DS3 NIU3 3-Slot Shelf
Installation and Maintenance Practice

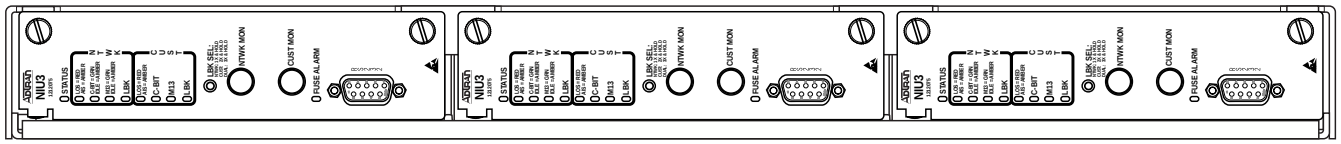

Figure 1. DS3 NIU3 3-Slot Shelf

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FIGURES

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1. GENERAL

This practice is used in association with the NIU3 circuit card practice, P/N 61213075L2-5.

The ADTRAN® NIU3 3-Slot Shelf (P/N 1212073L1) installs in a standard 19-inch bay (23-inch mounting flanges also included) at a designated location convenient to the customer.

Revision History

Issue 4 of this document provides the inclusion of a cautionary statement concerning the bypass relays in the *Installation* section on page 2.

2. DESCRIPTION

The NIU3 3-Slot Shelf is an all-metal construction housing that has slots for 3 NIU3 horizontally-mounted circuit cards. Card guides direct the card to the backplane edge connector. When properly inserted, thumbscrews on the NIU3 front panel align and fasten to threaded holes on the shelf. Shelf slots are numbered 1 through 3, left to right, looking at the front of the shelf. The backplane circuitry is protected by a metal cover that has openings for BNC data jacks, pass-through relays, power terminal connections, and alarm pins. Removable covers provide security for power and alarm connections, and pass-through and alarm relays. All connections are clearly labeled.

Features

The NIU3 3-Slot Shelf provides the following features and functions.

- Field replaceable pass-through relays ensure virtually uninterrupted transmission during card replacement, failure, or power loss.
- BNC transmit/receive jacks provided for each NIU3 card.
- Shelf alarm relay terminals provide alarm indication.
- Dual –48 VDC or ±24 VDC power feeds provided.
- Sturdy metal construction with durable powder-coated enamel finish.
- Mounting and accessory hardware included.

Compliance

The NIU3 3-Slot Shelf is intended for installation in a restricted access, environmentally controlled, or protected location only.

See **Table 1** for compliance codes.

Table 1. Compliance Codes

Code	Input	Output
Power Code (PC)	F	C
Telecommunication Code (TC)	-	-
Installation Code (IC)	E	-

The DS3 NIU3 3-Slot Shelf meets the following standards:

- NEBS: Level 3
- ANSI: T1.404
- UL: 60950
- FCC: Part 15, Class A

3. INSTALLATION

After unpacking the unit, inspect it for damage or missing components. If damage or missing components are noted, file a claim with the carrier, then notify ADTRAN. Refer to *Warranty and Customer Service*. Install per requirements of NEC NFPA 70. After installation, ensure equipment rack stability is not upset.

Location

The NIU3 3-Slot Shelf installs at any location convenient to the customer as a demarcation and loopback point for DS3 circuits. The NIU3 can pass both network and customer signals up to 900 feet. During NIU3 bypass operations, if total transmission distance exceeds 900 feet, signal quality may degrade. See **Figure 2** for maximum recommended transmission distances.

Rackmount

NOTE

Install the unit per NEC NFPA 70 requirements. See *Compliance* section.

The NIU3 3-Slot Chassis can be rack mounted at any convenient location. Reversible mounting flanges adjust to desired position in the 19-inch rack. Also included are 23-inch flanges. To mount the NIU3 3-Slot Chassis in a rack, perform the following steps:

1. Determine desired shelf extension from the rack frame.
2. Position the mounting flanges as necessary using the appropriate flanges for a 19-inch or 23-inch rack. Install using the supplied counter-sink screws.
3. Mount the shelf to the rack accordingly.

Wallmount

Additional brackets available from ADTRAN allow the chassis to be mounted to a wall. Wallmount bracket P/N 1212073L1WM accommodates one 3-Slot Shelf. Wallmount bracket P/N 1212078L1WM accommodates a stack of two 3-Slot Chassis. Six ¼ x ¾ inch bladed hex-head screws and flat washers are provided with the 1212078L1WM wallmount bracket for attaching to the wall. In this configuration, the original flanges are removed, and the wallmount flanges are installed using the countersink screws from the originals. If using P/N 1212073L1WM, install the chassis so the circuit cards' front panels face *up*.

If using P/N 1212078L1WM, install the chassis so the circuit cards' front panels face *out*. A 2-foot 16 AWG ground wire is also provided to be installed between the ground termination on the bracket and the ground termination on the housing. This allows the chassis to rotate without disturbing the main ground wire leaving the bracket.

CAUTION

When rotating the chassis in the 1212078L1WM brackets, always do so with care to ensure that all wiring and connections are protected.

