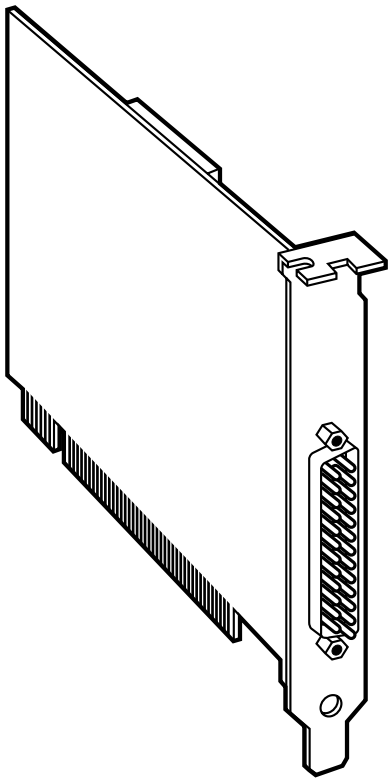
MAY 2006
IC251C

RS-232/422/530/485/V.35 Sync Interface Card



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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 B 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.

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This equipment complies with the requirements of the European EMC Directive 89/336/EEC.

CE

NORMAS OFICIALES MEXICANAS (NOM)
ELECTRICAL SAFETY STATEMENT

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:

    A: El cable de poder o el contacto ha sido dañado; u

    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o

    C: El aparato ha sido expuesto a la lluvia; o

    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o

    E: El aparato ha sido tirado o su cubierta ha sido dañada.

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Contents

1. Specifications

Communications Chip: Zilog Z16C32

Speed (Maximum): 10 MBps

Operation: Full duplex dual Direct Memory Access (DMA) transfer

Operating System: Windows® 98/Me/XP, Windows 2000

Connectors: (1) DB25 male

Temperature Tolerance: Operating: 32 to 158°F (0 to 70°C);
Storage: -58 to +221°F (-50 to +105°C)

Relative Humidity: 10 to 90% noncondensing

Power Consumption: Supply line: +5 VDC;
Rating: 450 mA

Size: Including goldfingers: 4"H x 4.9"L (10.2 x 12.5 cm);
Excluding goldfingers: 3.7"H x 4.9"L (9.4 x 12.5 cm)

2. Introduction

2.1 Overview

The RS-232/422/530/485/V.35 Sync Interface Card provides the PC with a single-channel high-speed multiprotocol serial interface suitable for the most popular communication protocols. This sync card provides an ideal solution for high-speed applications including LAN/WAN connectivity.

The card operates via a single-channel, high-speed, sync wide area network (WAN) interface. Connect the card to RS-232, RS-422/449, EIA-530, V.35, or RS-485 serial devices. The attached devices have multiprotocol capability, including PPP (point-to-point protocol), frame relay, X.25, high-speed async, bi-sync, mono-sync, HDLC, and SDLC.

Typical applications include T1, fractional T1, E1, ISDN, and other WAN applications. Using the Zilog Z16C32 (IUSC) chip DMA controller eliminates bus bandwidth constraints that are placed on typical interface adapters, so data rates can reach 10 MBps in burst mode. The card uses the Z16C32's 32-byte FIFO buffer coupled with 256 K of onboard memory to achieve these higher data rates. The card also supports link list DMA.

2.2 What's Included

You should have received the RS-232/422/530/485/V.35 Sync Interface Card and a CD-ROM with software and this users' manual in PDF format. If anything is missing or damaged, contact Black Box at 724-746-5500.

3. Installation

3.1 Software

CAUTION

Install the software before installing the card.

