

DS3 Network Interface Unit NIU3 with Performance Monitoring Installation and Maintenance Practice

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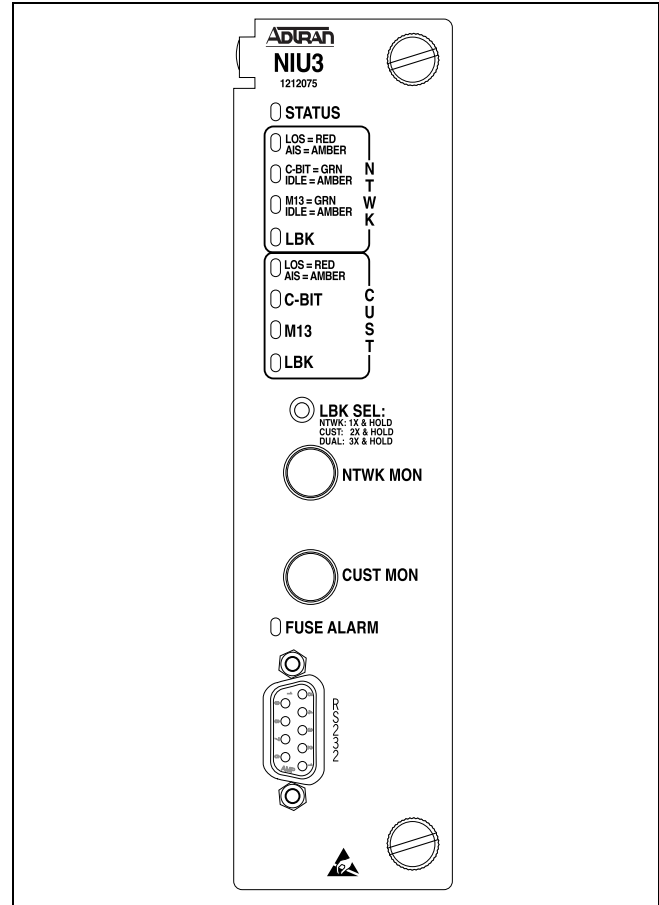


Figure 1. NIU3 PM

1. GENERAL

The 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 unit performs a loopback at the customer interface toward the network when initiated either remotely from the Test Center or CO, or locally from the unit's front panel **LBK SEL** pushbutton, or through the RS-232 craft interface.

The NIU3 PM provides performance monitoring and event history information through a DB-9 RS-232 craft interface. The NIU3 PM is transparent to data transmission during normal operation. **Figure 1** shows the NIU3 PM, P/N 1212075L2.

Revision History

Issue 4 of this document incorporates additional power connections and information, and adds loopback diagrams.

Features

The NIU3 PM supports the following features and functions:

- Standalone enclosure, 12-slot shelf, or 3-slot shelf installation.
- 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 inband 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.
- DB-9 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.

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.

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's bypass relays* 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. See [Figure 2](#) for a circuit diagram of the NIU3 PM in a DS3 network delivered via SONET.

*ADTRAN patent pending configuration.

In addition to supporting NPRM the NIU3 PM provides performance monitoring and event history through the front panel DB-9 RS-232 via a VT100 or similar test device or control terminal.

Compliance

[Table 1](#) shows the compliance codes for the DS3 Network Interface Unit NIU3 with Performance Monitoring. The DS3 Network Interface Unit NIU3 with Performance Monitoring is NRTL listed to the applicable UL standards.

Table 1. UL60950 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

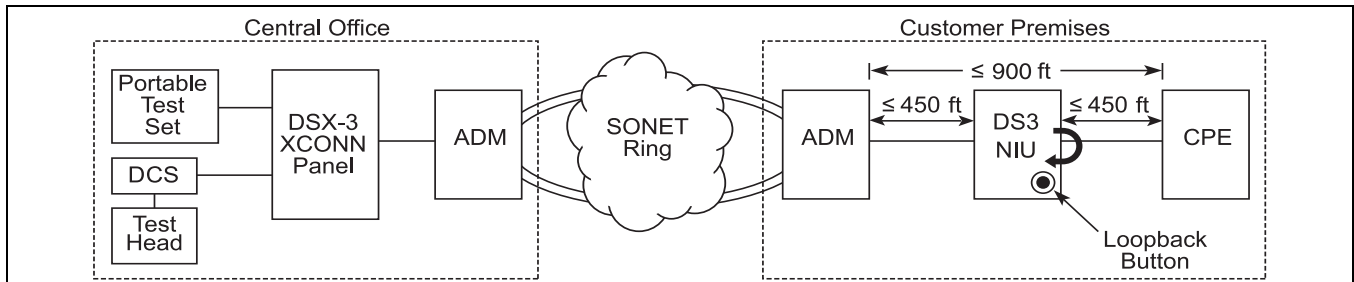


Figure 2. DS3 NIU3 PM Loopback Diagram

2. INSTALLATION



After unpacking the unit inspect it for damage. If damage is noted, file a claim with the carrier, then contact ADTRAN. Refer to [Warranty and Customer Service](#).

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. Also, during NIU3 bypass operations, if total transmission distance exceeds 900 feet, DS3 data may cease. The DS3 NIU is not intended for use as a repeater. See [Figure 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 a craft interface. The standalone housing or shelf security panel must be opened to access the monitoring jacks and the DB-9 craft interface.

CAUTION

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

Housing Ground Option

Optionally, frame ground is provided by a ground lug on the standalone motherboard (J1). J1 and TB1 are electrically connected. A ground wire portal on the rear panel of the housing provides access for this ground wire. J1 is a screw compression terminal requiring a copper wire (14 AWG minimum) connection. Ground posts are installed on the standalone housing, the 3-slot shelf, and the 12-slot shelf rear panels. The ground posts are sized for 6 AWG maximum.

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 **A PWR, A RET** and **B PWR, B RET** wiring (18 AWG minimum) plus a common Frame Ground (18 AWG minimum) connection (see [Figure 3](#)). The standalone housing has a power wire portal on the rear panel for termination on the host circuit board at TB1.

CAUTION

If supply and return terminals are installed opposite of the described configurations, the unit will not power-up.

