

## 6-Circuit (3634-80) and 3-Circuit (3634-81) 56/64xN Data Service Unit (DSU)–Data Port (DP)

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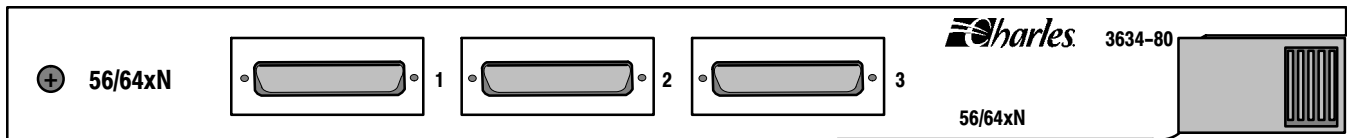


Figure 1. 6-Circuit (3634-80) 56/64xN DSU-DP

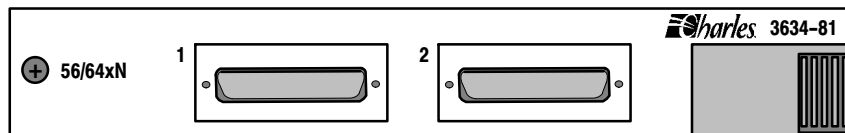


Figure 2. 3-Circuit (3634-81) 56/64xN DSU-DP

## 1. GENERAL

### 1.1 Document Purpose

This document provides general, installation and testing information for the 6-circuit and 3-circuit 56/64xN Data Service Unit—Data Port (DSU-DP). This document covers the following model numbers:

Model #	Description	Figure Reference
3634-80	6-circuit 56/64xN Data Service Unit—Data Port (DSU-DP)	Figure 1
3634-81	3-circuit 56/64xN Data Service Unit—Data Port (DSU-DP)	Figure 2

### 1.2 Equipment Function

The 56/64xN DSU-DP is part of the Charles 360-80 Intelligent Channel Bank (ICB). This unit provides a direct Data Communications Equipment (DCE) interface to allow connection to data equipment.

### 1.3 Equipment Location/Mounting

The 6-circuit unit (3634-80) plugs into any full-size slot of the 360-80 ICB. The 3-circuit unit (3634-81) plugs into the half-size slot of the 360-80 ICB.

### 1.4 Equipment Features

The DSU-DP provides the following features:

- Supports synchronous rate of 56 or 64 Kbps times 'N'

*Note: For T1, 'N' has the value from 1 to 24 (rates from 56 Kbps to 1.536 Mbps). For E1, 'N' has the value from 1 to 30 (rates from 56 Kbps to 1.92 Mbps). The data from this unit must be provisioned for contiguous time slots in the network interface unit.*

- Supports 6 circuits, each can use from 1 to 24 (T1) or 1 to 30 (E1) DS0 time slots
- Complies with UL Standard 1950, FCC part 68 and FCC part 15
- Supports clear channel at 64KB/s
- Supports requirements for RS-232/V.24, RS-449/422/V.36, RS530 or V.35 interfaces
- Manually-initiated loopback and self test features
- Responds to V.54 loopback code from the network
- Supports external clock from data equipment.

### 1.5 DTE/DCE Interfaces

DTE interface cables must be used between the specific Data Termination Equipment (DTE) interface and the DSU-DP module. See the *Installation* section for more information.

*Note: On the 6-circuit unit, circuits 4 through 6 are interfaced on the back of the unit. On the 3-circuit unit, circuit 3 is interfaced on the back of the unit.*

### 1.6 Control Interface

This unit is managed through the craft port or the Network Management Software (NMS) that controls the provisioning of the unit and obtains status information from the unit. Provisioning is described in the *Optioning* section of this document. For operation, see the craft port or NMS documentation.

