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

Section 61103.020L4-5A
Issue 1, March 1997
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MODEL U-BR1TE III W/PWR ISDN 2B1Q INTERFACE INSTALLATION/MAINTENANCE

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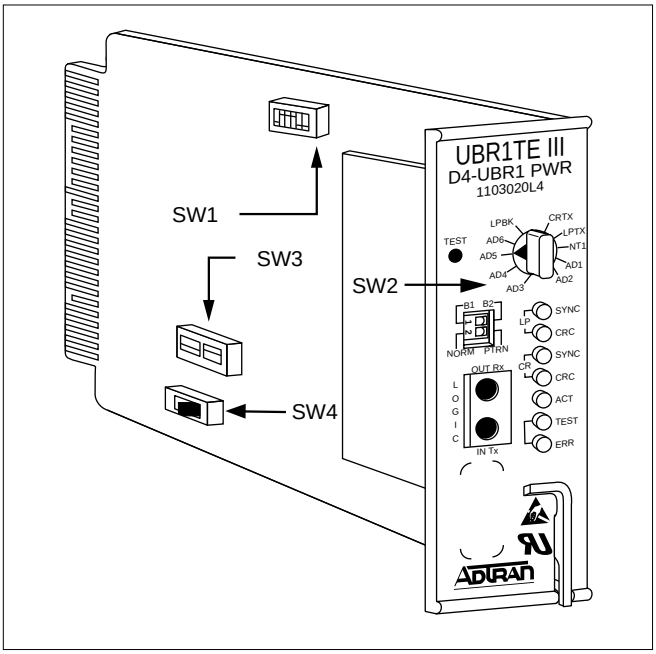


Figure 1. ADTRAN U-BR1TE III W/PWR

1. GENERAL

This practice provides installation and maintenance information for the ADTRAN U-BR1TE III w/PWR. **Figure 1** is an illustration of the U-BR1TE III w/PWR.

The U-BR1TE III w/PWR is a line card for use in a WECO compatible D4 and an AT&T SLC-96 channel bank. The U-BR1TE III w/PWR incorporates the functionality of a standard U-BR1TE III and the ADTRAN U-Repeater Powering Module which will simplify the installation of ADTRAN U-Repeaters when deployed from a Digital Loop Carrier (DLC) facility.

The U-BR1TE III w/PWR allows transport of Basic Rate ISDN over T1 carrier facilities and provides an ISDN 2B1Q U-interface that will supply span power for one of two modes of operation. In one mode of operation, the U-BR1TE III w/PWR supplies a constant 43 mA to span power an ADTRAN ISDN U-Repeater II or U-Repeater III. The other mode of operation allows the U-BR1TE III w/PWR to provide a constant -120 VDC to span power an ADTRAN I-NIU. The U-BR1TE III w/PWR automatically determines the appropriate mode of operation, without requiring an option selection.

While the span powering mode is intended to be used in an Adjacent-to-Customer location, such as a remote central office or remote terminal, the U-BR1TE III w/ PWR may also be configured for Adjacent-to-Switch (COT) and Tandem Office applications. Clear channel capability (B8ZS) is not required of the T1 facility if zero byte substitution is enabled. The U-BR1TE III w/PWR plugs into a single slot of the D4 and the SLC-96 channel bank, and typically requires three time slots for transport of 2B+D information. Block error rate performance over the T1 facility is monitored and is available to the network. The U-BR1TE III w/PWR provides for up to eight hours of performance history for both the T1 carrier and the U-interfaces.

Revision History

This is the first issue of this practice. Revisions to subsequent practices will be summarized in this paragraph.

Features

The U-BR1TE III w/PWR provides Basic Rate (2B+D) ISDN service to remote locations over existing single twisted pair wiring. The following is a list of the performance features offered by the ADTRAN U-BR1TE III w/PWR.

