

# DDS Testing

## I - Introduction

### *a. General:*

It is no wonder that testing dedicated digital service (DDS) loops at 56/64 kb/s is so difficult and confusing. There is no single way to test the circuit, DDS loop test equipment is hard to find, if a DS1 test set is used, it must have the proper options, setting up the test set can be a complicated task, looping code nomenclature is different across different test sets, there must be a functional CSU/DSU at the customer premises, and different CSU/DSUs react differently to looping codes.

This application note reduces test setups to a list of procedures. To use these setups, the DDS loop must terminate on an OCU-DP channel unit in a digital cross-connect system (such as UMC1000 or equivalent) and the cable pairs used for the DDS loop must be pre-qualified to meet not only analog VF requirements but also Carrier Serving Area (CSA) requirements (that is, limited working pair length and limited bridged tap lengths). Detailed design and qualification procedures can be found in Reference [2].

### *b. Test Methods:*

There are a couple ways to test the circuits – (1) Connect a DS1 test set to a DS1 interface on a digital cross-connect system in which a DS0 channel is cross-connected to an OCU-DP which, in turn, is connected to a loop to the customer's CSU/DSU, and (2) Connect a test set designed to test at the 56 and 64 kb/s rate on a 4-wire basis (this method does not test the OCU-DP in the digital cross-connect system). This application note discusses only method (1). Since the test set is connected to the digital cross-connect system at the DS1 rate, in performing the tests, the test signals are transported in seven of the eight channel bits for 56 kb/s rate and in all channel bits for the 64 kb/s rate. Most DDS circuit terminating equipment can be provisioned for speeds lower than 56 kb/s.

This application note covers only 56 kb/s and 64 kb/s rates, but the setups for the lower speeds (2.4, 4.8, 9.6, 19.2, 38.4 kb/s) are similar.

### *c. General Considerations:*

- The transmit port in the DS1 test set must be set for loop timing (recovered from the corresponding receive port)
- If the DDS loop is 64 kb/s, the DS1 line code must be set to B8ZS and the Digital Cross-connect System must be setup for Clear Channel Capability (CCC)
- The test set must be capable of Fractional T1 (Nx56 and Nx64) testing
- The test set must support DDS loop codes (variously called CSU, DSU or V.54) and DDS test patterns
- A “golden CSU/DSU” must be available for installation at the customer premises
- All testing is done with the circuit “out-of-service.”

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**d. Applicable Test Sets and Test Procedures:**

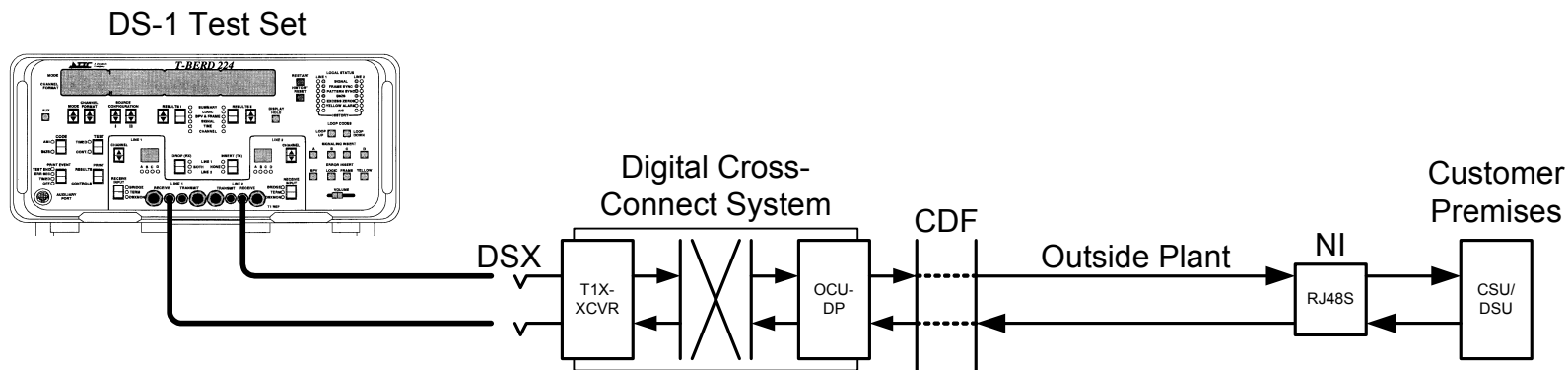
- TTC T-BERD 224 with T1/Fractional T1/DDS BERT Option (p/n 41500) – Section II
- Sunset T10 with Option Q: SW188 – DDS Testing – Section III
- TTC 2000 TestPad with 2209 T1 Application Interface Unit and Fractional T1 option – Section IV
- Hewlett Packard 37702A [Note: This test set cannot test 64 kb/s loops, only 56 kb/s loops] – Section V
- Alternate Test Method – Section VI

**e. Basic Setup:**

The basic setup is shown in Figure I-1. The customer's loop terminates on the OCU-DP channel unit in the digital cross-connect system (DCS). A telco-provided "golden CSU/DSU" is installed at the customer premises. A "golden CSU/DSU" is a CSU/DSU that is known to work and that is easy to setup (for example, the Adtran DSU III AR, p/n 1202.011L1). This ensures that the customer's equipment does not interfere with the tests.

Setup and test procedures for the Adtran DSU III AR are given below; other CSU/DSUs may be different results.

**Figure I-1 – Basic Setup**



The OCU-DP is temporarily cross-connected in the DCS to a spare DS1 interface in the DCS, preferably to channel (timeslot) 1. Channel 1 is used only for consistency and convenience – any channel could be used (the procedures in this document assume Channel 1). If the DDS loop is 64 kb/s, the cross-connect must be setup for Clear Channel Capability (on the UMC1000, go to the Provisioning Menu – DCS Provisioning Menu – Modify Channel Attributes and on the desired DS1 interface and channel set the Emulation to “User” and Clear Channel? to “Yes.”).

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The test set is connected to the DCS DS1 interface (on the UMC1000, this is a T1X-XCVR card configured for groomed cross-connects, ESF and B8ZS with timeslot 1 cross-connected to the OCU-DP) via the DSX-1 jack set associated with that interface. The test set is then setup for Nx64 (for 64 kb/s testing) or Nx56 (for 56 kb/s testing), as determined by the circuit requirements, and is used to loop up and loop down the CSU/DSU for loopback testing (some DS1 test sets, specifically the T-BERD 224, have an alternate setup called DS064 for 64 kb/s testing). Once testing is completed, the OCU-DP is re-cross-connected to its working DS1 interface.

Before testing can start, however, the loop between the OCU-DP and the CSU/DSU must work well enough to allow the CSU/DSU to be in the “Data Mode” with “Loop Normal.” Also, the OCU-DP channel unit should show the loop as “in-service” (on the UMC1000, the ACTV LED should be green). If these conditions are not met, it can mean several things:

- The OCU-DP is not provisioned correctly (the loop rate must be the same as the CSU/DSU)
- The CSU/DSU is not provisioned correctly (the network interface rate must be the same as the OCU-DP)
- Either one or both loop pairs are bad
- The transmit and receive pairs are reversed at one end or the other

## *f. Loopbacks*

Loopbacks provide for remote testing and are helpful in isolating problems between the network and customer installation. The definitions of loopback codes in industry standards are confusing and incomplete. The following brief descriptions will provide insight into the application of loopbacks and will help the reader use them in the field. Additional detail may be found in Reference [1]. Some limited loopback compatibility data is provided in the appendix.

Table I-1 lists the loopbacks and some alternate names for them, while Fig. I-2 shows their location. Two types of loopbacks are used: Non-Latching or Alternating Loopbacks and Latching Loopbacks. Loops that operate at 56 kb/s may use either Non-Latching or Latching Loopbacks but Non-Latching are more common. Non-Latching Loopbacks send alternating bytes of loopback code and test patterns and return to their normal state upon removal of the loopback code. Latching Loopbacks send the only loop-up code for a set length of time and then the test pattern. To deactivate the Latching Loopback, a loop-down code is sent for a set length of time. Latching Loopbacks are used only on DDS loops with secondary channel and on 64 kb/s DDS loops. Alternating loopbacks do not work on 64 kb/s loops.

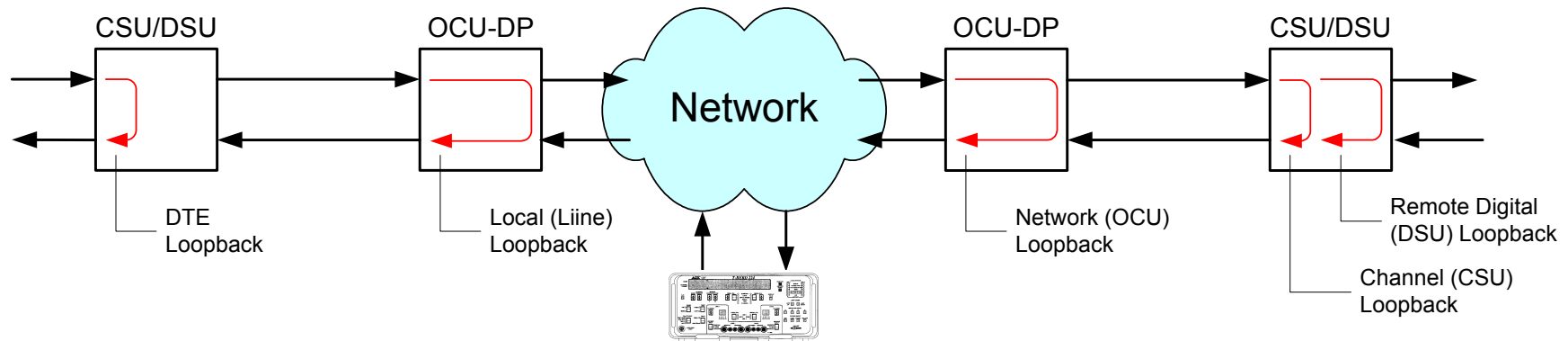
The Channel (CSU) Loopback and Network (OCU) Loopback are required by industry standards, but other loopbacks are optional and may not be available on all equipment. All modern OCU-DP channel units have the Local Line Loopback. Also, most modern DSUs are capable of providing a local DTE Loopback and initiating and responding to a Remote Digital (DSU) Loopback.

