Wide Area Network Adapters

IBM PCI WAN 2 Port S91
IBM PCI WAN MultiPort T1/E1 S94
IBM PCI WAN MultiPort T1/E1 P92

Installation Guide

OPTIONS
by IBM

Part Number: 33L4649

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Overview

This guide describes how to install and configure the following IBM WAN Adapters:

- IBM PCI WAN 2 Port S91
- IBM PCI WAN MultiPort T1/E1 P92
- IBM PCI WAN MultiPort T1/E1 S94

IBM PCI WAN 2 Port S91

The IBM PCI WAN 2 Port S91 is a PCI Plug-and-Play (PnP) card that offers X.25 connectivity through a high-speed port (supporting V.24, V.35, EIA-530, V.36/RS-449, or X.21 interfaces) at speeds of up to 2 Mbps, and/or through an ISDN BRI port at speeds of up to 128 kbps (over the “D” channel or the “B” channels).

Note The IBM PCI WAN 2 Port S91 also supports protocols such as SDLC, PPP, and Frame Relay.

Hardware Features

The IBM PCI WAN 2 Port S91 features a 25 MHz Motorola 68302 microprocessor with 1 MB of RAM and 1 MB of FLASH memory. It has two communications ports:

- an ISDN BRI port supporting transfer rates of up to 128 kbps (over the “D” channel or the “B” channels)
- a Very High-Speed Interface (VHSI) port, supporting full duplex communications over a V.24, V.35, EIA-530, V.36/RS-449, or X.21 interface at speeds of up to 2 Mbps (depending on the type of interface selected)

Ease of Use

The VHSI port features automatic interface selection. The intelligent controller on the IBM PCI WAN 2 Port S91 detects the type of cable connected to the port and automatically selects the matching interface.

IBM PCI WAN MultiPort T1/E1 P92

The IBM PCI WAN MultiPort T1/E1 P92 allows stand-alone PCs or multiple users on a Local Area Network (LAN) to make very high speed connections to a Wide Area Network (WAN). These connections are typically made through the IBM PCI WAN MultiPort T1/E1 P92 to external communications equipment (including CSUs, DSUs, and synchronous and asynchronous modems) to provide access to WAN lines. Direct connections to a host computer or to another IBM PCI WAN MultiPort T1/E1 P92 are also supported.

Hardware Features
The IBM PCI WAN MultiPort T1/E1 P92 features a 10MHz Hitachi 64570 controller and 512 KB of on-board RAM. It has two independent Very High-Speed Interface (VHSI) ports, supporting full duplex communications over a V.24, V.35, EIA-530, V.36/RS-449, or X.21 interface at speeds of up to 2 Mbps per port, depending on the type of interface selected.

Ease of Use
The IBM PCI WAN MultiPort T1/E1 P92 is a Plug and Play adapter with automatic interface selection. In most cases, no hardware configuration is required after installing the IBM PCI WAN MultiPort T1/E1 P92 and connecting the appropriate cable. The intelligent controller on the card detects which interfaces the cable supports and automatically configures that port accordingly.

IBM PCI WAN MultiPort T1/E1 S94

The IBM PCI WAN MultiPort T1/E1 S94 allows stand-alone PCs or multiple users on a Local Area Network (LAN) to make very high speed connections to a Wide Area Network (WAN). These connections are typically made through the IBM PCI WAN MultiPort T1/E1 S94 to external communications equipment (including CSUs, DSUs, and synchronous and asynchronous modems) to provide access to WAN lines. Direct connections to a host computer or to another IBM PCI WAN MultiPort T1/E1 S94 are also supported.

Hardware Features
The IBM PCI WAN MultiPort T1/E1 S94 features a 33 MHz Motorola 68360 microprocessor with 2 MB of RAM and 1 MB of FLASH memory. It has two independent Very High-Speed Interface (VHSI) ports, supporting full duplex communications over a V.24, V.35, EIA-530, V.36/RS-449, or X.21 interface at speeds of up to 2 Mbps per port (depending on the type of interface selected).

Ease of Use
The IBM PCI WAN MultiPort T1/E1 S94 features automatic interface selection. The intelligent controller on the card detects the type of cable connected to each port and automatically selects the matching interface.

Hardware Installation

Note Please refer to the user manual that came with your personal computer for detailed installation instructions.

Use the following procedure to install your IBM WAN Adapters.

1. Set the host computer system power switch to OFF and disconnect the power cord.
2. Locate a free PCI expansion slot.
3. Insert and secure the board firmly into the expansion slot.
4. Replace the power cord and turn the host computer system ON.

Software Installation

Refer to the Quick Start Card that came with the CD ROM for detailed instructions on loading the Software Driver.

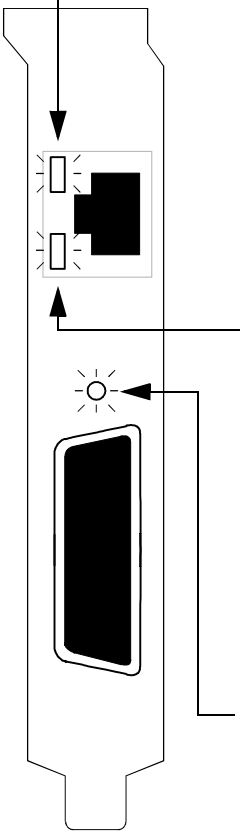
PCI System Setup

Peripheral Component Interconnect (PCI) system architecture has a design feature termed *Plug and Play.* This feature automatically detects, identifies and configures the *currently* installed devices each time the system is booted. Therefore, whenever a WAN Adapter is installed (or removed) in a PCI system, the Adapter is recognized and configured immediately upon restart.

Connection Status Indicators

IBM PCI WAN 2 Port S91

As shown in Figure 1 below, the IBM PCI WAN 2 Port S91 has three status lights (LEDs) on the end bracket. Two of these lights indicate the status of the ISDN connection, and the third identifies the card during configuration.



