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Meridian 1

# **QPC918 High Speed Data Card**

Description, installation and operation

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# Revision history

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Standard, release 1.0. Reissued for compliance with Northern Telecom standard 164.0.

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Standard, release 2.0. This document was reissued to include technical content updates. Because of the extent of the changes, revision bars were not used.

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## General information

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The QPC918 High Speed Data Card (HSDC) provides an RS-232-C/V.35 interface between compatible asynchronous or synchronous Data Terminal Equipment (DTE) and the Meridian SL-1 switching network. The HSDC provides connectivity to the DTEs for intra-switch communications, as well as for wide area communications over Digital Trunk Interface (DTI) or Primary Rate Interface (PRI) links to other Northern Telecom equipment.

The HSDC capabilities are similar to the High Speed Data Module (HSDM) QMT21. Refer to *QMT21 High Speed Data Module description, installation, and operation* (553-2731-107) for further information. Each HSDC supports two data ports that operate independently of each other in synchronous and asynchronous modes. Each port provides call originating and answering capabilities. In the answering mode, the HSDC adapts to the originating Meridian SL-1 data module characteristics (speed and mode of transmission, for example). The HSDC is mounted in slots one through eight of a standard Multi-Channel Data System (MCDS) shelf.

The HSDC, like the HSDM, interfaces with the data port of the Four Port Data Line Card (DLC) QPC432.

The HSDC can also connect to a QPC311 DLC. However, the QPC311 is being replaced by the QPC432 Four Port DLC.

The Four Port DLC can be installed in slots one through ten in the following peripheral equipment (PE) modules or shelves: NT8D13 (PE module), QSD64, QSD65, QSD80, QSP35, and QSP36.

## Purpose

The HSDC provides an interface to high-speed synchronous devices, such as front end processors, group IV facsimile equipment, or video conferencing ports. It also provides an interface to the Multi-Channel Data System (MCDS) and Meridian 1. In the synchronous mode, it supports data speeds up to 64,000 bits per second.

The HSDC works with the DTE only. The HSDC does not interface directly to modems or data communication equipment.

When the HSDC is used as an RS-232 interface unit, the HSDC can replace an Asynchronous/Synchronous Interface Module (ASIM) QMT11 or Asynchronous Interface Line Card (AIRC) QPC397. The HSDC meets the DTE/DCE interface requirements of the Electronics Industries Association (EIA) RS-232-C standard. The electrical characteristics of the interface to the Data Line Card (DLC) QPC311 or to the Four Port DLC QPC432 are the same as for the ASIM and AIC.

*Note:* The HSDC V.35 interface conforms to the CCITT V.35 electrical standard and to the ISO 2110 mechanical standard. When the HSDC is used as a V.35 interface unit, an adapter cable is needed to convert the ISO 2110 (DB-25) into an ISO 2593 (34-pin rectangular connector).

## Features

The following features are supported by the HSDC:

- RS-232-C/V.35 interface
- Up to 64 kbps in synchronous mode
- Hot Line
- Auto/Speed Dial
- Ring Again
- Remote Loopback
- Echo (automatically with keyboard dialing)
- Originate/Answer data calls
- Outbound Modem Pool Call

- Forced Digitone Receiver (DTR)
- Virtual Leased Line
- Keyboard dialing in asynchronous mode
- Self Diagnostics

## Related documents

Refer to the following documents for complete information about the Meridian 1 data features:

- *Meridian Data Services description (553-2731-100)*
- *QPC723 RS-232 Interface Line Card description, installation, and operation (553-2731-106)*
- *QMT21 High Speed Data Module description, installation, and operation (553-2731-107)*
- *Meridian data features traffic engineering and configuration (553-2731-151)*
- *Meridian data features operation and tests (553-2731-300)*
- *High Speed Data Module user guide (P0696749)*

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# Functional description

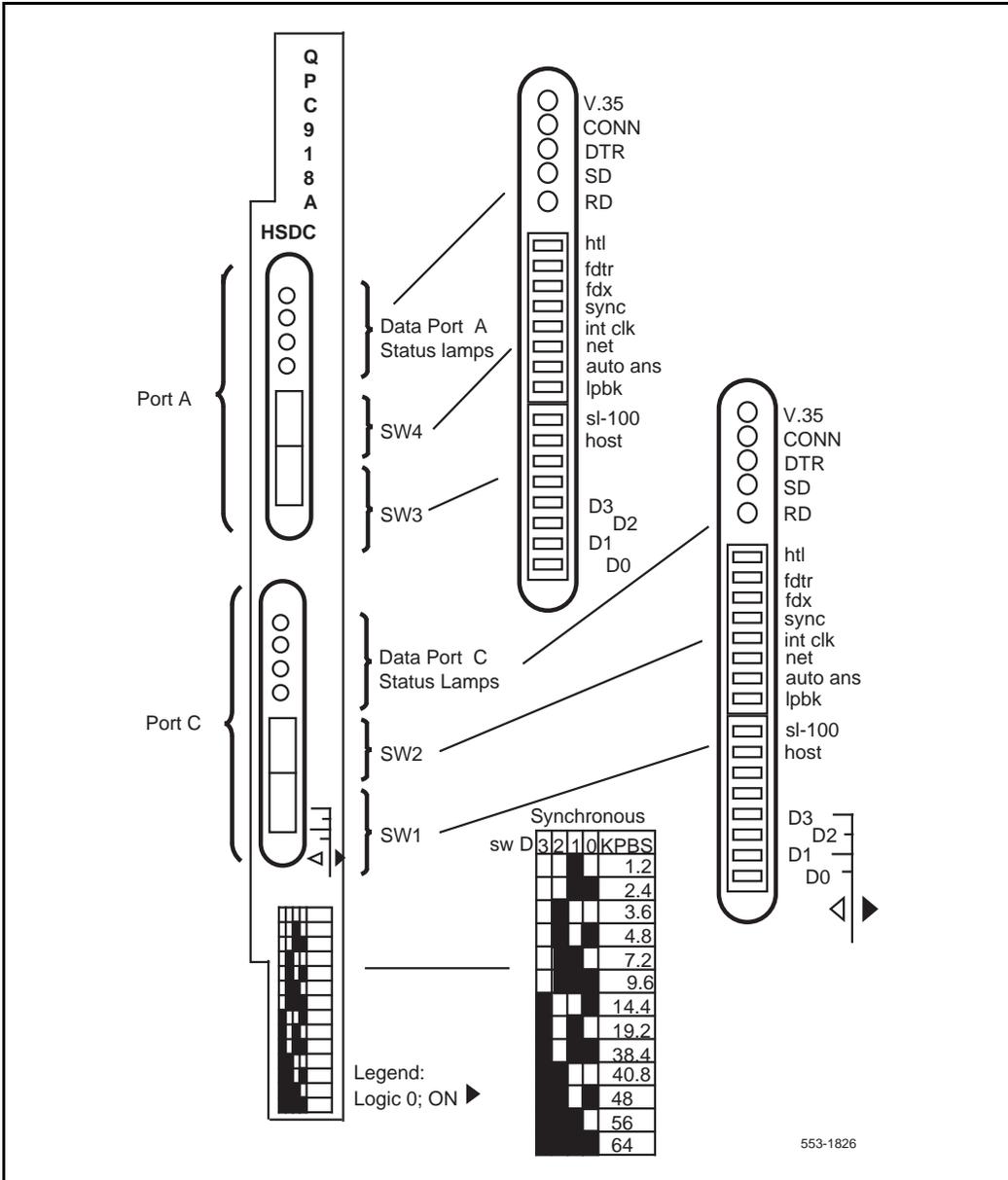
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## Controls and indicators

The HSDC supports full duplex (FDX) mode only in asynchronous transmission. In synchronous transmission, it supports both full duplex (FDX) and half duplex (HDX) operational modes.

In asynchronous or synchronous transmission modes, each port operates independently of the other. Each port adapts to the mode of the originating (calling) Meridian 1 data module, except for the Asynchronous/Synchronous mode. Asynchronous/Synchronous modes are set up by SW2 for Port C and SW4 for Port A. The modes are controlled by the switches mounted on the QPC918 faceplate. The layout of the faceplate is shown in Figure 1.