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**Table I-1**  
**Loopback Names**

Loopback Name	Alternate Name
DTE Loopback	EIA Loopback
Local Line Loopback	Local Loopback
Network Loopback	OCU Loopback
Channel Loopback	CSU Loopback
Remote Digital Loopback	RDL or DSU Loopback

**Fig. I-2 – Loopbacks**



## **g. Test Patterns**

A number of test patterns are available for channel testing. A complete discussion can be found in Reference [3] and [4]. There is more than one version of some patterns, which makes it difficult to do end-to-end testing with a different manufacturer or model test set at each end. However, for loopback testing, pattern incompatibility does not matter as the same test set that is sending is used for receiving. The most common test patterns are:

- Pseudo-random (PRBS) and Quasi-random (QRS) including the 511-bit and 2047-bit sequences; both are useful for testing timing recovery and equalization circuitry.
- Fixed Patterns including DDS1, DDS2, DDS3, DDS4, and DDS5. DDS1 is used to stress signal recovery circuitry while DDS2 simulates the flag bytes in bit oriented protocols such as SS7. DDS3 mimics framing patterns at 2.4 and 4.8 kb/s rates

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so it is little used in 56 and 64 kb/s testing. DDS4 is a useful low 1's density pattern, and DDS5 is DDS1 through DDS4 patterns in sequence.

- Other Patterns including DDS6 and Inverted PRBS. DDS6 is not standardized but appears in many test sets. It simulates the transition from the Control Mode Idle to the Data Mode Idle condition. The Inverted PRBS is a more random pattern than the 511-bit or 2047-bit sequences and is useful for testing 64 kb/s circuits.

No single test pattern is the best for all DDS circuit testing, but at least one PRBS/QRS pattern (511-bit or 2047-bit) and at least one Fixed Pattern (such as DDS4) should be used.

## *h. CSU/DSU Setup*

The setup below applies to the Adtran DSU III AR.

If necessary, press "CANCEL" to get to the MAIN Menu.

From the MAIN Menu, select "3" (CONFIG) and press ENTER

From the CONFIG Menu, select "1" (LOCAL) and ENTER

From the LOCAL Menu, select "1" (NETWORK OPT.) and ENTER

From the NETWORK OPT. Menu, select "1" (LOOP RATE) and ENTER

From the LOOP RATE Menu, select "8" (for 64 kb/s) and ENTER. For 56 kb/s, select "7" and ENTER and then "1" NO SEC. CH. and ENTER.

The display should momentarily display "COMMAND ACCEPTED."

From the NETWORK OPT. Menu, select "4" (NETWORK TYPE) and ENTER

From the NETWORK TYPE Menu, select "1" (DEDICATED) and ENTER

The display should momentarily display "COMMAND ACCEPTED."

From the NETWORK OPT. Menu, select "5" (CLOCK SOURCE) and ENTER

From the CLOCK SOURCE Menu, select "2" (FROM NETWORK) and ENTER

The display should momentarily display "COMMAND ACCEPTED."

Press CANCEL

From the LOCAL Menu, select "3" (TEST OPTIONS) and ENTER

From the TEST OPTIONS Menu, select "1" (TEST TIMEOUT) and ENTER

From the TEST TIMEOUT Menu, select "0" (OFF) and ENTER

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The display should momentarily display “COMMAND ACCEPTED.”

From the TEST OPTIONS Menu, select “2” (RDL EN/DIS) and ENTER  
From the RDL EN/DIS Menu, select “2” (RDL ACCEPTED) and ENTER  
The display should momentarily display “COMMAND ACCEPTED.”

From the TEST OPTIONS Menu, select “3” (EIA LLB EN/DIS) and ENTER  
From the EIA LLB EN/DIS Menu, select “1” (DISABLED) and ENTER  
The display should momentarily display “COMMAND ACCEPTED.”

From the TEST OPTIONS Menu, select “4” (EIA RLB EN/DIS) and ENTER  
From the EIA RLB EN/DIS Menu, select “1” (DISABLED) and ENTER  
The display should momentarily display “COMMAND ACCEPTED.”

Press CANCEL  
Press CANCEL

From the MAIN Menu, select “1” (STATUS) and press ENTER  
Display should show “DATA MODE” and “LOOP IS NORMAL.” If it shows “OPEN LOOP,” the loop is not connected properly or the receive cable pair is bad. The OCU-DP should be active. If the CSU/DSU shows “LOOP IS NORMAL” but the OCU-DP ACTV LED is extinguished, the transmit cable pair is bad.

When the CSU/DSU is looped, the display will show “UNIT IN TEST” and “TEST FROM TELCO.”

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*i. References:*

- [1] Subrate Digital Loops, Application Note No. 9, Whitham D. Reeve, 1997.
- [2] Subscriber Loop Signaling and Transmission Handbook: Digital, Whitham D. Reeve, IEEE Press, 1995.
- [3] Test Patterns for DS0 Synchronous Digital Data Circuits, Report No. 48, Committee T1M1.3, 1996.
- [4] DS1 Test Patterns, Whitham D. Reeve, 2003.

References [1] and [4] are available from Reeve Engineers ([www.reeve.com](http://www.reeve.com)), Reference [3] is available from ATIS, and Reference [2] is available from Wiley & Sons.

*j. Revision History:*

Iss. 0 (working issue, July 2, 2003)

Iss. 0.1 (final draft except 37702A procedures not double-checked, July 9, 2003)

*k. Document prepared by:*

Whitham D. Reeve

Email: [whit@reeve.com](mailto:whit@reeve.com)



Sound Advice In Telecommunications

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## II - TTC T-BERD 224

### *a. General:*

The T-BERD 224 must be equipped with the T1/Fractional T1/DDS BERT Option (p/n 41500). These procedures assume that **Line 1 Receive** port and **Line 2 Transmit** port will be used. Before setting up the T-BERD 224, verify that the loop is in-service as shown at the OCU-DP and CSU/DSU – the OCU-DP should be active (on the UMC1000, the **ACTV** LED on the OCU-DP card should be green) and the CSU/DSU display shows “**DATA MODE**” and “**LOOP IS NORMAL.**” The first tests are from the T-BERD 224 through the OCU-DP loopback to ensure the interface is provisioned correctly and then through the CSU/DSU loopback to ensure the DDS loop is good. For 64 kb/s, follow par. b and c., and for 56 kb/s, follow par. d. and e. See Figure II-1 for test set connections.

### *b. T-BERD 224 Initial Configuration (64 kb/s only):*

Step	Switch	Location	Action
1	<b>AUX</b>	Far left, below screen	AUX button lamp should be Red
2	<b>MODE</b>	Left, below screen	Select <b>AUX 05 LBO</b>
3	<b>RESULTS I</b>	Middle, below screen	Select <b>LINE 2 0 dB</b>
4	<b>MODE</b>	Left, below screen	Select <b>AUX 06 BACK TM</b>
5	<b>RESULTS I</b>	Middle, below screen	Select <b>LINE 2 RECOVERED</b>
6	<b>MODE</b>	Left, below screen	Select <b>AUX 07 DS0 TM</b>
7	<b>SOURCE CONFIGURATION II</b>	Middle-left, below screen	Select <b>DS0 INTERFACE TIMING COMMON</b>
8	<b>MODE</b>	Left, below screen	Select <b>AUX 10 N-CONTG</b>
9	<b>SOURCE CONFIGURATION II</b>	Middle-left, below screen	Select <b>LINE L1</b>
10	<b>RESULTS I</b>	Middle, below screen	Select <b>L1:01</b> (if necessary, use <b>RESULTS II</b> to <b>DEL</b> all channels except 01)
11	<b>MODE</b>	Left, below screen	Select <b>AUX 12 ERR COR</b>
12	<b>SOURCE CONFIGURATION II</b>	Middle-left, below screen	Select <b>DS0A ERROR CORRECTION OFF</b>
13	<b>MODE</b>	Left, below screen	Select <b>AUX 17 LOOP CD</b>
14	<b>SOURCE CONFIGURATION II</b>	Middle-left, below screen	Select <b>TYPE DDS-LAT</b>
15	<b>RESULTS I</b>	Middle, below screen	Select <b>EQUIP OCU</b>
16	<b>AUX</b>	Far left, below screen	AUX button lamp should be out
17	<b>MODE</b>	Left, below screen	Select <b>T1-ESF</b>
18	<b>CHANNEL FORMAT</b>	Left, below screen	For 64 kb/s circuit, select <b>DS064</b> or <b>64 X N</b> . If <b>64 X N</b> , use <b>SOURCE CONFIGURATION II</b> to select <b>N=1</b> .
19	<b>SOURCE CONFIGURATION I</b>	Middle-left, below screen	Select <b>DDS1</b> , <b>DDS2</b> , <b>DDS3</b> , or <b>DDS4</b> (if test set is



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			equipped with Advanced Stress Patterns Option, <b>DDS5</b> and <b>DDS6</b> also area available)
20	<b>RESULTS I (non-arrowed)</b>	Middle, below screen	Select <b>LOGIC</b>
21	<b>RESULTS II (non-arrowed)</b>	Right, below screen	Select <b>SUMMARY</b>
22	<b>CODE</b>	Far left	Select <b>B8ZS</b>
23	<b>DROP (Rx)</b>	Middle	Select <b>LINE 1</b>
24	<b>INSERT (Tx)</b>	Middle	Select <b>LINE 2</b>
25	<b>LINE 1 CHANNEL</b>	Middle left	Select <b>01</b>
26	<b>LINE 2 CHANNEL</b>	Middle right	Select <b>01</b>
27	<b>LINE 1 RECEIVE INPUT</b>	Lower left	Select <b>TERM</b>
28			

