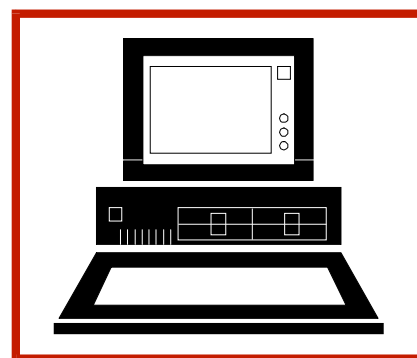
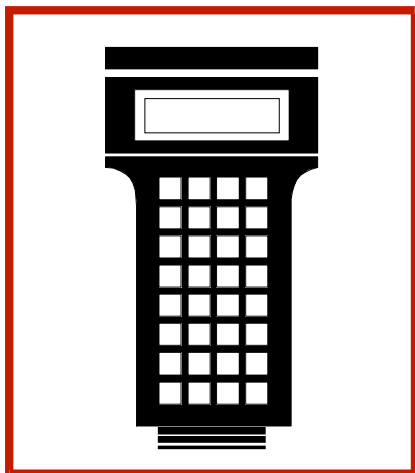
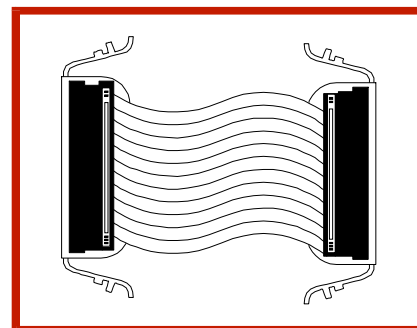
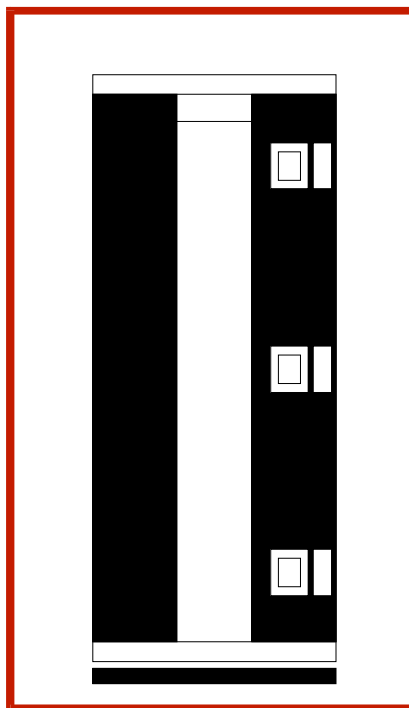
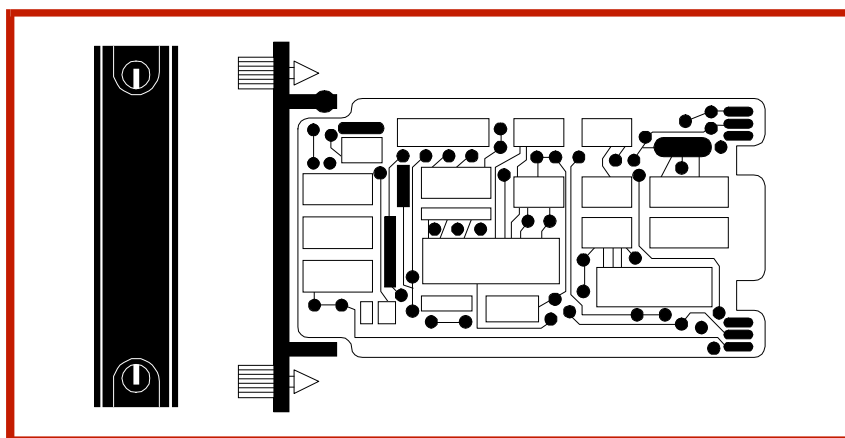
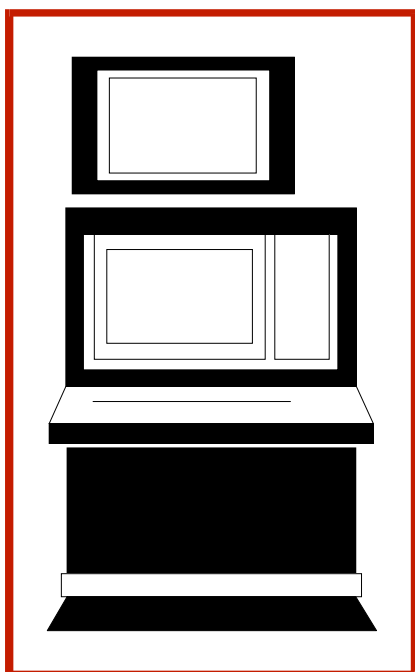


**E96-422**

**Bailey®  
infi 90**

# Instruction

## Communication Termination Unit (NTCL01)



**WARNING** notices as used in this instruction apply to hazards or unsafe practices that could result in personal injury or death.

**CAUTION** notices apply to hazards or unsafe practices that could result in property damage.

**NOTES** highlight procedures and contain information that assists the operator in understanding the information contained in this instruction.

## **WARNING**

### **INSTRUCTION MANUALS**

DO NOT INSTALL, MAINTAIN, OR OPERATE THIS EQUIPMENT WITHOUT READING, UNDERSTANDING, AND FOLLOWING THE PROPER **Elsag Bailey** INSTRUCTIONS AND MANUALS; OTHERWISE, INJURY OR DAMAGE MAY RESULT.

### **RADIO FREQUENCY INTERFERENCE**

MOST ELECTRONIC EQUIPMENT IS INFLUENCED BY RADIO FREQUENCY INTERFERENCE (RFI). CAUTION SHOULD BE EXERCISED WITH REGARD TO THE USE OF PORTABLE COMMUNICATIONS EQUIPMENT IN THE AREA AROUND SUCH EQUIPMENT. PRUDENT PRACTICE DICTATES THAT SIGNS SHOULD BE POSTED IN THE VICINITY OF THE EQUIPMENT CAUTIONING AGAINST THE USE OF PORTABLE COMMUNICATIONS EQUIPMENT.

### **POSSIBLE PROCESS UPSETS**

MAINTENANCE MUST BE PERFORMED ONLY BY QUALIFIED PERSONNEL AND ONLY AFTER SECURING EQUIPMENT CONTROLLED BY THIS PRODUCT. ADJUSTING OR REMOVING THIS PRODUCT WHILE IT IS IN THE SYSTEM MAY UPSET THE PROCESS BEING CONTROLLED. SOME PROCESS UPSETS MAY CAUSE INJURY OR DAMAGE.

## **AVERTISSEMENT**

### **MANUELS D'OPÉRATION**

NE PAS METTRE EN PLACE, RÉPARER OU FAIRE FONCTIONNER L'ÉQUIPEMENT SANS AVOIR LU, COMPRIS ET SUIVI LES INSTRUCTIONS RÉGLEMENTAIRES DE **Elsag Bailey**. TOUTE NÉGLIGENCE À CET ÉGARD POURRAIT ÊTRE UNE CAUSE D'ACCIDENT OU DE DÉFAILLANCE DU MATÉRIEL.

### **PERTURBATIONS PAR FRÉQUENCE RADIO**

LA PLUPART DES ÉQUIPEMENTS ÉLECTRONIQUES SONT SENSIBLES AUX PERTURBATIONS PAR FRÉQUENCE RADIO. DES PRÉCAUTIONS DEVRONT ÊTRE PRISES LORS DE L'UTILISATION DU MATÉRIEL DE COMMUNICATION PORTATIF. LA PRUDENCE EXIGE QUE LES PRÉCAUTIONS À PRENDRE DANS CE CAS SOIENT SIGNALÉES AUX ENDROITS VOULUS DANS VOTRE USINE.

### **PERTURBATIONS DU PROCÉDÉ**

L'ENTRETIEN DOIT ÊTRE ASSURÉ PAR UNE PERSONNE QUALIFIÉE EN CONSIDÉRANT L'ASPECT SÉCURITAIRE DES ÉQUIPEMENTS CONTRÔLÉS PAR CE PRODUIT. L'AJUSTEMENT ET/OU L'EXTRACTION DE CE PRODUIT PEUT OCCASIONNER DES À-COUPS AU PROCÉDÉ CONTRÔLE LORSQU'IL EST INSÉRÉ DANS UNE SYSTÈME ACTIF. CES À-COUPS PEUVENT ÉGALEMENT OCCASIONNER DES BLESSURES OU DES DOMMAGES MATÉRIELS.

