T400-19 Shelf

19” Type 400 Shelf

User Manual

Part Number 1150028L1-1

61150028L1-1D
March 2002

901 Explorer Boulevard
P.O. Box 140000
Huntsville, AL 35814-4000
(256) 963-8000

The following conventions are used in this manual.

Notes provide additional useful information.

Cautions signify information that could prevent service interruption.

WARNING

Warnings provide information that could prevent damage to the equipment or endangerment to human life.

Important Safety Instructions

When using your telephone equipment, please follow these basic safety precautions to reduce the risk of fire, electrical shock, or personal injury:

1. Do not use this product near water, such as near a bathtub, wash bowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool.
2. Avoid using a telephone (other than a cordless-type) during an electrical storm. There is a remote risk of shock from lightning.
3. Do not use the telephone to report a gas leak in the vicinity of the leak.
4. Use only the power cord, power supply, and/or batteries indicated in the manual. Do not dispose of batteries in a fire. They may explode. Check with local codes for special disposal instructions.

Save These Important Safety Instructions

Federal Communications Commission Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio frequencies. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Shielded cables must be used with this unit to ensure compliance with Class A FCC limits.

Change or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Canadian Emissions Requirements

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled "Digital Apparatus," ICES-003 of the Department of Communications.

Cet appareil nuerique respecte les limites de bruits radioelectriques applicables aux appareils numeriques de Class A prescrites dans la norme sur le materiel brouilleur: "Appareils Numeriques," NMB-003 edictee par le ministre des Communications.

Limited Product Warranty

ADTRAN warrants that for five (5) years from the date of shipment to Customer, all products manufactured by ADTRAN will be free from defects in materials and workmanship. ADTRAN also warrants that products will conform to the applicable specifications and drawings for such products, as contained in the Product Manual or in ADTRAN's internal specifications and drawings for such products (which may or may not be reflected in the Product Manual). This warranty only applies if Customer gives ADTRAN written notice of defects during the warranty period. Upon such notice, ADTRAN will, at its option, either repair or replace the defective item. If ADTRAN is unable, in a reasonable time, to repair or replace any equipment to a condition as warranted, Customer is entitled to a full refund of the purchase price upon return of the equipment to ADTRAN. This warranty applies only to the original purchaser and is not transferable without ADTRAN's express written permission. This warranty becomes null and void if Customer modifies or alters the equipment in any way, other than as specifically authorized by ADTRAN.

EXCEPT FOR THE LIMITED WARRANTY DESCRIBED ABOVE, THE FOREGOING CONSTITUTES THE SOLE AND EXCLUSIVE REMEDY OF THE CUSTOMER AND THE EXCLUSIVE LIABILITY OF ADTRAN AND IS IN LIEU OF ANY AND ALL OTHER WARRANTIES (EXPRESSED OR IMPLIED). ADTRAN SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, INCLUDING (WITHOUT LIMITATION), ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME STATES DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES, SO THIS EXCLUSION MAY NOT APPLY TO CUSTOMER.

In no event will ADTRAN or its suppliers be liable to Customer for any incidental, special, punitive, exemplary or consequential damages experienced by either Customer or a third party (including, but not limited to, loss of data or information, loss of profits, or loss of use). ADTRAN is not liable for damages for any cause whatsoever (whether based in contract, tort, or otherwise) in excess of the amount paid for the item. Some states do not allow the limitation or exclusion of liability for incidental or consequential damages, so the above limitation or exclusion may not apply to Customer.

Customer Service, Product Support Information, and Training

ADTRAN will repair and return this product if within five years from the date of shipment the product does not meet its published specification or the product fails while in service.

A return material authorization (RMA) is required prior to returning equipment to ADTRAN. For service, RMA requests, training, or more information, use the contact information given below.

Repair and Return

If you determine that a repair is needed, please contact our Customer and Product Service (CAPS) department to have an RMA number issued. CAPS should also be contacted to obtain information regarding equipment currently in house or possible fees associated with repair.

CAPS Department (256) 963-8722

Identify the RMA number clearly on the package (below address), and return to the following address:

ADTRAN Customer and Product Service
901 Explorer Blvd. (East Tower)
Huntsville, Alabama 35806

RMA # _____

Pre-Sales Inquiries and Applications Support

Your reseller should serve as the first point of contact for support. If additional pre-sales support is needed, the ADTRAN Support web site provides a variety of support services such as a searchable knowledge base, latest product documentation, application briefs, case studies, and a link to submit a question to an Applications Engineer. All of this, and more, is available at:

http://support.adtran.com

When needed, further pre-sales assistance is available by calling our Applications Engineering Department.

