



CAUTION!
 SUBJECT TO ELECTROSTATIC DAMAGE
 OR DECREASE IN RELIABILITY.
 HANDLING PRECAUTIONS REQUIRED.

Model ADTRAN DE-4 U-BR1TE LI ISDN 2B1Q Interface for Northern Telecom Channel Banks Installation and Maintenance

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1. GENERAL

This practice provides installation and maintenance information for the DE-4 U-BR1TE II L2, part number 1410020L2, and the DE-4 U-BR1TE II w/PWR L4, part number 1410020L4. **Figure 1** is an illustration of the DE-4 U-BR1TE II.

The DE-4 U-BR1TE II L2 and L4 are line cards designed to operate with the Northern Telecom DE-3/4/4E and DE-4E SMART channel banks. Both lists of the DE-4 U-BR1TE provide an ISDN U-interface allowing transportation of Basic Rate ISDN (2B+D) over T1 carriers. This allows ISDN service to be extended beyond the normal servicing range (18 kft) of an ISDN ready switch. Either list of the DE-4 U-BR1TE 2nd Generation may be used in the Central Office Terminal (COT) location and in the Remote Terminal (RT) location. Each list of the DE-4 U-BR1TE plugs into a single physical slot but requires up to three consecutive time slots when configured for 2B+D. Block error rate (BER) performance over the T1 facility is monitored and available to the network.

The DE-4 U-BR1TE II w/PWR L4 provides an ISDN 2B1Q U-interface that will supply 43 mA to span power an ADTRAN ISDN U-Repeater II or U-Repeater III.

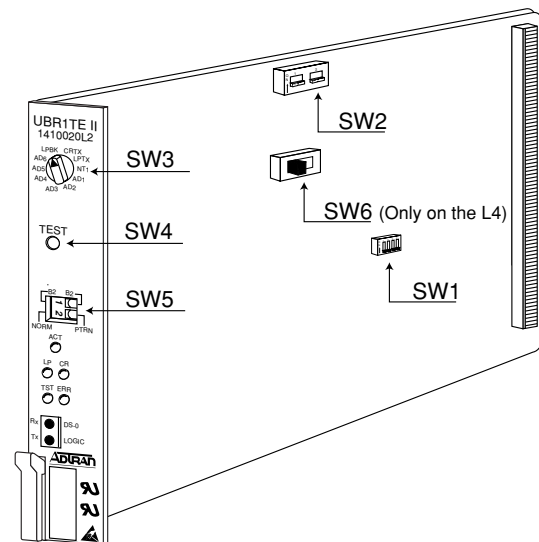


Figure 1. DE-4 U-BR1TE II

Each list of the DE-4 U-BR1TE are interchangeable with the Northern Telecom ISDN Channel Unit (NT4S10AA) however, provisioning using the DE-4E Smart Transmit/Receive Unit (STRU) interface is not supported. Features of the DE-4 U-BR1TE L2 and L4 include:

- ISDN 2B1Q interface meets all Layer 1 requirements as specified in ANSI T1.601-1992.
- Transports ISDN Basic Rate 2B+D information over T1 facilities in the 3-DS0 format per TR-NWT-000397.
- 18 kft nominal range on mixed gauge wire (42 dB @ 40 kHz loop loss, 1300 Ω DC resistance).
- Respond to all Layer 1 maintenance functions.
- Performance monitoring of the Layer 1 facility as specified in TR-NWT-000397.
- Distinctive metallic DC test signature to identify either line unit LT or line unit NT mode of operation.
- B1 and B2 addressability at the faceplate for a local loopback, the NT1, and up to six devices in the network-to-customer direction.

- DS0 logic level transmit and receive data access through faceplate bantam jacks.
- Faceplate LEDs indicate operational and test status.

Additional features to the L4 include:

- Provides repeater power of 43 mA at -28 to -120 VDC.