**c. T-BERD 224 Connections (64 kb/s only):**

<b>Step</b>	<b>Action</b>
1	Connect a patch cord from <b>Line 1 RX</b> jack to DSX-1 Line OUT jack. See Fig. II-1.
2	Connect a patch cord from <b>Line 2 TX</b> jack to DSX-1 Line IN jack. See Fig. II-1.
3	Press <b>RESTART</b> (Upper right, next to display).
4	Verify: <ul style="list-style-type: none"> <li>a. <b>LINE 1 SIGNAL</b> LED is illuminated. The LEDs are located on the upper right.</li> <li>b. <b>LINE 1 FRAME SYNC</b> LED is illuminated.</li> <li>c. <b>MODE</b> display shows proper framing format (either <b>T1-D4</b> or <b>T1-ESF</b>).</li> <li>d. <b>B8ZS</b> LED may be illuminated.</li> </ul> Do not proceed until the above has been verified.
5	Select screen <b>100 BIT ERR</b> using the <b>RESULTS I Arrowed</b> switch.
6	Press <b>LOOP UP</b> button on the far right
7	Verify: <ul style="list-style-type: none"> <li>a. The test set momentarily displays <b>LAT LOOP UP</b> and <b>COMPLETE/CONFIRMED</b>.</li> <li>b. The test set <b>PATTERN SYNC</b> LED is on.</li> <li>c. The correct OCU-DP is in the loopback mode (on the UMC1000, the <b>LPBK</b> LED is Amber).</li> <li>d. Let the loopback test run for about 5 minutes then check that there are no bit errors on <b>RESULTS I</b> screen <b>100</b> and <b>RESULTS OK</b> on <b>RESULTS II</b> screen.</li> </ul>
8	Press <b>LOOP DOWN</b> button on the far right
9	Verify: <ul style="list-style-type: none"> <li>a. The test set momentarily displays <b>LAT LOOP DOWN</b> and <b>COMPLETE</b>.</li> </ul>

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- b. The test set **PATTERN SYNC** LED is out.
- c. The OCU-DP is no longer in loopback mode (on the UMC1000, the **LPBK** LED is out).
- 10 Go to **AUX 17** (see Configuration above) and, using the **RESULTS I** (non-arrowed) switch, select **EQUIP CHANNEL**. When finished, press the **AUX** button.
- 11 Press **LOOP UP** button on the far right
- 12 Verify:
  - a. The test set momentarily displays **LAT LOOP UP** and **COMPLETE/CONFIRMED**.<sup>1</sup>
  - b. The test set **PATTERN SYNC** LED is on.
  - c. The OCU-DP shows the far end in **CHANNEL** loopback mode (on the UMC1000, the **LPBK** LED is Amber).
  - d. The CSU/DSU at the customer premises is in the loopback mode (on the Adtran DSU III AR, the display will show **UNIT IN TEST** and **TEST FROM TELCO**).
  - e. Let the loopback test run for about 15 minutes then check that there are no bit errors on **RESULTS I** screen **100** and **RESULTS OK** on **RESULTS II** screen. Continue running the test as long as necessary to establish circuit quality.
- 13 Press **LOOP DOWN** button on the far right
- 14 Verify:
  - a. The test set momentarily displays **LAT LOOP DOWN** and **COMPLETE**.
  - b. The test set **PATTERN SYNC** LED is out.
  - c. The CSU/DSU at the customer premises is no longer in loopback mode (on the Adtran DSU III AR, the display shows **DATA MODE** and **LOOP IS NORMAL**).
  - d. The OCU-DP no longer shows the far end in **CHANNEL** loopback mode (on the UMC1000, the **LPBK** LED is extinguished).

## ***d. T-BERD 224 Configuration (56 kb/s only):***

<b>Step</b>	<b>Switch</b>	<b>Location</b>	<b>Action</b>
1	<b>AUX</b>	Far left, below screen	AUX button lamp should be Red
2	<b>MODE</b>	Left, below screen	Select <b>AUX 05 LBO</b>
3	<b>RESULTS I</b>	Middle, below screen	Select <b>LINE 2 0 dB</b>
4	<b>MODE</b>	Left, below screen	Select <b>AUX 06 BACK TM</b>
5	<b>RESULTS I</b>	Middle, below screen	Select <b>LINE 2 RECOVERED</b>
6	<b>MODE</b>	Left, below screen	Select <b>AUX 07 DS0 TM</b>
7	<b>SOURCE CONFIGURATION II</b>	Middle-left, below screen	Select <b>DS0 INTERFACE TIMING COMMON</b>

<sup>1</sup> Some CSU/DSUs will go into loopback mode but the test set will show **UNCONFIRMED**. As long as the test set **PATTERN SYNC** LED is on, then the loopback is successful.

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8	<b>MODE</b>	Left, below screen	Select <b>AUX 10 N-CONTG</b>
9	<b>SOURCE CONFIGURATION II</b>	Middle-left, below screen	Select <b>LINE L1</b>
10	<b>RESULTS I</b>	Middle, below screen	Select <b>L1:01</b> (if necessary, use <b>RESULTS II</b> to <b>DEL</b> all channels except 01)
11	<b>MODE</b>	Left, below screen	Select <b>AUX 12 ERR COR</b>
12	<b>SOURCE CONFIGURATION II</b>	Middle-left, below screen	Select <b>DS0A ERROR CORRECTION OFF</b>
13	<b>MODE</b>	Left, below screen	Select <b>AUX 17 LOOP CD</b>
14	<b>SOURCE CONFIGURATION II</b>	Middle-left, below screen	Select <b>TYPE DDS-ALT</b>
15	<b>RESULTS I</b>	Middle, below screen	Select <b>EQUIP OCU</b>
16	<b>AUX</b>	Far left, below screen	<b>AUX</b> button lamp should be out
17	<b>MODE</b>	Left, below screen	Select <b>T1-ESF</b>
18	<b>CHANNEL FORMAT</b>	Left, below screen	For 56 kb/s circuit, select <b>DS0A56</b> or <b>56 X N.</b> and use <b>SOURCE CONFIGURATION II</b> to select <b>N=1</b>
19	<b>SOURCE CONFIGURATION I</b>	Middle-left, below screen	Select <b>DDS1, DDS2, DDS3, or DDS4</b> (if test set is equipped with Advanced Stress Patterns Option, <b>DDS5</b> and <b>DDS6</b> also area available)
20	<b>RESULTS I (non-arrowed)</b>	Middle, below screen	Select <b>LOGIC</b>
21	<b>RESULTS II (non-arrowed)</b>	Right, below screen	Select <b>SUMMARY</b>
22	<b>CODE</b>	Far left	Select <b>B8ZS</b>
23	<b>DROP (Rx)</b>	Middle	Select <b>LINE 1</b>
24	<b>INSERT (Tx)</b>	Middle	Select <b>LINE 2</b>
25	<b>LINE 1 CHANNEL</b>	Middle left	Select <b>01</b>
26	<b>LINE 2 CHANNEL</b>	Middle right	Select <b>01</b>
27	<b>LINE 1 RECEIVE INPUT</b>	Lower left	Select <b>TERM</b>
28			

**e. T-BERD 224 Connections (56 kb/s only):**

<b>Step</b>	<b>Action</b>
1	Connect a patch cord from <b>Line 1 RX</b> jack to DSX-1 Line OUT jack. See Fig. II-2.
2	Connect a patch cord from <b>Line 2 TX</b> jack to DSX-1 Line IN jack. See Fig. II-2.
3	Press <b>RESTART</b> (Upper right, next to display).
4	Verify: <ol style="list-style-type: none"> <li>a. <b>LINE 1 SIGNAL</b> LED is illuminated. The LEDs are located on the upper right.</li> <li>b. <b>LINE 1 FRAME SYNC</b> LED is illuminated.</li> </ol>

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- c. **MODE** display shows proper framing format (either **T1-D4** or **T1-ESF**).
- d. **B8ZS** LED may be illuminated.

Do not proceed until the above has been verified.

5 Select screen **100 BIT ERR** using the **RESULTS I Arrowed** switch.

6 Press **LOOP UP** button on the far right

7 Verify:

- a. The test set momentarily displays **ALT LOOP UP** and **COMPLETE**.
- a. The correct OCU-DP is in the loopback mode (on the UMC1000, the **LPBK** LED is Amber).
- c. Let the loopback test run for about 5 minutes then check that there are no bit errors on **RESULTS I** screen **100** and **RESULTS OK** on **RESULTS II** screen.

8 Press **LOOP DOWN** button on the far right

9 Verify:

- a. The test set momentarily displays **ALT LOOP DOWN** and **COMPLETE**.
- b. The OCU-DP is no longer in loopback mode (on the UMC1000, the **LPBK** LED is out).

10 Go to **AUX 17** (see Configuration above) and, using the **RESULTS I** (non-arrowed) switch, select **EQUIP CHANNEL**. When finished, press the **AUX** button.

11 Press **LOOP UP** button on the far right

12 Verify:

- a. The test set momentarily displays **ALT LOOP UP** and **COMPLETE**.<sup>2</sup>
- b. The test set **PATTERN SYNC** LED is on.
- c. The OCU-DP shows the far end in **CHANNEL** loopback mode (on the UMC1000, the **LPBK** LED is Amber).
- d. The CSU/DSU at the customer premises is in the loopback mode (on the Adtran DSU III AR, the display will show **UNIT IN TEST** and **TEST FROM TELCO**).
- e. Let the loopback test run for about 15 minutes then check that there are no bit errors on **RESULTS I** screen **100** and **RESULTS OK** on **RESULTS II** screen. Continue running the test as long as necessary to establish circuit quality.

13 Press **LOOP DOWN** button on the far right

14 Verify:

- a. The test set momentarily displays **ALT LOOP DOWN** and **COMPLETE**.
- b. The test set **PATTERN SYNC** LED is out.
- c. The CSU/DSU at the customer premises is no longer in loopback mode (on the Adtran DSU III AR, the display shows **DATA MODE** and **LOOP IS NORMAL**).
- d. The OCU-DP no longer shows the far end in **CHANNEL** loopback mode (on the UMC1000, the **LPBK** LED is extinguished).