The unit will maintain its default provisioning until that provisioning is altered through the control interface. If this unit's provisioning is changed, it will maintain the new provisioning even if power is lost. If replaced with a new unit, the new unit will default to the same provisioning as was set for the prior unit. If this unit is installed in a location that was used by a different type of unit, this unit will use its own default provisioning.

## 1.7 Indicators

This unit provides a variety of status information. The following is a list of all status information available through the management interface:

- Per circuit starting time slot (T1=1–24, None; E1= 1–15, 17–31, None)
- Per circuit number of time slots used (T1=1–24, None; E1=1–30, None)
- Per circuit data rate (56, 64)
- Per circuit zero code suppression (On, Off)
- Per circuit permanent request-to-send (On, Off)
- Per circuit idle data pattern (all 1's, 7F)
- Per circuit loopback detection (Enable, Disable)
- Per circuit physical interface (RS-232, V.35, V.36/RS-449, RS-530)
- Per circuit test loopback (Local, Remote, Network, None)

## 2. INSPECTION

### 2.1 Inspect for Damages

Inspect the equipment thoroughly upon delivery. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company.

### 2.2 Equipment Identification

Charles equipment is identified by a model and issue number imprinted on the front panel or located elsewhere on the equipment. Each time a major engineering design change is made on the equipment, the issue number is advanced by 1 and imprinted on subsequent units manufactured. Therefore, be sure to include both the model number and its issue number when making inquiries about the equipment.

### 2.3 Static Concerns

Each unit is shipped in static-protective packaging to prevent damages from electrostatic charges. Use approved static-preventive measures, such as static-conductive wrist straps and a static-dissipative mat, when handling units outside of their protective packaging. A unit intended for future use should be tested as soon as possible and returned to its original protective packaging for storage.



**STATIC-SENSITIVE**

**This equipment contains static-sensitive electronic devices. To prevent electrostatic charges from damaging static-sensitive units:**

- **Use approved static-preventive measures (such as static-conductive wrist straps and static-dissipative mats) at all times whenever touching units outside of their original, shipped, protective packaging.**
- **Do not ship or store units near strong electrostatic, electromagnetic, or magnetic fields.**
- **Always use the original static-protective packaging for shipping or storage. Return a tested unit to its original protective packaging for storage.**

## 3. APPLICATION GUIDELINES

The data port provides intermediate bit rate service (IBRS). IBRS refers to the availability of services consisting of multiple DS0 increments. Service providers currently offer IBRS at 64, 128, 384, 512 and 768 KB/s. The advantage of IBRS is found in treating all of the bandwidth as a single synchronous channel. This allows the use of the bandwidth for video conference capabilities and quick transfer of point-to-point data from large computer systems.

Figure 3 illustrates a typical application of the data port for the following situations:

- RS-232 Interface Low Speed 56/64 KB/s X N (N = 1–2)
- RS-449/422/V.36 Interface High Speed 56/64 KB/s X N (T1: N = 1–24) (E1:N=1–30)
- CCITT V.35 Interface High Speed 56/64 KB/s X N (T1: N = 1–24) (E1:N=1–30)