- ISDN 2B1Q interface which meets all Layer 1 requirements as specified in ANSI T1.601-1992.
- Provides repeater power of 43 mA at -28 to -120 VDC.
- Provides 12 mA at -120 VDC for I-NIU.
- 18 kft nominal range on mixed gauge wire 42 dB @ kHz loop loss, 1300 ohms DC resistance design.
- Internal test pattern allows for testing of individual B channels without requiring external test equipment.
- Transportation of ISDN Basic Rate 2B+D information over T1 facilities in the 3-DS0 format specified in TR-NWT-000397.
- All Layer 1 maintenance functions.
- Performance monitoring of the Layer 1 facility as specified in TR-NWT-000397 and TR-TSY-000829.
- Distinctive metallic DC test signature to identify either line unit LT or line unit NT mode of operation as specified in TR-NWT-000397.
- Provides loopback capability for full 2B+D as well as individual B channels in both loop and carrier directions. Individual B channel loopbacks may be initiated at the U-BR1TE III w/PWR faceplate or from a remote location through the maintenance channel.
- B1 and B2 loopback addressability at the faceplate for 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.
- A built-in Cyclic Redundancy Check (*CRC*) clock error detector allows for local performance monitoring at the faceplate without test equipment.
- Addressing and error status with front panel LED indicators. Test functions chosen by a front panel ten-position rotary switch.
- Responds to OCU latching loopback in 2B, B1, and B2 modes of operation.

The U-BR1TE III w/PWR is fully compatible in functionality and is interchangeable with the following units: U-BR1TE (1100.020L1, L3), U-BR1TE II (1102.020L2), U-BR1TE II w/PWR (1102.020L4), and the U-BR1TE III (1103.020L2).

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 **subsection 6**). To install the U-BR1TE III w/PWR, grasp the unit by the faceplate and insert it into the backplane connector until firmly seated. The faceplate latch will automatically secure itself to the channel bank.

Physical Requirements

The U-BR1TE III w/PWR plugs into a single D4/SLC-96 channel slot. The connector pin assignments are illustrated in **Figure 2**. When provisioned for 2B+D service, the U-BR1TE III occupies three time slots. In a D4 or SLC-96 Mode III channel bank, it occupies the time slot associated with the physical channel slot that it occupies and the next two time slots to the right. The

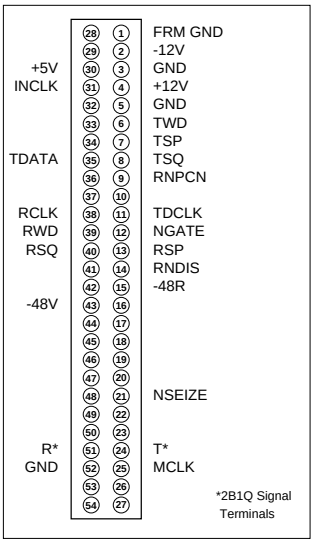


Figure 2. Connector Pin Assignments

physical channel slots, whose time slots are used in this manner, must remain unoccupied.

In an SLC-96 Mode I with D1D counting channel bank, the time slots are allocated as shown in **Figure 3** with two time slots per physical channel slot.

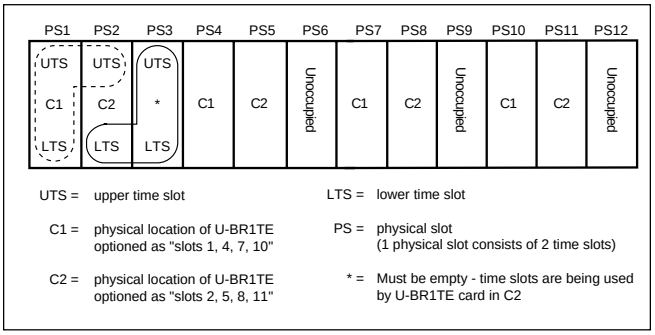


Figure 3. Time Slot Assignments for 2B+D Service in SLC Mode I w/ D1D Counting

The unit uses two time slots in one physical slot and a time slot from an adjacent slot when configured for 2B+D operation. When optioned for Slot 1, 4, 7, or 10 operation, the unit occupies the two time slots associated with the physical slot in which it resides and the upper time slot of the next adjacent physical slot.