D-channel Status

The D-channel controls the link to your ISDN service provider.

Off ..... The line is not active. The cable may not be connected.

Blinking ... The line is active, but a link can't be established. This may be a symptom of incorrect configuration.

Steady ..... The ISDN line is active and operating normally.

B-channel Status

The B-channels are used for the link to the remote ISDN device.

Off ..... There is no connection.

Blinking ... Attempting to connect to the remote device.

Steady ..... The connection is active and able to transmit data.

Configuration Status

This status light illuminates during configuration to indicate which card is being configured. This is most useful when more than one card is installed in the PC.

Consult the documentation provided with the configuration software for information about this status light.

Figure 1: Status Lights

IBM PCI WAN MultiPort T1/E1 S94 and IBM PCI WAN MultiPort T1/E1 P92

The green LED adjacent to each port on the IBM PCI WAN MultiPort T1/E1 S94 and the IBM PCI WAN MultiPort T1/E1 P92 (see Figure 2 at right) provides a convenient indication of the status of the connection on that port.

Explanations for the different LED states can be found in Table 1 below.

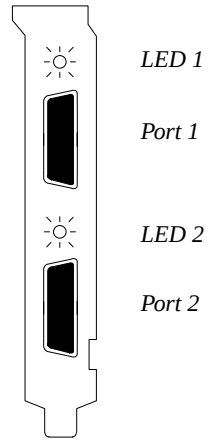


Figure 2: End Bracket

LED State	Connection Status	Remedy
Off	The port is not loaded (the configuration file describing protocol and interface parameters has not been read by the device driver on the PC).	Consult your networking software for instructions on how to load a configuration file and how to start a connection.
Rapid Flash (stays on for 1/2 second)	The connection has not been established. Either the port is loading, **OR** there is no response from the destination device, **OR** the WAN Adapter is waiting for a VHSI cable to be connected to the port.	Verify that the cable is properly connected to the port. If the light continues flashing after a few minutes, verify that the destination device is active.
Slow Flash (stays on for 1 second)	The connection was interrupted unexpectedly. The cable was unplugged or damaged while a connection was active.	Reconnect the cable.
On	The port is active and the connection is good.	

Table 1: LED States

Configuring the IBM WAN Adapters

Before you can use the IBM WAN Adapters, you must configure it to work with your communications software. The documentation which came with this software contains complete instructions on how to configure the card. During configuration, note the following:

- The ports are numbered Port 1 and Port 2 as indicated in the diagram to the right (IBM PCI WAN MultiPort T1/E1 S94 and IBM PCI WAN MultiPort T1/E1 P92 only).
- One or both LEDs flash when the card is being configured. This feature is useful when more than one card is installed in the same PC.
- Consult the documentation which came with your networking software for more information about the LEDs.

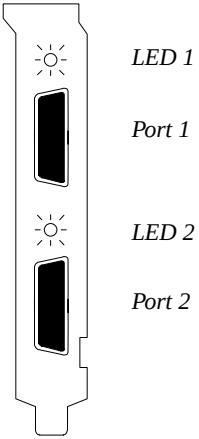


Figure 3: End Bracket

Making an ISDN Connection

IBM PCI WAN 2 Port S91 only

Locate the ISDN cable included with the IBM PCI WAN 2 Port S91.

- **In Europe**, connect one end of the cable to the ISDN port, and connect the other end to the wall jack installed by your ISDN service provider.

  Locate the RJ-45 to RJ-11 cable included with the card. Plug the RJ-45 end into the ISDN port on the card, and plug the RJ-11 end into the wall jack. These connections are shown in Figure 4 below.

  Note *The RJ-11 plug will also fit into an RJ-45 jack.*

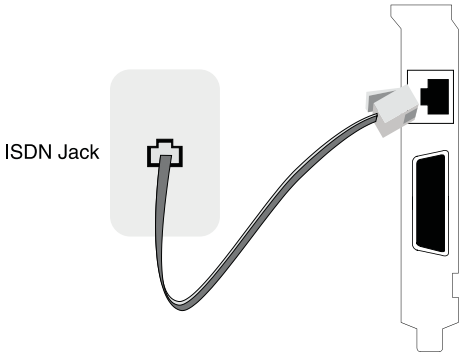


Figure 4: Connecting to an ISDN jack

- **In North America and Australia,** a network termination device (NT1) is required. Connect one end of the ISDN cable to the WAN Adapter, and connect the other end to the S/T interface connector on your NT1. Connect one end of the cable provided with your NT1 to its U interface connector, and connect the other end to the wall jack installed by your ISDN service provider. These connections are shown in Figure 5 below.

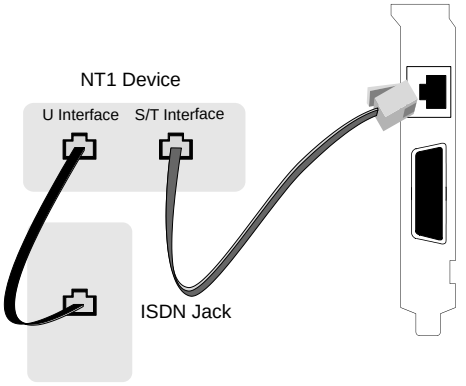


Figure 5: Connecting through an NT1 Device

Making a VHSI Connection

An IBM WAN Adapter can connect as a DTE to devices such as Data Service Units (DSUs) which support one of the following interfaces: V.24, V.35, EIA-530, V.36/RS-449, or X.21.

The IBM WAN Adapter can be ordered with different interface cables as shown in the table below.

Interface	Connection	North America	Outside North America
V.24	to V.24 DCE	33L4624	33L4628
V.35	to V.35 DCE	33L4625	33L4619
EIA-530	to EIA-530 DCE	33L4627	33L4631
V.36/RS-449	to V.36/RS-449 DCE	33L4626	33L4630
X.21	to X.21 DCE		33L4631

Table 2: Standard Interface Cables

To use an interface, simply install the appropriate cable. The WAN Adapter recognizes the cable and automatically prepares the port for that interface.

