

**MODEL 7511
DUAL DSU
USER'S GUIDE**

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About This Guide

Document Purpose and Intended Audience

This guide contains information needed to set up, configure, and operate the Model 7511 DSU and is intended for installers and operators.

Document Summary

Section	Description
Chapter 1	<i>About the Dual DSU.</i> Describes the DSU features and shows examples of typical configurations.
Chapter 2	<i>Configuring and Installing the DSUs.</i> Provides procedures for setting up and installing the DSU card.
Chapter 3	<i>Monitoring the DSUs.</i> Describes monitoring details about the LEDs, DSU status, and network statistics.
Chapter 4	<i>Testing.</i> Provides details about available tests and test setup.
Chapter 5	<i>Troubleshooting.</i> Provides information on device troubleshooting.
Appendix A	<i>Cables and Pin Assignments.</i> Contains connector and interface details.
Appendix B	<i>Technical Specifications.</i> Contains physical and regulatory specifications of the DSU.
Glossary	Defines acronyms and terms used in this document.
Index	Lists key terms, acronyms, concepts, and sections in alphabetical order.

Product-Related Documents

Document Number	Document Title
3000-A2-GA31	<i>COMSPHERE 3000 Series Carrier Installation Manual</i>
3000-A2-GZ47	<i>Network Interface Cable, Network Interface Module Installation</i>
7511-A2-GN10	<i>Model 7511 Dual DSU Startup Instructions</i>

To order additional product documentation, refer to *Warranty, Sales, and Service Information* on page A at the beginning of this User's Guide.

About the Dual DSU

1

Model 7511 Dual DSU Features

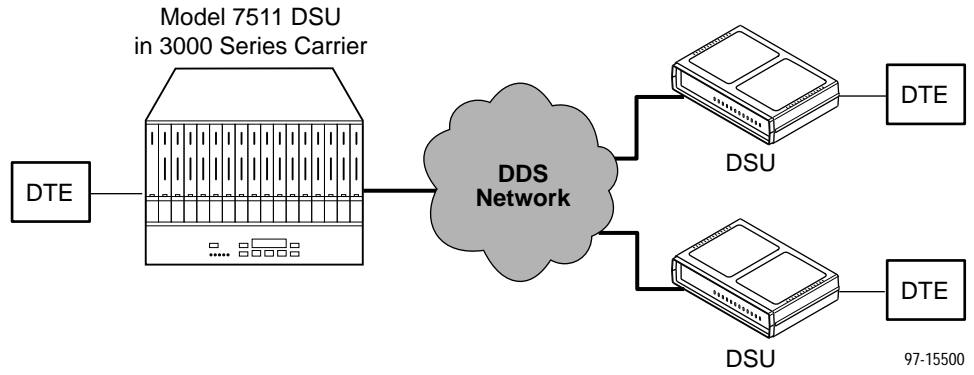
The DSU provides an interface between the customer premises equipment (CPE) and a Digital Data Service (DDS) network.

The DSU's features and capabilities include:

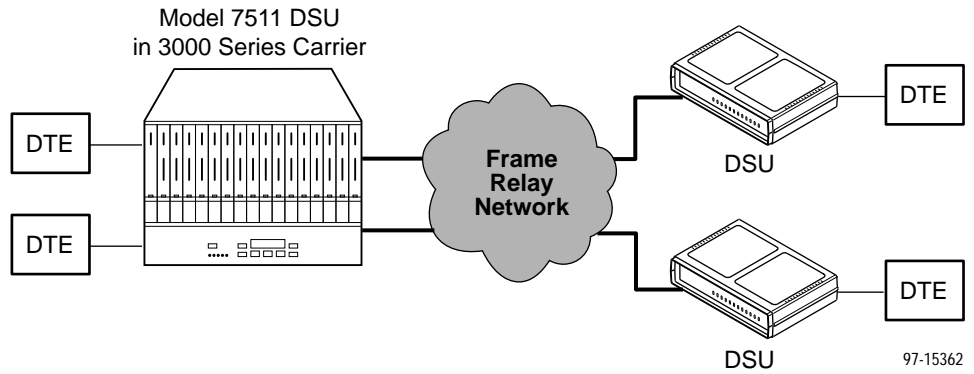
- **Two DSUs on one card.** Permits up to 32 DSUs in one 3000 Series carrier.
- **Easy Installation.** Connects to your equipment using standard connectors and cables.
- **Easy Configuration.** Simple hardware strapping minimizes your customization effort.
- **DDS Operation.** Operates at 56 and 64 kbps CC (clear channel).
- **Local Area Data Set (LADS) Operation.** Operates at 56 and 64 kbps full-duplex as a limited-distance modem.
- **Diagnostics.** Lets you diagnose device and network problems with digital loopbacks and pattern tests.
- **Interoperability.** Line-compatible with Model 3510, 3511, 3550, 3551, 3610, 3611, 3615, 3616, 7510, 7610 and 7612 DSUs on the DDS Primary Channel.
- **Reliability.** The 7511 Dual DSU's Mean Time Between Failures (MTBF) is over 30 years.

DSU Configurations

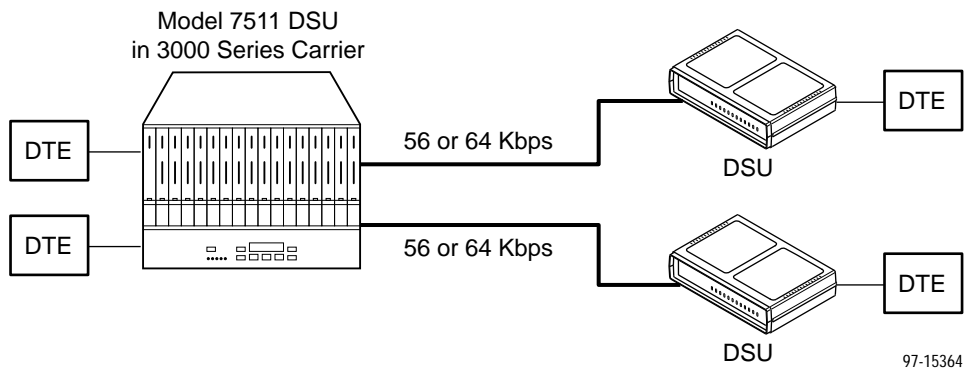
As shown in the following illustration, each DSU can be used in a multipoint network configuration across a DDS network.



DSUs can also be used for point-to-point DDS or frame relay applications.



DSUs can be connected back-to-back to act as Local Area Data Sets. Table B-2 in Appendix B shows the maximum distances for LADS applications.



Configuring and Installing the DSUs

2

Configuring the Dual DSU

▲ HANDLING PRECAUTIONS FOR STATIC-SENSITIVE DEVICES



The Model 7511 Dual DSU is designed to protect sensitive components from damage due to electrostatic discharge (ESD) during normal operation. When performing installation procedures, however, take proper static control precautions to prevent damage to equipment. If you are not sure of the proper static control precautions, contact your nearest sales or service representative.

► Procedure

To configure the Model 7511 Dual DSU:

1. Review Table 2-1 to determine the proper settings for your environment.
The first choice for each option (shown in **boldface** type) is the factory default setting. If you choose the factory default value, you do not need to change the position of the associated switch.
The factory default setting for all switches is Off.
2. Mark any options in the table that you wish to differ from the factory default.
3. Using Figure 2-1 and Table 2-1, verify that the switch settings for both DSUs on the 7511 card match your selections.
Do not modify the settings of switches not listed in the table. Any switch not designated for customer use should be in the Off position.
4. Where required, verify that the local and remote DSUs employ the same options. For example, both the local and remote DSU must use the same Line Rate and 64CC Data Scrambler settings.