Applications Engineering (800) 615-1176

Post-Sale Support

Your reseller should serve as the first point of contact for support. If additional support is needed, the ADTRAN Support web site provides a variety of support services such as a searchable knowledge base, updated firmware releases, latest product documentation, service request ticket generation and trouble-shooting tools. All of this, and more, is available at:

http://support.adtran.com

When needed, further post-sales assistance is available by calling our Technical Support Center. Please have your unit serial number available when you call.

Technical Support (888) 4ADTRAN

Installation and Maintenance Support

The ADTRAN Custom Extended Services (ACES) program offers multiple types and levels of installation and maintenance services which allow you to choose the kind of assistance you need. This support is available at:

http://www.adtran.com/aces

For questions, call the ACES Help Desk.

ACES Help Desk	(888) 874-ACES (2237)

Training

The Enterprise Network (EN) Technical Training Department offers training on our most popular products. These courses include overviews on product features and functions while covering applications of ADTRAN's product lines. ADTRAN provides a variety of training options, including customized training and courses taught at our facilities or at your site. For more information about training, please contact your Territory Manager or the Enterprise Training Coordinator.

Training Phone	(800) 615-1176, ext. 7500
Training Fax	(256) 963-6700
Training Email	training@adtran.com

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Chapter 1 General

OVERVIEW

The ADTRAN T400-19 Shelf is designed to accommodate up to 12 ADTRAN T400 circuit packs. The T400-19 Shelf fits into a 19-inch equipment rack. The T400-19 Shelf may be powered using internal Type 400 power supplies or an external -48 VDC power supply. If internal Type 400 power supplies are used, up to 10 Type 400 circuit packs may be accommodated. If an external power source is used, the shelf may house up to 12 Type 400 circuit packs. In addition, when using an external power supply, a battery backup can be used. The T400-19 Shelf is designed to be used with the ADTRAN NT1 T400 Circuit Pack, the U-Repeater Powering Modules (U-RPM), or T1 CSU T400 Circuit Pack. See *Chapter 2: NT1 Applications* for applications using network terminators (NT1s), *Chapter 3: U-RPM Applications* for applications using U-RPMs, and *Chapter 4: T1 CSU Appications* for applications using T1 CSUs.

T400-19 Shelf specifications are shown on page 17. A schematic of the T400-19 Shelf backplane is shown in Figure 1-1 on page 16