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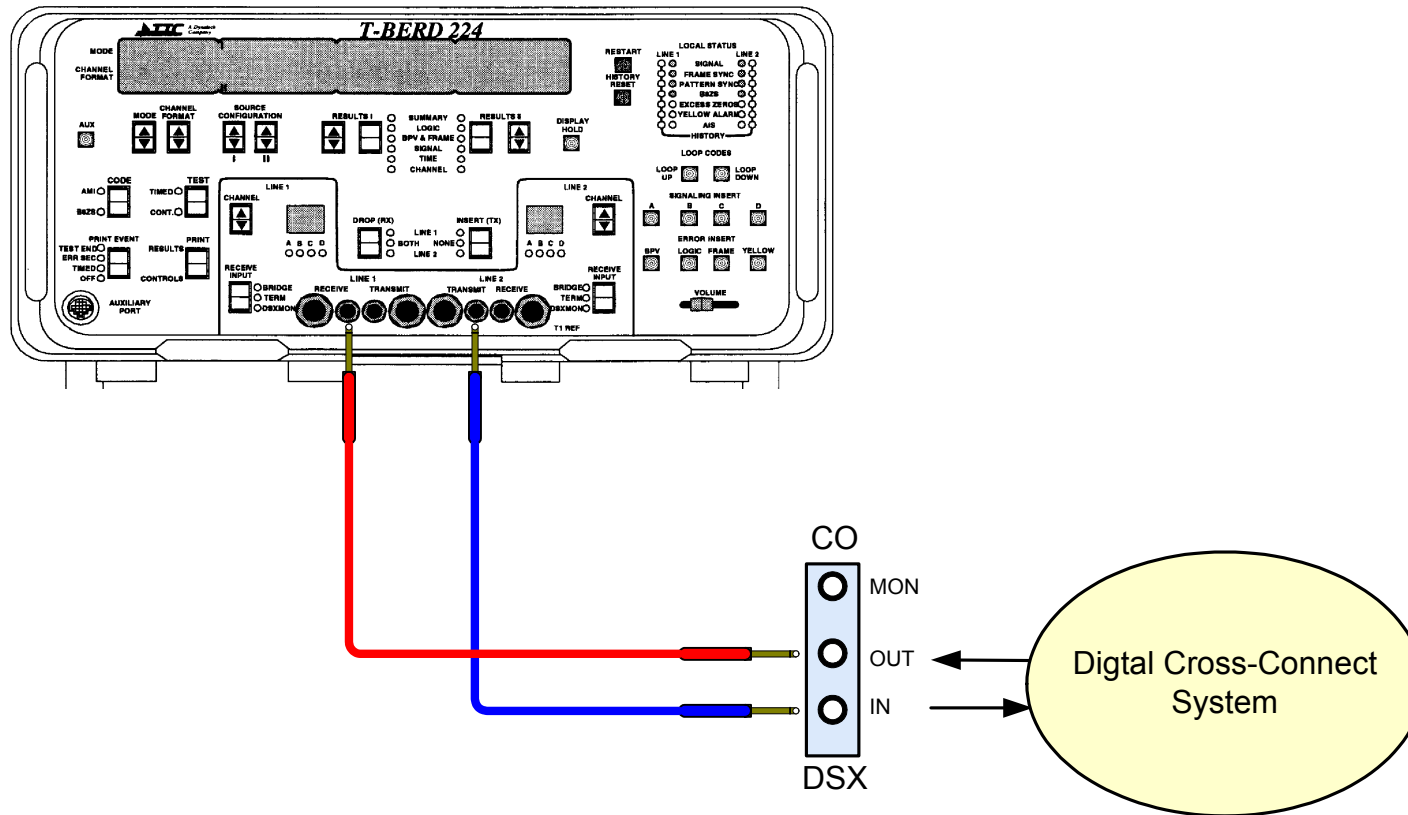
<sup>2</sup> Some CSU/DSUs will go into loopback mode but the test set will show **UNCONFIRMED**. As long as the test set **PATTERN SYNC** LED is on, then the loopback is successful.

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## f. Additional Loopback Testing:

The above procedures test the OCU-DP loopback and the CSU/DSU Channel (CSU) loopback. The CSU/DSU also has a DSU loopback that may be tested (see Figure I-2). Using the **AUX 17** screen, select **EQUIP DSU**, and loop up and loop down the CSU/DSU using the alternating or latching loopbacks as previously described for the 56 and 64 kb/s rates.

Figure II-1 – T-BERD 224 Connections



# DDS Testing

## III – SunSet T10

### *a. General:*

The T10 must be equipped with the DDS Testing Option (p/n SW188). These procedures assume that **Line 1 Receive** and **Line 1 Transmit** ports will be used. Before setting up the T10, verify that the loop is in-service as shown at the OCU-DP and CSU/DSU – the OCU-DP should be active (on the UMC1000, the **ACTV** LED on the OCU-DP card should be green) and the CSU/DSU display shows “**DATA MODE**” and “**LOOP IS NORMAL.**” The first tests are from the T10 through the OCU-DP loopback to ensure the interface is provisioned correctly and then through the CSU/DSU loopback to ensure the DDS loop is good. For 64 kb/s, follow par. b and c., and for 56 kb/s, follow par. d. and e. See Figure III-1 for test set connections.

### *b. SunSet T10 Configuration (64 kb/s only):*

Parameter	Setting	Remarks
<b>TEST CONFIGURATION Screen</b>		
TEST MODE	T1SINGL	Required setting
RxLVL-1	TERM	Required setting
FRAMING	ESF	Required setting; may be determined by pressing AUTO
CODING	B8ZS	B8ZS required for 64 kb/s
XMT CLOCK	L1-Rx	Required setting
TEST RATE	Nx64K	Select ‘T10 TIME SLOT’ 01 for both Transmit and Receive in the next screen and press <b>ENTER</b> to go back to the <b>TEST CONFIGURATION</b> screen.
LBO	0 dB	Required setting

### **OTHER MEASUREMENTS – DDS MEASUREMENTS – CONFIG & SEND PATT Screen**

Tx T/S	01
Rx T/S	01
TEST RATE	64K
SEND PATT	DDS1, DDS2, DDS3, DDS4, or DDS6

# DDS Testing

## c. SunSet T10 Connections (64 kb/s only):

Step	Action
1	Press <b>ESCAPE</b> until at the <b>MAIN MENU</b>
2	Connect a patch cord from <b>Line 1 RX</b> jack to DSX-1 Line OUT jack. See Fig. III-1.
3	Connect a patch cord from <b>Line 1 TX</b> jack to DSX-1 Line IN jack. See Fig. III-1.
4	Press <b>RESYNC</b> .
5	Verify: <ul style="list-style-type: none"><li>a. <b>Line 1 PULSES</b> LED is illuminated.</li><li>b. <b>Line 1 SF</b> or <b>ESF</b> LED is illuminated, depending on Framing selected.</li><li>c. <b>ERRORS</b> LED is off or, if flashing, press <b>HISTORY</b> key to stop flashing.</li></ul> Do not proceed until the above has been verified.
6	Use the cursor keys to select <b>OTHER MEASUREMENTS</b> and press <b>ENTER</b> .
7	Use the cursor keys to select <b>DDS MEASUREMENTS</b> and press <b>ENTER</b>
8	Use the cursor keys to select <b>LOOPBACK ACCESS</b> and press <b>ENTER</b>
9	Use the cursor keys to select <b>TYPE</b> and set to <b>LATCH</b> using the Function Key
10	Use the cursor keys to select <b>CODE</b> and set to <b>OCU</b> using the Function Key
11	Use the cursor keys to select <b>MODE</b> and set to <b>LOOP-UP</b> using the Function Key
12	Verify: <ul style="list-style-type: none"><li>a. The test set displays <b>DDS LOOP-UP IN PROGRESS</b> and <b>DDS LOOP-UP SUCCESS</b>.</li><li>b. The correct OCU-DP is in the loopback mode (on the UMC1000, the <b>LPBK</b> LED is Amber).</li></ul>
13	Press <b>ESCAPE</b> and use the cursor keys to select <b>MEASUREMENT RESULTS</b> .
14	Verify: <ul style="list-style-type: none"><li>a. The test set <b>PAT SYNC</b> LED is on</li><li>b. Let the loopback test run for about 5 minutes then check that there are no bit errors on the <b>MEASUREMENT RESULTS</b> screen.</li></ul>
15	Press <b>ESCAPE</b>
16	Use the cursor keys to select <b>LOOPBACK ACCESS</b> and press <b>ENTER</b>
17	Use the cursor keys to select <b>MODE</b> and set to <b>LOOP-DN</b> using the Function Key
18	Verify: <ul style="list-style-type: none"><li>a. The test set displays <b>DDS LOOP-DN IN PROGRESS</b> and <b>DDS LOOP-DN SUCCESS</b>.</li><li>b. The OCU-DP is no longer in loopback mode (on the UMC1000, the <b>LPBK</b> LED is out).</li></ul>
19	Press <b>ESCAPE</b>
20	Use the cursor keys to select <b>LOOPBACK ACCESS</b> and press <b>ENTER</b>
21	Use the cursor keys to select <b>CODE</b> and set to <b>CSU</b> using the Function Key
20	Use the cursor keys to select <b>MODE</b> and set to <b>LOOP-UP</b> using the Function Key

# DDS Testing

- 21 Verify:
  - a. The test set displays **DDS LOOP-UP IN PROGRESS** and **DDS LOOP-UP SUCCESS**.
  - b. The OCU-DP indicates the far end is in the loopback mode (on the UMC1000, the **LPBK** LED is Amber).
- 22 Press **ESCAPE** and use the cursor keys to select **MEASUREMENT RESULTS**.
- 23 Verify:
  - a. The test set **PAT SYNC** LED is on
  - b. The OCU-DP shows the far end in **CSU (CHANNEL)** loopback mode (on the UMC1000, the **LPBK** LED is Amber).
  - c. The CSU/DSU at the customer premises is in the loopback mode (on the Adtran DSU III AR, the display will show **UNIT IN TEST** and **TEST FROM TELCO**).
  - d. Let the loopback test run for about 15 minutes then check that there are no bit errors on **MEASUREMENT RESULTS** screen. Continue running the test as long as necessary to establish circuit quality.
- 24 Press **ESCAPE**
- 25 Use the cursor keys to select **LOOPBACK ACCESS** and press **ENTER**
- 26 Use the cursor keys to select **MODE** and set to **LOOP-DN** using the Function Key
- 27 Verify:
  - a. The test set displays **DDS LOOP-DN IN PROGRESS** and **DDS LOOP-DN SUCCESS**.
  - b. The test set **PAT SYNC** LED is out.
  - c. The CSU/DSU at the customer premises is no longer in loopback mode (on the Adtran DSU III AR, the display shows **DATA MODE** and **LOOP IS NORMAL**).
  - d. The OCU-DP no longer shows the far end in **CSU (CHANNEL)** loopback mode (on the UMC1000, the **LPBK** LED is extinguished).