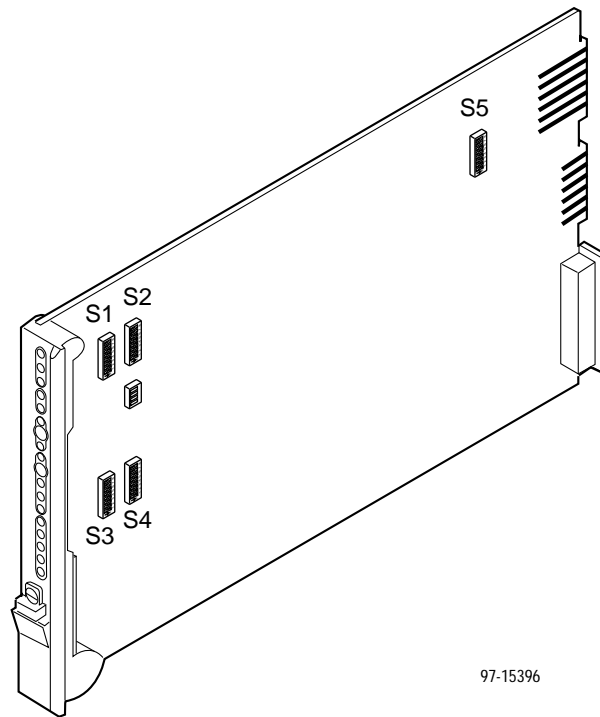


Figure 2-1. Model 7511 Switch Locations

Table 2-1. Configuration Options (1 of 5)

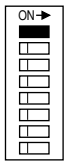

Switch	Options and Usage <i>Default in Bold</i>
<p>Line Rate</p> <p>S1-1 (DSU A) S3-1 (DSU B)</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>S1 S3</p> </div> <div style="text-align: center;">  <p>S2 S4</p> </div> <div style="text-align: center;"> <p>DSU A</p> <p>DSU B</p> </div> </div>	<p>DDS or LADS line rate.</p> <p>Off 56 kbps The line rate is 56 kbps.</p> <p>ON 64 kbps LADS: The line rate is 64 kbps. DDS: The line rate is 64 kbps clear channel.</p>

Table 2-1. Configuration Options (2 of 5)

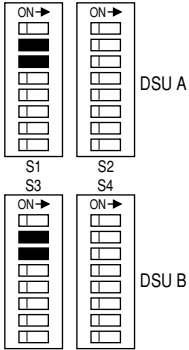
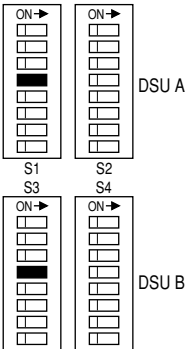
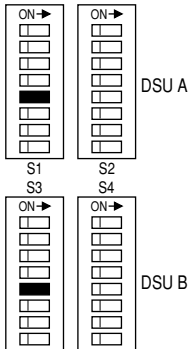
Switch	Options and Usage <i>Default in Bold</i>
<p>TX Timing Source</p> <p>S1-2 & S1-3 (DSU A) S3-2 & S3-3 (DSU B)</p> 	<p>The timing source for the DSU.</p> <p>Off Off DDS</p> <p>For DDS, both switches must be Off.</p> <p>For LADS:</p> <p>Off ON Receive Receive means timing is derived from the line receive signal.</p> <p>ON Off Internal Internal means timing is provided by the unit's internal clock.</p> <p>ON ON External External means timing is provided by the DTE.</p>
<p>Ten-Minute Test Abort Timer</p> <p>S1-4 (DSU A) S3-4 (DSU B)</p> 	<p>Determines whether user-initiated tests automatically terminate after 10 minutes.</p> <p>Off Enable</p> <p>Tests terminate automatically after 10 minutes.</p> <p>ON Disable Tests run indefinitely.</p>
<p>Network-Initiated DSU Loopback</p> <p>S1-5 (DSU A) S3-5 (DSU B)</p> 	<p>Determines whether the DSU responds to DSU latching loopback start and stop sequences sent by the network. This option is applicable only if the DDS line rate is 64 kbps clear channel.</p> <p>Off Enable</p> <p>The DSU responds to loopback sequences.</p> <p>ON Disable The DSU ignores loopback sequences.</p>

Table 2-1. Configuration Options (3 of 5)

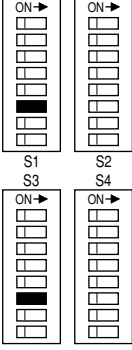
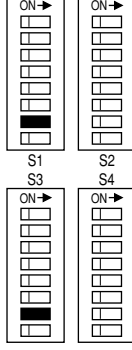
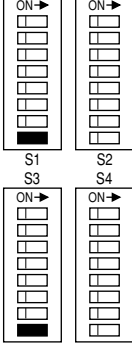
Switch	Options and Usage <i>Default in Bold</i>
<p>64CC Data Scrambler</p> <p>S1-6 (DSU A) S3-6 (DSU B)</p> 	<p>Determines whether the DSU scrambles data to minimize the possibility of the remote DSU falsely recognizing a loopback command.</p> <p>Off Disable</p> <p>Data scrambling is disabled.</p> <p>ON Enable</p> <p>Data scrambling is enabled.</p>
<p>V.54 Sequence Detection</p> <p>S1-7 (DSU A) S3-7 (DSU B)</p> 	<p>Determines whether the DSU responds to V.54 Loop Up and Loop Down sequences from the remote DSU.</p> <p>Off Disable</p> <p>V.54 loop sequences are ignored.</p> <p>ON Enable</p> <p>The DSU responds to V.54 loop sequences.</p>
<p>Invert TX Clock</p> <p>S1-8 (DSU A) S3-8 (DSU B)</p> 	<p>Determines whether the DSU clock provided on interchange circuit CT114 (TXC) is phase-inverted with respect to interchange circuit CT103 (TXD). This can reduce errors encountered due to excessive cable lengths.</p> <p>Off Normal</p> <p>TXC is not inverted.</p> <p>ON Invert</p> <p>TXC is inverted with respect to TXD.</p>

Table 2-1. Configuration Options (4 of 5)

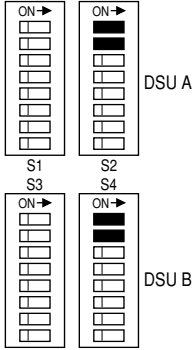
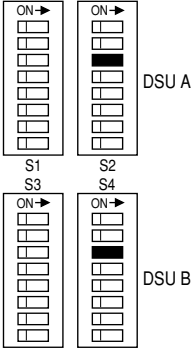
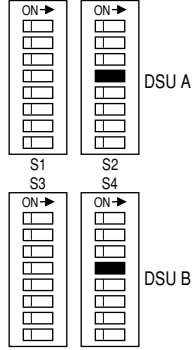
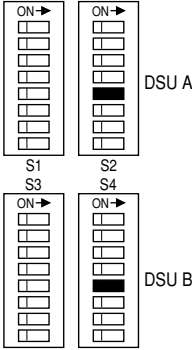
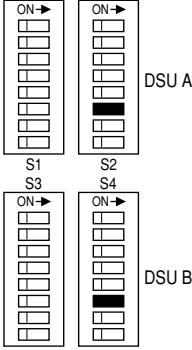
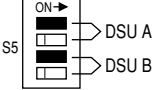
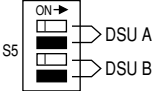
Switch	Options and Usage <i>Default in Bold</i>
<p>CTS</p> <p>S2-1 & S2-2 (DSU A) S4-1 & S4-2 (DSU B)</p> 	<p>Determines the operation of interchange circuit CT106, Clear to Send (CTS).</p> <p>Off Off Standard</p> <p>CTS follows RTS with a fixed delay except when an alarm is detected or a test is active, when CTS is turned off.</p> <p>Off ON Circuit Assurance</p> <p>Same as standard, but CTS is also turned off when Carrier Mode Idle codes are received.</p> <p>ON Off Follow RTS</p> <p>CTS follows RTS without delay, regardless of alarms and tests.</p> <p>ON ON Forced On</p> <p>CTS is forced on after a successful self-test.</p>
<p>RTS</p> <p>S2-3 (DSU A) S4-3 (DSU B)</p> 	<p>Determines the operation of interchange circuit CT105, Request to Send (RTS).</p> <p>Off Constant</p> <p>The internal RTS is forced on and the DSU is in a constant data mode. The transmitted signal is either Data Mode Idle codes or DTE data.</p> <p>ON Switched</p> <p>RTS is monitored, and Carrier Mode Idle codes are transmitted when RTS is off.</p>
<p>LSD</p> <p>S2-4 (DSU A) S4-4 (DSU B)</p> 	<p>Determines the operation of interchange circuit CT109, Line Signal Detect (LSD).</p> <p>Off Standard</p> <p>LSD is on when the receive line is in data mode, and off when an alarm is detected or Carrier Mode Idle codes are received.</p> <p>ON Forced On</p> <p>LSD is forced on after a successful self-test.</p>