**Figure 1**  
**High Speed Data Card (HSDC) faceplate**



## Mode switches

The HSDC has four recessed 8-position DIP mode switches. The functions controlled by these switches follow:

SW2 (Port C), SW4 (Port A)		SW1 (Port C), SW3 (Port A)	
S 1:	OFF/Hot Line ( <b>htl</b> )	S 1:	SL-1 or DMS\SL-100
S 2:	OFF/Forced Digitone Receiver ( <b>fdtr</b> )	S 2:	Terminal/Host
S 3:	HDX/FDX	S 3:	Reserved 1
S 4:	Asynch/Synch	S 4:	Reserved 2
S 5:	Ext/Int Clock	S 5:	D3-Speed Selection
S 6:	Modem/Network	S 6:	D2-Speed Selection
S 7:	Manual/Auto Answer	S 7:	D1-Speed Selection
S 8:	OFF/Loopback ( <b>lpbk</b> )	S 8:	D0-Speed Selection

Only the options on the right side, such as **htl**, **fdtr**, and **FDX**, are labeled on the faceplate.

An echo mode is not provided as an option, but characters will be echoed during keyboard dialing.

## Virtual Leased Line

To control the Virtual Leased Line (VLL) mode, set SW2 or SW4 to the **htl** and **fdtr** position. In the VLL mode, the HSDC waits 1.5 seconds after the call is disconnected and then begins to hot line continuously. The HSDC waits 40 seconds for the call to connect before aborting the call and starting over. Stop the VLL by setting either the Hot Line (**htl**) or Forced Digitone Receiver (**fdtr**) switch to the OFF position.

## SW2, SW4 definitions

S 1—OFF/Hot Line (htl). This switch is provided for the user who wishes to always access a particular data station. An autodial is initiated whenever the DTR lead goes from OFF to ON.

S 2—OFF/Forced DTR (fdtr). This switch forces the DTR lead to be high. This mode allows the High Speed Data Module (HSDM) to originate or answer a data call in the absence of a true hardware DTR.

S 3—HDX/FDX. This switch is provided for half or full duplex data transmission.

S 4—Asynch/Synch. This switch is provided for asynchronous or synchronous data transmission.

S 5—Ext/Int Clock. The external clock of the Ext/Int Clock Switch is used when the device connected to the HSDC controls the transmit clock. The internal clock is used when the HSDC controls the transmit clock. The receive clock is always controlled by the HSDC.

S 6—Modem/Network. In the synchronous mode, the modem setup of the switch is used for all connections except for connection to a digital network, such as through a Digital Service Unit (DSU) when the HSDC port clock (Txc and Rxc) is synchronized to the DSU's clock (Txc and Rxc).

S 7—Manual/Auto Answer. This switch is provided for the user to answer an incoming call manually or automatically. To manually answer an incoming call, enter carriage return <CR>. In the asynchronous mode, the HSDC provides both manual and auto-answer capability. In the synchronous mode, only auto-answer is provided. **A manual setting will result in the call not being answered.**

S 8—OFF/Loopback. This switch permits the local calling HSDC to force the far end data module into a Remote Loopback test mode. The switch is provided for maintenance personnel to diagnose problems. Refer to "Troubleshooting" on page 43 for diagnostic and maintenance procedures.

## SW1, SW3 definitions

S 1—SL-1 or DMS\SL-100. Because of the protocol difference between the HSDC and the DMS\SL-100 Data Unit (DU), when the DU calls the HSDC in the synchronous mode, the HSDC always goes into a full duplex mode. If half duplex mode is desired, the HSDC should have the **SL-1** or **DMS\SL-100** switch set to **DMS\SL-100**. Setting the switch to **DMS\SL-100** still allows the HSDC to answer the call automatically, but in the half duplex mode.

S 2—Terminal/Host. In the asynchronous mode, when the switch is set to **terminal**, prompts are provided for keyboard dialing. When the switch is set to **host**, prompts are not sent to the DTE.

S 3 and S 4—These switches are reserved for future use and should be set to the OFF position.

S 5 to S 8—These switches are reserved for synchronous speed selection.

## Data Port Status lamps

Table 1 gives the definitions of the Data Port Status lamps.

**Table 1**  
**Data Port Status lamps**

Indicator	Description
V.35	The V.35 LED lights when the HSDC is internally configured for the V.35 interface.
CONN	The CONNECT lamp is lit when a data call is connected between the HSDC port and the data module at the far end.
DTR	The DTR LED is lit to indicate that the DTR is ON from the attached device or is forced ON by the Forced DTR setting.
RD	The RD LED is lit when the DTE receives data.
SD	The SD LED is lit when the DTE transmits data.

## Keyboard dialing

Keyboard dialing (KBD) allows the user to initiate and terminate data calls to in-house or remote hosts using the terminal keyboard of a DTE.

KBD capability is supported for ASCII, asynchronous, character mode, interactive terminals equipped with an EIA RS-232-C or CCITT V.35 interface. It is not provided for synchronous or block mode terminals.

The HSDC and KBD provide the following features and capabilities:

- Call origination to local and remote hosts
- Ring Again capability
- Autodial data calling
- Speed Call data calling
- Auto-answer
- Manual-answer
- Asynchronous data transmission rate of 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200 bps
- Asynchronous Mode Autobaud and Autoparity features. On initial power up, a default speed of 1200, 2400, 4800, 9600, or 19200 bps is used. The default speed is selected by the SYNC speed switch setting. If the switch is not set to any of the five speed settings, the HSDC defaults to 9600 bps.
- The HSDC detects the speed on receipt of the carriage-return (<CR>) character. If the parity of the terminal matches the HSDC default setting (8 bits, no parity), the HSDC echoes a legible prompt on the screen. If the parity does not match, an illegible prompt appears on the screen. **When this happens, enter a period (.) and carriage-return (<CR>) to force the HSDC to detect the parity and to echo a legible prompt on the screen.**

- After having autobauded once, the HSDC remembers the current speed and continues to use the same speed if not again autobauded.
- The HSDC returns to the default mode when
  - The terminal powers OFF and ON
  - After a Control Z, Break, DTR OFF, or call disconnection from the far end

For complete descriptions of all keyboard dialing procedures, see the *High Speed Data Module user guide* (P0696749).

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# Interface specifications

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## Meridian 1 interface

The Multi-Channel Data System (MCDS) shelf containing HSDCs interfaces with Meridian 1 by the QPC311 Data Line Card (DLC) or QPC432 Four Port Data Line Card (Four Port DLC). A connecting loop wire gauge selection is provided on the HSDC. The selection plugs (J3 for Port C, J4 for Port A) select either 22/24-gauge inside wire or 24/26-gauge outside wire. J3 and J4 are not accessible from the faceplate (see Figure 2). To select wire gauge, remove the HSDC card from the MCDS shelf.