## ***d. SunSet T10 Configuration (56 kb/s only):***

<b>Parameter</b>	<b>Setting</b>	<b>Remarks</b>
<b>TEST CONFIGURATION Screen</b>		
<b>TEST MODE</b>	T1SINGL	Required setting
<b>RxLVL-1</b>	TERM	Required setting
<b>FRAMING</b>	ESF	Required setting; may be determined by pressing AUTO
<b>CODING</b>	B8ZS	Required setting
<b>XMT CLOCK</b>	L1-Rx	Required setting
<b>TEST RATE</b>	Nx56K	Select 'T10 TIME SLOT' 01 for both Transmit and Receive in the next screen and press <b>ENTER</b> to go back to the <b>TEST CONFIGURATION</b> screen. The <b>TEST RATE</b> may be set to Nx64K but for consistency use



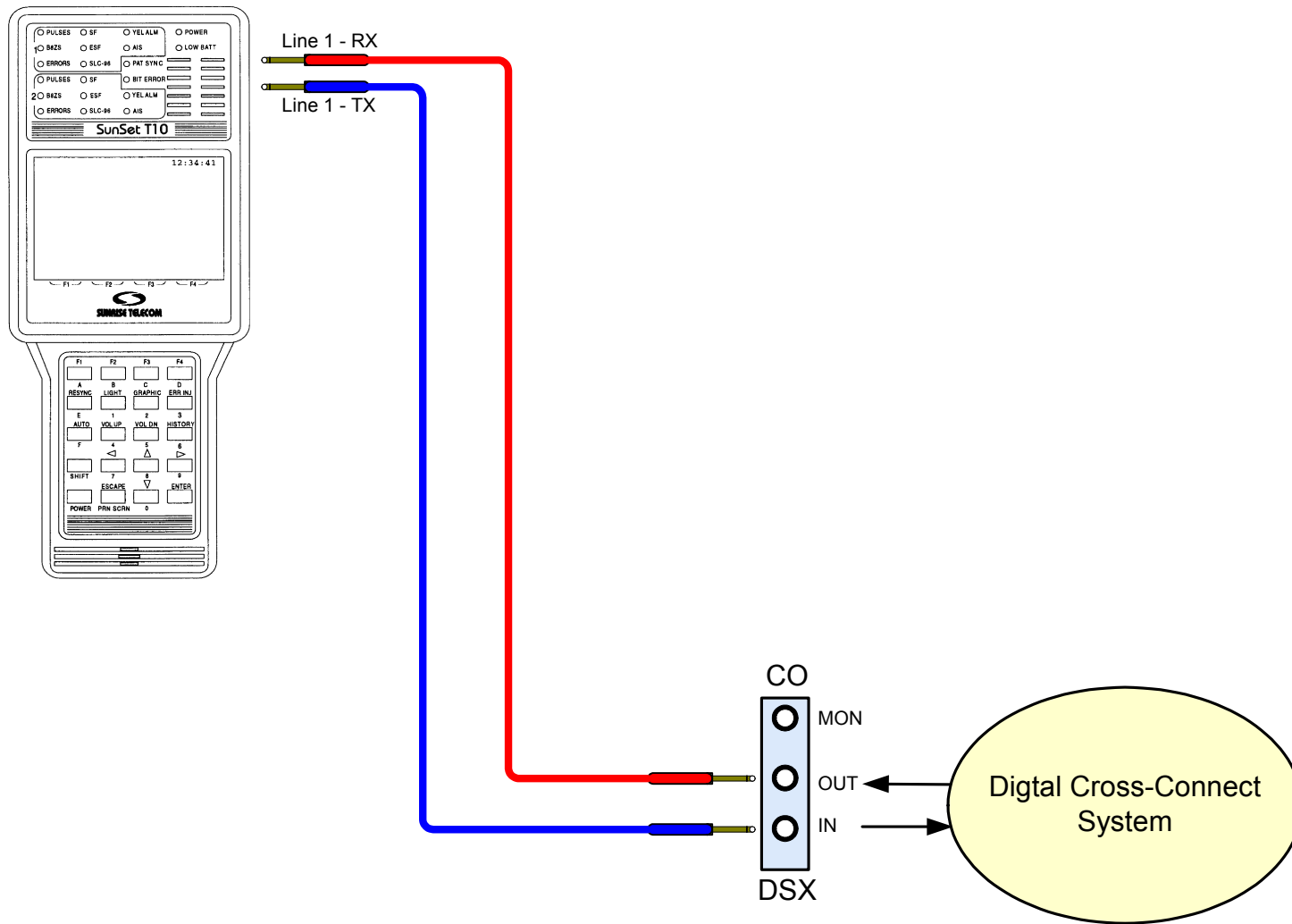


# DDS Testing

- b. Let the loopback test run for about 5 minutes then check that there are no bit errors on the **MEASUREMENT RESULTS** screen.
- 15 Press **ESCAPE**
- 16 Use the cursor keys to select **LOOPBACK ACCESS** and press **ENTER**
- 17 Use the cursor keys to select **MODE** and set to **LOOP-DN** using the Function Key
- 18 Verify:
  - a. The test set displays **DDS LOOP-DN IN PROGRESS** and **DDS LOOP-DN SUCCESS**.
  - b. The OCU-DP is no longer in loopback mode (on the UMC1000, the **LPBK** LED is out).
- 19 Press **ESCAPE**
- 20 Use the cursor keys to select **LOOPBACK ACCESS** and press **ENTER**
- 21 Use the cursor keys to select **CODE** and set to **CSU** using the Function Key
- 20 Use the cursor keys to select **MODE** and set to **LOOP-UP** using the Function Key
- 21 Verify:
  - a. The test set displays **DDS LOOP-UP IN PROGRESS** and **DDS LOOP-UP SUCCESS**.
  - b. The OCU-DP indicates the far end is in the loopback mode (on the UMC1000, the **LPBK** LED is Amber).
- 22 Press **ESCAPE** and use the cursor keys to select **MEASUREMENT RESULTS**.
- 23 Verify:
  - a. The test set **PAT SYNC** LED is on
  - b. The OCU-DP shows the far end in **CSU (CHANNEL)** loopback mode (on the UMC1000, the **LPBK** LED is Amber).
  - c. The CSU/DSU at the customer premises is in the loopback mode (on the Adtran DSU III AR, the display will show **UNIT IN TEST** and **TEST FROM TELCO**).
  - d. Let the loopback test run for about 15 minutes then check that there are no bit errors on **MEASUREMENT RESULTS** screen. Continue running the test as long as necessary to establish circuit quality.
- 24 Press **ESCAPE**
- 25 Use the cursor keys to select **LOOPBACK ACCESS** and press **ENTER**
- 26 Use the cursor keys to select **MODE** and set to **LOOP-DN** using the Function Key
- 27 Verify:
  - a. The test set displays **DDS LOOP-DN IN PROGRESS** and **DDS LOOP-DN SUCCESS**.
  - b. The test set **PAT SYNC** LED is out.
  - c. The CSU/DSU at the customer premises is no longer in loopback mode (on the Adtran DSU III AR, the display shows **DATA MODE** and **LOOP IS NORMAL**).
  - d. The OCU-DP no longer shows the far end in **CSU (CHANNEL)** loopback mode (on the UMC1000, the **LPBK** LED is extinguished).

# DDS Testing

Figure III-1 – SunSet T10 Connections



# DDS Testing

## IV - TTC T-BERD 2209

### *a. General:*

The T-BERD 2209 must be equipped with the Fractional T1 Option. The 2209 cannot test the OCU-DP or Channel (CSU) loopbacks, only the DSU (Remote Digital Loopback) loopback as it sends only the V.54 loop code. These procedures assume that **Primary Receive** and **Primary Transmit** ports will be used. Before setting up the 2209, verify that the loop is in-service as shown at the OCU-DP and CSU/DSU – the OCU-DP should be active (on the UMC1000, the **ACTV** LED on the OCU-DP card should be green) and the CSU/DSU display shows “**DATA MODE**” and “**LOOP IS NORMAL.**” The first tests are from the 2209 through the OCU-DP loopback to ensure the interface is provisioned correctly and then through the CSU/DSU loopback to ensure the DDS loop is good. For 64 kb/s, follow par. b and c., and for 56 kb/s, follow par. d. and e. See Figure IV-1 for test set connections.