1. Start Windows.
2. Insert the included CD-ROM in your CD drive.
3. If Autostart is enabled for this drive, the software will automatically launch. Otherwise, open up a Web browser, type **Index.htm** in the CD's root directory, and press **Enter**.
4. Select **Install Software**.
5. Select **IC251C**.
6. Select **Windows 98/Me/XP/Windows 2000**. The setup file will automatically detect the operating environment and install the proper components. Next , select **Run this program from its current location** or **Open** (depending on the operating system version). Follow the information presented on the screens that follow.
7. A screen may appear with this message: "The publisher cannot be determined due to the problems below: Authenticode signature not found." Select **Yes** and proceed with the installation. This declaration simply means that the operating system is not aware that the driver is being loaded. It will not harm your system.
8. During setup, you may specify installation directories and other preferred configurations. This program also adds entries to the system registry that are necessary for specifying the operating parameters for each driver. An uninstall option is also included to remove all registry/INI file entries from the system.

3.2 Hardware

Install the card in any 5-volt PCI expansion slot.

CAUTION

Install the software first before you install the card.

1. Turn off the PC's power. Disconnect the power cord.
2. Remove the PC's cover.
3. Locate an available PCI slot and remove the blank metal slot cover.
4. Gently insert the PCI card into the slot. Make sure that the card is seated properly.
5. Replace the screw. (This is required to ensure FCC Part 15 compliance.)
6. Replace the cover.
7. Connect the power cord.

Installation is complete.

Connecting the Cables

Choose from several types of cable to match the connected device's interface:

- RS-232 Cable, 25-Conductor, Male/Male (ECM25C)
- V.35 Interface Cable, Male/Male (EYN450-MM)
- RS-530 Data Cable, Male/Female (EVN530-MF)
- DB37 Interface Cable, Male/Female (EDN37J-MF)
- RS-449 to RS-530 Cable, DB37 Male/DB25 Female(EDN47J-MF)

You might also need a gender changer:

- V.35 Gender Changer, V.35 Male/DB25 Female (FA059-R2)

4. Technical Description

4.1 Overview

The RS-232/422/530/485/V.35 Sync Interface Card seamlessly integrates into any PCI-based system. The card requires a PCI slot, 1 IRQ, an 8-byte block of I/O address, and a 16K or 256K block of memory address. The memory range of this adapter can be configured as 16 x 16K blocks of page memory. High memory can be configured as a 256K inner block or 16K paged memory.

4.2 IUSC

The RS-232/422/530/485/V.35 Sync Interface Card is based on a single Zilog Z16C32 IUSC (Integrated Universal Serial Controller). Application and driver software access the IUSC registers through the first 256 bytes of onboard RAM. Register access to the IUSC can be disabled via I/O registers, allowing the first 256 bytes of RAM to be used for buffer storage. The IUSC has a built-in DMA controller that allows high-speed data transfers directly to and from the 256K of onboard memory. The IUSC's built-in DMA controller supports 4 modes of DMA transfer: single buffer, pipelined, array, and link list. An onboard 20-MHz oscillator clocks the IUSC.

4.3 RAM

The memory window is located by BIOS PCI setup or the Set PCI function. The window size is a 16K paged or 256K linear block. In paged mode, the registers are located in the I/O registers.

- Low memory options: 16 pages of 16K memory blocks totaling 256K.
- High memory options: 16 pages of 16K memory blocks totaling 256K or one linear block of 256K memory.

4.4 Control and Status Registers Defined

The control and status registers occupy 8 consecutive addresses (provided by the BIOS), as described in Table 4-1. Table 4-2 defines the control and status names.

Table 4-1. Control and status registers.

Address	Mode	D7	D6	D5	D4	D3	D2	D1	D0
Base+0	RD	ACCEN	MEM/ IUC	{0}	{1}	P17	P16	P15	P14
Base+0	WR	ACCEN	MEM/ IUC	X	X	P17	P16	P15	P14
Base+1	RD	{0}	{0}	{0}	{0}	{0}	{0}	{0}	{0}
Base+1	WR	X	X	X	X	X	X	X	X
Base+2	RS	LIN/ PAGED	{0}	{1}	{0}	{0}	{0}	{0}	{0}
Base+2	WR	LIN/ PAGED	X	X	X	X	X	X	X
Base+3	RD	{0}	{0}	INT-PEND	RE-STAT	{1}	{0}	{0}	{0}
Base+3	WR	Soft-ware board reset	X	X	X	X	X	X	X
Base+4	RD	{0}	IRQEN	{0}	{0}	{0}	{0}	{0}	{0}
Base+4	WR	X	IRQEN	X	X	X	X	X	X
Base+5	RD	LL	RL	{0}	{0}	M3	M2	M1	M0

X = do not care

{ } = always this value

Table 4-1 (continued). Control and status registers.