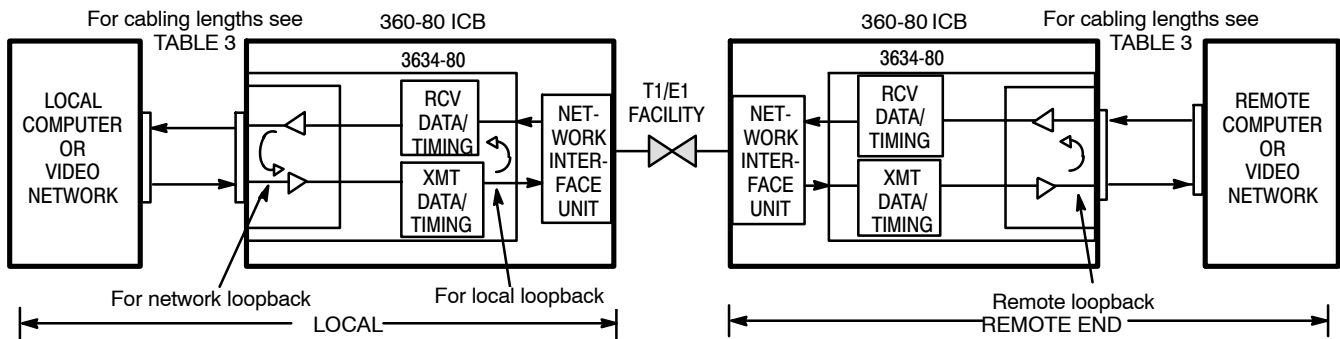


Figure 3. Local and Remote Computer or Video Application

Table 1 shows manually initiated loopback modes.

Refer to Figure 5 through Figure 8 for standard interface designations and pins that are supported by the various data ports. This interface connects to the data source DTE and controls the data transmitted over the data channel. All interface circuits meet the requirements defined in EIA recommendations RS-232D, V.36/RS-449, RS-530 and CCITT recommendation V.35. These recommendations define the electrical characteristics of the data, timing, and control leads. The interface connections are on the front and rear panels and require an adapter cable supplied with the unit. The adapter cable provides an HD-26 26-pin female micro connector at one end and the appropriate standard data connector at the other end.

Table 1. Manually-Initiated Loopback Modes

Mode	Control Leads				
	RTS	CTS	DSR	RLSD	TM
Network Loopback	<i>ON or OFF depending on whether data is present</i>	OFF	OFF	OFF	ON
Local Loopback		<i>Follows RTS</i>	ON	<i>Follows RTS</i>	OFF
Remote Loopback		<i>Follows RTS</i>	<i>ON or OFF</i>	<i>Follows RTS</i>	ON

Note: To perform remote loopback, V.54 loopback enable must be **ON** at both the local and the remote ICBs.

**CAUTION**

In T1 applications when; N=24 the T1 is optioned for SF mode, the DSU-DP unit is optioned with PRTS ON, and the interface to the DTE is not connected, the unit may transmit a data stream that will cause a T1 Yellow alarm at the remote channel bank because transmitted bit 2 is in a constant low state. This condition will not occur in ESF mode.

**4. CIRCUIT DESCRIPTION**

The 6-circuit and 3-circuit description of the 56/64xN DSU-DP is described through receive/transmit buffer functionality.

**4.1 Receive Buffer Circuit**

Every frame time (125 us) the unit takes in a burst of data from the network corresponding to the time slots it has been provisioned to accept based on the starting time slot and the bandwidth of the data. The unit takes in this data and buffers it. The unit also generates a constant clock that runs at a rate based on the bandwidth of the provisioning. The clock is locked to the frame rate to ensure that the buffers do not over-run or under-run. The buffered data is clocked out to the local customer’s equipment using the generated clock. The unit also provides this clock to the customer’s equipment to allow that equipment to be synchronized with the network timing.

## 4.2 Transmit Buffer Circuit

The unit clocks in data from the customer equipment. This data must be running at the same rate as the clock generated by the unit and fed to the customer equipment. The use of the external clock option allows the unit to accept a clock from the local customer equipment to compensate for the propagation delay within the data equipment. The external clock option does not provide the clock for the system, it is used to time the data from the data equipment to the DSU-DP module. It is recommended that this option be used for any rates over 64 Kbps if the data equipment provides a data clock (DTE timing/terminal timing) signal. This clock must be running at the same rate as the clock that the unit generates. The clock does not have to have the same phase as the generated clock. This clock is to ensure set-up and hold times between the clock used to clock in the data and the data itself. The data is clocked to a buffer. The unit then generates a gated clock that is run at the backplane rate. The timing of this clock insures that the data from the local equipment is inserted into the backplane during the correct time slots.

All clocks are locked together to ensure that the transmit and receive buffers do not suffer from overflow or underflow.

