

# Cisco Modular Access Router Cable Specifications

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This document provides cable specifications for Cisco 3600 series and Cisco 2600 series routers.

Use this document in conjunction with the following publications:

- Cisco 2600 Series Hardware Installation Guide
- Cisco 3600 Series Hardware Installation Guide
- Network Modules Hardware Installation Guide
- Cisco WAN Interface Cards Hardware Installation Guide

This document includes:

- Warning Conventions
- Console and Auxiliary Port Signals and Pinouts
- Ethernet Cable Pinouts
- Fast Ethernet Connector Pinouts
- Token Ring Port Pinouts
- ISDN BRI Interface
- CT1/PRI Pinouts
- CT1/PRI-CSU Pinouts
- CE1/PRI Interface
- 56/64-Kbps DSU/CSU Signals and Pinouts
- Serial Connection Signals and Pinouts

## Warning Conventions

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- Smart Serial Connection Signals and Pinouts

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**Note** All pins not listed in the tables in this document are not connected.

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If you prefer to order cables, see your router installation guide.

## Warning Conventions



**Warning** This warning symbol means *danger*. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

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**Waarschuwing** Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het document *Regulatory Compliance and Safety Information* (Informatie over naleving van veiligheids- en andere voorschriften) raadplegen dat bij dit toestel is ingesloten.

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**Varoitus** Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. Tässä julkaisussa esiintyvien varoitusten käännökset löydät laitteen mukana olevasta *Regulatory Compliance and Safety Information* -kirjasesta (määräysten noudattaminen ja tietoa turvallisuudesta).

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## Warning Conventions

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**Attention** Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions d'avertissements figurant dans cette publication, consultez le document *Regulatory Compliance and Safety Information* (Conformité aux règlements et consignes de sécurité) qui accompagne cet appareil.

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**Warnung** Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Dokument *Regulatory Compliance and Safety Information* (Informationen zu behördlichen Vorschriften und Sicherheit), das zusammen mit diesem Gerät geliefert wurde.

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**Avvertenza** Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nel documento *Regulatory Compliance and Safety Information* (Conformità alle norme e informazioni sulla sicurezza) che accompagna questo dispositivo.

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**Advarsel** Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i dokumentet *Regulatory Compliance and Safety Information* (Overholdelse av forskrifter og sikkerhetsinformasjon) som ble levert med denne enheten.

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**Aviso** Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. Para ver as traduções dos avisos que constam desta publicação, consulte o documento *Regulatory Compliance and Safety Information* (Informação de Segurança e Disposições Reguladoras) que acompanha este dispositivo.

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## Console and Auxiliary Port Signals and Pinouts

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**¡Advertencia!** Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. Para ver una traducción de las advertencias que aparecen en esta publicación, consultar el documento titulado *Regulatory Compliance and Safety Information* (Información sobre seguridad y conformidad con las disposiciones reglamentarias) que se acompaña con este dispositivo.

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**Varning!** Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. Se förklaringar av de varningar som förekommer i denna publikation i dokumentet *Regulatory Compliance and Safety Information* (Efterrättelse av föreskrifter och säkerhetsinformation), vilket medföljer denna anordning.

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## Console and Auxiliary Port Signals and Pinouts

Your router comes with a console and auxiliary cable kit, which contains the cable and adapters you need to connect a console terminal (an ASCII terminal or PC running terminal emulation software) or modem to your router. The console and auxiliary cable kit includes the following items:

- RJ-45-to-RJ-45 rollover cable
- RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL)
- RJ-45-to-DB-25 female DTE adapter (labeled TERMINAL)
- RJ-45-to-DB-25 male DCE adapter (labeled MODEM)

For console connections, proceed to the “Console Port Signals and Pinouts” section on page 4; for modem connections, proceed to the “Auxiliary Port Signals and Pinouts” section on page 6.

## Console Port Signals and Pinouts

Table 1 lists the pinouts for the asynchronous serial console port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL).

**Table 1 Console Port Signaling and Cabling Using a DB-9 Adapter**

Console Port (DTE)	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-9 Terminal Adapter	Console Device
	RJ-45 Pin	RJ-45 Pin	DB-9 Pin	
Signal				Signal
RTS	1 <sup>1</sup>	8	8	CTS
DTR	2	7	6	DSR
TxD	3	6	2	RxD
GND	4	5	5	GND
GND	5	4	5	GND
RxD	6	3	3	TxD
DSR	7	2	4	DTR
CTS	8 <sup>1</sup>	1	7	RTS

1. Pin 1 is connected internally to pin 8

Table 2 lists the pinouts for the asynchronous serial console port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-25 female DTE adapter (labeled TERMINAL).

**Table 2 Console Port Signaling and Cabling Using a DB-25 Adapter**

Console Port (DTE) <sup>1</sup>	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-25 Terminal Adapter	Console Device
	RJ-45 Pin	RJ-45 Pin	DB-25 Pin	
Signal				Signal
RTS	1 <sup>2</sup>	8	5	CTS
DTR	2	7	6	DSR
TxD	3	6	3	RxD
GND	4	5	7	GND
GND	5	4	7	GND
RxD	6	3	2	TxD

## Console and Auxiliary Port Signals and Pinouts

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**Table 2 Console Port Signaling and Cabling Using a DB-25 Adapter**

Console Port (DTE) <sup>1</sup>	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-25 Terminal Adapter	Console Device
	RJ-45 Pin	RJ-45 Pin	DB-25 Pin	Signal
DSR	7	2	20	DTR
CTS	8 <sup>1</sup>	1	4	RTS

1. You can use the same cabling to connect a console to the auxiliary port
2. Pin 1 is connected internally to pin 8

## Auxiliary Port Signals and Pinouts

Table 3 lists the pinouts for the asynchronous serial auxiliary port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-25 male DCE adapter (labeled MODEM).

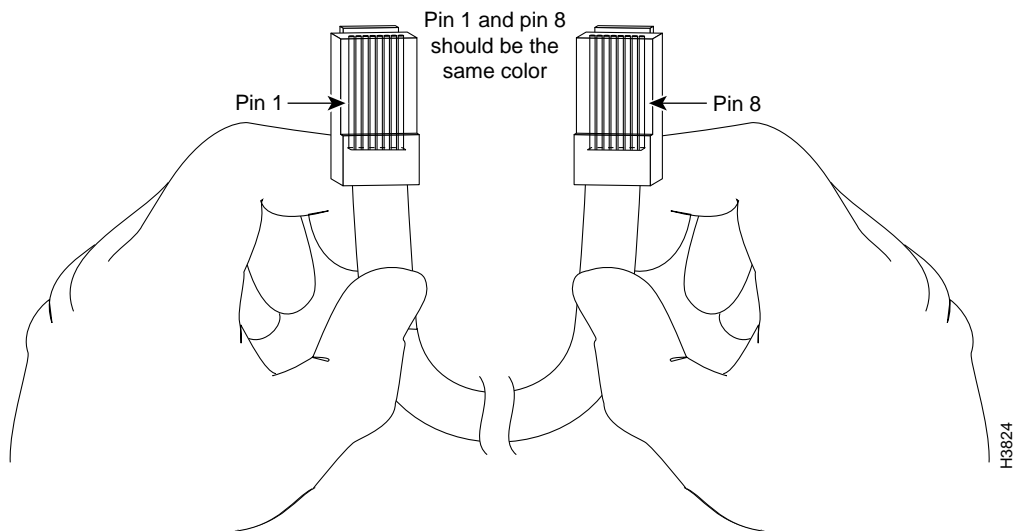
**Table 3 Auxiliary Port Signaling and Cabling Using a DB-25 Adapter**

Auxiliary Port (DTE)	RJ-45-to-RJ-45 Roll-Over Cable		RJ-45-to-DB-25 Modem Adapter	Modem
	RJ-45 Pin	RJ-45 Pin	DB-25 Pin	Signal
RTS	1 <sup>1</sup>	8	4	RTS
DTR	2	7	20	DTR
TxD	3	6	3	TxD
GND	4	5	7	GND
GND	5	4	7	GND
RxD	6	3	2	RxD
DSR	7	2	8	DCD
CTS	8 <sup>1</sup>	1	5	CTS

1. Pin 1 is connected internally to pin 8.

You can identify a rollover cable by comparing the modular plugs at the two ends of the cable. When you hold the plugs side by side, with the tab at the back, the wire connected to the pin on the outside of the left plug should be the same color as the wire connected to the pin on the outside of the right plug. (See Figure 1.) If you purchased your cable from Cisco Systems, pin 1 is white on one connector, and pin 8 is white on the other (a rollover cable connects pins 1 and 8, 2 and 7, 3 and 6, and 4 and 5).

**Figure 1** Identifying a Rollover Cable



## Ethernet Cable Pinouts

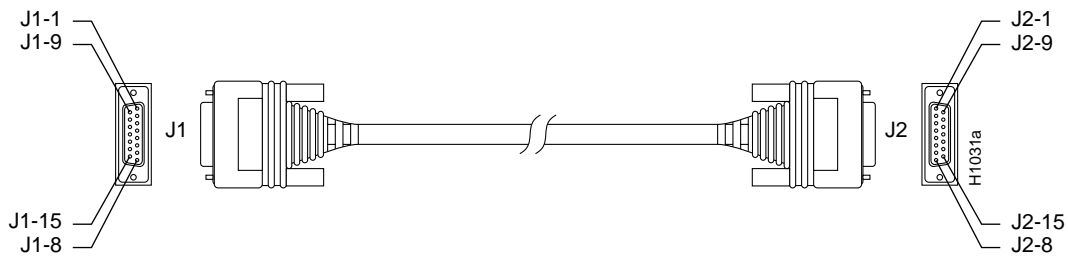
This section describes the following:

- Ethernet AUI Cable Pinouts
- 10BaseT Connector Pinouts

## Ethernet AUI Cable Pinouts

Figure 2 shows the Ethernet (AUI) cable assembly and Table 4 lists the pinouts.