Each list of the DE-4 U-BR1TE has two interfaces. The loop-side interface is an ISDN U-interface that transmits and receives data simultaneous. Full-duplex over a standard 2-wire and unloaded loop for a distance up to 18 kft of mixed gauge wire. Either DE-4 U-BR1TE list can be configured to connect to an ISDN switch, (Adjacent-to-Switch), the customer NT1 (Adjacent-to-Customer), another U-BR1TE (Tandem Office Mode), or Adjacent to an ADTRAN U-RPM/U-repeater. See **Figure 2** for circuit location description. The carrier side interface provides mapping of up to 2B+D and DSL overhead to three DS0s of the 1.544 Mbps T1 stream. Indicators for the loop and carrier synchronization status are located on the faceplate. See **Table A** for a description of each indicator. Connection to the U-interface is made to Tip/Ring of the physical shelf slot position of the U-BR1TE.

2. INSTALLATION

After unpacking the unit, immediately inspect it for possible shipping damage. If damage is discovered, file a claim immediately with the carrier, then contact ADTRAN Customer Service (See **Warranty and Customer Service**).

The DE-4 U-BR1TE plugs into a single shelf slot position of an DE-3/4/4E or DE-4E SMART channel bank and requires no special wiring. Connection to the U-interface is made to Tip/Ring (T/R) of the physical shelf slot position when the U-BR1TE is installed. The type of the service selected can affect the adjacent shelf slots. When configured for 2B+D mode of operation, which is the most typical application, three timeslots are required. The timeslots used are the first slot position the DE-4 U-BR1TE is installed in, and the next two adjacent shelf slot position, which must be empty. In the 2B+D mode of operation, the DE-4 U-BR1TE cannot be located in J23 or J24. In 1B+D or 2B modes of operation, only one adjacent shelf slot position is required, therefore, J24 cannot be used. In 1B and D modes of operation, only the physical time slot of the shelf slot position is required, and there are no restrictions.