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## Preface

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The NTCL01 terminates the connection of the INFI-NET<sup>®</sup> or Plant Loop communication loops to the Network Interface Slave Module (INNIS01) or the Loop Interface Module (INLIM03). The NTCL01 is designed to connect to communication loops of either twinaxial or coaxial cable.

This manual explains how to install and use the NTCL01. It explains how to set the jumpers, install the cables, mount the termination unit and lists maximum cable lengths for the communication loop.

## List of Effective Pages

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Total number of pages in this manual is 31, consisting of the following:

| <b>Page No.</b>         | <b>Change Date</b> |
|-------------------------|--------------------|
| Preface                 | Original           |
| List of Effective Pages | Original           |
| iii through vi          | Original           |
| 1-1 through 1-4         | Original           |
| 2-1 through 2-8         | Original           |
| 3-1                     | Original           |
| 4-1 through 4-2         | Original           |
| 5-1                     | Original           |
| A-1 through A-4         | Original           |
| B-1 through B-4         | Original           |
| Index-1                 | Original           |

When an update is received, insert the latest changed pages and dispose of the superseded pages.

**NOTE:** On an update page, the changed text or table is indicated by a vertical bar in the outer margin of the page adjacent to the changed area. A changed figure is indicated by a vertical bar in the outer margin next to the figure caption. The date the update was prepared will appear beside the page number.

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# Safety Summary

---

**GENERAL  
WARNINGS**

- Equipment Environment**  
All components, whether in transportation, operation or storage, must be in a noncorrosive environment.
- Electrical Shock Hazard During Maintenance**  
Disconnect power or take precautions to insure that contact with energized parts is avoided when servicing.
- Special Handling**  
This module uses Electrostatic Sensitive Devices (ESD).

**SPECIFIC  
CAUTIONS**

- We strongly recommend that you turn cabinet power off before doing any termination unit wiring. Failure to do so could result in equipment damage. Do not apply power until you verify all wire connections. (p. 2-7)
- When removing and replacing an NTCL01, all loop communication is lost while the termination unit is removed from the loop. (p. 4-1)
- Remove modules from their assigned MMU slots before installing or removing a cable connected to that slot. Failure to do so could result in damage to the module. (p. 4-2)

## Sommaire de Sécurité

---

**AVERTISSEMENTS  
D'ORDRE  
GÉNÉRAL****Environnement de l'équipement**

Ne pas soumettre les composants à une atmosphère corrosive lors du transport, de l'entreposage ou l'utilisation.

**Possibilité de chocs électriques durant l'entretien**

Débrancher l'alimentation ou prendre les précautions pour éviter tout contact avec des composants sous tension durant l'entretien.

**Precautions de Manutention**

Ce module contient des composants sensibles aux decharges electro-statiques.

**ATTENTIONS  
D'ORDRE  
SPÉCIFIQUE**

Il est fortement recommande, de debrancher l'alimentation electrique du cabinet avant d'effectuer toute connexion aux cartes de raccordement du chassis. Des dommages aux equipements pourraient survenir dans le cas contraire. Ne pas rebrancher l'alimentation avant que toutes les connexions aient ete verifiees. (p. 2-7)

Durant le demontage ou le remplacement d'une carte NTCL01, toute communication avec le reseau est interrompue et ce pendant tout le temps ou la carte est retiree du reseau. (p. 4-1)

Retirer le module de son emplacement dans le chassis de montage des modules avant d'installer ou de retirer un cable assigne a cet emplacement. Un manquement a cette procedure pourrait endommager le module. (p. 4-2)

---

# Table of Contents

|                                                                                  | <i>Page</i> |
|----------------------------------------------------------------------------------|-------------|
| <b>SECTION 1 - INTRODUCTION .....</b>                                            | <b>1-1</b>  |
| INTRODUCTION .....                                                               | 1-1         |
| INTENDED USER .....                                                              | 1-1         |
| HARDWARE DESCRIPTION .....                                                       | 1-2         |
| FEATURES .....                                                                   | 1-2         |
| INSTRUCTION CONTENT .....                                                        | 1-2         |
| HOW TO USE THIS MANUAL .....                                                     | 1-2         |
| GLOSSARY OF TERMS AND ABBREVIATIONS .....                                        | 1-3         |
| NOMENCLATURE .....                                                               | 1-3         |
| REFERENCE DOCUMENTS .....                                                        | 1-3         |
| SPECIFICATIONS .....                                                             | 1-4         |
| <b>SECTION 2 - INSTALLATION .....</b>                                            | <b>2-1</b>  |
| INTRODUCTION .....                                                               | 2-1         |
| SPECIAL HANDLING .....                                                           | 2-1         |
| UNPACKING AND INSPECTION .....                                                   | 2-1         |
| PREPARING THE TCL FOR INSTALLATION .....                                         | 2-2         |
| Installing the Fuse .....                                                        | 2-2         |
| Installing the Jumpers .....                                                     | 2-3         |
| MOUNTING THE TERMINATION UNIT .....                                              | 2-3         |
| CABLE INSTALLATION .....                                                         | 2-4         |
| Termination Unit Cables .....                                                    | 2-4         |
| Communication Cable .....                                                        | 2-5         |
| POWER WIRING .....                                                               | 2-7         |
| <b>SECTION 3 - MAINTENANCE .....</b>                                             | <b>3-1</b>  |
| INTRODUCTION .....                                                               | 3-1         |
| MAINTENANCE SCHEDULE .....                                                       | 3-1         |
| <b>SECTION 4 - REPAIR/REPLACEMENT PROCEDURES .....</b>                           | <b>4-1</b>  |
| INTRODUCTION .....                                                               | 4-1         |
| FUSE REPLACEMENT .....                                                           | 4-1         |
| TERMINATION UNIT REPLACEMENT .....                                               | 4-1         |
| <b>SECTION 5 - SUPPORT SERVICES .....</b>                                        | <b>5-1</b>  |
| INTRODUCTION .....                                                               | 5-1         |
| REPLACEMENT PARTS AND ORDERING INFORMATION .....                                 | 5-1         |
| TRAINING .....                                                                   | 5-1         |
| TECHNICAL DOCUMENTATION .....                                                    | 5-1         |
| <b>APPENDIX A - NETWORK INTERFACE SLAVE MODULE CONFIGURATION (INNIS01) .....</b> | <b>A-1</b>  |
| INTRODUCTION .....                                                               | A-1         |
| <b>APPENDIX B - LOOP INTERFACE MODULE CONFIGURATION (INLIM03) .....</b>          | <b>B-1</b>  |
| INTRODUCTION .....                                                               | B-1         |

## List of Tables

| <i>No.</i> | <i>Title</i>                                                                                   | <i>Page</i> |
|------------|------------------------------------------------------------------------------------------------|-------------|
| 2-1.       | TCL Circuit Board Revisions D and E Jumper Settings<br>(for LIM or LIS Application) .....      | 2-3         |
| 2-2.       | TCL Circuit Board Revisions F and Higher Jumper Settings<br>(for LIM or LIS Application) ..... | 2-3         |
| 2-3.       | TCL Cable Applications.....                                                                    | 2-5         |
| 3-1.       | Maintenance Schedule.....                                                                      | 3-1         |
| 4-1.       | Recommended Spare Parts List.....                                                              | 4-1         |
| A-1.       | SW1 Node Addresses/SW2 Ring Numbers .....                                                      | A-2         |
| A-2.       | Loop Mode Switch (SW3) Settings .....                                                          | A-2         |
| A-3.       | Slave Address Switch (SW4) Settings .....                                                      | A-2         |
| A-4.       | Event Counters .....                                                                           | A-3         |
| A-5.       | Error Counters .....                                                                           | A-4         |
| B-1.       | LIM Event Counter Addresses (S1) .....                                                         | B-2         |
| B-2.       | LIM Error Counter Addresses (S1) .....                                                         | B-3         |
| B-3.       | PCU Address Settings (S2) .....                                                                | B-4         |

## List of Figures

| <i>No.</i> | <i>Title</i>                                                                             | <i>Page</i> |
|------------|------------------------------------------------------------------------------------------|-------------|
| 1-1.       | The NTCL01 within a PCU on INFI-NET .....                                                | 1-1         |
| 2-1.       | NTCL01 Connector Assignments and Jumper Locations for<br>Revision F Circuit Boards ..... | 2-2         |
| 2-2.       | Mounting and Securing the TCL on the Field Termination Panel .....                       | 2-4         |
| 2-3.       | TCL Cable Connections to the INLIM03 with Twinaxial Communication Loop .....             | 2-6         |
| 2-4.       | TCL Cable Connections to the INNIS01 with Coaxial Communication Loop .....               | 2-6         |
| 2-5.       | NKPL01/02 Lead Assignments .....                                                         | 2-7         |
| A-1.       | Network Interface Slave Module Switch and Jumper Locations .....                         | A-1         |
| A-2.       | User Configured Jumpers .....                                                            | A-4         |
| B-1.       | Loop Interface Module Component Locations .....                                          | B-1         |

# SECTION 1 - INTRODUCTION

## INTRODUCTION

The Communication Termination Unit (NTCL01) provides a termination point for a Network Interface Slave Module (INNIS01) or a Loop Interface Module (INLIM03). The TCL gives the option of using twinaxial or coaxial cable to connect the NIS to the INFI-NET communication network or the LIM to Plant Loop. Jumper settings on the TCL select the type communication cable. Figure 1-1 shows an example of the NTCL01 within a PCU on the INFI-NET communication network.

