TROCU DP
1292006
SD4 2-WIRE

SYNC
LOOP OPEN
CRC
QM DISC
NO DSU
NTWK LBK
CUST LBK
AP

SC
64
56
19.2
9.6
4.8
2.4
SW56

ON

LBK

Rx (OUT)
Tx (IN)

LOGIC

ADTRAN
Total Reach
DDS

ADTRAN®

Total Reach® Office Channel Unit Data Port Installation and Maintenance Practice

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Revision History

Revision	Date	Description
A	April, 2001	Initial release
B	October, 2001	Revised to change CLEI code
C	October, 2006	Revised to change CLEI code

Conventions

The following typographical conventions are used in this document:

This font indicates a cross-reference link.

This font indicates screen menus, fields, and parameters.

THIS FONT indicates keyboard keys (ENTER, ESC, ALT). Keys that are to be pressed simultaneously are shown with a plus sign (ALT+X indicates that the ALT key and X key should be pressed at the same time).

This font indicates references to other documentation and is also used for emphasis.

`This font` indicates on-screen messages and prompts.

`This font` indicates text to be typed exactly as shown.

This font indicates silk-screen labels or other system label items.

This font is used for strong emphasis.

NOTE

Notes inform the user of additional, but essential, information or features.

CAUTION

Cautions inform the user of potential damage, malfunction, or disruption to equipment, software, or environment.

WARNING

Warnings inform the user of potential bodily pain, injury, or death.

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ADTRAN offers training courses on our products. These courses include overviews on product features and functions while covering applications of ADTRAN product lines. ADTRAN provides a variety of training options, including customized training and courses taught at our facilities or at customer sites.

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Total Reach
Office Channel Unit Data Port

INTRODUCTION

The Total Reach® Office Channel Unit Data Port (TR OCU DP) is a functional replacement for the D4 OCU DP, delivering data at rates up to 64 kbps over a single copper pair. Used in combination with the Total Reach Digital Data System-All Rate (DDS-R) termination unit (TR DDS-R), the TR OCU DP can accommodate extended loop lengths, eliminating the need for DDS repeaters.

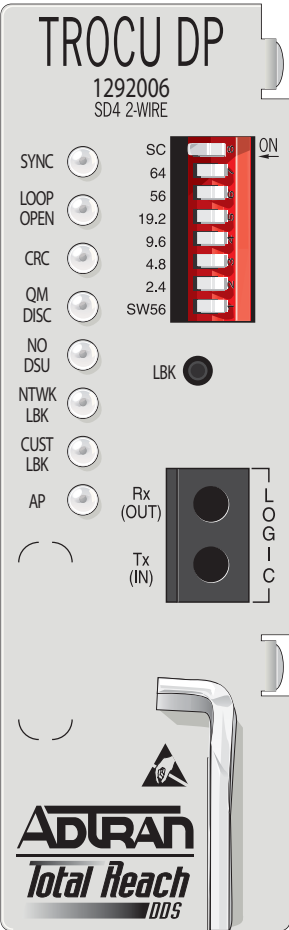Figure 1 illustrates the TR OCU DP front panel.

Figure 1. Total Reach Office Channel Unit Data Port

Description

The TR OCU DP can interoperate over the carrier system with another TR OCU DP, DS0 DP, TR DDS-DP, 1/0 DCS, or switch. The TR OCU DP can be located in an end office, hub office, intermediate office, or Digital Loop Carrier (refer to Figure 2.)