Consult the documentation which came with your networking software for more information about port configuration.

VHSI Port Interface Specifications

The standards compliant with each interface supported on the VHSI ports are listed in the table below. The rest of this section describes the allocation of pins used to implement the electrical and signalling requirements of each interface. A wiring diagram is also provided, to show the correspondence of the interface pinout to the VHSI port.

Interface	Standard	Compatibility
V.24	CCITT V.24	Signalling
	CCITT V.28	Electrical
	CCITT X.21bis	Electrical and signalling
	EIA RS-232-C	Electrical and signalling
	ISO 2110	Connector type for the DCE side of a V.24 VHSI Modem Cable
V.35	CCITT V.28	Some signals for electrical
	CCITT V.35	Some signals for electrical and signalling
	ISO 2593	Connector type for the DCE side of a V.35 VHSI Modem Cable
EIA-530	RS-422	Electrical
	RS-423	Electrical
	ISO 2110	Connector type for the DCE side of a EIA-530 VHSI Modem Cable
V.36/RS-449	CCITT V.10	Electrical
	CCITT V.11	Electrical
	RS-422	Electrical
	RS-423	Electrical
	ISO 4902	Connector type for the DCE side of a V.36/RS-449 VHSI Modem Cable
X.21	CCITT X.21	Signalling
	CCITT V.11	Electrical
	CCITT X.27	Electrical
	EIA RS-422-A	Electrical
	ISO 4903	Connector type for the DCE side of an X.21 VHSI Modem Cable

Table 3: Interface Compatibility

VHSI Cable Construction Information

If you plan to construct your own VHSI cables, be sure to observe the guidelines given below.

Wire Gauge, Grounding, and Pairing

- Use 28 AWG 7-strand wire with 0.020–0.028" insulation.
- The chassis must be grounded both by a drain wire and by the braid; both must be connected to the connector case and shell at each end of the cable. The braid must be connected through its full circumference.
- Wires identified under the heading “Twisted Pairs” must be paired. If you do not install twisted pairs correctly, the cable will not work.

Type of Connectors

The VHSI port accepts a high density 36-pin male cable connector. The types of connector used on the interface-specific end of the cable are as follows:

Interface	Connector
V.35	Type M
V.24	DB25
V.36/RS-449	DB37
EIA-530	DB25
X.21	DB15

Table 4: Connector Types

The V.24 Interface

The pin-out assignments for the V.24 interface are shown in the following diagram.

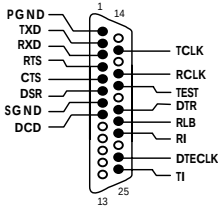


Figure 6: V.24 Interface

The signal definitions and names are listed in Table 5 below.

Pin #	Signal	Name	Direction	CCITT #
1	PGND	Protective Ground	Common	101
2	TXD	Transmit Data	Output	103
3	RXD	Receive Data	Input	104
4	RTS	Request to Send	Output	105
5	CTS	Clear to Send	Input	106
6	DSR	Data Set Ready	Input	107
7	SGND	Signal Ground	Common	102
8	DCD	Data Carrier Detect	Input	109
15	TCLK	Transmit Clock (DCE)	Input	114
17	RCLK	Receive Clock	Input	115
18	TEST	Local Loopback Activation	Output	141
20	DTR	Data Terminal Ready	Output	108
21	RLB	Remote Loopback	Output	140
22	RI	Ring Indicator	Input	125
24	DTECLK	Transmit Clock (DTE)	Output	113
25	TI	Test Indicator	Input	142

Table 5: V.24 Interface Signals

VHSI—V.24 Connections

The wiring diagram below shows the connections required to construct a VHSI—V.24 cable. For the additional information required to construct your own cables, see “VHSI Cable Construction Information” on page 10.

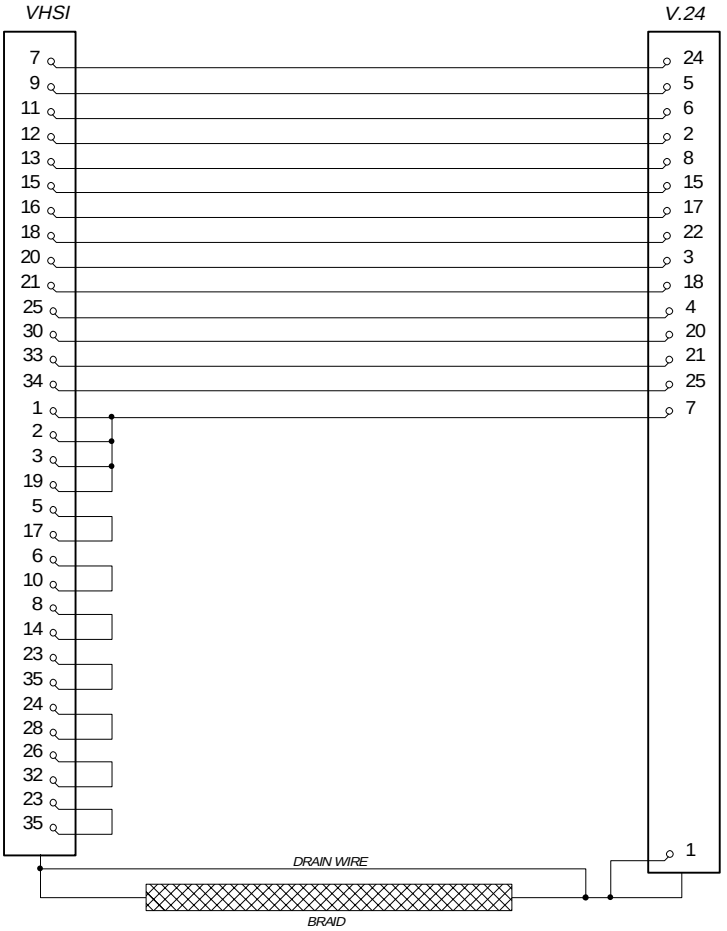


Figure 7: VHSI—V.24 Connections

The V.35 Interface

The pin-out assignments for the V.35 interface are shown in the following diagram.