## INTENDED USER

Technicians should read the manual before installing and operating the TCL. Do not put the TCL into operation until you read and understand this instruction.

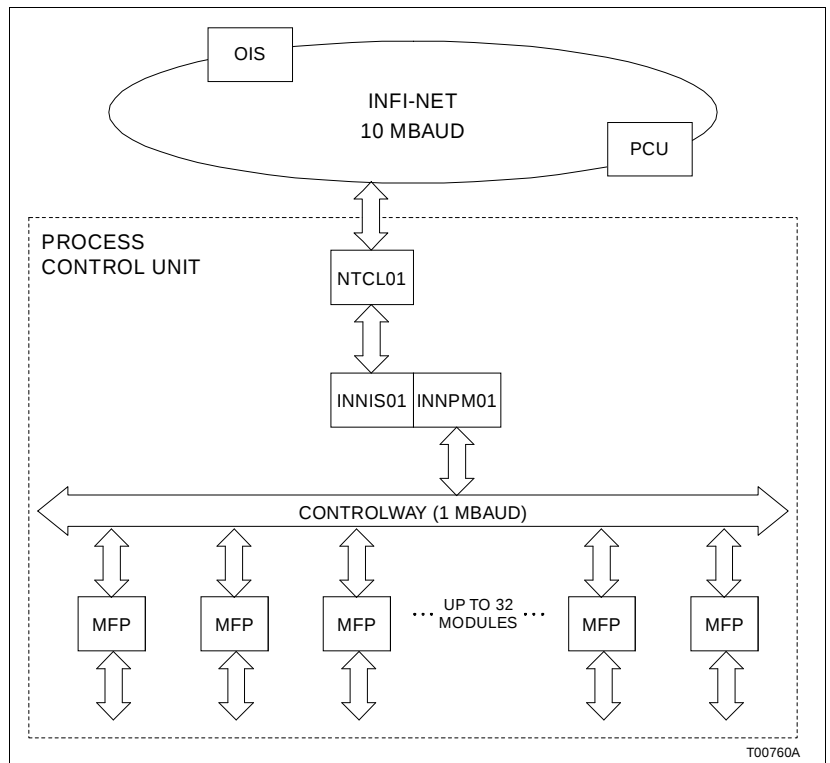


Figure 1-1. The NTCL01 within a PCU on INFI-NET

---

## HARDWARE DESCRIPTION

The TCL attaches to a Field Termination Panel (NFTP01), inside the INFI 90<sup>®</sup> cabinet, with two mounting screws and one ground screw. It is a printed circuit board that consists of:

- Terminal strips
- BNC connectors
- Electronic components
- Jumpers
- Fuse

---

## FEATURES

The NTCL01 provides connectors for both twinaxial cable and coaxial cable. Jumpers on the circuit board set the impedance to match the communication cable. The +24 VDC supplied to the board is fused, protecting the electronic circuitry on board.

---

## INSTRUCTION CONTENT

This manual has five sections and two appendices.

|                                      |                                                                                                                                    |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>Introduction</b>                  | Provides an overview of the TCL.                                                                                                   |
| <b>Installation</b>                  | Explains physical installation, wiring and cable requirements, jumper settings, etc.                                               |
| <b>Maintenance</b>                   | Contains a maintenance schedule.                                                                                                   |
| <b>Repair/Replacement Procedures</b> | Explains how to replace the fuse or the module.                                                                                    |
| <b>Support Services</b>              | Explains training, documentation and how to order parts from Bailey Controls.                                                      |
| <b>Appendices</b>                    | Briefly discuss the modules that can use the TCL and provide a cross-reference of dipswitch and jumper settings for those modules. |

---

## HOW TO USE THIS MANUAL

Read this manual before installing the TCL. Do the installation steps in order. Do not operate the TCL until you complete all the steps in this section. Refer to the appendices for specific module and cable questions.

**GLOSSARY OF TERMS AND ABBREVIATIONS**

| <b>Term</b>     | <b>Definition</b>                                                                                                      |
|-----------------|------------------------------------------------------------------------------------------------------------------------|
| FTP             | Field Termination Panel. A panel inside the INFI 90 cabinet on which to mount termination units.                       |
| TU              | Termination Unit. Provides input/output connection between plant equipment and the INFI 90/Network 90 process modules. |
| Coaxial cable   | A special type of communications cable that can transmit data at high speed.                                           |
| Twinaxial cable | A cable composed of two insulated conductors that are twisted together and attached or bound with a common covering.   |

**NOMENCLATURE**

| <b>Hardware</b>                                           | <b>Nomenclature</b> |
|-----------------------------------------------------------|---------------------|
| Network Interface Slave Module                            | INNIS01             |
| Loop Interface Module                                     | INLIM03             |
| Cables                                                    |                     |
| Twinaxial Communication Cable<br>(PVC, lugs at both ends) | NKPL01              |
| (non-PVC, lugs at both ends)                              | NKPL02              |
| TCL to INFI-NET Adapter Cable                             | NKTL01-3            |
| Coaxial Communication Cable<br>(PVC, BNC connectors)      | NKCL01              |
| (non-PVC, BNC connectors)                                 | NKCL02              |
| TCL to TCL Cable                                          | NKTT01              |
| TCL to LIM Cable<br>(PVC)                                 | NKLS03              |
| (non-PVC)                                                 | NKLS13              |
| TCL to NIS Cable<br>(PVC)                                 | NKLS01              |
| (non-PVC)                                                 | NKLS11              |
| Field Termination Panel                                   | NFTP01              |

**REFERENCE DOCUMENTS**

| <b>Document No.</b> | <b>Document</b>                            |
|---------------------|--------------------------------------------|
| I-E96-601           | INFI-NET Communications Modules            |
| I-E96-605           | Bus Interface Module/Loop Interface Module |

---

**SPECIFICATIONS**

|                       |                                                                                                    |                                    |
|-----------------------|----------------------------------------------------------------------------------------------------|------------------------------------|
| Power Requirements    | Voltage                                                                                            | 24 VDC                             |
|                       | Current                                                                                            | 19.7 mA maximum<br>15.8 mA typical |
|                       |                                                                                                    |                                    |
| Mounting              | Screw mounts to the field termination panel.                                                       |                                    |
| Cooling Requirements  | No cooling necessary when used in Bailey cabinets and operated within stated environmental limits. |                                    |
| Operating Temperature | 0° to 70°C (32° to 158°F).                                                                         |                                    |
| Relative Humidity     | 5% to 90% (± 5%) up to 55°C (131°F) noncondensing.                                                 |                                    |
|                       | 5% to 40% (± 5%) up to 70°C (158°F) noncondensing.                                                 |                                    |
| Air Quality           | Bailey equipment should be operated and stored in a noncorrosive environment.                      |                                    |
| Certification         | CSA certified as process control equipment for use in an ordinary (nonhazardous) location.         |                                    |

Specifications are subject to change without notice.

---

## SECTION 2 - INSTALLATION

---

### INTRODUCTION

This section explains how to install the communication termination unit (TCL). The installation procedure covers handling, jumper configuration, cable connection and physical installation.

---

### SPECIAL HANDLING

Observe these steps when handling electronic circuitry:

**NOTE:** Always use Bailey's Field Static Kit (P/N 1948385A1 - consisting of wrist straps, ground cord assembly, and alligator clip) when working with the modules. The kit connects a technician and the static dissipative work surface to the same ground point to prevent damage to the modules by electrostatic discharge.

