12-Channel (3633-80) and 6-Channel (3633-81) Data Service Unit-Data Port (DSU-DP)

CONTENTS PAGE

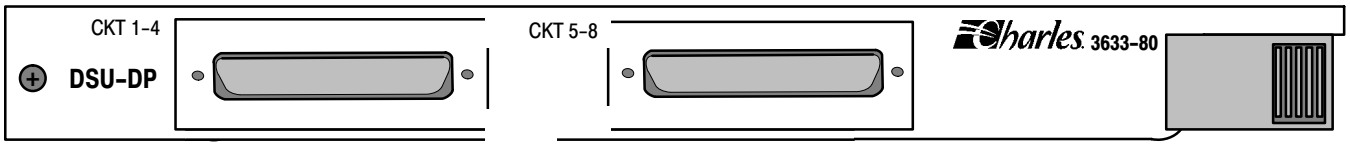

Figure 1. 12-Channel DSU-DP Front Panel – Full Size (3633-80)

Figure 2. 6-Channel DSU-DP Front Panel – Half Size (3633-81)

1. GENERAL

1.1 Document Purpose

This document provides general, installation and testing information for the 12-Channel and 6-Channel Data Service Unit—Data Port (DSU-DP). This document covers the following model numbers:

Model Number	Description	Figure
3633-80	12-Channel Data Service Unit—Data Port	Figure 1
3633-81	6-Channel Data Service Unit—Data Port	Figure 2

1.2 Equipment Function

The 12 channel and 6 channel DSU-DP are part of the 360-80 Intelligent Channel Bank (ICB). These units provide a direct Data Communication Equipment (DCE) interface to allow direct connection to data equipment.

1.3 Equipment Location/Mounting

The 3633-80 plugs into any full-size slot of the 360-80 ICB. The 3633-81 plugs into the half-size slot of the 360-80 ICB.

1.4 Equipment Features

The DSU-DP provides the following features:

- DTE interfaces of RS232/V.24, RS449/422/V.36, RS530 and V.35
- Synchronous operation at rates of 2.4, 4.8, 9.6, 19.2, 56 and 64 Kbps
- Asynchronous operation at rates of 2.4, 4.8, 9.6, and 19.2 Kbps
- Asynchronous to synchronous conversion using V.14 protocol
- Error correction at rates from 2.4 to 64 Kbps
- Compatible with “DDS” network control codes, error correction and multiplexing as defined in Bellcore TR-TSY-000077, TR-TSY-000083, and ANSI T1.107B 1991
- Optional latching loopback
- Integral local and network test features (available with the T1 Control Unit)
- Complies with FCC part 68, FCC part 15 and UL1950

1.5 DTE/DCE Interfaces

The DSU-DP uses 4:1 data cable adapters between the module and the individual interface cable assemblies. The adapter provides data service for 4 DSU circuits.

The 3633-81 uses a 2:1 data cable adaptor for access at the rear of the unit. See the section in this document on *Installation* for more information.

1.6 Control Interface

This unit is managed through the craft port, Network Management Software (NMS), or SNMP network mode manager interfaces. These management devices control the provisioning of the unit and provide status information about the DSU-DP. Provisioning is described in this document. For management device operation information, reference the corresponding document.

This unit will maintain its default provisioning until the provisioning is altered through the management 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 status alarms and messages available:

- Per circuit time slot used (T1=1–24, None) (E1=1–15, 17–31, None)
- Per circuit data mode (asynchronous, synchronous)
- Per circuit data rate (2.4, 4.8, 9.6, 19.2, 56, 64)
- Per circuit asynchronous data bit length (7, 8)
- Per circuit asynchronous parity bit (Yes, No)
- Per circuit asynchronous data stop bits (1, 2)
- Per circuit asynchronous shortened stop bit allowance (12.5, 25)
- Per circuit force RTS on (Enable, Disable)
- Per circuit zero code suppression (Enable, Disable)
- Per circuit parity channel error correction (Enable, Disable)
- Per circuit latch loopback code detection (Enable, Disable)
- Per circuit physical interface (RS-232, V.35, RS-422, RS-530)

The following are available with the T1 Control Unit:

- Per circuit test loopback location (near end, far end)
- Per circuit test loopback to be transmitted (OCU, CSU, DSU, none)
- Per circuit test loopback to be transmitted (latching, non-latching)
- Per circuit local loopback

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 Industries' 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 module 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 modules outside of their protective packaging. A module 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 DSU-DP can be used in point-to-point or multi-point applications. Figure 3 shows two possible end-to-end equipment configurations.

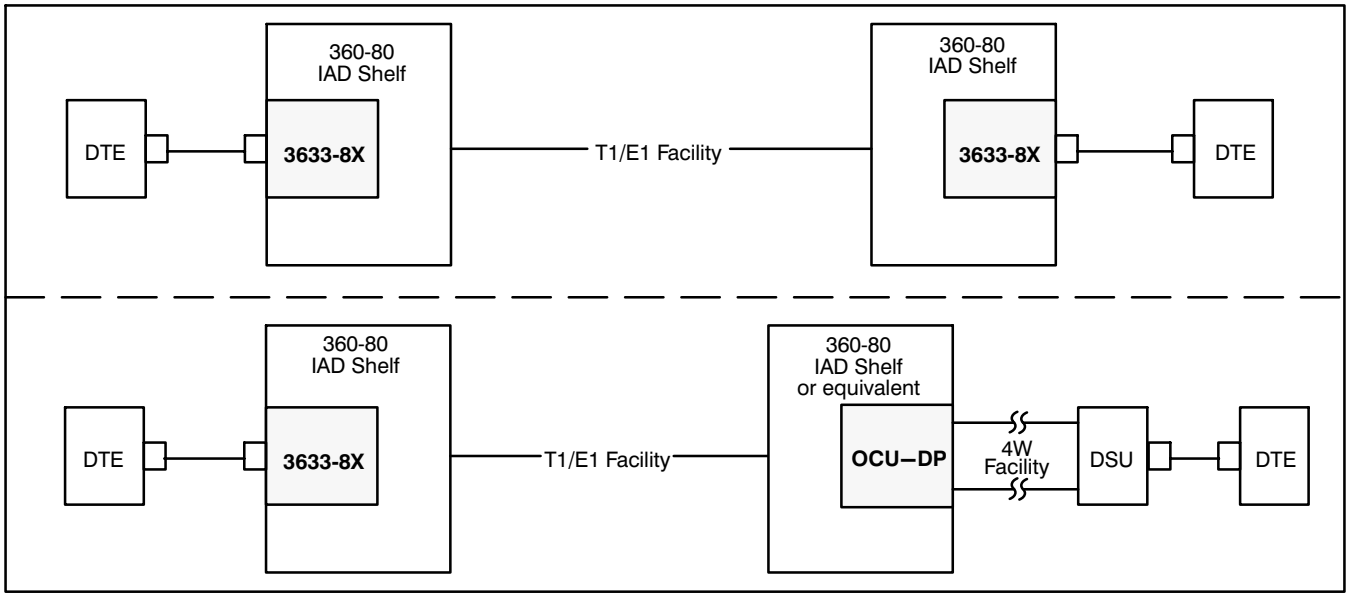

Figure 3. DSU-DP Applications

4. CIRCUIT DESCRIPTION

Refer to Figure 4, the DSU-DP Block Diagram, when reading the following description.