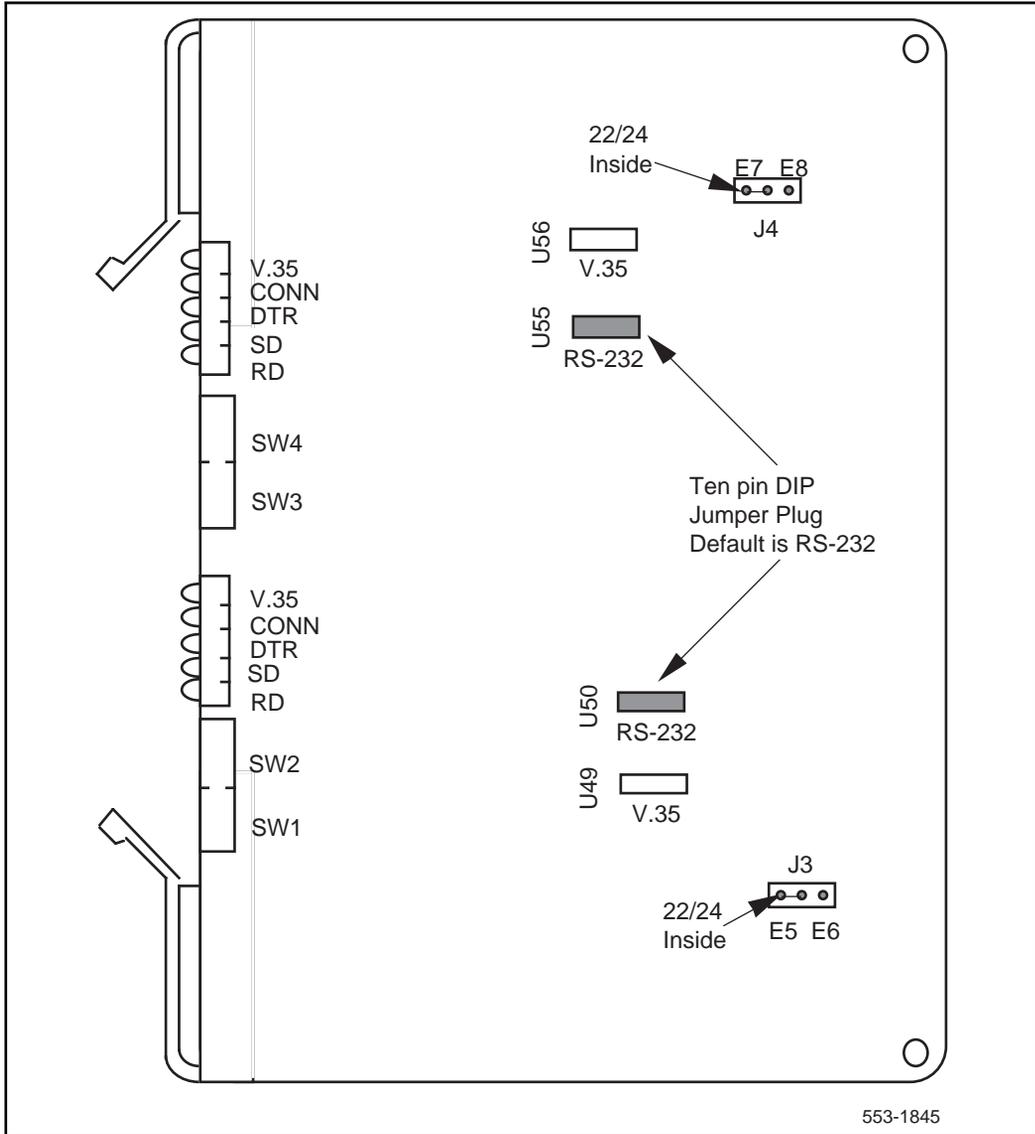
*Note:* The QPC432 replaces the QPC311 DLC, which is available for repair only and cannot be ordered as new equipment.

## RS-232 interface

For RS-232 interface configuration, place a 10-pin DIP jumper plug on the QPC918 board in the RS-232 position.

When the HSDC is used as an RS-232 interface unit, the HSDC can replace an Asynchronous/Synchronous Interface Module (ASIM) and Asynchronous Interface Card (AIC) completely. The HSDC meets the DCE and DTE interface requirements of the EIA RS-232-C standard.

Figure 2  
High Speed Data Card jumper locations



A 10-pin DIP jumper plug must be inserted in the correct socket of the HSDC, as shown in Table 2, to support RS-232-C or V.35 interfaces.

**Table 2**  
**HSDC interface selection**

Port	Interface Type	Install 10-pin DIP at Location
Port A	RS-232-C	U55
	V.35	U56
Port C	RS-232-C	U50
	V.35	U49

Table 3 shows the EIA leads supported by the HSDC and Multi-Channel Data System (MCDS) Port A or Port C.

**Table 3**  
**EIA signals supported by the HSDC (Part 1 of 2)**

Pin No.	Description	CKT	From	To
<b>Ground Leads</b>				
1 (Note 1)	Protective Ground	AA	—	—
7	Signal Ground (SG)	AB	—	—
<b>Control Leads</b>				
4	Request To Send (RTS)	CA	DTE	HSDC
5	Clear To Send (CTS)	CB	HSDC	DTE
6	Data Set Ready (DSR)	CC	HSDC	DTE
8	Carrier Detect (CD)	CF	HSDC	DTE
15	Serial Clock Receive (SCR)	DD	HSDC	DTE
17	Serial Clock Transmit (SCT)	DB	HSDC	DTE

**Table 3**  
**EIA signals supported by the HSDC (Part 2 of 2)**

Pin No.	Description	CKT	From	To
20	Data Terminal Ready (DTR)	CD	DTE	HSDC
22	Ring Indicator (RI)	CE	HSDC	DTE
23	Data Rate Selector	CH/CI	—	—
24	Ext Transmit Clock (SCTE)	DA	DTE	HSDC
25 (Note 2)	Busy out	BO	DTE	HSDC
<b>Data Leads</b>				
2	Transmit Data (TD)	BA	DTE	HSDC
3	Receive Data (RD)	BB	HSDC	DTE
<b>Note 1:</b> Pin 1 is connected to the MCDS shelf frame.				
<b>Note 2:</b> Pin 25 is connected to an RS-232 receiver on the HSDC but is ignored by the HSDC.				

## V.35 interface

For V.35 interface configuration, remove a 10-pin DIP jumper plug on the HSDC from the RS-232 socket and install it in the V.35 socket.

The HSDC V.35 interface conforms electrically to the CCITT V.35 standard and mechanically to the ISO 2110 (DB-25). When the HSDC is used as a V.35 interface unit, use an adapter cable to convert the ISO 2110 connector on the MCDS backplane into an ISO 2593 (34-pin rectangular connector).

The HSDC is shipped from the factory configured for the RS-232 interface. The V.35 is configured only when required by the application.

Table 4 shows the V.35 (CCITT) leads supported by the HSDC and MCDS Port A or Port C.

**Table 4**  
**V.35 (CCITT) signals supported by the HSDC and MCDS (Part 1 of 2)**

Pin No.	Description	EIA Signals	Abbrev.	CCITT	DB-25 Pin No.	V.35 Pin No.
1	Protective Ground (Note 2)	AA	DG	101	1	A
2	Transmitted Data A	BA	SDA	103A	2	P
3	Receive Data A	BB	RDA	104A	3	R
4	Request to Send	CA	RTS	105	4	C
5	Clear to Send	CB	CTS	106	5	D
6	Data Set Ready	CC	DSR	107	6	E
7	Signal Ground	AB	SG	102	7	B
8	Carrier Detect	CF	CD	109	8	F
9	No connection	—	—	—	9	CC
10	No connection	—	—	—	10	L
11	— (Note 3)	—	—	—	11	K
12	Receive Signal Element Timing B	SBA	SCRB	115B	12	X
13	Transmitted Data B	SBB	SDB	103B	13	S
14	Transmitted Signal B Element Timing	—	SCTB	114B	14	AA
15	Transmitter Signal A Element Timing	—	SCTA	114A	15	Y
16	Receive Data B	—	RDB	104B	16	T
17	Receiver Signal Element Timing A	—	SCRA	115A	17	V
18	No connection	—	—	—	18	M

**Table 4**  
**V.35 (CCITT) signals supported by the HSDC and MCDS (Part 2 of 2)**

Pin No.	Description	EIA Signals	Abbrev.	CCITT	DB-25 Pin No.	V.35 Pin No.
19	No connection	—	—	—	19	HH
20	Data Terminal Ready	CD	DTR	108.2	20	H
21	No connection	—	—	—	21	EE
22	Ring Indicator	CE	RI	125	22	J
23	Transmitter Signal Element Timing A	CH/CI	SCTEA	113B	23	W
24	Transmitter Signal Element Timing B	DA	SCTEB	113A	24	U
25	Busy Out (Note 3)	—	—	—	25	MM

**Note 1:** Leads not specified are not used.

**Note 2:** Pin 1 is connected to the MCDS shelf frame.

**Note 3:** When the HSDC is configured for the V.35 interface, pins 11 and 25 are still connected to an RS-232-C receiver.

## Data transmission rates

The data rates the HSDC supports are listed in Table 5. These speeds can be set by four switches labeled D0, D1, D2, and D3 on the faceplate.

In the asynchronous mode, there is one stop bit for all speeds except for 110 bps. There are two stop bits at 110 bps. The HSDC operates only in full duplex mode with 8 bits, including parity. The HSDC supports the asynchronous speeds of 110, 150, 300, 600, 1200, 2400, 4800, 9600, or 19200 bps. The HSDC will always autobaud to the DTE baud rate.