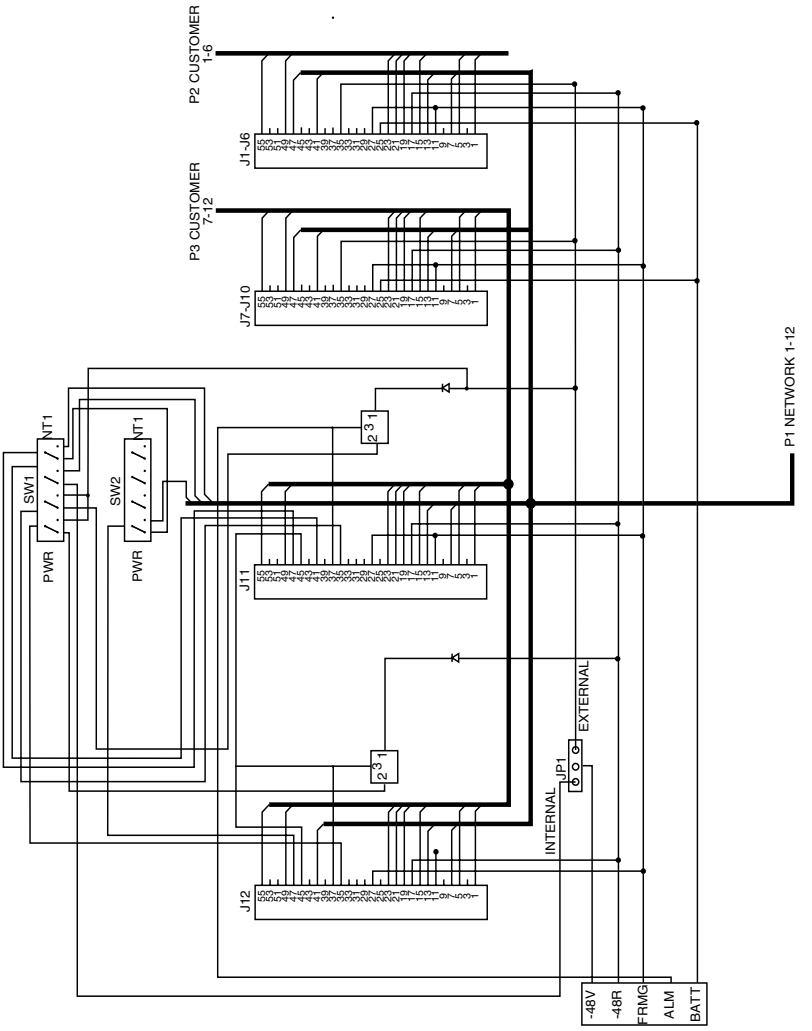

Figure 1-1. T400-19 Shelf Backplane Wiring Diagram

Features

- Provides a central location for customer equipment.
- Eases management and maintenance of ISDN and T1 circuits and equipment.
- Facilitates battery backup of customer equipment.
- Accommodates a wide variety of powering/battery systems.
- Provides 50-pin male connectors for network and customer connections.
- Provides separate frame ground to each circuit.

Specifications

Dimensions:	19.0"W x 6.0"H x 7.5"D
Weight:	4.8 lbs.
Mounting:	19-inch equipment rack
Fusing:	Internal Power: Two, 3-amp GMT-type fuses External Power: Requires external fuse
Circuit Capacity:	*Internal Power Supply*: Up to 10 NT1 T400 Circuit Packs or T1 CSU Circuit Packs *External Power Supply*: Up to 12 NT1 T400 Circuit Packs, U-RPMs, or T1 CSU Circuit Packs

Power:	NT1s and T1 CSU Circuit Packs *Internal*: One or two -48 VDC, amp T400 Power Supplies External: -48 VDC, (3 amp minimum) U-RPMs *External*: -48 VDC, (shelf containing 12 U-RPMs requires 3.6 amps)
Connectors:	To Telco Network: One 50-pin micro-ribbon connector To Customer Equipment: Two 50-pin micro-ribbon connectors To External Power Supply and Alarm: Five-position terminal block

Chapter 2 NT1 Applications

INSTALLATION

This chapter describes the installation of the T400-19-inch shelf when using ADTRAN NT1 T400 Circuit Packs (part number 1212010).

Initial Unit Inspection

After unpacking the unit, immediately inspect it for possible shipping damage. If damage is discovered, file a claim immediately with the carrier; then contact ADTRAN Customer Service. See the front section of this manual for information on how to contact ADTRAN.

Rack Installation

Place the shelf in the 19-inch equipment rack. Ensure proper clearance is provided for any equipment that may be mounted above or below the shelf. Line up the holes in the mounting flanges with those in the relay rack. Secure the shelf to the rack using the four 12-24 panhead screws supplied with the shelf.

Installer Connections

In Chapter 1, Figure 1-1 on page 16 shows the connections on the printed circuit board between the circuit slots and the power supply. The T400-19 Shelf Backplane connections are shown in Figure 2-1 on page 20. Three male 50-pin connectors, **P1**, **P2**, and **P3**, connect the T400-19 Shelf to the network and terminal equipment.

A five-position terminal block, **TB1**, connects the shelf to an external power supply, alarm, and frame ground. Table 2-1 on page 20 lists part numbers for cables and connectors, while Table 2-2 on page 22 shows the pinout for each connector.

Up to 12 NT1 T400 Circuit Packs can be installed in the shelf by firmly pushing the units into the shelf slots.