4.1 DTE-DCE Interface

This part of the circuit consists of a connector to the DTE, Loopback 1, and the interface drivers and receivers. This circuit is reconfigured by the unit depending on the electrical data channel equipment (DCE) interface selected via the ICB management interface.

4.2 Control Lead Logic

When the DTE sends data over the DSU channel, it checks the DSU's data set ready (DSR) control lead, which will be on if the DSU's channel is ready for service. Assuming DSR is on, the DTE then turns on its RTS (request to send) lead, which causes the DSU-DP to stop transmitting idle code to the far end. The DSU-DP now turns on its CTS (clear to send) lead to the DTE, which causes the DTE to send its data over the SD (send data) lead toward the DSU-DP and the network.

When the DSU-DP has data from the network to send to the DTE, it turns on its RLSD (receive line signal detect) lead to the DTE and sends data to the DTE on the RD (receive data) lead.

*Note: If the RTS Lead is not used, the RTS Force On option must be set to **ENABLE**.*

4.3 Synchronous to Asynchronous Conversion

When the ASYNC option is selected, the unit allows asynchronous data from the DTE to be passed over the synchronous T1 communications channel. This is accomplished by manipulating the asynchronous data stop bits.

When the frequency of the asynchronous data from the local DTE is slower than the synchronous channel, the unit will add stop bits to match the synchronous channel rate. When the frequency of the asynchronous data from the DTE is faster than the synchronous channel rate, up to one in every four stop bits can be deleted to match the rate.

In the receive direction, data from the synchronous channel to the DTE, the DSU-DP recognizes start and stop bits. If a missing stop bit is detected, then a stop bit is inserted and the stop bits are shortened during each character by a percentage of either 12.5% or 25%, as selected through the management interface.

4.4 Rate Adaptation and Error Correction — 2.4, 4.8, and 9.6 Kb Rates

Data transmitted from the DTE is broken into 6-bit bytes. To these bytes a least significant bit (LSB (stuff bit)) and most significant bit (MSB (control bit)) of logic 1 are added to make the byte 8 bits. To increase the sub-rate to the channel rate of 64 Kb/s, each byte is repeated 20 times at 2.4 Kb, 10 times at 4.8 Kb, and 5 times at 9.6 Kb. The resultant 64 Kb stream is sent to the multiplexer common equipment and the T1 network. This process is the same regardless of whether error correction is enabled or disabled.

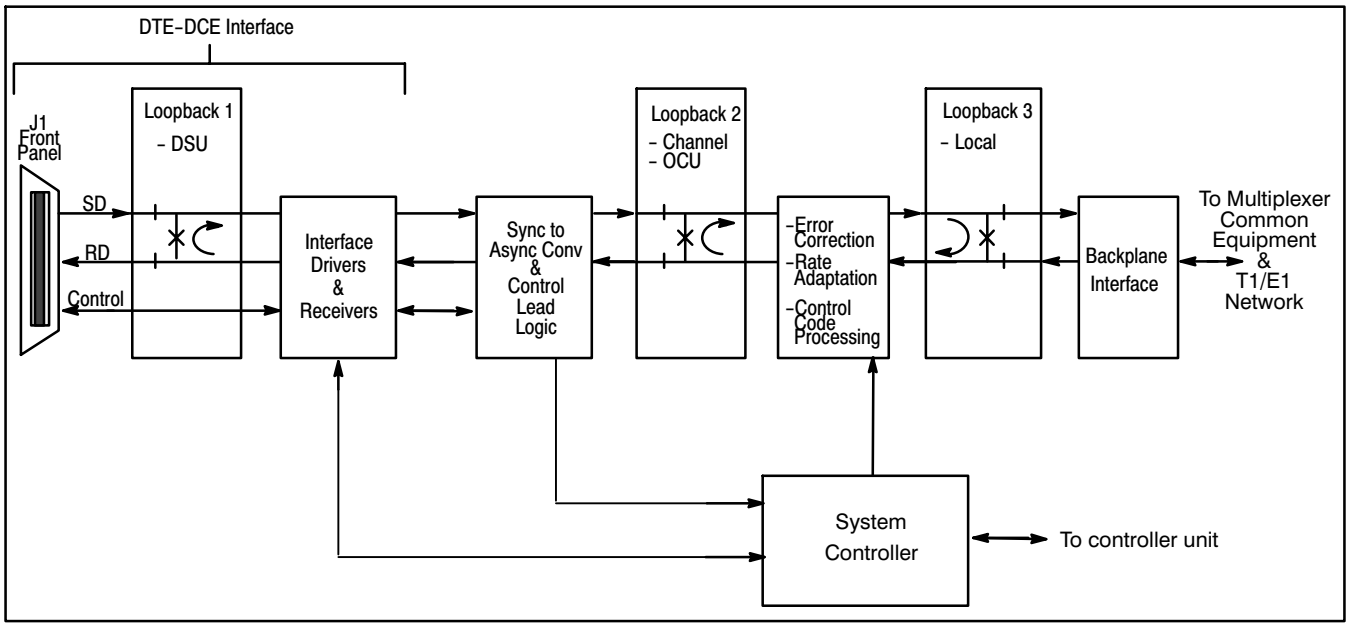

Figure 4. DSU-DP Block Diagram

The synchronous data received from the network for 2.4, 4.8 and 9.6 Kb data rates is received as 8-bit bytes. If error correction is enabled, the circuit performs a majority vote (MJV) on each group of 5 bytes. The corrected data is stripped of its LSB and MSB, and the resultant 6-bit bytes are sent toward the DTE. If error correction is disabled, the majority vote algorithm is not performed on the receive data.

4.5 Rate Adaptation and Error Correction, 19.2 Kb Rates

Data transmitted from the DTE at 19.2 Kb is broken into 6-bit bytes and has an LSB and MSB of logic 1 added to create an 8-bit byte. If error correction is enabled, a parity byte is calculated using a BCH algebraic coding algorithm. The two data bytes and their parity bytes are combined with a framing byte which is the complement of the second parity byte. The resultant 5-byte group (DATA 1, DATA 2, PARITY 1, PARITY 2, and FRAMING) is sent to the common equipment and T1 network.

