

DS3 Network Interface Unit with Performance Monitoring Installation and Maintenance Practice

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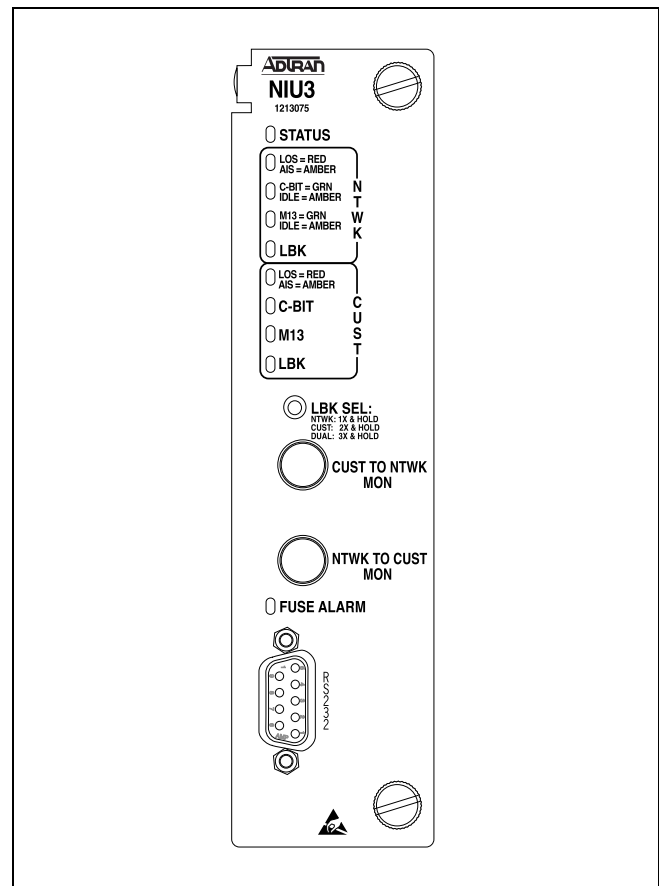


Figure 1. NIU3 PM

1. GENERAL

The ADTRAN® DS3 Network Interface Unit with Performance Monitoring (NIU3 PM) provides a demarcation and loopback point for DS3 circuits. The NIU3 PM can be deployed as a single unit or in two different shelf configurations with up to 12 units. The NIU3 PM provides troubleshooting suggestions, performance monitoring and event history information through an RS-232 craft interface. The NIU3 PM is transparent to data transmission during normal operation. **Figure 1** shows the front panel of the NIU3 PM, P/N 1213075L2.

Revision History

This is the fifth issue of this practice. This revision updates the Guidance Troubleshooting information.

Description

The NIU3 PM resides at the demarcation point next to customer premises equipment and can be housed in a standalone enclosure, a 3-unit shelf, or a 12-unit shelf.

A loopback can be initiated at the customer interface toward the network by either of the following methods:

- Remotely from the Test Center or Central Office (CO).
- Locally from the NIU3 PM front panel **LBK SEL** pushbutton. Refer to *Initiating Loopback with LBK SEL Pushbutton* on page 26 for details.
- Through the RS-232 (DB-9) craft interface.

The NIU3 PM is designed to loopback test data originating at the Test Center or the CO and responds to commands inserted into the data stream by a test head or portable test set. The loopback can isolate problems located on the customer side of the demarcation point, thus eliminating the need for an immediate trouble-call dispatch. The NIU3 PM is transparent to data transmission during normal operation. If the NIU3 PM fails, is removed from its housing, or a flash upgrade is in progress, the housing bypass relays (ADTRAN patent pending configuration) ensure circuit continuity to maintain data flow between the network and the customer. A front panel LED on the NIU3 PM provides notification of failure. [Figure 2](#) illustrates a circuit diagram of the NIU3 PM in a SONET-based DS3 network.

Features

The NIU3 PM supports the following features and functions:

- Enclosures:
 - 12-slot shelf (P/N 1212078L1)
 - 3-slot shelf (P/N 1212073L1)
 - Standalone housing (P/N 1212070L1)
- DS3 C-Bit and M13 framing or unframed
- Bypass relays ensure virtually uninterrupted data transmission during card failure, removal, or power loss
- BNC network and customer connections
- Loopback in response to FEAC and in-band M13 codes
- Midsize flush-mounted jacks for nonintrusive monitoring in both network and customer directions
- Recessed front panel pushbutton loopback control
- Performance and status information reports via DS3 network performance report messaging (NPRM)
- 50-character scratch pad
- RS-232 craft interface
- Loss of signal detection and notification
- 20, 60, 120-minute, and 24-hour test time out
- ± 24 VDC or -48 VDC power for standalone or shelf enclosures
- 120 VAC independent power options
- Dual power feeds in shelf configuration
- Internal test pattern generation/detection
- dBdsx measurement
- Performance history displays for intervals of 15 minutes, 60 minutes, 24 hours, and 30 days
- Customer transmit level setting
- Comprehensive troubleshooting screens including receive level and frequency offset warnings

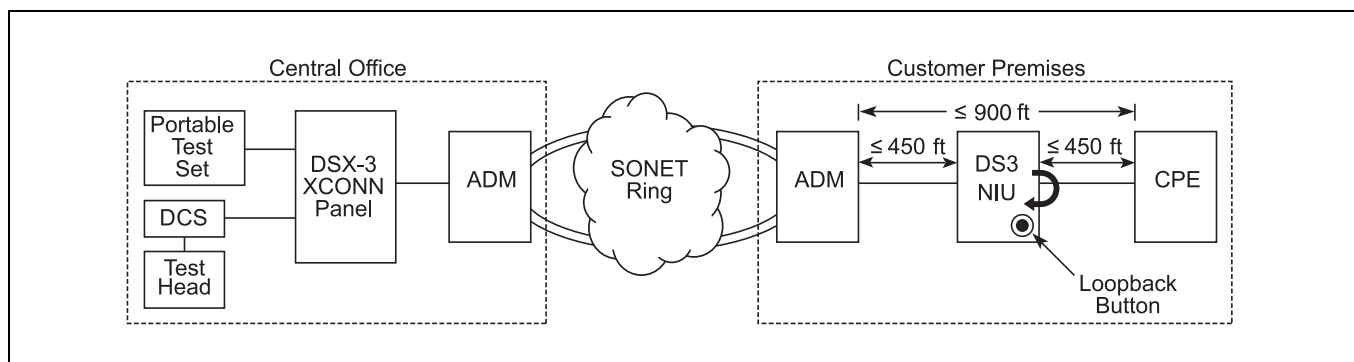


Figure 2. DS3 NIU3 PM Loopback Diagram

Compliance

Table 1 shows the compliance codes for the NIU3 PM. The NIU3 PM is NRTL listed to the applicable UL standards.

Table 1. Compliance Codes

Code	Input	Output
Power Code (PC)	F	C
Telecommunication Code (TC)	–	–
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.

This product is intended for installation in a DC-C (common) bonding and grounding system only. It is not intended or designed for installation in a DC-I (isolated) bonding and grounding system.

2. INSTALLATION



After unpacking the NIU3 PM inspect it for damage. If damage is noted, file a claim with the carrier, then contact ADTRAN. For more information, refer to the [Warranty and Customer Service](#) section.

This product is intended for use in a restricted access area in a type “B” or “E” enclosure only.

Location

The NIU3 PM installs at any convenient location adjacent to the customer. The NIU3 PM can pass both network and customer signals up to 900 feet. If total transmission distance exceeds 900 feet, DS3 data may cease during NIU3 bypass operations. The DS3 NIU is not intended for use as a repeater. See [Figure 2](#) on page 2 for maximum recommended transmission distances.

The NIU3 PM inserts into the host circuit board of the standalone housing or the backplane edge connector on either of the shelf units. Card guides direct the unit for correct insertion and prevent perpendicular movement. The unit is secured with two front panel thumbscrews.

Jack Connections

The three housings each have four rear panel BNC connectors for each NIU3 PM:

- Two for Customer Receive/Transmit
- Two for Network Receive/Transmit

Two additional mid-size jacks on the NIU3 PM front panel provide a nonintrusive monitoring point for the transmit network and customer signals. The front panel DB-9 provides an RS-232 craft interface. The standalone housing or shelf security panel must be opened to access the monitoring jacks and the RS-232 craft interface.

Housing Ground Option

CAUTION

Terminate grounds to an approved ground location. Check metal-to-metal contact on all ground connections, and verify ground circuit continuity.