Table 2-1. Configuration Options (5 of 5)

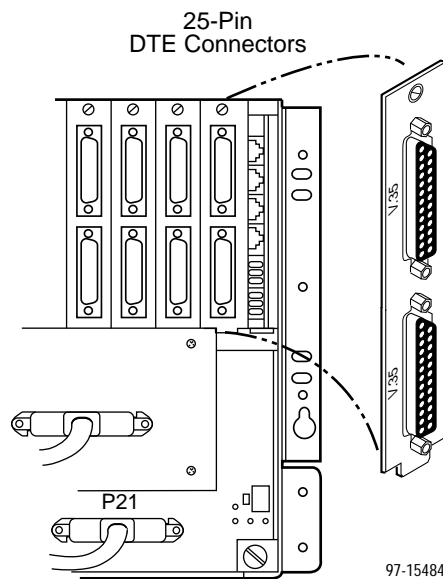
Switch	Options and Usage <i>Default in Bold</i>
<p>DSR</p> <p>S2-5 (DSU A) S4-5 (DSU B)</p> 	<p>Determines the operation of interchange circuit CT107, Data Set Ready (DSR).</p> <p>Off Standard</p> <p>DSR is always on, except when an alarm is detected or a test is active.</p> <p>ON Forced On</p> <p>DSR is forced on after a successful self-test.</p>
<p>511 Test Pattern Generation and Monitoring</p> <p>S2-6 (DSU A) S4-6 (DSU B)</p> 	<p>Determines whether the DSU will generate and monitor a 511 test pattern in remote loopback tests.</p> <p>Off Enable</p> <p>A 511 pattern is generated and monitored during the remote loopback test.</p> <p>ON Disable</p> <p>A 511 pattern is not generated. External test equipment is required to perform a Bit Error Rate test.</p>
<p>CT141</p> <p>S5-1 (DSU A) S5-3 (DSU B)</p> 	<p>Determines whether a local digital loopback can be controlled by the DTE using interchange circuit CT141, Local Loopback (LL). If enabled, the DTE port remains in loopback while LL is on.</p> <p>Off Disable</p> <p>The DSU will not initiate the loopback on command from the DTE.</p> <p>ON Enable</p> <p>The DSU initiates the loopback.</p>
<p>CT140</p> <p>S5-2 (DSU A) S5-4 (DSU B)</p> 	<p>Determines whether a remote digital loopback can be controlled by the DTE using interchange circuit CT140, Remote Loopback (RL). If enabled, the remote DSU must be able to detect the in-band V.54 loopback sequence.</p> <p>Off Disable</p> <p>The DSU will not initiate the loopback on command from the DTE.</p> <p>ON Enable</p> <p>The DSU initiates the loopback.</p>

Installing the Rear Connector Plate

► Procedure

To install the rear connector plate:

1. At the rear of the carrier, place the tab on the connector plate in its slot in the carrier's backplane. The connector plate must use the same slot position intended for the DSU card.
2. Loosely fasten the screw, allowing for a slight adjustment when installing the DSU card.

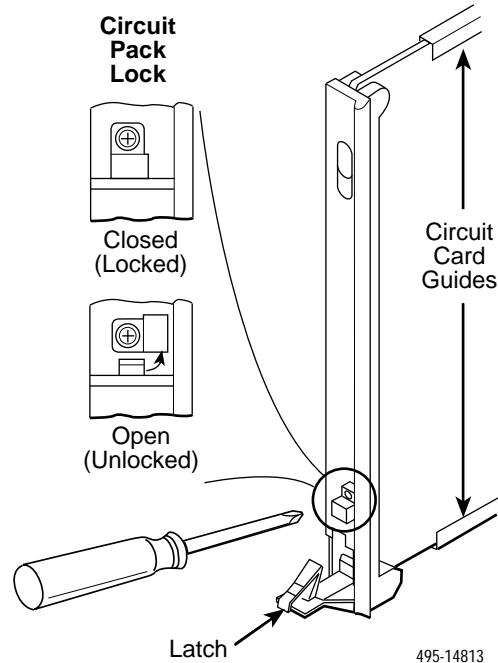


Installing the DSU Card

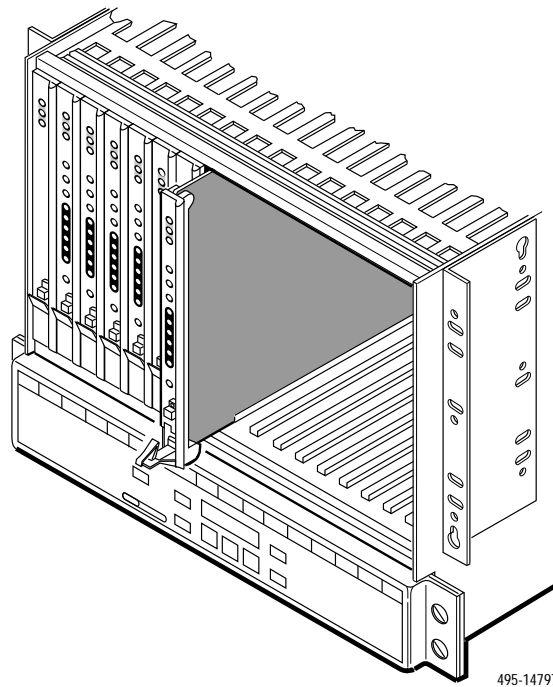
► Procedure

To install the DSU card:

1. Using a Phillips screwdriver, loosen the screw holding the circuit pack lock. Rotate the lock to the open position and open the latch.



2. At the front of the carrier, hold the circuit card vertically with the latch on its faceplate in the open position. Then insert the circuit card into the top and bottom circuit card guides.



3. Slide the circuit card into the slot and press until the connectors are seated firmly into the back of the carrier.
4. Press the faceplate latch to secure the circuit card.
5. Rotate the circuit pack lock into the closed position, and tighten the screw.
6. If power is applied to the carrier:
 - All LEDs momentarily light up, then the OK and Test LEDs remain on during a self-test.
 - If the hardware passes the self-test, the Test LED turns off and the OK LED remains on.
7. Return to the rear of the carrier and tighten the screw on the rear connector plate.

Installing the Network and DTE Cables

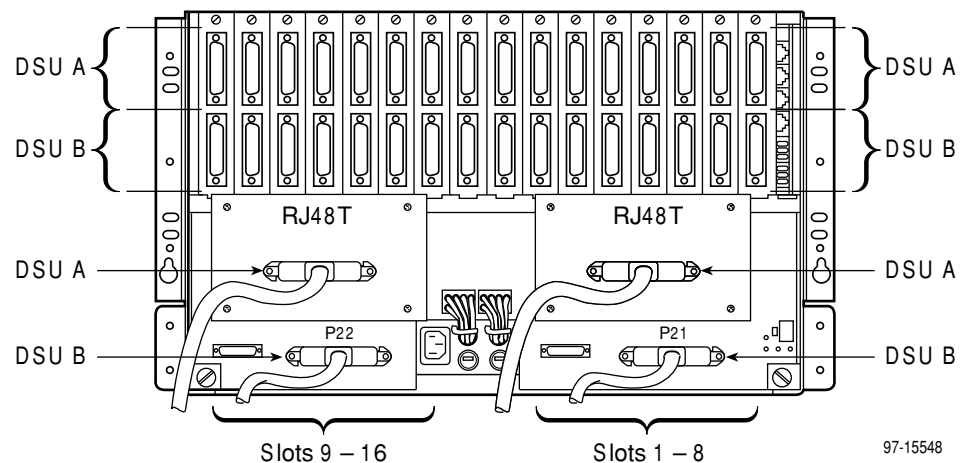
► Procedure

To install the cables:

1. Note the location of the 7511 Dual DSU circuit cards in the carrier (slots 1–8, slots 9–16, or all slots).
2. Connect network cables to the appropriate Network Interface Module (NIM) and backplane connector according to the following table.

Facing the rear of the carrier, connect a 50-pin network cable to . . .	
The NIM on the left side for DSU As on 7511 cards in slots 9–16.	The NIM on the right side for DSU As on 7511 cards in slots 1–8.
Connector P22 for DSU Bs on 7511 cards in slots 9–16.	Connector P21 for DSU Bs of 7511 cards in slots 1–8.