In the asynchronous mode, when the HSDC is first powered up, the default speed of either 1200, 2400, 4800, 9600, or 19200 is selected. This speed is determined by the D0, D1, D2, and D3 switch settings on the HSDC faceplate. After autobauding, the HSDC remembers the terminal speed (current speed). If the HSDC does not autobaud, it remembers the previous speed. If the switch settings are not set to one of the five speeds, 9600 bps is used as a default.

In the synchronous mode, the speeds available are listed in Table 5. The synchronous speeds are determined by the D0, D1, D2, and D3 switch settings. The speed can be changed only in the idle state.

**Table 5**  
**Data transmission rates and switch settings**

Asynchronous Mode (bps)	Synchronous Mode (bps)	Faceplate Switch Settings (SW1 or SW3)			
		D3	D2	D1	D0
—	—	OFF	OFF	OFF	OFF
—	—	OFF	OFF	OFF	ON
1200	1200	OFF	OFF	ON	OFF
—	3600	OFF	ON	OFF	OFF
4800	4800	OFF	ON	OFF	ON
—	7200	OFF	ON	ON	OFF
9600	9600	OFF	ON	ON	ON
—	—	ON	OFF	OFF	ON
19200	19200	ON	OFF	ON	OFF
—	38400	ON	OFF	ON	ON
—	40800	ON	ON	OFF	OFF
—	48000	ON	ON	OFF	ON
—	56000	ON	ON	ON	OFF
—	64000	ON	ON	ON	ON

**Note:** In the asynchronous mode, incoming data calls operating at speeds other than 110, 150, 300, 600, 1200, 2400, 4800, 9600, or 19200 bps will be disconnected and an appropriate message sent to the user screen. Each port will adapt to the data rate of the calling Meridian SL-1 data module.

## Data code and parity

The HSDC supports asynchronous data terminals using 7 bit ASCII code, 1 or 2 stop bits, and odd, even, space, or mark parity.

In asynchronous mode, the HSDC uses the autobaud and autoparity feature to automatically detect the speed and parity of the DTE. The procedure for autobaud and autoparity is as follows:

- The HSDC detects the speed of the carriage-return (<CR>) ASCII character. If the parity of the terminal matches the default (8 bit, space parity), the HSDC echoes legible prompts on the screen. Otherwise illegible prompts appear on the screen. To re-autoparity, enter period (.) and a carriage-return (<CR>). After the HSDC detects the parity, legible prompts will be echoed on the screen. This is the standard procedure used on all other SL-1 data products.
- The HSDC goes back to default mode under the following conditions:
  - The DTE power goes from ON to OFF, then returns to ON
  - After a Control Z, Break, DTR OFF, or call disconnection from the far end

## Re-downline loading

The HSDC is capable of accepting re-downline loading of the configuration parameters in the asynchronous mode.

## Power requirements

The HSDC is powered from an MCDS power supply. The power requirements per card are shown below.

Voltage	Tolerance	Current	
		Nominal	Maximum
+5 V dc	±5%	1.4 amp	2.1 A
+12 V dc	±10%	24 mA	0.2 A
-9 V dc	±10%	30 mA	0.2 A
+9 V dc	±10%	30 mA	0.2 A

A total of 1.7 A is required from the MCDS 110 V ac power receptacle when the MCDS shelf is fully loaded with eight HSDCs.

## Environmental

The HSDC is designed to operate without degradation under the following conditions.

Specification	Operating	Storage
Ambient temperature	0 to 50°C	-40 to 70°C
Relative humidity (noncondensing)	10 to 95%	0 to 95%

## Reliability

The HSDC has a predicted mean time between failure (MTBF) of 29.3 years at 40°C.

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# Installation

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## Multi-Channel Data System (MCDS)

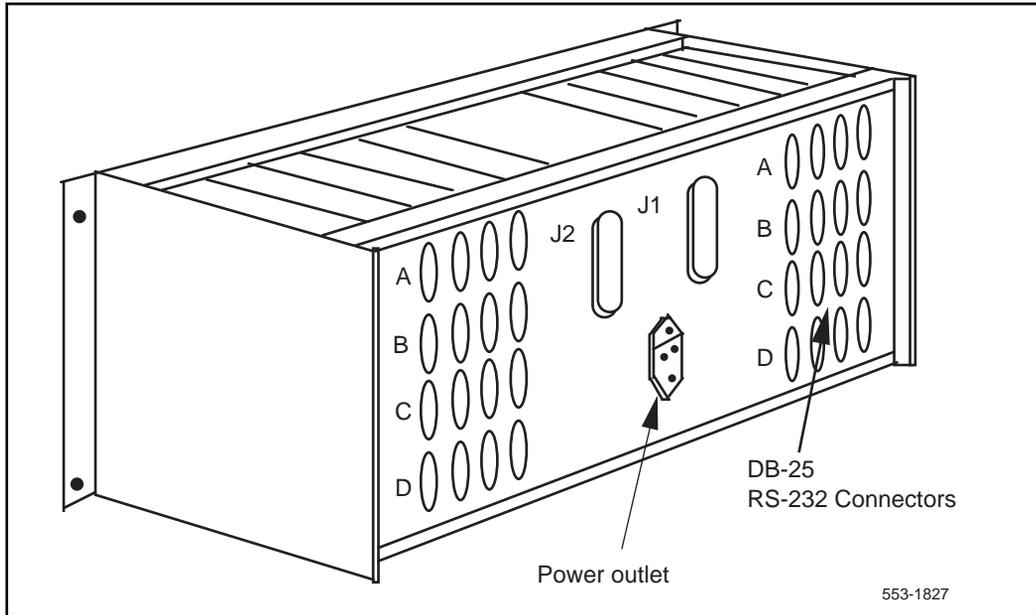
The MCDS is for use in computer rooms for interfacing multiple computer ports to the Meridian 1. The HSDC is mounted in the standard MCDS shelf (QSD27). Each shelf can accommodate up to eight HSDCs, eight Asynchronous Interface Line Cards (AILC QPC397), or any combination of the two, totaling eight. For each AILC, the MCDS shelf identifies four ports (units) A, B, C, and D. The HSDC supports two data ports per card. As a result, it uses only ports (units) A and C of the MCDS shelf.

The major equipment required to implement the MCDS is listed here:

— MCDS Shelf	QSD27
— MCDS Power Supply 110V	QSY27
— MCDS Power Supply 220V	QSY32
— 2-Port High Speed Data Card	QPC918
— 4-Port Line Card	QPC432
— 4-Port Asynch. Interface Card	QPC397
— MCDS Desk Cabinet (optional)	QCA77
— MCDS Rack Cabinet (optional)	QCA76

**The MCDS shelf** (Figure 3) houses a center-mounted power supply and four HSDCs or AILCs mounted on each side of the power supply (a total of eight). It can be either a stand-alone unit on an equipment frame or mounted in the MCDS cabinet. It is equipped with front flange mounting brackets and is 19 in. wide, 14 in. high, and 14.25 in. deep.