NOTE

The TR OCU DP must be used with an appropriate TR DDS-R unit.
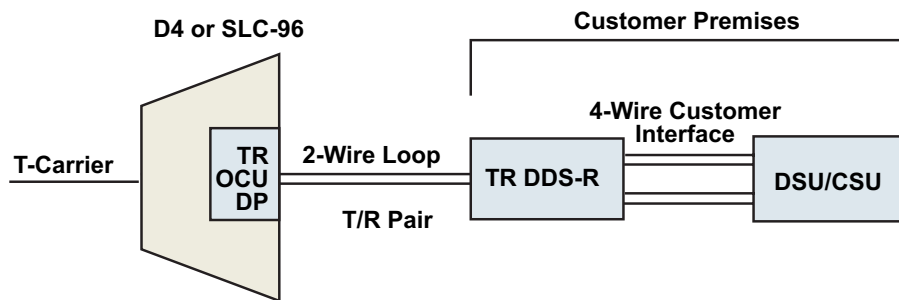
Figure 2. Total Reach DDS Circuit Diagram

The TR OCU DP occupies a single channel position in a WECO®-compatible D4 channel bank, AT&T® SLC-96 terminal, or an ADTRAN ACT 1900/2300 channel bank, providing the interface between a DS0 time slot of the T-carrier data stream and the 2-wire metallic loop extending to the customer premises.

The TR OCU DP span-powers the remote TR DDS-R located at the customer premises. The TR DDS-R converts the 2-wire signal to the traditional 4-wire Alternate Mark Inversion (AMI) signal for transmission to the customer.

Features

- Two-wire deployment
- Repeaterless operation
- Bridged tap tolerant
- Span power for remote TR DDS-R termination unit
- Protected Loopback prevents false latching loopback at 64 kbps
- For use in all D4 channel bank and SLC-96 Mode I, II, and III remote terminal applications
- NEAR and FAR logic level bantam test access
- Loop Quality Monitor and A/B Signaling options
- Embedded Digital System 6 capabilities for remote provisioning, configuration, and performance monitoring

Compliance

Table 1 lists the compliance codes for the TR OCU DP. The TR OCU DP is NRTL listed to the applicable UL standards. The TR OCU DP is only intended for installation in an enclosure installed in a restricted access location. The maximum input current at maximum load is 100 mA at −48 VDC.

Table 1. Compliance Codes

Code	Input	Output
Power Code (PC)	F	C
Telecommunication Code (TC)	–	X
Installation Code (IC)	A	–

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

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by ADTRAN could void the user's authority to operate this equipment.

INSTALLATION

C A U T I O N !
SUBJECT TO ELECTROSTATIC DAMAGE
OR DECREASE IN RELIABILITY.
HANDLING PRECAUTIONS REQUIRED.

After unpacking the TR OCU DP, inspect it for damage. If damage has occurred, file a claim with the carrier then contact ADTRAN Customer Service. Refer to "Appendix A, Warranty" for further information. If possible, keep the original shipping container to return the TR OCU DP for repair or for verification of shipping damage.

Shipping Contents

The contents include the following items:

- TR OCU DP Access Module
- *Total Reach OCU Data Port (*TR OCU DP*) Job Aid* (P/N 61292006L1-22)

CAUTION

Electrostatic discharge (ESD) can damage electronic modules. When handling modules, wear an antistatic discharge wrist strap to prevent damage to electronic components. Place modules in antistatic packing material when transporting or storing. When working on modules, always place them on an approved antistatic mat that is electrically grounded.

Instructions for Installing the Module

Installation assumes that the TR DDS-R is already installed. To install the TR OCU DP, perform the following steps:

1. Select DIP Switch **SW1** options as required (refer to "Circuit Board DIP Switch (SW1)" on page 6).

2. Select the desired data rate using the front panel DIP Switch (refer to "Circuit Board DIP Switch (SW1)").

3. Hold the TR OCU DP by the front panel while supporting the bottom edge of the module; align the module edges to fit in the lower and upper guide grooves for the access module slot.

4. Insert the module into the chassis. To do this, slide the module into the access module slot. Simultaneous thumb pressure at the top (above the **PWR** LED) and bottom (below the electrostatic caution symbol) of the module ensures that the module is firmly positioned against the backplane of the chassis.

   On power up, the TR OCU DP runs a power-up self-test and performs a synchronization phase during which all LEDs undergo an on/off sequence.

Synchronization and LED Indication

The TR OCU DP and TR DDS-R typically require 30 to 90 seconds to reach synchronization. Once synchronized, the **SYNC** LED turns green. All other LEDs remain off until network occurrences cause them to turn on. If the units cannot synchronize, examine the T/R pair for open (or short) circuit conditions or load coils. For more information, refer to "Troubleshooting" on page 15.