The following terminal connections are made:

- Connect –48 V or –24 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.

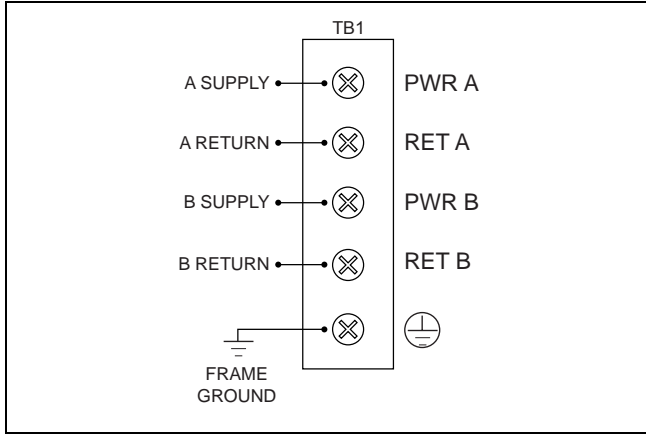


Figure 3. Shelf Power Connection

Independent Power Supplies

Two optional independent power supply units are available.

- AC/DC transformer, P/N 1212074L1, providing 48V at 200 mA. Output terminals are stripped and tinned wires.
- Power supply/rectifier, P/N 1212080L1, providing -54V @ 2 A. Output terminals are ring lugs sized for the NIU3 input terminals.

Both plug into a standard 120 VAC outlet.

AC/DC Transformer

The 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](#)).

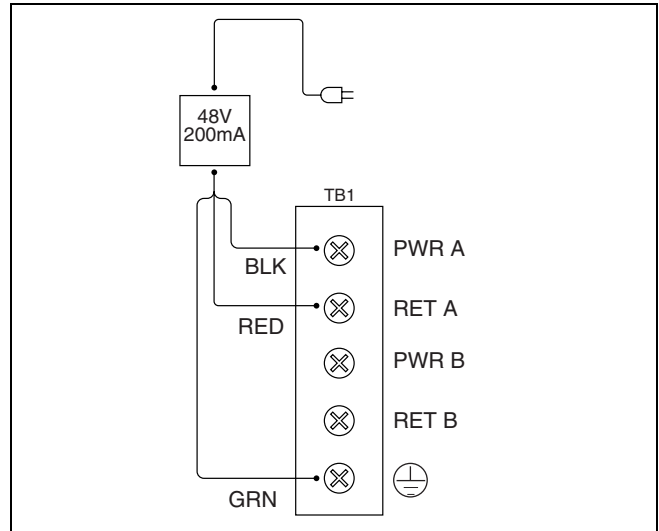


Figure 4. AC/DC Transformer Connection

Power Supply/Rectifier

For the 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 PS/R is a negative output device so RED and BLACK wires connect opposite of the AC/DC transformer wires.

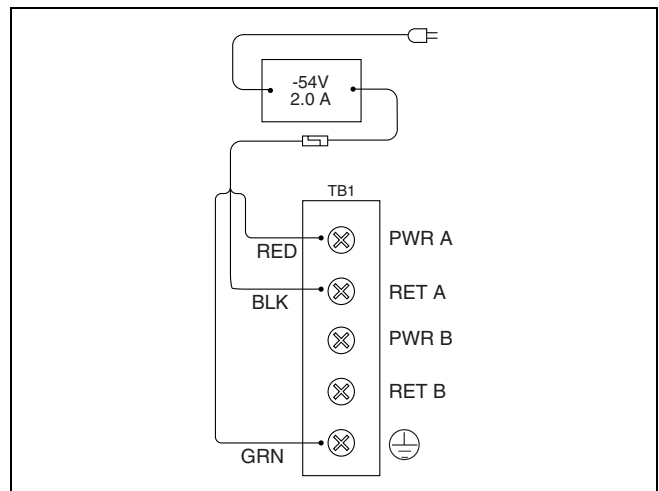


Figure 5. Power Supply/Rectifier Connection

Fuse

The input current is fused on each NIU3 PM card.

Options

Hardware options are not required prior to installation and turnup. Options for test time out, inband loopback enable, and keep alive signal are available on the Provisioning Menu screen. Framing is automatically detected and maintained through the unit.

LED Indication

Ten LEDs on the NIU3 PM front panel show status during normal, problem, and test operation. [Table 2](#) describes LED indication.

Initiating Loopback with SW1

The front panel **LBK SEL** pushbutton (SW1) controls three loopback modes as described here:

- To initiate a network loopback, depress SW1 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 turns ON solid; and SW1 can be released.
- To initiate a customer loopback, depress **SW1** twice and 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 **SW1** can be released.

Table 2. LED Indication

LED	Color	Status	Description
STATUS	Green	On	Normal operation.
	Red	On	Card malfunction (Bypass operation enabled).
		Off	No power.
NTWK LOS/AIS	Red	On	DS3 signal not present at network interface.
	Amber	On	AIS present at network interface.
		Off	DS3 signal present at network interface.
NTWK C-BIT	Green	On	C-Bit framing present at network interface.
		Off	C-Bit framing not detected at network interface.
	Amber	On	C-Bit framing present, TX idle.
NTWK M13	Green	On	M13 framing present at network interface.
		Off	M13 framing not detected at network interface.
	Amber	On	M13 framing present, 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	On	DS3 signal not present at customer interface.
	Amber	On	AIS present at customer interface.
		Off	DS3 signal present at customer interface.
CUST C-BIT	Green	On	C-Bit framing present at customer interface.
		Off	C-Bit framing not detected at customer interface
CUST M13	Green	On	M13 framing present 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.

- To initiate a dual (bidirectional) loopback, depress **SW1** 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 **SW1** can be released.

If **SW1** 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, depressing **SW1** 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.

3. TURNUP

When inserted into a host with power, the **STATUS** LED turns on red while the NIU3 PM performs a self-test. If the self-test passes, the **STATUS** LED turns on 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.

