

**PRODUCTIVITY SERIES 400**  
**DDS**  
**DSU/CSU**



**34-00222**  
**October 1997**

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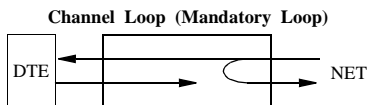
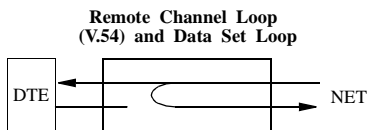
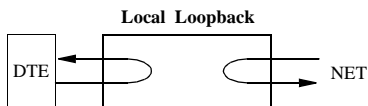
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**V.54 Channel Loop:** This loop is activated by the receipt of the V.54 loop command. This loop is unidirectional and returns the DSU receive data to the DSU transmit data, and subsequently the DDS transmit data. Receive data is unaffected and DSR and RLSD are forced Off.

**Remote Channel Loop:** This loop is activated by pressing the front panel switch to the RL position. This starts an internal test by replacing the DSU's transmitted data with the V.35 activate code to the far end DSU equipment for the proper time period. Then a test pattern is sent to verify the looped DDS DSU's integrity. If the transmitted pattern is received error free, the test lamp turns green. If errors are detected, the test lamp turns red. Normal DSU operation may resume for DCE BERT testing. Placing the switch in the NORM position transmits the V.54 deactivate code.

**Looping Diagrams**



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# 1. Introduction

The TxPORT Productivity Series DDS 400 provides an economical solution to access Digital Data Service. The 400 unit is fully compatible with AT&T TR62310, the industry specification standard for DDS. This unit is designed for standalone (table top) use, but may be rack mounted using the optional rack mount kit. See page 7 for ordering information.

The 400 rear panel has three interface connectors. An RJ-48C (8-pin) interface allows connection to the network. The V.35 (34-pin) high speed port connector supports data rates of 2.4, 4.8, 9.6, and 56 kbps. An RS-232 (25-pin) interface is also provided as a substitute for the V.35 interface.

The 400 unit is configured through a rear panel DIP switch. LED indicators on the front panel alert local personnel of the unit's line, DTE, and test status. A test switch activates a local loopback or initiates a remote loopback and pattern test.

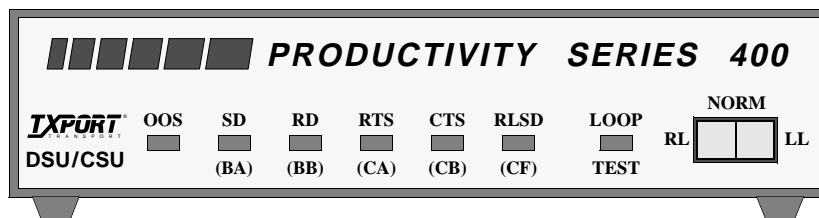
A power cord on each unit provides 115 VAC operation. Primary and secondary surge protection is provided on the network side (meeting UL 1459 requirements).

Each unit provides network ALBO circuitry. This network ALBO supports a receive range of +1 dB down to -40 dB.

## Specifications

### Network Interface

Line Rate:	2.4, 4.8, 9.6, 19.2, 28, 38.4, 56, and 64 kbps
Line Code:	AMI
Line Impedance:	Balanced 135 $\Omega$
Input Signal:	+1 to -40 dB (ALBO)
Output Signal:	3.0 V ( $\pm 15\%$ ) base-peak into 135 $\Omega$ 1.5 V ( $\pm 15\%$ ) at the 9.6 kbps line rate
Line Protection:	1000 V lightning, input/output



Productivity 400 DDS DSU/CSU

the V.54 code). If errors are detected, the TEST LED will be red. The NORM position deactivates the loop codes for normal operation. Refer to the Testing section on page 4 for further information.

## Testing

The front panel test switch is used as described in the following paragraphs. Three types of loops are shown in the diagrams on page 14.

**Local Loop:** Each unit can initiate a local loop by placing the test switch in the LOC position. The unit loops the signal from the customer equipment (DTE IN) back to the customer equipment (DTE OUT). It also transmits the DTE data towards the network.

