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

Section 61150.079L2-5
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BR1/10 LIU
BR1/10 LINE INTERFACE UNIT
INSTALLATION AND MAINTENANCE

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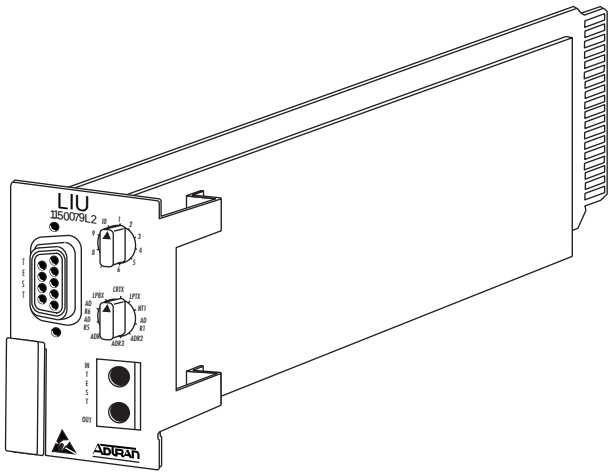

Figure 1. BR1/10 LIU

1. GENERAL

This practice provides installation and maintenance procedures for the ADTRAN BR1/10 Line Interface Unit (LIU). Figure 1 is an illustration of the BR1/10 LIU.

Features

The BR1/10 LIU, part number 1150.079L2, includes the following features:

- T1 interface compatible with DSX-1 and DS1 signals
- Superframe and Extended Superframe framing formats
- AMI and B8ZS Line Coding
- Local and remote loopback for T1 interface
- DS0 Test Access control
- Faceplate Bantam jack for DS0 logic tester access
- Faceplate DB-9 for DS0 logic tester clock input

General Description

The BR1/10 LIU is a common module plug-in unit used in the ADTRAN BR1/10 to provide an interface between the channel bank and the T1 line at the DSX-1 or DS1 level. The BR1/10 is an ISDN Channel Bank designed to provide a maximum concentration for 2B+D Basic Rate ISDN (BRI) in a compact and modular configuration. When deployed in the ADTRAN proprietary D-channel 4:1 TDM, up to 10-2B+D BRI circuits can be delivered, providing optimized utilization of the T1 carrier facilities. The BR1/10 also operates in the industry standard TR-NWT-000397 3-DS0 mode, and is compatible with any compliant ISDN channel unit, such as the ADTRAN D4 U-BR1TE II, and the ADTRAN SLC-5 U-BR1TE. The BR1/10 Channel Bank will interoperate with other channel bank systems that are WECO D4 compatible, such as SLC-96 and SLC-5 systems.

The BR1/10 LIU provides data formatting, line encoding, timing recovery, and generation. Two ten-position rotary switches allow for selection of DS0 tests; a dual Bantam jack provides test access; and a DB-9 furnishes an 8 kHz and a 64 kHz clock for the DS0 logic test set. Option selections for LIU functions are selected using the Dual In-line Package (DIP) switch on the BR1/10 BCU.

The BR1/10 LIU performs either a local or remote loopback as commanded by the BR1/10 BCU. In a local loopback, all outgoing transmitted data is internally looped back to the receiver at the local BR1/10. In Extended Superframe format (ESF), a remote loopback will cause the local LIU to send a loopback command to the network and the remote T1 channel bank. When optioned for Superframe format (SF), a remote loopback returns the incoming data from the T1 network.

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).

NOTE

Cycling power to the BR1/10, following the LIU installation, is recommended. To cycle power; remove the 1-amp fuse on the BR1/10 PAU faceplate or the -48V input fuse for the channel bank.

The BR1/10 LIU plugs directly into the common card area of a BR1/10 chassis in the position labeled LIU. To install the LIU, grasp the unit by the faceplate and insert it into the backplane connector until the unit is firmly seated.