Address	Mode	D7	D6	D5	D4	D3	D2	D1	D0
Base+5	WR	LL	RL	X	X	M3	M2	M1	M0
Base+6	RD	SD7	SD6	SD5	SD4	SD3	SD2	SD1	SD0
Base+7	RD	SD15	SD14	SD13	SD12	SD11	SD10	SD9	SD8

X = do not care

{ } = always this value

Table 4-2. Control and status name definitions.

Field	Description
ACCEN	1 = Host access to RAM or IUSC enabled; 0 = Host access to RAM of IUSC disabled. (0 on power-up)
MEM/IUC	1 = Enable host access to RA; 0 = Enable host access to IUSC. (0 on power-up)
P17–P14	These bits select which of 16 16-kbps RAM pages is visible at the address selected by MA18–MA14.
IRQEN	1 = Interrupts enabled; 0 = Interrupts disabled. (0 on power-up)
INTPEND	IUSC interrupt status; 1 = No interrupt pending on IUSC; 0 = Interrupt pending on IUSC.
RESTAT	Reset status:1 = Onboard reset inactive + e; 0 = Onboard reset active.
RL	Remote loopback.
LL	Local loopback.
M0–M3	I/O mode select to SP505 (all 0 on power-up). See Table 4-3 for valid interface options.

Table 4-2 (continued). Control and status name definitions.

Field	Description
SD0–SD15	Optional security feature. Unique value per customer or application. (Default value = FFFF)
LIN/PAGED	1 = 256K linear block in high memory only; 0 = 16 x 16K pages in low or high memory. (0 on power-up)

4.5 Interface Selection

The card supports a variety of electrical interfaces. (See Table 4-3.) RXD, RXC, and TXC lines are terminated in RS-530, RS-530A, RS-485, and V.35 modes.

Table 4-3. Selecting the electrical interface.

Hex	M3	M2	M1	M0	Interface Mode
0	0	0	0	0	All signals are high impedance
1	0	0	0	1	Not supported
2	0	0	1	0	RS-232
3	0	0	1	1	Not supported
4	0	1	0	0	RS-485T with 120-ohm termination
5	0	1	0	1	RS-485 without termination
6, 7, 8, 9	0	1	1	0	Not supported
A	1	0	1	0	Single-ended loopback
B	1	0	1	1	Differential loopback
C	1	1	0	0	Not supported
D	1	1	0	1	RS-530
E	1	1	1	0	V.35
F	1	1	1	1	RS-530A

4.6 Reset Circuit

Reset the Z16C32 by writing any value to base+3. A capacitor is discharged each time you write to base+3. It requires multiple writes to get a reset. When you read base+3 bit D4 and it is 0, that means you have written it enough times. Then, continue to read it until it goes back to 1.

As a programming example, if the base address for the card is D800, then writing to base+3 would return a value of D803.

4.7 TSET Clock Select

Use port 5 of Z16C32 to select TSET clock source. 0 selects Z16C32 TXC as source; 1 selects received TXC as source.

4.8 Z16C32 Register Access

Table 4-4. Accessing the register.

Pin	Source
Port 0	20-MHz clock
D/C (data/control)	address SA6
S/D (serial/DMA)	address SA7
DMA channel registers	base + 0–127
Serial controller base +	128–255

4.9 I/O Signal Derivation

Table 4-5. Signal source pins.