**Remote Channel Loop:** Each unit can generate a far end remote channel loop by placing the test switch in the RL position. The unit sends a V.35 loop code in the assigned channels to the far end for two seconds followed by two seconds of all ones, followed by DTE data. After four seconds, the far end should be looped.

In other words, this function starts an internal test by replacing the DSU's transmitted data with the V.54 activate code to the far end DSU equipment for the proper time period. Then a test pattern is sent to verify the looped channel's integrity. If the transmitted pattern is received error free, the LED illuminates green. If any errors are detected, the LED illuminates red. Normal DSU operation may resume at this time for DCE BERT testing. Returning the test switch to NORM transmits the V.54 deactivate code.

**Normal (Unloop):** When the test switch is moved from LOC back to NORM, the local loopback is removed. When the test switch is moved from REM back to NORM, the unit sends unloop messages to the far end unit for six seconds and the remote loopback is removed.

The following paragraphs describe other loops that may be initiated on the 400 unit:

**Channel Loop:** This loop is activated by the reversal of the simplex, 20 mA sealing current. This is a unidirectional loop that ignores the DSU transmit data and retransmits the received DDS data. Receive data is unaffected and circuits CC and CF are forced Off.

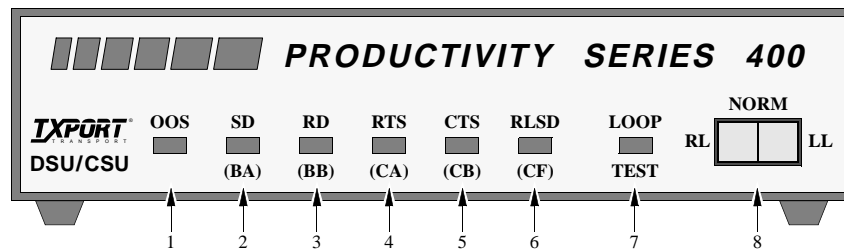
**Data Set Loop:** This loop is activated by the receipt of at least four consecutive loop commands and remains looped as long as each third pattern byte is the loop command. It returns to normal operation after at least four pattern bytes that are not the loop command. This is a unidirectional loop that retransmits the DSU received data on the DSU transmit data. Receive data is unaffected and circuits CC and CF are Off.

**Local Loop:** This loop is activated by pressing the front panel switch to the LL position. This loop is bidirectional and returns the DDS receive data to the DDS transmit line and the DSU transmit data to the DSU receive data output.

### 3. Operation

This chapter describes the front panel operation and test features of the TxPORT 400 DDS DSU/CSU. The unit is controlled manually using a front panel test switch and rear panel DIP switches. Refer to page 8 for specific information concerning DIP switch settings.

- 1) **OOS:** This three color Out Of Service LED indicates the DDS loop receiver's operating status. Green indicates DDS signal at the receiver (either customer data or zero suppression). Amber indicates DDS signal is still present, but received data is idle or out of service. Red indicates an insufficient signal for the DDS receiver to operate properly.
- 2) **SD:** This green Send Data LED illuminates when the data lead is a mark and is off when the data lead is a space. Therefore, the LED will vary from full intensity to off depending on the relative number of marks and spaces.
- 3) **RD:** This green Receive Data LED illuminates when the data lead is a mark and is off when the data lead is a space. Therefore, the LED will vary from full intensity to off depending on the relative number of marks and spaces.
- 4) **RTS:** This green Request To Send' LED illuminates when circuit CA is in the On state at the DSU interface.
- 5) **CTS:** This green Clear To Send LED illuminates when circuit CB is in the On state at the DSU interface.
- 6) **RLSD:** This green Receive Line Signal Detector LED illuminates when circuit CF is in the On state at the DSU interface.
- 7) **LOOP/TEST:** This amber LED remains illuminated if the unit is in a test mode, either by manually depressing the loop switch or by receipt of a test command from the facility. The LED turns red or green at the end of a V.54 test indicating the pass or fail state of the BERT. Refer to the Testing section on page 4 for specific information.
- 8) **Test Switch:** This 3-position switch is used as follows: The LL position places the unit in a local loop mode. Data from the DTE is looped back to the DTE. Data from the network is looped back to the network. The RL position initiates an automated V.54 remote loop and BERT sequence of assigned data channels. The TEST LED will be green if the test is successful (the far end unit loops and returns the data error free with