1. **Use Antistatic Bag.** Keep the modules in the antistatic bag until you are ready to install them in the system. Save the bag for future use.
2. **Ground Bags Before Opening.** Before opening a bag containing an assembly with CMOS devices, touch it to the equipment housing or a ground to equalize charges.
3. **Avoid Touching Circuitry.** Handle assemblies by the edges; avoid touching the circuitry.
4. **Avoid Partial Connection of CMOS Device.** Verify that all devices connected to the modules are properly grounded before using them.
5. **Ground Test Equipment.**
6. **Use an Antistatic Field Service Vacuum.** Remove dust from the module if necessary.
7. **Use a Grounded Wrist Strap.** Connect the wrist strap to the appropriate grounding plug on the power entry panel. The grounding plug on the power entry panel must be effectively connected to the earth grounding electrode system through the DC common bus.

---

### UNPACKING AND INSPECTION

1. Examine the termination unit immediately for any shipping damage.
2. Notify the nearest Bailey Controls sales office of any damage.

3. File a claim for any damage with the transportation company that handled the shipment.
4. Use the original packing material or container to store the termination unit.
5. Store the unit in an environment of good air quality, free from temperature and moisture extremes.

## PREPARING THE TCL FOR INSTALLATION

Before you mount the TCL on the field termination panel, install the jumpers. Jumper settings configure the termination unit to match the impedance of the communication cable. These jumpers must be properly installed for the system to operate. Figure 2-1 shows the location of the fuse holder, jumpers and connectors.

### Installing the Fuse

Bailey ships a 1.0 amp/250 volt fuse (Bailey P/N 194776A11001) installed on each TCL. Verify that the fuse is in the fuse holder marked F1. Figure 2-1 shows the location of the fuse holder on the TCL circuit board.

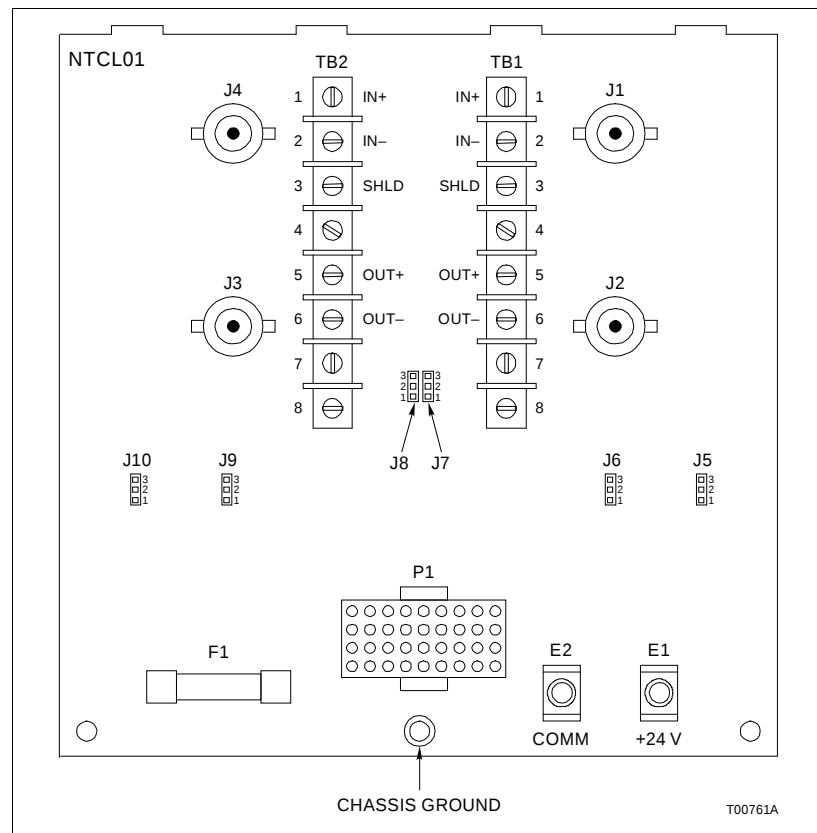


Figure 2-1. NTCL01 Connector Assignments and Jumper Locations for Revision F Circuit Boards

Installing the Jumpers

Install the jumpers to match the impedance of the communication cable. The proper jumper settings depend on the revision level of the termination unit. To set the jumpers on termination units that are revision A, B or C, follow the jumper settings silkscreened on the printed circuit board. Revision D and E TCLs must have jumpers J5 through J12 set for LIS (regardless of whether a LIM or LIS is used), and J13 through J18 are set for the cable type being used. Table 2-1 shows the jumper settings for communication termination units revisions D and E. Termination units that are revision F or higher use the jumper settings shown in Table 2-2. Set the jumpers for the type of cable being used for each loop before mounting the termination unit to the field termination panel.

**NOTE:** The revision level of a circuit board is indicated by the next to the last digit of the alphanumeric assembly number silkscreened to the circuit board. For example, ASSY P/N 6636997F1 indicates a revision F circuit board.

Table 2-1. TCL Circuit Board Revisions D and E Jumper Settings (for LIM or LIS Application)

| Jumper No. | Twinax                                                                                | Coax                                                                                  |
|------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| J5-J12     |  |  |
| J13-J18    |  |  |

T00490A

Table 2-2. TCL Circuit Board Revisions F and Higher Jumper Settings (for LIM or LIS Application)

| Jumper No. | Twinax                                                                                | Coax                                                                                  |
|------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| J5-J10     |  |  |

T00490A

MOUNTING THE TERMINATION UNIT

The termination unit is ready to install when the jumpers have been installed. To mount the termination unit:

1. Insert the tabs of the circuit board into the proper slots of the termination panel standoff as shown in Figure 2-2 and slide the circuit board into position.

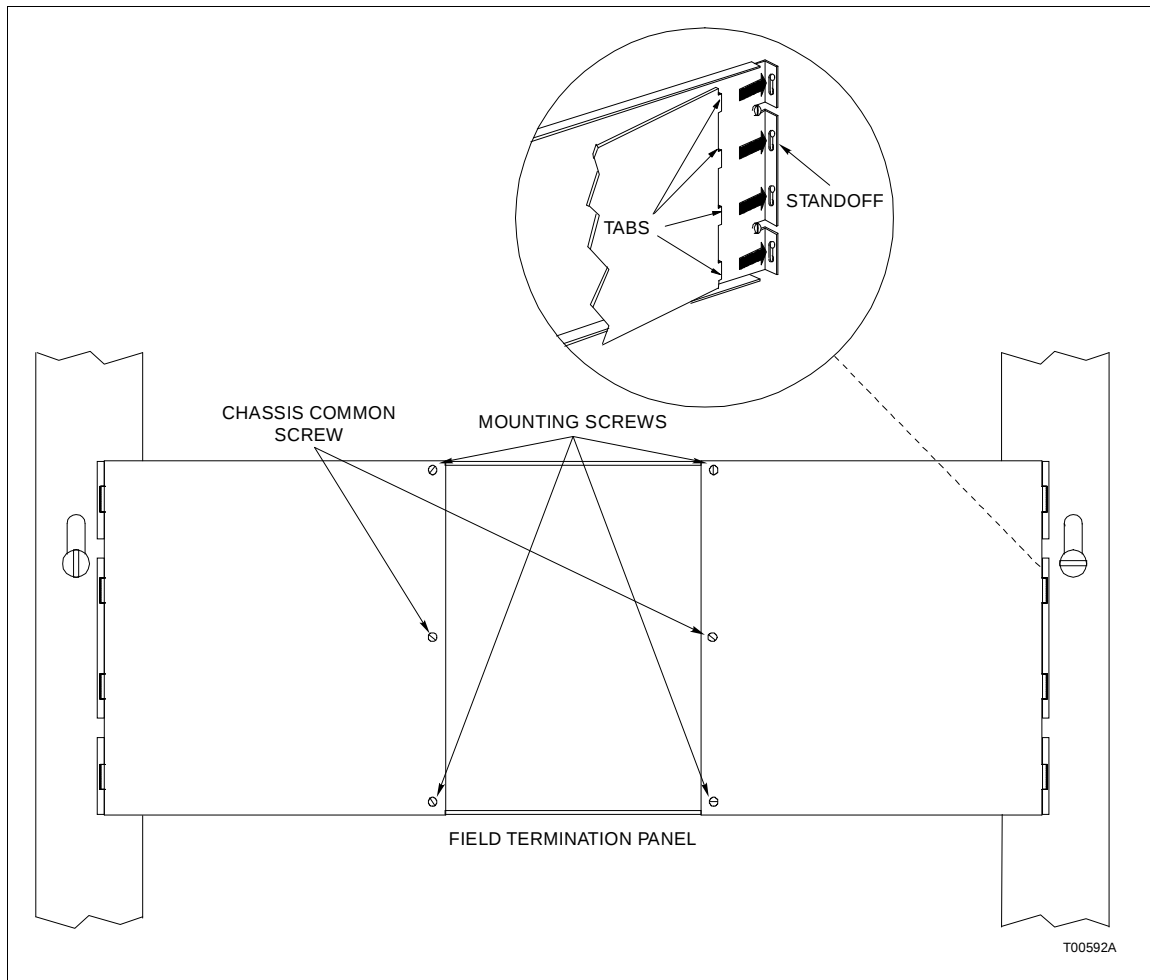


Figure 2-2. Mounting and Securing the TCL on the Field Termination Panel

2. Secure the termination unit circuit board to the field termination panel with two number 10 machine screws (see Figure 2-2).
3. Connect the chassis ground by installing a number 10 self-tapping screw and external star washer in the location shown in Figure 2-2.