**Figure 2 Ethernet (AUI) Cable Assembly**



**Table 4 Ethernet (AUI) Pinouts**

Pin	Ethernet Circuit	Signal Name
3	DO-A	Data Out Circuit A
10	DO-B	Data Out Circuit B
11	DO-S	Data Out Circuit Shield
5	DI-A	Data In Circuit A
12	DI-B	Data In Circuit B
4	DI-S	Data In Circuit Shield
7	CO-A	Control Out Circuit A (not connected)
15	CO-B	Control Out Circuit B (not connected)
8	CO-S	Control Out Circuit Shield (not connected)
2	CI-A	Control In Circuit A
9	CI-B	Control In Circuit B
1	CI-S	Control In Circuit Shield
6	VC	Voltage Common



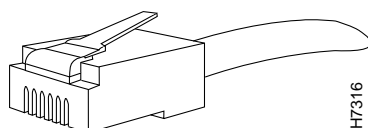
**Table 4 Ethernet (AUI) Pinouts**

Pin	Ethernet Circuit	Signal Name
13	VP	Voltage Plus
14	VS	Voltage Shield (L25 and M25)
Shel 1	PG	Protective Ground

## 10BaseT Connector Pinouts

Figure 3 shows the 10BaseT connector (RJ-45) and Table 5 lists its pinouts.

**Figure 3 10BaseT Connector (RJ-45)**



**Table 5 10BaseT Connector (RJ-45) Pinouts**

Pin <sup>1</sup>	Description
1	TX+
2	TX-
3	RX+
4	-
5	-
6	RX-
7	-
8	-

## Fast Ethernet Connector Pinouts

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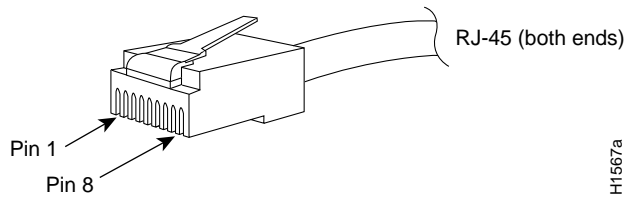
1. Any pin not described is not connected

## Fast Ethernet Connector Pinouts

This section illustrates the Fast Ethernet 100BaseTX (RJ-45) connector and lists its pinout and signal descriptions.

Figure 4 shows the 100BaseTX RJ-45 connector, and Table 6 lists its pinout. The 1-port Fast Ethernet network module RJ-45 port actively terminates wire pair 4 and 5 and wire pair 7 and 8. Common-mode termination reduces electromagnetic interference (EMI) and susceptibility to common-mode sources.

**Figure 4** 100BaseTX RJ-45 Connector



**Table 6** RJ-45 Connector Pinout

Pin	Signal
1	TX+
2	TX-
3	RX+
6	RX-

## Token Ring Port Pinouts

The 1E1R 2-slot module provides both UTP and STP Token Ring connections described in:

- Token Ring STP Connector Pinouts
- Token Ring UTP Connector Pinouts

The IEEE has established Token Ring as standard IEEE 802.5. The distance limitations for the IEEE 802.5 specification indicate a maximum segment distance of 328 feet (100 meters) for UTP cabling. The distance limitation is 1,640 feet (500 meters) for STP cabling.

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**Note** To ensure agency compliance with FCC Class B electromagnetic emissions requirements (EMI), make sure that you use the shielded RJ-45 Token Ring cable when connecting your router to the Token Ring network.

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Token Ring can operate at two different ring speeds: 4 and 16 Mbps. All devices on the ring must use the same operating speed.

Only one Token Ring port can be used at a time. The module will automatically detect which port, STP or UTP, is in use. Use the provided Token Ring cable to connect the router to a switch.

## Token Ring STP Connector Pinouts

Table 7 shows the Token Ring STP port pinouts used by the 1E1R 2-slot module.

**Table 7** Token Ring STP Port (DB-9) Pinouts

9-Pin	Signal Name
1	RX-
2	Ground
3	+5 Volt, fused
4	Ground
5	TX-
6	+RX

## ISDN BRI Interface

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**Table 7** Token Ring STP Port (DB-9) Pinouts

<b>9-Pin</b>	<b>Signal Name</b>
7	Ground
8	Ground
9	+TX

## Token Ring UTP Connector Pinouts

Table 8 shows the Token Ring UTP port pinouts used by the 1E1R 2-slot module.

**Table 8** Token Ring UTP Port (DB-9) Pinouts

<b>RJ-45 Pins</b>	<b>Signal</b>
1	GND
2	GND
3	TX
4	RX
5	TX
6	RX
7	GND
8	–

## ISDN BRI Interface

This section contains the following topics:

- ISDN BRI Connections
- ISDN BRI Pinouts



**Warning** Network hazardous voltages are present in the BRI, fractional T1/T1, and switched 56 cables. If you detach the cable, detach the end away from the router first to avoid possible electric shock. Network hazardous voltages also are present on the system card in the area of the BRI port (RJ-45 connector), fractional T1/T1 port (RJ-48C connector), and switched port (RJ-11 or RJ-48S connector), regardless of when power is turned OFF.

## ISDN BRI Connections



**Warning** The ISDN connection is regarded as a source of voltage that should be inaccessible to user contact. Do not attempt to tamper with or open any public telephone operator (PTO)-provided equipment or connection hardware. Any hardwired connection (other than by a nonremovable, connect-one-time-only plug) must be made only by PTO staff or suitably trained engineers.

Use a BRI cable (not included) to connect the BRI WAN interface card directly to an ISDN. Table 9 lists the specifications for ISDN BRI cables.

**Table 9 ISDN BRI Cable Specifications**

Specification	High-Capacitance Cable	Low-Capacitance Cable
Resistance (at 96 kHz)	160 ohms/km	160 ohms/km
Capacitance (at 1 kHz)	120 nF <sup>1</sup> /km	30 nF/km
Impedance (at 96 kHz)	75 ohms	150 ohms
Wire diameter	0.024" (0.6 mm)	0.024" (0.6 mm)
Distance limitation	32.8' (10 m)	32.8' (10 m)

1.nF=nanoFarad

## ISDN BRI Pinouts

Table 10 lists the connector signals and pinouts for the ISDN BRI S/T card. Table 11 lists the connector signals and pinouts for the ISDN BRI U card.

## CT1/PRI Pinouts

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**Caution** To prevent damage to the system, make certain you connect the BRI cable to the BRI connector *only* and not to any other RJ-45 connector.

**Table 10 ISDN BRI S/T Port Signals and Pinouts (RJ-45)**

8 Pin <sup>1</sup>	TE <sup>2</sup>	NT <sup>3</sup>	Polarity
3	TX	RX	+
4	RX	TX	+
5	RX	TX	-
6	TX	RX	-

1. Pins 1, 2, 7, and 8 are not used
2. TE refers to terminal terminating layer 1 aspects of TE1, TA, and NT functional groups (this applies to the ISDN BRI S/T WAN interface card)
3. NT refers to network terminating layer 1 aspects of NT1 and NT2 functional groups

**Table 11 ISDN BRI U Port Signals and Pinouts (RJ-45)**

8 Pin <sup>1</sup>	Function
3	No connection
4	Signal—Tip or Ring
5	Signal—Tip or Ring
6	No connection

1. Pins 1, 2, 7, and 8 are not used.

## CT1/PRI Pinouts

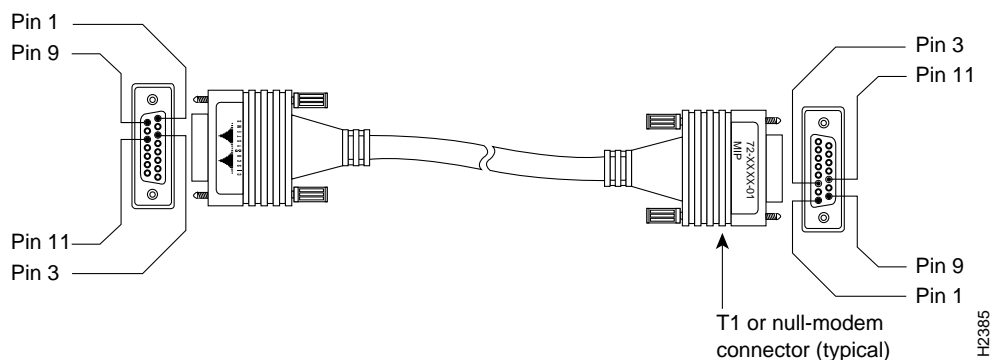
Two standard T1 serial cables are available for the CT1/PRI module: null-modem and straight-through. A straight-through cable connects the router to an external CSU. Null-modem cables are used for back-to-back operation and testing.

The T1 interface cable has two 15-pin DB connectors at each end to connect the CT1/PRI with the external T1 CSU. Figure 5 shows the T1 interface cable, connectors, and pinouts. Table 12 lists the pinouts for the null-modem T1 cable and Table 13 lists the pinouts for the straight-through T1 cable.



**Warning** Network hazardous voltages are present in the BRI, fractional T1/T1, and switched 56 cables. If you detach the cable, detach the end away from the router first to avoid possible electric shock. Network hazardous voltages also are present on the system card in the area of the BRI port (RJ-45 connector), fractional T1/T1 port (RJ-48C connector), and switched port (RJ-11 or RJ-48S connector), regardless of when power is turned OFF.

**Figure 5 T1 Interface Cable**



**Table 12 Null-Modem T1 Cable Pinouts**

15-Pin DB Connector		15-Pin DB Connector	
Signal	Pin	Pin	Signal
Transmit Tip	1	3	Receive Tip
Receive Tip	3	1	Transmit Tip
Transmit Ring	9	11	Receive Ring
Receive Ring	11	9	Transmit Ring

## CT1/PRI-CSU Pinouts

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**Table 13** Straight-Through T1 Cable Pinouts

15-Pin DB Connector		15-Pin DB Connector	
Signal	Pin	Pin	Signal
Transmit Tip	1	1	Transmit Tip
Transmit Ring	9	9	Transmit Ring
Receive Tip	3	3	Receive Tip
Receive Ring	11	11	Receive Ring

## CT1/PRI-CSU Pinouts

Table 14 lists the CT1/PRI-CSU module port pinouts. Use a straight-through RJ-48C-to-RJ-48C cable to connect the T1 port to an RJ-48C jack.