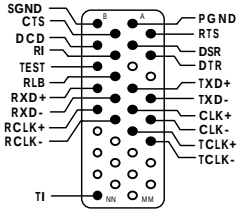


Figure 8: V.35 Interface

The signal definitions and names are listed in Table 6 below.

Pin #	Signal	Name	Direction	CCITT #
A	PGND	Protective Ground	Common	101
B	SGND	Signal Ground	Common	102
C	RTS	Request to Send	Output	105
D	CTS	Clear to Send	Input	106
E	DSR	Data Set Ready	Input	107
F	DCD	Data Carrier Detect	Input	109
H	DTR	Data Terminal Ready	Output	108
J	RI	Ring Indicator	Input	125
L	TEST	Local Loopback Activation	Output	141
N	RLB	Remote Loopback	Output	140
P	TXD+	Transmit Data	Output	103A
R	RXD+	Receive Data	Input	104A
S	TXD-	Transmit Data	Output	103B
T	RXD-	Receive Data	Input	104B
U	CLK+	Transmit Clock (DTE)	Output	113A
V	RCLK+	Receive Clock (DCE)	Input	115A
W	CLK-	Transmit Clock (DTE)	Output	113B
X	RCLK-	Receive Clock (DCE)	Input	115B
Y	TCLK+	Transmit Clock (DCE)	Input	114A
AA	TCLK-	Transmit Clock (DCE)	Input	114B
NN	TI	Test Indicator	Input	142

Table 6: V.35 Interface Signals

VHSI—V.35 Connections

The wiring diagram below shows the connections required to construct a VHSI—V.35 cable. For the additional information required to construct your own cables, see “VHSI Cable Construction Information” on page 10.

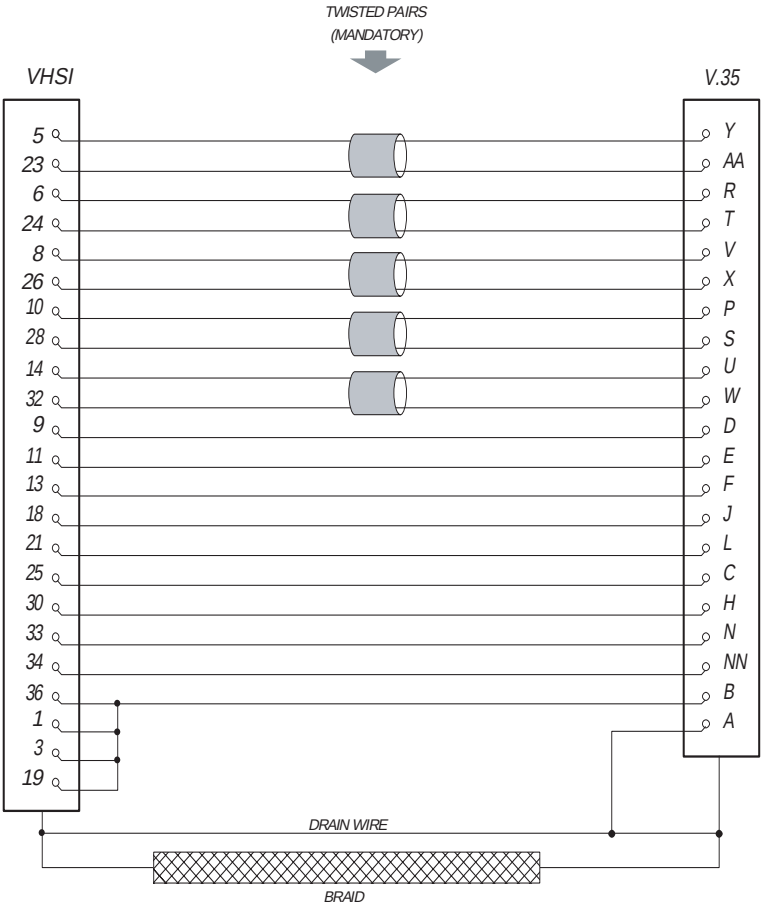


Figure 9: VHSI—V.35 Connections

The EIA-530 Interface

The pin-out assignments for the EIA-530 interface are shown in the following diagram.

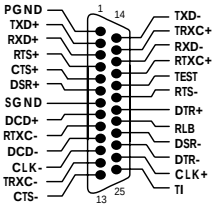


Figure 10: EIA-530 Interface

The signal definitions and names are listed in Table 7 below.

Pin #	Signal	Name	Direction	CCITT #	EIA #
1	PGND	Protective Ground	Common	101	-
2	TXD+	Transmit Data	Output	103A	BA(A)
3	RXD+	Receive Data	Input	104A	BB(A)
4	RTS+	Request to Send	Output	105A	CA(A)
5	CTS+	Clear to Send	Input	106A	CB(A)
6	DSR+	Data Set Ready	Input	107A	CC(A)
7	SGND	Signal Ground	Common	102B	AB
8	DCD+	Data Carrier Detect	Input	109A	CF(A)
9	RTXC-	Receive Clock (DCE)	Input	115B	DD(B)
10	DCD-	Data Carrier Detect	Input	109B	CF(B)
11	CLK-	Transmit Clock (DTE)	Output	113B	DA(B)
12	TRXC-	Transmit Clock (DCE)	Input	114B	DB(B)
13	CTS-	Clear to Send	Output	106B	CB(B)
14	TXD-	Transmit Data	Output	103B	BA(B)
15	TRXC+	Transmit Clock (DCE)	Input	114A	DB(A)
16	RXD-	Receive Data	Input	104B	BB(B)
17	RTXC+	Receive Clock (DCE)	Input	115A	DD(A)
18	TEST	Local Loopback	Output	141A	LL
19	RTS-	Request to Send	Output	105B	CA(B)
20	DTR+	Data Terminal Ready	Output	108A	CD(A)
21	RLB	Remote Loopback	Output	140A	RL
22	DSR-	Data Set Ready	Input	107B	CC(B)
23	DTR-	Data Terminal Ready	Output	108B	CD(B)
24	CLK+	Transmit Clock (DTE)	Output	113A	DA(A)
25	TI	Test Indicator	Input	142A	TM

Table 7: EIA-530 Interface Signals

VHSI—EIA-530 Connections

The wiring diagram below shows the connections required to construct a VHSI—EIA-530 cable. For the additional information required to construct your own cables, see “VHSI Cable Construction Information” on page 10.