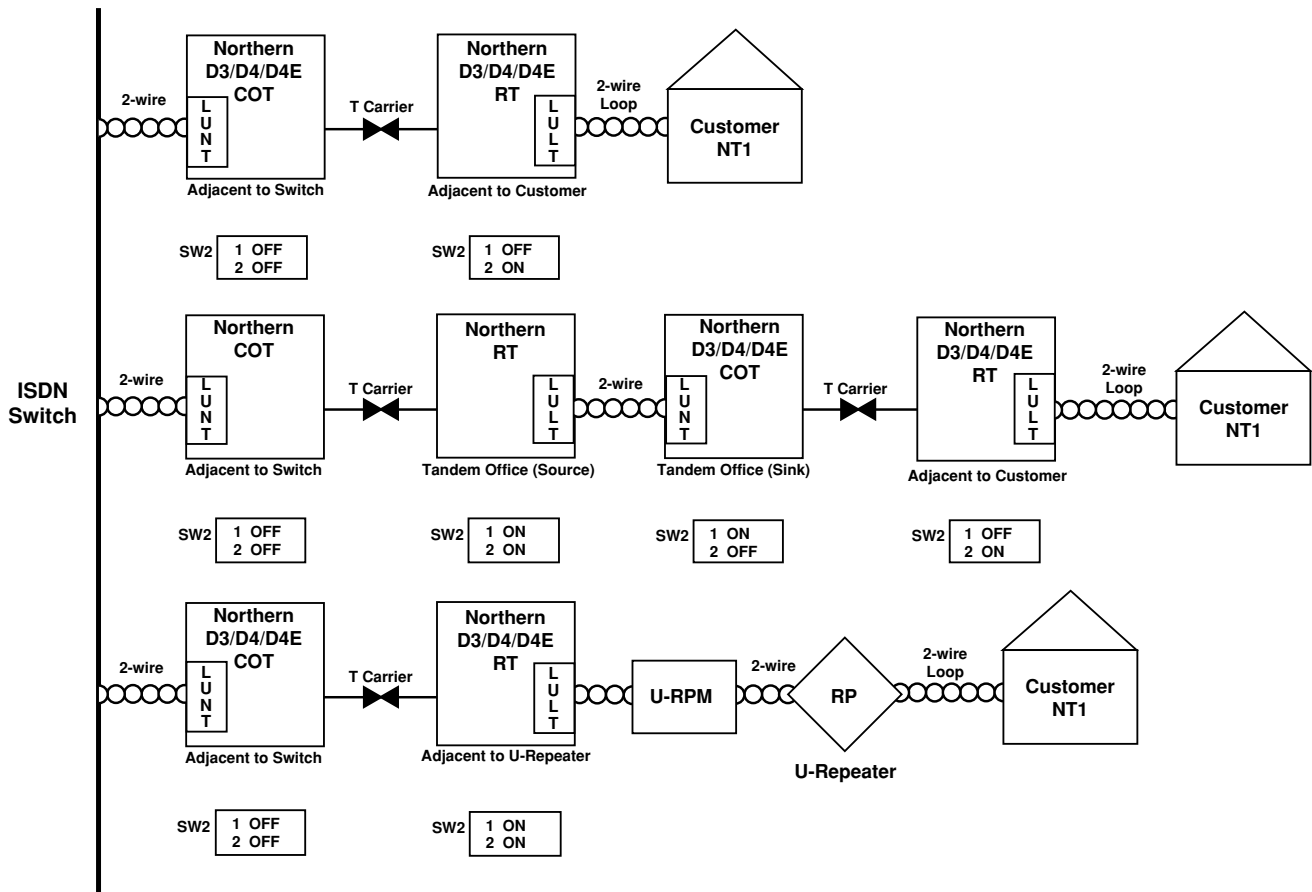


Figure 2. Position Switch Settings at Network Locations

Table A. Faceplate LED Indicators

Indicator	Color	Description
Loop (LP)	Yellow	OFF during normal operation or test modes, indicates no Near-End Block Errors (NEBE) or Far-End Block Errors (FEBE) are detected from the U-interface loop. Flashes yellow upon receipt of a NEBE or FEBE. During Local Performance Monitoring (see Section 4) will flash yellow when a BER > 10 ⁻⁶ is detected and illuminate yellow when a BER > 10 ⁻⁵ is detected.
Carrier (CR)	Yellow	OFF during normal operation or test modes, indicates no NEBEs or FEBEs are detected from the carrier. Flashes yellow upon receipt of a NEBE or FEBE. During Local Performance Monitoring (see Section 4) will flash yellow when a BER > 10 ⁻⁶ is detected and illuminate yellow when a BER > 10 ⁻⁵ is detected.
Loop Sync (LP)	Red	Illuminated when U-interface is out of sync or has a loss of signal. OFF indicates loop synchronization has been established.
Carrier Sync (CR)	Red	Illuminated when no framing pattern (TR-TSY-000397 compliant) is received. OFF indicates carrier synchronization has been established.
Activation (ACT)	Green	Illuminated when Layer 1 is established from the ISDN switch to the customer ISDN terminal equipment.
Test (TST)	Yellow	Solid yellow when front panel test has been successfully initiated or when responding to a 2B+D loopback request. Flashes yellow once every two seconds when responding to a B1 loopback request or when forced into a B1 loopback from the front panel. Flashes yellow twice every two seconds when responding to a B2 loopback request or when forced in to a B2 loopback from the front panel.
	Green	Solid Green when in Local Performance Monitoring or when the local test pattern gen/det is invoked.
Error (ERR)	Red	Flashes red when errors are seen by local test pattern detector.

When the DE-4 U-BR1TE is deployed in a channel bank located at the same facility as the ISDN servicing switch (Adjacent-to-Switch) or in a tandem Office configuration, the channel bank should be provisioned for external timing. External timing from a suitable composite clock must have Stratum One traceability. When deployed in a remote terminal (Adjacent-to-Customer), the timing for that channel bank may either be loop-timed (LP) or timed from an external source. Consult local provisioning documents for timing options.

3. CONFIGURATION

There are several switch settings on SW1 that must be configured before installing the DE-4 U-BR1TE. **Figures 1 and 3** identify the location of SW1 and its switch settings. **Table B** describes the settings for determining the appropriate switch positions. **Figure 2** displays a typical circuit position and associated switch settings.