Front Panel LEDs

The TR OCU DP provides front panel LEDs to display status information. Table 2 lists the TR OCU DP LEDs and status descriptions.

Table 2. Front Panel LEDs

Label	Status		Description
SYNC	🟢	Green	Loop synchronized
	🔴	Red	Loop not synchronized
			(Red indicates that the is no synchronization between the TR OCU DP and the remote TR DDS-R; check for continuity, load coils, and other abnormal line conditions.)
LOOP OPEN	🔴	Red	No sealing current on local loop
			(Check for continuity and proper Total Reach DDS termination at remote end TR DDS-R.)
CRC	🔴	Red	Errors on the 2-wire loop
			(Check for abnormal loop conditions.)
QM DISC	🔴	Red	Quality Monitor Disconnect has occurred
NO DSU	🟡	Yellow	Customer DSU/CSU is not responding or installed, as determined by the TR DDS-R
NTWK LBK	🟡	Yellow	An OCU loopback toward the network exists at the TR OCU DP.
	✴	Flashing Yellow	A loopback toward the network exists at the TR DDS-R or a channel loopback at the CSU.
CUST LBK	🟡	Yellow	Loopback toward the customer exists at the TR OCU DP.
AP	🟢	Green	Unit has been remotely provisioned.
	✴	Flashing Green	Flashing: The remote control link is active. Push and hold the **LBK** button for five seconds to toggle between manual and remote provisioning.

Signal Pair

The TR OCU DP plugs directly into either a WECO-compatible D4 channel bank, AT&T SLC-96 terminal, or an ADTRAN ACT 1900/2300 channel bank. This requires no special wiring. The 2-wire loop uses the T/R (Tip and Ring) pair pins 24 and 51 of the D4 backplane. The Total Reach DDS system is not polarity sensitive.

Span Power

Span powering is accomplished using –130 VDC measured from Tip to Ring. Voltage measured from Ring to GND should indicate 0 V. Voltage measured from Tip to GND should indicate –130 VDC or less, depending on voltmeter impedance.

Circuit Board DIP Switch (SW1)

The circuit board DIP Switch (see Figure 3) is used to provision the TR OCU DP and is set prior to circuit board installation. Pushing the switches to the right (**ON**) enables the function. The functions of SW1 are shown in the Table 3 on page 7.
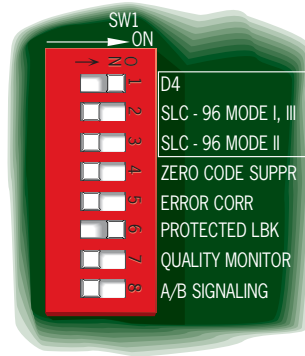
Figure 3. Circuit Board DIP Switch SW1 – Option Selection

Front Panel DIP Switch

The front panel DIP Switch (see Figure 4) is used to set the data rate. Pushing the switch to the left (**ON**) enables the function. The Secondary Channel (SC) cannot be selected if circuit is SW56 or 64 kbps. Only one data rate can be selected.

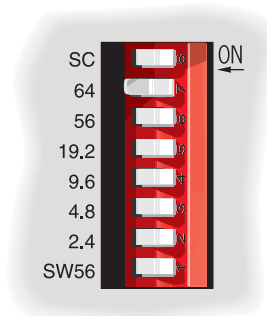### NOTE

If SW56 is selected, Error Correction must be **OFF**.