Data received from the network for the 19.2 Kb rate is received as 8-bit bytes. When error correction is enabled, the BCH error correction algorithm uses the parity bytes in each 5-byte group to correct any data errors. This error correction scheme will correct all 1- and 2-bit errors and some 3-bit errors.

When error correction is disabled at the 19.2 Kb rate, the unit does not create parity bytes for the DTE data sent to the network. The 5-byte sequence is DATA 1, DATA 2, DATA 2, DATA 2, DATA 2, with the MSB set to zero for the last three bytes of DATA 2. In the receive direction from the network, the unit discards the bytes with MSB set to zero and passes the data to the DTE.

4.6 Rate Adaptation at 56 and 64 Kb

Data transmitted at 56 Kb is broken into 7-bit bytes and has an LSB of Logic 1 added to create an 8-bit byte.

4.7 Parity Channel Error Correction

At rates above 19.2 Kb, error correction requires an additional time slot. The second time slot carries parity bytes used to check the data channel for bit errors. The error correction system can correct all 1 and 2-bit errors and some 3-bit errors.

4.8 Control Code Processing

The DSU-DP can receive data, idle pattern, or one of several control codes from the network. These codes, their meaning and functions, are shown in Table 1. The DSU-DP will transmit an idle pattern to the network when not in a test mode or sending data. One of two types of idle pattern may be selected.

Table 1. Network Control Codes

Mode	Received Control Codes	Definition	DTE Control Leads			
			CTS	DSR	RLSD	TM
Normal	XXXX XXX1	Data	ON/OFF	ON	ON	OFF
	X111 1110	Idle	OFF	ON	OFF	OFF
Out of Service	X001 1000	Unassigned MUX channel	OFF	OFF	OFF	ON
	X001 1010	MUX out of sync				
	X001 1100	Test code				
	X001 1110	Abnormal remote station				
Test Loopback	X010 1100	DSU loopback	OFF	OFF	OFF	ON
	X010 1000	CSU (channel) loopback				
	X010 1010	OCU loopback				
Test Latching Loopback Sequence	X011 1010	Transition in progress	OFF	OFF	OFF	ON
	X101 0101 or X011 0001	OCU select CSU channel select				
	X101 0110	Loopback enable				
	X010 1010	Far-end voice				
Unknown	X010 1010	Other	OFF	OFF	OFF	ON
Note: X = don't care.						

4.8.1. Zero Code Suppression

If the zero code suppression (ZCS) option is enabled when an All-0's DS0 byte is encountered, it is replaced by a 00011000 byte in the bit stream outbound for the facility.

4.8.2. Loopback Code Detector

The unit will always respond to network initiated *non-latching* loopback control sequences. If *latching* loopback is ON, the unit will also respond to latching loopback control sequences.

Latching loopback for OCU loopback and channel loopback is activated by using the specific latching loopback sequence (per Bellcore publication TR-TSY-000077) as follows:

Enable:

TIP (min. 35 bytes) — Transition In Progress
LSC (min. 35 bytes) — Loopback Select Code
LBE (min. 100 bytes) — Loopback Enable
FEV (min. 32 bytes) — Far End Voice

Disable:

TIP (min. 35 bytes) — Transition In Progress

A 10-second watchdog timer is activated between the LSC bytes and FEV bytes. The timer requires the correct receipt of the LBE sequences in less than 10 seconds after recognition of the LSC bytes. This ensures a termination of the latching loopback sequence if it is incorrectly started by receipt of random data/errors. In addition, the timer prevents the long-term latch due to receipt of enable sequences which may be embedded in data over a long period of time.

5. INSTALLATION

5.1 Attaching the Rear Panel

The rear panel of the unit should be installed before all units are installed in the shelf and before wiring begins.

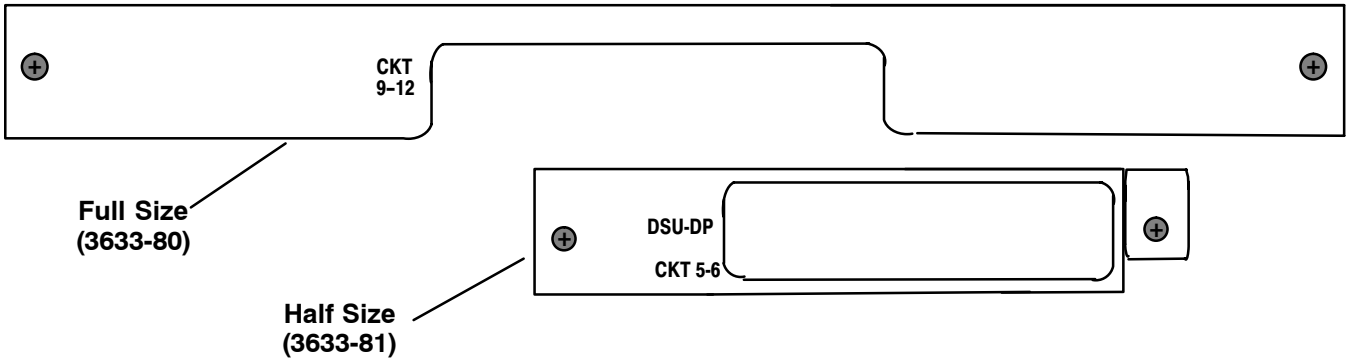

Figure 5. DSU-DP Rear Panel

5.2 Installing the Unit

5.2.1. Installing 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 into 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.	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 about this interface).

5.2.2. Installing a Replacement Unit

If you are replacing a unit that is already in service, insure that the unit is the same 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 procedure for installing a new unit.

5.3 Connecting the DSU-DP to the DTE

The DSU-DP will be one of two card styles, a full size (3633-80) or half size (3633-81). The full size unit will provide up to 12 connections from the DSU-DP if each of the three circuit connections on the unit are used. On the full size DSU-DP there are two circuits on the front of the unit and one on the back. Using all 12 connections would require three 4-to-1 adapter cables. The half size unit will provide up to six connections from the DSU-DP. There are two circuit connections, one on the front and one on the back. The circuit connector on the front requires a 4-to-1 adapter cable and the one on the back a 2-to-1 adapter cable.

5.3.1. Full Size DSU-DP (3633-80)

Figure 6 shows how a 4-to-1 adapter cable and DTE cable assembly are connected to the DSU-DP. All cables are approximately 3 feet long. Up to three 4-to-1 adapter cables can be connected to a full size DSU-DP allowing 12 DTE connections.