Optioning

The BR1/10 LIU has no options or adjustments. The Dual In-line Package (DIP) switch on the BR1/10 BCU provides the necessary option settings for the BR1/10 ISDN Channel Bank modes of operation. Refer to the BCU Installation and Maintenance Practice, ADTRAN part number 61150.080L1-5, for additional information. For LBO switch setting on the BR1/10 BCU refer to Table A.

Table A. Line Build Out (LBO) Options

S1-1	S1-2	S1-3	LBO Settings
On	On	On	0-133 ft DSX-1 or 0 dB DS1
On	On	Off	133-266 ft DSX-1
On	Off	On	266-399 ft DSX-1
On	Off	Off	399-533 ft DSX-1
Off	On	On	533-655 ft DSX-1
Off	On	Off	-7.5 dB DS1
Off	Off	On	-15 dB DS1
Off	Off	Off	-22 dB DS1

Note: Switch S1 is located on the BR1/10 BCU, Part Number 1150.081L1.

Connections

All input and output to the BR1/10 LIU are made through the backplane. No additional backplane wiring is necessary for normal operation.

Faceplate Features

The BR1/10 LIU faceplate is used in conjunction with the BR1/10 BCU to initiate DS0 level testing. This version of the LIU does not allow DSX-1/DS1 access on the Bantam jack. Two 10-position rotary switches provide for selection of the desired test access and channel unit. The Bantam jacks accept standard 310 Bantam plugs while the DB-9 provides the necessary clock output required by standard DS0 Logic Test equipment. Figure 2 is an illustration of the BR1/10 LIU and BCU.

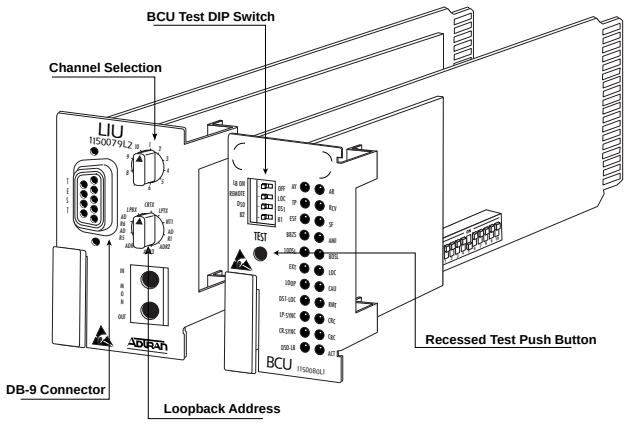

Figure 2. BR1/10 LIU and BCU

The 10-position DSL rotary switch is used to monitor the status of an individual channel position or when performing DS0 testing. Labeled 1 through 10, the DSL rotary switch selects the corresponding channel unit; the BR1/10 BCU then displays the status of the selected channel unit. When selected, the individual channel unit's STATUS LED will *Flash* GREEN and RED for 3 seconds. Table B shows the 10-position rotary test switch options.

Table B. Rotary Test Switch Options

Display	Interpretation
ADR 1	Address # 1, address of this unit
ADR 2	Address # 2, the next unit downstream
ADR 3	Address # 3, the second unit downstream
ADR 4	Address # 4, the third unit downstream
ADR 5	Address # 5, the fourth unit downstream
ADR 6	Address # 6, the fifth unit downstream
LBPK	Loopback forces this unit to loopback either B1 or 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 carrier direction
NT1	NT1, address of the NT1

The 10-position Address rotary switch selects the local test to be performed for the selected channel unit. Tests include loopback for the NT-1 and up to six ISDN devices in the network-to-customer direction, transmitting a test pattern to either the carrier or the loop interface, a local bilateral loopback, and local performance monitoring.

The DB-9 female connector provides access to the 8 kHz and 64 kHz clock reference for DS0 logic test equipment. Figure 3 illustrates the DB-9 connector.