Optionally, frame ground is provided by ground posts on the standalone chassis. The ground posts and **TB1** are electrically connected. A ground wire portal on the rear panel of the housing provides access for grounding via **TB1**. The ground posts are installed on the standalone housing, the 3-slot shelf, and the 12-slot shelf rear panels. A 6 AWG (maximum) ground lug is included with each chassis for connecting the ground wire to the ground posts.

Shelf Power

The NIU3 PM operates on local ± 24 VDC or -48 VDC. The standalone housing, 3-slot, and 12-slot shelf backplanes have a dual power terminal (**TB1**) with terminal connections for **PWR A**, **RET A** and **PWR B**, **RET B** wiring (18 AWG minimum) plus a common Frame Ground (18 AWG minimum) connection (see [Figure 3](#) on page 4). The standalone housing has a power wire portal on the rear panel for termination on the host circuit board at **TB1**.

CAUTION

Be careful to connect supply and return terminals in the described configurations.

Make the following terminal connections:

- Connect the -48 V or $\pm 24\text{ V}$ supply to **PWR A**.
- Connect the associated return wire to **RET A**.
- If redundant power is intended, make similar connections to **PWR B** and **RET B**.

A diode arrangement adds reliability by allowing both DC supplies to load-share with one side picking up the entire load if the other side fails.

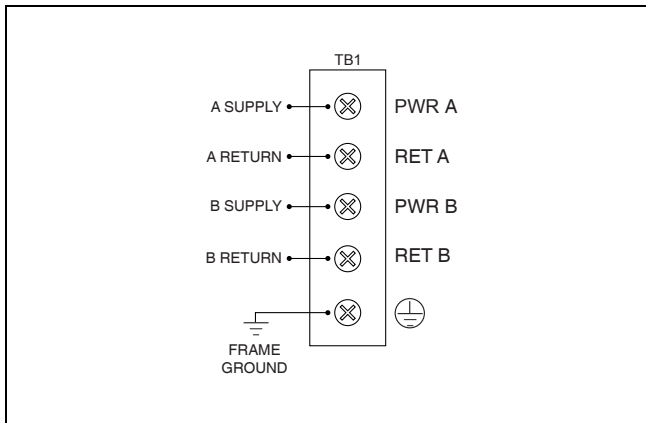


Figure 3. Shelf Power Connection

Independent Power Supplies

Two optional independent power supply units are available.

- AC/DC transformer (P/N 1212074L1) providing 48 VDC at 200 mA . Output terminals are stripped and tinned wires.
- Power supply/rectifier (P/N 1212080L1) providing -54 VDC at 2 amps . Output terminals are ring lugs sized for the shelf input terminals.

Both units plug into a standard 120 VAC outlet.

AC/DC Transformer

The 200 mA AC/DC transformer is specifically intended for use with the standalone housing (P/N 1212070L1). For the AC/DC transformer, the (red) power wire is connected to the RET terminal and the (black) return wire to the PWR terminal. The green wire connects to the Frame Ground terminal (see [Figure 4](#)).

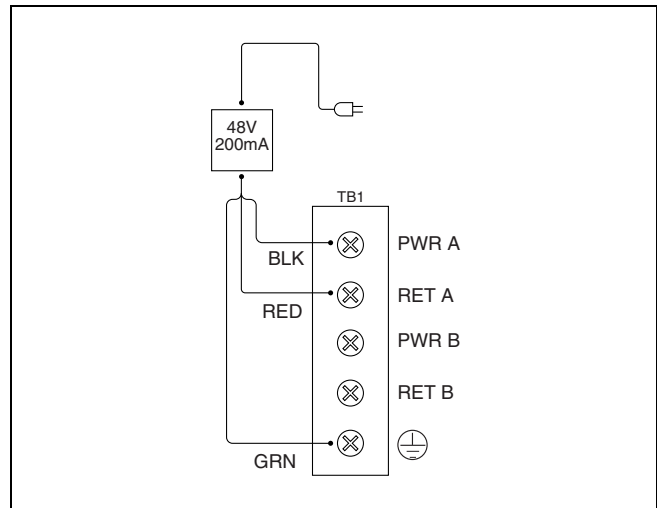


Figure 4. AC/DC Transformer Connection

Power Supply/Rectifier

For the 2.0 amp power supply/rectifier unit ([Figure 5](#)), the output wire on the PS/R terminates in a modular connector. An extension wire with a matching connector is included. The extension wire has ring terminals on the far end for connection to the NIU3 power terminals.

The red wire is -54 VDC and connects to the **PWR A** terminal; the black wire is the return and connects to the **RET A** terminal; the green wire connects to FGND.

NOTE

The power supply/rectifier unit is a negative output device; therefore, red and black wires connect *opposite* of the AC/DC transformer wires.

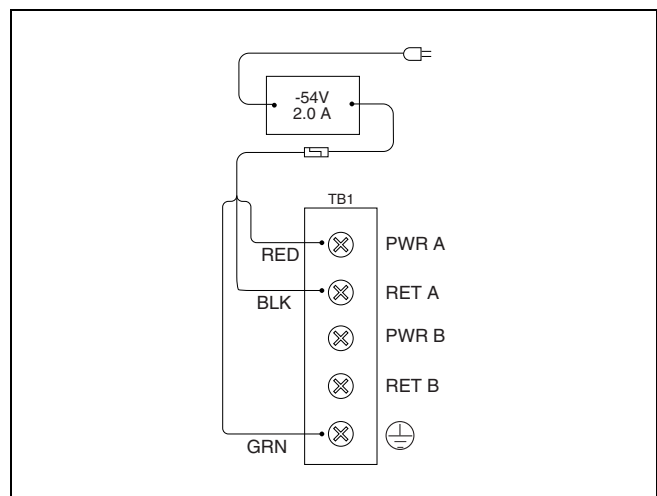


Figure 5. Power Supply/Rectifier Connection

Fuse

The input current is fused at 1.0 amp on each NIU3 PM and cannot be replaced in the field.

Options

Options for test time out, in-band loopback enable, keep alive signal, and customer transmit level are available through the Provisioning menu screen. There are no hardware options on the NIU3 PM. Framing is automatically detected as the DS3 signal passes through the unit.

3. TURNUP

When inserted into a housing with power applied, the **STATUS** LED illuminates red while the NIU3 PM performs a self-test. If the self-test passes, the **STATUS** LED illuminates green and the remaining LEDs go through an on/off sequence indicating the NIU3 PM is online. If the test fails, the **STATUS** LED remains red and the host bypass relays will maintain data flow around the NIU3 PM. Shutdown procedures are not required.

LED Indicators

LED indicators on the NIU3 PM front panel display status during normal, trouble, and test operation.

[Table 2](#) describes the LED indicators.

Table 2. LED Indications

LED	Color	Status	Description
STATUS	Green Red	On	Normal operation
		On	Card malfunction (bypass operation enabled)
		Off	No power
NTWK LOS/AIS	Red Amber	On	DS3 signal not present at network interface
		On	AIS present at network interface
		Off	DS3 signal present at network interface
NTWK C-BIT	Green Amber	On	C-Bit framing detected at network interface
		Off	C-Bit framing not detected at network interface
		On	C-Bit framing detected, Tx idle
NTWK M13	Green Amber	On	M13 framing detected at network interface
		Off	M13 framing not detected at network interface.
		On	M13 framing detected, Tx idle
NTWK LBK	Amber	Flashing	Slow: Network pattern test active
		Flashing	Fast: Loopback arming
		On	Loopback toward network enabled
		Off	Loopback toward network disabled, network pattern test disabled
CUST LOS/AIS	Red Amber	On	DS3 signal not present at customer interface
		On	AIS present at customer interface
		Off	DS3 signal present at customer interface
CUST C-BIT	Green	On	C-Bit framing detected at customer interface
		Off	C-Bit framing not detected at customer interface
CUST M13	Green	On	M13 framing detected at customer interface
		Off	M13 framing not detected at customer interface
CUST LBK	Amber	Flashing	Slow: Customer pattern test active
		Flashing	Fast: Loopback arming
		On	Loopback toward customer enabled
		Off	Loopback toward customer disabled, customer pattern test disabled
FUSE ALARM	Red	Off	Normal
		On	Circuit board fuse failed

Note: All LEDs *off* indicates no power or other system malfunction.

4. OPERATION

During normal operation the NIU3 PM is transparent to the network. In the event of circuit trouble, test equipment at the central office control terminal can monitor the loop. When a loopback is initiated, the transmit/receive paths can be tested to the customer interface.

Monitoring

Front panel mid-size monitoring jacks provide non-intrusive monitoring access through a high-impedance bridging circuit. The monitor level is nominally 21.5 dB below the signal power. The signal to the network is monitored via the **CUST TO NTWK MON** jack; the signal to the customer is monitored via the **NTWK TO CUST MON** jack.