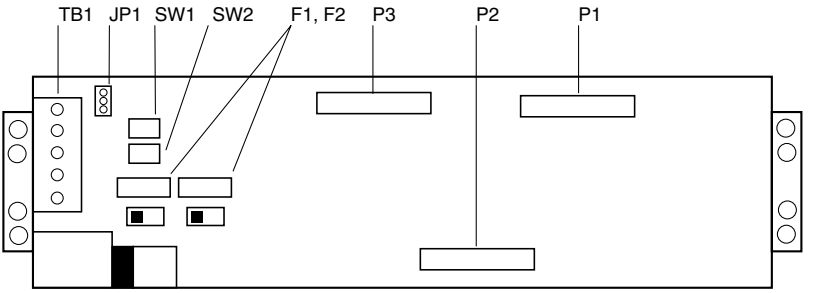

Figure 2-1. T400-19 Shelf Backplane Connections and Fuses

Network Connection

The Network is connected to **P1** on the T400-19 Shelf. One way to make this connection is to use a punchdown block and a 50-pin cable.

Terminal Equipment Connection

P2 and **P3** provide connections to the terminal equipment (TE) from the NT1s. The TE interface to the NT1 can be brought out to a punchdown block or twelve 8-pin modular jacks using two 6-connector harmonica blocks and two 50-pin cables.

Table 2-1. Cables and Connectors Part Numbers

Connector/Cables	Part Number
Punchdown Block	3353002
Cable for Punchdown Block (female to male)	3353003
Harmonica Block	3353001
Cable for Harmonica block (male to male)	3353004

Earth Ground

Connect an external earth ground to the **FRMG** connection on **TB1**. Use a 10, 12, or 14 gauge wire.

Power Configuration

The shelf and the terminal equipment are powered either internally or externally. Internal power is provided by using one or two Type 400 power supplies (part number 1353POWER04). External power is provided by any -48 VDC power source (minimum 3 amp for shelf with 12 NT1s) such as a Ratelco 110 VAC to -48 VDC. **JP1** is a jumper that selects internal or external power. **SW1** and **SW2** are slide switches that configure **Slot 11** and **Slot 12** for either NT1s or internal T400 power supplies.

*Power for the TE connected to the NT1 T400 Circuit Pack can be optioned between PS1, PS2, or none, depending on the terminal power requirements (see the NT1 T400 manual). If PS2 is selected, power from the NT1 to the TE is provided on **P2** and **P3**. See Table 2-2 for PS2 pinouts.*

Table 2-2. T400-19 Pin Assignments for 25 Pair Connections

Slot	Network U-Interface P1	Terminal Equipment P2 & P3		PS2
		ST-TX	ST- RX	
1	P1-01 (TR) P1-26 (TT)	P2-01 (TR) P2-26 (TT)	P2-02 (RR) P2-27 (RT)	P2-28 (+) P2-29 (-)
2	P1-03 (TR) P1-28 (TT)	P2-05 (TR) P2-30 (TT)	P2-06 (RR) P2-31 (RT)	P2-32 (+) P2-33 (-)
3	P1-05 (TR) P1-30 (TT)	P2-09 (TR) P2-34 (TT)	P2-10 (RR) P2-35 (RT)	P2-36 (+) P2-37 (-)
4	P1-07 (TR) P1-32 (TT)	P2-13 (TR) P2-38 (TT)	P2-14 (RR) P2-39 (RT)	P2-40 (+) P2-41 (-)
5	P1-09 (TR) P1-34 (TT)	P2-17 (TR) P2-42 (TT)	P2-18 (RR) P2-43 (RT)	P2-44 (+) P2-45 (-)
6	P1-11 (TR) P1-36 (TT)	P2-21 (TR) P2-46 (TT)	P2-22 (RR) P2-47 (RT)	P2-48 (+) P2-49 (-)
7	P1-13 (TR) P1- 38 (TT)	P3-01 (TR) P3-26 (TT)	P3-02 (RR) P3-27 (RT)	P3-28 (+) P3-29 (-)
8	P1-15 (TR) P1-40 (TT)	P3-05 (TR) P3-30 (TT)	P3-06 (RR) P3-31 (RT)	P3-32 (+) P3-33 (-)
9	P1-17 (TR) P1-42 (TT)	P3-09 (TR) P3-34 (TT)	P3-10 (RR) P3-35 (RT)	P3-36 (+) P3-37 (-)
10	P1-19 (TR) P1-44 (TT)	P3-13 (TR) P1-38 (TT)	P3-14 (RR) P3-39 (RT)	P3-40 (+) P3-41 (-)
11	P1-21 (TR) P1-46 (TT)	P3-17 (TR) P3-42 (TT)	P3-18 (RR) P3-43 (RT)	P3-44 (+) P3-45 (-)
12	P1-23 (TR) P1-48 (TT)	P3-21 (TR) P3-46 (TT)	P3-22 (RR) P3-47 (RT)	P3-48 (+) P3-49 (-)

Configuration 1- External Power Supply (Optional Battery Backup)

In this configuration, power is supplied by an external -48 VDC power supply which may have a reserve battery supply, as shown in Figure 2-2. Up to 12 NT1s may be housed in the shelf in this configuration. When supplying external power, connect the -48 VDC from the supply to the -48 VDC on **TB1**. **JP1** should be in the **External** position. **SW1** and **SW2** should be in the **NT1** position.