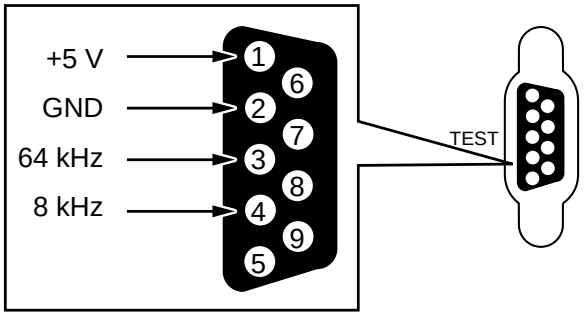

Figure 3. DB-9 Connector

3. TESTING

The BR1/10 LIU allows local access DS0 testing. In addition, the LIU performs remotely commanded loopbacks when configured for Extended Superframe Format (ESF) mode of operation.

DS1 testing has two loopback modes: local loopback and remote loopback. DS1 loopbacks include:

- Responding to a remote payload or a line loopback command from a remote T1 network device or test equipment (ESF mode only).
- Responding to a remote CSU loopback command, when enabled, from a remote T1 network device or test equipment.
- Initiating a payload or line loopback command to a remote T1 multiplexer (ESF mode only).
- Providing a loopback for the local T1 data stream.
- Providing a local loopback to the T1 network (SF mode only).

CAUTION

All DS1 tests are intrusive and will result in interruption of service for the entire BR1/10.

When remote testing is not available, during fault isolation or during equipment malfunction, the BR1/10 LIU and BCU allow local technicians test access for standard DS0 test sets. The LIU provides locally initiated test selection for each individual BR1TE channel unit. While ISDN is designed to be tested from the ISDN switch, it may be necessary to perform local testing. Each BR1TE channel unit will respond to embedded operation channel (*eoc*) loopbacks, including B1, B2, and 2B+D, when configured for D channel operation. These commands may be initiated from an upstream device, including the ISDN switch, another BR1TE channel unit, or ISDN test equipment developed for this purpose.

DS0 testing provides local test access for the individual BR1/10 BR1TE channel units. The LIU's Bantam jacks accommodate standard DS0 logic testers such as the TPI-108/109 RT II or the FIREBERD 4000/6000. Selection for B1 or B2 is also made on the BCU faceplate DIP switch. The recessed TEST push-button on the BCU will initiate the test and channel selected on the LIU's two ten-position rotary switches.

WARNING

During normal operation, the DS0/DS1 DIP switch should be kept in the DS0 position to prevent inadvertent interruption of service for the BR1/10 channel bank.

DS1 TESTING

Local Loopback (SF and ESF)

A local loopback bridges the T1 line across the receiver pair to the transmit pair, isolating the bank from the T1 line. This allows for internal bank testing and individual card testing and provides a baseline for T1 line testing.

To initiate local loopback, select LOC and LB *ON* on the BCU faceplate. All outgoing transmitted data is looped back to the receiver at the local BR1/10. Unframed ALL 1's (AIS) are transmitted to the T1 network causing the DS1 LOC LED on the BCU faceplate to *illuminate* GREEN. To terminate the test , set the LB ON to the *OFF* position. When the local loopback is invoked, and the BCU is configured for loop timing, the BR1/10 defaults to local timing. Table C explains BCU Test DIP switch options.

Table C. BCU Test DIP Switch

LB	*ON* enables and disables DS1 level loopbacks.
LOC/REMOTE	LOC provides internal local loopback of the T1 data stream. REMOTE in ESF will initiate a remote loopback to the far unit. REMOTE in SF will initiate a line loopback at the local BR1/10 bank.
DS0/DS1	Reserved for future use.
B1/B2	When in DS0, B1/B2 selects the appropriate B-channel to be tested.

Remote Loopback (ESF Mode Only)
A remote loopback in the ESF mode allows a local craftsperson the ability to further test the T1 line. This allows for testing from one location, limiting the need for additional personnel for trouble isolation.