Loss of Signal

In the event of a loss of signal, the NIU3 PM provides both a “keep alive” signal and LED notification.

- If there is no signal from the network, the **NTWK LOS/AIS** LED turns on red, and the NIU3 PM will transmit an unframed all ones signal toward the customer, while simultaneously transmitting RAI towards the network.
- If there is no signal from the customer, the **CUST LOS/AIS** LED turns on red, and the NIU3 PM will transmit the signal selected by the Customer LOS option on the Provisioning menu. The four selections that can be sent to the network upon customer LOS are as follows:
 - Framed Idle
 - AIS
 - No Signal
 - AIS-CI

Loss of Framing

If either **NTWK** or **CUST C-BIT** and **M13** LEDs are both off, the associated network or customer signal is unframed.

If the NIU3 PM cannot detect framing in the signal from the Network, then the NIU3 PM transparently passes unframed data toward the Customer and RAI back toward the Network.

If the NIU3 PM cannot detect framing in the signal from the Customer, then the NIU3 PM transmits AIS-CI toward the Network.

In the event that data transmitted through the circuit is intended to be unframed, the AIS/RAI response to loss of framing can be disabled via the Provisioning terminal screen.

If the AIS/RAI response is disabled, then the NIU3 PM will transparently pass unframed data from the Network to the Customer and vice-versa.

Table 3 on page 7 provides a summary of the operation of the NIU3 PM fault conditions.

Table 3. Fault Conditions

Condition Detected	Direction of Transmission	Transmission
LOS detected on Network Interface	Network Interface to Customer Interface	Unframed all ones signal is transmitted to the Customer Interface
	Customer Interface to Network Interface	RAI is transmitted to the Network Interface
LOF detected on Network Interface	Network Interface to Customer Interface	If “Send AIS/RAI when LOF detected” = Disabled, then unframed DS3 payload is transparently passed through to the Customer Interface. If “Send AIS/RAI when LOF detected” = Enabled, then unframed DS3 payload is transparently passed through to the Customer Interface.
	Customer Interface to Network Interface	If “Send AIS/RAI when LOF detected” = Disabled, then Customer Interface signal is transparently passed through to the Network Interface. If “Send AIS/RAI when LOF detected” = Enabled, then RAI is transmitted to the Network Interface.
AIS detected on Network Interface	Network Interface to Customer Interface	AIS is transparently passed through to the Customer Interface.
	Customer Interface to Network Interface	RAI is transmitted to the Network Interface.
LOS detected on Customer Interface	Customer Interface to Network Interface	AIS, IDLE, NO SIGNAL, or AIS-CI is transmitted to the Network Interface. This depends on the provisioning of the “Customer LOS” option.
LOF detected on Customer Interface	Customer Interface to Network Interface	If “Send AIS/RAI when LOF detected” = Disabled, then unframed DS3 payload is transparently passed through to the Network Interface. If “Send AIS/RAI when LOF detected” = Enabled, then AIS-CI is transmitted to the Network Interface.
AIS detected on Customer Interface	Customer Interface to Network Interface	AIS-CI is transmitted to the Network Interface.
RAI detected on Customer Interface	Customer Interface to Network Interface	RAI-CI is transmitted to the Network Interface.

Control Port Operation

The NIU3 PM front panel DB-9 provides an RS-232 craft interface for connection to a controlling terminal. The DB-9 pinout is shown in **Figure 6**. A terminal session is initiated upon insertion of a DB-9 jack into the RS-232 craft interface. The terminal interface operates at data rates from 1.2 kbps to 19.2 kbps. The asynchronous data format is fixed at 8 data bits, no parity, and 1 stop bit. The supported terminal type is VT100 or compatible.

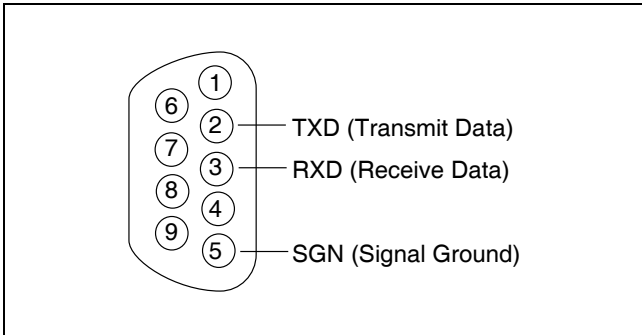


Figure 6. Front Panel DB-9 Pin Assignments

Terminal Session

The NIU3 PM synchronizes upon insertion in a powered-up shelf or housing. After synchronization, terminal sessions provide access to screen menus for provisioning, monitoring, testing, or obtaining performance or event history. Terminal session screen access

is available at any time during operation. The screens shown in this practice identify the main menu screens; subordinate screens are not depicted. Abbreviations used in screen diagrams are explained in **Table 4** on page 8.

NOTE

If using a personal computer with terminal emulation capability, disable all power saving programs. Otherwise, communication between the PC and the NIU3 PM may be disrupted, resulting in misplaced characters, or screen time outs.

NOTE

Not all option screens are shown in this document. Many screen options selected will advance to additional screens with additional options. Navigation through the complete option menu series is enhanced with on-screen instructions.

Table 4. Definition of Screen Abbreviations

Abbreviation	Definition
2 ²³ -1	Pseudorandom Pattern: This format designates the pattern used to simulate live T3 data.
AIS	Alarm Indication Signal: An alarm indication signal is a framed, alternating 1s and 0s (1010...) signal sent down or up stream by a device when it detects an error condition or receives an error notification from another unit in the transmission path.
AISS-P	AIS Seconds-Path: This condition is defined as a count of 1-second intervals containing one or more AIS defects.
BPV	Bipolar Violation: This violation represents the occurrence of a pulse of the same polarity as the previous pulse. BPVs that are part of the zero substitution code are excluded.
C-Bit	DS3 C-Bit Parity: This format is defined as a framed DS3 signal with an application identification channel signal set to 1. The C-Bit channel is available for carrying parity information, FEBE bits, far-end alarm and control signals, etc.
CV-L	Code Violation Count: This count represents the number of BPVs and EXZs occurring over the accumulation period.

Table 4. Definition of Screen Abbreviations (Continued)

Abbreviation	Definition
CV-P	Code Violation Count: This count represents the number of parity errors occurring over the accumulation period. This parameter is based on P-bit parity errors for the M13 application. For the C-bit parity application, it is based on CP-bit parity errors as well as P-bit parity errors.
ES-L	Errored Seconds-Line: This value represents a count of 1-second intervals containing one or more BPVs, one or more EXZs, or one or more LOS defects.
ES-P	Errored Seconds-Path: This value represents a count of 1-second intervals containing one or more parity errors, one or more SEF defects, or one or more AIS defects.
EXZ	Excessive Zeros: A signal condition indicated by the occurrence of more than two consecutive zeros
FEBE	Far-End Block Error: A signal condition indicated by the occurrence of a “not all 1s” pattern in the three FEBE bits and is a result of either a far-end M-bit error, a far-end F-bit error, or a far-end CP-bit error. FEBEs apply only to the C-Bit parity application.
LOS	Loss of Signal: An LOS is declared when the DS3 receiver cannot detect a valid DS3 signal.
LOSS-L	Loss of Signal Seconds-Line: This value represents a count of 1-second intervals containing one or more LOS defects.
M13	DS3 M13 Multiplex: A signal format characterized by a framed DS3 signal with an application identification channel (AIC) signal of random 1s and 0s. The C-Bit channel is employed to denote the presence or absence of stuffed bits. Also known as M23.
OOF	Out of Frame: This condition is declared when the DS3 receiver cannot detect valid frame alignment in the DS3 signal.
QRSS	Quasi Random Signal Source: A modified 2 ²⁰ -1 pseudorandom test signal that has artificial constraints to limit the maximum number of zeros in the bit stream.
RAI	Remote Alarm Indication: An alarm indication occurring when a DS3 sink detects an SEF or AIS defect; it sets both of the X-bits to zero to send RAI to the far end. When the SEF or AIS defect is cleared, then the X-bits are both set back to 1 to clear the RAI signal.
SAS-P	SEF/AIS Seconds-Path: This value represents a count of 1-second intervals containing one or more SEF defects or one or more AIS defects.
SEF	Severely Errored Frame: An SEF defect occurs when three or more F-bit errors in 16 consecutive F-bits are detected. An SEF defect is terminated when the signal is in-frame and there are less than three F-bit errors in 16 consecutive F-bits.
SEFS-P	Severely Errored Frame Seconds-Path: This value represents a count of 1-second intervals containing one or more SEF defects.
SES-L	Severely Errored Seconds-Line: This value represents a count of 1-second intervals containing 45 or more BPVs plus EXZs, or one or more LOS defects.
SES-P	Severely Errored Second-Path: This value represents a count of 1-second intervals containing 45 or more parity errors, one or more SEF defects, or one more AIS defects.
UAS-P	Unavailable Seconds-Path: This value represents a count of 1-second intervals for which the DS3 path is unavailable. The DS3 path becomes unavailable at the onset of 10 contiguous SES-Ps. Once unavailable, the DS3 path becomes available at the onset of 10 contiguous seconds with no SES-Ps.
UNFR	Unframed: A signal condition defined as an unframed DS3 signal.