When optioned for Slot 2, 5, 8, or 11 operation, the unit occupies the lower time slot of the occupied physical slot and the adjacent two time slots of the next physical slot to the right. When using the Slot 2, 5, 8, or 11 option, the

physical slot to the right must be left vacant. A unit optioned for one or two time slots, B1+D, B2+D, B1, B2, 2B, and D only, occupies only the two time slots associated with the physical slot used. In this configuration, option the unit for Slot 1, 4, 7, or 10. See Table A for additional channel slot deployment restrictions for each bank type.

D4 Bank Requirements

The COT D4 bank must be configured with an OIU-2 optioned for external timing. The COT bank must be provided with an external composite clock synchronized with the network.

SLC Bank Requirements

The COT SLC bank must be configured with a special service unit (SSU) optioned for external timing. The COT SLC bank must be provided with an external composite clock synchronized with the network.

Interface Requirements

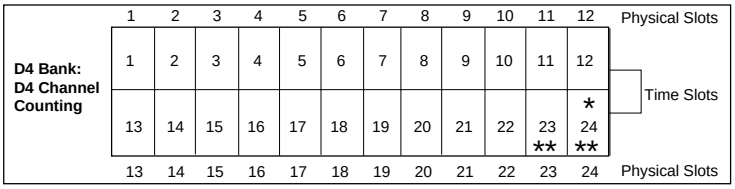
The U-BR1TE III w/PWR unit includes two interfaces. The loop-side interface is an ISDN U-interface which is used to deliver Basic Rate service. The carrier-side interface is a D4/SLC-96 channel bank interface which is used to insert data into the 1.544 Mbps T1 stream. Only the polarity-insensitive T and R leads are used in the cross-connection. When deployed in a SLC-96 channel bank, the U-BR1TE III w/PWR U-interface pins out on the "odd" pair of the physical slot where it is located.

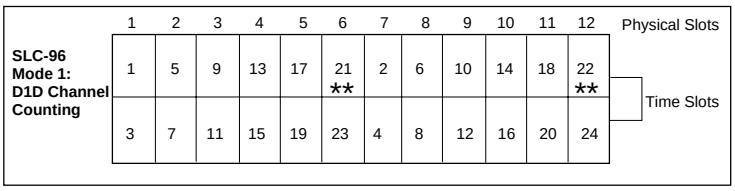
Option Switch Settings

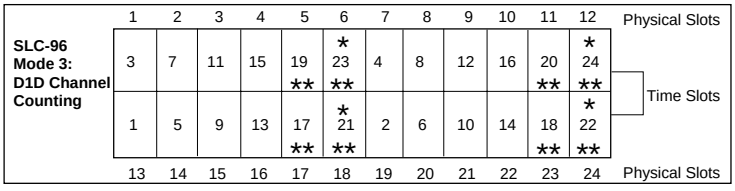
Table B contains the option settings for SW1, SW3, and SW4. **Figure 4** displays the locations for SW1, SW3, and SW4.

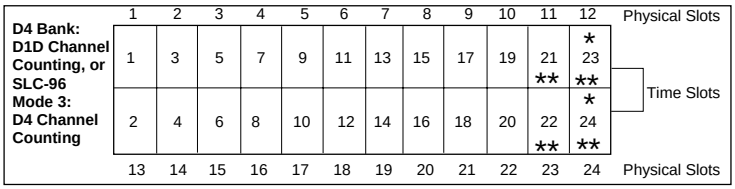
Table A. Channel Slots that CANNOT Contain BR1TE Cards

Type of Service	D4 Bank with D4 Counting	SLC-96 Mode I with D1D Counting	SLC-96 Mode III with D1D Counting	D4 Bank with D1D Counting or SLC-96 Mode III with D4 Counting
D	---	---	---	---
B1+D or B2+D (*)	24	---	6, 12, 18, 24,	12, 24,
2B+D (**)	23, 24	6, 12	5, 6, 11, 12, 17, 18, 23, 24	11, 12, 23, 24