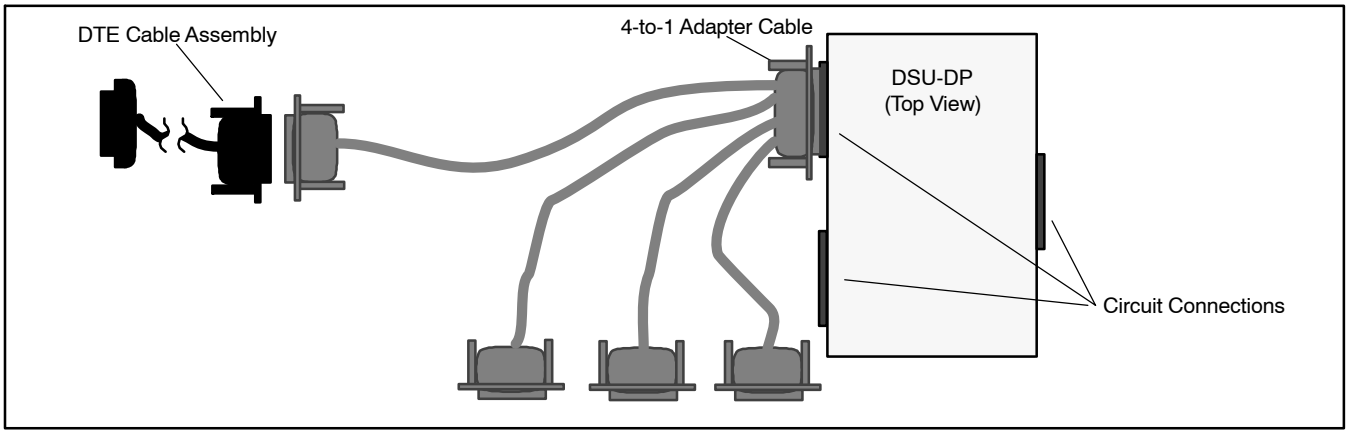

Figure 6. Full Size DSU-DP with Cable Connections

5.3.2. Half Size DSU-DP (3633-81)

Figure 7 shows how a 4-to-1 adapter cable and DTE cable assembly are connected to the DSU-DP. In addition, a 2-to-1 adapter cable is shown connected to the back of the unit. All cables are approximately 3 feet long. The half size DSU-DP provides up to six DTE connections.

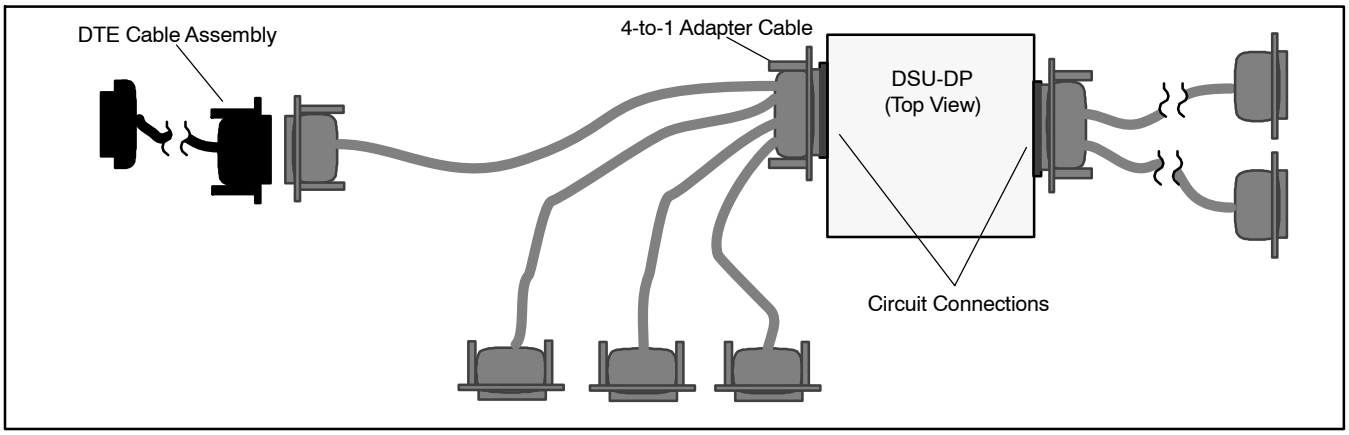

Figure 8. Half Size DSU-DP with Cable Connections

5.4 DTE Interface Cable Assembly

The DTE interface cable assembly connects the 4-to-1 or 2-to-1 adapter cable,to the data terminal equipment. Four different interfaces may be used: RS232, RS530, RS449/422, or V.35. Table 2 shows which DTE cable assembly to use with each type of interface. Figure 9 through Figure 12 show the pinout connections for each type of DTE interface.

Table 2. Cabling for Each Interface Type

Interface Type	DTE Cable Assembly	4-to-1 Adapter	2-to-1 Adapter (3633-81 only)
V.35 DTE/DCE	03-210149-0	03-210148-0	03-210152-0
RS530 DTE/DCE	03-210150-0	03-210148-0	03-210152-0
RS232 DTE/DCE	03-210150-0	03-210148-0	03-210152-0
V.36/RS449	03-210151-0	03-210148-0	03-210152-0

Note: On model 3633-80, circuits 9 through 12 are interfaced on the back of the unit.
On model 3633-81, circuits 5 and 6 are interfaced on the back of the unit.