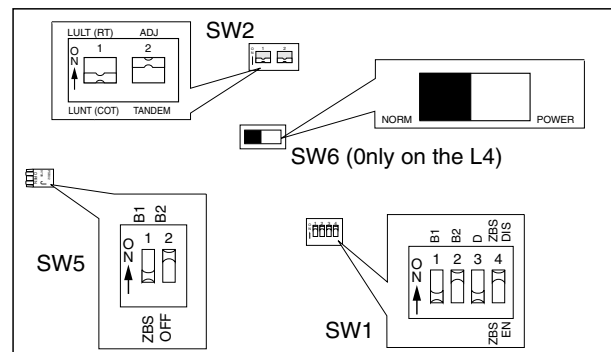


Figure 3. SW1, SW2, and SW6 Labeling

Table B. SW1, SW2, and SW6 Option Settings

SWITCH	LABEL	FUNCTION	DESCRIPTION																																				
SW1-1 SW1-2 SW1-3	B1 B2 D	Service Level Selection	<p>Selects the service level. The DE-4 U-BR1TE II may be optioned to deliver full ISDN (2B+D) or any other level of service.</p> <table border="0"> <thead> <tr> <th></th> <th>SW1-1</th> <th>SW1-2</th> <th>SW1-3</th> </tr> <tr> <th><u>Service Option</u></th> <th><u>B1</u></th> <th><u>B2</u></th> <th><u>D</u></th> </tr> </thead> <tbody> <tr> <td>2B+D</td> <td>On</td> <td>On</td> <td>On</td> </tr> <tr> <td>2B</td> <td>On</td> <td>On</td> <td>Off</td> </tr> <tr> <td>B1+D</td> <td>On</td> <td>Off</td> <td>On</td> </tr> <tr> <td>B2+D</td> <td>Off</td> <td>On</td> <td>On</td> </tr> <tr> <td>B1</td> <td>On</td> <td>Off</td> <td>Off</td> </tr> <tr> <td>B2</td> <td>Off</td> <td>On</td> <td>Off</td> </tr> <tr> <td>D</td> <td>Off</td> <td>Off</td> <td>On</td> </tr> </tbody> </table>		SW1-1	SW1-2	SW1-3	<u>Service Option</u>	<u>B1</u>	<u>B2</u>	<u>D</u>	2B+D	On	On	On	2B	On	On	Off	B1+D	On	Off	On	B2+D	Off	On	On	B1	On	Off	Off	B2	Off	On	Off	D	Off	Off	On
	SW1-1	SW1-2	SW1-3																																				
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2B+D	On	On	On																																				
2B	On	On	Off																																				
B1+D	On	Off	On																																				
B2+D	Off	On	On																																				
B1	On	Off	Off																																				
B2	Off	On	Off																																				
D	Off	Off	On																																				
SW 1-4		Zero Byte Substitution	<p>The ZBS option must be set the same for the COT and RT. SW1-4 should be set toward "ZBS EN" for AMI-provisioned carriers. The switch setting is optional for B8ZS-provisioned carriers. Consult local provisioning guidelines.</p>																																				
On Off	ZBS DIS ZBS EN	Disables ZBS Enables ZBS																																					
SW 2-1		Termination Mode	<p>This switch should be set toward "LULT" when the unit is installed as Adjacent-to U-Repeater, Adjacent-to-Customer, or Tandem Office Source configuration. This switch should be set toward "LUNT" for Adjacent-to-Switch and Tandem Office Sink configurations.</p>																																				
On Off	LULT(RT) LUNT(COT)	LULT mode (RT typical) LUNT mode (COT typical)																																					
SW 2-2		<p><i>Function dependent upon SW2-1 setting in non-powering configuration. Function is not applicable in powering configuration (SW6 to Power).</i></p>																																					
On Off	ADJ TANDEM	<p>LULT Mode (SW2-1 On) DC sealing current provided DC sealing current not provided</p>	<p>In the LULT(RT) mode, SW2-2 controls sealing current. When used in an Adjacent-to-Customer configuration, sealing current should be provided (SW2-2 On). In a Tandem Office Source, sealing current is <i>not</i> required, and should be disabled (SW2-2 Off).</p> <p>In the LUNT(COT) mode, SW2-2 controls periodic wake-up tone. Periodic wake-up tones should be disabled when located in an Adjacent-to-Switch location (SW2-2 On). Periodic wake-up tones are required (SW2-2 Off) when located in a Tandem Office Sink configuration, or when adjacent to a device requiring wake-up tones, such as a Newbridge® switch.</p>																																				
On Off	ADJ TANDEM	<p>LUNT Mode (SW2-1 Off) Periodic wake-up tone not provided Periodic wake-up tone provided</p>																																					
SW6*	NORM POWER	Normal Powering provided toward the customer U-interface.	<p>No powering provided toward the customer U-interface.</p> <p>Automatically determines which of the following modes of operation is appropriate:</p> <ul style="list-style-type: none"> Supply a constant 43 mA to power an ADTRAN ISDN U-Repeater II or U-Repeater III. 																																				
<p>Note: Power option should only be used in the LULT (RT) configuration</p>																																							
<p>* Applies to the DE-4 U-BR1TE II w/PWR, L4</p>																																							