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 nonintrusive 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 **NTWK MON** jack; the signal to the customer is monitored via the **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.
- 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 Option 3 on the Provisioning menu. The three selections that can be sent to the network upon customer LOS are these:

- Framed Idle
- AIS
- No Signal

Loss of Framing

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

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 6**. 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 1 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 circuit card fails or loses power
- The NIU3 circuit card is removed
- Flash upgrade is in progress

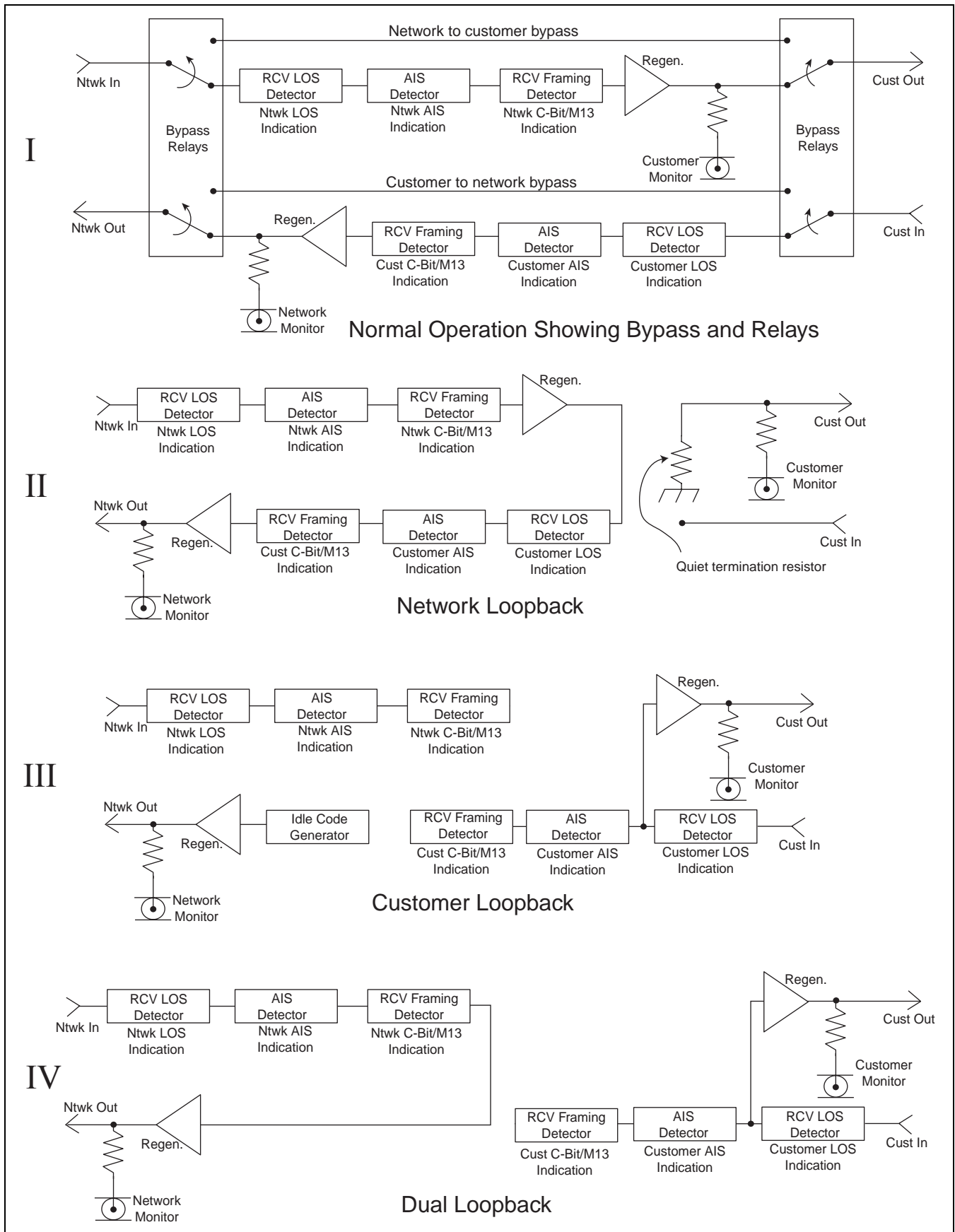


Figure 6. Loopback Block Diagrams

Inband Test Codes

Remote testing can also be conducted using inband 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 NTWK interface at the moment an NIU inband 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.

The loopback command can also be enabled or terminated with the front panel **LBK SEL** pushbutton or via craft interface. 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.

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 craft interface.

NOTE

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

6. CONTROL PORT OPERATION

The NIU3 PM front panel DB-9 provides an RS-232 interface for connection to a controlling terminal. The DB-9 pinout is shown in [Figure 7](#). A terminal session is initiated upon insertion of a DB-9 jack into the RS-232. 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.

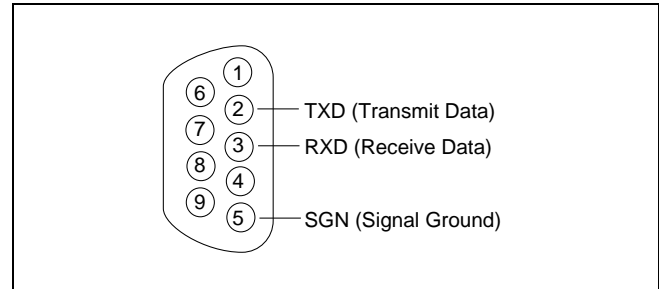


Figure 7. Cable Side Pin Assignments

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 3](#).

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. Following screen instructions will successfully navigate the user through the complete option menu series.

Table 3. Definition of Screen Abbreviations

UNFR	Unframed: An unframed DS3 signal.
M13	DS3 M13 Multiplex: 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.
C-Bit	DS3 C-Bit Parity: 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.
2²³-1	Pseudorandom Pattern: With a maximum of 22 sequential 0s and 23 sequential 1s that is used to simulate live T3 data.
BPV	Bipolar Violation: The occurrence of a pulse of the same polarity as the previous pulse. BPVs that are part of the zero substitution code are excluded.
EXZ	Excessive Zeros: The occurrence of more than two consecutive zeros.
FEBE	Far-End Block Error: 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 only apply to the C-Bit parity application.
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.
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.

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 Main Menu appears as shown in [Figure 8](#).