* A channel unit with B+D service *cannot* occupy this slot
** A channel unit with 2B+D service *cannot* occupy this slot

Table B. SW1, SW3, and SW4 Option Settings

SWITCH	LABEL	FUNCTION	DESCRIPTION
SW1-1 SW1-2	TRM TRM	Bank Type Selection	Selects the bank type for the U-BR1TE III w/PWR. **Bank** — **Count/Slot** — **SW1-1** — **SW1-2** D4 — D4 Counting* — *On* — *Off* D1D Counting — *On* — *On* SLC I — CU in slots 1,4,7,10 — *On* — *On* CU in slots 2,5,8,11 — *Off* — *Off* SLC III — D4 Counting — *On* — *On* D1D Counting — *Off* — *On*
SW1-3 SW1-4 SW1-5	B1 B2 D	Service Level Selection	Selects the service level. The U-BR1TE III w/PWR may be optioned to deliver full ISDN (2B+D) or any other level of service. **Service Option** — **SW1-3 B1** — **SW1-4 B2** — **SW1-5 D** 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 1-6 *On** *Off*	 ZBS DIS ZBS EN	Zero Byte Substitution Disables ZBS Enables ZBS	The ZBS option must be set the same for the COT and RT. SW1-6 should be set toward “ZBS EN” for AMI-provisioned carriers. The switch setting is optional for B8ZS-provisioned carriers. Consult local provisioning guidelines.
SW 3-1 *On** *Off*	 LULT(RT) LUNT(COT)	Termination Mode LULT mode (RT typical) LUNT mode (COT typical) **(See figure 5)**	This switch should be set toward “LULT” when the unit is installed as Adjacent-to U-Repeater/I-NIU, Adjacent-to-Customer, or Tandem Office Source configuration. This switch should be set toward “LUNT” for Adjacent-to-Switch and Tandem Office Sink configurations.
SW 3-2		*Function dependent upon SW3-1 setting in non-powering configuration. Function is not applicable in powering configuration (SW-4 to Power).*	
*On** *Off*	ADJ TANDEM	**LULT Mode (SW3-1 *On*)** DC sealing current provided DC sealing current **not** provided	In the LULT(RT) mode, SW3-2 controls sealing current. When used in an Adjacent-to-Customer configuration, sealing current should be provided (SW3-2 *On*). In a Tandem Office Source, sealing current is *not* required, and should be disabled (SW3-2 *Off*).
On *Off*	ADJ TANDEM	**LUNT Mode (SW3-1 *Off*)** Periodic wake-up tone **not** provided Periodic wake-up tone provided	In the LUNT(COT) mode, SW3-2 controls periodic wake-up tone. Periodic wake-up tones should be disabled when located in an Adjacent-to-Switch location (SW3-2 *On*). Periodic wake-up tones are required (SW3-2 *Off*) when located in a Tandem Office Sink configuration, or when adjacent to a device requiring wake-up tones, such as a Newbridge® switch.
SW4	NORM	Normal	No powering provided toward the customer U-interface.
	POWER*	Powering provided toward the customer U-interface.	Automatically determines which of the following modes of operation is appropriate: • Supply a constant 43 mA to power an ADTRAN ISDNU-Repeater II or U-Repeater III. • Supply a constant -120 VDC to power an ADTRAN I-NIU.
Note: Power option should only be used in the LULT (RT) configuration			