400 DDS Front Panel

#### Power

AC Power:	115 VAC (± 10%), 150 mA maximum, 20 Watts, 73 BTU maximum
Connection:	5-foot power cord

#### Mechanical

Mounting:	Desktop, wall, or rack mount
Dimensions:	Height: 1.75 inches (4.45 cm)
	Width: 6.8 inches (17.27 cm)
	Depth: 10.5 inches (26.67 cm)
	Weight: 2 pounds (0.91 kg)

#### Industry Standards

FCC Compliance:	Part 15 Subpart B, Class A, Part 68
U.S. Safety:	UL 1459
Canadian Safety:	CSA C22.2 No. 225-M90
IC:	CS03

#### Environmental

Operating Temp:	0° to 50° C (32° to 122°F)
Storage Temp:	-20° to 85° C (-4° to 185°F)
Humidity:	95% max (non-condensing)

### FCC Requirements

**⚠ Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.**

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

This device may not cause harmful interference.

2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference. The user will be required to correct the interference at his own expense.

Notice to Users of DDS service: The following instructions are provided to ensure compliance with FCC Rules, Part 68:

- 1) All direct connections to DDS lines must be made using standard plugs and jacks.
- 2) Before connecting your unit, you must inform the local telephone company of the following information:

Port ID	REN/SOC	kbps	FIC	USOC
12 - 00492	6.0 N	2.4	04DU5-24	RJ-48C jack
		4.8	04DU5-48	
		9.6	04DU5-96	
		38.4	04DU5-38	
		56	04DU5-56	
		64	04DU5-64	

- 3) If the unit appears to be malfunctioning, it should be disconnected from the telephone lines until you learn whether the source of trouble is your equipment or the telephone line. If your equipment needs repair, it should not be reconnected until it is repaired.
- 4) The unit has been designed to prevent harm to the DDS network. If the telephone company finds that the equipment is exceeding tolerable parameters, they can temporarily disconnect service. In this case, the telephone company will give you advance notice, if possible.
- 5) Under FCC rules, no customer is authorized to repair this equipment. This restriction applies regardless of whether the equipment is in or out of warranty.
- 6) If the telephone company alters their equipment in a manner that will affect the use of this device, they must give you advance warning so that you can have the opportunity for uninterrupted service. You will be advised of your right to file a complaint with the FCC.
- 7) The attached affidavit must be completed by the installer.
- 8) In the event of equipment malfunction, all repairs should be performed by our company or an authorized agent. It is the responsibility of users requiring service to report the need for service to our company or to one of our authorized agents.

## Warranty

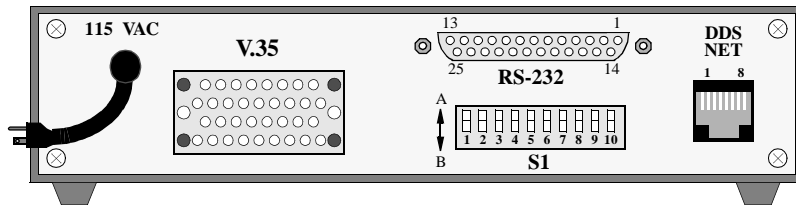
If for any reason you must return your TxPORT product, it must be returned to the factory, shipping prepaid and packaged to the best commercial standard for electronic equipment. TxPORT will pay shipping charges for delivery on return. You are responsible for mode and cost of shipment to TxPORT.

You must have a Return Material Authorization (RMA) number marked on the shipping package. Products sent to TxPORT without RMA numbers will be returned to the sender unopened, at the sender's expense. A product sent directly to TxPORT for repair must first be assigned a Return Materials Authorization (RMA) number.