The BR1/10 can initiate two types of remote loopback: payload and line. A payload loopback results in only the payload data being looped, framing is regenerated by the remote T1 multiplexer. A line loopback results in a full loopback, framing is not regenerated by the remote T1 multiplexer, but simply echoed back to the local BR1/10. To select a loopback command type, use switch 2-3 on the BCU.

To initiate remote loopback, select the REMOTE, and LB *ON* switches on the BCU faceplate. This sends a Loopback Activate command to the remote T1 channel bank according to ANSI specification, T1.403 -1991. In response to a Loopback Activate, the remote BR1/10 LIU retransmits the Receive Data (after jitter attenuation and re-equalization) to the network BR1/10 which initiates the REMOTE loopback. The remote BR1/10 BCU will *Flash* the RMT LED in response to the loopback command. Upon receiving an echoed command, the local BCU RMT LED will turn *ON*, indicating successful completion of the remote loopback.

To terminate a REMOTE loopback, set the LB *ON* to *OFF*. A Loopback Deactivation command is sent and returned by the remote T1 multiplexer, which then exits the remotely commanded test. When no longer detecting the echoed Loopback Deactivate command, the local BR1/10 LIU returns to the normal mode of operation.

Remote Loopback (SF Mode Only)
In this loopback, the local BR1/10 retransmits received T1 data back to the T1 network. To initiate a remote loopback select REMOTE, and LB *ON* on the BCU faceplate. To deactivate this test, set the LB *ON* switch to *OFF*.

DS0 TESTING
Local test access is provided to each of the installed BR1/10 BR1TE channel units in the downstream and the upstream directions. Bantam jacks for DS0 logic access, the 8 kHz and 64 kHz clock reference, the selection of the desired channel unit (1-10), and of the desired test are provided by the BR1/10 LIU. When the 10 position rotary switch is used to select a BR1TE channel unit, the Status LED on the BR1TE channel unit will alternate *Flashing* RED and GREEN for approximately 3 seconds before returning to the current status display. See the BR1TE channel unit document, ADTRAN part number 61150.077L1-5, for additional STATUS LED operation.

Loopback Test (ADR1-ADR6, NT1)
Loopbacks in the network-to-customer direction can be initiated from either the ISDN switch or the BR1/10 LIU. The downstream direction is automatically selected based on the card position in the network. To initiate a loopback, perform the following steps:

1. Insert the TX and RX Bantam plugs of the DS0 digital test set into the Bantam jack of the LIU. Connect the clock input to the DS0 digital test set DB-9 connector on the LIU. Configure the test set for Near Logic and 64 kbps.
2. Select the desired BR1TE channel unit using the DSL rotary switch on the LIU. The selected BR1TE channel card STATUS LED will *Flash* GREEN and RED for approximately 3 seconds when selected.
3. Select the desired loopback address on the LIU (ADR1-ADR6, or NT1).
4. Select the desired bearer channel using B1/B2 DIP switch on the BCU.
5. Press the BCU's recessed TEST push-button to initiate the loopback test. The DS0 LB status LED will *illuminate* YELLOW when the loopback is established to the selected address. If the selected address does not respond, the DS0 LB LED will remain out. Observe the DS0 digital set for bit errors.
6. Tests to additional network addresses may be performed by changing to another address (step 3). It is not necessary to exit the test mode to select a new address. If a new BR1TE channel unit is selected, all DS0 tests will be terminated. To continue testing on another channel, return to step 2.
7. To terminate the loopback, press the TEST push-button, or remove the transmit Bantam plug. Upon deactivation of the test, the Yellow DS0 LB LED will go out.

Point-to-Point Test, (CRTX, LPTX)
A point-to-point (straightaway) test can be performed to either the U-interface (LPTX) or the T1 carrier interface (CRTX).