Establishing a Terminal Session

To establish a terminal session, connect a terminal device to the front panel DB-9, then enter the password **ADTRAN**. The NIU3 Main Menu appears as shown in **Figure 7**.

NIU3 Main Menu

The NIU3 Main Menu provides access to detailed performance and configuration information. To access

subsequent screens, as shown on the following pages, type the selection number then press ENTER.

NIU3 Unit Information

The NIU3 Unit Information screen (**Figure 8**) displays part number, serial number, CLEI code, firmware revision, and checksums for the NIU3 PM.

```
CIRCUIT ID: xxxxxxxx                                03/01/04 13:04:03

                                Adtran NIU3 Main Menu

                                1. NIU3 Unit Information
                                2. Provisioning
                                3. Status
                                4. Troubleshooting
                                5. Loopbacks and Test
                                6. Performance History
                                7. Event History
                                8. Alarm Log
                                9. Set Circuit ID and Scratch Pad
                                10. Set Date and Time
                                11. Terminal Modes
                                12. Software Download

                                Selection:
```

Figure 7. Adtran NIU3 Main Menu Screen

```
CIRCUIT ID:                                          03/01/04 13:04:03

                                Press ESC to return to previous menu

                                ## #####
                                # ##          ##          ##          ##          ##          ##          ##          ##          ##
                                # ##          ##          ##          ##          ##          ##          ##          ##          ##
                                # ##          ##          ##          ##          ##          ##          ##          ##          ##
                                #####          ##          ##          ##          ##          ##          ##          ##          ##
                                #          #####          ##          ##          ##          ##          ##          ##          ##

                                #####
                                901 Explorer Boulevard, Huntsville, AL 35806-2807

                                ADTRAN NIU3
                                Part #: 1213075L2
                                S/N: xxxxxxxxx
                                CLEI: NCD3EGRAAA
                                Rev: xxx
                                App 0 CS: xxxx Ver: xxxx PASS ACTIVE
                                App 1 CS: xxxx Ver: xxxx PASS
                                Boot CS: xxxx

                                Support Hours: 7am - 7pm CST
                                Emergency: 7days x 24hrs
                                Phone: 800.726.8663
                                Fax: 256.963.6217
                                Internet: www.adtran.com
```

Figure 8. NIU3 Unit Information Screen

Provisioning

The Provisioning screen (**Figure 9**) displays the screen option selections. The Inband M13 Loopback Enable/Disabled option is used to enable or disable detection of in-band loopback codes. The Customer LOS option selects which keep alive signal is sent to the network when the NIU3 customer receiver detects LOS, such as Idle, AIS, No Signal, or AIS-CI.

The BERT/Loopback Timeout screen options can be disabled, or selected for 20 minutes, 60 minutes, 120 minutes, or 24 hours. After the selected test timeout expires, the loopback or pattern test releases. Pressing the **LBK SEL** button during a loopback also releases the loopback and returns the unit to normal operation.

The NIU3 may be connected to equipment whose receiver is sensitive to signal levels in the upper range of T3 specifications. In this case, the Tx Level to Customer option may be set to Low to reduce the customer transmit signal level. A setting of Normal allows the NIU3 PM to transmit the customer signal with a shape and amplitude that meet ANSI T1.102-1993 and T1.404-2002.

The Send AIS/RAI when LOF detected option is used to disable the generation of alarm signals in response to LOF. Refer to **Table 3** on page 7 for additional details on this option.

The Reset to Factory Default option resets (when D is pressed) the options shown on the Provisioning screen.

```
CIRCUIT ID: xxxxxxxx                                03/01/04 13:04:03
                                     Press ESC to return to previous menu

                                     Provisioning

1. Bert/Loopback Timeout           = 120 min.
2. Inband M13 Loopback             = Enabled
3. Customer LOS                    = AIS
4. Tx Level to Customer            = Normal
5. Send AIS/RAI when LOF Detected = Enabled

D. Reset to Factory Defaults

                                     Selection:
```

Figure 9. Provisioning Screen

Status

The Status screen (Figure 10) provides quick access to the network and customer status information.

```
CIRCUIT ID: xxxxxxxx                                03/01/04 13:04:03
                                     Press ESC to return to previous menu

                               Status Screen

                                NETWORK          T3 RECEIVER DATA          CUSTOMER
                                -----
                                LIVE            <- DS3 SIGNAL ->          LOS
                                C-BIT          <- FRAMING ->            UNFR
                                + 3.6         <- dBdsx LEVEL ->        - 2.9

----->| NIU3 |----->
|      |      |
NET |      | CUST -----
|      |      | 15M/ 24H / 30D          15M/ 24H / 30D
<-AIS--|      |<-LOS-- 000 00000 0000000 <- ES-L -> 000 00000 0000000
|      |      | 000 00000 0000000 <- SES-L -> 000 00000 0000000
|      |      | 000 00000 0000000 <- LOSS-L -> 000 00000 0000000
|      |      | 000 00000 0000000 <- ES-P -> 000 00000 0000000
|      |      | 000 00000 0000000 <- SES-P -> 000 00000 0000000
|      |      | 000 00000 0000000 <- UAS-P -> 000 00000 0000000

                                1. Clear PM Data

                                Selection:
```

Figure 10. Status Screen

Troubleshooting

The Troubleshooting Screen (see [Figure 11](#)), which is accessed by selecting 4 at the Adtran NIU3 Main Menu, provides guidelines in correcting problems detected by the NIU3. The Troubleshooting Screen includes a graphic showing the NIU3 and the status of its interfaces. The following T3 Receiver data are also shown: DS3 Signal state, Framing, dBdsx Level, and RX Frequency Lock warnings. Lastly, the following Performance Parameters are shown accumulated in 15-minute, 24-hour, and 30-day intervals: LOS (Loss of Signal), LOF (Loss of Framing), AIS (Alarm Indication

Signal), BPV (Bipolar Violations), and Far End Errors. From the Troubleshooting Screen, it is possible to make the following selections:

- Receive Guidance in problem resolution
- Clear the Performance Monitoring information
- Clear the Alarm History
- View Performance History

The Guidance Screen is unique to the Troubleshooting Screen.

```

CIRCUIT ID:                               03/01/04 13:04:03
                                     Press ESC to return to previous menu

                                     Troubleshooting Screen

                                     NETWORK          T3 RECEIVER DATA          CUSTOMER
                                     -----
                                     AIS      <-  DS3 SIGNAL  ->    LIVE
                                     M13     <-  FRAMING    ->    C-BIT
--AIS-->|----->  + 3.2    <-  dBdsx LEVEL  ->    + 3.1
                                     |             <-RX FREQUENCY LOCK->    ERR
                                     NET |         CUST
                                     |-----|-----
                                     |             |             |
<-----|-----< 15M/ 24H / 30D          15M/ 24H / 30D
011 05410 0005410 <-  LOS      -> 181 05580 0005580
000 00000 0000000 <-  LOF      -> 000 00000 0000000
000 00000 0000000 <-  AIS      -> 000 00000 0000000
045 00049 0000049 <-  BPV      -> 091 00096 0000096
000 00000 0000000 <-  FEBE     -> 156 00156 0000156

1. Guidance
2. Clear PM Data
3. Alarm History
4. Performance
   History

                                     Selection:

```

Figure 11. Troubleshooting Screen

Guidance

When a problem is detected and the Guidance option is selected, the screen (see **Figure 12**) displays a graphic representation of the NIU3, network equipment, and customer equipment. A problem will be emphasized in reverse video on the appropriate DS3 loop. Text beneath the graphic will provide guidance toward isolating any problem or warning. Although all problems present will be shown in reverse video on the graphic, guidance text will only be displayed for the highest priority problem.

Press N to display the next screen, which has guidance text for a problem that is present but is not the highest priority.

Once the trouble is resolved, that indication will be cleared from the graphic and the guidance text for the next highest priority problem, if any, will be displayed. Problems are prioritized from greater to lesser importance as follows for the Network and Customer interface:

- LOS (Loss of Signal)
- LOF (Loss of Framing)

- AIS (Alarm Indication Signal)
- BPV (Bipolar Violations)
- Far End Errors.