## CABLE INSTALLATION

### Termination Unit Cables

After mounting the termination unit to the FTP, install the termination cables. Table 2-3 lists the cables, their application, connector assignments and length restrictions. Figures 2-3 and 2-4 show diagrams of cable connections to the LIM and NIS. To install the termination unit cable:

**NOTE:** If the LIM or NIS module is already installed, pull the module away from the MMU backplane several inches. The card edge of the module must not come into contact with the card edge connector of the termination cable while installing the cable. After installing the cable, slide the module into the MMU so that the card edge seats within the card edge connector. Refer to the product instructions for the INLIM03 or INNIS01 for more information about the installation or removal of those modules.

1. Install the hooded end of the appropriate cable in the module mounting unit (MMU) backplane slot assigned to the LIM or NIS.
2. Insert the socket connector end of the cable into P1 of the TCL. See Figure 2-1 for the location of P1 on the TCL circuit board.

### Communication Cable

The communication cable connects the TCL to INFI-NET or Plant Loop. Table 2-3 lists the communication cables, their application, connector assignments and length restrictions. Figures 2-3 and 2-4 show diagrams of twinaxial and coaxial cable connections. To install the communication cable:

1. If using coaxial cable, connect the cable to the termination unit at the appropriate (loop 1 or 2) BNC connector. The BNC connector assignments are marked on the circuit board and are shown in Figure 2-1.
2. If using twinaxial cable, connect the cable to the termination unit at the terminal blocks, TB1 or TB2. Figure 2-1 shows the terminal assignments as they are marked on the circuit board. Figure 2-5 shows the lead assignments of the NKPL01/02 cable.

Table 2-3. TCL Cable Applications

| Nomenclature/<br>Description                                                                | Application                                         | Connector                            | Maximum Length<br>Meters (Feet)   |
|---------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------------------------------|-----------------------------------|
| NKLS01 (PVC)<br>NKLS11 (non-PVC)<br>Termination cable                                       | Connects the TCL to the INNIS01                     | P1                                   | 25 (82)                           |
| NKLS03 (PVC)<br>NKLS13 (non-PVC)<br>Termination cable                                       | Connects the TCL to the INLIM03                     | P1                                   | 25 (82)                           |
| NKCL01 (PVC)<br>NKCL02 (non-PVC)<br>Coaxial communication cable<br>INFI-NET or Plant Loop   | Connects individual drops on the communication loop | Must connect to a NKTL01 on each end | 2000 (6562), INFI-NET at 10 Mbaud |
|                                                                                             |                                                     |                                      | 4000 (13120), INFI-NET at 2 Mbaud |
|                                                                                             |                                                     |                                      | 2000 (6562), Plant Loop           |
| NKPL01 (PVC)<br>NKPL02 (non-PVC)<br>Twinaxial communication cable<br>INFI-NET or Plant Loop | Connects individual drops on the communication loop | TB1 for Loop 1<br>TB2 for Loop 2     | 1000 (3281), INFI-NET at 10 Mbaud |
|                                                                                             |                                                     |                                      | 2000 (6562), INFI-NET at 2 Mbaud  |
|                                                                                             |                                                     |                                      | 2000 (6562), Plant Loop           |

Table 2-3. TCL Cable Applications (continued)

| Nomenclature/<br>Description      | Application                                  | Connector                            | Maximum Length<br>Meters (Feet) |
|-----------------------------------|----------------------------------------------|--------------------------------------|---------------------------------|
| NKTL01-3<br>Coaxial adapter cable | Adapts and connects the<br>NKCL01 to the TCL | J1,J2 for Loop 1<br>J3,J4 for Loop 2 | 1 (3)                           |
| NKTT01<br>Coaxial cable           | Connects a TCL to a TCL                      | J1 to J4                             | 800 (2624)                      |

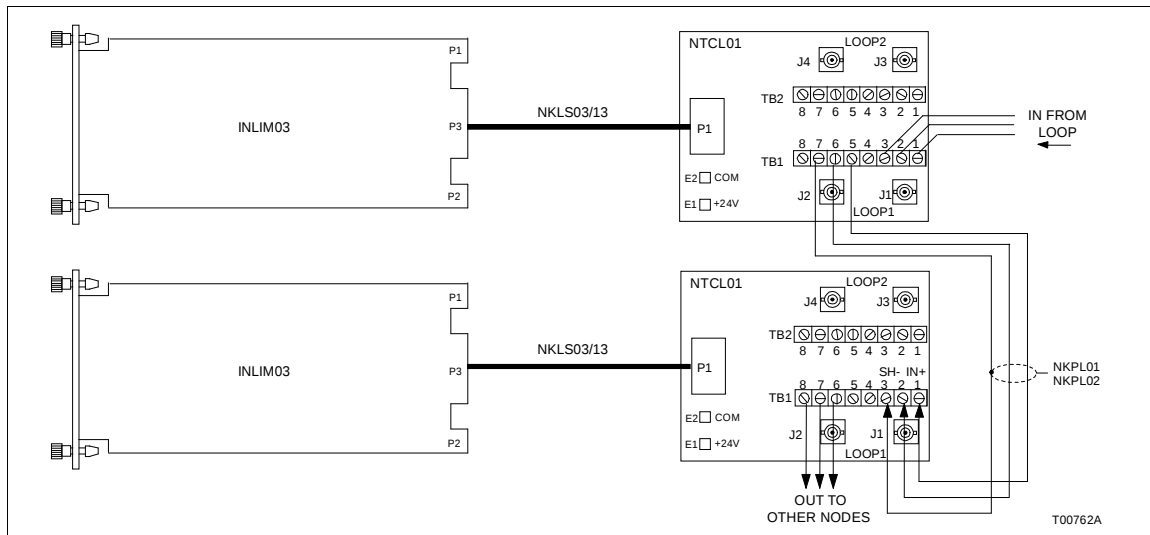


Figure 2-3. TCL Cable Connections to the INLIM03 with Twinaxial Communication Loop