CAUTION

There are six removable bypass relays and 1 removable alarm relay located on the rear of the shelf. After installation, remove the relay covers and ensure that the relays are properly and firmly seated in their sockets. Replace the relay covers.

4. WIRING

Wiring consists of three elements: data, power/ground, and alarms. Use suitably sized copper conductors only.

Data

Externally, the shelf backplane has four BNC connectors for each of the three NIU3 slots labeled **NTWK IN**/**OUT** and **CUST IN**/**OUT** (see **Figure 3**).

Wiring Connections

Connect data wiring per the following procedure:

1. Connect the cables to the BNCs on the backplane for those shelf slots that will be populated.
2. If not already done, connect the opposite ends to their designated terminations.
3. Dress and lace the wire runs to the bay frames as necessary.

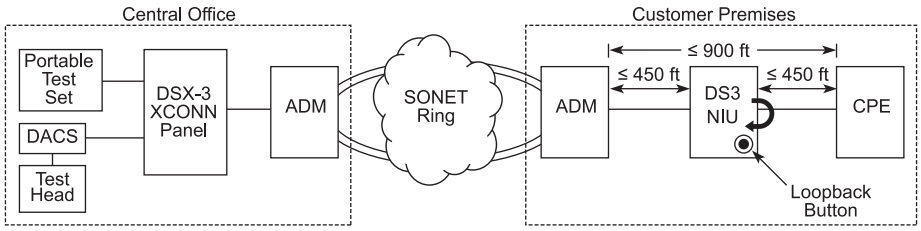

Figure 2. NIU3 Circuit Diagram

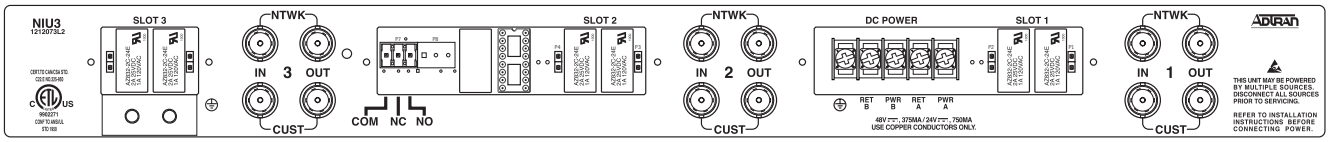

Figure 3. NIU3 3-Slot Shelf Rear Panel

Power

Fully populated, the NIU3 3-Slot Shelf operates on local –48 VDC at 0.375 amps maximum, or ±24 VDC at .750 amps maximum. The shelf backplane has spade lug terminal connections (**TB1**) for both an "A-side" and "B-side" independent DC source, plus Frame Ground (see **Figure 4**).

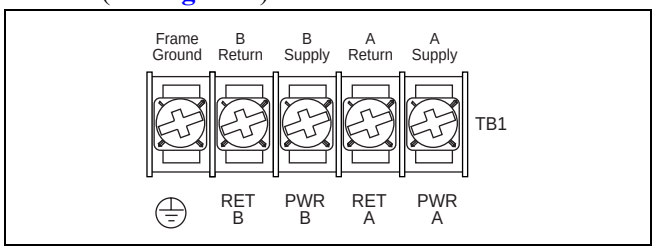

Figure 4. Local DC Power Connection

WARNING

Ensure power is off and tagged out-of-service before making power wiring connections.

Use one of the following requirements for powering the unit locally:

1. Connect to a grounded –48 VDC source, electrically isolated from the AC source. Provide branch circuit overcurrent protection with a fuse or circuit breaker, minimum 48 VDC, maximum 15 amps. Provide an easily accessed approved and rated disconnect device in the field wiring.
2. Connect to an approved Class 2 Type (LPS) power supply rated 48 VDC, maximum 240 VA.

For those slots not populated with an NIU3 circuit card, blank covers (P/N 1212076L1) must be installed.

The following terminal connections are made:

1. Connect –48 V or ±24 V local supply to **PWR A**.
2. Connect the associated return wire to **RET A**.
3. If redundant power is intended, make similar connections to **PWR B** and **RET B**.

CAUTION

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

4. Connect the common frame ground terminal or ground lug (6 AWG max.) to an approved ground location.

CAUTION

Per GR-1089-CORE, October 2002, Section 9, this system is designed and 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.

Independent Power Supply

An optional independent power supply unit is available. The Power Supply/Rectifier (PS/R), P/N 1212080L1, provides –54V at 2 A. The PS/R plugs into a standard

120 VAC outlet. (See **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 shelf 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 the frame ground.