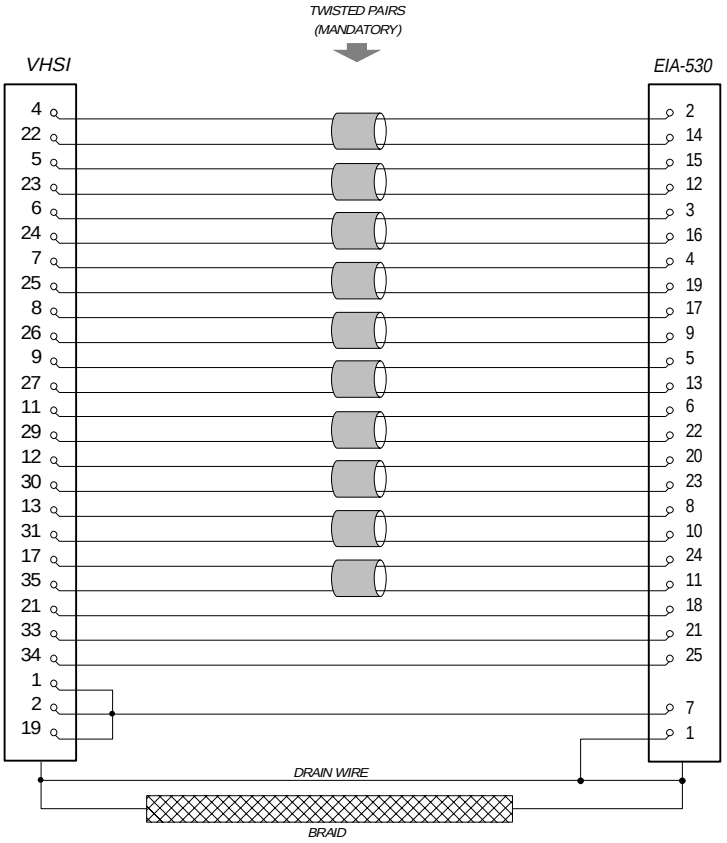


Figure 11: VHSI—EIA-530 Connections

The V.36/RS-449 Interface

The pin-out assignments for the V.36/RS-449 interface are shown in the following diagram.

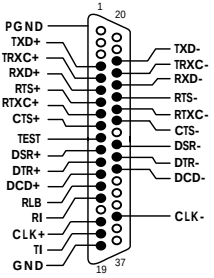


Figure 12: V.36/RS-449 Interface

The signal definitions and names are listed in Table 8 below.

Pin #	Signal	Name	Direction	CCITT #
Case	PGND	Protective Ground	Common	101
4	TXD+	Transmit Data	Output	103A
5	TRXC+	Transmit Clock (DCE)	Input	114A
6	RXD+	Receive Data	Input	104A
7	RTS+	Request to Send	Output	105A
8	RTXC+	Receive Clock (DCE)	Input	115A
9	CTS+	Clear to Send	Input	106A
10	TEST	Local Loopback Activation	Output	141A
11	DSR+	Data Set Ready	Input	107A
12	DTR+	Data Terminal Ready	Output	108A
13	DCD+	Data Carrier Detect	Input	109A
14	RLB	Remote Loopback	Output	140A
15	RI	Ring Indicator	Input	125A
17	CLK+	Transmit Clock (DTE)	Output	113A
18	TI	Test Indicator	Input	142A
19	GND	DTE Common Return	Common	102A/B
22	TXD-	Transmit Data	Output	103B
23	TRXC-	Transmit Clock (DCE)	Input	114B
24	RXD-	Receive Data	Input	104B
25	RTS-	Request to Send	Output	105B
26	RTXC-	Receive Clock (DCE)	Input	115B
27	CTS-	Clear to Send	Input	106B
29	DSR-	Data Set Ready	Input	107B
30	DTR-	Data Terminal Ready	Output	108B
31	DCD-	Data Carrier Detect	Input	109B
35	CLK-	Transmit Clock (DTE)	Output	113B

Table 8: V.36/RS-449 Interface Signals

VHSI—V.36/RS-449 Connections

The wiring diagram below shows the connections required to construct a VHSI—V.36/RS-449 cable. For the additional information required to construct your own cables, see “VHSI Cable Construction Information” on page 10.