Circuit	V.35	RS-232	Signal Function (Note: all other pins are open)	DCE
101	A	1	Frame Ground - This circuit is used to terminate shields.	Gnd
102	B	7	Signal Ground - This circuit is used as the return reference for unbalanced signals.	Gnd
103	P/S	2	Transmit Data - This input is used for synchronous TD from the DTE. It is transmitted on the DDS side.	In
104	R/T	3	Receive Data - This output is the data decoded from the incoming DDS receive data.	Out
105	C	4	Request To Send - This input is a control line from the DTE indicating data is to be transmitted. When RTS is On (space), the data transmitter, the zero suppression circuitry, and the CTS are enabled. When RTS is Off, the transmitter sends idle code and the CTS is forced Off.	In
106	D	5	Clear To Send - This output is a DCE response, indicating that either RTS is On or S1-8, position B, is forcing RTS On. When S1-7 is in position B, RTS and RLSD must be On for CTS to be On.	Out
107	E	6	Data Set Ready - This output is On when the unit is not in a test mode (other than a V.54 test).	Out
109	F	8	Data Carrier Detect - This output is On when the correct data or zero suppression code is being received and DSR is On. It is Off when either DSR is Off, the DDS receiver has lost sufficient signal to operate for at least one second, or the receiver has received OOS, OOF, idle, or loop codes for about 20 U.I.	Out
113	U/W	24	External Transmit Clock - This is the synchronous transmit clock input from the DTE. When both S1-3 and S1-4 are in the B position, this clock controls the frequency of the DDS transmit clock and clocks circuit 103 (TD). When either S1-3 or S1-4 is in the A position, this input has no effect on DDS operation.	In
114	Y/AA	15	Transmit Clock - This output is supplied by the DCE as an external DTE timing source. It is generated from the internal data clock or the far end transmit data. Not available when S1-3 and S1-4 are in the B position.	Out
115	V/X	17	Receive Clock - This clock output is the timing for the RD and is always used to time the receive data. This clock is always derived from the DDS receive data.	Out
142	K	25	Test Mode - This output is On when the unit is in the Test/Loop mode.	Out

## Connections

The 400 DDS rear panel has three interface connectors: an RJ-48C DDS network connector, a V.35 high speed port connector, and an RS-232 connector. Each unit comes equipped with a power cord for 115 VAC operation ( $\pm 10\%$ ).



**TxPORT 400 DDS Rear Panel**

### DDS Network Connection

The network DDS facility interface is a standard RJ-48C (8-pin) modular jack with the following pinout:

Pin	Assignment
1	Network Transmit Out
2	Network Transmit Out
3	Not Used
7	Network Data In
8	Network Data In

### V.35 and RS-232 Port Connection

The V.35 or the RS-232 port is automatically selected when you physically connect the cable to the port. Connection to only one of these two connectors is allowed at any one time because the internal circuitry selects the proper interface depending on which connector has TXD applied. These ports meet all the general physical and electrical requirements. The V.35 connector is a standard 34-pin female. The RS-232 connector is a standard DB-25 female.

The V.35 and RS-232 pin assignments are shown in the previous table. Only circuits serviced by the unit are listed. When two pins are listed, the first is the *A* differential pin and the second is the *B* differential pin. All balanced bipolar inputs and outputs meet the physical and electrical specifications at ITU V.35. All unbalanced bipolar inputs and outputs meet the physical and electrical specifications of ITU V.28.

You may obtain an RMA number from customer service at 800-926-0085 extension 2282. When calling TxPORT for an RMA, please have the following information available.

- Model number and serial number for each unit.
- Reason for return and symptoms of problem.
- Warranty status (if known).
- Purchase order number to cover charges for out-of-warranty items.
- Name and phone number of person we can contact if we have questions about the unit(s).
- Mode of shipment required (second-day air is the normal mode of shipment for all returned material unless otherwise specified).

Units being returned to TxPORT should be sent to the following address.

TxPORT  
127 Jetplex Circle  
Madison, Alabama 35758

## Ordering Information

You may require additional items to install and operate each unit. Use the following numbers to order the basic unit or optional equipment.

Part Number	Description
F-400-001--111	Productivity Series Multirate 400 DSU/CSU unit
9-2000-001-1	Single unit horizontal rack mount hardware for 19-inch equipment rack
9-2000-001-2	Dual unit horizontal rack mount hardware for 19-inch equipment rack
9-2000-002-1	Single unit horizontal rack mount hardware for 23-inch equipment rack
9-2000-002-2	Dual unit horizontal rack mount hardware for 23-inch equipment rack
9-2000-001-8	19-inch multi-unit rack mounting for eight units.
9-2000-002-8	23-inch multi-unit rack mounting for ten units.