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

1. Insert the TX and RX Bantam plugs of the DS0 digital test set into the Bantam jack on the LIU. Connect the clock input to the DS0 digital test set DB-9 connector on the LIU. Configure the test set for Near Logic and 64 kbps.

2. Select the desired BR1TE channel unit using the DSL rotary switch on the LIU. The selected BR1TE channel card STATUS LED will *Flash* GREEN and RED for approximately 3 seconds when selected.
3. Select the desired test direction, LPTX or CRTX, on the LIU.
4. Select the desired bearer channel using B1/B2 DIP switch on the BCU.
5. Press the recessed TEST push-button on the BCU to initiate the test.
6. If the far end unit is a BR1/10 BR1TE channel unit, perform Steps 1 through 4, choosing the same faceplate switch setting. Ensure both test sets are configured for the same test pattern (511, 2047).
7. Observe the DS0 digital test set for bit errors.
8. To deactivate the loopback, press the TEST push-button, or remove the transmit Bantam plug. Upon deactivation of the test, the DS0-LB LED will go out.

Local Loopback (LPBK)

A bilateral loopback can be initiated for any of the BR1/10 BR1TE channel units for either bearer channel. A local test pattern source is not required for this test. To initiate a local loopback, perform the following:

1. Select the desired BR1TE channel unit using the DSL rotary switch on the LIU. The selected BR1TE channel card STATUS LED will *Flash* GREEN and RED for approximately 3 seconds when selected.
2. Select the LPBK using the ten-position rotary switch on the LIU.
3. Select the desired bearer channel using B1/B2 DIP switch on the BCU.
4. Press the recessed TEST push-button to initiate the test. The DS0-LB LED will *Flash* YELLOW once a second for B1, or twice in succession for B2.
5. To deactivate the loopback, press the TEST push-button. Upon deactivation of the test the DS0 LED will go out.

Local Performance Monitoring

Performance monitoring of the local T1 carrier system and the 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. Make sure that a Bantam plug is NOT installed in the faceplate TX Bantam jack on the BR1/10 LIU.
2. Select the desired BR1TE channel unit using the DSL rotary switch on the LIU. The selected BR1TE channel card STATUS LED will *Flash* GREEN and RED for approximately 3 seconds when selected.
3. Select ADR1 on the LIU.
4. Press the recessed TEST Push-button to initiate the test. The DS0-LB will *illuminate* YELLOW.
5. The total number of *crc* errors is simultaneously displayed by the LP and CR CRC status LEDs. LEDs will *Flash* for more than 6 or fewer than 19 *crc*s; LEDs will *illuminate* solid for more than 20 errors.

4. SPECIFICATIONS

The specifications for the BR1/10 LIU are listed in Table D**.**

Table D. BR1/10 LIU Specifications

Environmental	
Operating Temperature:	-40°C to +70°C (-40°F to +158°F)
Storage Temperature:	-40°C to +85°C (-40°F to +185°F)
Relative Humidity:	95% max., non-condensing
Physical	
Dimension:	9 3/8" Long, 2 1/2" High, 7/8" Wide
Weight:	3.2 ounces

5. MAINTENANCE

The BR1/10 LIU requires no routine maintenance to operate properly.

ADTRAN does not recommend that repairs be performed in the field. Repair services are obtained by returning the defective unit to ADTRAN's customer service.

6. WARRANTY AND CUSTOMER SERVICE

ADTRAN will replace or repair this product within five years from the date of shipment if it does not meet its published specifications or fails while in service (see ADTRAN Equipment Warranty, Repair, and Return Policy and Procedure).

Return Material Authorization (RMA) is required prior to returning equipment to ADTRAN.

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

ADTRAN Technical Support..... (800) 726-8663
Standard support hours, Monday-Friday, 7am-7pm CST
Emergency Support:, 7 days/week, 24 hours/day

ADTRAN Sales..... (800) 827-0807

ADTRAN Repair/RMA..... (205) 963-8722

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