The Main Menu provides access to detailed performance and configuration information. The following screens are available from the Main Menu:

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. NIU3 Unit Information | <ol style="list-style-type: none"> 2. Provisioning 3. Status 4. Loopbacks and Test 5. Performance History 6. Event History 7. Alarm Log 8. Set Circuit ID and Scratch Pad 9. Set Date and Time 10. Terminal Modes 11. Software Download |
|--|---|

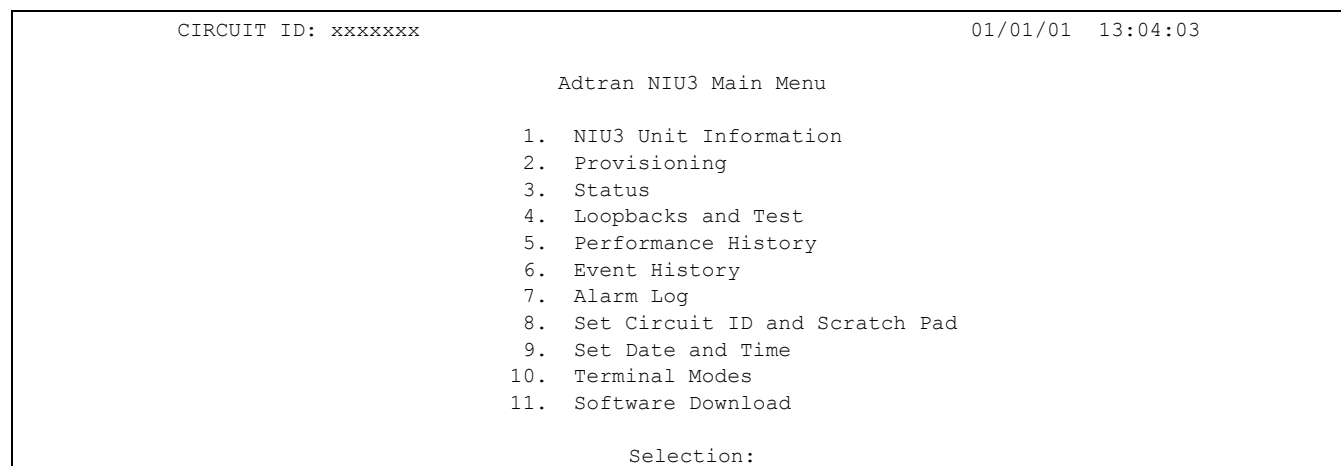


Figure 8. Main Menu Screen

The NIU3 Unit Information screen, **Figure 9**, displays part number, serial number, CLEI code, firmware revision, and checksums for the NIU3 PM.

The Provisioning screen, **Figure 10**, shows screen option selections. Option 2, Inband M13 Loopback Enable/Disabled, is used to enable or disable detection of inband loopback codes. Option 3, KAS for Customer LOS, selects which keep alive signal is sent to the network when the NIU3 customer receiver detects LOS, such as Idle, AIS, or No Signal.

The Reset to Factory Default selection, D, resets options 1, 2 and 3 as shown in Figure 10.

The Bert/Loopback Timeout screen options can be Disabled, or selected for 20 min, 60 min, 120 min, or 24 hrs. 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.