### *b. T-BERD 2209 Configuration (64 kb/s only):*

Step	Soft Switch	Location	Action
1	<b>Application Buttons</b>	Upper Left windowpane	Tap <b>TERM</b>
2	<b>Drop Down Menu</b>	Below Application Buttons	Tap <b>Terminate FT1 BERT</b>
3	<b>Drop Down Menu</b>	To Right of previous menu	Tap <b>T1 External</b>
4	<b>Setup Button</b>	Upper Right windowpane	Tap <b>Setup</b>
5	<b>Tx Coding Tab</b>		Select <b>B8ZS</b> .(required for 64 kb/s)
6	<b>Framing Tab</b>		Select <b>T1 ESF</b>
7	<b>Pattern Tab</b>		Select <b>63, 511 or 2047</b>
8	<b>Timing Tab</b>		Select <b>RECOVERED (loop)</b>
9	<b>Receive Input Tab</b>		Select <b>TERMINATE</b>
10	<b>LBO Tab</b>		Select <b>0 dB</b>
11	<b>Channel Tab</b>		<b>Clear All Channels</b> and then select <b>1</b> and set <b>Bandwidth</b> to <b>Nx64K</b>
12	<b>Error Insert Tab</b>		Select <b>DS1 LOGIC</b>
13	<b>Summary Tab</b>		Confirm all settings
14	<b>OK Button</b>	Bottom Left of windowpane	Tap <b>OK</b>
	<b>Left Result Group Button</b>	Middle-Left windowpane	Tap <b>Primary</b>
	<b>Right Result Group Button</b>	Middle-Right windowpane	Tap <b>Primary</b>
	<b>Left Result Category Button</b>	Middle-Left windowpane	Tap <b>Summary</b>
	<b>Right Result Category Button</b>	Middle-Right windowpane	Tap <b>Signal</b>

# DDS Testing

## c. T-BERD 2209 Connections (64 kb/s only):

Step	Action
1	Connect a patch cord from <b>Primary Receive</b> jack to DSX-1 Line OUT jack. See Fig. IV-1.
2	Connect a patch cord from <b>Primary Transmit</b> jack to DSX-1 Line IN jack. See Fig. IV-1.
3	Press <b>RESTART</b> (Upper right, next to display)
4	Verify: <ul style="list-style-type: none"><li>a. <b>Primary SIGNAL</b> LED is green. The LED is located just below the receive jack.</li><li>b. <b>Primary FRAME</b> LED is green. The LED is located just below the transmit jack.</li><li>c. <b>Pattern Sync OFF</b> shows in the left <b>Results Category</b> windowpane.</li></ul> Do not proceed until the above has been verified.
5	Select <b>Loop</b> Application Button at top of windowpane.
6	Select <b>Loop FT1 CSU</b> and <b>T1 External</b>
7	Select <b>Loop Up</b> Button at the bottom right of windowpane.
8	<b>Verify:</b> <ul style="list-style-type: none"><li>a. <b>Loop FT1 CSU: Sending V.54 Loop Up Code</b> and <b>Loop FT1 CSU: Loop Up Successful</b> displays in the upper portion of the windowpane just below the Applications Buttons.</li><li>b. <b>Primary PATTERN</b> LED is green.</li><li>c. The CSU/DSU at the customer premises is in the loopback mode (on the Adtran DSU III AR, the display will show <b>UNIT IN TEST</b> and <b>LOOP IS NORMAL</b>).</li><li>d. Let the loopback test run for about 15 minutes then check that there are no bit errors on the <b>Results Category</b> windowpane. Continue running the test as long as necessary to establish circuit quality.</li><li>e. If desired, check loopback by pressing <b>LOGIC ERROR</b> button on the bottom right of the screen and noting that 1 error shows on the <b>Category Results</b> windowpane.</li></ul>
9	Select <b>Loop Down</b> Button at the bottom right of windowpane.
27	<b>Verify:</b> <ul style="list-style-type: none"><li>a. The test set displays <b>DDS LOOP-DN IN PROGRESS</b> and <b>DDS LOOP-DN SUCCESS</b>.</li><li>b. The test set <b>PAT SYNC</b> LED is out.</li><li>c. The CSU/DSU at the customer premises is no longer in loopback mode (on the Adtran DSU III AR, the display shows <b>DATA MODE</b> and <b>LOOP IS NORMAL</b>).</li><li>d. The OCU-DP no longer shows the far end in <b>CSU (CHANNEL)</b> loopback mode (on the UMC1000, the <b>LPBK</b> LED is extinguished).</li></ul>

# DDS Testing

## ***d. T-BERD 2209 Configuration (56 kb/s only):***

Step	Soft Switch	Location	Action
1	<b>Application Buttons</b>	Upper Left windowpane	Tap <b>TERM</b>
2	<b>Drop Down Menu</b>	Below Application Buttons	Tap <b>Terminate FT1 BERT</b>
3	<b>Drop Down Menu</b>	To Right of previous menu	Tap <b>T1 External</b>
4	<b>Setup Button</b>	Upper Right windowpane	Tap <b>Setup</b>
5	<b>Tx Coding Tab</b>		Select <b>B8ZS</b>
6	<b>Framing Tab</b>		Select <b>T1 ESF</b>
7	<b>Pattern Tab</b>		Select <b>63, 511 or 2047</b>
8	<b>Timing Tab</b>		Select <b>RECOVERED (loop)</b>
9	<b>Receive Input Tab</b>		Select <b>TERMINATE</b>
10	<b>LBO Tab</b>		Select <b>0 dB</b>
11	<b>Channel Tab</b>		<b>Clear All Channels</b> and then select <b>1</b> and set <b>Bandwidth</b> to <b>Nx56K</b>
12	<b>Error Insert Tab</b>		Select <b>DS1 LOGIC</b>
13	<b>Summary Tab</b>		Confirm all settings
14	<b>OK Button</b>	Bottom Left of windowpane	Tap <b>OK</b>
	<b>Left Result Group Button</b>	Middle-Left windowpane	Tap <b>Primary</b>
	<b>Right Result Group Button</b>	Middle-Right windowpane	Tap <b>Primary</b>
	<b>Left Result Category Button</b>	Middle-Left windowpane	Tap <b>Summary</b>
	<b>Right Result Category Button</b>	Middle-Right windowpane	Tap <b>Signal</b>

## ***e. T-BERD 2209 Connections (56 kb/s only):***

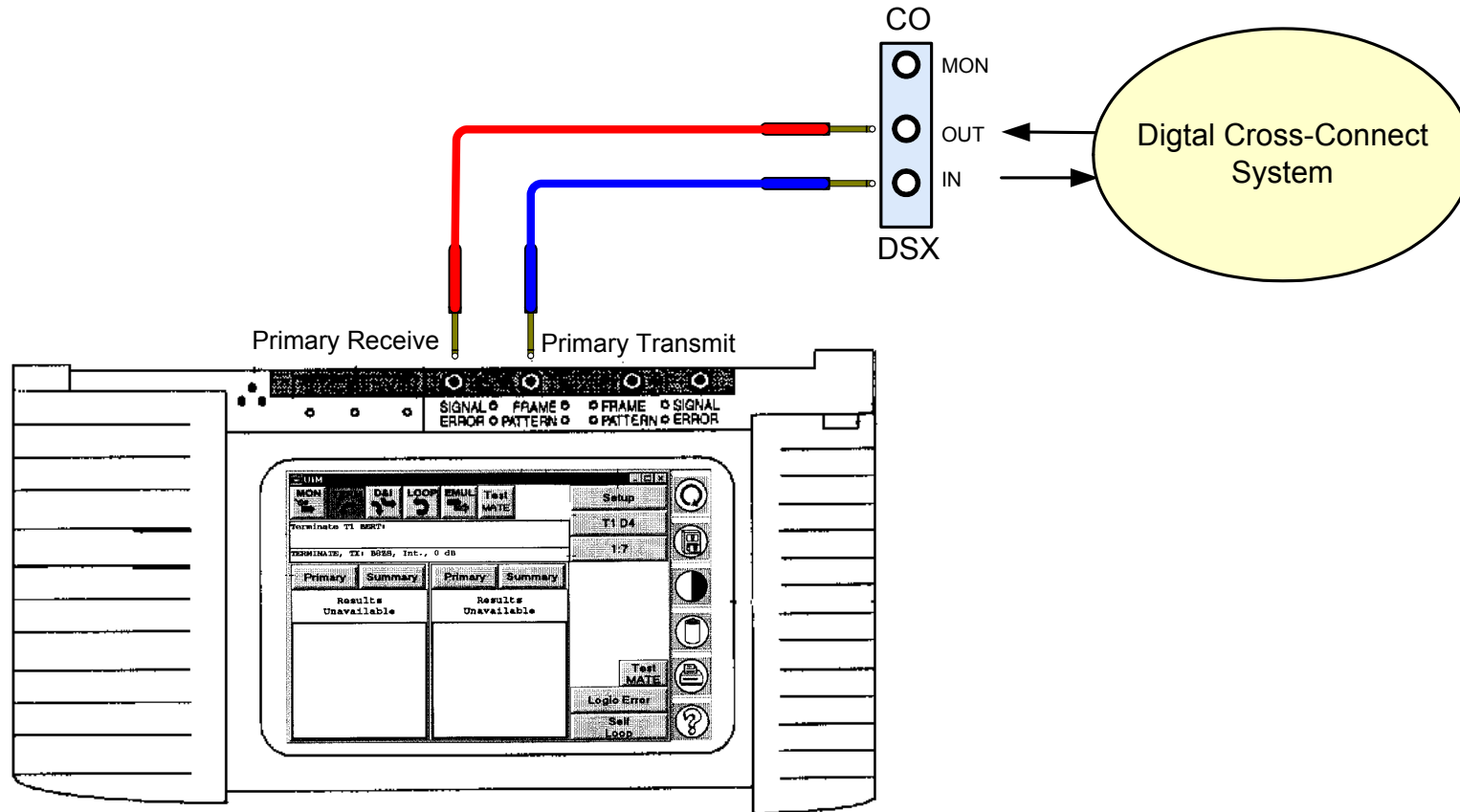
Step	Action
1	Connect a patch cord from <b>Primary Receive</b> jack to DSX-1 Line OUT jack. See Fig. IV-1.
2	Connect a patch cord from <b>Primary Transmit</b> jack to DSX-1 Line IN jack. See Fig. IV-1.
3	Press <b>RESTART</b> (Upper right, next to display)
4	Verify: <ol style="list-style-type: none"> <li><b>Primary SIGNAL</b> LED is green. The LED is located just below the receive jack.</li> <li><b>Primary FRAME</b> LED is green. The LED is located just below the transmit jack.</li> <li><b>RESULTS OK</b> shows in the <b>Results Category</b> windowpane.</li> </ol> Do not proceed until the above has been verified.