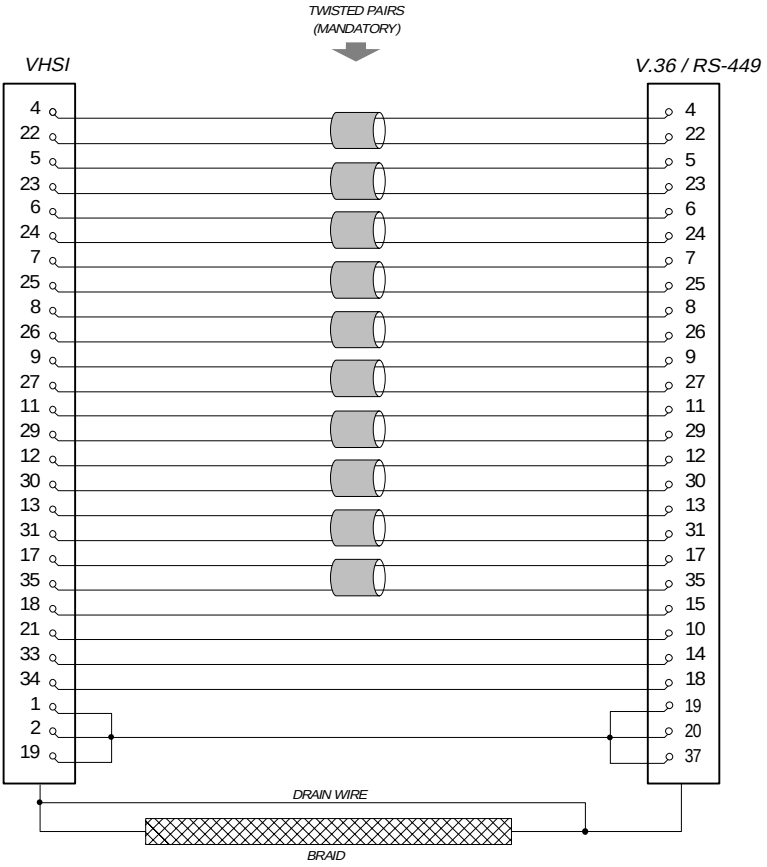


Figure 13: VHSI—V.36/RS-449 Connections

The X.21 Interface

The pin-out assignments for the X.21 interface are shown in the following diagram.

The signal definitions and names are listed in Table 9 below.

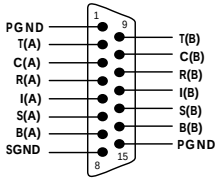


Figure 14: X.21 Interface

Pin #	Signal	Name	Direction	CCITT #
1/15	PGND	Protective Ground	Common	101
2	T(A)	Transmit Data (+)	Output	103A
3	C(A)	Control Signal (+)	Output	105A
4	R(A)	Receive Data (+)	Input	104A
5	I(A)	Indication (+)	Input	109A
6	S(A)	Signal Element Timing (+)	Input	115A
7	B(A)	Byte Timing (+)	Input	114A
8	SGND	Signal Ground	Common	102
9	T(B)	Transmit Data (-)	Output	103B
10	C(B)	Control Signal (-)	Output	105B
11	R(B)	Receive Data (-)	Input	104B
12	I(B)	Indication (-)	Input	109B
13	S(B)	Signal Element Timing (-)	Input	115B
14	B(B)	Byte Timing (-)	Input	114B

Table 9: X.21 Interface Signals

VHSI—X.21 Connections

The wiring diagram below shows the connections required to construct a VHSI—X.21 cable. For the additional information required to construct your own cables, see “VHSI Cable Construction Information” on page 10.

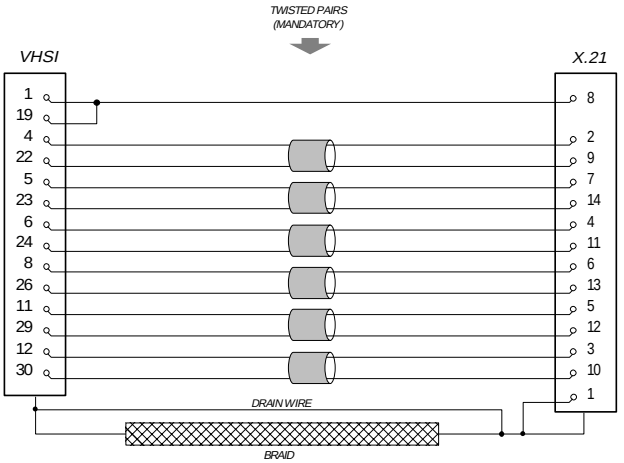


Figure 15: VHSI—X.21 Connections

Back-to-Back Connections

The wiring diagram below shows the connections required to construct a back-to-back VHSI—VHSI cable. Back-to-back operations are conducted through the V.36 interface. For the additional information required to construct your own cables, see “VHSI Cable Construction Information” on page 10.

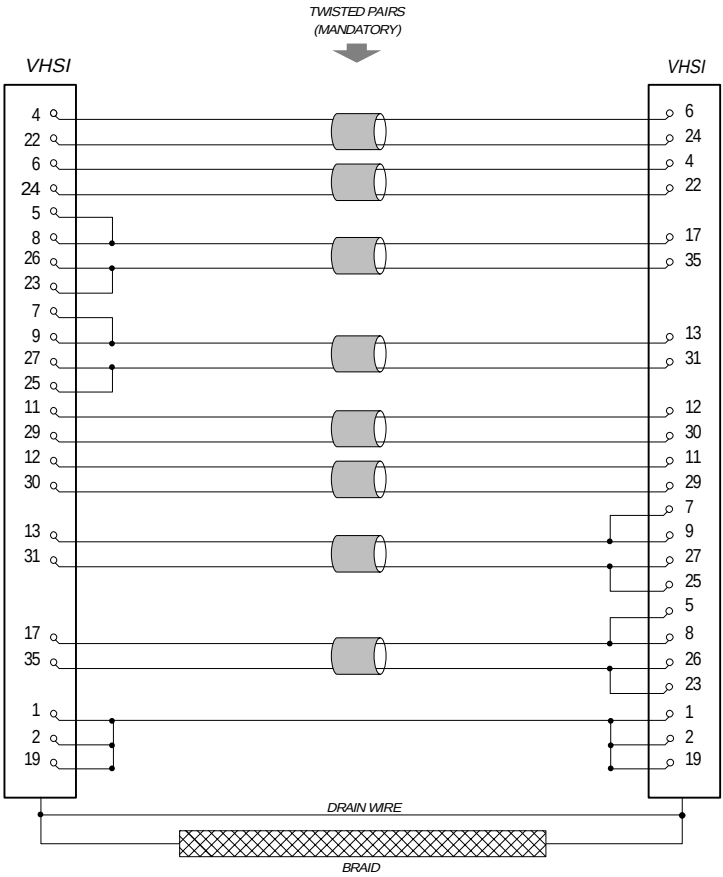


Figure 16: VHSI—VHSI Connections

Product Warranty

The following warranty information applies to products purchased in the United States, Canada, and Puerto Rico. For warranty terms and conditions for products purchased in other countries, see the enclosed Warranty insert, or contact your IBM reseller or IBM marketing representative. International Business Machines CorporationArmonk, New York, 10504.