**Table 14** CT1/PRI-CSU Module Port (RJ-48C) Pinouts

RJ-48C Pin	Description
1	Receive Ring
2	Receive Tip
4	Ring
5	Tip

## CE1/PRI Interface

This section contains the following topics:

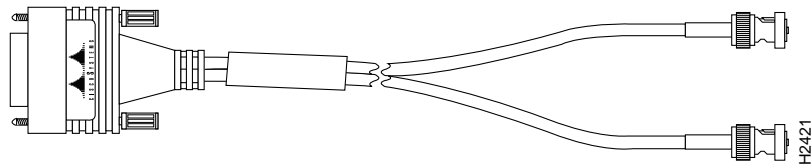
- CE1/PRI Cables
- CE1/PRI Pinouts



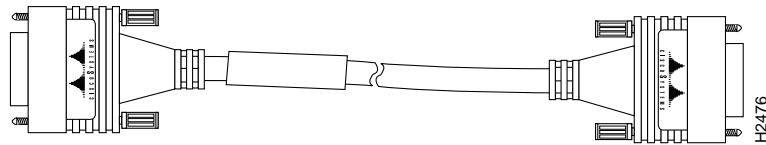
## CE1/PRI Cables

Cisco Systems makes four cables for the CE1/PRI modules. All four have DB-15 connectors on the CE1/PRI end and either BNC, DB-15, Twinax, or RJ-45 connectors on the network end. Figure 6 through Figure 9 show the CE1/PRI interface cables.

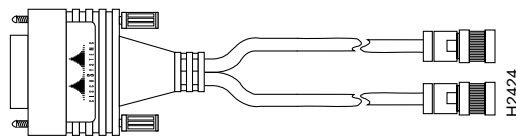
**Figure 6 E1 Interface Cable for 75-Ohm, Unbalanced Connections with BNC Connectors**



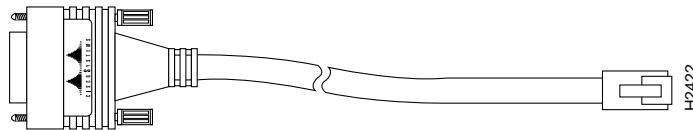
**Figure 7 E1 Interface Cable for 120-Ohm, Balanced Connections with DB-15 Connectors**



**Figure 8 E1 Interface Cable for 120-Ohm, Balanced Connections with Twinax Connectors**



**Figure 9 E1 Interface Cable for 120-Ohm, Balanced Connections with an RJ-45 Connector**



## CE1/PRI Pinouts

Table 15 lists pinouts for the CE1/PRI interface cables.

**Table 15 E1 Interface Cable Pinouts**

CE1/PRI End		Network End						
DB-15		BNC	DB-15		Twinax		RJ-45	
Pin	Signal	Signal	Pin	Signal	Pin	Signal	Pin	Signal
9	TX Tip	TX Tip	1	TX Tip	TX-1	TX Tip	1	TX Tip
2	TX Ring	TX Shield	9	TX Ring	TX-2	TX Ring	2	TX Ring
10	TX Shield	–	2	TX Shield	Shield	TX Shield	3	TX Shield
8	RX Tip	RX Tip	3	RX Tip	RX-1	RX Tip	4	RX Tip
15	RX Ring	RX Shield	11	RX Ring	RX-2	RX Ring	5	RX Ring
7	RX Shield	–	4	RX Shield	Shield	RX Shield	6	RX Shield

## 56/64-Kbps DSU/CSU Signals and Pinouts

Switched 56-kbps connections are provided by the 56-kbps DSU/CSU WAN interface card. For more information, see the publication *Network Modules Hardware Installation Guide*.



**Warning** Network hazardous voltages are present in the BRI, fractional T1/T1, and switched 56 cables. If you detach the cable, detach the end away from the router first to avoid possible electric shock. Network hazardous voltages also are present on the system card in the area of the BRI port (RJ-45 connector), fractional T1/T1 port (RJ-48C connector), and switched port (RJ-11 or RJ-48S connector), regardless of when power is turned OFF.

Table 16 lists the 56/64-kbps DSU/CSU connector signals and pinouts.

**Table 16 56/64-Kbps DSU/CSU (RJ-48S) Signals and Pinouts**

8 Pin <sup>1</sup>	Description
1	Transmit Ring
2	Transmit Tip
7	Receive Tip
8	Receive Ring

1. Pins 3, 4, 5, and 6 are not used.

## Serial Connection Signals and Pinouts

This section provides information about the 1-port serial WAN interface card. With the appropriate serial transition cable, this card can provide an EIA/TIA-232, EIA/TIA-449, V.35, X.21, DTE/DCE, EIA-530 DTE, or NRZ/NRZI serial interface.

### Types of Serial Cables

Six types of serial cables (also called serial adapter cables or serial transition cables) are available from Cisco Systems:

- EIA/TIA-232 Interface
- EIA/TIA-449 Interface
- V.35 Interface
- X.21 Serial Cable Assembly

## Serial Connection Signals and Pinouts

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- EIA-530 Interface

All serial cables provide a universal plug at the interface card end. The network end of each cable provides the physical connectors most commonly used for the interface. For example, the network end of the EIA/TIA-232 serial cable is a DB-25 connector, the most widely used EIA/TIA-232 connector.

All serial interface types except EIA-530 are available in DTE or DCE format: DTE with a plug connector (male) at the network end and DCE with a receptacle (female) at the network end. V.35 is available in either mode with either gender at the network end. EIA-530 is available in DTE only.

## Connecting the Card to the Network

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**Note** The serial WAN interface card uses a universal high-density, 60-pin receptacle. Each universal port requires a serial port adapter cable that determines the port's electrical interface type and mode: DTE or DCE. Although all port adapter cables use a universal plug at the quad serial module end, the network end of each cable type uses the physical connectors commonly used for the interface. (For example, the network end of the EIA/TIA-232 port adapter cable is a DB-25 connector, the most widely used EIA/TIA-232 connector.)

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After you install the serial WAN interface card, use the appropriate serial cable to connect the interface card's DB-60 serial port to one of the following types of equipment:

- An asynchronous modem, if connecting to an analog telephone line
- A synchronous modem, data service unit/channel service unit (DSU/CSU), or other data circuit-terminating equipment (DCE), if connecting to a digital WAN line

## EIA/TIA-232 Interface

This section contains the following topics:

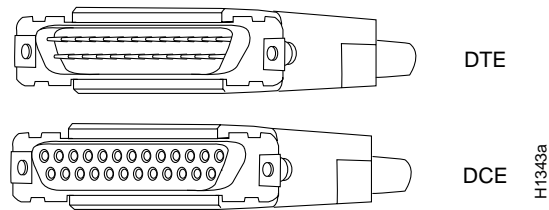
- EIA/TIA-232 Connections

- EIA/TIA-232 Serial Cable Assembly

### EIA/TIA-232 Connections

EIA/TIA-232 supports unbalanced circuits at signal speeds up to 64 kbps. The network end of the adapter cable is a standard 25-pin D-shell connector known as a DB-25. (See Figure 10.) The router console and auxiliary ports also use EIA/TIA-232 connections; however, the serial module ports support synchronous connections, and the console and auxiliary ports support asynchronous connections.

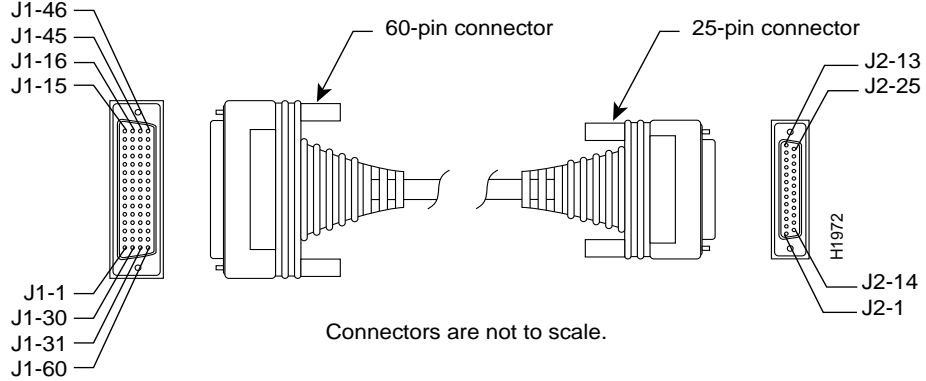
**Figure 10 EIA/TIA-232 Adapter Cable Connectors, Network End**



### EIA/TIA-232 Serial Cable Assembly

Figure 11 shows the EIA/TIA-232 serial cable assembly. Table 17 lists the DTE pinout and Table 18 lists the DCE pinout. Arrows indicate signal direction:  $\longrightarrow$  means DTE to DCE and  $\longleftarrow$  means DCE to DTE.

**Figure 11 EIA/TIA-232 Cable Assembly**



**Table 17 EIA/TIA-232 DTE Cable Pinout (DB-60 to DB-25)**

60-Pin	Signal	Note	Direction	25-Pin	Signal
J1-50	MODE_0	Shorting group	-	-	-
J1-51	GND				
J1-52	MODE_DC				
J1-46	Shield GND	Single	-	J2-1	Shield GND
J1-46	Shield GND	Single	-	J2-1	Shield GND
J1-41	TXD/RXD	Twisted pair no. 5	—>	J2-2	TXD
Shield	-		-	Shield	-
J1-36	RXD/TXD	Twisted pair no. 9	<—	J2-3	RXD
Shield	-		-	Shield	-
J1-42	RTS/CTS	Twisted pair no. 4	—>	J2-4	RTS
Shield	-		-	Shield	-
J1-35	CTS/RTS	Twisted pair no. 10	<—	J2-5	CTS
Shield	-		-	Shield	-

**Table 17 EIA/TIA-232 DTE Cable Pinout (DB-60 to DB-25) (continued)**

60-Pin	Signal	Note	Direction	25-Pin	Signal
J1-34 Shield	DSR/DTR -	Twisted pair no. 11	<— -	J2-6 Shield	DSR -
J1-45 Shield	Circuit GND -	Twisted pair no. 1	- -	J2-7 Shield	Circuit GND -
J1-33 Shield	DCD/LL -	Twisted pair no. 12	<— -	J2-8 Shield	DCD -
J1-37 Shield	TXC/NIL -	Twisted pair no. 8	<— -	J2-15 Shield	TXC -
J1-38 Shield	RXC/TXCE -	Twisted pair no. 7	<— -	J2-17 Shield	RXC -
J1-44 Shield	LL/DCD -	Twisted pair no. 2	—> -	J2-18 Shield	LTST -
J1-43 Shield	DTR/DSR -	Twisted pair no. 3	—> -	J2-20 Shield	DTR -
J1-39 Shield	TXCE/TXC -	Twisted pair no. 6	—> -	J2-24 Shield	TXCE -