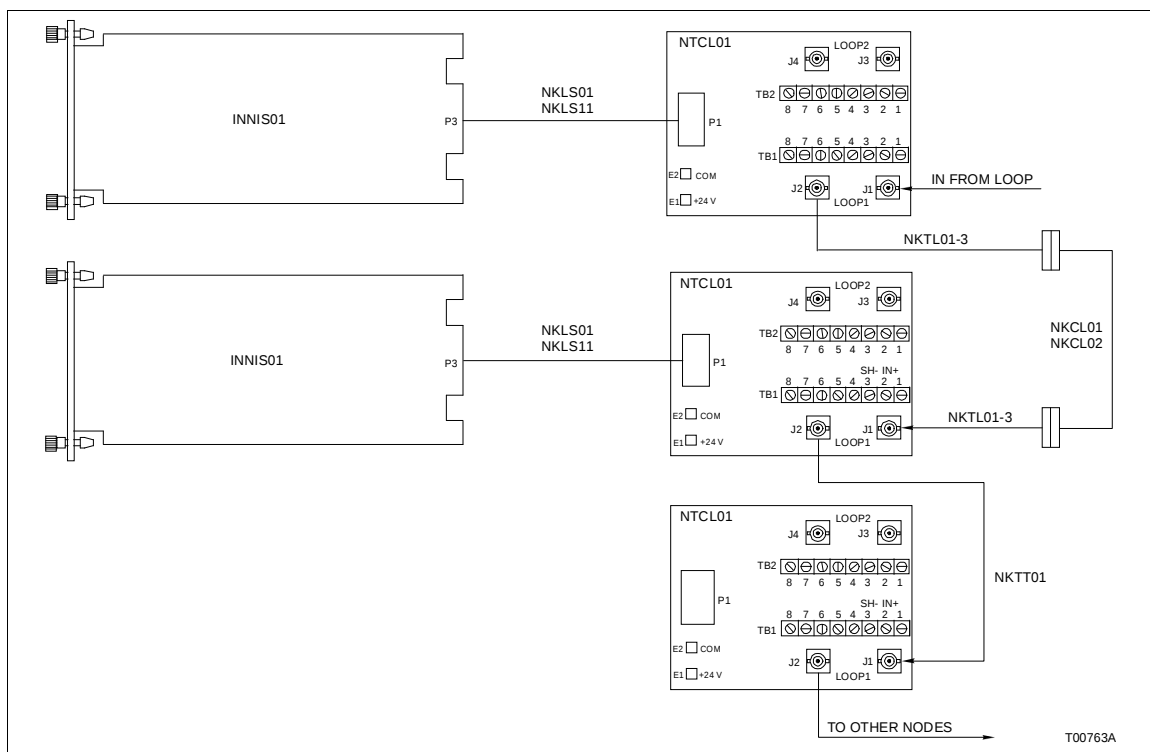


Figure 2-4. TCL Cable Connections to the INNIS01 with Coaxial Communication Loop

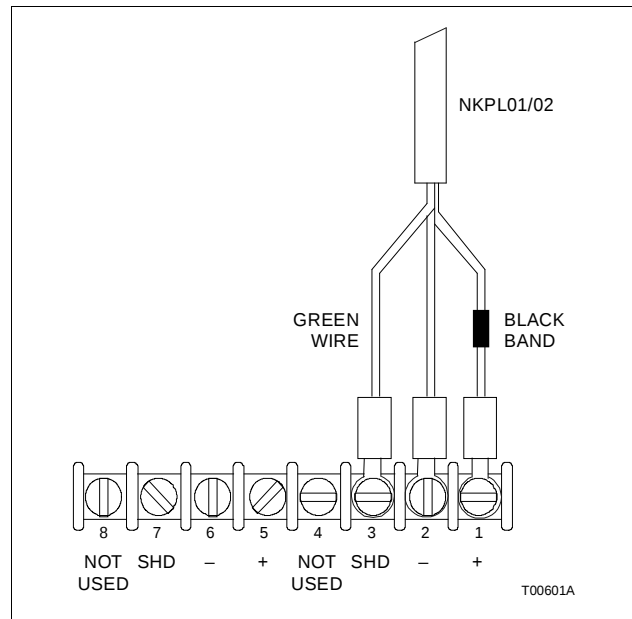


Figure 2-5. NKPL01/02 Lead Assignments

#### POWER WIRING

##### CAUTION

We strongly recommend that you turn cabinet power off before doing any termination unit wiring. Failure to do so could result in equipment damage. Do not apply power until you verify all wire connections.

##### ATTENTION

Il est fortement recommande, de debrancher l'alimentation electrique du cabinet avant d'effectuer toute connexion aux cartes de raccordement du chassis. Des dommages aux equipements pourraient survenir dans le cas contraire. Ne pas rebrancher l'alimentation avant que toutes les connexions aient ete verifiees.

There is one terminal (E1) that connects to +24 VDC and one terminal (E2) that connects to system common. Figure 2-1 shows their location on the TCL circuit board.

To connect power to the termination unit in a system using modular power supplies:

1. Attach a 14 AWG wire from a source of +24 VDC within the cabinet to the E1 terminal on the TCL.
2. Attach a 14 AWG wire from the DC common bus bar at the bottom of the cabinet to the E2 terminal of the TCL.

The NTCL01 is ready for operation if:

1. The fuse is installed.

2. The jumpers are installed for the type of communication cable.
3. The circuit board is mounted on the field termination panel.
4. All required cables are connected to the termination unit.
5. Power is connected and is applied to the termination unit.

---

## SECTION 3 - MAINTENANCE

---

### INTRODUCTION

The communication termination unit requires minimal maintenance. Doing the tasks in Table 3-1 will provide long, trouble free service. Please note that only qualified personnel should perform maintenance.

---

### MAINTENANCE SCHEDULE

Table 3-1 is the maintenance schedule. These tasks are to be performed at the specified intervals.

*Table 3-1. Maintenance Schedule*

| Task                                                  | Interval                                                         |
|-------------------------------------------------------|------------------------------------------------------------------|
| Clean and tighten all cable and power connections.    | Every 6 months or during plant shutdown, whichever occurs first. |
| Use a static safe vacuum cleaner to remove dust from: |                                                                  |
| Termination units.                                    |                                                                  |
| Field termination panel.                              |                                                                  |

---

## SECTION 4 - REPAIR/REPLACEMENT PROCEDURES

---

### INTRODUCTION

Repair procedures are limited to fuse and termination unit (TU) replacement. If the TCL fails, remove and replace it with another one.

---

### FUSE REPLACEMENT

If the fuse (F1) opens, replace it with a fuse having an equivalent rating. Table 4-1 describes the fuse and lists its Bailey part number. To replace a fuse:

1. Turn off power to the cabinet.
2. Remove the blown fuse from its holder (F1).
3. Replace the blown fuse with a 1.0 amp, 250 volt fuse.
4. Turn on power to the cabinet.

Table 4-1. Recommended Spare Parts List

| Description     | Part Number             |
|-----------------|-------------------------|
| Fuse, 1.0A/250V | Bailey P/N 194776A11001 |

---

### TERMINATION UNIT REPLACEMENT

#### CAUTION

When removing and replacing an NTCL01, all loop communication is lost while the termination unit is removed from the loop.

#### ATTENTION

Durant le demontage ou le remplacement d'une carte NTCL01, toute communication avec le reseau est interrompue et ce pendant tout le temps ou la carte est retiree du reseau.

If you determine that the TCL is faulty, replace it with a new one. **Do not** try to repair the module; replacing components may affect the module performance and certification. Table 4-1 contains a list of recommended spare parts.

When replacing a termination unit, verify that:

1. The proper fuse has been installed on the replacement termination unit.

**CAUTION**

Remove modules from their assigned MMU slots before installing or removing a cable connected to that slot. Failure to do so could result in damage to the module.

**ATTENTION**

Retirer le module de son emplacement dans le chassis de montage des modules avant d'installer ou de retirer un cable assigne a cet emplacement. Un manquement a cette procedure pourrait endommager le module.

2. All jumper settings on the replacement termination unit are the same as the failed unit.

3. The module terminated by the faulty termination unit should be disconnected from its TU cable before that cable is disconnected from the TU. Pull the module out of its MMU slot so that its edge connector is not in contact with the TU cable connected to the MMU backplane.

**NOTE:** Turn off power to the cabinet before removing the +24 VDC and grounding connection to the TCL.

Follow Steps 1 through 8 to replace the TCL termination unit.

1. Mark the connector or terminal assignment first, then disconnect the coaxial or twinaxial cable from the termination unit.

2. Disconnect the termination unit cable from the P1 socket on the termination unit.

3. Verify that the cabinet power is off, then disconnect the +24 VDC and ground wiring from E1 and E2 on the termination unit.

4. Remove and save the two screws that secure that termination unit to the field termination panel, and the chassis ground screw with star washer.

5. Remove the faulty termination unit.

6. Insert the tabs of the replacement TU into the same slots of the termination panel standoff as shown in Figure 2-3 and slide the circuit board into position.

7. Secure the termination unit circuit board to the field termination panel with the two screws saved from Step 4. Replace the chassis ground screw and star washer.

8. Replace the +24 VDC power wiring, reconnect the termination unit cable to P1, and reconnect the coaxial or twinaxial cable to the termination unit.

9. Insert the LIM or NIS module.

---

## SECTION 5 - SUPPORT SERVICES

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### **INTRODUCTION**

Bailey Controls is ready to help in the use and repair of its products. Contact your nearest sales office to make requests for sales, applications, installation, repair, overhaul and maintenance contract services.

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### **REPLACEMENT PARTS AND ORDERING INFORMATION**

When making repairs at your facility, order replacement parts from a Bailey sales office. Provide this information:

1. Part description, part number and quantity.
2. Model and serial numbers (if applicable).
3. Bailey instruction manual number, page number and reference figure that identifies the part.

When you order standard parts from Bailey Controls, use part numbers and descriptions from the Recommended Spare Parts Lists. You must order parts without commercial descriptions from the nearest Bailey Controls sales office.

---

### **TRAINING**

Bailey Controls has a modern training facility available for training your personnel. On-site training is also available. Contact a Bailey Controls sales office for specific information and scheduling.