## 2. Installation

This chapter contains information and instructions required to prepare the TxPORT 400 DSU/CSU for use. Included are configuration guidelines and connection instructions.

### Supplied Materials

Each 400 unit is shipped with the TxPORT 400 DDS DSU/CSU reference manual. You may require additional items for the installation and operation of the unit. Refer to page 7 for complete ordering information.

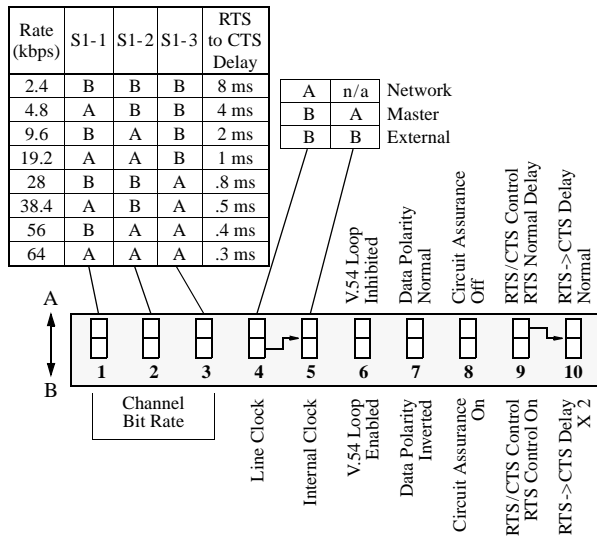
### Unit Configuration

On power up, each unit is configured to the hardware settings of the option switches (S1). Subsequent changes to these settings will not take effect until the unit has been reset. This may be accomplished either by removing and then reapplying power or by pushing the test switch toward local loop LL and then quickly back to center or NORM. The unit then recycles through its LEDs and reads the new configuration.

S1 is a 10-position DIP switch located on the unit's rear panel. This switch provides the following configuration parameters.



The symbol '⏏' indicates that the switch pointed to is not functional unless the opposite end of the arrow is in the position shown. For example, S1-5 is not functional unless S1-4 is in the B position.



**Channel Bit Rate Select:** Positions S1-1, S1-2, and S1-3 select the channel bit rate. Refer to the table in the above diagram to determine the switch settings for a particular bit rate. The RTS to CTS delays are multiplied by two when position S1-10 is in the B position.

**Line Clock:** Position S1-4 selects either an internal clocking source or a loop timing source from the received data.

A - Loop timing source      B - Internal line clock

**Internal Clock:** Position S1-5 selects either the DSU external clock input or the crystal oscillator as the clocking source. This function is applicable only if position S1-4 is in the B position.

A - Internal master clock      B - DSU external clock input

**V.54 Loop Operation:** Position S1-6 enables or disables V.54 loop operation.

A - Disabled      B - Enabled

**Data Polarity:** Position S1-7 determines whether data bits are inverted. In the A position, marks equal pulses. In the B position, spaces equal pulses. Receipt of OOF, OOS, idle, or loop codes forces the DSU data to all marks (A position) or spaces (B position).

A - Normal      B - Inverted

**Circuit Assurance:** When position S1-8 is On, the status of CF (receive line signal detector) and CA (request to send) controls the output CB (clear to send). If either CA or CF is Off (position A), CB is Off. If CA and CF are On (position B), CB is On.

A - Off      B - On

**RTS/CTS Control:** When position S1-9 is in the B position, CTS is forced On regardless of the RTS input status. In the A position, the delays are determined by S1-10.

A - Normal Delay      B - Control On

**RTS -> CTS Delay:** When position S1-10 is in the A position, the RTS to CTS delay is as shown in the S1-1, S1-2, and S1-3 bit rate table. In the B position, the delays shown are multiplied by two.

A - Normal Delay      B - Delay multiplied by two

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# Addendum

**Document:** Productivity Series 400 Reference Manual

**Date:** June 12, 1998

The power rating, as listed on page 5 of the manual, has been revised as follows.

**Power AC:** 115 VAC, 120 mA, 7 W maximum, 23 BTU maximum