**Table 18 EIA/TIA-232 DCE Cable Pinout (DB-60 to DB-25)**

60-Pin	Signal	Note	Direction	25-Pin	Signal
J1-50 J1-51	MODE_0 GND	Shorting group	-	-	-
J1-36 Shield	RXD/TXD -	Twisted pair no. 9	<— -	J2-2 Shield	TXD -
J1-41 Shield	TXD/RXD -	Twisted pair no. 5	—> -	J2-3 Shield	RXD -
J1-35 Shield	CTS/RTS -	Twisted pair no. 10	<— -	J2-4 Shield	RTS -

## Serial Connection Signals and Pinouts

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**Table 18 EIA/TIA-232 DCE Cable Pinout (DB-60 to DB-25)**

<b>60-Pin</b>	<b>Signal</b>	<b>Note</b>	<b>Direction</b>	<b>25-Pin</b>	<b>Signal</b>
J1-42 Shield	RTS/CTS –	Twisted pair no. 4	—> –	J2-5 Shield	CTS –
J1-43 Shield	DTR/DSR –	Twisted pair no. 3	—> –	J2-6 Shield	DSR –
J1-45 Shield	Circuit GND –	Twisted pair no. 1	– –	J2-7 Shield	Circuit GND
J1-44 Shield	LL/DCD –	Twisted pair no. 2	—> –	J2-8 Shield	DCD –
J1-39 Shield	TXCE/TXC –	Twisted pair no. 7	—> –	J2-15 Shield	TXC –
J1-40 Shield	NIL/RXC –	Twisted pair no. 6	—> –	J2-17 Shield	RXC –
J1-33 Shield	DCD/LL –	Twisted pair no. 12	<— –	J2-18 Shield	LTST –
J1-34 Shield	DSR/DTR –	Twisted pair no. 11	<— –	J2-20 Shield	DTR –
J1-38 Shield	RXC/TXCE –	Twisted pair no. 8	<— –	J2-24 Shield	TXCE –

## EIA/TIA-449 Interface

This section contains the following topics:

- EIA/TIA-449 Connections
- EIA/TIA-449 Serial Cable Assembly

### EIA/TIA-449 Connections

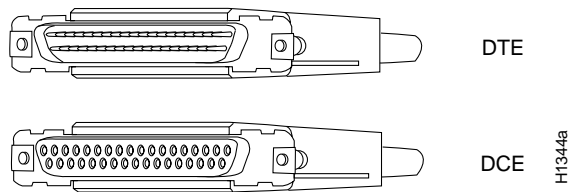
EIA/TIA-449, which supports balanced (EIA/TIA-422) and unbalanced (EIA/TIA-423) transmissions, is a faster (up to 2 Mbps) version of EIA/TIA-232 that provides more functions and supports transmissions over greater distances.



The EIA/TIA-449 standard was intended to replace the EIA/TIA-232 standard, but it was not widely adopted primarily because of the large installed base of DB-25 hardware and because of the larger size of the 37-pin EIA/TIA-449 connectors, which limited the number of connections possible (fewer than possible with the smaller, 25-pin EIA/TIA-232 connector).

The network end of the EIA/TIA-449 adapter cable provides a standard 37-pin D-shell connector. (See Figure 12.) EIA/TIA-449 cables are available as either DTE (DB-37 plug) or DCE (DB-37 receptacle).

**Figure 12 EIA/TIA-449 Adapter Cable Connectors, Network End**

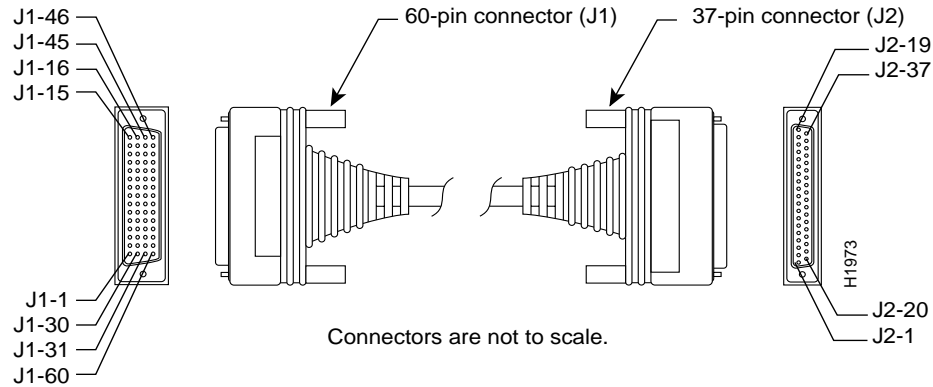


### EIA/TIA-449 Serial Cable Assembly

Figure 13 shows the EIA/TIA-449 serial cable assembly. Table 19 lists the DTE pinout and Table 20 lists the DCE pinout. Arrows indicate signal direction: —> means DTE to DCE and <— means DCE to DTE.

## Serial Connection Signals and Pinouts

**Figure 13 EIA/TIA-449 Serial Cable Assembly**



**Table 19 EIA/TIA-449 DTE Cable Pinout (DB-60 to DB-37)**

60-Pin	Signal Name	Note	Direction	37-Pin	Signal Name
J1-49 J1-48	MODE_1 GND	Shorting group	—	—	—
J1-51 J1-52	GND MODE_DCE	Shorting group	—	—	—
J1-46	Shield_GND	Single	—	J2-1	Shield GND
J1-11 J1-12	TXD/RXD+ TXD/RXD-	Twisted pair no. 6	—>	J2-4 J2-22	SD+ SD-
J1-24 J1-23	TXC/RXC+ TXC/RXC-	Twisted pair no. 9	<—	J2-5 J2-23	ST+ ST-
J1-28 J1-27	RXD/TXD+ RXD/TXD-	Twisted pair no. 11	<—	J2-6 J2-24	RD+ RD-
J1-9 J1-10	RTS/CTS+ RTS/CTS-	Twisted pair no. 5	—>	J2-7 J2-25	RS+ RS-
J1-26 J1-25	RXC/TXCE+ RXC/TXCE-	Twisted pair no. 10	<—	J2-8 J2-26	RT+ RT-

**Table 19 EIA/TIA-449 DTE Cable Pinout (DB-60 to DB-37) (continued)**

60-Pin	Signal Name	Note	Direction	37-Pin	Signal Name
J1-1	CTS/RTS+	Twisted pair no. 1	<—	J2-9	CS+
J1-2	CTS/RTS-		<—	J2-27	CS-
J1-44	LL/DCD	Twisted pair no. 12	—>	J2-10	LL
J1-45	Circuit_GND		—	J2-37	SC
J1-3	DSR/DTR+	Twisted pair no. 2	<—	J2-11	DM+
J1-4	DSR/DTR-		<—	J2-29	DM-
J1-7	DTR/DSR+	Twisted pair no. 4	—>	J2-12	TR+
J1-8	DTR/DSR-		—>	J2-30	TR-
J1-5	DCD/DCD+	Twisted pair no. 3	<—	J2-13	RR+
J1-6	DCD/DCD-		<—	J2-31	RR-
J1-13	TXCE/TXC+	Twisted pair no. 7	—>	J2-17	TT+
J1-14	TXCE/TXC-		—>	J2-35	TT-
J1-15	Circuit_GND	Twisted pair no. 9	—	J2-19	SG
J1-16	Circuit_GND		—	J2-20	RC

**Table 20 EIA/TIA-449 DCE Cable Pinout (DB-60 to DB-37)**

60-Pin	Signal Name	Note	Direction	37-Pin	Signal Name
J1-49	MODE_1	Shorting group	—	—	—
J1-48	GND		—	—	—
J1-46	Shield_GND	Single	—	J2-1	Shield GND
J1-28	RXD/TXD+	Twisted pair no. 11	<—	J2-4	SD+
J1-27	RXD/TXD-		<—	J2-22	SD-
J1-13	TXCE/TXC+	Twisted pair no. 7	—>	J2-5	ST+
J1-14	TXCE/TXC-		—>	J2-23	ST-
J1-11	TXD/RXD+	Twisted pair no. 6	—>	J2-6	RD+
J1-12	TXD/RXD-		—>	J2-24	RD-

## Serial Connection Signals and Pinouts

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**Table 20 EIA/TIA-449 DCE Cable Pinout (DB-60 to DB-37) (continued)**

<b>60-Pin</b>	<b>Signal Name</b>	<b>Note</b>	<b>Direction</b>	<b>37-Pin</b>	<b>Signal Name</b>
J1-1	CTS/RTS+	Twisted pair no. 1	<—	J2-7	RS+
J1-2	CTS/RTS—		<—	J2-25	RS—
J1-24	TXC/RXC+	Twisted pair no. 9	—>	J2-8	RT+
J1-23	TXC/RXC—		—>	J2-26	RT—
J1-9	RTS/CTS+	Twisted pair no. 5	—>	J2-9	CS+
J1-10	RTS/CTS—		—>	J2-27	CS—
J1-29	NIL/LL	Twisted pair no. 12	—>	J2-10	LL
J1-30	Circuit_GND		—	J2-37	SC
J1-7	DTR/DSR+	Twisted pair no. 4	—>	J2-11	DM+
J1-8	DTR/DSR—		—>	J2-29	DM—
J1-3	DSR/DTR+	Twisted pair no. 2	<—	J2-12	TR+
J1-4	DSR/DTR—		<—	J2-30	TR—
J1-5	DCD/DCD+	Twisted pair no. 3	—>	J2-13	RR+
J1-6	DCD/DCD—		—>	J2-31	RR—
J1-26	RXC/TXCE+	Twisted pair no. 10	<—	J2-17	TT+
J1-25	RXC/TXCE—		<—	J2-35	TT—
J1-15	Circuit_GND	Twisted pair no. 8	—	J2-19	SG
J1-16	Circuit_GND		—	J2-20	RC

## V.35 Interface

This section contains the following topics:

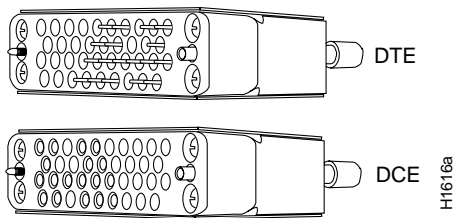
- V.35 Connections
- V.35 Serial Cable Assembly

### V.35 Connections

The V.35 interface is recommended for speeds up to 48 kbps, although in practice it is used successfully at 4 Mbps.

The network end of the V.35 adapter cable provides a standard 34-pin Winchester-type connector. (See Figure 14.) V.35 cables are available with a standard V.35 plug or receptacle in either DTE or DCE mode.