3. Connect a DTE cable to each of the V.35 connectors on the rear connector plates. Connect the other end of each cable to its respective DTE interface.
The top V.35 connector of each rear connector plate is for DSU A on the 7511 card in that slot. The bottom V.35 connector is for DSU B.



97-15548

Monitoring the DSUs

3

Selecting a DSU

The 7511 comprises two DSUs, designated DSU A and DSU B. The DSU A and DSU B LEDs designate which DSU is selected. To select the other DSU for monitoring or testing, press the A/B switch on the faceplate.

Front Panel LEDs

The network activity and the status of the DSUs are reflected in the faceplate's light-emitting diodes (LEDs).

Initialization

When the card first receives power, a self-test begins and the LEDs exhibit the following behavior:

1. All LEDs except A Alarm and B Alarm are initialized to off.
2. All LEDs turn on momentarily.
3. All LEDs turn off momentarily.
4. The Alarm and OK LEDs are turned off or on depending on the test results.

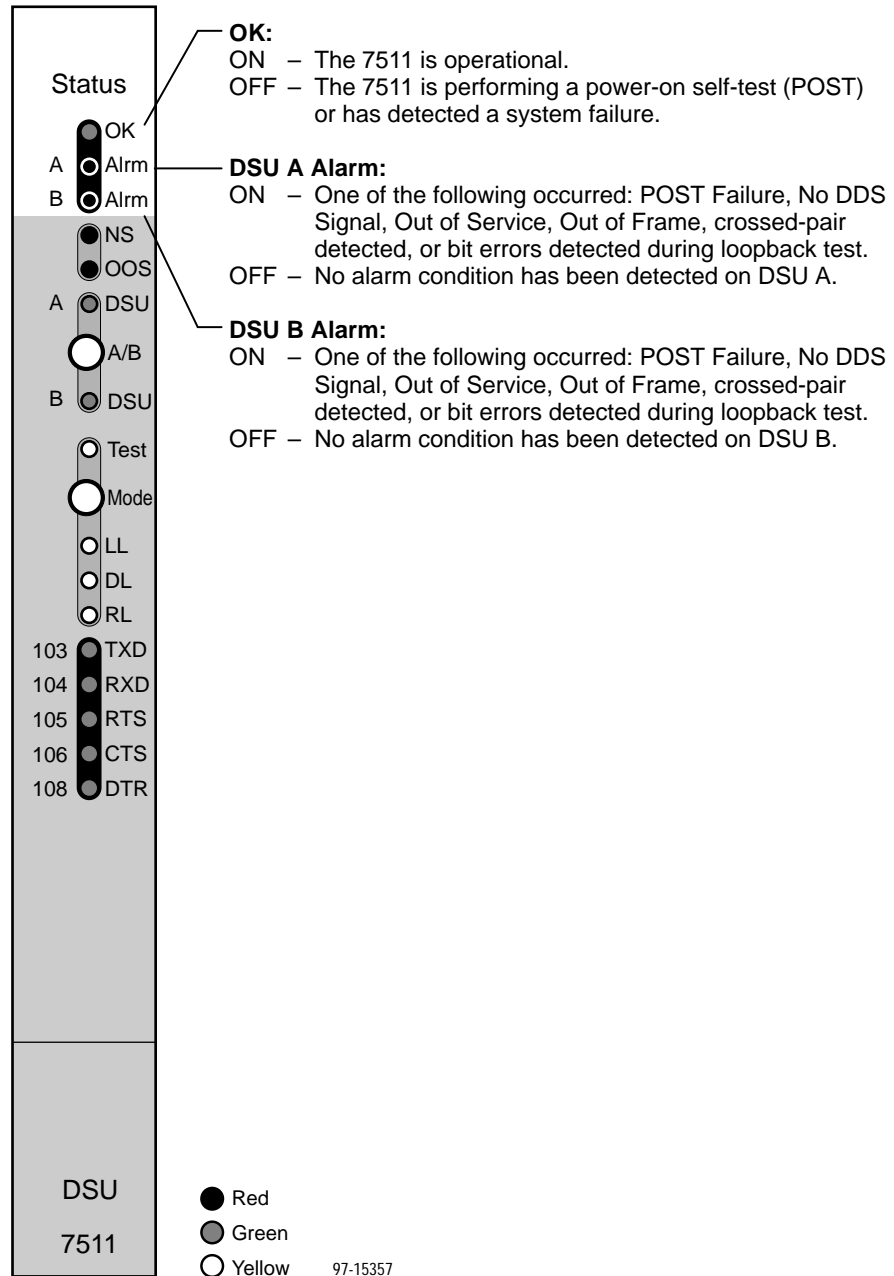
LED Groups

The LEDs can be divided into five logical groups:

- Status
- Network
- DSU selection
- Test
- Port

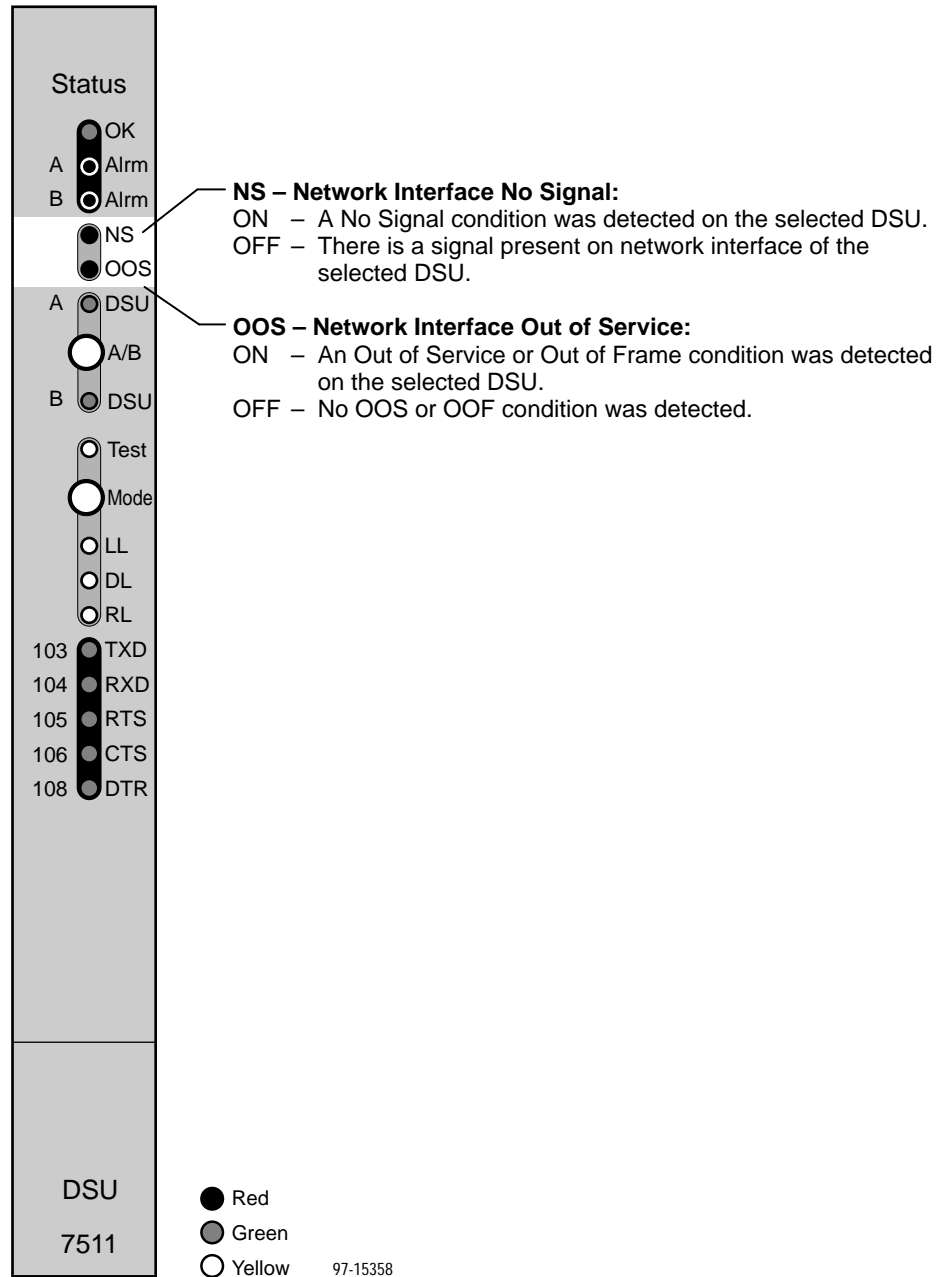
Status LEDs

The status LEDs show the general state of the 7511 card and its DSUs.