* Factory default settings

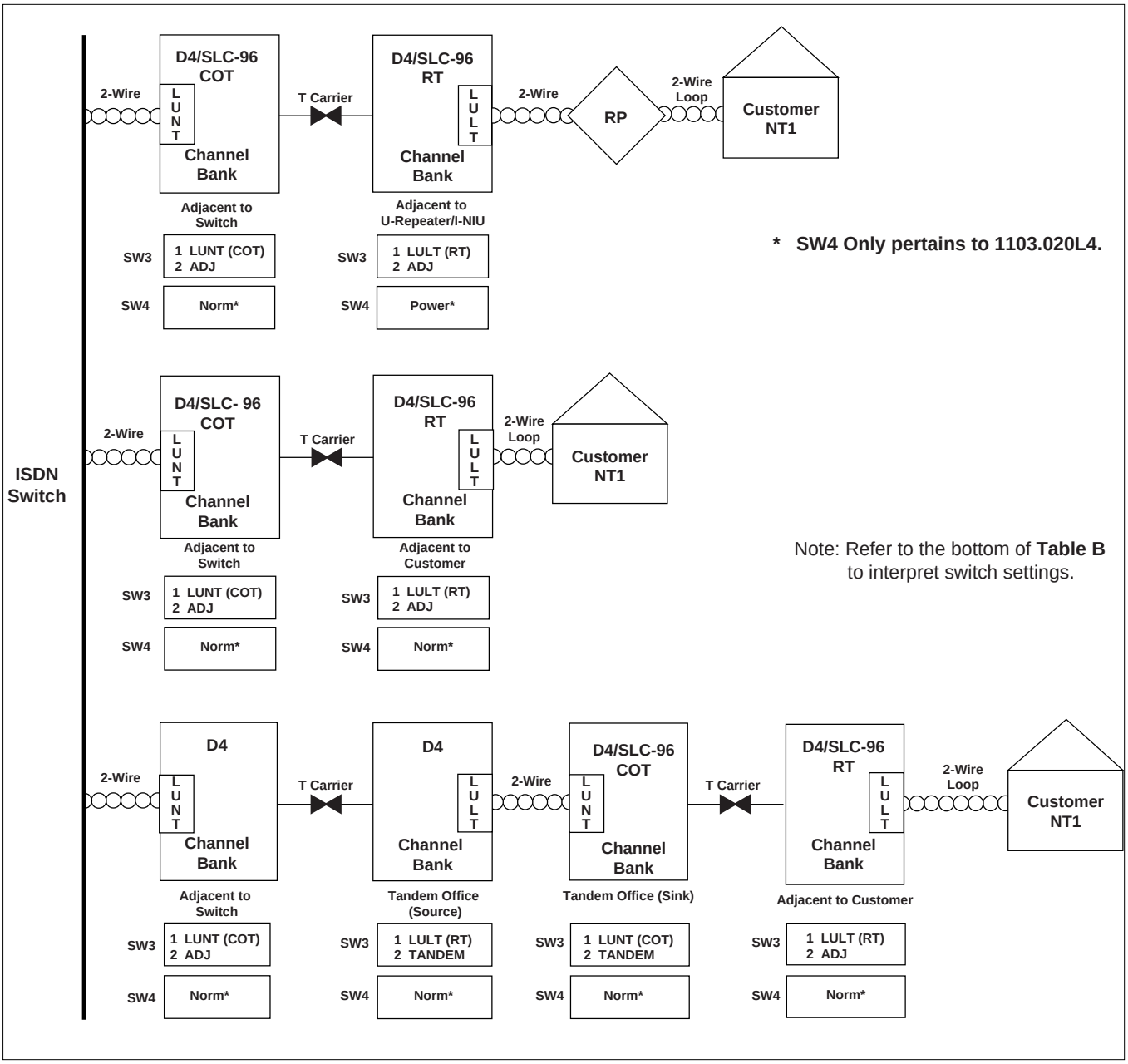


Figure 5. Position Switch Settings at Network Locations

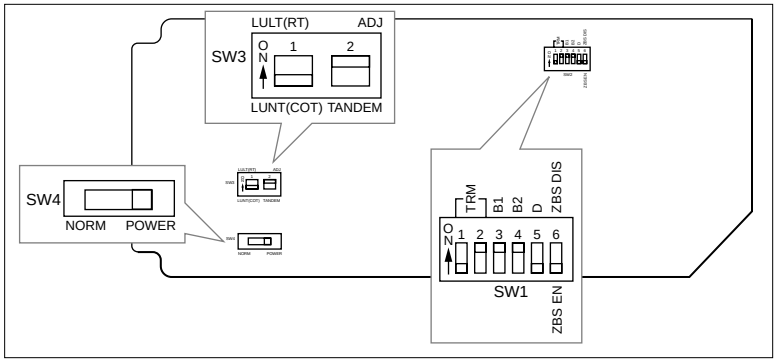


Figure 4. SW1, SW3, and SW4 Labeling

Faceplate Features

The U-BR1TE III w/PWR faceplate features a two-position Dual In-line Package (DIP) Switch, a recessed push-button, a rotary switch, a bantam jack, and LEDs, as illustrated in **Figure 1**. The B1/B2 DIP Switch selects the desired bearer channel, B1 or B2, to be tested during local tests using the U-BR1TE III w/PWR faceplate. The NORM/PTRN DIP Switch selects between normal and internal 2047 pattern generator local test. The ten-position rotary switch is used to determine the specific test that will be performed, including downstream loopbacks (See **Table C**). LED indicators display the current status of the unit, as listed in **Table D**.

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

3. TESTING

The U-BR1TE III w/PWR responds to embedded operation channel loopbacks, including B1, B2, and 2B+D, when configured for D channel operation. When used in non-D channel modes of operation (B1, B2, or 2B), the Adjacent-to-Customer U-BR1TE will respond to the inbound OCU Latching loopback sequence for each B-Channel. When remote testing is not available, or during sectionalization of trouble or equipment malfunction, the U-BR1TE III w/PWR faceplate provides local capabilities. Using the internal 2047 pseudorandom test pattern generator or the bantam jacks allows craftpersons to test in both the downstream and upstream directions, including loopback for 6 addressable ISDN devices and the customer's NT1.

The faceplate bantam jacks accommodate standard DS0 Logic Testers such as the TPI 108/109 RT II or FIREBERD 4000/6000 which perform both the upstream and the downstream testing.