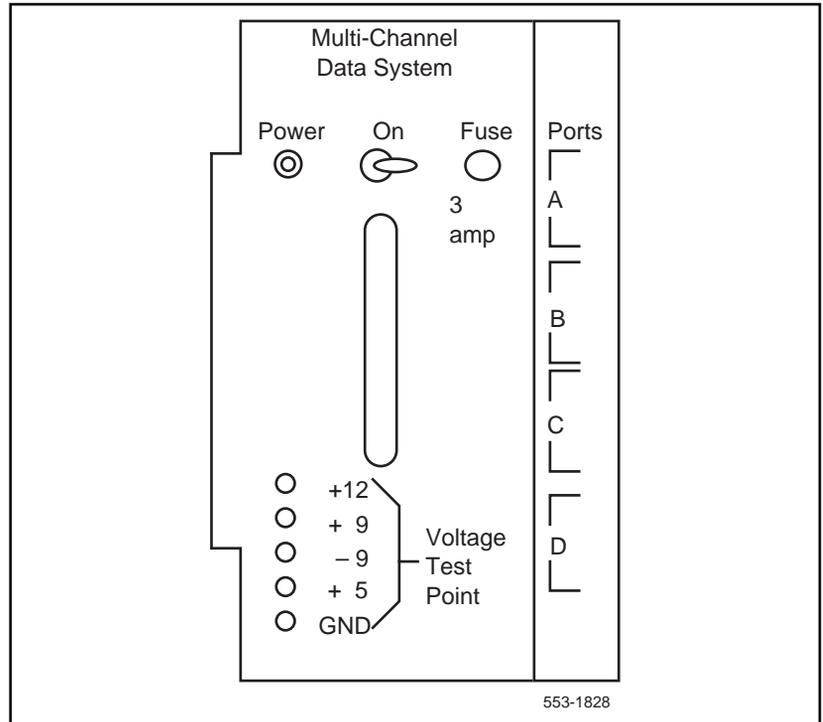
Figure 3  
MCDS QSD27 shelf



553-1827

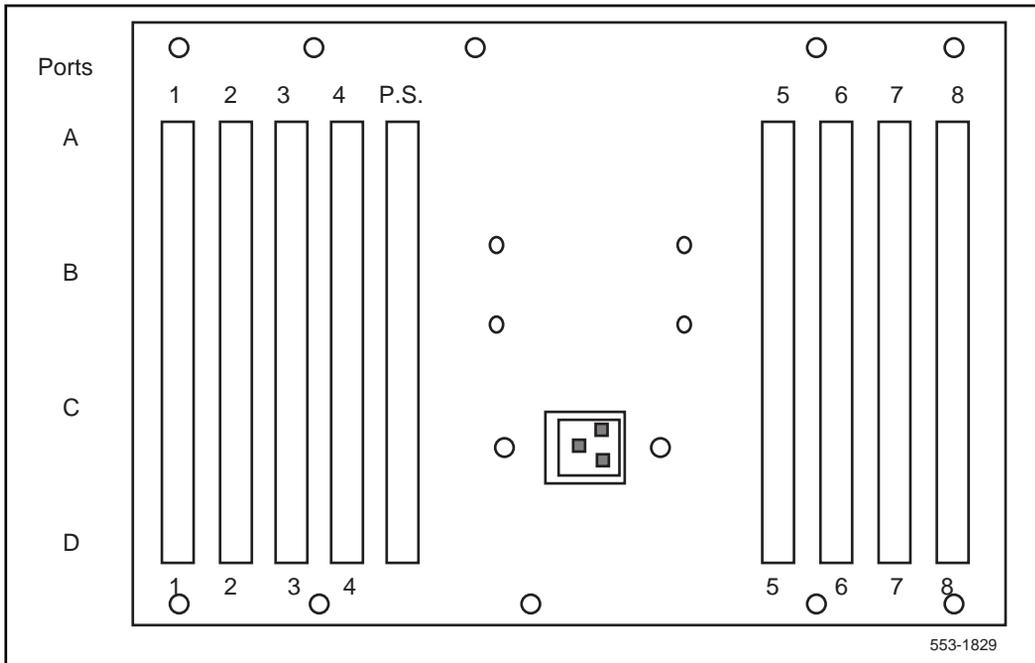
The **MCDS power supply** (Figure 4) is an off-line, switched mode supply that provides multiple, regulated, and protected DC voltage to the shelf backplane. It requires 1.7 A from a 110V, 60 Hz AC source. An optional MCDS power supply (QSY32) is available that connects to 220 V Hz AC lines.

**Figure 4**  
**MCDS power supply**



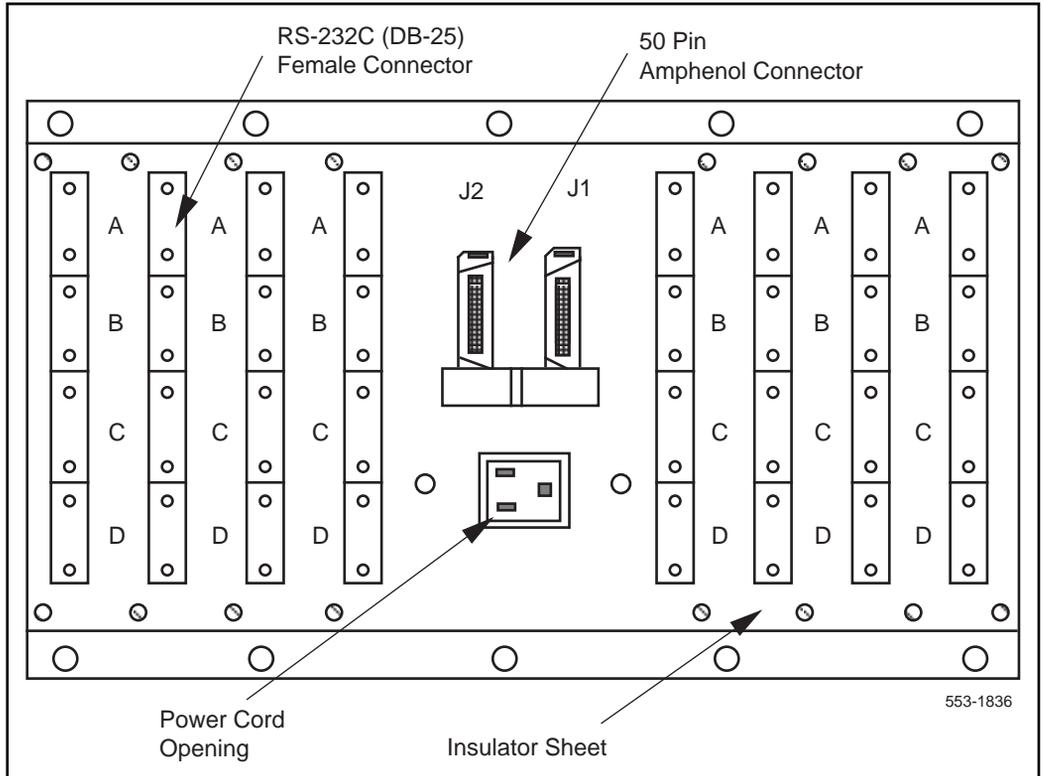
**The MCDS backplane** (Figures 5 and 6), that is a part of the shelf assembly, has two-sided circuitry. It is equipped with nine 160-pin connectors to receive the interface cards and shelf power supply. It is also equipped with two 25-pair standard Amphenol type plugs (J1, J2) to connect to the Meridian 1, and 32 female, standard RS-232-C (DB-25) connectors to provide interface to the computer ports (DTEs). The backplane is also provided with an insulator sheet on the rear surface to prevent accidental shorting of the traces with metal connector hoods.

**Figure 5**  
**MCDS backplane (front view)**



**The Spectron patch panel** is inserted between the MCDS and the DTE computer ports to provide a convenient means of rearranging interconnections and for maintenance diagnostics. Each panel contains 16 plug-in modules. To monitor a 2-shelf MCDS cabinet, two panels are required.

**Figure 6**  
**MCDS backplane (rear view)**



**The AILC card** supports four asynchronous DTEs that use 7-bit ASCII code and 1 or 2 stop bits. It supports full duplex (FDX) and half duplex (HDX) modes of operation and provides auto-answer capability only.