Figure 4. Front Panel DIP Switch – Rate Selection

Table 3. Circuit Board DIP Switch (SW1) Settings

Switch	Function	On/Off	Description
SW1-1	D4 Channel Bank (Default)	–	Selects the D4 Channel Bank type [1]
SW1-2	SLC 96 Mode I, III	–	Selects the SLC 96 Mode I, III Bank type [1]
SW1-3	SLC 96 Mode II	–	Selects the SLC 96 Mode II Bank type [1]
SW1-4	Zero Code Suppression	On	Ensures pulse density in T-carrier data stream for rates other than 64 kbps
		Off	Disabled for 64 kbps operation; Zero Code Suppression is automatically disabled for 64 kbps clear channel operation
SW1-5	Error Correction	On	Enables data integrity across the T-carrier system [2]
SW1-6	Protected Loopback	On	Enables Protected Loopback mode [3] For more information refer to "Latching Loopback" on page 7.
SW1-7	Quality Monitor	On	Enables the TR OCU DP to monitor the incoming 4-wire loop and 4-wire customer interface data for errors. If excessive errors are detected, the unit blocks the customer's data transmission and sends an abnormal station code (ASC) to the network. Customer data transmission is automatically restored when the trouble condition is cleared.
SW1-8	A/B Signaling	On	Enables the TR OCU DP to determine the state of the A and B signaling bits using signals present on the backplane on the channel bank. This method assumes that proper signaling has been maintained throughout the network tandems and cross connect systems.
		Off	Enables the TR OCU DP to derive signaling from the incoming data stream. [4]

1. Note: Only one bank type can be selected or selection defaults to D4.
2. Error Correction at data rates of 56 kbps and 64 kbps requires two DS0 time slots for data and error-correcting parity bytes. When SW56 is enabled on the front panel DIP switch, Error Correction should remain in the OFF position.
3. Latching Loopback is always enabled except when temporarily disabled using the protected loopback features.
4. The A/B signaling option is only applicable when SW56 is selected on the front panel DIP Switch; otherwise it is a "don't care."

Latching Loopback

Latching Loopback is always enabled except when temporarily disabled using the protected loopback features.

When a data rate of 64 kbps is enabled, placing **SW1-6** to **OFF** permits the TR OCU DP to respond to the legacy latching loopback sequence, as described in TR62310 and ANSI T1.107. With a data rate of 64 kbps, with **SW1-6 ON**, the TR OCU DP will enable the ADTRAN "Protected Loopback" mode.

False Loopback Immunity

The ADTRAN Protected Loopback family of channel units includes an algorithm compatible with SARTS®, Hekimian®, TPI®, and other test systems that virtually eliminates false latching loopbacks. Immunity is automatically enabled at a data rate of 64 kbps. Additionally, the ADTRAN Protected Loopback family features a "Protected Loopback" mode for further false latching loopback protection.

Protected Loopback

The ADTRAN Protected Loopback supports the DDS latching loopback standard in T1E1.2/99-007R1. When protected loopback is enabled, the TR OCU DP responds to latching loopback when the idle code preamble is sent prior to the latching loopback sequence specified in TR62310 and ANSI T1.107. Protected loopback prevents false latching loopbacks when the loopback sequence is embedded in customer payload data. Test equipment should support T1E1.2/99-007R1 to perform testing at a data rate of 64 kbps when protected loopback is enabled. Refer to Table 4 for the latching loopback sequence requirement when protected loopback is enabled.

**Table 4. Protected Loopback Mode Requirement T1E1.2/99-007R1
(Latching Loopback)**

Sequence Function	Byte Code	Number of Received Bytes
Exit data protocol	Idle - 11111110	Minimum of 35 Idle bytes
Clear existing loopbacks	Transition in progress (TIP) X0111010	Minimum of 35 TIP bytes
Identify device to be looped	Loopback select code (LSC) X1010101 - OCU X0110001 - CSU X1000001 - NEI	Minimum of 35 LSC bytes
Prepare to loop; send MAP code after 30 bytes	Loopback enabled (LBE) X1010110	Minimum of 100 LBE bytes
Activate loopback	Far-End voice (FEV) X1011010	Minimum of 32 FEV bytes

Note: Minimum of 35 TIP bytes required to disable established latching loopback.
Note: X = Don't care bit

TESTING

Testing for the TR OCU DP is accomplished using the same test procedures for 4-wire OCU DP units. Table 5 describes cable loss for the Total Reach DDS Nyquist frequency of 13.3 kHz. The TR OCU DP is equipped with logic level bantam test access jacks that permit testing in both directions using a portable test set. Latching OCU DP loopback sequences are supported.