Additionally, the following warnings will display immediately upon occurrence on the Network and Customer interface:

- Receive Level Low or High
- Receive Frequency Lock Error

The Receive Frequency Lock Error provides a warning that the NIU3 has detected that the DS3 Receive frequency is far enough out of tolerance that the NIU3 may not be able to re-transmit this frequency. In this case, the NIU3 monitor jacks may not provide an accurate signal reference. A DS3 test set should be used to measure the DS3 frequency. This condition could be due to either of the following:

- Both the Network side terminating equipment and the Customer side terminating equipment are set for Loop Timing, causing a timing drift.
- The DS3 timing source is not within tolerance.

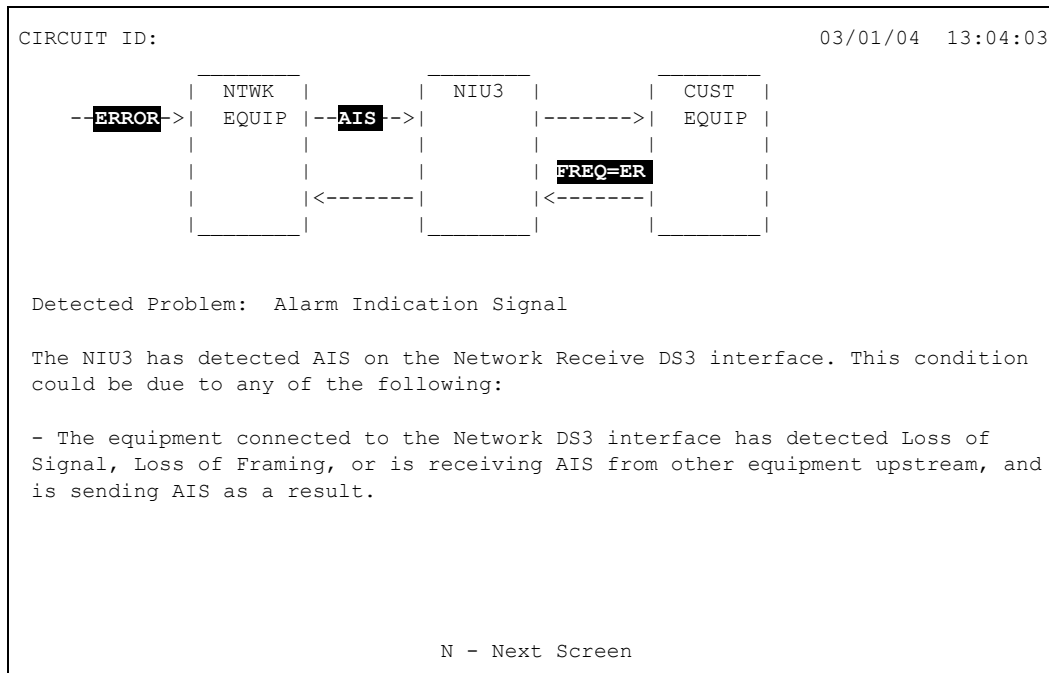


Figure 12. Guidance Screen

Loopback and Test

The Loopback and Test Commands Screen, shown in **Figure 13** and **Figure 14** on page 16, allows tests to be initiated or terminated while graphically displaying the test status of the NIU3 PM. The test patterns can be initiated in both directions simultaneously, but a test pattern and a loopback cannot both be active. A loopback request is confirmed by typing “Y” on the next screen. **Figure 13** shows an active network loopback.

```
CIRCUIT ID: xxxxxxxx                                03/01/04 13:04:03
                                     Press ESC to return to previous menu

                                     Loopback and Test Commands

----->| NIU3 |----->
        |   |   |
NET     |   |   | CUST
        |   |   |
<-----|<---|<-----
        |   |   |

                                     1. Deactivate Network Loopback
                                     2. Loopback Customer
                                     3. Dual Loopback
                                     4. Send Pattern to Network
                                     5. Deactivate Pattern to Network
                                     6. Send Pattern to Customer
                                     7. Deactivate Pattern to Customer
                                     8. Pattern Type                2^23-1
                                     9. Framing for Pattern         C-BIT
                                     10. Timing Source for Pattern  LOCAL
                                     11. Insert Bit Error
                                     12. Reset Pattern Errors

        Pattern
        Errors
        -----
Network      N/A
Customer    N/A

                                     Selection:
```

Figure 13. Loopback and Test Commands Screen, NTKW LBK Active

Figure 14 shows an active test pattern to the network. The error count display for the test pattern will count to and hold at 65535 errors. A loss of pattern sync will cause the count to increment to 65535. Reset the error count by selecting “Reset Pattern Errors”. If a test pattern is active to the network, then a pattern of unframed all “ones” is transmitted toward the customer. The pattern that is sent can be selected using the Pattern Type option. Patterns available include 2²³-1, QRSS, Blue, Idle, and User Defined.

The following sequence is the factory default for the user defined pattern:

0000 0000 1111 1111

If a test pattern is active to the customer, then framed DS3 idle is transmitted toward the network. The Framing for Pattern option selects the framing for the test patterns for both the network and the customer, and it can be set to C-BIT, M13, or UNFR (unframed). The Timing Source for Pattern option selects whether the received network DS3 signal (NTWK) or the NIU3 PM local reference clock (LOCAL) will be used as the clock for the transmitted test pattern.

The timing source for the pattern is set to Network to preserve network timing. If a network signal is not present or if a loopback removes the timing reference from the network signal, local timing can be used for pattern testing.

```

CIRCUIT ID: xxxxxxxx                                03/01/04 13:04:03
                                     Press ESC to return to previous menu

                                     Loopback and Test Commands

Errs: 00000 | NIU3 |                               1. Loopback Network
----->| |----->                               2. Loopback Customer
      | | |                                         3. Dual Loopback
      | | |                                         4. Send Pattern to Network
NET   | | | CUST                                   5. Deactivate Pattern to Network
      | | |                                         6. Send Pattern to Customer
      | | |                                         7. Deactivate Pattern to Customer
<--2^23-1--| |<-----                             8. Pattern Type                2^23-1
      | | |                                         9. Framing for Pattern          C-BIT
      | | |                                        10. Timing Source for Pattern   LOCAL

      Pattern
      Errors
      -----
Network 00000
Customer N/A

                                     Selection:

```

Figure 14. Loopback and Test Commands Screen, Pattern Active

Performance History

The Performance History screens (Figure 15 through Figure 18 on page 18) exhibit a date and time stamp in the upper right-hand corner for the data capture displayed. Figure 15 is an example of the 15-Minute Performance History screen. The date and time shown in each row of data registers indicate the end time of that particular interval. At each 15-minute interval, all performance information is backed up to nonvolatile

memory, and the current 15-minute data registers are transferred to the 15-minute historical data registers. All 15-minute performance data registers are available for the past 24 hours.

The 60-minute performance data registers (Figure 16) are available for the current hour and the past 60 hours.

```

CIRCUIT ID: xxxxxxxx                                03/01/04 13:04:03
Press ESC to return to previous menu

Menu          15 Minute Network Near End Performance Data

1. Definitions      Page 3 of 9  ES-L  SES-L  LOSS-L  CV-L
2. Reset Data      MSEC  000  000  000  000  00000
3. 15 Min Data     01/01 13:00 000  000  000  00000
4. 60 Min Data     01/01 12:45 000  000  000  00000
5. 24 Hr Data      01/01 12:30 000  000  000  00000
6. 30 Days Data    01/01 12:15 000  000  000  00000
7. Line Data       01/01 12:00 000  000  000  00000
8. Path Data 1     01/01 11:45 000  000  000  00000
9. Path Data 2     01/01 11:30 000  000  000  00000
10. Network Near End 01/01 11:15 000  000  000  00000
11. Customer Near End 12/31 10:00 000  000  000  00000
12. Network Far End 12/31 10:45 000  000  000  00000
13. Customer Far End 12/31 10:30 000  000  000  00000
14. Change Thresholds 12/31 10:15 000  000  000  00000

'B'Backward      -10->|_____|--->13
'F'Forward      |N C|
                12<---|_____|<-11-

Selection:
    
```

Figure 15. 15-Minute Performance History

```

CIRCUIT ID: xxxxxxxx                                03/01/04 13:04:03
Press ESC to return to previous menu

Menu          60 Minute Network Near End Performance Data

1. Definitions      Page 2 of 5  ES-P  SES-P  UAS-P  CV-P
2. Reset Data      MESC  00000  0000  0000  0000  00000
3. 15 Min Data     03/01 13:00 0000  0000  0000  00000
4. 60 Min Data     03/01 12:00 0000  0000  0000  00000
5. 24 Hr Data      03/01 11:00 0000  0000  0000  00000
6. 30 Day Data     03/01 10:00 0000  0000  0000  00000
7. Line Data       03/01 09:00 0000  0000  0000  00000
8. Path Data 1     03/01 08:00 0000  0000  0000  00000
9. Path Data 2     03/01 07:00 0000  0000  0000  00000
10. Network Near End 03/01 06:00 0000  0000  0000  00000
11. Customer Near End 03/01 05:00 0000  0000  0000  00000
12. Network Far End 03/01 04:00 0000  0000  0000  00000
13. Customer Far End 03/01 03:00 0000  0000  0000  00000
14. Change Thresholds 03/01 02:00 0000  0000  0000  00000

'B'Backward      -10->|_____|--->13
'F'Forward      |N C|
                12<---|_____|<-11-

Selection:
    
```

Figure 16. 60-Minute Performance History

The 24-hour performance data registers (Figure 17) are available for the current day and the past 30 days.