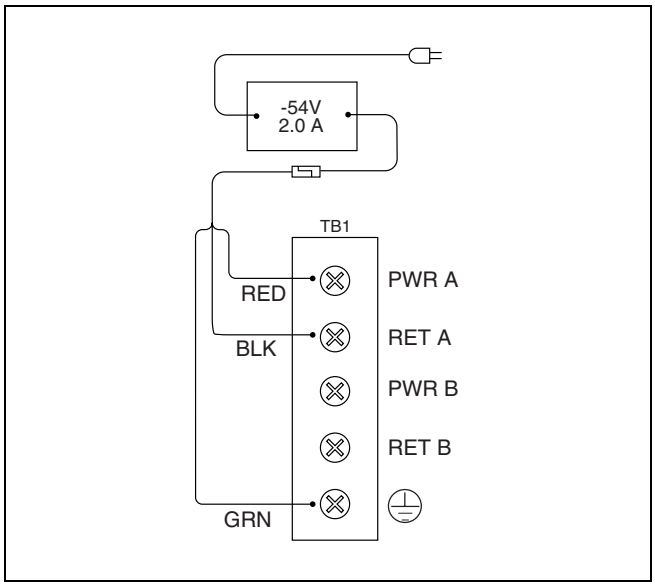

Figure 5. Power Supply/Rectifier Connection

Alarms

A 3-post wire-wrap terminal (**P7**) on the shelf backplane selects either a normally closed (**COM**/**NC**) or a normally open (**COM**/**NO**) alarm relay. The alarm relay output responds to the card malfunction status on individual NIU3 cards.

1. Determine if the desired alarm output is a NO or a NC response.
2. Make wire-wrap connections accordingly.
3. If not already done, connect alarm output to designated terminations.

CAUTION

After wiring connections are made, replace power and alarm security covers.

Options

Aside from mounting configuration, connecting redundant power, and alarm NO/NC selection, there are no options associated with the shelf.

Final

After power and alarm wiring is connected and verified in accordance with local standards, codes, and this practice, perform the following tasks:

1. Dress and lace wiring to workmanship standards.
2. Install all protective shields and panels that were removed for wiring installation.
3. Provide power to the backplane.

5. TURNUP

When an NIU3 is inserted into a shelf with power on the backplane, the **STATUS** LED turns on red while the NIU3 performs a self-test. If the test passes, the **STATUS** LED turns on green, and the other LEDs go through an on/off sequence, indicating the NIU3 is online. If the test fails, the **STATUS** LED remains red, and the bypass relays (ADTRAN patent pending) maintain data flow around the NIU3.

6. OPERATION

The NIU3 3-Slot Shelf exchanges data to and from the network loop and customer loop via the BNC connectors. If the NIU3 fails or is removed from the circuit, the affected card relays on the backplane provide pass-through transmission so data flow is maintained.

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

LED Indication

There are no LEDs on the 3-slot shelf. However, NIU3 LEDs provide information for NIU3 and shelf configuration and status.

7. MAINTENANCE

Aside from replacing failed relays, the NIU3 3-Slot Shelf does not require maintenance for normal operation. ADTRAN does not recommend field repair. For repair services, refer to *Warranty and Customer Service*.

Signal Relay Replacement

Each loop has a cut-through signal relay accessible on the backplane. The relay ensures data transfer in the event the NIU3 card fails, is removed, or loses power. Failure of the relay is determined by process of elimination. If a loss of signal occurs, and all other parameters are satisfactory, then a failed relay is indicated. A relay replacement kit (P/N 1212072L1) is available from ADTRAN.

CAUTION

Observe prong configuration on the removed relay. Relays are polarity sensitive, and replacement relays must be oriented correctly.

Follow this procedure to replace a failed signal 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. Align and insert the replacement relay, taking care not to bend prongs, and that relay orientation is the same as the removed relay.
4. Remove the jumper strap.
5. Observe normal operation.

Alarm Relay Replacement

The alarm relay is located adjacent to the alarm wire-wrap pins on the backplane. The alarm relay output responds to the card malfunction status on individual NIU3 cards. If an alarm condition occurs, but an alarm signal is not present, then a failed alarm relay is indicated. Follow this procedure to replace a failed alarm relay:

1. Using an appropriately-sized IC extractor tool, lift the relay off its socket.
2. Align and insert the replacement relay, taking care not to bend prongs, and that relay orientation is the same as the removed relay.

8. SPECIFICATIONS

See **Table 2** for shelf specifications.

Table 2. DS3 NIU3 3-Slot Shelf Specifications

Environmental	
Operating Temperature	–40°C to 70°C (–40°F to 158°F)
Storage Temperature	–40°C to 85°C (–40°F to 185°F)
Relative Humidity	Per GR-63
Physical	
Dimensions	17.5 in. W 7.0 in. D 1.75 in. H T400 density
Weight	12 lb. w/3 NIU3 cards
Power	
Volts	–48 VDC or ±24 VDC (nominal)
Max input current	0.375 A or 0.750 A (fully loaded)
Compliance	
NEBS	Level 3
UL	60950
FCC	Part 15, Class A
ANSI	T1.404
Part Numbers	
DS3 NIU3 3-Slot Shelf	1212073L1 CLEI: NCM5K4ZD _ _
NIU3	1213075L2 CLEI: NCD3EGRA _ _
Blank slot cover	1212076L1
Power Supply/Rectifier	1212080L1
Relay Replacement Kit (1 Alarm Relay, 2 Signal Relays, 2 Jumper Straps)	1212072L1
Wallmount Brackets:	
3-Slot Shelf	1212073L1WM
12-Slot Shelf	1212078L1WM

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.

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.

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