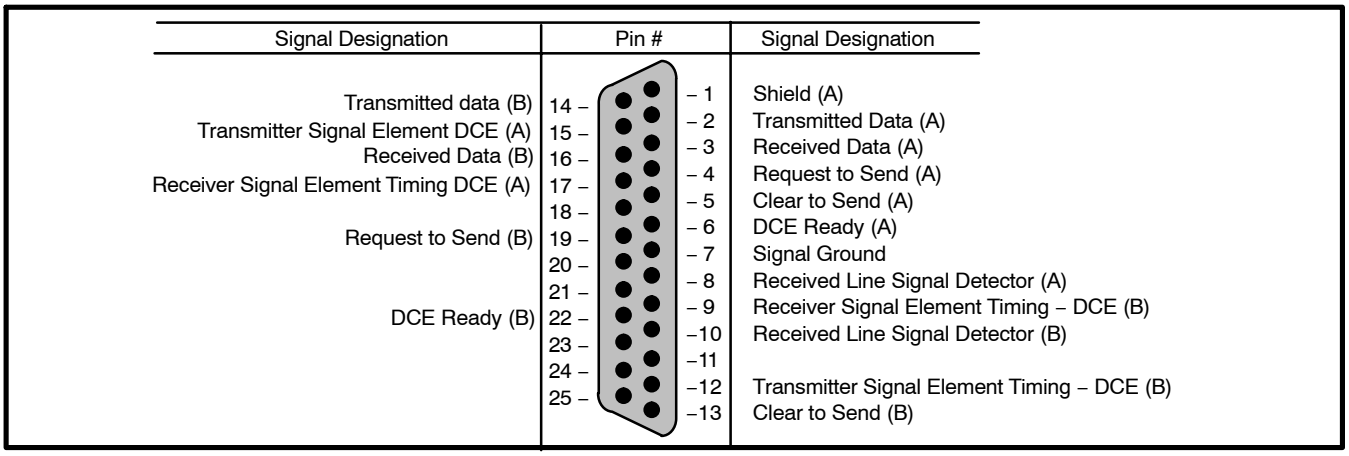

Figure 9. RS530 DTE/DCE Interface

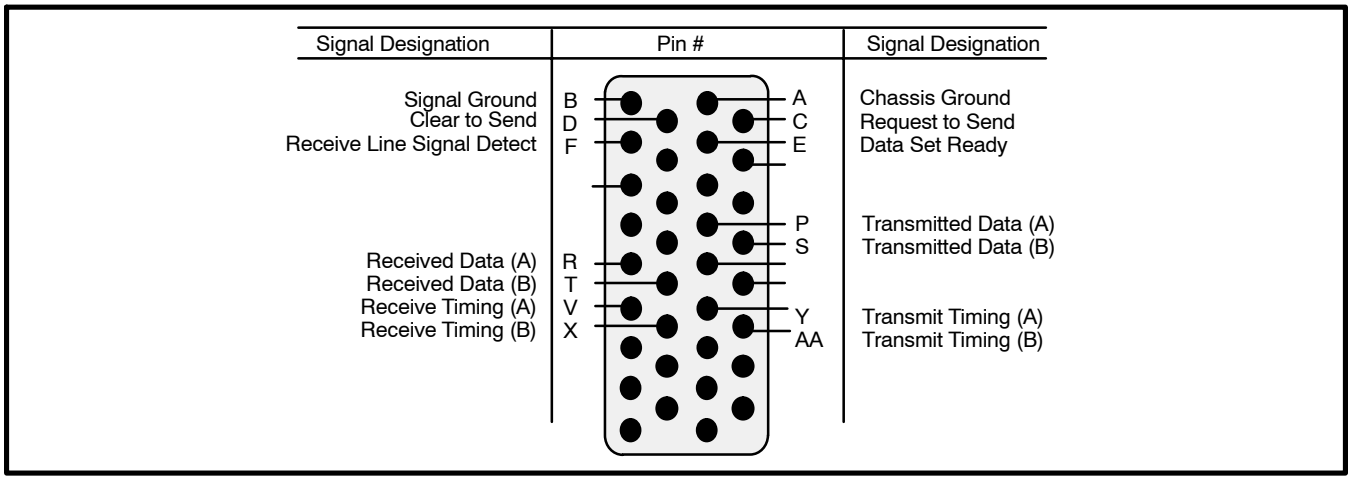

Figure 10. V.35 DTE/DCE Interface

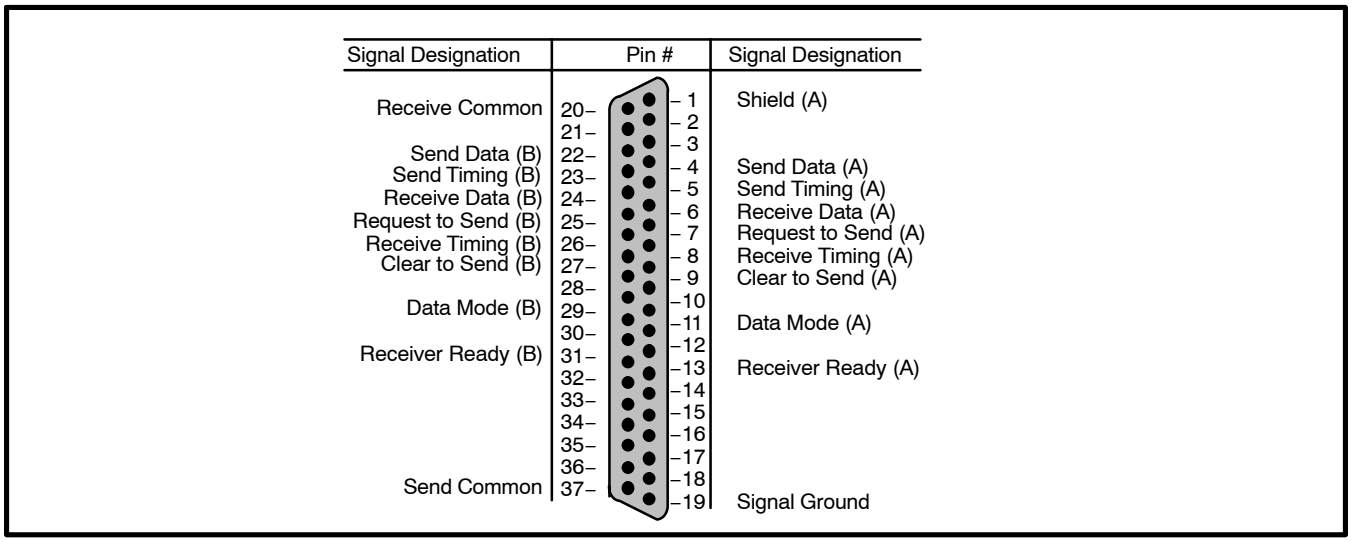

Figure 11. RS449/422/V.36 DTE/DCE Interface

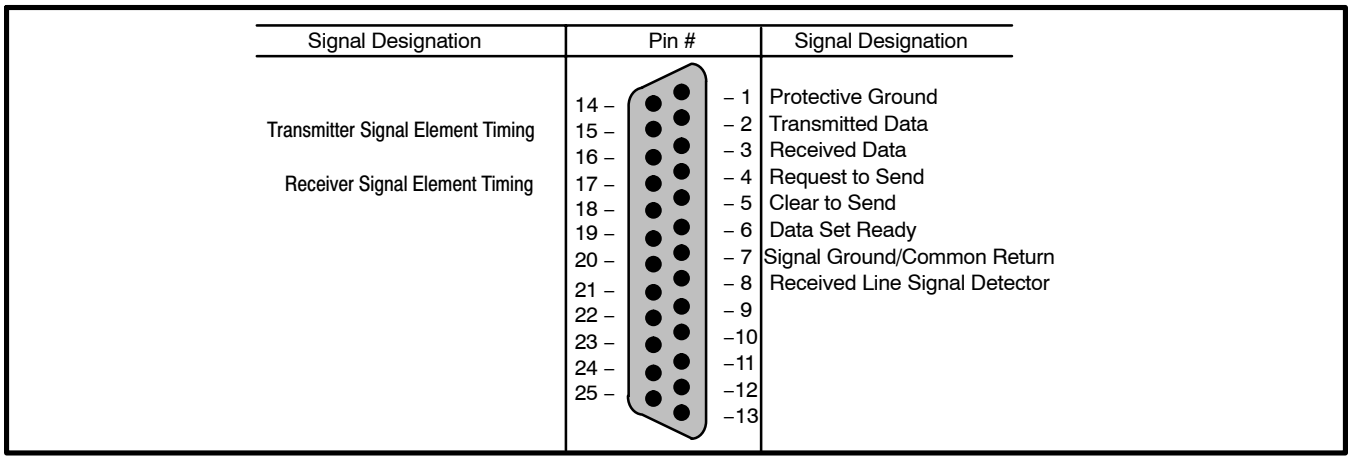

Figure 12. RS232/V.24 DTE/DCE Interface

5.5 Provisioning

This unit comes from the factory with default provisioning. This provisioning can be altered through the Network Management interface. When this module is inserted in to a previously provisioned slot, if the card type matches,

the module will change its provisioning options to match the previously provisioned module. If the module type does not match the module will assume its default provisioning. The provisioning options are as follows with the default optioning noted.

Option	Choices	Default
Per circuit time slots used	T1=1–24, None E1=1–15, 17–31, None	3633-80: channel number 3633-81: T1=None E1=channel number
Per circuit data mode	asynchronous, synchronous	Synchronous
Per circuit data rate	2.4, 4.8, 9.6, 19.2, 56, 64	64
Per circuit asynchronous data bit length	7, 8	7
Per circuit asynchronous parity bit	No, Yes	No
Per circuit asynchronous data stop bits	1, 2	1
Per circuit asynchronous shortened stop bit allowance	12.5, 25	12.5
Per circuit RTS Force On	Enable, Disable	Disable
Per circuit zero code suppression	Enable, Disable	Disable
Per circuit error correction for 19.2, 56, 64	Enable, Disable	Disable
Per circuit latching loopback enable	Enable, Disable	Disable
Per circuit physical interface	RS-232, V.35, RS-422, RS-530	V.35