# DDS Testing

- 5 Select **Loop** Application Button at top of windowpane.
- 6 Select **Loop FT1 CSU** and **T1 External**
- 7 Select **Loop Up** Button at the bottom right of windowpane.
- 8 Verify:
  - a. **Loop FT1 CSU: Sending V.54 Loop Up Code** and **Loop FT1 CSU: Loop Up Successful** displays in the upper portion of the windowpane just below the Applications Buttons.
  - b. The test set **Pattern** LED is green.

# DDS Testing

Figure V-1 – T-BERD 2209 Connections





# DDS Testing

## V – HP 37702A

### a. *General:*

The 37702A cannot test at 64 kb/s loop through a DS1 interface; however, it still can be used to test the end circuit by temporarily setting up the OCU-DP and CSU/DSU for 56 kb/s rate (a circuit that works at 56 kb/s almost always will work at 64 kb/s provided the embedded DS1 circuits are setup for B8ZS and have 64 kb/s Clear Channel Capability). Before setting up the 37702A, verify that the DDS loop is in-service as shown at the OCU-DP and CSU/DSU – the OCU-DP should be active (on the UMC1000, the ACTV LED on the OCU-DP card should be green and on the Adtran DSU III AR, the CSU/DSU display shows “**DATA MODE**” and “**LOOP IS NORMAL**”). The first tests are from the 37702A through the OCU-DP loopback to ensure the interface is provisioned correctly and then through the CSU/DSU loopback to ensure the DDS loop is good. See Figure V-1 for test set connections.

### b. HP37702A Configuration (56 kb/s only):

Step	Key	Location	Action
1	<b>CONFIG</b>	Right of screen	Select <b>T1-DDS</b> using the <i>Status</i> switches below the screen
2	<b>FRAME</b>	Right of screen	Select <b>ESF</b> category using the <i>Status</i> switches below the screen
3	<b>CODE</b>	Right of screen	Select <b>B8ZS</b>
4	<b>CODE</b>	Right of screen	Use the cursor keys to highlight the <b>THRU</b> field and select <b>OFF</b> using the <i>Status</i> switches below the screen
5			Use the cursor keys to highlight the <b>IN TS</b> field and select <b>1</b> using the <i>Status</i> switches below the screen
6			Use the cursor keys to highlight the <b>PAYLOAD</b> field and select <b>56.0kb/s</b> using the <i>Status</i> switches below the screen
7	<b>PATTERN</b>	Right of screen	Use the <i>Status</i> switches below the screen to select <b>PRBS 2047, PRBS 511, DDS STRESS 1, 2, 3, 4 or 5.</b>
8	<b>INTERFACE</b>	<i>T1 Interface</i> subpanel	Select <b>TERM</b>
9	<b>LBO</b>	<i>T1 Interface</i> subpanel	Select <b>0 dB (DSX)</b>
10	<b>TRANSMIT TIMING</b>	<i>T1 Interface</i> subpanel	<b>RECOV'D (LOOP)</b>
11	<b>AUX</b>	Right of screen	Select <b>DDS ERRORS &amp; LOOPING</b>
12	<b>AUX</b>	Right of screen	Use the cursor keys to highlight <b>USER PROGRAM ERROR RATE</b> and select <b>1E-6</b> using the <i>Status</i> switches below the screen
13	<b>AUX</b>	Right of screen	Use the cursor keys to highlight <b>DDS OPERATION</b> and select <b>LATCHING</b> using the <i>Status</i> switches below the screen

# DDS Testing

14	AUX	Right of screen	Use the cursor keys to highlight <b>LATCHING L/B</b> and select <b>OCU-DP</b> using the <i>Status</i> switches below the screen
15	TYPE	<i>Transmit Error Insert</i> subpanel	Set to <b>LOGIC</b>
16	RATE	<i>Transmit Error Insert</i> subpanel	Set to <b>ERR FREE</b>

## c. HP37702A Connections (56 kb/s only):

Step	Action
1	Connect a patch cord from <b>T1 RECEIVE</b> jack to DSX-1 Line OUT jack. See Fig. V-1.
2	Connect a patch cord from <b>T1 TRANSMIT</b> jack to DSX-1 Line IN jack. See Fig. V-1.
3	Press <b>RESTART</b> .
4	Verify: a. <b>SIGNAL PRESENT</b> and <b>FRAME SYNC</b> LEDs are green. The LEDs are located on the upper right. b. <b>PATTERN LOSS</b> and <b>ERRORS</b> LEDs are red. Do not proceed until the above has been verified.
5	Press <b>RESULTS</b> button located to lower right of screen and select <b>ERROR RESULTS</b> in the <b>DISPLAY</b> field using the <i>Status</i> switches below the screen.
6	Use the cursor keys to highlight the next field after <b>DISPLAY</b> and select <b>LOGIC</b> using the <i>Status</i> switches below the screen.
7	Use the cursor keys to highlight the next field after <b>LOGIC</b> and select <b>ALL RESULTS</b> using the Status switches below the screen.
8	Press <b>LOOP UP</b> key on upper right of test set under the <b>SEND LOOPCODES</b> subpanel.
9	<b>Verify:</b> a. The test set displays <b>Latching Loop-up (AUX-DDS Looping)</b> followed by <b>Loop up successful</b> . b. The correct OCU-DP is in the loopback mode (on the UMC1000, the <b>LPBK</b> LED is Amber). c. The test set <b>PATTERN SYNC</b> LED is green. <b>Action:</b> a. Press <b>Reset History</b> key at bottom right of test set. b. Let the loopback test run for about 5 minutes then check that there are no bit errors on the <b>RESULTS</b> screen. c. If desired, check loopback by pressing <b>SINGLE</b> key on the <i>Transmit Error Insert</i> subpanel on the upper middle-right of the test set and noting that 1 error shows on the <b>RESULTS</b> display.
10	Press <b>LOOP DOWN</b> key on upper right of test set under <b>SEND LOOPCODES</b> .
11	<b>Verify:</b> a. The test set displays <b>Loop down successful</b> .

# DDS Testing

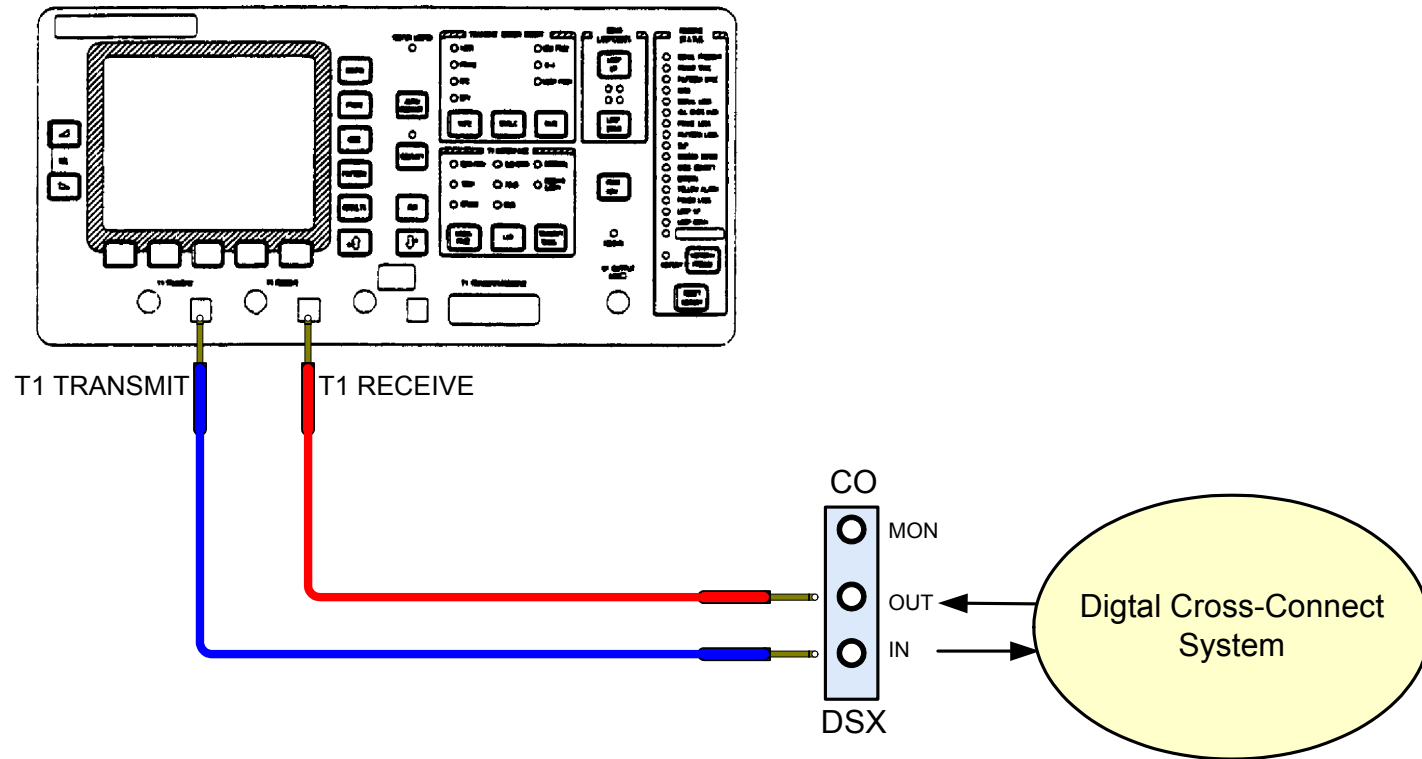
- b. The OCU-DP is no longer in loopback mode (on the UMC1000, the **LPBK** LED is out).
- 12 Press the **AUX** key and use the cursor keys to select **LATCHING** under **DDS OPERATION**. Use the *Status* switches below the screen to select **CHANNEL** in the **LATCHING L/B** field.
- 13 Press **RESULTS** button located to lower right of screen and select **ERROR RESULTS** in the **DISPLAY** field using the *Status* switches below the screen.
- 14 Press **LOOP UP** key on upper right of test set under the **SEND LOOPCODES** subpanel.
- 15 **Verify:**
  - a. The test set displays **Latching Loop-up (AUX-DDS Looping)** followed by **Loop up successful**.
  - b. The test set **PATTERN SYNC** LED is on
  - c. The OCU-DP shows the far end in **CSU (CHANNEL)** loopback mode (on the UMC1000, the **LPBK** LED is Amber).
  - d. The CSU/DSU at the customer premises is in the loopback mode (on the Adtran DSU III AR, the display will show **UNIT IN TEST** and **TEST FROM TELCO**).