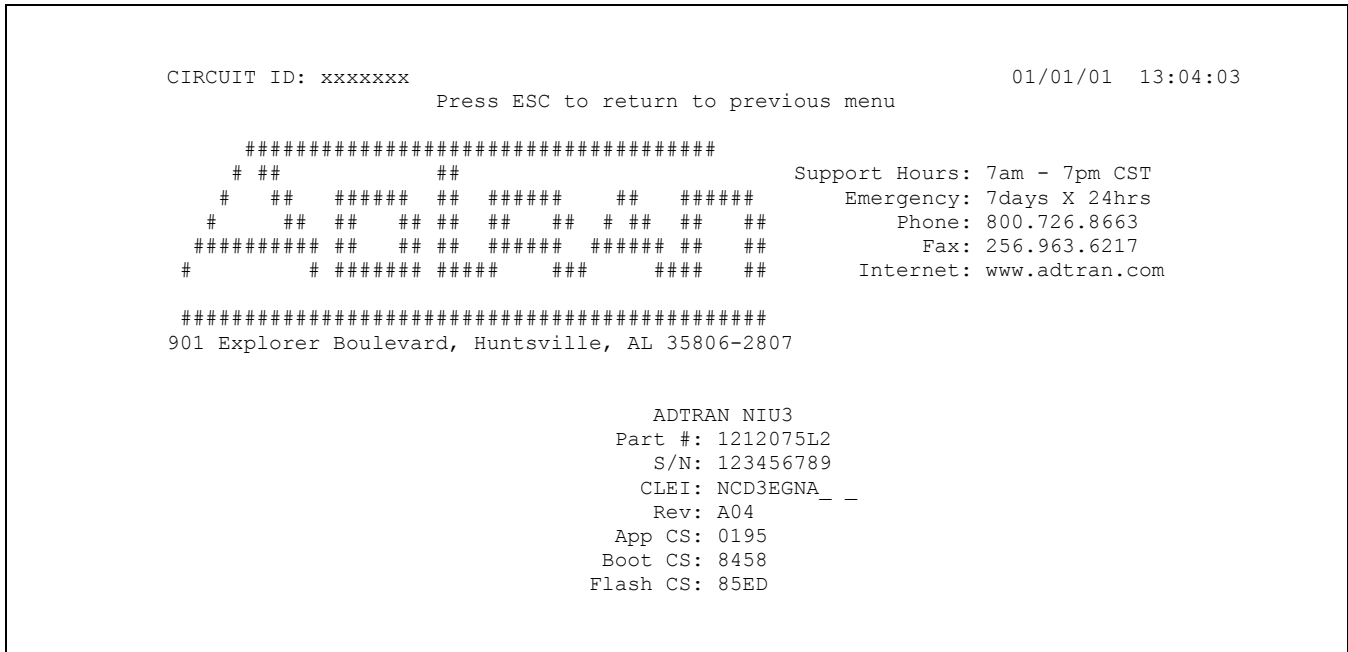


Figure 9. Unit Information Screen

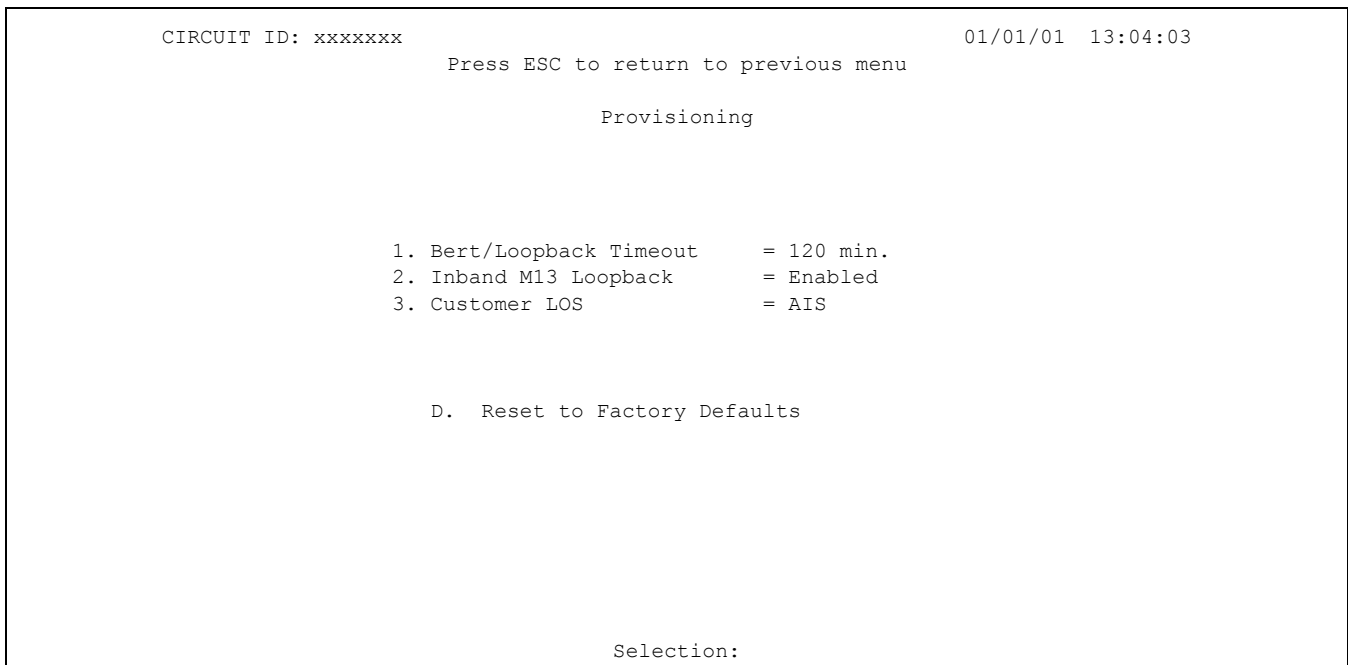


Figure 10. Provisioning Screen

The Status screen, **Figure 11**, provides quick access to the network and customer status information. The indication of “ones” is only shown for the transmit status.

```

CIRCUIT ID: xxxxxxxx                                01/01/01 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
                |     |     |
                <-AIS--|     |<-LOS--
                |_____|     |
                15M/ 24H / 30D          15M/ 24H / 30D
                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 11. Status Screen

The Loopback and Test Commands Screen, **Figure 12** and **Figure 13**, 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 12 shows an active network loopback.

Test Pattern Pattern Generator

Figure 13 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.

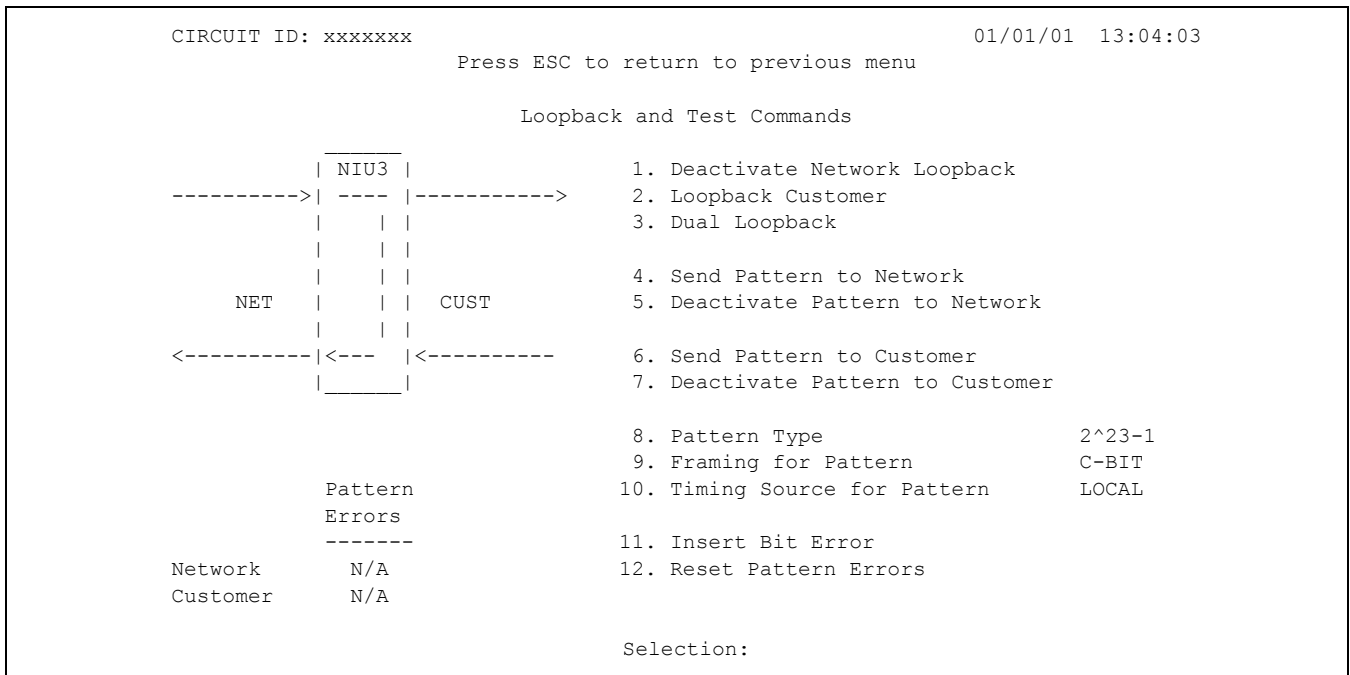


Figure 12. Loopback and Test Commands Screen, NTKW LBK Active

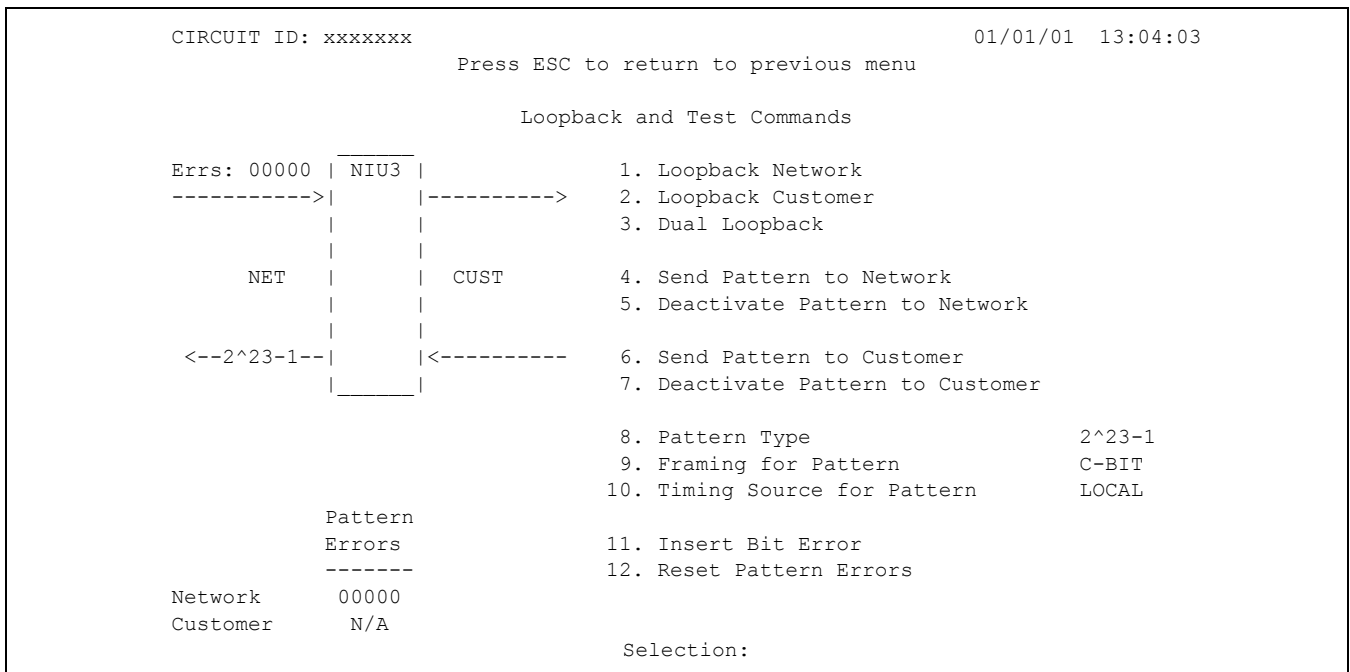


Figure 13. Loopback and Test Commands Screen, Pattern Active

The pattern that is sent can be selected using the Pattern Type option. Patterns available include 2^23-1, QRSS, Blue, Idle, and User Defined.

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

```
0000 0000 1111 1111
```

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.

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 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 Performance History screens (Figure 14 through Figure 17) exhibit a date and time stamp in the upper righthand corner for the data capture displayed.

Figure 14 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 (see Figure 15) are available for the current hour and the past 60 hours. The 24-hour performance data registers (see Figure 16) are available for the current day and the past 30 days. The 30-day performance data registers (see Figure 17) are available for the current 30 days and three previous 30-day periods. All performance data registers can be reset by choosing 2. Reset Data. 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		01/01/01 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	01:45	000	000	000	00000	
4. 60 Min Data	01/01	01:30	000	000	000	00000	
5. 24 Hr Data	01/01	01:15	000	000	000	00000	
6. 30 Days Data	01/01	01:00	000	000	000	00000	
7. Line Data	01/01	01:00	000	000	000	00000	
8. Path Data 1	01/01	00:45	000	000	000	00000	
9. Path Data 2	01/01	00:30	000	000	000	00000	
10. Network Near End	01/01	00:15	000	000	000	00000	
11. Customer Near End	12/31	23:45	000	000	000	00000	
12. Network Far End	12/31	23:30	000	000	000	00000	
13. Customer Far End	12/31	23:15	000	000	000	00000	
14. Change Thresholds	12/31	23:00	000	000	000	00000	
'B'Backward						10----	---->13