**The QPC432 4PDLC** supports two HSDCs or one AILC.

## MCDS shelf to DTE connection

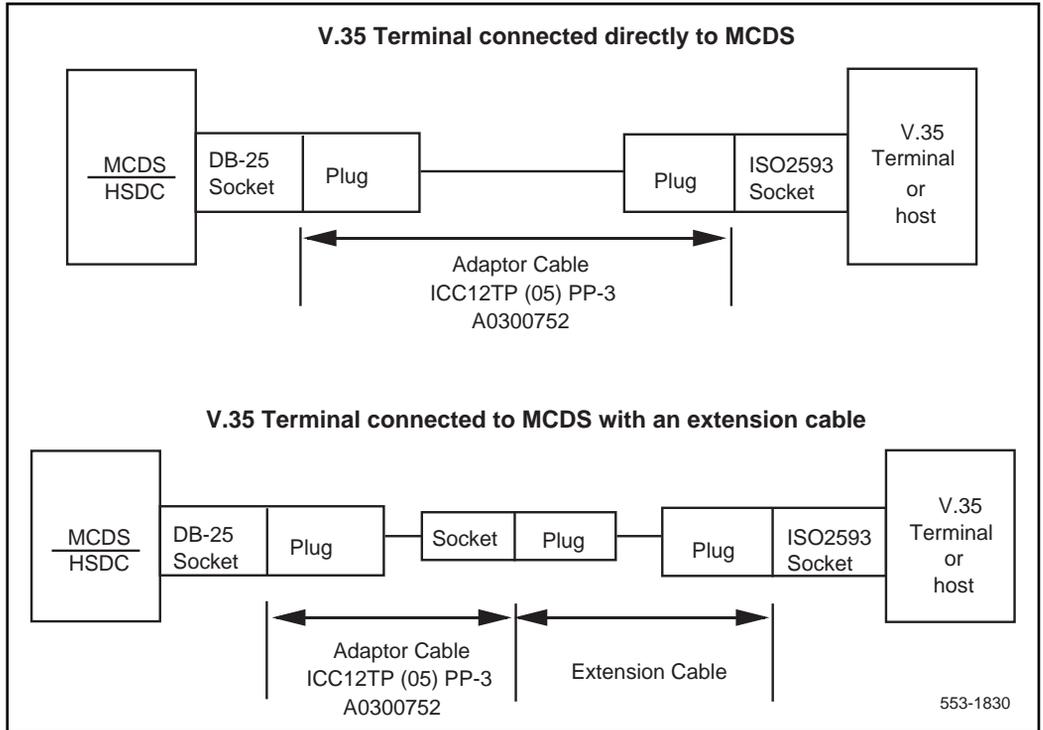
When the Spectron patch panel is not used, connect the MCDS shelf to the computer ports with an RS-232-C cable equipped with male-type 25-pin connectors.

When the Spectron patch panel is used, use a Spectron patch cable to connect the MCDS shelf to the assigned monitor jacks of the patch panel, which is labeled Modem. Then connect the associated equipment jacks (labeled Equip.) to the computer ports with an RS-232-C cable equipped with male-type 25-pin connectors.

When the HSDC is used as the V.35 interface unit, an adapter cable is needed to convert the ISO-2110 (DB-25) connector on the MCDS backplane into an ISO-2593 (34-pin rectangular) connector. Figure 7 shows the details and connection of the adapter cable.

For DTE equipped with a female ISO-2593, an adapter cable, number A0300752, is required. For DTE equipped with a male ISO-2593, an adapter cable, number A0300753, is required.

**Figure 7**  
**MCDS to V.35 DTE connection**



## MCDS shelf to Meridian 1 connection

The selection plugs J3 and J4 on the HSDC are provided to select a 22/24-gauge inside wire or 24/26-gauge outside wire.

Designation	Setting
E5, E7	inside 22/24 AWG
E6, E8	outside 24/26 AWG

The physical capacities and provisioning requirements of Meridian 1 Data feature hardware must be met upon installation. Table 6 lists cabling and environmental requirements and limitations. All hardware is installed using basic installation tools.

**Table 6**  
**MCDS to SL-1 cabling**

Allowable Cabling	Type D PVC inside wiring cable; PIC for outside use only.		
<b>Maximum separation distances (by cable type)</b>			
MCDS to 4PDLC			
	<b>PIC Outside</b>	<b>PVC Inside</b>	<b>Gauge</b>
	4000 ft (1220 m)	4000 ft (1219 m)	22 AWG
	3500 ft (1070 m)	2900 ft (884 m)	24 AWG
	2000 ft (610 m)		26 AWG
	2500 ft (760 m)	2500 ft (760 m)	22/24 mixed
	1500 ft (460 m)	1200 ft (370 m)	24/26 mixed

The MCDS shelf cabling sequence is shown in Figure 8.

**Note:** Each HSDC uses only Port A (Unit A) and Port C (Unit C) of the MCDS shelf.

**Figure 8**  
**MCDS shelf to host**

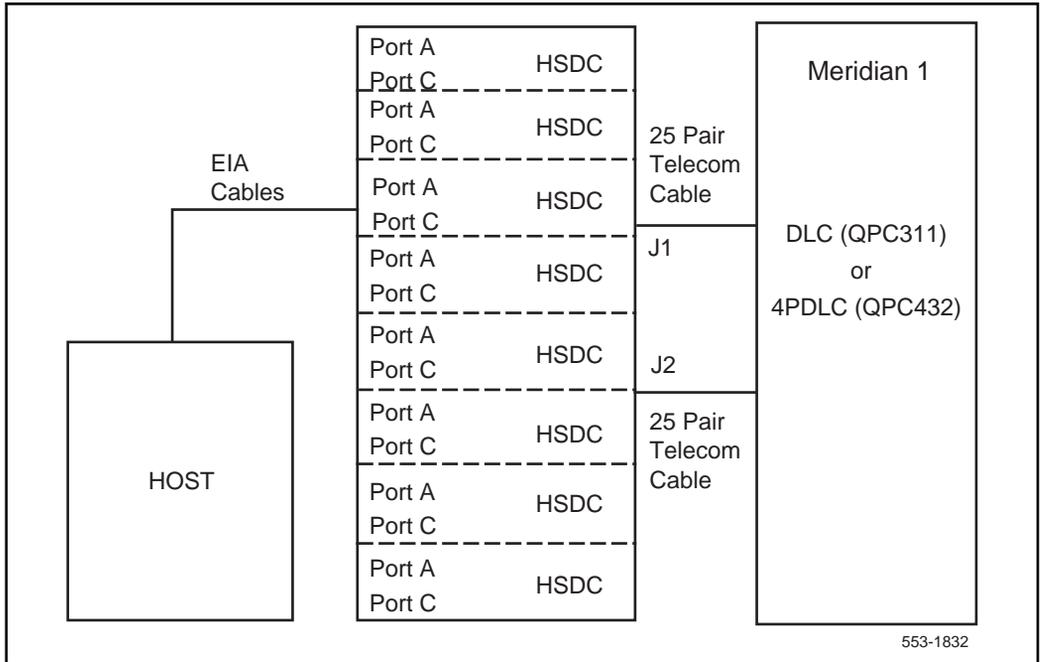


Table 7 lists the MCDS shelf pair-terminations and Tables 9 through 9 list the NT8D13 PE Module I/O Panel connectors and the signal assignments to the connector pins, and the QPC432 (4PDLC) and QPC311 DLC units and their I/O port signals.

**Note:** The HSDC uses only Ports A and C on the MCD.

Only units D1 and D3 of the QPC311 DLC and units 0 to 3 of the QPC432 4PDLC can be used.

The I/O Panel connectors for the NT8D13 PE module can also be used for QSD64, QSD65, QSD80, QSP35, and QSP36 PE shelves.

Figure 8 shows the connection of the MCDS shelf to the SL-1 and host computer.

**Table 7**  
**MCDS shelf pair-terminating sequence (Part 1 of 2)**

Cable J1						Cable J2					
Pair	Pin	Pair Color	Card 1-4			Pair	Pin	Pair Color	Card 5-8		
1T R	26 1	W-BL BL-W	Card 1	Unit A		1T R	26 1	W-BL BL-W	Card 5	Unit A	
2T R	27 2	W-O O-W	Card 1	Unit B		2T R	27 2	W-O O-W	Card 5	Unit B	
3T R	28 3	W-G G-W	Card 1	Unit C		3T R	28 3	W-G G-W	Card 5	Unit C	
4T R	29 4	W-BR BR-W	Card 1	Unit D		4T R	29 4	W-BR BR-W	Card 5	Unit D	
5T R	30 5	W-S S-W	Card 2	Unit A		5T R	30 5	W-S S-W	Card 6	Unit A	
6T R	31 6	R-BL BL-R	Card 2	Unit B		6T R	31 6	R-BL BL-R	Card 6	Unit B	
7T R	32 7	R-O O-R	Card 2	Unit C		7T R	32 7	R-O O-R	Card 6	Unit C	
8T R	33 8	R-G G-R	Card 2	Unit D		8T R	33 8	R-G G-R	Card 6	Unit D	
9T R	34 9	R-BR BR-R	Card 3	Unit A		9T R	34 9	R-BR BR-R	Card 7	Unit A	
10T R	35 10	R-S S-R	Card 3	Unit B		10T R	35 10	R-S S-R	Card 7	Unit B	
11T R	36 11	BK-BL BL-BK	Card 3	Unit C		11T R	36 11	BK-BL BL-BK	Card 7	Unit C	
12T R	37 12	BK-O O-BK	Card 3	Unit D		12T R	37 12	BK-O O-BK	Card 7	Unit D	