Choose NEAR to test toward the customer loop; choose FAR to test toward the T-carrier.

- In the FAR direction, an OCU DP loopback sequence will loop the unit across the T-carrier system.

- In the NEAR direction, an OCU DP loopback sequence will loop the unit directly connected to the portable test set.

Latching and alternating OCU and CSU loopback sequences are supported. Alternating loopbacks do not operate when the a data rate of 64 kbps is selected.

NOTE

If a data rate of 64 kbps is selected, the unit will only respond to latching loopback sequences. Alternating sequences are not valid at this rate.

Table 5. Cable Type and Temperature Loss Data at 13.3 kHz

Plastic Cable	dB Loss/kft	Paper Cable	dB Loss/kft
19 Gauge PIC (0°F) 19 Gauge PIC (70°F) 19 Gauge PIC (120°F)	0.5302 0.6083 0.6610	19 Gauge PULP (0°F) 19 Gauge PULP (70°F) 19 Gauge PULP (120°F)	0.5616 0.6415 0.6955
22 Gauge PIC (0°F) 22 Gauge PIC (70°F) 22 Gauge PIC (120°F)	0.912 1.0258 1.1015	22 Gauge PULP (0°F) 22 Gauge PULP (70°F) 22 Gauge PULP (120°F)	0.9454 1.0606 1.1370
24 Gauge PIC (0°F) 24 Gauge PIC (70°F) 24 Gauge PIC (120°F)	1.2571 1.3982 1.4917	24 Gauge PULP (0°F) 24 Gauge PULP (70°F) 24 Gauge PULP (120°F)	1.2900 1.4324 1.5268
26 Gauge PIC (0°F) 26 Gauge PIC (70°F) 26 Gauge PIC (120°F)	1.6751 1.8469 1.9608	26 Gauge PULP (0°F) 26 Gauge PULP (70°F) 26 Gauge PULP (120°F)	1.6823 1.8568 1.9718

Dual Function LBK Button

The TR OCU DP front panel loopback pushbutton (**LBK**) allows loopbacks to be activated without test equipment or centralized test coordination.

- Pressing the **LBK** button once loops the TR DDS-R toward the network.

- Pressing the **LBK** button during an active loopback releases any loopbacks in the Total Reach system.

- Pressing and holding the **LBK** button for five seconds toggles between local and alternate (remotely-provisioned) option settings.

Loopback LED Operation

The TR OCU DP system loopback status is indicated by the front panel **NTWK LBK** and **CUST LBK** LEDs. An active loopback occurring at the unit being viewed is indicated by a solid loopback LED. A flashing loopback LED indicates a loopback condition at the remote unit. When a loopback toward the network is initiated, the **NTWK LBK** LED is illuminated. A loopback generated toward the customer illuminates the **CUST LBK** LED.

TR OCU DP Bidirectional Loopback Support

The TR OCU DP will execute a bidirectional loopback when performing an OCU DP loopback at the TR OCU DP. This allows a standard portable DDS test set, connected to the 4-wire customer interface of the TR DDS-R, to verify the integrity of the 4-wire loop by transmitting a test pattern and examining the returning data for synchronization and errors. The TR OCU DP **NTWK LBK** and **CUST LBK** indicators illuminate during a TR OCU DP bidirectional loopback.

Refer to Figure 5 for an illustration of the bidirectional loopback. The latching and alternating loopback sequences are defined in Table 6 and Table 7.