Statement of Limited Warranty

The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you originally purchase for your use, and not for resale, from IBM or your reseller. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them.

Unless IBM specifies otherwise, the following warranties apply only in the country where you acquire the Machine. If you have any questions, contact IBM or your reseller.

Production Status

Each Machine is manufactured from new parts, or new and used parts. In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's warranty terms apply.

The IBM Warranty for Machines

IBM warrants that each Machine

1. is free from defects in materials and workmanship and
2. conforms to IBM's Official Published Specifications.

The warranty period for a Machine is a specified, fixed period commencing on its Date of Installation. The date on your receipt is the Date of Installation, unless IBM or your reseller informs you otherwise. During the warranty period IBM or your reseller, if authorized by IBM, will provide warranty service under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine. For IBM or your reseller to provide warranty service for a feature, conversion, or upgrade, IBM or your reseller may require that the Machine on which it is installed be

1. for certain Machines, the designated, serial-numbered Machine and
2. at an engineering-change level compatible with the feature, conversion, or upgrade.

Many of these transactions involve the removal of parts and their return to IBM.

You represent that all removed parts are genuine and unaltered. A part that replaces a removed part will assume the warranty service status of the replaced part.

If a Machine does not function as warranted during the warranty period, IBM or your reseller will repair it or replace it with one that is at least functionally equivalent, without charge. The replacement may not be new, but will be in good working order. If IBM or your reseller is unable to repair or replace the Machine, you may return it to your place of purchase and your money will be refunded.

If you transfer a Machine to another user, warranty service is available to that user for the remainder of the warranty period. You should give your proof of purchase and this Statement to that user. However, for Machines which have a life-time warranty, this warranty is not transferable.

Help and Service Information

Before calling, please prepare for your call by having available as much of the following information as possible:

- Computer manufacturer and computer model.
- Options part number.
- Options part name.
- Serial number (if available).
- Proof of purchase (including date and place).
- Exact wording of the error message (if any).
- Description of the problem.
- Hardware and software configuration information for your system.

If possible, be at your computer. Your technical support representative might want to walk you through the problem during the call.

Warranty Service

To obtain warranty service for the Machine, you should contact your reseller or call IBM.

- In the United States, call IBM at 1-800-426-7378.
- In Canada, call IBM at 1-800-426-7378.

You may be required to present proof of purchase.

IBM or your reseller will provide certain types of repair and exchange service, either at your location or at IBM's or your reseller's service center, to restore a Machine to good working order.

When a type of service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours.

You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service

status of the replaced item. Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service. You also agree to ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange.

You agree to:

1. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
2. where applicable, before service is provided —
   a) follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provide,
   b) secure all programs, data, and funds contained in a Machine, and
   c) inform IBM or your reseller of changes in a Machine's location.

IBM is responsible for loss of, or damage to, your Machine while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for the transportation charges.

Extent of Warranty

IBM does not warrant uninterrupted or error-free operation of a Machine.

The warranties may be voided by misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, removal or alteration of Machine or parts identification labels, or failure caused by a product for which IBM is not responsible.

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Circumstances may arise where, because of a default on IBM's part or other liability you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), IBM is liable only for:

1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages or loss, up to the greater of U.S. $100,000 or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

UNDER NO CIRCUMSTANCES IS IBM LIABLE FOR ANY OF THE FOLLOWING:

1. THIRD-PARTY CLAIMS AGAINST YOU FOR LOSSES OR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE);
2. LOSS OF, OR DAMAGE TO, YOUR RECORDS OR DATA; OR
3. SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS OR SAVINGS), EVEN IF IBM OR YOUR RESELLER IS INFORMED OF THEIR POSSIBILITY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU.

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- IBM HelpCenter

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EiconCard S91, EiconCard S94, EiconCard P92, and EiconCard are trademarks of Eicon Technology Corporation.

Other company, product, and service names, which may be denoted by a double asterisk (**), may be trademarks or service marks of others.

Telecommunication Notices

IBM PCI WAN 2 Port S91 Only

Federal Communications Commission (FCC) and Telephone Company Requirements

1. This adapter complies with Part 68 of the FCC rules. A label is affixed to the adapter that contains, among other things, the FCC registration number, USOC, and Ringer Equivalency Number (REN) for this equipment. If these numbers are requested, provide this information to your telephone company.
2. The REN is useful to determine the quantity of devices you may connect to your telephone line and still have those devices ring when your number is called. In most, but not all areas, the sum of the RENs of all devices should not exceed five (5.0). To be certain of the number of devices you may connect to your line, as determined by the REN, you should call your local telephone company to determine the maximum REN for your calling area.
3. If the adapter causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance; if advance notice is not practical, you will be notified as soon as possible. You will be advised of your right to file a complaint with the FCC.
4. Your telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of your equipment. If they do, you will be given advance notice to give you an opportunity to maintain uninterrupted service.
5. If you experience trouble with this product, contact your Authorized Reseller, or call IBM. In the United States, call IBM at 1-800-772-2227. In Canada, call IBM at 1-800-565-3344. You may be required to present proof of purchase.

   The telephone company may ask you to disconnect the adapter from the network until the problem has been corrected, or until you are sure the adapter is not malfunctioning.
6. No customer repairs are possible to the adapter. If you experience trouble with the adapter, contact your Authorized Reseller or see Help and Service section of this manual for information.
7. This adapter may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs. Contact your state public utility commission or corporation commission for information.
8. When ordering network interface (NI) service from the local Exchange Carrier, specify one of the following service arrangements:

S91 S/T:		*S91 U:*	
Facility Interface code:	02IS5	USOC Jack type:	RJ-49C
Digital Reg. code:	XD	Facility Interface code:	02IS5
Services order code:	6.0N	Digital Reg. code:	DE
		Services order code:	6.0N

Canadian Department of Communications Certification Label

NOTICE: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

NOTICE: The LOAD NUMBER (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the sum of the LOAD NUMBERS of all the devices does not exceed 100.