---

### **TECHNICAL DOCUMENTATION**

You can obtain additional copies of this manual from the nearest Bailey sales office at a reasonable charge.

# APPENDIX A - NETWORK INTERFACE SLAVE MODULE CONFIGURATION (INNIS01)

## INTRODUCTION

The Network Interface Slave Module (INNIS01) uses the NTCL01 to terminate its connection to an INFI-NET ring. A termination cable (NKLS01/11) connects the NIS to the TCL. The TCL provides a place to connect either coaxial or twinaxial cable from the communication loop. This appendix contains figures and tables that show the dipswitch and jumper locations on the NIS and their settings. This information is provided as a quick reference guide for personnel installing the NTCL01. Figure A-1 shows the dipswitch locations on the NIS circuit board. Table A-1 shows how to set the NIS node address and ring number using dipswitches SW1 and SW2. Table A-2 lists the loop mode dipswitch settings (SW3). Table A-3 shows examples of slave address settings (SW4). Tables A-4 and A-5 list event and error counter settings respectively, using dipswitch SW4. Figure A-1 shows the jumper settings (J1 through J6) that set the communication rate of the receiver analog circuit on the NIS. Refer to the INFI-NET Communications Modules Instruction for more detailed installation and configuration information.

**NOTE:** For all dipswitches:  
OPEN or OFF position = logic 1  
CLOSED or ON position = logic 0

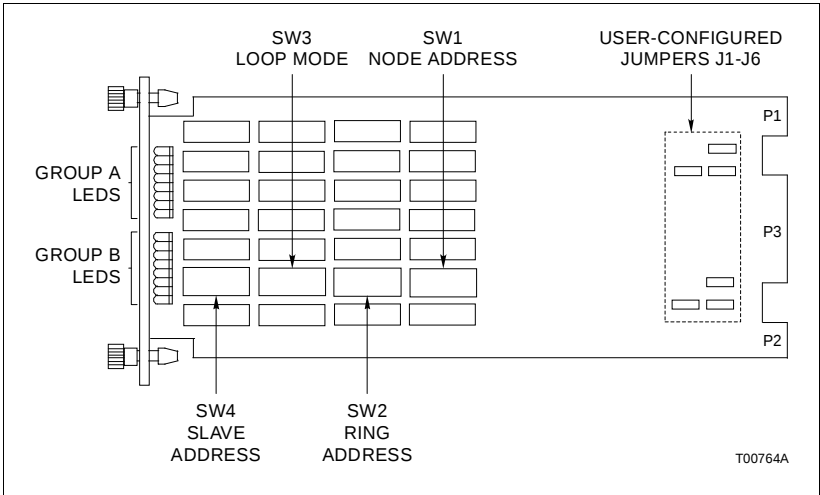


Figure A-1. Network Interface Slave Module Switch and Jumper Locations

Table A-1. SW1 Node Addresses/SW2 Ring Numbers

| Example Settings |                 |     |    |    |    |   |   |   |   |
|------------------|-----------------|-----|----|----|----|---|---|---|---|
| Address Example  | Switch Position | 1   | 2  | 3  | 4  | 5 | 6 | 7 | 8 |
|                  | Binary Value    | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
| 1                |                 | 0   | 0  | 0  | 0  | 0 | 0 | 0 | 1 |
| 64               |                 | 0   | 1  | 0  | 0  | 0 | 0 | 0 | 0 |
| 250              |                 | 1   | 1  | 1  | 1  | 1 | 0 | 1 | 0 |

Table A-2. Loop Mode Switch (SW3) Settings

| Pole           | Setting | Function                                                                                                                                                                                  |
|----------------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1              | 1       | IPL/IIL (Bridge or Gateway).                                                                                                                                                              |
|                | 0       | PCU/ICI.                                                                                                                                                                                  |
| 2              | 1       | ROM Checksum Enabled.                                                                                                                                                                     |
|                | 0       | ROM Checksum Disabled.                                                                                                                                                                    |
| 3              | 1       | Test mode; no timeout for handshake failure.                                                                                                                                              |
|                | 0       | Normal operating mode.                                                                                                                                                                    |
| 4 <sup>1</sup> | 0       | Normal operating mode.                                                                                                                                                                    |
|                | 1       | Busy NAK all Loop Messages.                                                                                                                                                               |
| 5 <sup>1</sup> | 0       | LED display as defined by SW4.                                                                                                                                                            |
|                | 1       | Will toggle on/off group A LEDs if loop 1 is idle or shorted. Will toggle on/off group B LEDs if loop 2 is idle or shorted. If both loops are good, normal LED display as defined by SW4. |
| 6 <sup>1</sup> | 0       | Normal operating mode.                                                                                                                                                                    |
|                | 1       | Diagnostic mode.                                                                                                                                                                          |
| 7/8            | 0/0     | 10 MHz INFI-NET mode.                                                                                                                                                                     |
|                | 0/1     | 2 MHz INFI-NET mode.                                                                                                                                                                      |
|                | 1/0     | Not used.                                                                                                                                                                                 |
|                | 1/1     | 500 kHz Plant Loop mode.                                                                                                                                                                  |

1. Applies to Revision B and later version ROMs. For Revision A ROMs, poles 4 through 6 must be set to 0.

Table A-3. Slave Address Switch (SW4) Settings

| Example Settings |      |   |   |
|------------------|------|---|---|
| Address          | Pole |   |   |
|                  | 1    | 2 | 3 |
| 00               | 0    | 0 | 0 |
| 03               | 0    | 1 | 1 |
| 07               | 1    | 1 | 1 |

Table A-4. Event Counters

| SW4 Position<br>4 5 6 7 8 | Hex | Description                                                               |
|---------------------------|-----|---------------------------------------------------------------------------|
| 0 0 0 0 0                 | 00  | Number of timer interrupts.                                               |
| 0 1 0 0 1                 | 09  | Number of multicast messages received, excluding originated messages.     |
| 0 1 0 1 0                 | 0A  | Number of multicast destinations received.                                |
| 0 1 0 1 1                 | 0B  | Number of time-sync messages received, excluding originated messages.     |
| 0 1 1 0 0                 | 0C  | Number of broadcast messages received, excluding originated messages.     |
| 0 1 1 0 1                 | 0D  | Number of NIS poll messages received, excluding originated messages.      |
| 0 1 1 1 0                 | 0E  | Number of NIS poll messages acknowledged (ACK) by this node.              |
| 0 1 1 1 1                 | 0F  | Number of NIS poll messages busy-not acknowledged (BSY-NAK) by this node. |
| 1 0 0 0 0                 | 10  | Number of messages transmitted, total loop traffic.                       |
| 1 0 0 0 1                 | 11  | Number of messages received and forwarded by this node.                   |
| 1 0 0 1 0                 | 12  | Number of messages originated by this node, including retries.            |
| 1 0 0 1 1                 | 13  | Number of message retries originated by this node.                        |
| 1 0 1 0 0                 | 14  | Number of transmitted message watchdog expirations.                       |
| 1 0 1 0 1                 | 15  | Number of messages put into receive buffer and retained.                  |
| 1 0 1 1 0                 | 16  | Number of bytes originated by this node, including retries.               |
| 1 0 1 1 1                 | 17  | Number of bytes received and forwarded by this node.                      |
| 1 1 0 0 0                 | 18  | Number of Slave Expander Bus to NIS handshakes.                           |
| 1 1 0 0 1                 | 19  | Number of Slave Expander Bus Messages to Transmit Buffer signals.         |
| 1 1 0 1 0                 | 1A  | Number of Slave Expander Slave Bus PCU-status requests.                   |
| 1 1 0 1 1                 | 1B  | Number of Slave Expander Bus NIS-status requests.                         |
| 1 1 1 0 0                 | 1C  | Number of Slave Expander Bus interrupts with invalid status.              |
| 1 1 1 0 1                 | 1D  | Number of transmit buffer realignments due to invalid contents.           |
| 1 1 1 1 0                 | 1E  | Number of receive buffer realignments.                                    |
| 1 1 1 1 1                 | 1F  | Number of status buffer realignments.                                     |