The 30-day performance data registers (Figure 18) are available for the current 30 days and three previous 30-day periods. All performance data registers can be reset by the Reset Data option. This reset must be confirmed by choosing Y on the warning screen (not shown).

The MSEC (Measured Seconds) parameter is a count of how many seconds have elapsed during the current interval displayed on the Performance History screen. The count will reset to zero when the performance history data is reset, or if the date or time is changed. The count will automatically restart when the current interval being observed ends and a new current interval begins.

```

CIRCUIT ID: xxxxxxxx                                03/01/04 13:04:03
                Press ESC to return to previous menu

                Menu                                24 Hour Network Far End Performance Data

1. Definitions                                Page 1 of 1    ES-P  SES-P  UAS-P  CV-P
2. Reset Data                                MSEC         00000 00000 00000 00000 0000000
3. 15 Min Data                                03/01        00000 00000 00000 00000 0000000
4. 60 Min Data                                02/29        00000 00000 00000 00000 0000000
5. 24 Hr Data                                 02/28        00000 00000 00000 00000 0000000
6. 30 Day Data                                02/27        00000 00000 00000 00000 0000000
7. -----                                02/26        00000 00000 00000 00000 0000000
8. Path Data 1                                02/25        00000 00000 00000 00000 0000000
9. Path Data 2                                02/24        00000 00000 00000 00000 0000000
10. Network Near End                          02/23        00000 00000 00000 00000 0000000
11. Customer Near End                         02/22        00000 00000 00000 00000 0000000
12. Network Far End                           02/21        00000 00000 00000 00000 0000000
13. Customer Far End                          02/20        00000 00000 00000 00000 0000000
14. Change Thresholds                         02/19        00000 00000 00000 00000 0000000

                                                    -10->|_____|--->13
                                                    |N  C|
                                                    12<---|_____|<-11-

                Selection:
    
```

Figure 17. 24-Hour Performance History

```

CIRCUIT ID: xxxxxxxx                                03/01/04 13:04:03
                Press ESC to return to previous menu

                Menu                                30 Day Network Near End Performance Data

1. Definitions                                PAGE 1 of 1    ES-L  SES-L  LOSS-L  CV-L
2. Reset Data                                MSECs 0000082 0000098 0000097 0000097 0000007
3. 15 Min Data                                Ending: 02/31 0000293 0000293 0000293 0000000
4. 60 Min Data                                Ending: 01/01 0000313 0000313 0000313 0000000
5. 24 Hr Data                                 Ending: 11/30 0002285 0000929 0000376 0002704
6. 30 Day Data
7. Line Data
8. Path Data 1
9. Path Data 2
10. Network Near End
11. Customer Near End
12. Network Far End
13. Customer Far End
14. Change Thresholds

                                                    -10->|_____|--->13
                                                    |N  C|
                                                    12<---|_____|<-11-

                Selection:
    
```

Figure 18. 30-Day Performance History

Each 15-minute and 24-hour performance parameter has a threshold as shown in the Performance Thresholds screen (Figure 19). Thresholds can be set in Change Performance Threshold (Figure 20) which automatically displays upon entering the threshold number selection in Figure 19. The 15-minute maximum value is 900. The 24-hour maximum value is 65535. The 15-minute and 24-hour default values are as shown in

Figure 19. When a threshold is crossed, an event is logged in the Event Log History.

The Line Related thresholds set the threshold for both the network and customer line parameters for the near end only. The Path Related thresholds set the thresholds for the near and far path parameters for both network and customer. All thresholds can be disabled or reset to factory default.

```

CIRCUIT ID: xxxxxxxx                                03/01/04 13:04:03
                Press ESC to return to previous menu

                Performance Thresholds

                15 Min          Line Related          24 Hr
-----
1. CV-L          = 387                9. CV-L          = 00387
2. ES-L          = 025                10. ES- L        = 00025
3. SES-L         = 004                11. SES-L        = 00004
4. LOSS-L        = 004                12. LOSS-L       = 00004

                15 Min          Path Related          24 Hr
-----
5. CV-P          = 382                13. CV-P         = 00382
6. ES-P          = 025                14. ES-P         = 00025
7. SES-P         = 4                  15. SES-P        = 00004
8. UAS-P         = 010                16. UAS-P        = 00010

17. Restore Default Thresholds          18. Disable All Thresholds

                Selection:
  
```

Figure 19. Performance Thresholds Screen

```

CIRCUIT ID: xxxxxxxx                                03/01/04 13:04:03
                Press ESC to return to previous menu

                CV-L 15 Min Threshold = 387

                D. Disable Threshold

                Enter Value:
  
```

Figure 20. Change Performance Threshold Screen

The Performance Data Definitions screens (**Figure 21** and **Figure 22**) describe each line, path, and far-end performance parameter and explain using reverse video to indicate incomplete or invalid data registers.

```

CIRCUIT ID: xxxxxxxx                                03/01/04 13:04:03
                Press ESC to return to previous menu

                Performance Data Definitions

Line Related (Near End only):
  ES-L      Errored Seconds          (BPV + EXZ) >= 1 or LOS >= 1
  SES-L     Severely Errored Seconds (BPV + EXZ) >= 45 or LOS >= 1
  LOSS-L    Loss of Signal Seconds   LOS >= 1
  CV-L      Code Violation Count      (BPV + EXZ) count

Path Related (Near End):
  ES-P      Errored Seconds          Parity errors >=1 or
                                         SEF >= 1 or AIS >= 1
  SES-P     Severely Errored Seconds Parity errors >= 45 or
                                         SEF >= 1 or AIS >= 1
  UAS-P     Unavailable Seconds      >10 cont. SES-Ps
  CV-P      Code Violation Count      Parity Error Count

NOTE: Reverse video indicates invalid data due to a terminal restart (or power
      cycle), a data register reset, or a system date or time change.

                'N' - Next Page
  
```

Figure 21. Performance History Data Definitions 1

```

CIRCUIT ID: xxxxxxxx                                03/01/04 13:04:03
                Press ESC to return to previous menu

                Performance Data Definitions

Path Related (Near End continued):
  SAS-P    SEF/AIS Seconds           AIS >= 1 or SEF >= 1
  SEFS-P   Severely Errored Frame Seconds SEF >= 1
  AISS-P   AIS Seconds               AIS >= 1

Path Related (Far End):
  ES-P     Errored Seconds           FEBE >=1 or SEF/AIS(far) >= 1
  SES-P    Severely Errored Seconds FEBE >= 45 or SEF/AIS(far) >= 1
  UAS-P    Unavailable Seconds       >10 cont. SES-Ps
  CV-P     Code Violation Count      FEBE Count

NOTE: Under an UAS-P condition, ES-P, SES-P, CV-P, SAS-P, SEFS-P and
      AISS-P counts are inhibited. Under a SES-L or SES-P condition, the
      respective CV-L or CV-P count is inhibited.
NOTE: Parity errors are P-bit parity errors for M13 framing and CP-bit parity
      errors for C-bit framing.
  
```

Figure 22. Performance History Data Definitions 2

Event History

The Event History screen (Figure 23) shows the last 200 events logged to the event log. Events are time stamped and shown in chronological order. To view the newest events, press E to go to the end of the event log. Oldest events are seen by choosing H to go to the beginning (Home) of the event log. Each event source is shown and can be either NI (network interface), CI (customer interface), or NIU3 (local to the NIU3 PM).