Signal	Source
Transmit Data	Z16C32 TXD pin
Request to Send	Z16C32 Port 7 pin
Data Terminal Ready	Z16C32 Port 6 pin
Transmit Signal Element Timing	Z16C32 TXC pin
Receive Data	Z16C32 RXC pin
Clear to Send	Z16C32 CTS pin
Data Set Ready	Z16C32 RXREQ pin

Table 4-5 (continued). Signal source pins.

Signal	Source
Data Carrier Detect	Z16C32 DCD pin
Transmit Clock	Z16C32 TXCO pin
Receive Clock	Z16C32 RXCO pin
Ring Indicator	Z16C32TXREQ pin

4.10 25-Pin Connector Signal Layouts (DB25 Male)

NOTE FOR PROGRAMMERS

When programming this card, follow the rules listed at the beginning of Sections 4.10.1 through 4.10.5 for calls to the card's base address.

4.10.1 RS-232 SIGNALS

Base+5, M3–M0=2, 0010

Table 4-6. DB25 connector pinout.

Signal	Name	Pin #	Mode
GND	Ground	7	—
RD	Receive Data	3	Input
CTS	Clear to Send	5	Input
DSR	Data Set Ready	6	Input
DCD	Data Carrier Detect	8	Input
TM	Test Mode	25	Input
RI	Ring Indicator	22	Input
TXC	Transmit Clock	15	Input
RXC	Receive Clock	17	Input
TSET	Transmit Signal Element Timing	24	Output
DTR	Data Terminal Ready	20	Output
TD	Transmit Data	2	Output
RTS	Request to Send	4	Output
LL	Local Loopback	18	Output
RL	Remote Loopback	21	Output

4.10.2 V.35 SIGNALS

Base+5, ME–M0=E, 1110

Table 4-7. V.35 connector pinout.

Signal	Name	DB25	V.35	Mode
GND	Ground	7	B	—
RDB RX+	Receive Positive	16	T	Input
RDA RX-	Receive Negative	3	R	Input
TXCB TXC+	Transmit Clock Positive	12	AA	Input
TXCA TXC-	Transmit Clock Negative	15	Y	Input
RXCB RXC+	Receive Clock Positive	9	X	Input
RXCA RXC-	Receive Clock Negative	17	V	Input
TDB TX+	Transmit Positive	14	S	Output
TDA TX-	Transmit Negative	2	P	Output
TSETB TSET+	Transmit Signal Element Timing +	11	W	Output
TSETA TSET-	Transmit Signal Element Timing -	24	U	Output
CTS	Clear to Send	5	D	Input*
DSR	Data Set Ready	6	E	Input*
DCD	Data Carrier Detect	8	F	Input*
RI	Ring Indicator	22	J	Input*
DTR	Data Terminal Ready	20	H	Output*
RTS	Request to Send	4	C	Output*
LL	Local Loopback	18	—	Output*
RL	Remote Loopback	21	—	Output*

*All modem control signals are single-ended (unbalanced) with RS-232 signal levels.

NOTE

Please terminate any control signals that are not going to be used. The most common way to do this is to connect RTS to CTS and RI. Also, connect DCD to DTR and DSR. Terminating these pins, if not used, will help you get the best performance from the card.

4.10.3 RS-530 (RS-422) Signals

Base+5, M3–M0=D, 1101

Table 4-8. RS-530 connector pinout.

Signal	Name	Pin #	Mode
GND	Ground	7	—
RDB RX+	Receive Positive	16	Input
RDA RX-	Receive Negative	3	Input
CTSB CTS+	Clear to Send Positive	13	Input
CTSA CTS-	Clear to Send Negative	5	Input
DCDB DCD+	Data Carrier Detect Positive	10	Input
DCDA DCD-	Data Carrier Detect Negative	8	Input
TXCB TXC+	Transmit Clock Positive	12	Input
TXCA TXC-	Transmit Clock Negative	15	Input
RXCB RXC+	Receive Clock Positive	9	Input
RXCA RXC-	Receive Clock Negative	17	Input
TDB TX+	Transmit Positive	14	Output
TDA TX-	Transmit Negative	2	Output
RTSB RTS+	Request to Send Positive	19	Output
RTSA RTS-	Request to Send Negative	4	Output
DTRB DTR+	Data Terminal Ready Positive	23	Output
DTRA DTR-	Data Terminal Ready Negative	20	Output
TSETB TSET+	Transmit Signal Element Timing Positive	11	Output
TSETA TSET-	Transmit Signal Element Timing Negative	24	Output
DSRB DSR+	Data Set Ready Positive	22	Input
DSRA DSR-	Data Set Ready Negative	6	Input