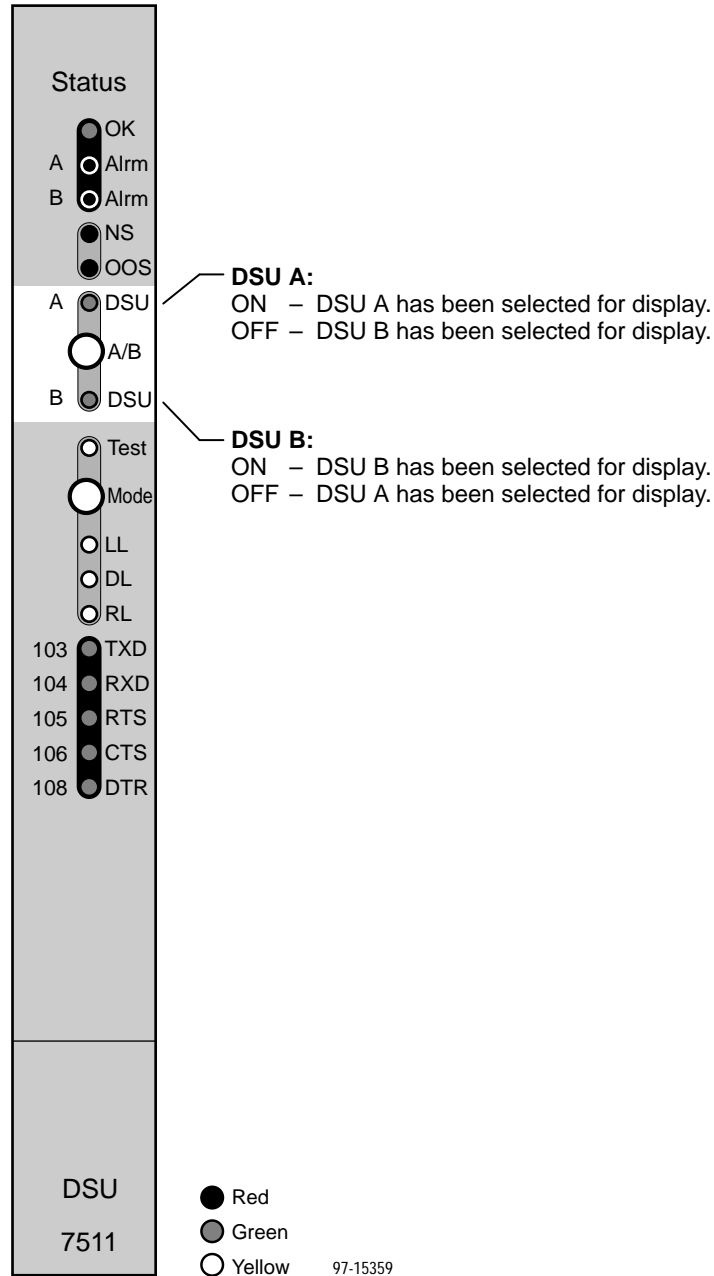
Network LEDs

The network LEDs reflect error conditions received on the network by the currently selected DSU.



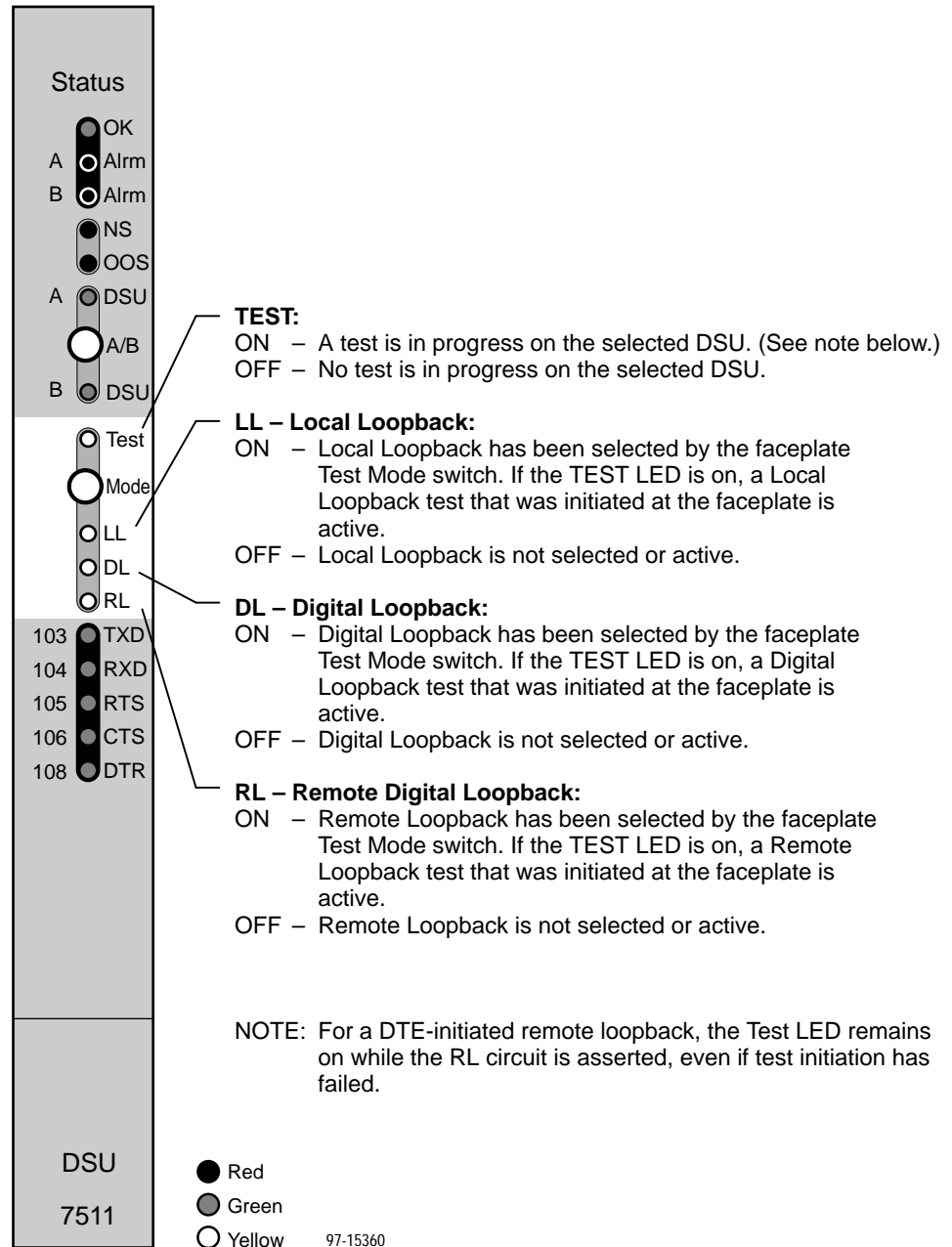
DSU Selection LEDs

The DSU selection LEDs show which of the two DSUs on the 7511 card is selected for monitoring and testing. The selection is performed by pressing the A/B momentary switch between the two selection LEDs.