To clear the event log, choose R for Reset. This reset must be confirmed by choosing Y on the next screen. Possible events include the following:

- Status changes
- Provisioning commands
- Loopback commands (remote and manual)
- Power events
- Event log reset
- Performance data reset
- PM threshold crossings
- DS3 framing mismatch detect
- FEAC messages

```
CIRCUIT ID: xxxxxxxx                                03/01/04 13:04:03
                                     Press ESC to return to previous menu

                                     Event History

Num  Description of Event                               Date   Time      Source
-----
  1.  NIU3 Powered Up                                  03/01/04 00:20:42  NIU3
  2.  DS3 Out-Of-Frame FEAC Alarm                     03/01/04 00:43:13  CI
  3.
  4.
  5.
  6.
  7.
  8.
  9.
 10.

Page Number:  1/ 1  Number of Events:  2
-----
'P' - Previous Page  'H' - Home      'R' - Reset Events
'N' - Next Page     'E' - End

Selection:
```

Figure 23. Event History Screen

Alarm Log

The Alarm Log Screen (**Figure 24**) shows the last 200 alarms logged to the alarm log. Alarms are time stamped and shown in chronological order. The newest alarms are seen by choosing E to go to the end of the alarm log. Oldest alarms are seen by choosing H to go to the beginning of the alarm log. Each alarm source is shown and can be either NI (network interface), CI (customer interface), or NIU3 (local to the NIU3 PM).

To clear the alarm log, choose R. This reset must be confirmed by choosing Y on the next screen. Possible alarms include the following:

- Power events
- Alarm log reset
- FEAC alarms
- AIS
- LOS
- OOF
- RAI
- Receive level and frequency offset warnings

```
CIRCUIT ID: xxxxxxxx                                03/01/04 13:04:03
Press ESC to return to previous menu

Alarm Log

Num  Description of Alarm                               Date    Time    Source
-----
1.  NIU3 Powered Up                                  01/01/04 00:20:42 NIU3
2.  DS3 Out-Of-Frame FEAC Alarm                     01/01/04 00:43:13 CI
3.
4.
5.
6.
7.
8.
9.
10.

Page Number:  1/ 1  Number of Events:  2

-----
'P' - Previous Page  'H' - Home      'R' - Reset Events
'N' - Next Page      'E' - End

Selection:
```

Figure 24. Alarm Log Screen

Set Circuit ID and Scratch Pad

The Set Circuit ID screen (**Figure 25**) sets the circuit identification (20-characters maximum, alphanumeric and special characters included). The screen includes a 50-character Scratchpad.

Set Date and Time

The Set System Date and Time screen (**Figure 26**) is used to set the NIU3 PM date and time. Once date and time are configured, the date and time performance registers update accordingly.

```
CIRCUIT ID: xxxxxxxx                                03/01/04  13:04:03
Press ESC to return to previous menu

Set Circuit ID and Scratchpad

1. Set Circuit ID
2. Set Scratchpad

Current Scratchpad:

Selection:
```

Figure 25. Set Circuit ID and Scratch Pad

```
CIRCUIT ID: xxxxxxxx                                03/01/04  13:04:03
Press ESC to return to previous menu

Set System Date and Time

New Date =    /    /    (MM/DD/YY)

<Press TAB to cycle between Time and Date>

New Time =    :    :    (HH:MM:SS)
```

Figure 26. Set System Date and Time

Terminal Modes

The Terminal Modes Menu ([Figure 27](#)) is available for configuring the RS-232 craft interface for a manual terminal update or a real-time terminal update.

Software Download

The Software Download screen is shown in [Figure 28](#). Procedures for upgrading the NIU3 PM are shown in [Table 5, Software Upgrade Procedure](#) on page 25.

NOTE

Real-time terminal update is recommended for normal operation unless screens are to be captured or logged to a print file.

```
CIRCUIT ID: xxxxxxxx "CTRL + R" TO UPDATE 03/01/04 02:04:03
Press ESC to return to previous menu

TERMINAL MODES MENU

MANUAL UPDATE MODE:

* You can print or log screens
* No text is highlighted
* "Ctrl+R TO UPDATE" appears at the top of each screen, reminding
  you to press the "Ctrl" and "R" keys to update the screen
* There is a delay between screen changes & updates
* After 30 min. of no interaction, a new baud rate search is begun
* Ignores input until screen is finished printing
* The <Backspace> key is disabled

REAL-TIME UPDATE MODE:

* Faster of the two modes
* You cannot print screens to a log file
* Highlighting is enabled
* Recommended for daily operation

Press CTRL+T to toggle update modes on any screen
```

Figure 27. Terminal Modes Menu

```
CIRCUIT ID: xxxxxxxx 03/01/04 02:30:19
Press ESC to return to previous menu

Software Download

Press 1 to begin YMODEM download

Selection:
```

Figure 28. Software Download

FLASH UPGRADE OF THE NIU3

To upgrade the NIU3 PM using the YModem protocol, perform the steps listed in [Table 5](#):

Table 5. Software Upgrade Procedure

Step #	Procedure
1	Save the new flash file onto the computer that is being used to control the upgrade. File should have “.flh” extension.
2	Logon to the NIU3 PM using HyperTerminal.
3	HyperTerminal setup on the Configure Screen: Speed: 19200 Parity: None Data: 8 Stop: 1 Flow Control: None.
4	From the ADTRAN NIU3 menu, select the Software Download option, and press ENTER.
5	From the Software Download menu, to begin YModem download, select option 1, press ENTER.
6	A screen appears, stating that the NIU3 PM is waiting for download and the character C appears across the screen to show the unit is still active. With the mouse, click on Transfer, then click Send File.
7	A screen appears requesting a filename. <i>Ensure that YModem protocol is selected.</i> Enter the filename where the new firmware is being stored, then click on Send.
8	When finished, a message will appear stating the following: Flash Upload complete, Rebooting.....Please wait.
9	The NIU3 PM will reboot, and the upgrade is complete. <i>NOTE: The cut-through relays will momentarily disconnect the NIU3 from the circuit as self-tests are being run.</i>

5. TESTING

The NIU3 is compatible with standard test equipment. Digital testing is accomplished with the T-BERD 310 or equivalent.

FEAC Loopback

The test device at the CO inserts a DS3 NIU FEAC (Far End Alarm and Control) loop up code (C-bit parity framing only) toward the NIU3. The NIU3 then performs a network loopback. The loopback is terminated by a DS3 NIU FEAC loop down code.

Loopback and Bypass Configurations

There are four basic NIU3 normal/loopback configurations:

- I. Normal Operation
- II. Network Loopback
- III. Customer Loopback
- IV. Dual Loopback

Each configuration is shown in a block diagram in [Figure 29](#) on page 27. Each block diagram represents the NIU3 circuit card in normal operation or a particular loopback.

Each block diagram illustrates the relative position of the detecting circuits to one another and the LED indication associated with each, plus the location of the mid-size monitoring jacks. See [Table 2](#) on page 5 for LED descriptions.

Bypass Operation

The bypass relays are represented in block diagram I only. The bypass relays are independent of the NIU3 circuit card and loopback configurations. The relays switch to the bypass position during one of the following conditions:

- The NIU3 PM fails or loses power
- The NIU3 PM is removed
- Flash upgrade is in progress

In-band Test Codes

Remote testing can also be conducted using in-band test codes. The CO test device inserts the arming code: 1011100 for 5 seconds. After 5 seconds the test device has 20 seconds to transmit one of the following test identifier codes:

- 1101 0011 1101 0011 D3D3h Loopback
- 0010 1110 0010 0011 2E23h 2[^]23-1
- 0010 1110 0010 0000 2E20h QRSS
- 1101 0111 0100 0001 D741h Blue

- 1101 0111 0100 0010 D742h Idle
- 1101 0111 0100 0011 D743h User Defined

The first code initiates a Loopback at the customer interface in the network direction. The remaining codes send the associated test pattern in both network and customer directions simultaneously. To deactivate a loopback or test pattern, send 1110110, and the NIU will respond immediately.

NIU test patterns are framed according to framing of the incoming signal at the NIU network interface at the moment an NIU in-band test pattern is activated. The User Defined test pattern is set to the last test pattern programmed on the NIU Loopbacks and Test Commands screen.

Initiating Loopback with LBK SEL Pushbutton

The front panel **LBK SEL** pushbutton controls three loopback modes as described here:

- To initiate a loopback toward the *network*, press **LBK SEL** once and hold for 5 seconds. During this time the **NTWK LBK** LED flashes rapidly indicating the network loopback is arming. After 5 seconds the network loopback enables; the **NTWK LBK** LED illuminates solid; and **LBK SEL** can be released.
- To initiate a loopback toward the *customer*, press **LBK SEL** twice and then hold for 5 seconds. During this time the **CUST LBK** LED flashes rapidly indicating the customer loopback is arming. After 5 seconds the customer loopback enables; the **CUST LBK** LED turns on solid; and **LBK SEL** can be released.
- To initiate a dual (bidirectional) loopback, press **LBK SEL** three times and hold for 5 seconds. During this time the **NTWK LBK** and **CUST LBK** LEDs flash rapidly indicating the dual loopback is arming. After 5 seconds the dual loopback enables, the **NTWK LBK** and **CUST LBK** LEDs turn on solid, and **LBK SEL** can be released.