Per circuit test loopback to be transmitted*	OCU, DSU, CSU, Local, None	None
Per circuit test loopback to be transmitted*	Latching, Non-latching	Non-latching
Per circuit test loopback location*	Near end, far end	Near end
Per circuit test loopback time*	Hour/minute/second	1 minute
Per circuit test loopback 2047 pattern*	Disable, enable	Disable
** Available with the T1 Control Unit.*		

Note: The maximum allowed rate for the physical interface, RS–232/V.24, is 19.2 Kbps.

6. TESTING (T1 CONTROL UNIT ONLY)

If trouble is encountered with the operation of the unit, verify that all the installer connections have been properly made and that all options have been conditioned as required. Make certain that the unit is making good connection with the mounting assembly card connector; remove and reinsert the module.

See Figure 13 through Figure 18 for loopback test descriptions. All loopbacks are initiated through the craft terminal interface or the network management system (NMS). All DSU loopbacks are bidirectional.

6.1 Near End DSU Latching Loopback

In this state, the RD and SD leads are disconnected from the DTE and an out-of-service condition is indicated to the DTE by forcing the DSR, CTS, and RLSD control leads OFF, and forcing TM ON.

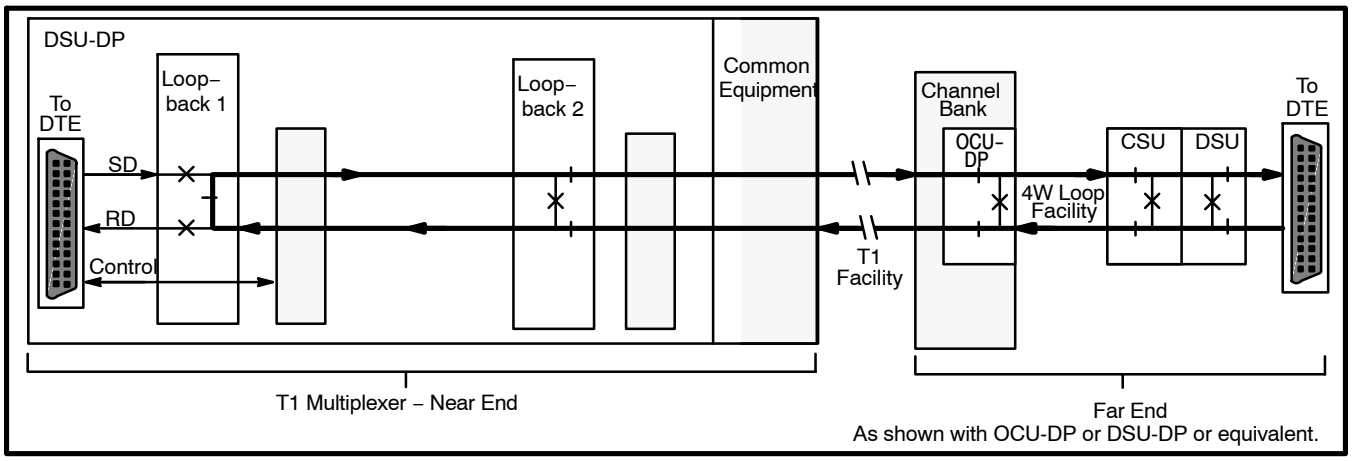

Figure 13. Near End DSU Latching Loopback

6.2 Near End DSU, CSU & OCU Non-latching & Latching Loopback with 2047 Pattern Enabled

The unit automatically enables the 2047 test pattern generator. Monitoring the test pattern gives an indication of near end equipment operation.