External power supplies usually have a **Normally Open**, **Normally Closed**, and **Common** contact for indicating loss of power. Connect the **Normally Closed** contact on the supply to **BATT** on **TB1**, and connect the **Common** contact on the power supply to ground on the power supply. When AC power is lost, the **Normally Closed** contact opens, which alerts the **NT1s** that reserve battery power is now in use. The **NT1s** reserve power to the terminal equipment which alerts the user that AC power is lost.

Use external fusing to protect the external power supply and the T400 Shelf. Consult the user manual supplied with the external power supply for proper fuse ratings.

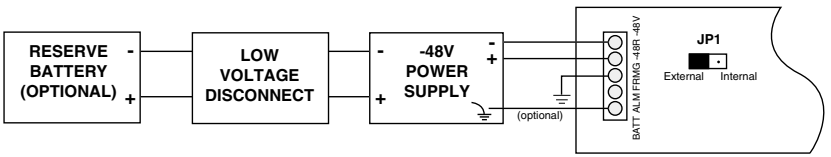

Figure 2-2. Configuration 1 - External Power Supply

Configuration 2 - Internal Power Supply

In this configuration, up to 10 NT1s may be housed in Slots 1 through 10 of the shelf. Power is supplied by an internal Type 400 power supply in Slot 12. Additionally, a second redundant power supply may be placed in Slot 11 and engaged as a backup if the first unit fails. **JP1** should be in the **Internal** position. **SW1** and **SW2** should be in the **PWR** position (see Figure 2-1 on page 20 and Figure 2-3.).

There are two fuses, **F1** and **F2**, on the power connections for Slot 11 and Slot 12 (See Figure 2-1 on page 20). These fuses are designed to protect the internal power supplies from a short circuit. Three-amp, **GMT** fuses are installed at the factory. Replacement fuses should be of the same type. An external alarm output is available for the T400 Shelf to indicate that a fuse has blown due to an overcurrent condition. Connect the external alarm to the **ALM** terminal of **TB1**, shown on Figure 2-3. When a fuse blows, -48 VDC powers the external alarm.

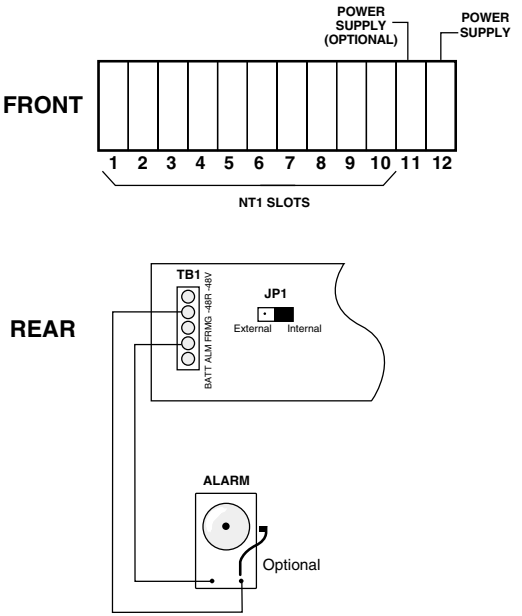

Figure 2-3. Configuration 2 - Internal Power Supply

Chapter 3 U-RPM Applications

INSTALLATION

This chapter describes the installation of the T400-19 shelf when using U-RPM Applications.

Initial Unit Inspection

After unpacking the unit, immediately inspect it for possible shipping damage. If damage is discovered, file a claim immediately with the carrier; then contact ADTRAN Customer Service. See the front section of this manual for information on how to contact ADTRAN.

Rack Installation

Place the shelf in the 19-inch equipment rack. Make sure that proper clearance is provided for any equipment that may be mounted above or below the shelf. Line up the holes in the mounting flanges with those in the relay rack. Secure the shelf to the rack using the four 12-24 panhead screws supplied with the shelf.