CAUTION: Do not use the power option (SW6 – POWER) unless this product is connected to an ISDN repeater, or IDSL OCU-R that is not locally powered.

4. TESTING

The DE-4 U-BR1TE responds to the B1, B2 and 2B+D loopbacks as specified in TR-NWT-000397. This allows an upstream network element, such as the ISDN switch, U-BR1TE, or U-interface testers to initiate industry standard *EOC* loopbacks. The faceplate can aid in circuit turn-up and, in case of equipment malfunction, sectionalize the network fault. For local test access, a DS0 logic tester (equivalent to a TPI 108/109) can be used along with the ten position Address Select Knob, TEST pushbutton, and B1/B2 switches to perform local and downstream loopbacks. See **Figures 1** and **4** for location identification. In addition, non-intrusive local performance monitoring information is available through the faceplate LEDs. The faceplate LEDs provide the U-BR1TE operational and test status indications.

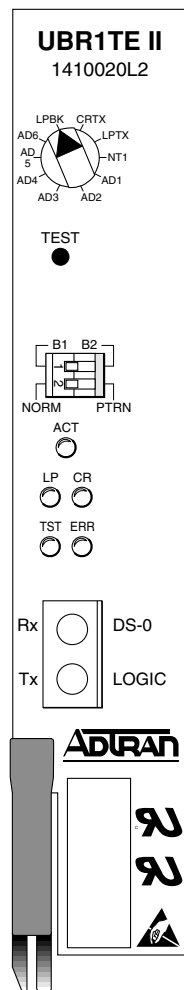


Figure 4. U-BR1TE II Faceplate

Loopbacks in the network-to-customer direction can be initiated from the faceplate of the DE-4 U-BR1TE. Faceplate initiated loopbacks are unobtrusive to unused channels. Loopback on a single B channel will not interrupt the other channels. The 2B+D loopback is service affecting for the customer.

Faceplate indicators display the various conditions occurring with respect to the DE-4 U-BR1TE. **Table A** lists the faceplate indicators and their error messages.

The ten position rotary Address Select Knob (SW1) determines which downstream network element is to be looped. See **Figure 1** for switch location and **Table C** for setting descriptions.

Table C. Rotary Switch Options

DISPLAY	INTERPRETATION
AD1	Address #1, address of this unit
AD2	Address #2, the next downstream unit away
AD3	Address #3, the second unit downstream
AD4	Address #4, the third unit downstream
AD5	Address #5, the fourth unit downstream
AD6	Address #6, the fifth unit downstream
LPBK	Loopback, forces this unit to loopback either B1/B2 from the front panel. Loopbacks occur in both the customer and network directions.
CRTX	Carrier transmit, in the carrier direction
LPTX	Loop transmit, in the loop direction
NT1	NT1, address of the NT1

Selecting the B1/B2 DIP switch (SW5-1) sets the bearer channel. The NORM/PTRN switch (SW5-2) selects between normal and internal 2047 pattern generator local test. The Test pushbutton (SW4) activates and deactivates the test. See **Figures 1** and **4** for switch locations.