One of two possible patterns are selected to be transmitted when data is not being transmitted, an idle data pattern or a control code pattern. An idle data pattern is represented by all one's (11111111). A control code pattern is represented by seven one's and then a zero (11111110).

*Note: It is recommended that the idle control pattern only be used when the base rate is set to 56 Kbps.*

The Zero Code Suppression (ZCS) option checks for an all zeroes byte (00000000). When this check is performed by the card and all zero's are detected, the byte is substituted with (00011000). Typically, this option is used when the base rate is set to 64 Kbps, but the T1 transport does not support clear channel operation. This equipment provisioning can be used when the format of the data over the channel does not generate more than 7 consecutive zeroes. For example the data format of HDSL (does not transmit more than 6 consecutive one's) and is transported with it's logic states inverted.

### 4.2.1. Control Lead Operation

The Clear to Send (CTS) output lead from the DSU-DP will follow the Request to Send lead from the DTE unless the Permanent Request to Send (PRTS) option is enabled. If the PRTS is enabled, then the CTS lead will always be ON. Normally, the Data Set Ready (DSR) from the DSU-DP will be ON indicating the DSU-DP is ready to send data. The Data Carrier Detect (DCD) lead from the DSU-DP will be ON when the card is receiving data or is set to 64 Kbps mode. The DCD lead will be OFF when the card is receiving control codes or is in loopback. The unit provides the ability to force output leads (CTS, DSR, DCD). When the control lead is enabled, setting the lead to a "1" will turn the lead ON and setting the lead to a "0" will turn the lead OFF.

*Note: If RTS is not used, Permanent Request To Send (PRTS) must be set to **ENABLE**.*

## 4.3 V.54 Loopback Code Detection

When the V.54 loopback option is enabled, the unit detects V.54 loopback codes in the first time slot of the consecutive time slots used by the unit. The detected codes are used to determine if the unit is to perform loopback functions. The unit can also generate V.54 loopback codes that can be sent to remote unit during system testing.

For the V.54 loopback, the local unit uses a four-phase sequence for testing the circuit at a remote location: preparatory, acknowledgement, test and termination.

### 4.3.1. Preparatory Phase

The local unit transmits a pattern of 2048 bits, produced by scrambling a binary 0 with the scrambling polynomial.

### 4.3.2. Acknowledgement Phase

The remote unit detects the preparatory pattern and responds by transmitting the acknowledgement pattern. When the remote unit completes the acknowledgement, it initiates the loopback (towards the local unit).

### 4.3.3. Test Phase

The local unit transmits standard testing patterns and running bit error tests.

#### 4.3.4. Termination Phase

Remote loopback is terminated. The local unit transmits a pattern of 8192 bits produced by scrambling binary 1 with the scrambling polynomial. When the remote unit detects the termination pattern, it removes the loopback.

## 5. INSTALLATION

### 5.1 Attaching the Rear Panel

The rear panel of the unit should be installed before the unit is installed in the shelf, and before wiring begins.