**Table 7**  
**MCDS shelf pair-terminating sequence (Part 2 of 2)**

Cable J1						Cable J2					
Pair	Pin	Pair Color	Card 1-4			Pair	Pin	Pair Color	Card 5-8		
13T R	38 13	BK-G G-BK	Card 4	Unit A		13T R	38 13	BK-G G-BK	Card 8	Unit A	
14T R	39 14	BK-BR BR-BK	Card 4	Unit B		14T R	39 14	BK-BR BR-BK	Card 8	Unit B	
15T R	40 15	BK-S S-BK	Card 4	Unit C		15T R	40 15	BK-S S-BK	Card 8	Unit C	
16T R	41 16	Y-BL BL-Y	Card 4	Unit D		16T R	41 16	Y-BL BL-Y	Card 8	Unit D	
17T R	42 17	Y-O O-Y	Spare			17T R	42 17	Y-O O-Y	Spare		
18T R	43 18	Y-G G-Y				18T R	43 18	Y-G G-Y			
19T R	44 19	Y-BR BR-Y				19T R	44 19	Y-BR BR-Y			
20T R	45 20	Y-S S-Y				20T R	45 20	Y-S S-Y			
21T R	46 21	V-BL BL-V				21T R	46 21	V-BL BL-V			
22T R	47 22	V-O O-V				22T R	47 22	V-O O-V			
23T R	48 23	V-G G-V				23T R	48 23	V-G G-V			
24T R	49 24	V-BR BR-V	24T R	49 24	V-BR BR-V						
25T R	50 25	V-S S-V	Spare			25T R	50 25	V-S S-V	Spare		

**Table 8**  
**QPC432 (4PDLC) and QPC311 DLC pair-terminations for NT8D13 PE**  
**Module I/O Panel connectors A, C, E, and G (Single Loop Mode)**  
**(Part 1 of 2)**

Port Pairs	Connector Pin Number and Wire Color Code		I/O Panel Connectors				4PDLC		DLC	
			A	C	E	G	Sig	Unit	Sig	Unit
1T 1R 2T 2R	26 1 27 2	W-BL BL-W W-O O-W					T R SA SB	D0	T R SA SB	V0
3T 3R 4T 4R	28 3 29 4	W-G G-W R-BL BL-R					T R SA SB	D1	T R SA SB	D1
5T 5R 6T 6R	30 5 31 6	W-S S-W R-BL BL-R	S L O T	S L O T	S L O T	S L O T	T R SA SB	D2	T R SA SB	V2
7T 7R 8T 8R	32 7 33 8	R-O O-R R-G G-R	X-1	X-4	X-7	X-10	T R SA SB	D3	T R SA SB	D3
9T 9R 10T 10R	34 9 35 10	R-BR BR-R R-S S-R	C A R D	C A R D	C A R D	C A R D				
11T 11R 12T 12R	36 11 37 12	BK-BL BL-BK BL-O O-BL	1	4	7	10				
13T 13R 14T 14R	38 13 39 14	BK-G G-BK BK-BR BR-BK								
15T 15R 16T 16R	40 15 41 16	BK-S S-BK Y-BL BL-Y								

**Table 8**  
**QPC432 (4PDLC) and QPC311 DLC pair-terminations for NT8D13 PE**  
**Module I/O Panel connectors A, C, E, and G (Single Loop Mode)**  
**(Part 2 of 2)**

Port Pairs	Connector Pin Number and Wire Color Code		I/O Panel Connectors				4PDLC		DLC	
			A	C	E	G	Sig	Unit	Sig	Unit
17T 17R	42 17	Y-O O-Y	S L O T	S L O T	S L O T	S P A R E	T	D0	T	V0
18T 18R	43 18	Y-G G-Y					R		R	
							SA		SA	
							SB		SB	
19T 19R	44 19	Y-BR BR-Y	X-2	X-5	X-8	S P A R E	T	D1	T	D1
20T 20R	45 20	Y-S S-Y					R		R	
							SA		SA	
							SB		SB	
21T 21R	46 21	V-BL BL-V	C A R D	C A R D	C A R D	S P A R E	T	D2	T	V2
22T 22R	47 22	V-O O-V					R		R	
							SA		SA	
							SB		SB	
23T 23R	48 23	V-BR BR-V	2	5	8	S P A R E	T	D3	T	D3
24T 24R	49 24	V-S S-V					R		R	
							SA		SA	
			SB	SB						

**Table 9**  
**QPC432 (4PDLC) and QPC311 DLC pair-terminations for NT8D13 PE**  
**Module I/O Panel connectors B, D, and F (Single Loop Mode)**  
**(Part 1 of 2)**

Port Pairs	Connector Pin Number and Wire Color Code		I/O Panel Connectors			4PDLC		DLC	
			B	D	F	Sig	Unit	Sig	Unit
1T 1R	26 1	W-BL BL-W	S L O T  X-2  C A R D  2	S L O T  X-5  C A R D  5	S L O T  X-8  C A R D  8				
2T 2R	27 2	W-O O-W							
3T 3R	28 3	W-S S-W							
4T 4R	29 4	R-BL BL-R							
5T 5R	30 5	W-S S-W							
6T 6R	31 6	R-BL BL-R							
7T 7R	32 7	R-O O-R							
8T 8R	33 8	R-G G-R							

**Table 9**  
**QPC432 (4PDLC) and QPC311 DLC pair-terminations for NT8D13 PE**  
**Module I/O Panel connectors B, D, and F (Single Loop Mode)**  
**(Part 2 of 2)**

Port Pairs	Connector Pin Number and Wire Color Code		I/O Panel Connectors			4PDLC		DLC				
			B	D	F	Sig	Unit	Sig	Unit			
9T 9R 10T 10R	34 9 35 10	R-BR BR-R R-S S-R	S L O T  X-3	S L O T  X-6	S L O T  X-9	T R SA SB	D0	T R SA SB	V0			
11T 11R 12T 12R	36 11 37 12	BK-BL BL-BK BL-O O-BL				T R SA SB	D1	T R SA SB	D1			
13T 13R 14T 14R	38 13 39 14	BK-G G-BK BK-BR BR-BK				T R SA SB	D2	T R SA SB	V2			
15T 15R 16T 16R	40 15 41 16	BK-S S-BK Y-BL BL-Y				T R SA SB	D3	T R SA SB	D3			
17T 17R 18T 18R	42 17 43 18	Y-O O-Y Y-G G-Y				C A R D  3	C A R D  6	C A R D  9				
19T 19R 20T 20R	44 19 45 20	Y-BR BR-Y Y-S S-Y										
21T 21R 22T 22R	46 21 47 22	V-BL BL-V V-O O-V										
23T 23R 24T 24R	48 23 49 24	V-BR BR-V V-S S-V										

**Table 10**  
**QPC432 (4PDLC) and QPC311 DLC pair-terminations for NT8D13 PE**  
**Module I/O Panel connectors A, C, E, and G (Single Loop Mode)**  
**(Part 1 of 2)**

Port Pairs	Connector Pin Number and Wire Color Code		I/O Panel Connectors				4PDLC		DLC	
			A	C	E	G	Sig	Unit	Sig	Unit
1T 1R 2T 2R	26 1 27 2	W-BL BL-W W-O O-W					T R SA SB	D0	T R SA SB	V0
3T 3R 4T 4R	28 3 29 4	W-S S-W R-BL BL-R					T R SA SB	D1	T R SA SB	D1
5T 5R 6T 6R	30 5 31 6	W-S S-W R-BL BL-R	S L O T	S L O T	S L O T	S L O T	T R SA SB	D2	T R SA SB	V2
7T 7R 8T 8R	32 7 33 8	R-O O-R R-G G-R	X-1	X-4	Y-2	Y-5	T R SA SB	D3	T R SA SB	D3
9T 9R 10T 10R	34 9 35 10	R-BR BR-R R-S S-R	C A R D	C A R D	C A R D	C A R D				
11T 11R 12T 12R	36 11 37 12	BK-BL BL-BK BL-O O-BL	1	4	2	5				
13T 13R 14T 14R	38 13 39 14	BK-G G-BK BK-BR BR-BK								
15T 15R 16T 16R	40 15 41 16	BK-S S-BK Y-BL BL-Y								