The following describes local test access testing for local or remote loopbacks.

1. Connect the DS0 tester configured for Near Logic to the Rx/Tx Bantam jack, and the clock cord to the Timing Supply unit.
2. Using the ten position rotary Address Select Knob (SW-3), select the desired address of the downstream unit to be tested. See **Table C** for address information.
3. Select the appropriate bearer channel using the B1/B2 DIP switch (SW5-1).
4. To activate the loopback test, press the TEST pushbutton (SW4).
5. Upon completion of the test, select another address using the ten position rotary switch, or another B channel (SW5-1).

6. Upon completion of all testing, press the TEST pushbutton (SW4) and remove the DS0 tester from the Bantam jack.

Local performance monitoring provides a non-intrusive method for local craftspersons to observe an accumulative Bit Error Rate (BER). Local performance information is available simultaneously for both the loop and carrier side. The BER is calculated every minute and will display the average BER for the previous six minutes using the LP and CR LEDs. See Table B for associated LED indications. The following describes the test configuration for local performance monitoring.

NOTE

DO NOT use a DS0 Logic tester.

1. Select AD1 on the ten position rotary Address Select Knob (SW3).
2. Press the TEST pushbutton (SW4).
3. Observe the LP and CR LEDs for BER information. LEDs will normally be off with no errors present. LEDs will flash yellow when a BER $> 10^{-6}$ is detected and illuminate yellow when a BER $> 10^{-5}$ is detected.
5. Upon completion of monitoring, press the TEST pushbutton (SW4).

5. WARRANTY AND CUSTOMER SERVICE

ADTRAN will replace or repair this product within ten (10) years from the date of shipment if this product does not meet its published specifications or if it fails while in service. For detailed warranty, repair, and return information, refer to the ADTRAN U.S. and Canada Carrier Networks Equipment Warranty, document 60000087-10.

Return material Authorization (RMA) is required prior to returning equipment to ADTRAN. ADTRAN does not recommend that repairs be performed in the field.

For Service, RMA requests, or further information, contact one of the following numbers:

ADTRAN Customer Service:

ADTRAN Technical Support (Post-Sales)

(Have unit serial number available) (800) 726-8663

Standard Support hours: Monday-Friday
7am-7 pm CST

Emergency Support: 7 days/week, 24 hours/day

Sales (800) 827-0807

RMA (Repair Service) (205) 963-8722

Repair and Return Address:

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

Table D. Specifications

Input/Output Signal				
Line:	2-wire (tip/ring)			
Operating Mode:	Full Duplex			
Data rate:	160 kbps; 144 Kbps available to customer			
Signal Format:	2B1Q			
Faceplate Indicators				
LP (Loop Sync)	Red	U-interface is out of sync		
LP (Loop CRC)	Yellow	Loop side NEBE or FEBE		
CR (Carrier Sync)	Red	No Framing pattern being received		
CR (CarrierCRC)	Yellow	Carrier side NEBE or FEBE		
ACT (Active)	Green	Layer 1 established		
TST (Remote Loopback)	Yellow	Downstream has responded to loopback request		
	Green	Responding to a loopback request from an upstream unit		
Power				
	L2		L4*	
Voltage:	-48 V	5 V	-48V	5V
Current:	30 mA	60 mA	118mA	65mA
On card dissipation:	2 W maximum		4 W maximum	
Sealing Current				
Constant:	6-8 mA constant			
Repeater Powering Current*				
Constant:	43mA constant			
Dimensions				
Height:	6.2 in.			
Width:	10.0 in.			
Depth:	1.15 in.			
Weight:	16.0 oz.			
Mounting:	Mounts in a Northern Telecom DE-3, DE-4, DE-4E, and DE-4E Smart channel banks			
Operating Environment				
Temperature:	0° - 55° C (32° - 131° F)			
Humidity:	To 95%, non-condensation			
*Applies to the DE-4 U-BR1TE II w/PWR, L4				