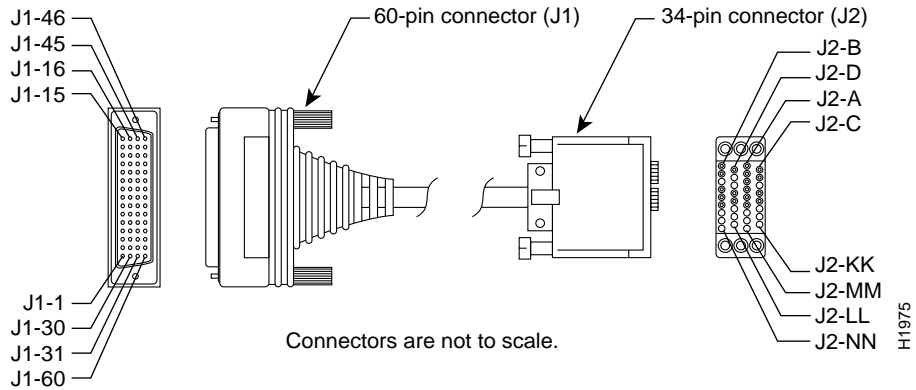
**Figure 14 V.35 Adapter Cable Connectors, Network End**



### V.35 Serial Cable Assembly

Figure 15 shows the V.35 serial cable assembly. Table 21 lists the DTE pinout and Table 22 lists the DCE pinout. Arrows indicate signal direction:  $\rightarrow$  means DTE to DCE and  $\leftarrow$  means DCE to DTE.

**Figure 15 V.35 Serial Cable Assembly**



## Serial Connection Signals and Pinouts

**Table 21 V.35 DTE Cable Pinout (DB-60 to Winchester-Type 34-Pin)**

60-Pin	Signal Name	Type	Direction	34-Pin	Signal Name
J1-49 J1-48	MODE_1 GND	Shorting group	–	–	–
J1-50 J1-51 J1-52	MODE_0 GND MODE_DCE	Shorting group	–	–	–
J1-53 J1-54 J1-55 J1-56	TxC/NIL RxC_TxCE RxD/TxD GND	Shorting group	–	–	–
J1-46	Shield_GND	Single	–	J2-A	Frame GND
J1-45 Shield	Circuit_GND –	Twisted pair no. 12	– –	J2-B Shield	Circuit GND –
J1-42 Shield	RTS/CTS –	Twisted pair no. 9	—> –	J2-C Shield	RTS –
J1-35 Shield	CTS/RTS –	Twisted pair no. 8	<— –	J2-D Shield	CTS –
J1-34 Shield	DSR/DTR –	Twisted pair no. 7	<— –	J2-E Shield	DSR –
J1-33 Shield	DCD/LL –	Twisted pair no. 6	<— –	J2-F Shield	RLSD –
J1-43 Shield	DTR/DSR –	Twisted pair no. 10	—> –	J2-H Shield	DTR –
J1-44 Shield	LL/DCD –	Twisted pair no. 11	—> –	J2-K Shield	LT –
J1-18 J1-17	TxD/RxD+ TxD/RxD–	Twisted pair no. 1	—> —>	J2-P J2-S	SD+ SD–
J1-28 J1-27	RxD/TxD+ RxD/TxD–	Twisted pair no. 5	<— <—	J2-R J2-T	RD+ RD–

**Table 21 V.35 DTE Cable Pinout (DB-60 to Winchester-Type 34-Pin) (continued)**

60-Pin	Signal Name	Type	Direction	34-Pin	Signal Name
J1-20	TxCE/TxC+	Twisted pair no. 2	—>	J2-U	SCTE+
J1-19	TxCE/TxC-		—>	J2-W	SCTE-
J1-26	RxC/TxCE+	Twisted pair no. 4	<—	J2-V	SCR+
J1-25	RxC/TxCE-		<—	J2-X	SCR-
J1-24	TxC/RxC+	Twisted pair no. 3	<—	J2-Y	SCT+
J1-23	TxC/RxC-		<—	J2-AA	SCT-

**Table 22 V.35 DCE Cable Pinout (DB-60 to Winchester-Type 34-Pin)**

60-Pin	Signal Name	Type	Direction	34-Pin	Signal Name
J1-49	MODE_1	Shorting group	—	—	—
J1-48	GND		—	—	—
J1-50	MODE_0	Shorting group	—	—	—
J1-51	GND		—	—	—
J1-53	TxC/NIL	Shorting group	—	—	—
J1-54	RxC_TxCE		—	—	—
J1-55	RxD/TxD		—	—	—
J1-56	GND		—	—	—
J1-46	Shield_GND	Single	—	J2-A	Frame GND
J1-45	Circuit_GND	Twisted pair no. 12	—	J2-B	Circuit GND
Shield	—		—	Shield	—
J1-35	CTS/RTS	Twisted pair no. 8	<—	J2-C	RTS
Shield	—		—	Shield	—
J1-42	RTS/CTS	Twisted pair no. 9	—>	J2-D	CTS
Shield	—		—	Shield	—
J1-43	DTR/DSR	Twisted pair no. 10	—>	J2-E	DSR
Shield	—		—	Shield	—

## Serial Connection Signals and Pinouts

**Table 22 V.35 DCE Cable Pinout (DB-60 to Winchester-Type 34-Pin) (continued)**

60-Pin	Signal Name	Type	Direction	34-Pin	Signal Name
J1-44 Shield	LL/DCD –	Twisted pair no. 11	—> –	J2-F Shield	RLSD –
J1-34 Shield	DSR/DTR –	Twisted pair no. 7	<— –	J2-H Shield	DTR –
J1-33 Shield	DCD/LL –	Twisted pair no. 6	<— –	J2-K Shield	LT –
J1-28 J1-27	RxD/TxD+ RxD/TxD–	Twisted pair no. 5	<— <—	J2-P J2-S	SD+ SD–
J1-18 J1-17	TxD/RxD+ TxD/RxD–	Twisted pair no. 1	—> —>	J2-R J2-T	RD+ RD–
J1-26 J1-25	RxC/TxCE+ RxC/TxCE–	Twisted pair no. 4	<— <—	J2-U J2-W	SCTE+ SCTE–
J1-22 J1-21	NIL/RxC+ NIL/RxC–	Twisted pair no. 3	—> —>	J2-V J2-X	SCR+ SCR–
J1-20 J1-19	TxCE/TxC+ TxCE/TxC–	Twisted pair no. 2	—> —>	J2-Y J2-AA	SCT+ SCT–

## X.21 Interface

This section contains the following topics:

- X.21 Connections
- X.21 Serial Cable Assembly

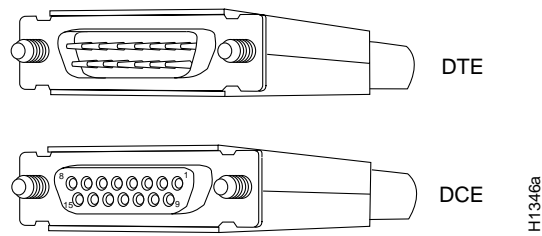
### X.21 Connections

The X.21 interface uses a 15-pin connection for balanced circuits and is commonly used in the United Kingdom to connect public data networks. X.21 relocates some of the logic functions to the DTE and DCE interfaces and, as a result, requires fewer circuits and a smaller connector than EIA/TIA-232.



The network end of the X.21 adapter cable is a standard DB-15 connector. (See Figure 16.) X.21 cables are available as either DTE (DB-15 plug) or DCE (DB-15 receptacle).

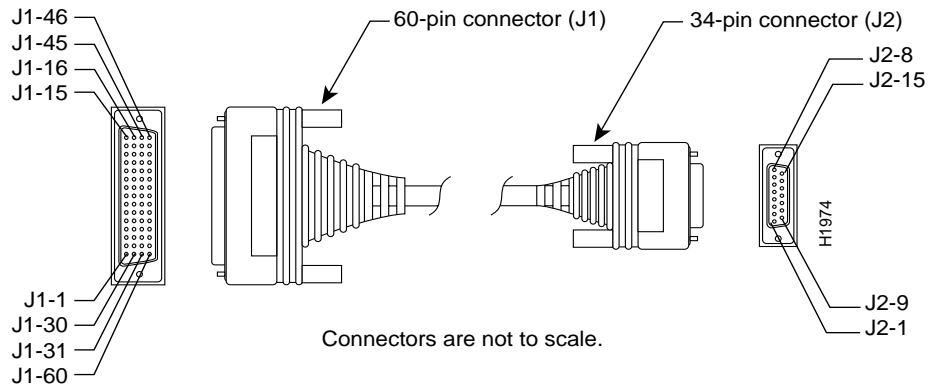
**Figure 16 X.21 Adapter Cable Connectors, Network End**



### X.21 Serial Cable Assembly

Figure 17 shows the X.21 serial cable assembly. Table 23 lists the DTE pinout and Table 24 lists the DCE pinout. Arrows indicate signal direction:  $\rightarrow$  means DTE to DCE and  $\leftarrow$  means DCE to DTE.