Installer Connections

A typical U-RPM application is illustrated in Figure 3-1 on page 26. The U-RPM is located near the ISDN switch in the T400-19 Shelf. The U-Repeater is located outside the facility in a manhole, vault, or on a pole, approximately half-way between the switch and the deployment premises.

Up to 12 U-RPMs can be installed in the shelf by firmly pushing the units into the shelf slots. Two connections to each U-RPM must be made. A male 50-pin connector (P1) is used to connect the U-RPMs in the T400-19 Shelf to the Network and to U-Repeaters. A five-position terminal block (**TB1**) connects

the shelf to an external power supply, alarm, and frame ground. **JP1** is a jumper that selects external power. **SW1** and **SW2** are slide switches that configure **Slot 11** and **Slot 12** for U-RPMs. For an illustration of the T400 Shelf backplane connections, see on Figure 2-1 on page 20.

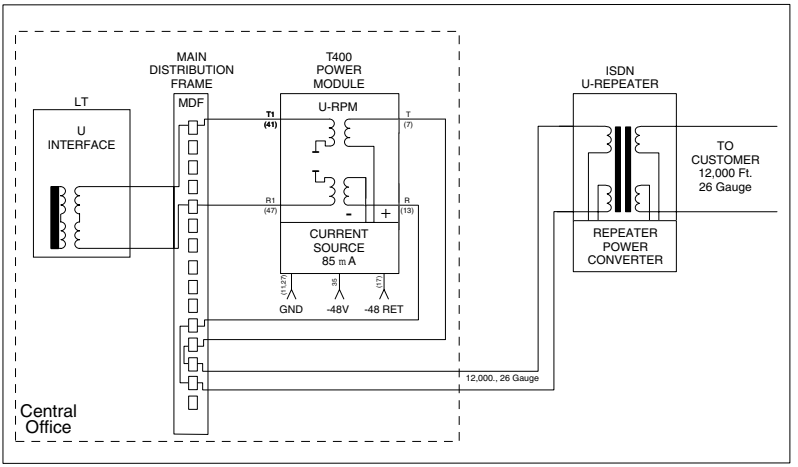

Figure 3-1. U-RPM Application

Network Connection

Connect the U-interface from the ISDN switch to Tip 1 and Ring 1 of P1 on the T400-19 Shelf backplane using a punchdown block (part number 3353.002) and a 50-pin cable (part no. 3353.003). See Table 3-1 on page 28 for the pinouts associated with each slot.

U-Repeater Connection

Use the punchdown block to connect the U-signal from the U-RPM to the Tip and Ring pins on the **P1** to the appropriate U-Repeater. See Table 3-1 on page 28 for the **P1** pinouts associated with each slot.

Earth Ground

Connect an external earth ground to the **FRMG** connection on **TB1**. Use a 10, 12, or 14 gauge wire.

Powering the Shelf

Power is supplied by an external -48 VDC power supply which may have a reserve battery supply. When supplying external power, connect the -48 VDC from the supply to the **-48 V** on TB1 as shown in Figure 2-2 on page 23. Then, connect the +48 VDC from the power supply to the **-48 R** on **TB1**. **JP1** should be in the **External** position. **SW1** and **SW2** should be in the **NT1** position.

Use external fusing to protect the external power supply and the T400 Shelf.

The installer must make sure that the -48 VDC power supply has sufficient capacity for the number of U-RPMs installed. Each U-RPM has a maximum current requirement of 300 mA. Therefore, a fully loaded shelf would require a maximum of 3.6 amps.

Table 3-1. Pinouts for T400 U-RPM Application

T400-19 Slot	Connection to Switch	Connection to U-Repeater
1	P1-01 P1-26	P1-02 P1-27
2	P1-03 P1-28	P1-04 P1-29
3	P1-05 P1-30	P1-06 P1-31
4	P1-07 P1-32	P1-08 P1-33
5	P1-09 P1-34	P1-10 P1-35
6	P1-11 P1-36	P1-12 P1-37
7	P1-13 P1-38	P1-14 P1-39
8	P1-15 P1-40	P1-16 P1-41
9	P1-17 P1-42	P1-18 P1-43
10	P1-19 P1- 44	P1-20 P1-45
11*	P1-21 P1-46	P1-22 P1-47
12*	P1-23 P1-48	P1-24 P1-49

*SW1 and SW2 must be in the NT1 position to use these slots

Chapter 4 T1 CSU Applications

INSTALLATION

This chapter describes the installation of the T400-19-inch shelf when using ADTRAN T1 CSU T400 Circuit Packs (part number 1210018L1).