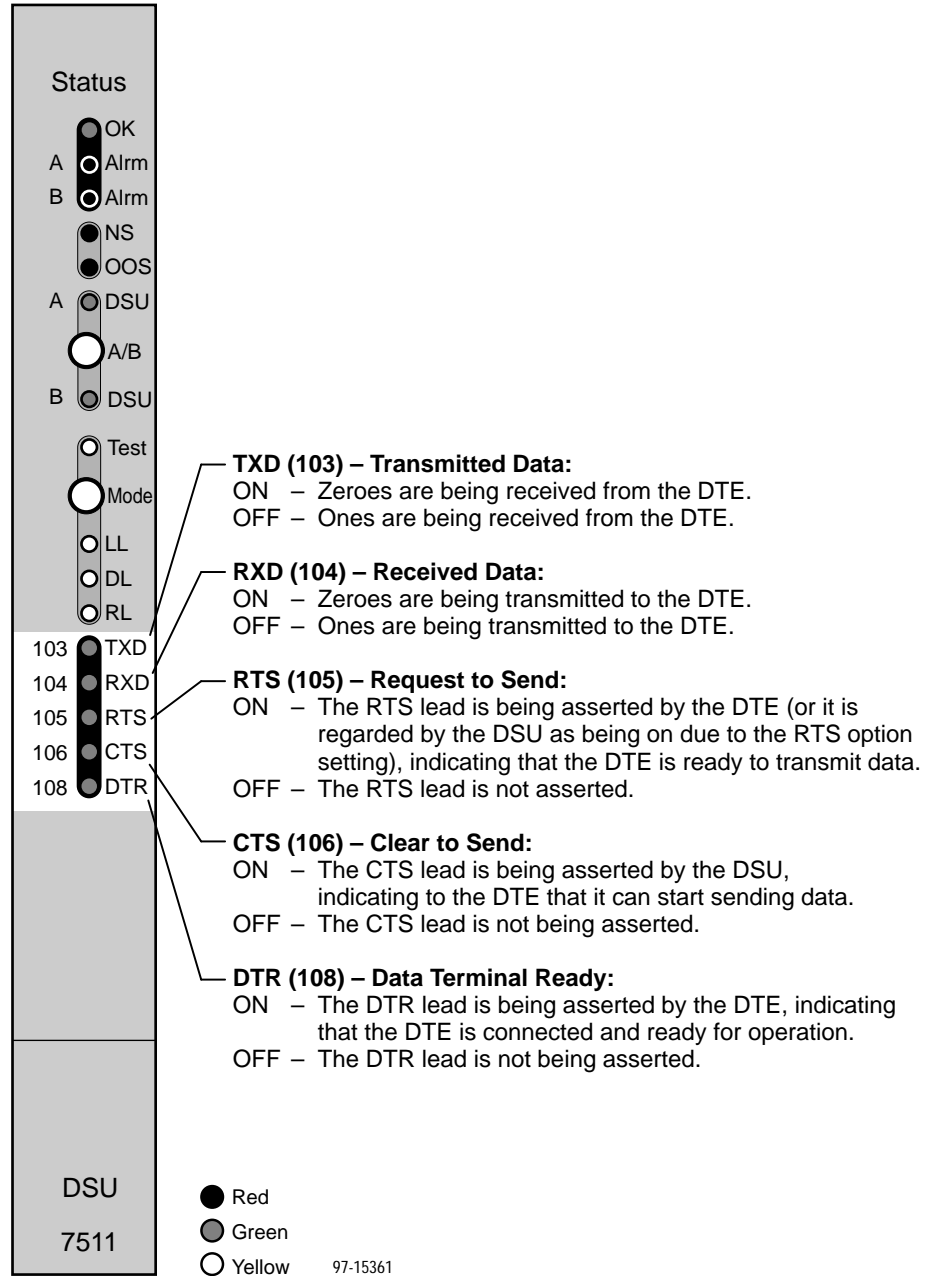
Test

The test LEDs aid in test selection and show the presence of any ongoing test.



Port

The port LEDs show the status of interchange circuits.



Testing

4

Selecting a DSU

The 7511 comprises two DSUs, designated DSU A and DSU B. The DSU A or DSU B LED in its lighted state designates the selected DSU. To select the other DSU for monitoring or testing, press the A/B switch on the faceplate.

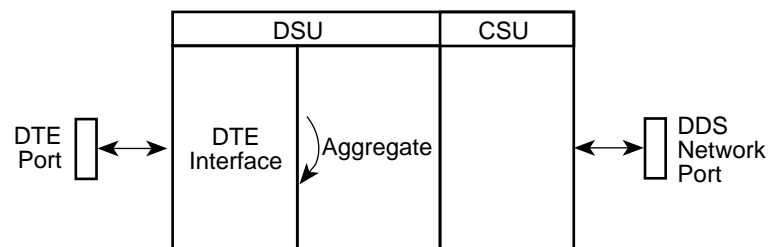
Local Loopback

The Local Loopback test loops the signal received on the user data port back to the DTE.

► Procedure

To run a Local Loopback:

1. Select the DSU you wish to test using the A/B switch.
2. Determine that no test is active by checking the TEST LED. If a test is active, wait for it to end, or press the Test Mode switch once to abort the test. The Test Mode switch will not terminate a DTE- or network-initiated loopback.
3. When the TEST LED is off, press the Test Mode switch once. The LL (Local Loopback) LED lights up.
4. Wait three seconds. The TEST LED lights up and the Local Loopback test begins.

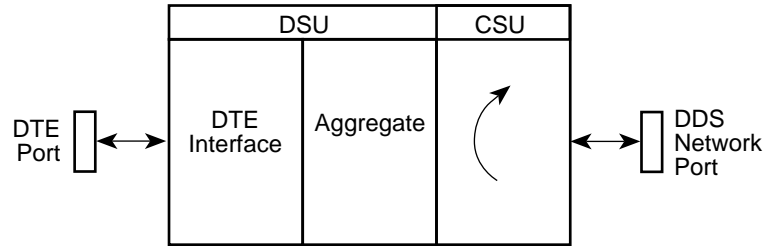


Local Loopback

97-15344

CSU or External Network Loopback

CSU loopback is an external loopback that is located as closely as possible to the network interface. A CSU loopback is initiated by the network.



CSU Loopback

496-15144

Digital Loopback (DL) and Remote Loopback (RL)

A Digital Loopback is an internal loopback that loops the signal received on the network interface back to the network. This loopback can be initiated on a remote DSU by initiating a Remote Loopback test, which sends the V.54 Loop Up command to the remote unit.

Remote loopback in a multipoint environment is restricted to one tributary DSU at a time. The other tributary DSU must be turned off or otherwise disabled.

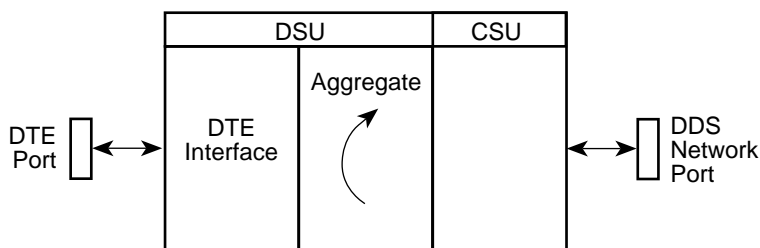
► Procedure

To run a Digital Loopback or Remote Loopback:

1. Select the DSU you wish to test using the A/B switch.
2. Determine that no test is active by checking the TEST LED. If a test is active, wait for it to end, or press the Test Mode switch once to abort the test. The Test Mode switch will not terminate a DTE- or network-initiated loopback.
3. When the TEST LED is off, press the Test Mode switch
 - Two times for a Digital Loopback (DL) test
 - Three times for a Remote Digital Loopback (RL) test

The appropriate LED (DL or RL) lights up.

4. Wait three seconds. The TEST LED lights up and the test begins.
(If the TEST LED never lights up and the RL LED turns off, the V.54 Loop Up command was not acknowledged by the remote unit.)



DSU Loopback

496-15160

Ending an Active Test

A test initiated by the user can be ended by the user:

- Using the automatic timeout. The 10-Minute Test Abort Timer option can automatically terminate a user-initiated Loopback or Pattern test after it has been running for 10 minutes. See *Configuring the Dual DSU* in Chapter 2.
The timer does not pertain to tests commanded by the:
 - Network, such as the network-initiated CSU and DSU Loopbacks.
 - DTE, such as the DTE-initiated Local Loopback.
- Using the Test Mode switch. Press the Test Mode switch at any time during a test to abort the test.

Troubleshooting

5

Troubleshooting

This DSU is designed to provide you with many years of trouble-free service. If a problem occurs, however, refer to Table 5-1 for possible solutions.