DSR+ is available by placing a jumper over E1. This will disable the use of Ring Indicator on RS-232, V.35, and RS-530A.

In this mode, the following signals will be available:

Signal	Name	Pin #	Mode
DSRB DSR+	Data Set Ready Positive	22	Input
DSRA DSR-	Data Set Ready Negative	6	Input

4.10.4 RS-530A Signals

Base+5, M3–M0=F, 1111

Table 4-9. RS-530A connector pinout.

Signal	Name	Pin #	Mode
GND	Ground	7	—
RDB RX+	Receive Positive	16	Input
RDA RX-	Receive Negative	3	Input
CTSA CTS-	Clear to Send Negative	5	Input
DCDA DCD-	Data Carrier Detect Negative	8	Input
RIA	Ring Indicator Negative	22	Input
TXCB TXC+	Transmit Clock Positive	12	Input
TXCA TXC-	Transmit Clock Negative	15	Input
RXCB RXC+	Receive Clock Positive	9	Input
RXCA RXC-	Receive Clock Negative	17	Input
TDB TX+	Transmit Positive	14	Output
TDA TX-	Transmit Negative	2	Output
RTSA RTS-	Request to Send Negative	4	Output
DTRA DTR-	Data Terminal Ready Negative	20	Output
TSETB TSET+	Transmit Signal Element Timing Positive	11	Output
TSETA TSET-	Transmit Signal Element Timing Negative	24	Output
LL	Local Loopback	18	Output
RL	Remote Loopback	21	Output

4.10.5 RS-485/RS-485T Signals

Base+5, M3–M0=4, 0100 (with termination) (RS-485T)

Base+5, M3–M0=5, 0101 (without termination) (RS-485)

Table 4-10. RS-485 connector pinout.

Signal	Name	Pin #	Mode
GND	Ground	7	—
RDB RX+	Receive Positive	16	Input
RDA RX-	Receive Negative	3	Input
TXCB TXC+	Transmit Clock Positive	12	Input
TXCA TXC-	Transmit Clock Negative	15	Input
RXCB RXC+	Receive Clock Positive	9	Input
RXCA RXC-	Receive Clock Negative	17	Input
TDB TX+	Transmit Positive	14	Output
TDA TX-	Transmit Negative	2	Output
TSETB TSET+	Transmit Signal Element Timing Positive	11	Output
TSETA TSET-	Transmit Signal Element Timing Negative	24	Output
LL	Local Loopback	18	Output
RL	Remote Loopback	21	Output

Appendix A. Electrical Interfaces

A.1 RS-232

The most widely used communication standard is RS-232. This implementation has been defined and revised several times and is often referred to as RS-232 or EIA/TIA-232.

This standard is defined as the *Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange*. The RS-232 standard's mechanical implementation is on a DB25 connector.

RS-232 is capable of operating at data rates of up to 20 kbps at distances less than 50 feet (15.2 m). The absolute maximum data rate may vary due to line conditions and cable lengths. RS-232 often operates at 38.4 kbps over very short distances.

The voltage levels defined by RS-232 range from -12 to +12 volts. RS-232 is a single-ended or unbalanced interface, meaning that a single electrical signal is compared to a common signal (ground) to determine binary logic states. A voltage of +12 volts (usually +3 to +10 volts) represents a binary 0 (space), and -12 volts (-3 to -10 volts) denotes a binary 1 (mark).