'F'Forward							N C
					12<---	---->11	
Selection:							

Figure 14. 15-Minute Performance History Screen

CIRCUIT ID: xxxxxxxx		01/01/01 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	0000	0000	0000	0000	00000
3. 15 Min Data	01/01 02:00	0000	0000	0000	0000	00000
4. 60 Min Data	01/01 01:00	0000	0000	0000	0000	00000
5. 24 Hr Data	01/01 00:00	0000	0000	0000	0000	00000
6. 30 Day Data	12/31 23:00	0000	0000	0000	0000	00000
7. Line Data	12/31 22:00	0000	0000	0000	0000	00000
8. Path Data 1	12/31 21:00	0000	0000	0000	0000	00000
9. Path Data 2	12/31 20:00	0000	0000	0000	0000	00000
10. Network Near End	12/31 19:00	0000	0000	0000	0000	00000
11. Customer Near End	12/31 18:00	0000	0000	0000	0000	00000
12. Network Far End	12/31 17:00	0000	0000	0000	0000	00000
13. Customer Far End	12/31 16:00	0000	0000	0000	0000	00000
14. Change Thresholds	12/31 15:00	0000	0000	0000	0000	00000
'B'Backward					10--->	--->13
'F'Forward					N C	
					12<---	<---11
Selection:						

Figure 15. 60-Minute Performance History Screen

CIRCUIT ID: xxxxxxxx		01/01/01 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	01/01	00000	00000	00000	00000	0000000
4. 60 Min Data	12/31	00000	00000	00000	00000	0000000
5. 24 Hr Data	12/30	00000	00000	00000	00000	0000000
6. 30 Day Data	12/29	00000	00000	00000	00000	0000000
7. -----	12/28	00000	00000	00000	00000	0000000
8. Path Data 1	12/27	00000	00000	00000	00000	0000000
9. Path Data 2	12/26	00000	00000	00000	00000	0000000
10. Network Near End	12/25	00000	00000	00000	00000	0000000
11. Customer Near End	12/24	00000	00000	00000	00000	0000000
12. Network Far End	12/23	00000	00000	00000	00000	0000000
13. Customer Far End	12/22	00000	00000	00000	00000	0000000
14. Change Thresholds	12/21	00000	00000	00000	00000	0000000
					10--->	--->13
					N C	
					12<---	<---11
Selection:						

Figure 16. 24-Hour Performance History Screen

CIRCUIT ID:

11/19/03 00:01:22

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: 03/31	0000293	0000293	0000293	0000000	
4. 60 Min Data	Ending: 03/01	0000313	0000313	0000313	0000000	
5. 24 Hr Data	Ending: 01/31	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 17. 30-Day Performance History Screen

Each 15-minute and 24-hour performance parameter has a threshold as shown in the Performance Thresholds screen, **Figure 18**. Thresholds can be set in Change Performance Threshold, **Figure 19**, which automatically displays upon entering the threshold number selection in **Figure 18**. 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                                01/01/01  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         = Disabled           15. SES-P        = 00004
8. UAS-P         = 010                16. UAS-P        = 00010

17. Restore Default Thresholds          18. Disable All Thresholds

                Selection:
  