Étiquette d'homologation du ministère des Communications du Canada

AVIS : L'étiquette du ministère des Communications du Canada identifie le matériel homologué. Cette étiquette certifie que le matériel est conforme à certaines normes de protection, d'exploitation et de sécurité des réseaux de télécommunications. Le ministère n'assure toutefois pas que le matériel fonctionnera à la satisfaction de l'utilisateur.

Avant d'installer ce matériel, l'utilisateur doit s'assurer qu'il est permis de le raccorder aux installations de l'entreprise locale de télécommunications. Le matériel doit également être installé en suivant une méthode acceptée de

raccordement. L'abonné ne doit pas oublier qu'il est possible que la conformité aux conditions énoncées ci-dessus n'empêchent pas la dégradation du service dans certaines situations.

Les réparations de matériel homologué doivent être effectuées par un centre d'entretien canadien autorisé désigné par le fournisseur. La compagnie de télécommunications peut demander à l'utilisateur de débrancher un appareil à la suite de réparations ou de modifications effectuées par l'utilisateur ou à cause d'un mauvais fonctionnement.

Pour sa propre protection, l'utilisateur doit s'assurer que tous les fils de mise à la terre de la source d'énergie électrique, des lignes téléphoniques et des canalisations d'eau métalliques, s'il y en a, sont raccordés ensemble. Cette précaution est particulièrement importante dans les régions rurales.

Avertissement: l'utilisateur ne doit pas tenter de faire ces raccordements lui-même, il doit avoir recours à un service d'inspection des installations électriques ou à un électricien, selon le cas.

AVIS: L'INDICE DE CHARGE (IC) assigné à chaque dispositif terminal indique, pour éviter toute surcharge, le pourcentage de la charge totale qui peut être raccordé à un circuit téléphonique bouclé utilisé par ce dispositif. L'extrémité du circuit bouclé peut consister en n'importe quelle combinaison de dispositifs pourvu que la somme des INDICES DE CHARGE de l'ensemble des dispositifs ne dépasse pas 100.

Regulatory Information for European Union

This equipment displays the CE168 X mark to show that it has been tested and found to be in full compliance with the requirements of the Terminal Equipment, EMC and Low Voltage Directives (91/263/EEC, 89/336/EEC and 72/23/EEC, as amended by Directive 93/68/EEC).

Safety Status: SELV

No voltages within this equipment exceed SELV voltages. All interconnection points and ports are SELV.

Electronic Emission Notices

IBM PCI WAN 2 Port S91
IBM PCI WAN MultiPort T1/E1 P92
IBM PCI WAN MultiPort T1/E1 S94

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM authorized dealers. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Responsible Party:

International Business Machines Corporation
New Orchard Road
Armonk, NY 10504
Telephone: 1-919-543-2193

Industry Canada Class B Emission Compliance Statement

This Class B digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe B est conform à la norme NMB-003 de l'Industrie Canada.

European Union - Emission Directive

This product is in conformity with the protection requirements of EU Council Directive 89/366/ECC on the approximation of the laws of the Member States relating to electromagnetic compatibility.

IBM can not accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to CISPR 22 / European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communiction devices.

Deutsche EMV-Direktive (electromagnetische Verträglichkeit)

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG vom 9.Nov.92 das EG-Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die IBM UK, Greenock.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse B.

Union Européenne - Directive Conformité électromagnétique

Ce produit est conforme aux exigences de protection de la Directive 89/336/EEC du Conseil de l'UE sur le rapprochement des lois des États membres en matière de compatibilité électromagnétique.

IBM ne peut accepter aucune responsabilité pour le manquement aux exigences de protection résultant d'une modification non recommandée du produit, y compris l'installation de cartes autres que les cartes IBM.

Ce produit a été testé et il satisfait les conditions de l'équipement informatique de Classe B en vertu de CISPR22 / Standard européen EN 55022. Les conditions pour l'équipement de Classe B ont été définies en fonction d'un contexte résidentiel ordinaire afin de fournir une protection raisonnable contre l'interférence d'appareils de communication autorisés.

Union Europea - Normativa EMC

Questo prodotto è conforme alle normative di protezione ai sensi della Direttiva del Consiglio dell'Unione Europea 89/336/CEE sull'armonizzazione legislativa degli stati membri in materia di compatibilità elettromagnetica.

IBM non accetta responsabilità alcuna per la mancata conformità alle normative di protezione dovuta a modifiche non consigliate al prodotto, compresa l'installazione di schede e componenti di marca diversa da IBM.

Le prove effettuate sul presente prodotto hanno accertato che esso rientra nei limiti stabiliti per le le apparecchiature di informatica Classe B ai sensi del CISPR 22 / Norma Europea EN 55022. I limiti delle apparecchiature della Classe B sono stati stabiliti al fine di fornire ragionevole protezione da interferenze mediante dispositivi di comunicazione in concessione in ambienti residenziali tipici.

Unione Europea - Directiva EMC (Conformidad électromagnética)

Este producto satisface los requisitos de protección del Consejo de la UE, Directiva 89/336/CEE en lo que a la legislatura de los Estados Miembros sobre compatibilidad electromagnética se refiere.

IBM no puede aceptar responsabilidad alguna si este producto deja de satisfacer dichos requisitos de protección como resultado de una modificación no recomendada del producto, incluyendo el ajuste de tarjetas de opción que no sean IBM.

Este producto ha sido probado y satisface los límites para Equipos Informáticos Clase B de conformidad con el Estándar CISPR22 y el Estándar Europeo EN 55022. Los límites para los equipos de Clase B se han establecido para entornos residenciales típicos a fin de proporcionar una protección razonable contra las interferencias con dispositivos de comunicación licenciados.

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