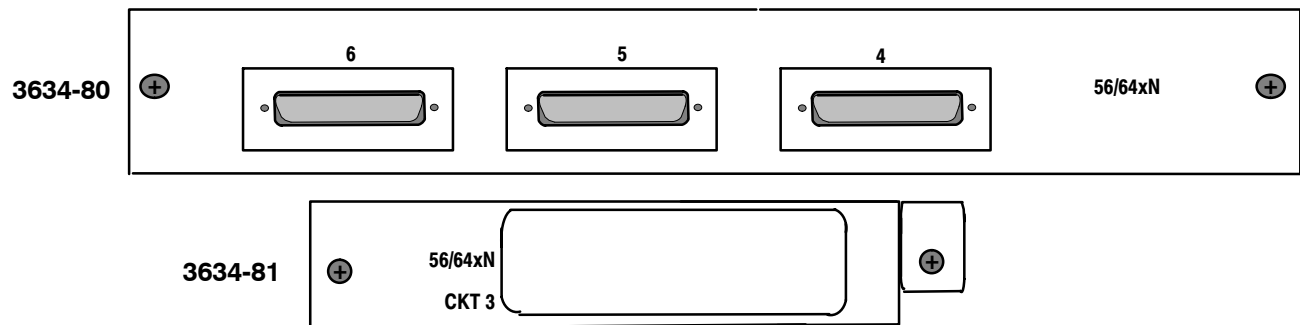


Figure 4. 56/64xN DSU-DP Rear Panel

### 5.2 Installing the Unit

#### 5.2.1. Installing a New Unit

Use the following steps to install a new unit.

Step	Action
1.	If not already installed, install the rear panel, screwing it to the appropriate mounting locations on the shelf using the provided hardware.
2.	Insert the unit into the shelf, making sure that the unit is aligned with the card guides inside the shelf.
3.	Slide the unit fully in to the shelf.
4.	Once the unit is fully inserted, tighten the securing screw on the front panel of the unit. The unit will perform a self-test to ensure that it is compatible with the network management software on the system.
5.	Wire the unit based on the information in the section <i>Wiring the Unit</i> in this document.
6.	After the self-test is performed, check the software provisioning of the card using either the front panel craft interface on the front of the controller unit or the network management interface on the rear of the controller (see the network management documentation for more information).

#### 5.2.2. Installing a Replacement Unit

If you are replacing a unit that is already in service, make sure the unit is the same type as the unit being replaced.

Step	Action
1.	Remove the wiring connectors from the front and rear of the unit.
2.	Unscrew the front panel securing screw to release the unit from the shelf.
3.	Using the card ejector, remove the unit from the shelf.
4.	Follow the steps in the section <i>Installing a New Unit</i> in this document.

### 5.3 Wiring the Unit

Figure 5 through Figure 8 show the standard interface pinouts and designations supported by the data ports.

Signal Designation	Pin #	Signal Designation
Transmitted data (B)	14 -	Shield (A)
Transmitter Signal Element DCE (A)	15 -	Transmitted Data (A)
Received Data (B)	16 -	Received Data (A)
Receiver Signal Element Timing DCE (A)	17 -	Request to Send (A)
Local Loopback	18 -	Clear to Send (A)
Request to Send (B)	19 -	DCE Ready (A)
DTE Ready (A)	20 -	Signal Ground
	21 -	Received Line Signal Detector (A)
DCE Ready (B)	22 -	Receiver Signal Element Timing - DCE (B)
DTE Ready (B)	23 -	Received Line Signal Detector (B)
Transmitter Signal Element Timing DTE (A)	24 -	Transmitter Signal Element Timing - DTE (B)
Test Mode	25 -	Transmitter Signal Element Timing - DCE (B)
		Clear to Send (B)

Figure 5. RS530 DTE/DCE Interface

Signal Designation	Pin #	Signal Designation
Signal Ground	B	Chassis Ground
Clear to Send	D	Request to Send
Receive Line Signal Detect	F	Data Set Ready
		Data Terminal Ready
Local Loopback	L	
		Transmitted Data (A)
Received Data (A)	R	Transmitted Data (B)
Received Data (B)	T	Terminal Timing (A)
Receive Timing (A)	V	Terminal Timing (B)
Receive Timing (B)	X	Transmit Timing (A)
		Transmit Timing (B)

Figure 6. V.35 DTE/DCE Interface

Signal Designation	Pin #	Signal Designation
Receive Common	20 -	Shield (A)
	21 -	
Send Data (B)	22 -	Send Data (A)
Send Timing (B)	23 -	Send Timing (A)
Receive Data (B)	24 -	Receive Data (A)
Request to Send (B)	25 -	Request to Send (A)
Receive Timing (B)	26 -	Receive Timing (A)
Clear to Send (B)	27 -	Clear to Send (A)
	28 -	Local Loopback
Data Mode (B)	29 -	Data Mode (A)
Terminal Ready (B)	30 -	Terminal Ready (A)
Receiver Ready (B)	31 -	Receiver Ready (A)
	32 -	
	33 -	
	34 -	
Terminal Timing (B)	35 -	Terminal Timing (A)
	36 -	
Send Common	37 -	Signal Ground