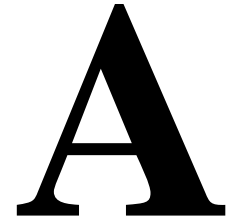
Table 5-1. Troubleshooting (1 of 2)

Symptom	Possible Cause	Recommendations
An Alarm LED is on.	One of several alarm conditions exists: <ul style="list-style-type: none">■ Power-on self-test failed■ No DDS signal■ Out of Service■ Out of Frame■ Crossed pair detected■ Bit errors detected during loopback test (which also causes an Out of Frame condition)	<ul style="list-style-type: none">■ If the NS LED is lit:<ul style="list-style-type: none">– Verify that the DSU is connected to the network– Request a CSU loopback from your network service provider■ If the OOS LED is lit:<ul style="list-style-type: none">– Check the status of the remote DSU– Initiate a Remote Loopback■ Try a different DSU with the same network connection. If the problem persists, contact your service representative.
Power-Up Self-Test fails. Only the Alarm LEDs are on after power-up.	The DSU has detected an internal hardware failure.	<ul style="list-style-type: none">■ Reset the card and try again.■ Contact your service representative.
An LED is not lit.	LED is burned out.	While the DSUs are not in use, cycle power to the card by pulling it slightly out of the carrier then replacing it. If the LED in question does not flash with the other LEDs, contact your service representative.
No power, or the LEDs are not lit.	<ul style="list-style-type: none">■ The power supply to the carrier has failed.■ The card is not seated properly.	If other devices in the carrier are functioning, verify that the DSU card is properly seated and locked in position.

Table 5-1. Troubleshooting (2 of 2)

Symptom	Possible Cause	Recommendations
Not receiving data; DSU is not responding.	<ul style="list-style-type: none"> ■ DDS line rate/speed has changed ■ Excessive BPVs ■ Excessive loop loss 	<ol style="list-style-type: none"> 1. Verify that your subscriber loop is running at 56 or 64 CC kbps. 2. Run Loopback tests. Refer to <i>Testing</i>, Chapter 4. 3. If network testing exposes excessive BPVs, verify that you do not have a bad cable. If the cable is good, contact the network service provider. 4. If network testing exposes excessive loop loss, install a higher quality cable. Refer to Table B-2 in Appendix B, <i>Technical Specifications</i>.
The Test Mode switch has no effect.	Switch S2-8 is ON. Switch S2-8 is for Manufacturing use only and may affect the DSU's behavior.	Move switch S2-8 to the Off position.
The Test LED does not light up when you attempt to start a Remote Digital Loopback; the RL LED turns off.	The remote unit failed to acknowledge the V.54 Loop Up command.	Check the remote unit.

Cables and Pin Assignments



Overview

The following sections provide pin assignments for the:

- [RJ48T 50-Pin Network Interface Connector](#)
- [Digital Network \(DDS\) Connector](#)
- [V.35 DTE Connector](#)

RJ48T 50-Pin Network Interface Connector

USOC RJ48T 50-pin network interface connectors on the Network Interface Module (NIM) and the COMSPHERE 3000 Series Carrier each support the digital network connections for eight DSUs:

- The NIM inserted in the 3000 Carrier connectors P24 and P23 has a 50-pin connector that supports DSU A for Model 7511 Dual DSUs in slots 1–8.
- The 3000 Carrier backplane has a 50-pin connector designated P21 that supports DSU B on Model 7511 Dual DSUs in slots 1–8.
- The NIM inserted in the 3000 Carrier connectors P26 and P25 has a 50-pin connector that supports DSU A for Model 7511 Dual DSUs in slots 9–16.
- The 3000 Carrier backplane has a 50-pin connector designated P22 that supports DSU B on Model 7511 Dual DSUs in slots 9–16.

The pin assignments for these interfaces are listed in Table A-1.

**Table A-1. RJ48T Digital Network Connector Pins (50-Pin)
for the COMSPHERE 3000 Series Carrier and RJ48T NIM**

Slot	Pin			
	Receive Circuits		Transmit Circuits	
	T	R	T1	R1
1 or 9	26	1	27	2
2 or 10	28	3	29	4
3 or 11	30	5	31	6
4 or 12	32	7	33	8
5 or 13	34	9	35	10
6 or 14	36	11	37	12
7 or 15	38	13	39	14
8 or 16	40	15	41	16

Digital Network (DDS) Connector

The eight 4-wire groups of the RJ48T network cable shown in Table A-1 normally are terminated in eight 8-pin modular connectors. The pin assignments for these connectors are listed in Table A-2.

Table A-2. Digital Network (DDS) Connector Pin Assignments

Pin	Circuit	Function
1	R1	Transmit data to local loop
2	T1	Transmit data to local loop
7	T	Received data from local loop
8	R	Received data from local loop

V.35 DTE Connector

The Model 7511 Dual DSU is shipped with a rear connector plate, which is mounted onto the rear of the 3000 Series Carrier. The plate contains two 25-pin CCITT V.35 DTE connectors. Two V.35 interconnect cables, interfaces between the 25-pin CCITT V.35 connectors and standard 34-pin V.35 connectors, are shipped with the Model 7511 Dual DSU and rear connector plate. Figure A-1 shows the rear connector plate and Figure A-2 shows the V.35 interconnect cable. Table A-3 identifies the interconnect cable's pin assignments.

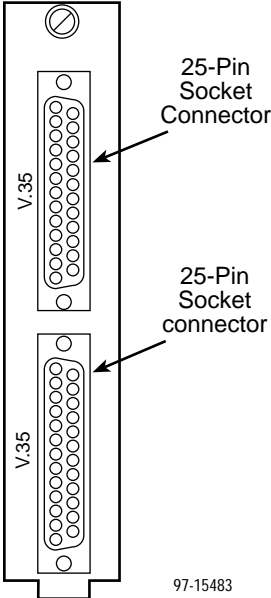


Figure A-1. Model 7511 Dual DSU Rear Connector Plate

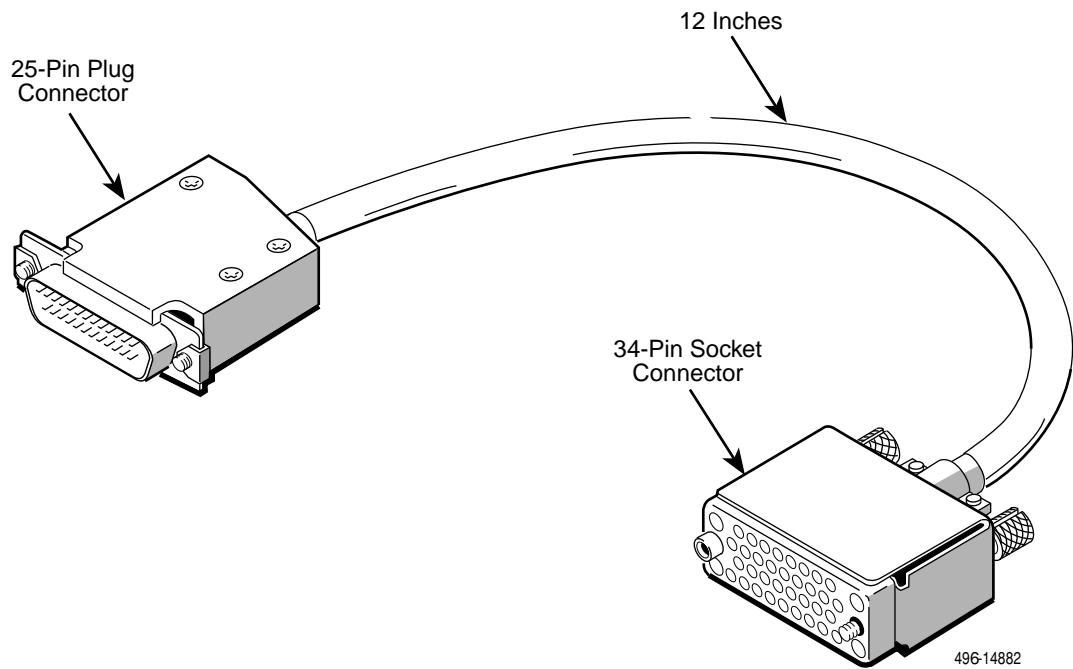


Figure A-2. V.35 Interconnect Cable

Table A-3. Model 7511 Dual DSU 25-Pin CCITT V.35 Connector Pins

25-Pin Connector on Rear Connector Plate	34-Pin Connector on V.35 Interconnect Cable	Circuit Name
7	B	Signal Ground
4	C	Request-to-Send (RTS)
5	D	Clear-to-Send (CTS)
6	E	Data Set Ready (DSR)
8	F	Received Line Signal Detect (RLSD)
20	H	Data Terminal Ready (DTR)
18	L	Local Loopback (LL)
19	N	Remote Digital Loopback (RL)
24, 11	P, S	Transmitted Data (TXD)
23, 22	R, T	Received Data (RXD)
15, 2	U, W	Trans. Signal Element Timing – DTE Source
16, 3	V, X	Recvr. Signal Element Timing – DCE Source
14, 1	Y, AA	Trans. Signal Element Timing – DCE Source
9	HH	Positive dc Test Voltage
10	KK	Negative dc Test Voltage
25	NN	Test Mode (TM) Shell Shield