**Action:**

  - a. Press **Reset History** key at bottom right of test set.
  - b. Let the loopback test run for about 15 minutes then check that there are no bit errors on the **RESULTS** screen. Continue running the test as long as necessary to establish circuit quality.
  - c. If desired, check loopback by pressing **SINGLE** key on the *Transmit Error Insert* subpanel on the upper middle-right of the test set and noting that 1 error shows on the **RESULTS** display.
- 16 Press **LOOP DOWN** key on upper right of test set under **SEND LOOPCODES**.
- 17 **Verify:**
  - a. The test set displays **Loop down successful**.
  - b. The test set **PATTERN SYNC** LED is out.
  - c. The CSU/DSU at the customer premises is no longer in loopback mode (on the Adtran DSU III AR, the display shows **DATA MODE** and **LOOP IS NORMAL**).
  - d. The OCU-DP no longer shows the far end in **CSU (CHANNEL)** loopback mode (on the UMC1000, the **LPBK** LED is extinguished).

# DDS Testing

Figure IV-1 – HP37702A Connections

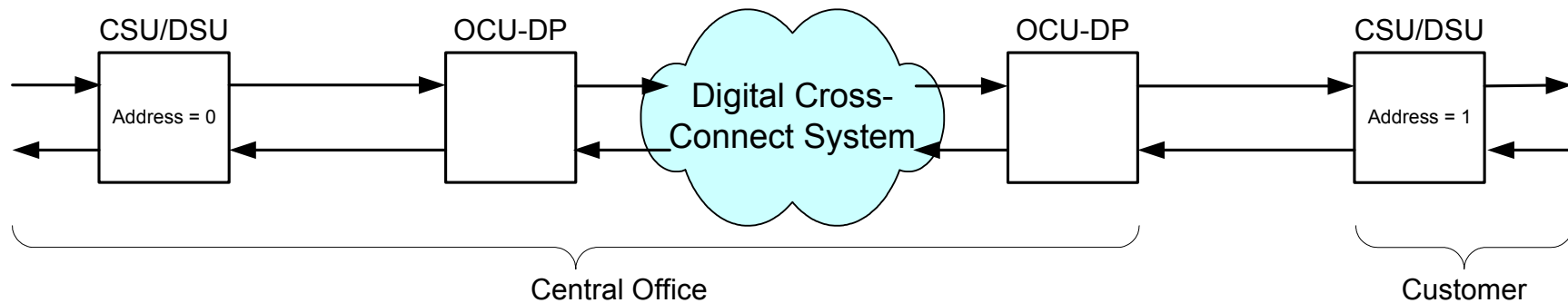


# DDS Testing

## VI – ALTERNATE TEST METHOD

It is possible to setup an end-to-end channel with two OCU-DP and two CSU/DSU and then use the CSU/DSUs to test the circuit. In this case, one OCU-DP and one CSU/DSU are associated with the customer's circuit and the other OCU-DP and CSU/DSU is setup as a zero loop local circuit in the central office (Fig. I-3). The two OCU-DPs are cross-connected (in the UMC1000, a "Plug-In" cross-connect would be used) and no DS1 test set or DS1 interface is required. One CSU/DSU is used to setup a loopback in the remote CSU/DSU and then an internal test pattern is sent to the far end and back. The Adtran DSU III AR has a selection of test patterns and is entirely compatible with this scheme. To eliminate any possible incompatibilities, the DSU III AR should be used at both ends.

**Fig. I-3 – End-To-End DDS Test Circuit**



Setup the DSU III AR as follows: Perform the basic CSU/DSU setup as already discussed with one additional step. At the CONFIG Menu, select "1" (NETWORK OPT.) and then "2" (NETWORK ADDR.). Set the address at the central office end to "0" and at the customer end to "1". Make sure both the customer circuit and the local central office circuits are active.

At the CSU/DSU at one end, go to the Main Menu and select "2" TEST and then select "2" (REMOTE UNIT). When asked for the TEST UNIT ADDRESS, enter the remote unit address with the keypad. If at the central office, the remote unit address is 1 and if at the customer premises, the remote unit address is 0. Press ENTER and then select one of the test patterns ("1" through "6"). Press ENTER. The display at the near end should show EXECUTING TEST and in a moment the display REMOTE WITH TP and TST ERR=0000. At this time, the far end should display UNIT IN TEST and LOOP IS NORMAL. At both CSU/DSUs, the amber TST LED should be on.

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If there are any errors, they could be produced at either end but most likely on the customer end. If the outside plant is suspect, move the CSU/DSU from the customer to the central office and bypass the outside plant. If the test runs with no errors, then the outside plant is causing the problems.

When the test is to be ended, press CANCEL at the near end and select “2” (TEST). At the TEST menu, select “1” (EXIT TEST) and press ENTER. At this time, the display should show PLEASE WAIT and in a moment should return to the Main Menu.

If the remote CSU/DSU fails to enter the loopback (test) mode, there could be a provisioning problem somewhere in between. If both CSU/DSUs show LOOP IS NORMAL, it is unlikely the problem is in the Outside Plant or central office connections from the CSU/DSU to the OCU-DP.

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## Appendix – DSU/CSU Loopback Compatibility

### CSU/DSU to CSU/DSU

Remote Loopback Initiated By	Speed	Loopback Type	Operation
Adtran DSU III AR → Kentrox D-SERV 56/64	56 kb/s	V.54	√
Adtran DSU III AR → Kentrox D-SERV 56/64	64 kb/s	V.54	√
Kentrox D-SERV → Adtran DSU III AR	56 kb/s	V.54	√
Kentrox D-SERV → Adtran DSU III AR	64 kb/s	V.54	√
Adtran DSU III AR → Kentrox 552	56 kb/s	V.54	X
Adtran DSU III AR → Kentrox 552	64 kb/s	V.54	X
Kentrox 552 → Adtran DSU III AR	56 kb/s	V.54	√ But no confirmation
Kentrox 552 → Adtran DSU III AR	64 kb/s	V.54	√ But no confirmation
Kentrox D-SERV → Kentrox 552	56 kb/s	V.54	X
Kentrox D-SERV → Kentrox 552	64 kb/s	V.54	X
Kentrox 552 → Kentrox D-SERV 56/64	56 kb/s	V.54	√
Kentrox 552 → Kentrox D-SERV 56/64	64 kb/s	V.54	√ But no confirmation
Adtran DSU III AR → Adtran DSU III AR	56 kb/s	V.54	√
Adtran DSU III AR → Adtran DSU III AR	64 kb/s	V.54	√

**Generally, but not always, use Alternating (Non-Latching) Loopback for 56 kb/s and Latching Loopback for 64 kb/s**

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## Test Set to CSU/DSU

Remote Loopback Initiated By	Speed	Loopback Type	Operation
Sunset T10 → Kentrox D-SERV 56/64	56 kb/s	Latching CSU	√
Sunset T10 → Kentrox D-SERV 56/64	56 kb/s	Latching DSU	X
Sunset T10 → Kentrox D-SERV 56/64	56 kb/s	Non-latching CSU	√
Sunset T10 → Kentrox D-SERV 56/64	56 kb/s	Non-latching DSU	√
Sunset T10 → Kentrox D-SERV 56/64	64 kb/s	Latching CSU	√
Sunset T10 → Kentrox D-SERV 56/64	64 kb/s	Latching DSU	X
Sunset T10 → Kentrox 552	56 kb/s	Latching CSU	√
Sunset T10 → Kentrox 552	56 kb/s	Latching DSU	X
Sunset T10 → Kentrox 552	56 kb/s	Non-latching CSU	√
Sunset T10 → Kentrox 552	56 kb/s	Non-latching DSU	X
Sunset T10 → Kentrox 552	64 kb/s	Latching CSU	√
Sunset T10 → Kentrox 552	64 kb/s	Latching DSU	X
T-BERD 224 → Kentrox D-SERV 56/64	56 kb/s	DSU	√
T-BERD 224 → Kentrox D-SERV 56/64	56 kb/s	CHANNEL	√
T-BERD 224 → Kentrox D-SERV 56/64	64 kb/s	DSU	√
T-BERD 224 → Kentrox D-SERV 56/64	64 kb/s	CHANNEL	√
T-BERD 224 → Kentrox 552	56 kb/s	DSU	√
T-BERD 224 → Kentrox 552	56 kb/s	CHANNEL	√
T-BERD 224 → Kentrox 552	64 kb/s	DSU	X
T-BERD 224 → Kentrox 552	64 kb/s	CHANNEL	√ Latching loopback only
HP37702A → Kentrox D-SERV 56/64	56 kb/s	Latching Channel	√
HP37702A → Kentrox D-SERV 56/64	56 kb/s	Latching V.54	√
HP37702A → Kentrox D-SERV 56/64	56 kb/s	Alternating Channel	X
HP37702A → Kentrox D-SERV 56/64	56 kb/s	Alternating DSU	√
HP 37702A → Kentrox 552	56 kb/s	Latching Channel	√
HP 37702A → Kentrox 552	56 kb/s	Latching V.54	X
HP 37702A → Kentrox 552	56 kb/s	Alternating Channel	X
HP 37702A → Kentrox 552	56 kb/s	Alternating DSU	√

**Generally, but not always, use Alternating (Non-Latching) Loopback for 56 kb/s and Latching Loopback for 64 kb/s**