing 3M-3485-4000 may be used with the connector.
2. DTE - Data Terminal Equipment mode (male connector); DCE - Data Set Equipment mode (female connector).
3. Cable is tapered at one end to fit the 3M-3462 connector.
4. Cable is tapered to fit 3M-3464 connector.
5. Pin 26 of the edge connector is not connected to the flat cable.
6. Pins 38, 39, and 40 of the edge connector are not connected to the flat cable.
7. May be used with the cable housing 3M-3485-1000.

Electrical Characteristics

DC POWER REQUIREMENTS

Interface	Voltage	Current (max)	Total Power
RS 232C	+5 ± 0.25V	595 mA	3.8 watts
	−12 ± 0.6V	30 mA	
	+12 ± 0.6V	30 mA	
RS 449/422A	+5 ± 0.25V	775 mA	4.1 watts

Environmental Characteristics

Temperature — 0 - 55°C, free moving air across base board and MULTIMODULE board

Humidity — to 90%, without condensation

Physical Characteristics

Width — 7.27 cm (2.85 inches)

Length — 9.40 cm (3.70 inches)

Height — 1.40 cm (0.56 inches)

Weight — 72 gm (2.53 ounces)

Reference Manual (Not Supplied)

143983 — iSBX 352 Bit Serial Communications MULTIMODULE Board Hardware Reference Manual.

Reference manuals may be ordered from any Intel sales representative, distributor office or from Intel Literature Department, 3065 Bowers Ave., Santa Clara, California 95051.

ORDERING INFORMATION

Part Number	Description
SBX 352	HDLC/SDLC Serial I/O MULTIMODULE Board