Loopback Tests (ADR1 - ADR6, NT1)

Loopbacks in the network-to-customer direction can be initiated from either the ISDN switch or the faceplate. Either the internal 2047 test pattern or a DS0 digital test set provide the 64kbs bit test pattern to be tested in B1 or B2. When initiating loopbacks from the U-BR1TE III w/ PWR faceplate, the downstream direction is automatically selected based on the card position in the network. To initiate a loopback using the internal 2047 test pattern, perform the following:

Table D. LED Indicators

DISPLAY	COLOR	INTERPRETATION
LP SYNC (Loop Sync)	*Red*	U-interface is out of sync.
LP CRC (Loop *CRC*)	*Red*	In normal mode, *Flashes* upon receipt of NEBE from the loop. In Local Performance Monitoring: *Flashes* when 6-19 *CRC* errors are detected from the loop. *Solid* when 20 or more *CRC* errors are detected from the loop.
CR SYNC (Carrier Sync)	*Red*	Invalid TR-397 framing over the T1 carrier facilities.
CR CRC (Carrier CRC)	*Red*	In normal mode, *Flashes* upon receipt of NEBE from the T1 In Local Performance Monitoring: *Flashes* when 6-19 *CRC* errors are detected from the T1. *Solid* when 20 or more *CRC* errors are detected from the T1.
ACT (ACT Bit)	*Green*	Customer NT1 successfully exchanging ACT bits with the network.
TEST	*Green*	*Solid* when internal 2047 test has successfully looped the selected remote, during internal 2047 in LPTX or CRTX test, or in Local Performance Monitoring.
	Yellow	*Flashes* once per second in response to a *EOC* B1 loopback. *Flashes* twice per second in response to a *EOC* B2 loopback. *Solid* in response to *EOC* 2B+D loopback and during DS0 logic test when the remote unit has successfully looped, or in LPTX or CRTX.
ERR	*Red*	*Flashes* when a bit error is received during the internal 2047 test pattern. *Solid* when unit has encountered an error while in test mode.