**Figure 17 X.21 Serial Cable Assembly**



## Serial Connection Signals and Pinouts

**Table 23 X.21 DTE Cable Pinout (DB-60 to DB-15)**

60-Pin	Signal Name	Type	Direction	15-Pin	Signal Name
J1-48	GND	Shorting group	-	-	-
J1-47	MODE_2				
J1-51	GND	Shorting group	-	-	-
J1-52	MODE_DCE				
J1-46	Shield_GND	Single	-	J2-1	Shield GND
J1-11	TXD/RXD+	Twisted pair no. 3	—>	J2-2	Transmit+
J1-12	TXD/RXD-		—>	J2-9	Transmit-
J1-9	RTS/CTS+	Twisted pair no. 2	—>	J2-3	Control+
J1-10	RTS/CTS-		—>	J2-10	Control-
J1-28	RXD/TXD+	Twisted pair no. 6	<—	J2-4	Receive+
J1-27	RXD/TXD-		<—	J2-11	Receive-
J1-1	CTS/RTS+	Twisted pair no. 1	<—	J2-5	Indication+
J1-2	CTS/RTS-		<—	J2-12	Indication-
J1-26	RXC/TXCE+	Twisted pair no. 5	<—	J2-6	Timing+
J1-25	RXC/TXCE-		<—	J2-13	Timing-
J1-15	Control_GND	Twisted pair no. 4	-	J2-8	Control GND
Shield	-		-	Shield	-

**Table 24 X.21 Serial DCE Cable Pinout (DB-60 to DB-15)**

60 Pin	Signal Name	Type	Direction	15 Pin	Signal Name
J1-48	GND	Shorting group	-	-	-
J1-47	MODE_2				
J1-46	Shield_GND	Single	-	J2-1	Shield GND
J1-28	RXD/TXD+	Twisted pair no. 6	<—	J2-2	Transmit+
J1-27	RXD/TXD-		<—	J2-9	Transmit-
J1-1	CTS/RTS+	Twisted pair no. 1	<—	J2-3	Control+
J1-2	CTS/RTS-		<—	J2-10	Control-

**Table 24 X.21 Serial DCE Cable Pinout (DB-60 to DB-15) (continued)**

60 Pin	Signal Name	Type	Direction	15 Pin	Signal Name
J1-11	TXD/RXD+	Twisted pair no. 3	—>	J2-4	Receive+
J1-12	TXD/RXD-		—>	J2-11	Receive-
J1-9	RTS/CTS+	Twisted pair no. 2	—>	J2-5	Indication+
J1-10	RTS/CTS-		—>	J2-12	Indication-
J1-24	TXC/RXC+	Twisted pair no. 4	—>	J2-6	Timing+
J1-23	TXC/RXC-		—>	J2-13	Timing-
J1-15	Control_GND	Twisted pair no. 5	-	J2-8	Control GND
Shield	-		-	Shield	-

## EIA-530 Interface

This section contains the following topics:

- EIA-530 Connections
- EIA-530 Serial Cable Assembly

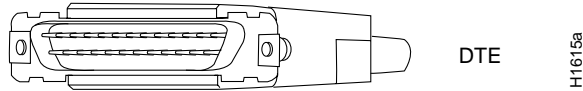
### EIA-530 Connections

EIA-530, which supports balanced transmission, provides the increased functionality, speed, and distance of EIA/TIA-449 on the smaller DB-25 connector used for EIA/TIA-232, instead of the 37-pin connectors used for EIA/TIA-449. Like EIA/TIA-449, EIA-530 refers to the electrical specifications of EIA/TIA-422 and EIA/TIA-423. Although the specification recommends a maximum speed of 2 Mbps, EIA-530 is used successfully at 4 Mbps or faster speeds over short distances.

The EIA-530 adapter cable is available in DTE mode only. The network end of the EIA-530 adapter cable is a standard DB-25 plug commonly used for EIA/TIA-232 connections. Figure 18 shows the DB-25 connector at the network end of the adapter cable.

## Serial Connection Signals and Pinouts

**Figure 18 EIA-530 Adapter Cable Connector, Network End**

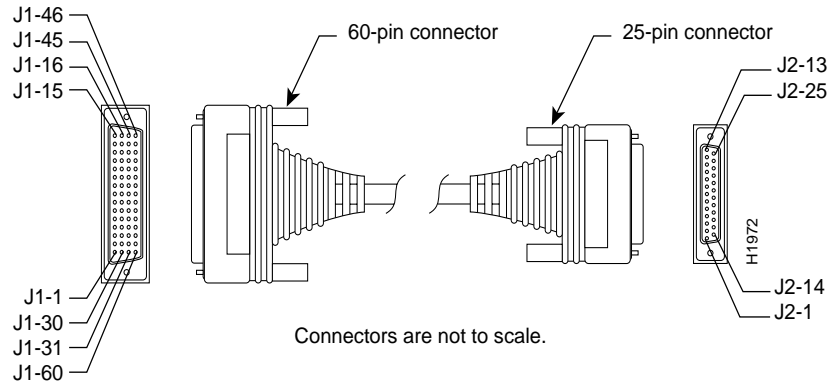


### EIA-530 Serial Cable Assembly

Figure 19 shows the EIA-530 serial cable assembly, and Table 25 lists the pinout. Arrows indicate signal direction:  $\rightarrow$  means DTE to DCE and  $\leftarrow$  means DCE to DTE.

The EIA-530 interface cannot be operated in DCE mode, and no DCE cable is available for it.

**Figure 19 EIA-530 Serial Cable Assembly**



**Table 25 EIA-530 DTE Cable Pinout (DB-60 to DB-25)**

60-Pin	Signal Name	25-Pin	Signal Name	Direction
J1-11	TXD/RXD+	J2-2	BA(A), TXD+	$\rightarrow$
J1-12	TXD/RXD-	J2-14	BA(B), TXD-	$\rightarrow$

**Table 25 EIA-530 DTE Cable Pinout (DB-60 to DB-25) (continued)**

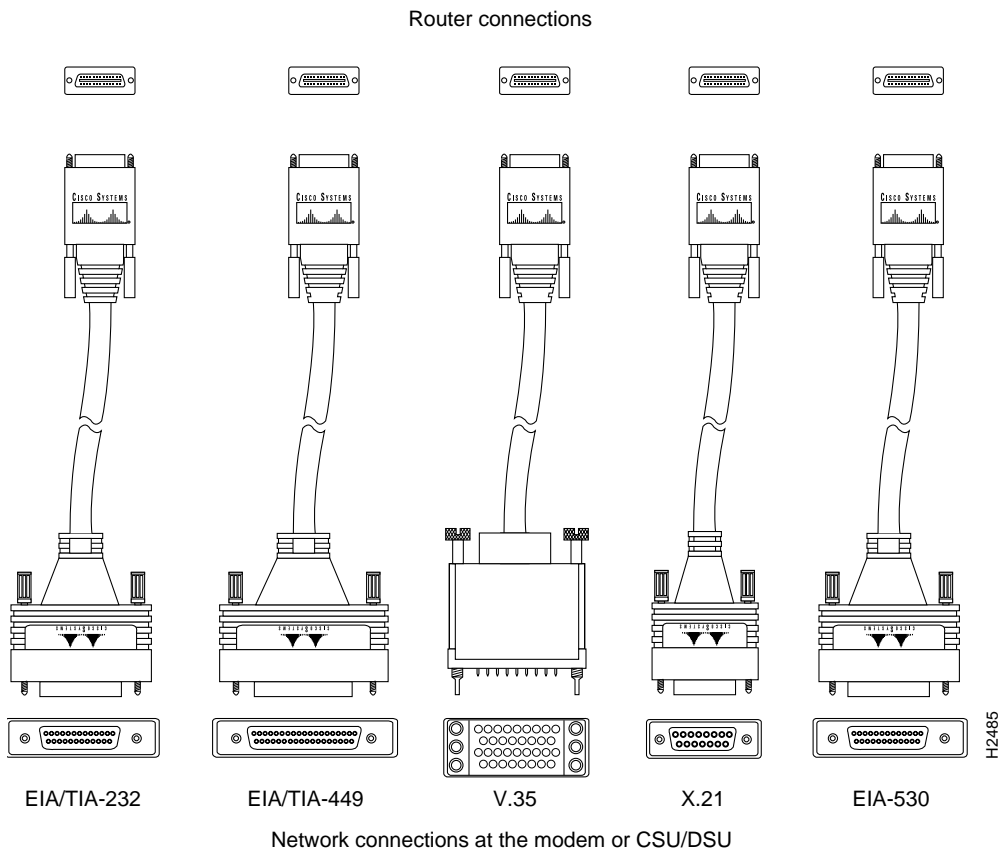
60-Pin	Signal Name	25-Pin	Signal Name	Direction
J1-28	RXD/TXD+	J2-3	BB(A), RXD+	<—
J1-27	RXD/TXD–	J2-16	BB(B), RXD–	<—
J1-9	RTS/CTS+	J2-4	CA(A), RTS+	—>
J1-10	RTS/CTS–	J2-19	CA(B), RTS–	—>
J1-1	CTS/RTS+	J2-5	CB(A), CTS+	<—
J1-2	CTS/RTS–	J2-13	CB(B), CTS–	<—
J1-3	DSR/DTR+	J2-6	CC(A), DSR+	<—
J1-4	DSR/DTR–	J2-22	CC(B), DSR–	<—
J1-46	Shield_GND	J2-1	Shield	Shorted
J1-47	MODE_2	–	–	
J1-48	GND	–	–	Shorted
J1-49	MODE_1	–	–	
J1-5	DCD/DCD+	J2-8	CF(A), DCD+	<—
J1-6	DCD/DCD–	J2-10	CF(B), DCD–	<—
J1-24	TXC/RXC+	J2-15	DB(A), TXC+	<—
J1-23	TXC/RXC–	J2-12	DB(B), TXC–	<—
J1-26	RXC/TXCE+	J2-17	DD(A), RXC+	<—
J1-25	RXC/TXCE–	J2-9	DD(B), RXC–	<—
J1-44	LL/DCD	J2-18	LL	—>
J1-45	Circuit_GND	J2-7	Circuit_GND	–
J1-7	DTR/DSR+	J2-20	CD(A), DTR+	—>
J1-8	DTR/DSR–	J2-23	CD(B), DTR–	—>
J1-13	TXCE/TXC+	J2-24	DA(A),	—>
J1-14	TXCE/TXC–	J2-11	TXCE+	—>
			DA(B),	
			TXCE–	
J1-51	GND	–	–	Shorted
J1-52	MODE_DCE	–	–	

## Smart Serial Connection Signals and Pinouts

The Smart Serial cable interface supports two independent serial interface ports. Each port supports six types of serial interfaces: EIA/TIA-232, EIA/TIA-449, X.21, V.35 in both DTE and DCE modes, and EIA530/EIA530A in DTE mode. The serial end of the Smart Serial cable is a 26-pin connector. These cables are used with the 2-port serial and 2-port asynchronous/synchronous WAN interface cards.

Figure 20 shows the serial transition cables you can connect to the DB-60 port on the asynchronous/synchronous serial modules and serial WAN interface card.

**Figure 20 Smart Serial Interface Adapter Cables**



## EIA/TIA-232 Smart Serial Cable Assembly

Table 26 lists the DCE pinout and Table 27 lists the DTE pinout for the EIA/TIA-232 Smart Serial cable. Arrows indicate signal direction: —> means DTE to DCE and <— means DCE to DTE.