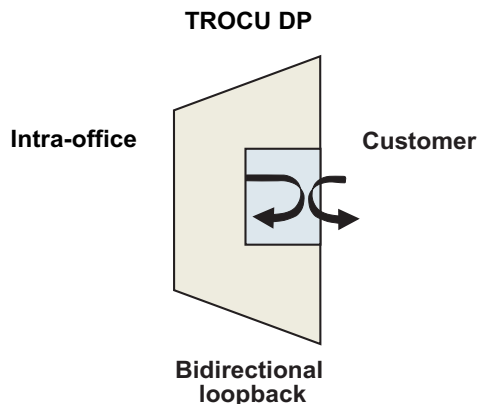**Figure 5. OCU DP Bidirectional Loopback**

Table 6. Latching Loopback Activation

Sequence Function	Byte Code	Number of Received Bytes
Clear existing loopbacks	Transition in progress (TIP) X0111010	Minimum of 35 TIP bytes
Identify device to be looped	Loopback select code (LSC) X1010101 - OCU X0110001 - CSU X1000001 - NEI	Minimum of 35 LSC bytes
Prepare to loop; send MAP code after 30 bytes	Loopback enabled (LBE) X1010110	Minimum of 100 LBE bytes
Activate loopback	Far-End voice (FEV) X1011010	Minimum of 32 FEV bytes

Note: Minimum of 35 TIP bytes required to disable established latching loopback.

Table 7. Alternating Loopback Activation Sequence

Sequence Function	Received Bytes
Active loopback	Four consecutive bytes of specified loopback code X0101010 - OCU X0101000 - CSU X0101100 - DSU
Maintain loopback and test for bit errors	Data byte alternating with loopback code Example: XDDDDDD1/X0101010
Clear loopback	Four consecutive data bytes without alternating loopback code

Note: X = Don't Care bit

Remote End Initiated LBK Tests

The TR OCU DP supports loopbacks generated from the TR DDS-R, which allow testing to be performed without coordination with the central office (CO) or test center. Loopbacks initiated by the TR DDS-R front panel **LBK** pushbutton aid in system turnup testing or troubleshooting from the remote end. The TR OCU DP responds to a loopback command initiated at the TR DDS-R as follows:

- Pressing the TR DDS-R **LBK** pushbutton once initiates a loopback at the TR OCU DP toward the customer. Refer to Figure 6. This allows data to be sent from the remote end to test the local loop and the TR DDS-R. This loopback is indicated by a flashing **CUST** LED on the TR DDS-R and a solid **CUST** LED on the TR OCU DP.

- Pressing the **LBK** pushbutton a second time initiates a loopback at the TR DDS-R toward the 4-wire DDS (CPE) interface. Refer to Figure 7. A solid **CUST LBK** LED on the TR DDS-R indicates a loopback at the TR DDS-R toward the customer equipment.

- Pressing the TR DDS-R **LBK** pushbutton a third time disables all current latching loopbacks.

If errors exist, the loopbacks can help determine the source, either the local loop or the TR DDS-R. During a remote end initiated loopback, the Total Reach system transmits ASC (9Eh) toward the network, indicating an out-of-service condition generated by the remote end, as shown in Figure 6 and Figure 7.

All Total Reach system latching loopbacks, whether initiated by a **LBK** pushbutton, CO, or from a remote Test Center, can be released by sending 35 DDS loop down TIP bytes <X0111010> (where X is a "don't care" bit). All existing latching loopbacks can also be disabled by pressing the **LBK** pushbutton on the CO or remote unit.
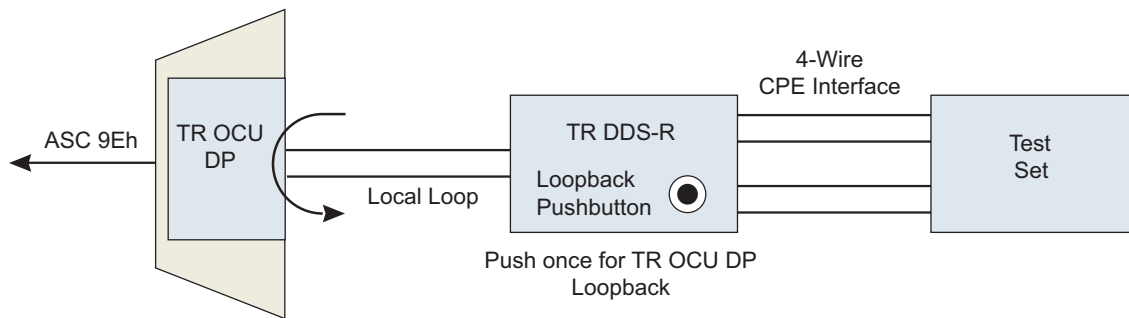