Figure 7. RS449/422/V.36 DTE/DCE Interface

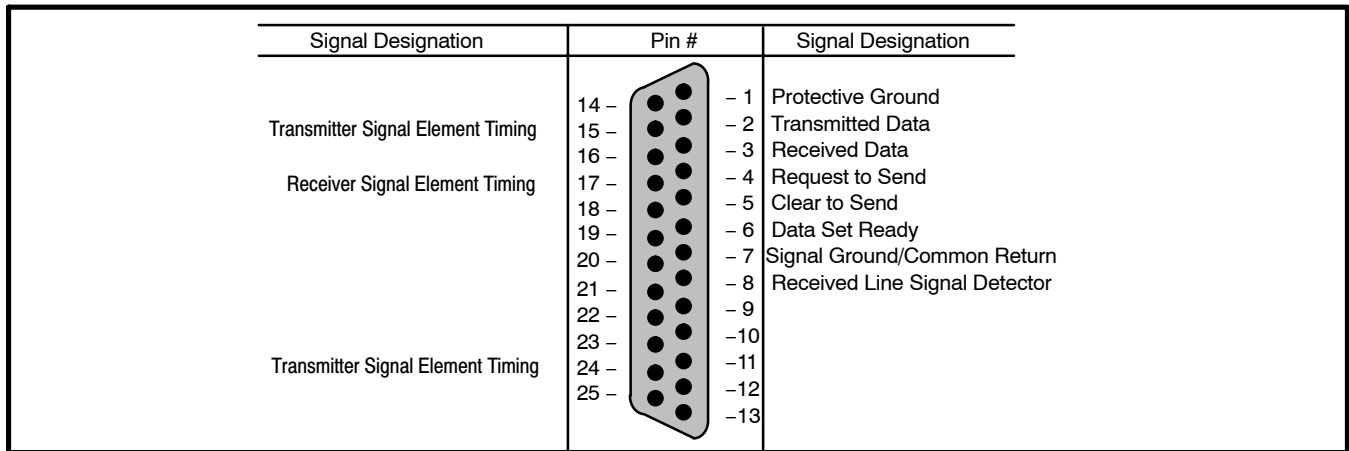


Figure 8. RS232/V.24 DTE/DCE Interface

5.4 DTE Interface Cable

The DTE interface cable connects to the front or rear panel of the unit and provides the RS232, RS530, RS449/422, or V.35 interface to the DTE. All cables are approximately three feet long.

Table 2. Cabling for Each Interface Type

Interface Type	Cable Assembly
V.35 DTE/DCE	03-210149-0
RS530 DTE/DCE	03-210150-0
RS232/V.24 DTE/DCE	03-210150-0
V.36/RS449/RS422	03-210151-0

Table 3 shows the maximum permissible cable length in addition to the data rate for each interface. The 24-gauge cable has a capacitance of 50pF/meter.

Table 3. Maximum Cable Length (24-Gauge)

Rate		Cable			Rate		Cable		
N	KB/s	449/530	V.35	RS-232	N	KB/s	449/530	V.35	RS-232
		ft/m	ft/m	ft/m			ft/m	ft/m	ft/m
1	56	3900/1188	1300/396	50/15	13	728	560/171	190/58	N/A
	64	3900/1188	1300/396	50/15		832	490/149	160/49	N/A
2	112	3900/1188	1300/396	20/6	14	784	490/149	160/49	N/A
	128	3250/991	1080/329	20/6		896	420/128	140/43	N/A
3	168	2280/878	760/232	N/A	15	840	470/143	150/46	N/A
	192	1630/496	540/165	N/A		960	420/128	140/43	N/A
4	224	1630/496	540/165	N/A	16	896	420/128	140/43	N/A
	256	1460/455	490/149	N/A		1024	420/128	140/43	N/A
5	280	1300/396	430/128	N/A	17	952	420/128	140/43	N/A
	320	1300/396	430/128	N/A		1088	360/110	120/37	N/A
6	336	1250/381	400/122	N/A	18	1008	420/128	140/43	N/A
	384	1000/305	330/101	N/A		1152	330/101	110/34	N/A