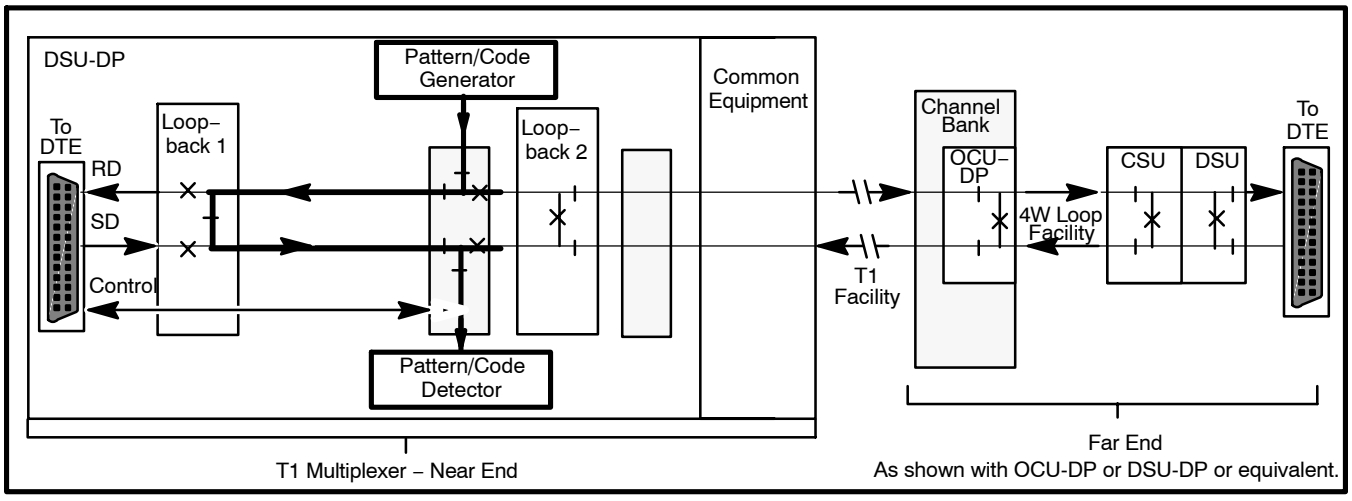

Figure 14. Near End DSU, CSU & OCU Non-latching & Latching Loopback with 2047 Pattern Enabled

6.3 Local Loopback

In this state, the DTE data is looped back to the DTE. The TM control lead is ON. The - and RLSD control leads follow the RTS control lead from the DTE.

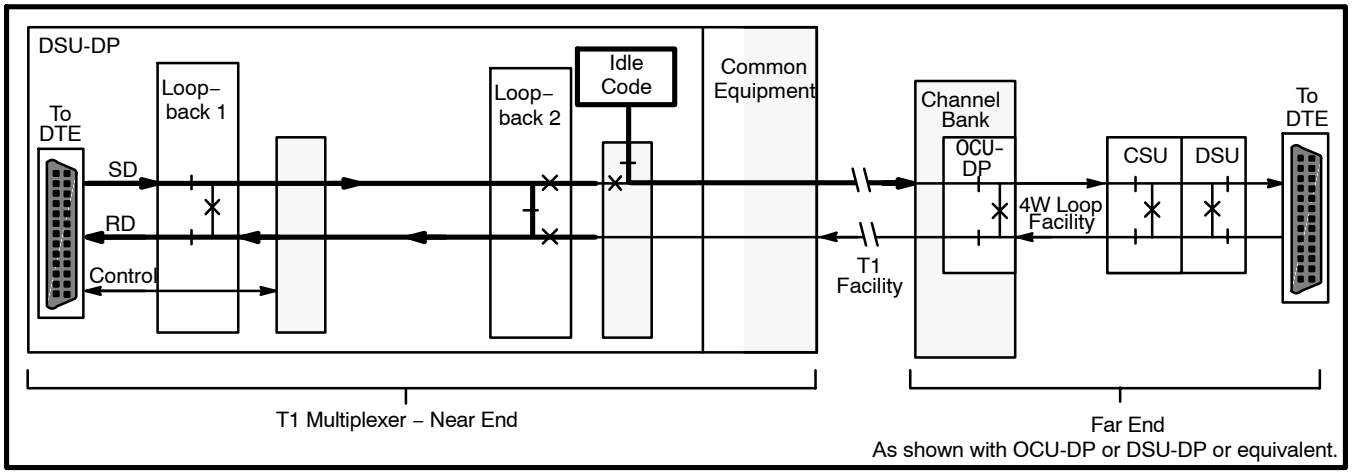

Figure 15. Local Loopback

6.4 Far End DSU, CSU & OCU Non-latching & Latching Loopback with 2047 Pattern Enabled

For a non-latching loopback, the unit sends the non-latching loopback codes to the far end. The unit automatically enables the 2047 test pattern generator. Monitoring the test pattern gives an indication of line and equipment operation.

For a latching loopback, the unit sends the latching loopback sequence. When the 2047 test pattern is enabled, the near end transmit path is broken and the test pattern is transmitted to the far end. The near end receive path is also broke, allowing the unit to monitor the test pattern received for errors.

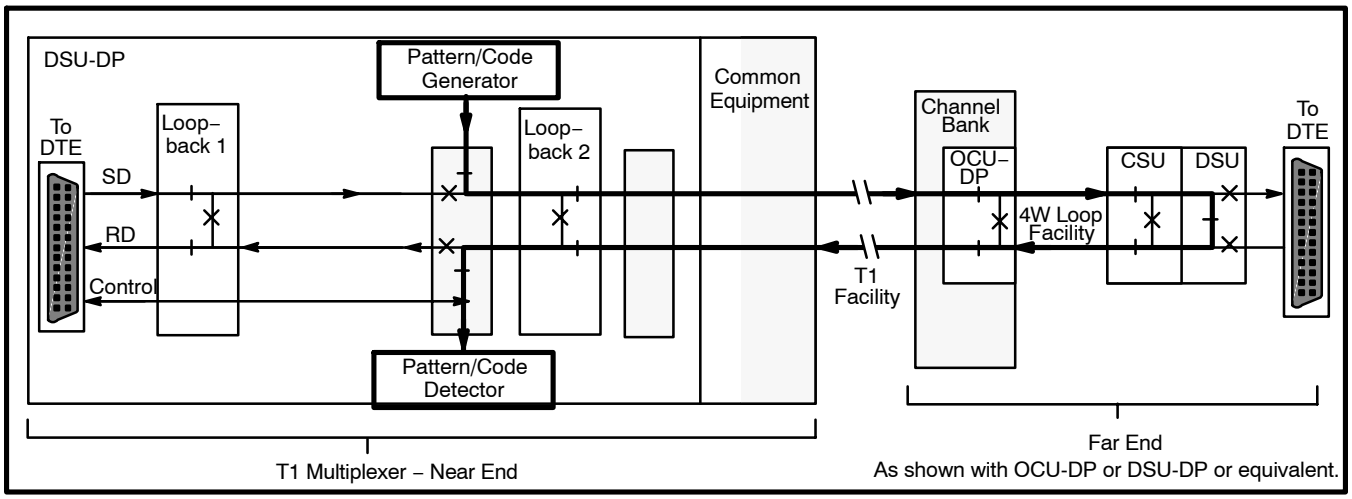

Figure 16. Far End DSU, CSU & OCU Non-latching & Latching Loopback with 2047 Pattern Enabled

6.5 Far End DSU, CSU and OCU Latching Loopback

This causes the unit to send a latching loopback code sequence to the far-end. When the far-end loops up as evidenced by the return of the control code, the unit will disconnect the control code generator and allow the local DTE data to be looped back from the far end. When loopback is turned off, the control code generator will loop down the far end.