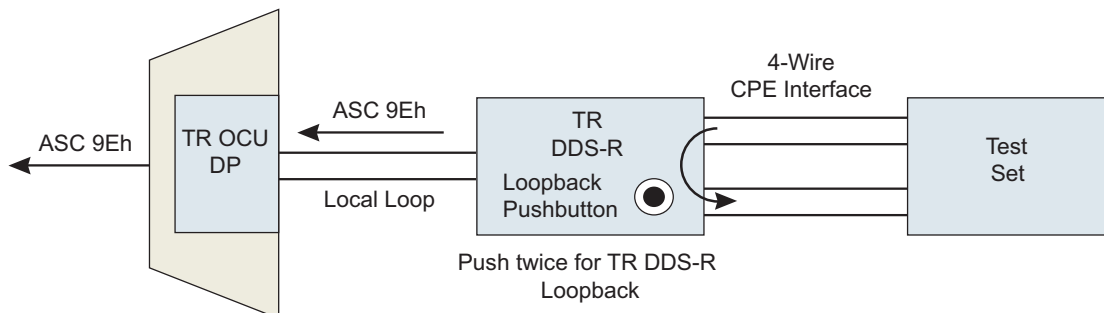**Figure 6. TR DDS-R Remote End Initiated Loopback, Local Loop**

Figure 7. TR DDS-R Remote End Initiated Loopback, Customer Loop

Latching Loopback Time out

Latching loopbacks created by either the **LBK** pushbutton on the TR OCU DP or the TR DDS-R automatically release after 120 minutes, returning the system to normal operation.

Remote Provisioning and Diagnostics Control Protocol

Remote access to provisioning and status information is accomplished using the ADTRAN Digital System 6 Message protocol, as defined in the *Control and Diagnostic Procedures Practice,* Section 6032991-6. Digital System 6 is supported by the TPI 108/109 and 105 portable test sets and is supported by the Hekimian React 2001 Release 1.900 remote test system. The Total Reach DDS network elements comply with ANSI T1.107-1995, "*Digital Hierarchy Format Specifications Annex G,*" which allows remote provisioning, querying, and performance monitoring using in-band control of network elements.

NOTE

The REACT 2001 GUI software Release 1.900 supports ANSI T1.107-1995. Remote access is accomplished using a defined set of in-band DS0 byte sequences similar to the latching loopback sequence. Commands issued through the test system are recognized by the individual channel unit, which responds with the appropriate byte sequences. These in-band commands can be used to verify options by way of dialogs with REACT 2001, TPI 105, and TPI 108/109 test sets. Unit CLEI, serial number, provisioning, and performance information can be retrieved remotely using the Digital System 6 protocol.

Provisioning and Status

All configuration options can be remotely viewed or provisioned. The front panel **AP** LED flashes during control link establishment and remains **ON** after the TR OCU DP has been remotely provisioned. If the TR OCU DP has been remotely provisioned, the operator can alternate between remote configuration and manual switch settings by depressing the front panel **LBK** pushbutton for five seconds. If the TR OCU DP is removed from the system, the unit retains previous provisioning information in nonvolatile RAM. The **AP** LED remains **ON** when the TR OCU DP is operating based on remote provisioning, and is **OFF** when operating on manual switch settings. Refer to Table 2 on page 5 for LED indicators.

DEPLOYMENT GUIDELINES

The TR OCU DP and TR DDS-R use technology intended to eliminate the need for repeaters and concerns over impairments caused by typical noise and bridged tap. Listed below are the loop design guidelines for Total Reach DDS (Refer to Table 5 on page 9 and Table 8 for more information).

- All loops must be nonloaded.
- Actual Measured Loss (AML) should not exceed 50 dB at 13.3 kHz (135-ohm termination), the Nyquist frequency of Total Reach DDS.