Rate		Cable			Rate		Cable		
		449/530	V.35	RS-232			449/530	V.35	RS-232
N	KB/s	ft/m	ft/m	ft/m	N	KB/s	ft/m	ft/m	ft/m
7	392	950/289	320/98	N/A	19	1064	360/110	120/37	N/A
	448	820/250	270/82	N/A		1216	330/101	110/34	N/A
8	448	820/250	270/82	N/A	20	1120	330/101	110/34	N/A
	512	810/247	270/82	N/A		1280	300/90	100/30	N/A
9	504	810/247	270/82	N/A	21	1176	330/101	110/34	N/A
	576	750/229	230/70	N/A		1344	260/80	90/27	N/A
10	560	750/229	230/70	N/A	22	1232	330/101	110/34	N/A
	640	620/189	210/64	N/A		1408	250/76	80/24	N/A
11	616	620/189	210/64	N/A	23	1288	260/80	90/27	N/A
	704	570/174	190/58	N/A		1472	250/76	80/24	N/A
12	672	570/174	190/58	N/A	24	1344	260/80	90/27	N/A
	768	560/171	190/58	N/A		1536	250/76	80/24	N/A

## 6. OPTIONING

This unit comes from the factory with default provisioning, which can be altered through the management interface. When this unit is inserted in to a previously provisioned slot, if the card type matches, the unit will change its provisioning options to match the previously provisioned unit. If the unit type does not match the unit will assume its default provisioning. The provisioning options are as follows:

Option	Choices	Default
Per channel starting time slot	T1=1–24, None E1=1–15, 17–31, None	3634-80: Sequence* 3634-81: T1=None, E1=Sequence*
Per channel number of time slots used	T1=1–24, None E1=1–30, None	2
Per channel base rate setting	56K, 64K	64K
Per channel interface type	RS530, V.35, V.36/RS449, RS232	V.35
Per channel idle data pattern	11111111, 11111110	11111110
Per channel CTS (Clear to Send) control	Yes, No (force to 0 or 1)	No
Per channel DSR (Data Set Ready) control	Yes, No (force to 0 or 1)	No
Per channel DCD (Data Carrier Detect) control	Yes, No (force to 0 or 1)	No
Per channel zero code suppression	Disable, Enable	Disable
Per channel PRTS (Permanent Request To Send)	Disable, Enable	Enable
Per channel external DTE clock	Disable, Enable	Disable
Per channel V.54 loopback send/detect	Disable, Enable	Disable
Per channel DTE local loopback lead	Disable, Enable	Disable

\*Sequence indicates that the default circuit uses 2 time slots. Therefore, if the 6-circuit unit was plugged in to the slot for channels 1–12, circuit 1 would use time slots 1–2, circuit 2 would use time slots 3–4, and so on up to circuit 6 which would use time slots 11–12.

*Note: The maximum number of time slots for an RS-232 interface is two.*

## 7. TECHNICAL ASSISTANCE

If technical assistance is required, contact the Charles Technical Services Center at:

847-806-8500  
847-806-8556 (FAX)  
800-607-8500  
techserv@charlesindustries.com (e-mail)

## 8. WARRANTY & CUSTOMER SERVICE

### 8.1 Warranty

Charles offers a 2-year warranty on this product. Contact your local Sales Representative at the address or telephone numbers below for warranty details. The warranty provisions are subject to change without notice. The terms and conditions applicable to any specific sale of product shall be defined in the resulting sales contract.