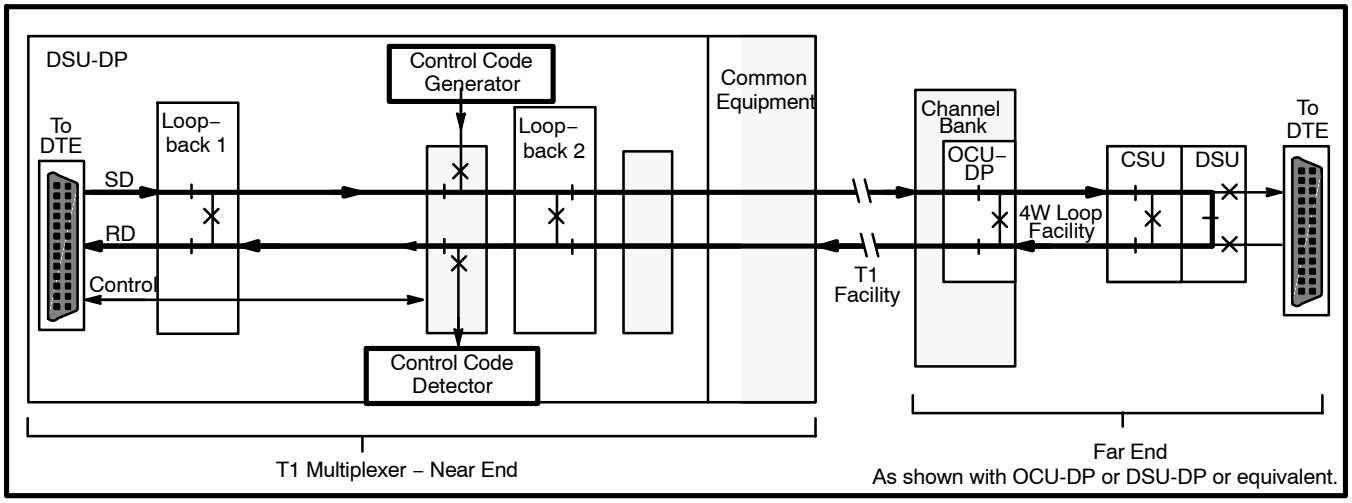

Figure 17. Far End DSU, CSU and OCU Latching Loopback

6.6 Network-Initiated DSU, CSU and OCU Loopback

This loopback is initiated at the network test center by sending the control sequence as shown in Table 1. In this state, the RD and SD leads are disconnected from the DTE and an out-of-service condition is indicated to the DTE by forcing the DSR, CTS, and RLSD control leads OFF, and forcing TM ON.

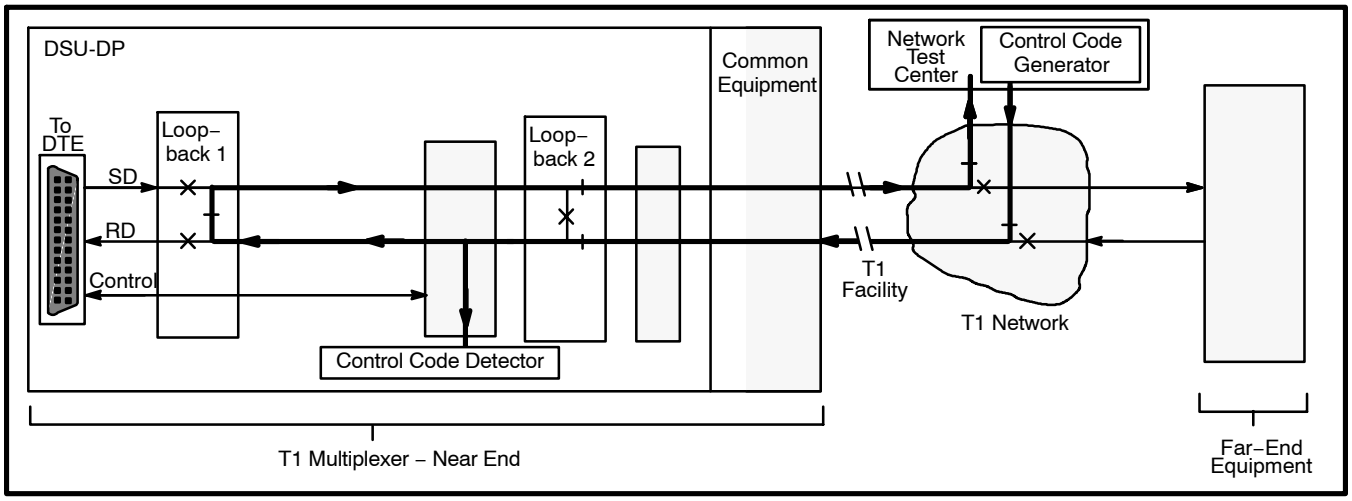

Figure 18. Network-Initiated DSU, CSU and OCU Loopback

7. TECHNICAL ASSISTANCE

If technical assistance is required, contact Charles Industries' 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
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 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	Specification
Number of subscribers for each module	12 circuits (3633-80) 6 circuits (3633-81)
Data rate	2.4, 4.8, 9.6, 19.2, 56, 64 Kb/s. All data rates support sync mode. 19.2Kbps and lower support async mode
DTE interface	Supports CCITT V.35, RS449/422/V.36, and RS530 19.2Kbps and lower support CCITT V.24/RS232
Loopback	All data rates support OCU, CSU, DSU latch loopback. Below 64Kbps data rates support OCU, CSU, DSU non-latching loopback.
DDS Test Set	DDS Test set emulation with 2047-bit test pattern.
Power Supply Current (−42 to −56 volts)	Average = 0.27 amp (3633-80), 0.21 amp (3633-81) Worst Case = 0.31 amp
Heat Dissipation	13 watts (3633-80) 10 watts (3633-81)

9.2 Physical

Feature	3633-80		3633-80	
	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	1.01 pounds	460 grams	0.60 pound	273 grams
Temperature	0° to + 122° F	0° to + 50° C	0° to + 122° F	0° to + 50° C
Humidity	<95%		<95%	