```

Figure 18. Performance Thresholds Screen

```

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

                CV-L 15 Min Threshold = 387

                D. Disable Threshold

                Enter Value:
  
```

Figure 19. Change Performance Threshold Screen

The Performance Data Definitions screens, **Figure 20** and **Figure 21**, describe each line, path, and far-end performance parameter and explain using reverse video to indicate incomplete or invalid data registers.

```

CIRCUIT ID: xxxxxxxx                                01/01/01 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 20. Performance History Data Definitions Screen I

```

CIRCUIT ID: xxxxxxxx                                01/01/01 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 21. Performance History Data Definitions Screen II

The Event History screen, **Figure 22**, shows the last 200 events logged to the event log. Events are time stamped and shown in chronological order. The newest events are seen by choosing **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 typing **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                                01/01/01 13:04:03
                Press ESC to return to previous menu

                        Event History

Num  Description of Event                          Date   Time      Source
-----
  1. NIU3 Powered Up                               01/01/01 00:20:42  NIU3
  2. DS3 Out-Of-Frame FEAC Alarm                   01/01/01 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 22. Event History Screen

The Alarm Log Screen, **Figure 23**, 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 typing **Y** on the next screen. Possible alarms include the following:

- Power events
- Alarm log reset
- FEAC alarms
- AIS
- LOS
- OOF
- RAI

```

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

                        Alarm Log

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

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

                        Selection:

```

Figure 23. Alarm Log Screen

The Set System Date and Time screen, **Figure 24**, is used to set the NIU3 PM date and time. Once date and time are configured, the date and time performance registers update accordingly.