Charles Industries, Ltd.  
5600 Apollo Drive  
Rolling Meadows, Illinois 60008-4049  
U.S.A.  
847-806-6300 (Main Office)  
847-806-6231 (FAX)

### 8.2 Field Repairs (In-Warranty Units)

Field repairs involving the replacement of components within a unit are not recommended and may void the warranty and compatibility with any applicable regulatory or agency requirements. If a unit needs repair, contact Charles for replacement or repair instructions, or follow the *Repair Service Procedure* below.

### 8.3 Advanced Replacement Service (In-Warranty Units)

Charles offers an “advanced replacement” service if a replacement unit is required as soon as possible. With this service, the unit will be shipped in the fastest manner consistent with the urgency of the situation. In most cases, there are no charges for in-warranty repairs, except for the transportation charges of the unit and for a testing and handling charge for units returned with no trouble found. Upon receipt of the advanced replacement unit, return the out-of-service unit in the carton in which the replacement was shipped, using the pre-addressed shipping label provided. Call your customer service representative at the telephone number above for more details.

### 8.4 Standard Repair and Replacement Service (Both In-Warranty and Out-Of-Warranty Units)

Charles offers a standard repair or exchange service for units either in- or out-of-warranty. With this service, units may be shipped to Charles Industries for either repair and quality testing or exchanged for a replacement unit, as determined by Charles. Follow the *Repair Service Procedure* below to return units and to secure a repair or replacement. A handling charge applies for equipment returned with no trouble found. To obtain more details of this service and a schedule of prices, contact the Charles Service Center at 217-932-5292 (FAX 217-932-2943).

#### *Repair Service Procedure*

1. Prepare, complete, and enclose a purchase order in the box with the equipment to be returned.
2. Include the following information:
  - Company name and address
  - Contact name and phone number
  - Inventory of equipment being shipped
  - Particulars as to the nature of the failure
  - Return shipping address
3. Ship the equipment, purchase order, and above-listed information, transportation prepaid, to the service center address shown below.

Charles Service Center  
 503 N.E. 15th St, P.O. Box 339  
 Casey, IL 62420-2054  
 U.S.A.

4. Most repaired or replaced units will be returned within 30 or 45 days, depending on the product type and availability of repair parts. Repaired units are warranted for either 90 days from the date of repair or for the remaining unexpired portion of the original warranty, whichever is longer.

## 9. SPECIFICATIONS

### 9.1 Electrical

Parameter	Function Specification
Number of subscribers for each unit	3634-80: 6 circuits 3634-81: 3 circuits
Transmission type	Synchronous
Data rate	T1=56xN : 56Kbps–1.344Mbps    E1=56xN: 56 Kbps–1.68 Mbps T1=64xN : 64Kbps–1.536Mbps    E1=64xN: 64 Kbps–1.92 Mbps
DTE interface	All data rates support CCITT V.35, V.36, and RS530 64KB/s and 56KB/s support CCITT V.24
Loopback	Supports V.54 loopback
Power supply current (42–56V)	3634-80: 0.138 amp 3634-81: 0.120 amp
Heat dissipation	3634-80: 7 watts 3634-81: 5.88 watts

### 9.2 Physical

Feature	6-Circuit (3634-80)		3-Circuit (3634-81)	
	U.S.	Metric	U.S.	Metric
Height	0.75 inch	1.9 centimeters	0.75 inch	1.9 centimeters
Width	9.625 inches	24.45 centimeters	5.64 inches	14.32 centimeters
Depth	9.25 inches	23.49 centimeters	9.25 inches	23.49 centimeters
Weight	1.02 pounds	470 grams	0.57 pound	258 grams
Temperature	32° to +122° F	0° to +50° C	32° to +122° F	0° to +50° C
Humidity	to < 95%		to < 95%	