**Table 26 EIA/TIA-232 DCE Smart Serial Cable Pinout**

26-Pin	Signal Name	Note	Direction	DB-25 Pin	Signal Name
J1-23	MODE_0	Local connections			
J1-24	MODE_DCE				
Drain wire		Shield	—	J2-01	Shield_GND
J1-05	I_RXD/TXD+	Twisted pair no. 9	<—	J2-02	RXD
J1-18	GND+		—		GND
J1-01	O_TXD/RXD+	Twisted pair no. 5	—>	J2-03	TXD
J1-14	GND+		—		GND
J1-11	I_CTS/RTS+	Twisted pair no. 2	<—	J2-04	CTS
J1-12	I_DSR/DTR+		<—	J2-20	DSR
J1-08	O_RTS/CTS	Twisted pair no. 4	—>	J2-05	RTS
J1-07	O_DTR/DSR+		—>	J2-06	DTR
J1-06	B_DCD/DCD+	Twisted pair no. 1	<—	J2-08	DCD
J1-19	GND+		—	J2-07	GND
J1-03	B_TXC/TXC+	Twisted pair no. 7	<—	J2-15	TXC
J1-16	GND+		—		GND
J1-02	O_TXCE/RXC+	Twisted pair no. 6	—>	J2-24	TXCE
J1-15	GND+		—		GND
J1-13	B_LL/LL+	Twisted pair no. 3	—>	J2-18	LTST
J1-26	GND+		—		GND
J1-04	I_RXC/TXCE+	Twisted pair no. 8	<—	J2-17	RXC
J1-17	GND+		—		GND



**Table 27 EIA/TIA-232 DTE Smart Serial Cable Pinout**

26-Pin	Signal Name	Note	Direction	DB-25 Pin	Signal Name
J1-23	MODE_0	Local connections			
Drain wire		Shield	—	J2-01	Shield_GND
J1-05 J1-18	I_RXD/TXD+ GND+	Twisted pair no. 5	<— —	J2-02	TXD GND
J1-01 J1-14	O_TXD/RXD+ GND+	Twisted pair no. 9	—> —	J2-03	RXD GND
J1-11 J1-12	I_CTS/RTS+ I_DSR/DTR+	Twisted pair no. 2	<— <—	J2-04 J2-20	RTS DTR
J1-08 J1-07	O_RTS/CTS O_DTR/DSR+	Twisted pair no. 4	—> —>	J2-05 J2-06	CTS DSR
J1-06 J1-19	B_DCD/DCD+ GND+	Twisted pair no. 1	—> —	J2-08 J2-07	DCD GND
J1-03 J1-16	B_TXC/TXC+ GND+	Twisted pair no. 7	—> —	J2-15	TXC GND
J1-02 J1-15	O_TXCE/RXC+ GND+	Twisted pair no. 8	—> —	J2-17	RXC GND
J1-13 J1-26	B_LL/LL+ GND+	Twisted pair no. 3	<— —	J2-18	LTST GND
J1-04 J1-17	I_RXC/TXCE+ GND+	Twisted pair no. 6	<— —	J2-24	TXCE GND

## EIA/TIA-449 Smart Serial Cable Assembly

Table 28 lists the DTE pinout and Table 29 lists the DCE pinout for the EIA/TIA-449 Smart Serial cable. Arrows indicate signal direction: —> means DTE to DCE and <— means DCE to DTE.

**Table 28 EIA/TIA-449 DTE Smart Serial Cable Pinout**

26-Pin	Signal Name	Note	Direction	DB-37 Pin	Signal Name
Drain wire		Shield	—	J2-01	Shield_GND
J1-22	MODE_I	Twisted pair no. 2	—	J2-19	SG
J1-24	MODE_DCE		—	J2-20	RC
J1-05	I_RXD/TXD+	Twisted pair no. 5	—>	J2-04	RD+
J1-18	I_RXD/TXD-		—>	J2-22	RD-
J1-03	B_TXC/TXC+	Twisted pair no. 7	<—	J2-05	ST+
J1-16	B_TXC/TXC-		<—	J2-23	ST-
J1-01	O_TXD/RXD+	Twisted pair no. 5	—>	J2-06	SD+
J1-14	O_TXD/RXD-		—>	J2-24	SD-
J1-11	I_CTS/RTS+	Twisted pair no. 4	<—	J2-09	CS+
J1-10	I_CTS/RTS-		<—	J2-27	CS-
J1-02	O_TXCE/RXC+	Twisted pair no. 6	—>	J2-17	TT+
J1-15	O_TXCE/RXC-		—>	J2-35	TT-
J1-08	O_RTS/CTS	Twisted pair no. 1	—>	J2-07	RS+
J1-09	O_RTS/CTS-		—>	J2-25	RS-
J1-06	B_DCD/DCD+	Twisted pair no. 11	—>	J2-13	RR+
J1-19	B_DCD/DCD-		—>	J2-31	RR-
J1-07	O_DTR/DSR+	Twisted pair no. 3	—>	J2-12	TR+
J1-20	O_DTR/DSR-		—>	J2-30	TR-
J1-12	I_DTR/DSR+	Twisted pair no. 10	<—	J2-11	DM+
J1-25	I_DTR/DSR-		<—	J2-29	DM-

**Table 28 EIA/TIA-449 DTE Smart Serial Cable Pinout (continued)**

26-Pin	Signal Name	Note	Direction	DB-37 Pin	Signal Name
J1-13	B_LL/LL+	Twisted pair no. 12	→	J2-10	LL
J1-26	GND+		—	J2-37	SC
J1-04	I_RXC/TXCE+	Twisted pair no. 8	←	J2-08	RT+
J1-17	I_RXC/TXCE-		←	J2-26	RT-

**Table 29 EIA/TIA-449 DCE Smart Serial Cable Pinout**

26-Pin	Signal Name	Note	Direction	DB-37 Pin	Signal Name
Drain wire		Shield	—	J2-01	Shield_GND
J1-22	MODE_I	Twisted pair no. 2	—	J2-19	SG
			Not used	J2-20	RC
J1-05	I_RXD/TXD+	Twisted pair no. 5	←	J2-04	SD+
J1-18	I_RXD/TXD-		←	J2-22	SD-
J1-03	B_TXC/TXC+	Twisted pair no. 7	→	J2-05	ST+
J1-16	B_TXC/TXC-		→	J2-23	ST-
J1-01	O_TXD/RXD+	Twisted pair no. 9	→	J2-06	RD+
J1-14	O_TXD/RXD-		→	J2-24	RD-
J1-11	I_CTS/RTS+	Twisted pair no. 1	←	J2-07	RS+
J1-10	I_CTS/RTS-		←	J2-25	RS-
J1-02	O_TXCE/RXC+	Twisted pair no. 8	→	J2-08	RT+
J1-15	O_TXCE/RXC-		→	J2-26	RT-
J1-08	O_RTS/CTS	Twisted pair no. 4	→	J2-09	CS+
J1-09	O_RTS/CTS-		→	J2-27	CS-
J1-06	B_DCD/DCD+	Twisted pair no. 11	→	J2-13	RR+
J1-19	B_DCD/DCD-		→	J2-31	RR-

## Smart Serial Connection Signals and Pinouts

**Table 29 EIA/TIA-449 DCE Smart Serial Cable Pinout (continued)**

26-Pin	Signal Name	Note	Direction	DB-37 Pin	Signal Name
J1-07	O_DTR/DSR+	Twisted pair no. 10	—>	J2-11	DM+
J1-20	O_DTR/DSR-		—>	J2-29	DM-
J1-12	I_DTR/DSR+	Twisted pair no. 3	<—	J2-12	TR+
J1-25	I_DTR/DSR-		<—	J2-30	TR-
J1-13	B_LL/LL+	Twisted pair no. 12	—>	J2-10	LL
J1-26	GND+		—	J2-37	SC
J1-04	I_RXC/TXCE+	Twisted pair no. 6	<—	J2-17	TT+
J1-17	I_RXC/TXCE-		<—	J2-35	TT-

## X.21 Smart Serial Cable Assembly

Table 30 lists the DTE pinout and Table 31 lists the DCE pinout for the X.21 Smart Serial cable. Arrows indicate signal direction: —> means DTE to DCE and <— means DCE to DTE.

**Table 30 X.21 DTE Smart Serial Cable Pinout**

26-Pin	Signal Name	Note	Direction	DB-15 Pin	Signal Name
J1-21	MODE_2	Local connections			
J1-24	MODE_DCE				
Drain wire		Shield	—	J2-01	Shield_GND
J1-05	I_RXD/TXD+	Twisted pair no. 8	<—	J2-04	RECEIVE+
J1-18	I_RXD/TXD-		<—	J2-11	RECEIVE-
J1-01	O_TXD/RXD+	Twisted pair no. 5	—>	J2-03	TRANSMIT+
J1-14	O_TXD/RXD-		—>	J2-09	TRANSMIT-
J1-11	I_CTS/RTS+	Twisted pair no. 2	<—	J2-05	INDICATION+
J1-10	I_DSR/DTR+		<—	J2-12	INDICATION-

**Table 30 X.21 DTE Smart Serial Cable Pinout (continued)**

26-Pin	Signal Name	Note	Direction	DB-15 Pin	Signal Name
J1-08	O_RTS/CTS	Twisted pair no. 3	—>	J2-03	CONTROL+
J1-09	O_DTR/DSR+		—>	J2-10	CONTROL-
J1-26	GND+ Not used	Twisted pair no. 1	—	J2-08	CCT GND Not used
J1-04	I_RXC/TXCE+	Twisted pair no. 7	<—	J2-06	TIMING+
J1-17	I_RXC/TXCE-		<—	J2-13	TIMING-
	Not used	Twisted pair no. 4			Not used
	Not used	Twisted pair no. 6			Not used
	Not used	Twisted pair no. 9			Not used

**Table 31 X.21 DCE Smart Serial Cable Pinout**

26-Pin	Signal Name	Note	Direction	DB-15 Pin	Signal Name
J1-21	MODE_2	Local connections			
Drain wire		Shield	—	J2-01	Shield_GND
J1-05	I_RXD/TXD+	Twisted pair no. 5	<—	J2-02	TRANSMIT+
J1-18	I_RXD/TXD-		<—	J2-09	TRANSMIT-
J1-01	O_TXD/RXD+	Twisted pair no. 8	—>	J2-04	RECEIVE+
J1-14	O_TXD/RXD-		—>	J2-11	RECEIVE-
J1-11	I_CTS/RTS+	Twisted pair no. 3	<—	J2-03	CONTROL+
J1-10	I_DSR/DTR+		<—	J2-10	CONTROL-
J1-08	O_RTS/CTS	Twisted pair no. 2	—>	J2-05	INDICATION+
J1-09	O_DTR/DSR+		—>	J2-12	INDICATION-
J1-02	O_TXCE/RXC+	Twisted pair no. 7	—>	J2-06	TIMING+
J1-15	O_TXCE/RXC+		—>	J2-13	TIMING-

## Smart Serial Connection Signals and Pinouts

**Table 31 X.21 DCE Smart Serial Cable Pinout (continued)**

26-Pin	Signal Name	Note	Direction	DB-15 Pin	Signal Name
J1-26	GND Not used	Twisted pair no. 1	—	J2-08	CCT GND Not used
	Not used	Twisted pair no. 4			Not used
	Not used	Twisted pair no. 6			Not used
	Not used	Twisted pair no. 9			Not used

## V.35 Smart Serial Cable Assembly

Table 32 lists the DTE pinout and Table 33 lists the DCE pinout for the V.35 Smart Serial cable. Arrows indicate signal direction: —> means DTE to DCE and <— means DCE to DTE.