Initial Unit Inspection

After unpacking the unit, immediately inspect it for possible shipping damage. If damage is discovered, file a claim immediately with the carrier; then contact ADTRAN Customer Service. See the front section of this manual for information on how to contact ADTRAN.

Rack Installation

Place the shelf in the 19-inch equipment rack. Ensure proper clearance is provided for any equipment that may be mounted above or below the shelf. Line up the holes in the mounting flanges with those in the relay rack. Secure the shelf to the rack using the four 12-24 panhead screws supplied with the shelf.

Installer Connections

In Chapter 1, Figure 1-1 on page 16 shows the connections on the printed circuit board between the circuit slots and the power supply. The T400-19 Shelf Backplane connections are shown in Figure 4-1 on page 30. Three male 50-pin connectors, **P1**, **P2**, and **P3**, connect the T400-19 Shelf to the network and terminal equipment.

A five-position terminal block, **TB1**, connects the shelf to an external power supply, alarm, and frame ground. Table 4-1 on page 30 lists part numbers for cables and connectors, while Table 4-2 on page 32 shows the pinout for each connector.

Up to 12 T1 CSU T400 Circuit Packs can be installed in the shelf by firmly pushing the units into the shelf slots.

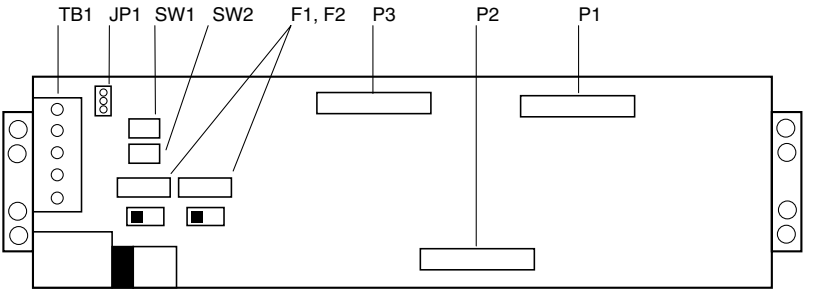

Figure 4-1. T400-19 Shelf Backplane Connections and Fuses

Table 4-1. Cables and Connectors Part Numbers

Connector/Cables	Part Number
Punchdown Block	3353002
Cable for Punchdown Block (female to male)	3353003
Harmonica Block	3353001
Cable for Harmonica block (male to male)	3353004

Network Connection

The Network is connected to **P1** on the T400-19 Shelf. One way to make this connection is to use a punchdown block and a 50-pin cable.

Terminal Equipment Connection

P2 and **P3** provide connections to the customer equipment (CPE) from the T1 CSUs. The CPE interface to the T1 CSU can be brought out to a punchdown block or twelve 8-pin modular jacks using two 6-connector harmonica blocks and two 50-pin cables.

Earth Ground

Connect an external earth ground to the **FRMG** connection on **TB1**. Use a 10, 12, or 14 gauge wire.

Power Configuration

The shelf and the terminal equipment are powered either internally or externally. Internal power is provided by using one or two Type 400 power supplies (part number 1353POWER04). External power is provided by any -48 VDC power source (minimum 3 amp for shelf with 12 T1 CSUs) such as a Ratelco 110 VAC to -48 VDC. **JP1** is a jumper that selects internal or external power. **SW1** and **SW2** are slide switches that configure **Slot 11** and **Slot 12** for either T1 CSUs or internal T400 power supplies.