**Table 10**  
**QPC432 (4PDLC) and QPC311 DLC pair-terminations for NT8D13 PE**  
**Module I/O Panel connectors A, C, E, and G (Single Loop Mode)**  
**(Part 2 of 2)**

Port Pairs	Connector Pin Number and Wire Color Code		I/O Panel Connectors				4PDLC		DLC	
			A	C	E	G	Sig	Unit	Sig	Unit
17T 17R	42 17	Y-O O-Y	S L O T	S L O T	S L O T	S P A R E	T	D0	T	V0
18T 18R	43 18	Y-G G-Y					R		R	
							SA		SA	
							SB		SB	
19T 19R	44 19	Y-BR BR-Y	X-2	X-5	Y-8	S P A R E	T	D1	T	D1
20T 20R	45 20	Y-S S-Y					R		R	
							SA		SA	
							SB		SB	
21T 21R	46 21	V-BL BL-V	C A R D	C A R D	C A R D	S P A R E	T	D2	T	V2
22T 22R	47 22	V-O O-V					R		R	
							SA		SA	
							SB		SB	
23T 23R	48 23	V-BR BR-V	2	5	3	S P A R E	T	D3	T	D3
24T 24R	49 24	V-S S-V					R		R	
							SA		SA	
			SB	SB						

**Table 11**  
**QPC432 (4PDLC) and QPC311 DLC pair-terminations for NT8D13 PE**  
**Module I/O Panel connectors B, D, and F (Single Loop Mode)**  
**(Part 1 of 2)**

Port Pairs	Connector Pin Number and Wire Color Code		I/O Panel Connectors			4PDLC		DLC	
			B	D	F	Sig	Unit	Sig	Unit
1T 1R	26 1	W-BL BL-W	S L O T	S L O T	S L O T				
2T 2R	27 2	W-O O-W							
3T 3R	28 3	W-S S-W							
4T 4R	29 4	R-BL BL-R				X-2	X-5	Y-3	
5T 5R	30 5	W-S S-W	C A R D	C A R D	C A R D				
6T 6R	31 6	R-BL BL-R							
7T 7R	32 7	R-O O-R							
8T 8R	33 8	R-G G-R				2	5	3	

**Table 11**  
**QPC432 (4PDLC) and QPC311 DLC pair-terminations for NT8D13 PE**  
**Module I/O Panel connectors B, D, and F (Single Loop Mode)**  
**(Part 2 of 2)**

Port Pairs	Connector Pin Number and Wire Color Code		I/O Panel Connectors			4PDLC		DLC				
			B	D	F	Sig	Unit	Sig	Unit			
9T 9R 10T 10R	34 9 35 10	R-BR BR-R R-S S-R	S L O T  X-3	S L O T  Y-1	S L O T  Y-4	T R SA SB	D0	T R SA SB	V0			
11T 11R 12T 12R	36 11 37 12	BK-BL BL-BK BL-O O-BL				T R SA SB	D1	T R SA SB	D1			
13T 13R 14T 14R	38 13 39 14	BK-G G-BK BK-BR BR-BK				T R SA SB	D2	T R SA SB	V2			
15T 15R 16T 16R	40 15 41 16	BK-S S-BK Y-BL BL-Y				T R SA SB	D3	T R SA SB	D3			
17T 17R 18T 18R	42 17 43 18	Y-O O-Y Y-G G-Y				C A R D	C A R D	C A R D				
19T 19R 20T 20R	44 19 45 20	Y-BR BR-Y Y-S S-Y				3	1	4				
21T 21R 22T 22R	46 21 47 22	V-BL BL-V V-O O-V										
23T 23R 24T 24R	48 23 49 24	V-BR BR-V V-S S-V										

## Service change

The Meridian 1 recognizes the HSDC port as an SL-1 telephone; the DLC and 4PDLC as SL-1 line cards. Use the LD77 to enter the HSDC port call processing into the system.

Define the following items:

- Key 0            Directory Number (DN)
- Key 1            Secondary Directory Number (DN)
- Key 2            Call Transfer (optional)
- Key 3            Autodial Calling (optional)
- Key 4            Ring Again (optional)
- Key 6            Speed Call (optional)
- Key 7            Display (DSP) (optional)
- Key 9            Release

**Note 1:** Key 2 is required to provide access to a manual outbound modem pooling.

**Note 2:** Key 3 is required to operate Autodial or the Hot Line feature.

**Note 3:** DSP requires the Class of Service updated to Digit Display (DDS) or Automatic Digit Display (ADD).

To use the 64 kbps data capability, the following Meridian 1 configurations are required:

- Meridian 1 software must be X11 release 12 or later.
- QPC720 PRI must be configured for B8ZS line coding.
- TI facility must support B8ZS line coding.
- For connection to SL-100, the software should be X11 release 13 or later; QPC720 PRI vintage B or higher should be configured for B8ZS.

## Troubleshooting

If the HSDC does not operate properly, perform the following checks:

### Procedure 1

#### HSDC troubleshooting procedures (general check)

- 1 Ensure that the MCDS power supply is powered on.
- 2 Operate the **fdtr** key on the HSDC faceplate and verify that the DTR lamp lights. Replace the HSDC if the lamp does not light.
- 3 The V.35 lamp should be ON if the 10-pin jumper plug is inserted into the V.35 socket on the HSDC. If the jumper is installed and the V.35 LED is off, replace the card.
- 4 Ensure that the data terminal power is ON and that the ON-LINE/OFF-LINE (LINE/LOCAL) switch (if equipped) is set to ON-LINE (LINE).
- 5 Ensure that the Data Terminal or Host Port is ready for data transmission with the proper speed and other parameters set appropriately.

**If the call is connected but the station is not sending or receiving data, check the following:**

- 6 Is the MONITOR SEND lamp on the DTE (if equipped) or the SD lamp on the HSDC flashing while sending data?

**If the lamps do not flash:**

- 7 Ensure the interface cable is properly connected to the MCDS and the DTE.
- 8 Ensure the ON-LINE/OFF-LINE (LINE/LOCAL) switch is set to ON-LINE (LINE).
- 9 If problems occur during call setup, disconnect and attempt to place the call again. Place the call from a regular phone to ensure that the far end data equipment and the HSDM or HSDC is properly set up and working before calling for service.

If the problem continues, place a test call using an Asynchronous Terminal connected to the HSDC port in loopback mode. The data sent by your terminal will be looped back. Perform the following steps:

**Procedure 2**  
**HSDC troubleshooting**

- 1 Set the local HSDC to asynchronous, loopback, full duplex, and terminal mode. Make sure the remote HSDC or HSDM is set to the asynchronous mode and loopback is OFF.
- 2 Be sure that the terminal is set so it does not check parity or that it is set to 8 bits (no parity). If it is set to 7 bits, even, or odd parity, enter a period (.) and carriage-return (<CR>) to force the HSDC to calculate parity and provide legible prompts.
- 3 Press <CR> on the asynchronous terminal connected to the HSDC that is in loopback mode.
- 4 Dial the call using the terminal keyboard. The lamps for CONN and DTR should be ON for a successful call.
- 5 Check that the characters you type are echoed on the screen at the local terminal. If the characters are returned properly, check the remote DTE connected to the HSDC, HSDM, or both.
- 6 If the characters are not returned properly, place a call to another remote HSDC, HSDM, or both. If the problem persists, do the following:
  - Use LD32 to check that the QPC311 or QPC432 is enabled.
  - Enable the HSDC and proceed with troubleshooting.
  - Replace the HSDC.

Meridian 1  
**Transparent Data  
Networking**

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