NOTE

The 50 dB AML limit includes 6 dB of signal margin to account for potential near-end cross talk (NEXT) from other digital services that may be provisioned in the same binder group.

- Loop length should not exceed 50 kft.
- Bridged tap length should not exceed 12 kft.
- Background noise level should not exceed 34 dBrn.
- Impulse noise should not exceed –40 dBm, (+50 dBrn).

NOTE

Measure noise with 50-kbit weighting characteristic approximating a filter with a passband of 40 Hz to 30 kHz. Background noise level or impulse noise level is referenced from data rates of 56/64 kbps in TR6210.

Table 8. Total Reach DDS Insertion Loss Measurements

Line Configuration	13.3 kHz	28 kHz
27 kft 26 AWG	50.12 dB	65.35 dB
36.25 kft 24 AWG	50.00 dB	62.50 dB
50 kft 22 AWG	50.24 dB	59.33 dB

MAINTENANCE

The TR OCU DP does not require routine maintenance for normal operation. Do not attempt repairs in the field. Repair services can be obtained by returning the defective unit to ADTRAN. For more information, refer to the "Appendix A, Warranty" section for further information.

TROUBLESHOOTING

Follow the steps in Table 9 to troubleshoot the installation of the TR OCU DP.

Table 9. Troubleshooting Table

Problem	Possible Solution
No power at the TR DDS-R	• Ensure the TR OCU DP is supplying the necessary voltage to power the TR DDS-R. Measure tip/ring voltage at the frame (tip to ground should be –130 VDC or less depending on input voltmeter impedance; tip to ring should be –125 VDC to –130 VDC; ring to ground should be 0 VDC). The Total Reach DDS system is not polarity sensitive. • Measure tip/ring voltage at the TR DDS-R. If voltage is not present, check the continuity of the cable pair. If voltage is measured at the TR DDS-R, replace the unit. The TR DDS-R does not invoke a measurable short between tip/ring, thus cable resistance measurements must be made with a manually applied short, and the Total Reach elements removed.
Power, but no synchronization	• Check the cable for load coils. • Note the signal meter reading on the TR DDS-R during power up and the synchronization process. Refer to "Signal Loss Indication" on the applicable TR DDS-R job aid for definitions. Loop loss can be too great for synchronization to occur. • Ensure loop length is within allowable deployment guidelines. • Relocate the TR DDS-R to splice points sequentially closer to the TR OCU DP to isolate suspect cable sections.
Excessive errors on loop	• Measure the background noise; ensure that it does not exceed 34 dBrn. • Using a 50 kb filter, ensure that the impulse noise is not greater than –40 dBm (+50 dBrn). • Compare resistances of individual conductors. If different, high-resistance or intermittent opens could be indicated.
Trouble codes	• The TR OCU DP transmits an ASC (9Eh) trouble code toward the network under the following fault conditions: 2-wire DSL loss of signal; Loss of synchronization; Open loop. • The TR DDS-R transmits an ASC (9Eh) trouble code toward the network from the customer premises for similar 4-wire customer interface fault conditions. • ASC (9Eh) is transmitted to the network during loopback conditions initiated by the TR DDS-R.

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Appendix A
Warranty

WARRANTY AND CUSTOMER SERVICE

ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found at www.adtran.com/warranty.

Refer to the following subsections for sales, support, Customer and Product Service (CAPS) requests, or further information.

ADTRAN Sales

Pricing/Availability:

800-827-0807

ADTRAN Technical Support

Pre-Sales Applications/Post-Sales Technical Assistance:

800-726-8663

Standard hours: Monday - Friday, 7 a.m. - 7 p.m. CST
Emergency hours: 7 days/week, 24 hours/day

ADTRAN Repair/CAPS

Return for Repair/Upgrade:

(256) 963-8722

Repair and Return Address

Contact CAPS prior to returning equipment to ADTRAN.

ADTRAN, Inc.
CAPS Department
901 Explorer Boulevard
Huntsville, Alabama 35806-2807

ADTRAN

Carrier Networks Division
901 Explorer Blvd.
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