The RS-232 and the EIA/TIA-574 specification define two types of interface circuits: Data Terminal Equipment (DTE) and Data-Circuit Terminating Equipment (DCE). The RS-232/422/530/485/V.35 Sync Interface Card is a DTE interface.

A.2 RS-422

The RS-422 specification defines the electrical characteristics of balanced voltage digital interface circuits.

RS-422 is a differential interface that defines voltage levels and driver/receiver electrical specifications. On a differential interface, logic levels are defined by the difference in voltage between a pair of outputs or inputs. In contrast, a single-ended interface—for example, RS-232—defines the logic levels as the difference in voltage between a single signal and a common ground connection.

Differential interfaces also have greater drive capabilities that allow for longer cable lengths. RS-422 is rated up to 10 Mbps and can have cabling up to 4000 feet (1219.2 m).

RS-422 also defines driver and receiver electrical characteristics that will allow 1 driver and up to 32 receivers on the line at once. RS-422 signal levels range from 0 to +5 volts. RS-422 does not define a physical connector.

A.3 RS-530/530A

RS-530 (also known as EIA-530) compatibility means that RS-422 signal levels are met, and the pinout for the DB25 connector is specified. The EIA (Electronic Industry Association) created the RS-530 specification to detail the pinout and define a full set of modem control signals that can be used for regulating flow control and line status.

The major difference between RS-530 and RS-530A lies in the modem control signals. In RS-530, all signals are differential. In RS-530A, signals DTR, DSR, and DCD are single-ended.

The RS-530 specification defines two types of interface circuits: Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The RS-232/422/530/485/V.35 Sync Interface Card is a DTE interface.

A.4 RS-485/RS-485T

RS-485 is backwardly compatible with RS-422; however, it is optimized for party-line or multidrop applications. RS-485T functions in the same way as RS-485, but RS-485 has no termination and RS-485T does have termination.

The RS-422/485 driver output is capable of being active (enabled) or tri-state (disabled). This capability allows multiple ports to be connected in a multidrop bus and selectively polled. RS-485 allows cable lengths up to 4000 feet (1219.2 m) and data rates up to 10 Mbps.

The signal levels for RS-485 are the same as those defined by RS-422. RS-485 has electrical characteristics that allow for 32 drivers and 32 receivers to be connected to 1 line. This interface is ideal for multidrop or network environments. RS-485 tri-state driver (not dual-state) will allow the electrical presence of the driver to be removed from the line. Only one driver may be active at a time and the other driver(s) must be tri-stated.

RS-485 can be cabled in two ways: two-wire and four-wire mode. Two-wire mode does not allow for full duplex communication and requires that data be transferred in only one direction at a time. For half-duplex operation, the two transmit pins should be connected to the two receive pins (TX+ to RX+ and TX- to RX-). Four-wire mode allows full duplex data transfers.

RS-485 does not define a connector pinout, a set of modem control signals, or a physical connector.