Table 4-2. T400-19 Pin Assignments for 25 Pair Connection

Connector P1 - Network Connection for Slots 1-12				
Slot	**Tip to Network**	**Ring to Network**	**Tip 1 from Network**	**Ring 1 from Network**
1	1	26	2	27
2	3	28	4	29
3	5	30	6	31
4	7	32	8	33
5	9	34	10	35
6	11	36	12	37
7	13	38	14	39
8	15	40	16	41
9	17	42	18	43
10	19	44	20	45
11	21	46	22	47
12	23	48	24	49
Connector P2 - Customer Connection for Slots 1-6				
Slot	**Tip from Customer**	**Ring from Customer**	**Tip 1 to Customer**	**Ring 1 to Customer**
1	1	26	2	27
2	5	30	6	31
3	9	34	10	35
4	13	38	14	39
5	17	42	18	43
6	21	46	22	47
Connector P3 - Customer Connection for Slots 7-12				
Slot	**Tip from Customer**	**Ring from Customer**	**Tip 1 to Customer**	**Ring 1 to Customer**
7	1	26	2	27
8	5	30	6	31
9	9	34	10	35
10	13	38	14	39
11	17	42	18	43
12	21	46	22	47

Configuration 1- External Power Supply (Optional Battery Backup)

In this configuration, power is supplied by an external -48 VDC power supply which may have a reserve battery supply, as shown in Figure 2-2. Up to 12 T1 CSUs may be housed in the shelf in this configuration. When supplying external power, connect the -48 VDC from the supply to the -48 VDC on **TB1**. **JP1** should be in the **External** position. **SW1** and **SW2** should be in the **NT1** position.

External power supplies usually have a **Normally Open**, **Normally Closed**, and **Common** contact for indicating loss of power. Connect the **Normally Closed** contact on the supply to **BATT** on **TB1**, and connect the **Common** contact on the power supply to ground on the power supply. When AC power is lost, the **Normally Closed** contact opens, which alerts the **T1 CSUs** that reserve battery power is now in use. The **T1 CSUs** reserve power to the terminal equipment which alerts the user that AC power is lost.

Use external fusing to protect the external power supply and the T400 Shelf. Consult the user manual supplied with the external power supply for proper fuse ratings.

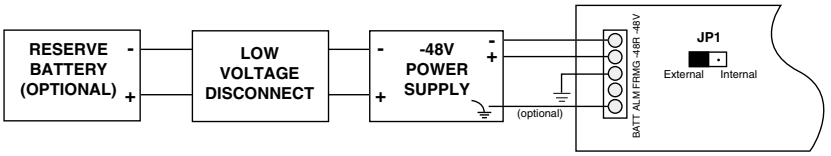

Figure 4-2. Configuration 1 - External Power Supply

Configuration 2 - Internal Power Supply

In this configuration, up to 10 T1 CSUs may be housed in Slots 1 through 10 of the shelf. Power is supplied by an internal Type 400 power supply in Slot 12. Additionally, a second redundant power supply may be placed in Slot 11 and engaged as a backup if the first unit fails. **JP1** should be in the **Internal** position. **SW1** and **SW2** should be in the **PWR** position (see Figure 2-1 on page 30 and Figure 2-3.).

There are two fuses, **F1** and **F2**, on the power connections for Slot 11 and Slot 12 (See Figure 2-1 on page 30). These fuses are designed to protect the internal power supplies from a short circuit. Three-amp, **GMT** fuses are installed at the factory. Replacement fuses should be of the same type. An external alarm output is available for the T400 Shelf to indicate that a fuse has blown due to an overcurrent condition. Connect the external alarm to the **ALM** terminal of **TB1**, shown on Figure 2-3. When a fuse blows, -48 VDC powers the external alarm.

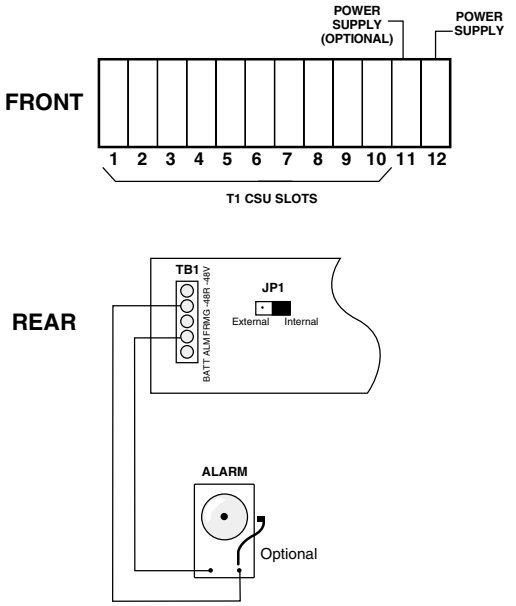

Figure 4-3. Configuration 2 - Internal Power Supply

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