If **LBK SEL** is released before the arming period expires the loopback does not initiate. This feature decreases the chance of an inadvertent loopback.

If a loopback is in effect, pressing **LBK SEL** will disable the loopback regardless of initiation point.

Loopback priority is in response to the most recent local or remote input. The **LBK** LEDs show status.

The NIU3 features additional testing available in the loopback and test commands menus. Manual loopback and BERT tests are available as shown in the Loopback and Test commands menu screens.

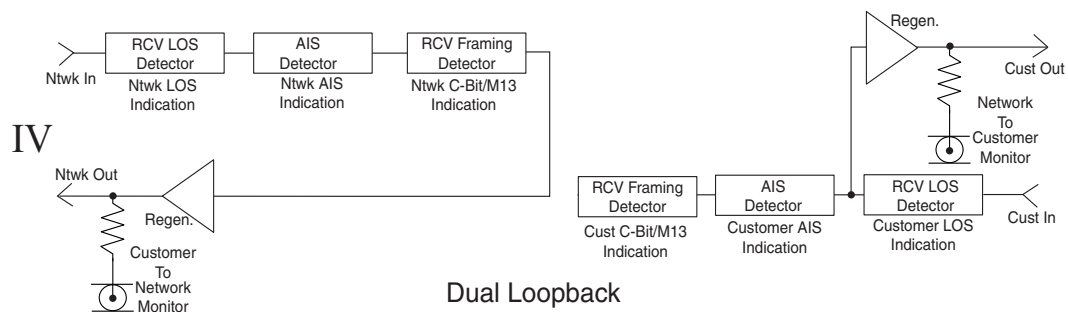
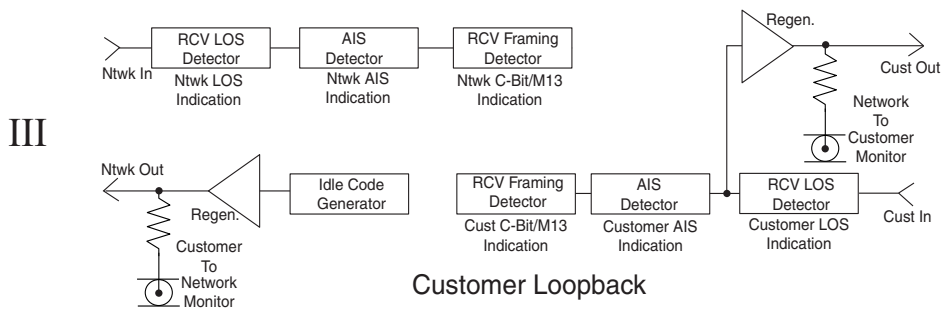
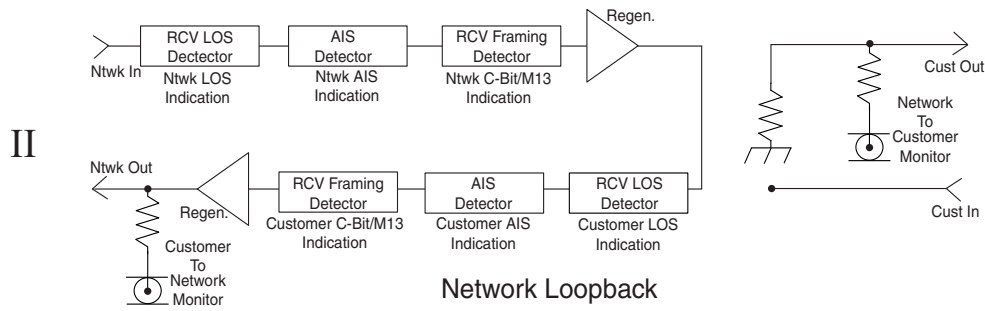
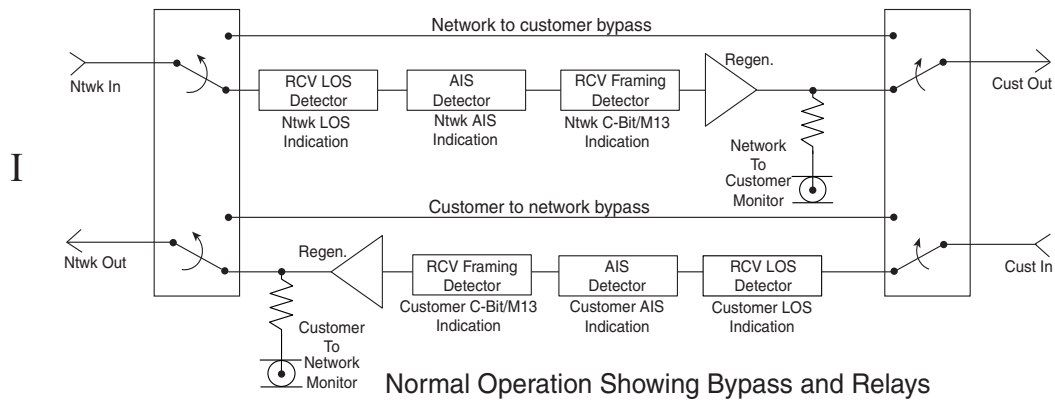


Figure 29. Loopback Block Diagrams

Time Out

After a loopback or pattern test is initiated, unless terminated manually, a time out returns the loop to normal operation after 20 minutes, 60 minutes, 120 minutes, or 24 hours. The timer is reset at any point by sending the FEAC loop up code. The test time out can be disabled through the RS-232 craft interface.

NOTE

When conducting a terminal session always select VT100 mode in the Settings menu prior to making the RS-232 craft interface connection.

6. MAINTENANCE

The NIU3 PM does not require maintenance for normal operation. ADTRAN does not recommend field repairs. For repair services, refer to *Warranty and Customer Service*.

Relay Replacement

A failed relay can be identified by a process of elimination. If there is no data transmission during a malfunction, power loss, or removal of the NIU3 circuit card, or during a flash upgrade, a failed relay is indicated. A Relay Replacement Kit (P/N: 1212072L1) is available from ADTRAN.

CAUTION

Relay prongs are fragile. Take extreme care when removing and replacing relays so prongs are not bent or broken.

To remove a relay, perform the following steps:

1. Insert a jumper strap on the posts immediately adjacent to the suspect relay. This provides a signal path, bypassing the relay.
2. Using an appropriately-sized IC extractor tool, lift the relay off its socket.
3. Take note of prong configuration to match polarity of the replacement relay.
4. Carefully align and insert the replacement relay until fully seated.
5. Remove the jumper strap.
6. Verify data transmission.

7. SPECIFICATIONS

Specifications for the NIU3 PM are detailed in [Table 6](#) on page 29.

8. 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, 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 Customer and Product Service (CAPS) prior to returning equipment to ADTRAN.

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

Table 6. Specifications and Compliance

Electrical	
Input Voltage:	–48 VDC Systems = –42 VDC to –56 VDC –24 VDC systems = –22 VDC to –27 VDC +24 VDC systems = +22 VDC to +27 VDC
Input Current:	–48 VDC systems: 125 mA maximum ±24 VDC systems: 250 mA maximum
Compliance Standards	
NEBS:	Level 3
FCC:	Part 15, Class A
UL:	60950
ANSI:	T1.102 and T1.404
Mechanical	
Dimensions:	Height: 5-5/8 inches Width: 1-7/8 inches Depth: 5-1/2 inches T400 density
Weight:	NIU3 PM circuit board: 8 ounces Standalone housing: 2 pounds 3-slot shelf: 4 pounds 12-slot shelf: 12 pounds
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:	Per GR-63-CORE
Part Numbers	
NIU3 PM:	1213075L2, CLEI: NCD3EGRA __
Standalone Housing:	1212070L1, CLEI: NCM5KWVD __
3-Slot Shelf:	1212073L1, CLEI: NCM5K4ZD __
12-Slot Shelf:	1212078L1, CLEI: NCM5RZ0D __
48 VDC Standalone AC/DC Transformer:	1212074L1 (separately purchased)
–54 VDC Power Supply/Rectifier:	1212080L1 (separately purchased)
Relay Replacement Kit:	1212072L1
Shelf Empty Slot Blank Cover:	1212076L1