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

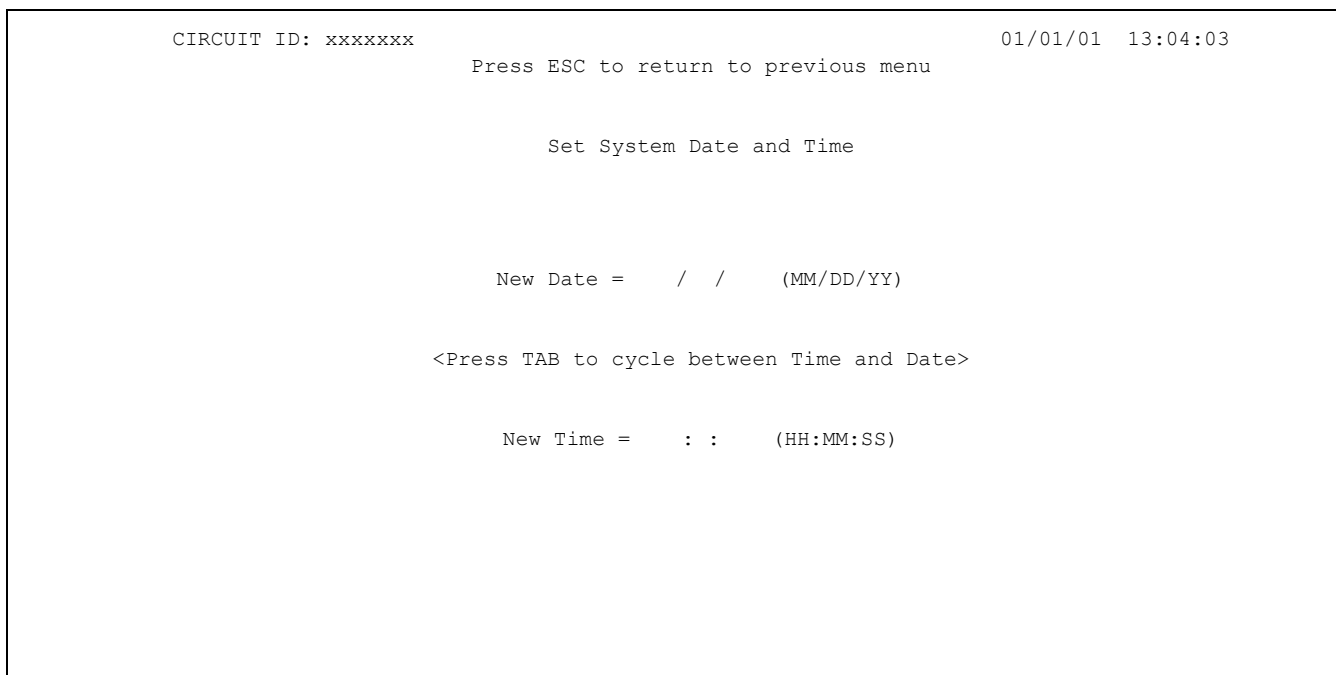


Figure 24. Set System Date/Time Screen

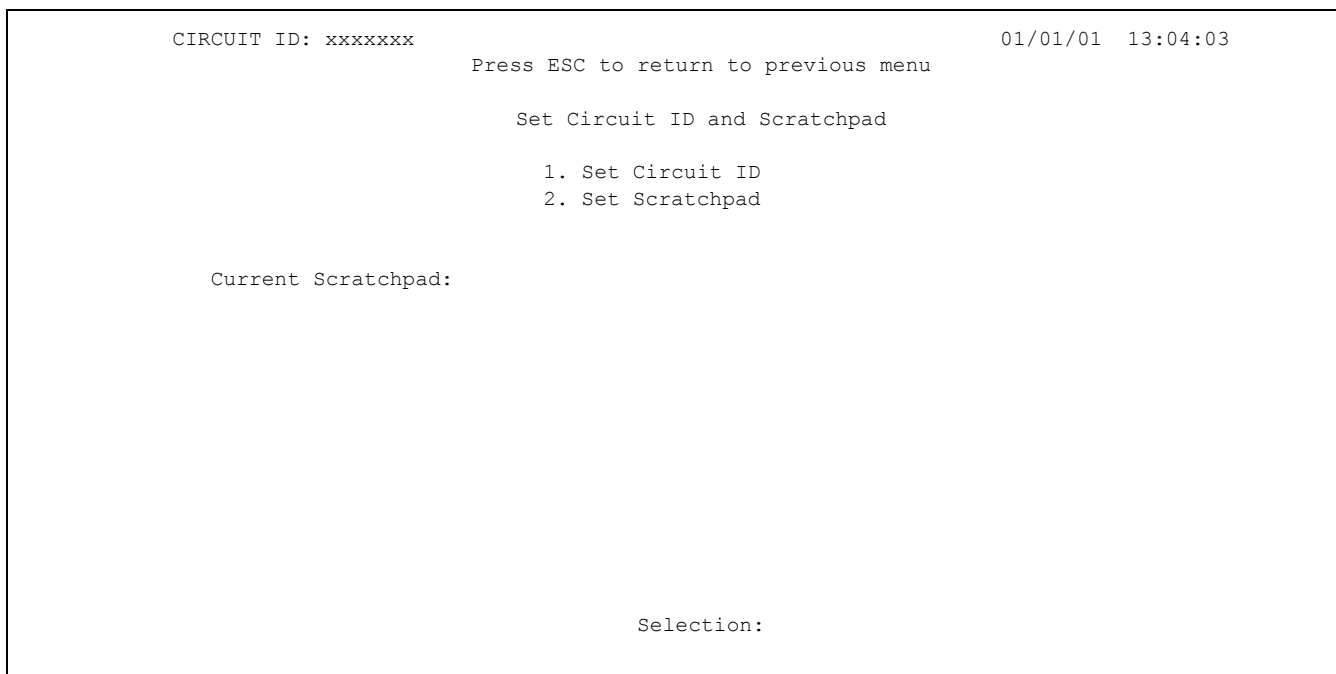


Figure 25. Set Circuit ID Screen

The Terminal Modes Menu, [Figure 26](#), is available for configuring the craft interface for a manual terminal update or a real-time terminal update.

Software Download

The Software Download screen is shown in [Figure 27](#). *Appendix A* provides instructions for upgrading NIU3 software.

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 01/01/01 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 26. Terminal Modes Menu Screen

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

Software Download

Press 1 to begin YMODEM download

Selection: 1
```

Figure 27. Upload Flash Menu Screen

7. SPECIFICATIONS

See **Table 4** for specifications and compliance requirements.

8. 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.

CAUTION

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

To remove a relay:

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.

9. 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.

U.S. and Canada customers can also receive a copy of the warranty via ADTRAN's toll-free faxback server at 877-457-5007.

- Request Document 414 for the *U.S. and Canada Carrier Networks Equipment Warranty*.
- Request Document 901 for the *U.S. and Canada Enterprise Networks Equipment 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 4. Specifications and Compliance

Electrical			
Power	-20 VDC to -56 VDC (nominal -48 VDC)		
Input Current	125 mA @ -48 VDC or 250 mA @ -24 VDC maximum		
Compliance Standards			
NEBS	Level 3		
FCC	Part 15, Class A		
UL	60950		
ANSI	T1.102 and T1.404		
Compliance Codes			
Code	Input	Output	
Power Code (PC)	F	C	
Telecommunications Code (TC)	-	-	
Installation Code (IC)	A	-	
Mechanical			
Dimensions	1-7/8-in. W x 5-5/8-in. H x 5-1/2-in. D, T400 density		
Weight	NIU3 PM circuit board: 8 oz. Standalone housing: 2 lb. 3-slot shelf: 4 lb. 12-slot shelf: 12 lb.		
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	1212075L2, CLEI: NCD3EGNA __		
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)		
Shelf Empty Slot Blank Cover	1212076L1		

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Appendix A

Upgrading NIU3 Software

Materials Required

- ADTRAN NIU3.
- Computer with terminal emulation program with VT100 and YModem capability.

Upgrading the NIU3 Using the YModem Protocol

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 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 option 11, **Software Download**, and press Enter.
5. From the **Software Download** menu, to begin YModem download, select option 1, press Enter.
6. Cut-through relays disengage, causing the NIU3 to disconnect from the circuit during download. An audible click will be heard when Enter is pressed.
7. A screen appears, stating that the NIU3 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**.
8. A screen appears requesting a filename. **Ensure that YModem protocol is selected.** Enter the filename where the new firmware is being stored, then click on **Send**.
9. When finished, a message will appear stating the following:
Flash Upload complete, Rebooting.....Please wait.
10. The NIU3 will reboot, and the upgrade is complete.

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Notes

ADURAN