**Table 32 V.35 DTE Smart Serial Cable Pinout**

26-Pin	Signal Name	Note	Direction	V.35 Pin	Signal Name
J1-22	MODE_1	Local connections			
J1-23	MODE_0				
J1-24	MODE_DCE				
Drain wire		Shield	—	J2-A	Shield_GND
J1-06	B_DCD/DCD+	Twisted pair no. 1	<—	J2-F	RLSD
J1-19	GND+		—		GND
J1-13	B_LL/LL+	Twisted pair no. 3	—>	J2-K	LT
J1-26	GND		—	J2-B	GND
J1-05	I_RXD/TXD+	Twisted pair no. 9	<—	J2-R	RD+
J1-18	I_RXD/TXD-		<—	J2-T	RD-
J1-01	O_TXD/RXD+	Twisted pair no. 5	—>	J2-P	SD+
J1-14	O_TXD/RXD-		—>	J2-S	SD-

**Table 32 V.35 DTE Smart Serial Cable Pinout (continued)**

26-Pin	Signal Name	Note	Direction	V.35 Pin	Signal Name
J1-11	I_CTS/RTS+	Twisted pair no. 2	<—	J2-D	CTS
J1-12	I_DSR/DTR+		<—	J2-E	DSR
J1-08	O_RTS/CTS	Twisted pair no. 4	—>	J2-C	RTS
J1-07	O_DTR/DSR+		—>	J2-H	DTR
J1-04	I_RXC/TXCE+	Twisted pair no. 8	<—	J2-V	SCR+
J1-17	I_RXC/TXCE-		<—	J2-X	SCR-
J1-02	O_TCXE/RXC+	Twisted pair no. 6	—>	J2-U	SCTE+
J1-15	O_TXCE/RXC-		—>	J2-W	SCTE-
J1-03	B_TXC/TXC+	Twisted pair no. 7	<—	J2-Y	SCT+
J1-16	B_TXC/TXC-		<—	J2-AA	SCT-

**Table 33 V.35 DCE Smart Serial Cable Pinout**

26-Pin	Signal Name	Note	Direction	V.35 Pin	Signal Name
J1-22	MODE_1	Local connections			
J1-23	MODE_0				
Drain wire		Shield	—	J2-A	Shield_GND
J1-06	B_DCD/DCD+	Twisted pair no. 1	—>	J2-F	RLSD
J1-19	GND+		—		GND
J1-13	B_LL/LL+	Twisted pair no. 3	—>	J2-K	LT
J1-26	GND		—	J2-B	GND
J1-05	I_RXD/TXD+	Twisted pair no. 5	<—	J2-P	SD+
J1-18	I_RXD/TXD-		<—	J2-S	SD-
J1-01	O_TXD/RXD+	Twisted pair no. 9	—>	J2-R	RD+
J1-14	O_TXD/RXD-		—>	J2-T	RD-
J1-11	I_CTS/RTS+	Twisted pair no. 4	<—	J2-C	RTS
J1-12	I_DSR/DTR+		<—	J2-H	DSR

## Smart Serial Connection Signals and Pinouts

**Table 33 V.35 DCE Smart Serial Cable Pinout (continued)**

26-Pin	Signal Name	Note	Direction	V.35 Pin	Signal Name
J1-08	O_RTS/CTS	Twisted pair no. 2	—>	J2-D	CTS
J1-07	O_DTR/DSR+		—>	J2-E	DSR
J1-04	I_RXC/TXCE+	Twisted pair no. 6	<—	J2-U	SCTE+
J1-17	I_RXC/TXCE-		<—	J2-W	SCTE-
J1-02	O_TCXE/RXC+	Twisted pair no. 8	—>	J2-V	SCR+
J1-15	O_TXCE/RXC-		—>	J2-X	SCR-
J1-03	B_TXC/TXC+	Twisted pair no. 7	—>	J2-Y	SCT+
J1-16	B_TXC/TXC-		—>	J2-AA	SCT-

## EIA-530 Smart Serial Cable Assembly

Table 34 lists the DTE pinout and Table 35 lists the DCE pinout for the EIA-530 Smart Serial cable. Arrows indicate signal direction: —> means DTE to DCE and <— means DCE to DTE.

**Table 34 EIA-530 DTE Smart Serial Cable Pinout**

26-Pin	Signal Name	Note	Direction	DB-25 Pin	Signal Name
J1-21	MODE_2	Local connections			
J1-23	MODE_0				
J1-24	MODE_DCE				
Drain wire		Shield	—	J2-01	Shield_GND
J1-06	B_DCD/DCD+	Twisted pair no. 11	<—	J2-08	CF(A); DCD+
J1-19	B_DCD/DCD-		<—	J2-10	CF(B); DCD-
J1-13	B_LL/LL+	Twisted pair no. 12	—>	J2-18	LL
J1-26	GND		—	J2-07	GND
J1-05	I_RXD/TXD+	Twisted pair no. 9	<—	J2-03	BB(A); RXD+
J1-18	I_RXD/TXD-		<—	J2-16	BB(B); RXD-



**Table 34 EIA-530 DTE Smart Serial Cable Pinout (continued)**

26-Pin	Signal Name	Note	Direction	DB-25 Pin	Signal Name
J1-01	O_TXD/RXD+	Twisted pair no. 5	—>	J2-02	BA(A); TXD+
J1-14	O_TXD/RXD-		—>	J2-14	BA(B); TXD-
J1-11	I_CTS/RTS+	Twisted pair no. 4	<—	J2-05	CB(A); CTS+
J1-10	I_DSR/RTS-		<—	J2-13	CB(B); CTS-
J1-03	B_TXC/TXC+	Twisted pair no. 7	<—	J2-15	DB(A); TXC+
J1-16	B_TXC/TXC-		<—	J2-12	DB(B); TXC-
J1-12	I_DSR/DTR+	Twisted pair no. 10	<—	J2-06	CC(A); DSR+
J1-25	I_DSR/DTR-		<—	J2-22	CC(B); DSR-
J1-08	O_RTS/CTS	Twisted pair no. 1	—>	J2-04	CA(A); RTS+
J1-09	O_RTS/CTS-		—>	J2-19	CA(B); RTS-
J1-04	I_RXC/TXCE+	Twisted pair no. 8	<—	J2-17	DD(A); RXC+
J1-17	I_RXC/TXCE-		<—	J2-09	DD(B); RXC-
J1-02	O_TCXE/RXC+	Twisted pair no. 6	—>	J2-24	DB(A); TXCE+
J1-15	O_TCXE/RXC-		—>	J2-11	DB(B); TXCE-
J1-03	B_TXC/TXC+	Twisted pair no. 7	<—	J2-15	DB(A); TXC+
J1-16	B_TXC/TXC-		<—	J2-12	DB(B); TXC-
J1-07	O_DTR/DSR+	Twisted pair no. 3	—>	J2-20	CD(A); DTR+
J1-20	O_DTR/DSR-		—>	J2-23	CD(B); DTR-
	Not used	Twisted pair no. 2			Not used

**Table 35 RS-530A DCE Smart Serial Cable Pinout**

26-Pin	Signal Name	Note	Direction	DB-25 Pin	Signal Name
J1-21	MODE_2	Local connections			
J1-22	MODE_1				
J1-24	MODE_DCE				
Drain wire		Shield	—	J2-01	Shield_GND

## Smart Serial Connection Signals and Pinouts

**Table 35 RS-530A DCE Smart Serial Cable Pinout (continued)**

26-Pin	Signal Name	Note	Direction	DB-25 Pin	Signal Name
J1-06	B_DCD/DCD+	Twisted pair no. 11	<—	J2-08	CF(A); DCD+
J1-19	B_DCD/DCD-		<—	j2-10	CF(B); DCD-
J1-13	B_LL/LL+	Twisted pair no. 12	—>	J2-18	LL
J1-26	GND		—	J2-07	AB; GND
J1-05	I_RXD/TXD+	Twisted pair no. 9	<—	J2-03	BB(A); RXD+
J1-18	I_RXD/TXD-		<—	J2-16	BB(B); RXD-
J1-01	O_TXD/RXD+	Twisted pair no. 5	—>	J2-02	BA(A); TXD+
J1-14	O_TXD/RXD-		—>	J2-14	BA(B); TXD-
J1-11	I_CTS/RTS+	Twisted pair no. 4	<—	J2-05	CB(A); CTS+
J1-10	I_DSR/RTS-		<—	J2-13	CB(B); CTS-
J1-12	I_DSR/DTR+	Twisted pair no. 10	<—	J2-06	CC(A); DSR+
J1-25	GND		—		AC; GND
J1-03	B_TXC/TXC+	Twisted pair no. 7	<—	J2-15	DB(A); TXC+
J1-16	B_TXC/TXC-		<—	J2-12	DB(B); TXCS-
J1-08	O_RTS/CTS	Twisted pair no. 1	—>	J2-04	CA(A); RTS+
J1-09	O_RTS/CTS-		—>	J2-19	CA(B); RTS-
J1-04	I_RXC/TXCE+	Twisted pair no. 8	<—	J2-17	DD(A); RXC+
J1-17	I_RXC/TXCE-		<—	J2-09	DD(B); RXC-
J1-02	O_TCXE/RXC+	Twisted pair no. 6	—>	J2-24	DB(A); TXCE+
J1-15	O_TXCE/RXC-		—>	J2-11	DB(B); TXCE-
J1-03	B_TXC/TXC+	Twisted pair no. 7	<—	J2-15	DB(A); TXC+
J1-16	B_TXC/TXC-		<—	J2-12	DB(B); TXC-
J1-07	O_DTR/DSR+	Twisted pair no. 3	—>	J2-20	CD(A); DTR+
J1-20	GND+		—	J2-23	AC; GND
	Not used	Twisted pair no. 2			Not used