1. Select the desired loopback address using the ten-position rotary switch. Refer to **Table C**.
2. Select the desired bearer channel using the B1/B2 DIP switch.
3. Select PTRN on the NORM/PTRN DIP switch.
4. Depress the recessed TEST push-button to initiate the test. The TEST LED will illuminate GREEN when the loopback is established to the selected address, and the ERR LED should go out following synchronization to the test pattern. If the selected address does not respond, the TEST LED will remain out and the ERR LED will illuminate.

5. To insert one bit error, momentarily (for less than 2 seconds) depress the TEST push-button. The ERR LED should flash upon receipt of the injected error.
6. Tests to additional network addresses may be performed by changing the selector knob to the desired address. It is not necessary to exit the test mode to select a new address.
7. To deactivate the loopback, depress the TEST push-button for 2 seconds, until the GREEN TEST LED is extinguished, or select NORM on the NORM/PTRN DIP switch.

To initiate a loopback using a DS0 digital test set, perform the following:

1. Insert the TX and RX bantam plugs of the DS0 digital test set into the U-BR1TE III w/PWR respective front panel bantam jacks. Connect the clock input of the DS0 digital test set to the channel bank's clock source (D4's OIU, or the SLC-96 SSU). Configure the test set for Near Logic and 64kbps.
2. Select the desired loopback address using the ten-position rotary switch. Refer to **Table C**.
3. Select the desired bearer channel using the B1/B2 DIP switch.
4. Depress the recessed TEST push-button to initiate the test. The TEST LED will illuminate YELLOW when the loopback is established to the selected address. If the selected address does not respond, the TEST LED will remain out. Observe the DS0 digital test set for bit errors.
5. Tests to additional network addresses may be performed by changing the selector knob to the desired address. It is not necessary to exit the test mode to select a new address.
6. To deactivate the loopback, depress the TEST push-button or remove the transmit bantam plug. Upon deactivation of the test, the TEST LED will go out.

Point-to-Point Test (CRTX, LPTX)

A point-to-point (straight-away) test can be performed to either the U-interface (LPTX) or the T1 carrier interface (CRTX). In both cases either the internal 2047 test pattern generator or a DS0 digital test set is used to verify the performance of the selected bearer channel. To initiate a point-to-point test using the internal 2047 test pattern, perform the following:

1. Select the desired test direction, LPTX or CRTX, using the ten-position rotary switch. Refer to **Table C**.
2. Select the desired bearer channel using the B1/B2 DIP switch.
3. Select PTRN on the NORM/PTRN DIP switch.
4. Depress the recessed TEST push-button to initiate the test. The TEST LED will illuminate GREEN and the ERR LED should go out following synchronization to the test pattern from the far end.
5. If the far end unit is a U-BR1TE III w/PWR, using the internal 2047 test pattern, perform steps 1-4, choosing the same faceplate switch setting. If the far end is a test set, ensure it is configured for a 2047 test pattern.
6. To insert one bit error, momentarily (for less than 2 seconds) depress the TEST push-button. Bit errors will be seen at the far end test unit.
7. To deactivate the loopback, depress the TEST push-button for 2 seconds, until the GREEN TEST LED is extinguished, or select NORM on the NORM/PTRN DIP switch. Upon deactivation of the test, the TEST LED will go out.

To initiate a point-to-point test using a DS0 digital test set, perform the following:

1. Insert the TX and RX bantam plugs of the DS0 digital test set into the U-BR1TE III w/PWR respective front panel bantam jacks. Connect the clock input of the DS0 digital test set to the channel banks clock source (D4's OIU, or the SLC-96 SSU). Configure the test set for Near Logic and 64kbps.
2. Select the desired test direction, LPTX or CRTX, using the ten-position rotary switch. Refer to **Table C**.
3. Select the desired bearer channel using the B1/B2 DIP switch.
4. Depress the recessed TEST push-button to initiate the test. The TEST LED will illuminate YELLOW.
5. If the far end unit is a U-BR1TE III w/PWR using a DS0 digital test set, perform steps 1-4, choosing the same faceplate switch setting. Ensure that both test sets are configured for the same test pattern (511, 2047). If the far end unit is a U-BR1TE III w/PWR using the internal 2047 test pattern, perform steps 1-4 of the previous section.
6. Observe the DS0 digital test set for bit errors.
7. To deactivate the loopback, depress the TEST push-button, or remove the transmit bantam plug. Upon deactivation of the test, the TEST LED will go out.