A.5 V.35

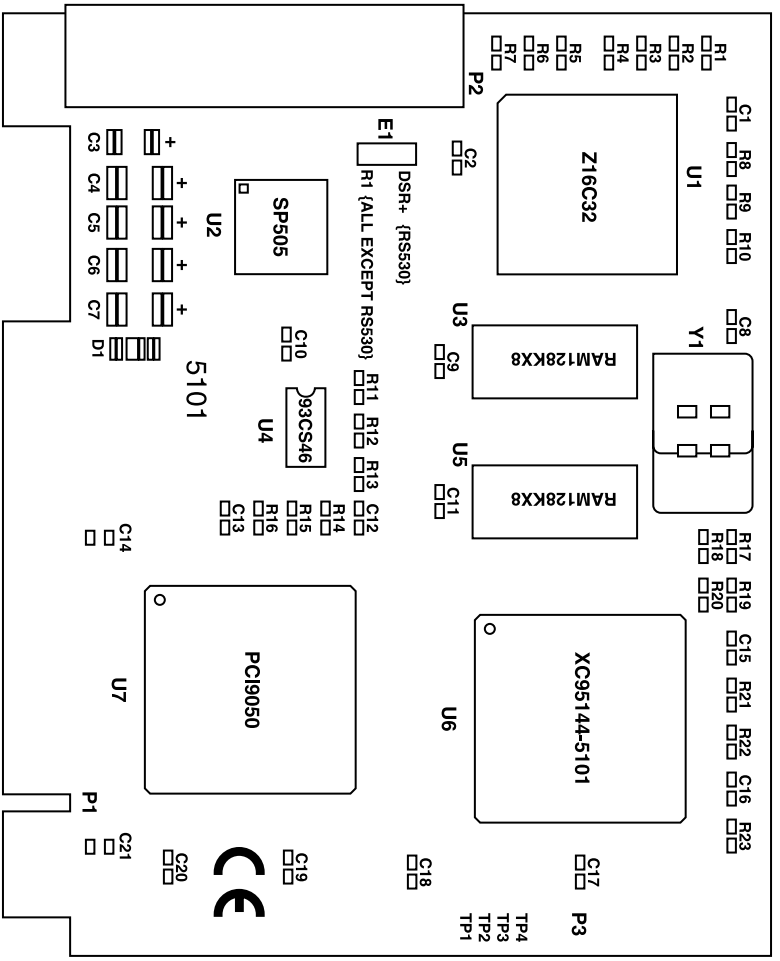
V.35 is a standard defined by ITU (formerly CCITT) that specifies an electrical, mechanical, and physical interface. This interface is used extensively by high-speed digital carriers such as AT&T® Dataphone Digital Service (DDS).

ITU V.35 is an international standard that is often referred to as *Data Transmission at 48 kbps Using 60- to 108-kHz Group-Band Circuits*. ITU V.35 electrical characteristics are a combination of unbalanced voltage and balanced current mode signals. Data and clock signals are balanced current mode circuits. These circuits typically have voltage levels from +0.5 volts to -0.5 volts (1-volt differential). The modem control signals are unbalanced signals and are compatible with RS-232.

The physical connector is a 34-pin connector that supports 24 data, clock, and control signals. The physical connector is defined in the ISO2593 standard.

The ITU V.35 specification defines two types of interface circuits: Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The RS-232/422/530/485/V.35 Sync Interface Card is a DTE interface.

Appendix B. Board Layout



Appendix C. Troubleshooting

C.1 Software

Use the troubleshooting software supplied with the RS-232/422/530/485/V.35 Sync Interface Card. Following the steps listed below can eliminate most common problems. If you still need help, call Black Box Technical Support as described in **Section C.2**.

1. Identify all I/O adapters currently installed in your system.This includes your onboard serial ports, controller cards, sound cards, etc. The I/O addresses used by these adapters, as well as the IRQ (if any) should be identified.

2. Configure your RS-232/422/530/485/V.35 Sync Interface Card so that there is no conflict with currently installed cards. No two cards can occupy the same I/O address.

3. Make sure that the RS-232/422/530/485/V.35 Sync Interface Card is using a unique IRQ. While the card does allow IRQ sharing, many other cards (such as SCSI adapters and onboard serial ports) do not.

4. Make sure the RS-232/422/530/485/V.35 Sync Interface Card is securely installed in a PCI slot.

5. Use the supplied software and this users' manual to verify that the card is configured correctly. The supplied software contains an easy-to-use diagnostic program (SSDR56) that verifies proper configuration.

6. Users should use the installed programs in the SeaMAC folder to verify operation.

C.2 Calling Black Box

If you determine that your RS-232/422/530/485/V.35 Sync Interface Card is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box at 724-746-5500.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem.
- when the problem occurs.
- the components involved in the problem.
- any particular application that, when used, appears to create the problem or make it worse.

C.3 Shipping and Packaging

If you need to transport or ship your RS-232/422/530/485/V.35 Sync Interface Card:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the card for repair, make sure you include everything that came in the original package. Before you ship, contact Black Box to get a Return Authorization (RA) number.

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