Technical Specifications

B

Table B-1. Model 7511 DSU Technical Specifications (1 of 2)

Item	Specifications
Size	
Height	7.1 inches (18.1 cm)
Width	1.0 inches (2.5 cm)
Depth	13.4 inches (34.0 cm)
Weight	0.8 pounds (0.4 kg)
Approvals	
FCC Part 15	Class A digital device
FCC Part 68	Refer to the equipment's label for Registration Number.
Safety Certifications	Refer to the equipment's label for approvals on product.
Emissions	Class A digital apparatus
Interface and Connectors	
25-pin D-subminiature connector with 34-pin adapter cable	V.35
Physical Environment	
Operating Temperature	32° to 122° F (0° to 50° C)
Storage Temperature	-4° to 158° F (-20° to 70° C)
Relative Humidity	5%—95% (noncondensing)
Shock and Vibration	Withstands normal shipping and handling
Heat Dissipation	22.9 Btu/hr. (max.)

Table B-1. Model 7511 DSU Technical Specifications (2 of 2)

Item	Specifications
Network Interface Data rates LADS data rates Services supported	56 kbps and 64 kbps clear channel (CC) 56 kbps and 64 kbps 4-wire service
Network Compatibility ANSI T1.410-1992 and AT&T Technical Reference 62310-1993	56 and 64 kbps meeting desired loop loss

Table B-2. Model 7511 DSU LADS Connection Distances

Data Rate (kbps)	Wire Diameter (AWG)			
	19 Gauge (.0359 inch or .9122 mm)	22 Gauge (.0253 inch or .643 mm)	24 Gauge (.0201 inch or .511 mm)	26 Gauge (.0159 inch or .404 mm)
56	10.84 mi (17.45 km)	6.4 mi (10.3 km)	4.50 mi (7.24 km)	3.34 mi (5.37 km)
64	10.69 mi (17.2 km)	6.06 mi (9.76 km)	4.47 mi (7.2 km)	3.20 mi (5.15 km)

Glossary

aggregate	A single bit stream that combines two or more bit streams.
ASCII	American Standard Code for Information Interchange. A 7-bit code that establishes compatibility between data services. ASCII is the standard for data transmission over telephone lines.
asynchronous	A data transmission that is synchronized by a transmission start bit at the beginning of a character (five to eight bits) and one or more stop bits at the end.
AUX port	The auxiliary communications port on a router.
BPV	Bipolar Violation. A modified bipolar signaling method in which a control code is inserted.
CCA	Circuit Card Assembly. A printed circuit board to which separate components are attached.
CCITT	Consultative Committee on International Telegraphy and Telephony. See ITU.
CD	Carrier Detect. A signal indicating that energy exists on the transmission circuit. Associated with Pin 8 on an EIA-232 interface.
channel	An independent data path.
CMi	Control Mode Idle. A control signal sent over the DDS line to indicate that no data is being sent.
COM port	Communications port. A computer's serial communications port used to transmit to and receive data from a DCE. The DCE connects directly to this port.
CPE	Customer Premises Equipment. Terminating equipment supplied by either the customer or some other supplier that is connected to the telecommunications network (e.g., DSUs, terminals, phones, routers, modems).
crossed pair	An alarm condition in which the DDS receive and transmit pairs are crossed.
CTS	Clear to Send. An EIA-lead standard for V.24 circuit CT 106; an output signal (DCE-to-DTE).
DCE	Data Communications Equipment. The equipment that provides the functions required to establish, maintain, and end a connection. It also provides the signal conversion required for communication between the DTE and the network.
DDS	Digital Data Service. Provides digital communication circuits.
DMI	Data Mode Idle. Refers to a sequence of ones transmitted or received on the DDS network.
DSR	Data Set Ready. An EIA-lead standard for V.24 circuit CT 107; an output signal (DCE-to-DTE).
DSU	Data Service Unit. Data communications equipment that provides an interface between the DTE and the digital network.
DTE	Data Terminal Equipment. The equipment, such as computers and printers, that provides or creates data.
DTR	Data Terminal Ready. An EIA-lead standard for V.24 circuit CT 108; an input signal (DTE-to-DCE).

EIA	Electronic Industries Association. This organization provides standards for the data communications industry to ensure uniformity of interface between DTEs and DCEs.
EIA-232	The EIA's standards defining the 25-pin interface between the DTE and DCE.
excessive BPV	An excessive bipolar violation condition results when at least one invalid bipolar violation has occurred every 20 milliseconds for 2 seconds.
factory defaults	A predetermined set of configuration options for general operation.
FCC	Federal Communications Commission. Board of Commissioners that regulates all U.S. interstate, intrastate, and foreign electrical communication systems that originate from the United States.
frame relay	A switching interface that is designed to get frames from one part of the network to another as quickly as possible.
full-duplex	The capability to transmit in two directions simultaneously.
interface	A shared boundary between functional units.
ITU	International Telecommunication Union, formerly known as CCITT. An advisory committee established by the United Nations to recommend communications standards and policies.
LADS	Local Area Data Set is used to provide a point-to-point link between two devices (also called LDM – limited distance modem).
LAN	Local Area Network. A network designed to connect devices over short distances, like within a building.
latching loopback	A loopback that is maintained until a specific release code is detected. A latching loopback can only be initiated or terminated by the 64 kbps clear channel network service provider.
LED	Light Emitting Diode. A status indicator that responds to the presence of a certain conditions.
link layer protocol	The protocol that regulates the communication between two network nodes.
LL	Local Loopback. An EIA-lead standard for V.24 circuit CT 141; an input signal (DTE-to-DCE).
loopback	Used to test various portions of a data link in order to isolate an equipment or data line problem. A diagnostic procedure that sends a test message back to its origination point.
LSD	Line Signal Detect. An EIA-lead standard for V.24 circuit CT 109; an output signal (DCE-to-DTE).
multiplexing	A method for interleaving several access channels onto a single circuit for transmission over the network.
node	A connection or switching point on the network.
non-latching loopback	A loopback that is not maintained unless network loopback codes are interspersed with the test data. A non-latching loopback can only be initiated or terminated by the 56 kbps network service provider.
NS	No Signal. A network-reported condition.
OOF	Out Of Frame. An error condition in which frame synchronization bits are in error. A network-reported condition.
OOS	Out of Service. A digital network trouble signal.
point-to-point circuit	A data network circuit with one control and one tributary device.

protocol	The rules that govern how devices exchange information on a network. It covers timing, format, error control, and flow control during data transmission.
PSTN	Public Switched Telephone Network. A network shared among many users who can use telephones to establish connections between two points.
reset	A reinitialization of the device that occurs at power-up or in response to a reset command.
RIP	Routing Information Protocol. Specifies the routing protocol used between DSUs.
RLSD	Receive Line Signal Detect. See CD.
router	A device that makes decisions about the paths network traffic should take and forwards that traffic to its destination. A router helps achieve interoperability and connectivity between different vendor's equipment, regardless of protocols used.
RS-232	An EIA standard for the 25-pin DCE/DTE interface. Same as EIA-232.
RTS	Request to Send. An EIA-lead standard for V.24 circuit CT 105; an input signal (DTE-to-DCE).
RXC	Received Clock. An EIA-lead standard for V.24 circuit CT 115; an output signal (DCE-to-DTE).
RXD	Received Data. An EIA-lead standard for V.24 circuit CT 104; an output signal (DCE-to-DTE).
synchronous	Data transmission that is synchronized by timing signals. Characters are sent at a fixed rate.
TM	Test Mode. An EIA-lead standard for V.24 circuit CT 142; an output signal (DCE-to-DTE).
TXC	Transmit Clock. An EIA-lead standard for V.24 circuit CT 114; an output signal (DCE-to-DTE).
TXD	Transmit Data. An EIA-lead standard for V.24 circuit CT 103; an input signal (DTE-to-DCE).
V.35	ITU-T standard for a high-speed, 34-pin, DCE/DTE interface.
WAN	Wide Area Network. A network that operates over long distances and spans a relatively large geographic area (e.g., a country).

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