Local Loopback (LPBK)

A bilateral loopback can be initiated from the U-BR1TE III w/PWR faceplate for either bearer channel. A test pattern source is not required for this test. To initiate a local loopback, perform the following:

1. Select the desired bearer channel using the B1/B2 DIP switch.
2. Select LPBK using the ten-position rotary switch. Refer to **Table C**.
3. Depress the recessed TEST Push-button to initiate the test. The TEST LED will flash YELLOW to indicate B1 or B2.
4. To deactivate the loopback, depress the TEST push-button. Upon deactivation of the test, the TEST LED will go out.

Local Performance Monitoring
Performance Monitoring of the local T1 carrier system and 2-wire U-interface of the ISDN data can be performed from the front panel without interruption of service to the customer. For this test, bearer channel selection is not applicable and a test pattern source is not required. To initiate local performance monitoring, perform the following:

1. Ensure the NORM/PTRN DIP switch is in the NORM position, and that a bantam plug is NOT installed in the faceplate TX bantam jack.
2. Select ADR1 using the ten-position rotary switch.
3. Depress the recessed TEST Push-button to initiate the test. The TEST LED will illuminate GREEN.
4. The total number of Near End Block Errors (NEBE) received are simultaneously displayed as *CRC* errors with the LP and CR CRC status LEDs. (See **Table D**).
5. To exit Local Performance monitoring, depress the TEST button for 2 seconds or longer. Upon deactivation of the test, the TEST LED will go out.

Leased Mode Testing (B1, B2, and 2B)
For leased mode applications, the D channel is typically disabled on the U-BR1TE III w/PWR. Without the D channel, standard ISDN loopbacks by way of the *EOC* are not available across the T1 carrier system. For this situation the ADTRAN U-BR1TE III w/PWR responds to independent network-issued OCU latching loopback sequences for B1 and B2, when configured as the Adjacent-to-Customer.

Enabling OCU latching loopback sequence:

1. Minimum of 35 transition in progress (TIP) bytes (*0111010).
2. Minimum of 35 loopback select code (LSC) bytes (*1010101).
3. Minimum of 100 loopback enable (LBE) bytes (*1010110).
4. Minimum of 32 far-end voice (FEV) bytes (*1011010).

* Denotes *Don't Care* bit -- either a 1 or a 0.

Disabling OCU latching loopback sequence:

1. Minimum of 35 TIP bytes.

The valid front panel tests in leased modes are ADR1, CRTX, LPTX, and LPBK for all circuit positions. NT1, ADR1-ADR6 loopback tests are valid for the Adjacent-to-Customer circuit position only. ADR2 would be used to test an ADTRAN U-Repeater deployed from the U-BR1TE III w/PWR.

Local Performance Monitoring is available only for the U-interface, when configured for a leased mode of operation. See the subsections entitled *Loopback Tests*, *Point-to-Point Test*, and *Local Loopback* for applicable test descriptions.

4. WARRANTY AND CUSTOMER SERVICE

ADTRAN will replace or repair this product within ten 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 Equipment Warranty and Return Policy Procedure.

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:

Telco Technical Support	(800) 726-8663
Standard support hours:	Monday-Friday 7 a.m. - 7 p.m. CST
Emergency support:	7 days/week, 24 hours/day
Sales	(800) 827-0807
RMA (repair service)	(205) 971-8722

Repair and Return Address:
ADTRAN, Inc.
Customer Service Department
901 Explorer Boulevard
Huntsville, Alabama 35806-2807