Table A-5. Error Counters

| SW4 Position<br>4 5 6 7 8 | Hex | Description                                                              |
|---------------------------|-----|--------------------------------------------------------------------------|
| 0 0 0 0 1                 | 01  | Number of channel 1 receive errors.                                      |
| 0 0 0 1 0                 | 02  | Number of channel 2 receive errors.                                      |
| 0 0 0 1 1                 | 03  | Number of transmitter errors.                                            |
| 0 0 1 0 0                 | 04  | Number of messages lost to receive queue overflow.                       |
| 0 0 1 0 1                 | 05  | Number of messages dumped with circulation count errors.                 |
| 0 0 1 1 0                 | 06  | Number of messages dumped with destination count or message-type errors. |
| 0 0 1 1 1                 | 07  | Number of messages dumped with source-state errors.                      |
| 0 1 0 0 0                 | 08  | Number of messages dumped with source-sequence mismatch.                 |

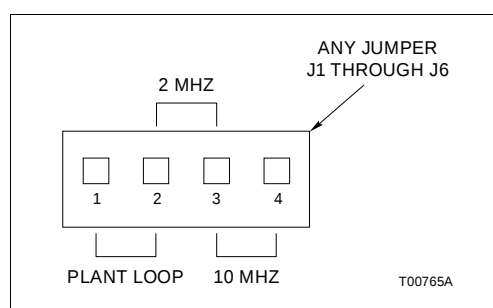


Figure A-2. User Configured Jumpers

# APPENDIX B - LOOP INTERFACE MODULE CONFIGURATION (INLIM03)

## INTRODUCTION

The Loop Interface Module (INLIM03) uses the NTCL01 to terminate its connection to Plant Loop. A termination cable (NKLS03/13) connects the LIM to the TCL. The TCL provides a place to connect either coaxial or twinaxial cable from the communication loop. This appendix contains figures and tables that show the dipswitch locations on the LIM and their settings, and is provided as a quick reference for personnel installing the NTCL01. Figure B-1 shows the dipswitch locations on the LIM circuit board. Tables B-1 and B-2 list the event counter and error counter addresses for dipswitch S1. Table B-3 lists PCU addresses set by dipswitch S2. Refer to the INLIM03 instruction for more detailed installation and configuration information.

**NOTE:** For all dipswitches:  
OPEN or OFF position = logic 1  
CLOSED or ON position = logic 0

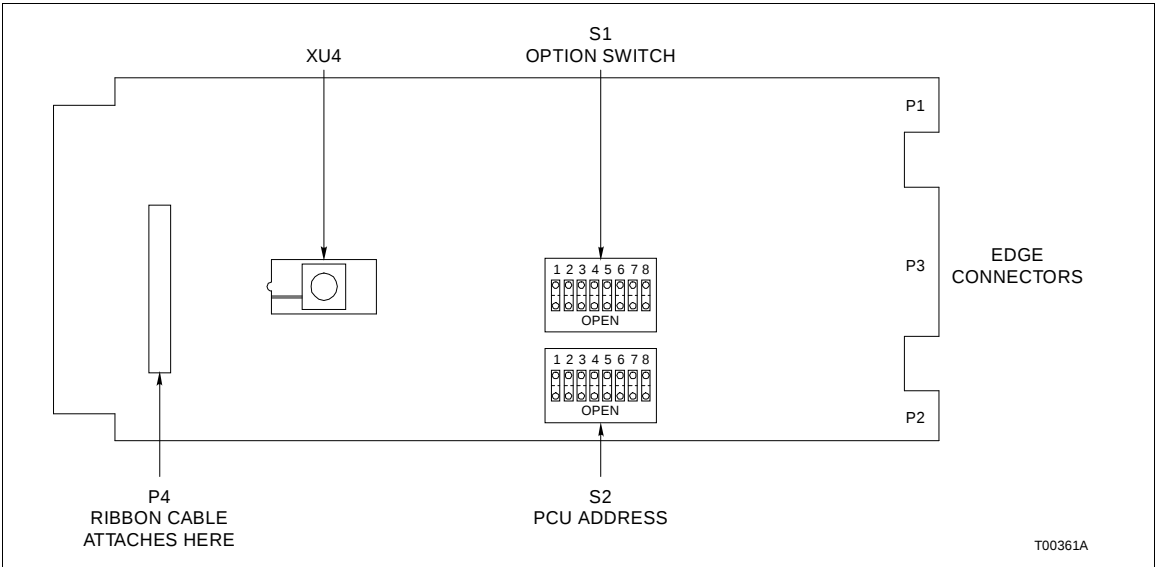


Figure B-1. Loop Interface Module Component Locations

Table B-1. LIM Event Counter Addresses (S1)

| Counter Address | Hex Address | Switch Positions<br>(Binary Address) |   |   |   |   |   |   |   | Description                                                                   |
|-----------------|-------------|--------------------------------------|---|---|---|---|---|---|---|-------------------------------------------------------------------------------|
|                 |             | 1                                    | 2 | 3 | 4 | 5 | 6 | 7 | 8 |                                                                               |
| 48              | 30          | 0                                    | 0 | 1 | 1 | 0 | 0 | 0 | 0 | Total messages transmitted, including forwarding.                             |
| 49              | 31          | 0                                    | 0 | 1 | 1 | 0 | 0 | 0 | 1 | Transmit retries.                                                             |
| 50              | 32          | 0                                    | 0 | 1 | 1 | 0 | 0 | 1 | 0 | Composite BIM Receive/Transmit 4 bits each. Receive is viewed at the top LED. |
| 51              | 33          | 0                                    | 0 | 1 | 1 | 0 | 0 | 1 | 1 | Messages taken from the BIM transmit buffer.                                  |
| 52              | 34          | 0                                    | 0 | 1 | 1 | 0 | 1 | 0 | 0 | Messages stored in BIM receive buffer.                                        |
| 53              | 35          | 0                                    | 0 | 1 | 1 | 0 | 1 | 0 | 1 | Interrupt Requests (IRQs) sent by BIM.                                        |
| 54              | 36          | 0                                    | 0 | 1 | 1 | 0 | 1 | 1 | 0 | High Priority (HP) messages transmitted.                                      |
| 55              | 37          | 0                                    | 0 | 1 | 1 | 0 | 1 | 1 | 1 | High Priority messages received.                                              |
| 56              | 38          | 0                                    | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Commands issued by the BIM.                                                   |
| 57              | 39          | 0                                    | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Missed BIM transmit requests.                                                 |
| 58              | 3A          | 0                                    | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Spurious Non-Maskable Interrupts (NMI) caused by "address present."           |
| 59              | 3B          | 0                                    | 0 | 1 | 1 | 1 | 0 | 1 | 1 | HEY (request for an interrupt; generated by BIM) message sent.                |
| 60              | 3C          | 0                                    | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Messages discarded when the destination is off-line.                          |
| 61              | 3D          | 0                                    | 0 | 1 | 1 | 1 | 1 | 0 | 1 | HEY time expirations.                                                         |
| 62              | 3E          | 0                                    | 0 | 1 | 1 | 1 | 1 | 1 | 0 | Passes through the IDLE level (2 bytes wide).                                 |

Table B-2. LIM Error Counter Addresses (S1)

| Counter Address | Hex Address | Switch Positions<br>(Binary Address) |   |   |   |   |   |   |   | Description                                                                                         |
|-----------------|-------------|--------------------------------------|---|---|---|---|---|---|---|-----------------------------------------------------------------------------------------------------|
|                 |             | 1                                    | 2 | 3 | 4 | 5 | 6 | 7 | 8 |                                                                                                     |
| 64              | 40          | 0                                    | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Composite error count developed every handshake period - the summation of all other error counters. |
| 65              | 41          | 0                                    | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Unresolved NMI interrupts.                                                                          |
| 66              | 42          | 0                                    | 1 | 0 | 0 | 0 | 0 | 1 | 0 | Unresolved IRQ interrupts.                                                                          |
| 67              | 43          | 0                                    | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Unresolved timer interrupts.                                                                        |
| 68              | 44          | 0                                    | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Queue overflow message losses.                                                                      |
| 69              | 45          | 0                                    | 1 | 0 | 0 | 0 | 1 | 0 | 1 | Checksum failures.                                                                                  |
| 70              | 46          | 0                                    | 1 | 0 | 0 | 0 | 1 | 1 | 0 | Unresolved BIM IRQs.                                                                                |
| 71              | 47          | 0                                    | 1 | 0 | 0 | 0 | 1 | 1 | 1 | Sequence errors.                                                                                    |
| 72              | 48          | 0                                    | 1 | 0 | 0 | 1 | 0 | 0 | 0 | Header CRC/OVRN errors.                                                                             |
| 73              | 49          | 0                                    | 1 | 0 | 0 | 1 | 0 | 0 | 1 | Data CRC/OVRN errors.                                                                               |
| 74              | 4A          | 0                                    | 1 | 0 | 0 | 1 | 0 | 1 | 0 | Messages developing data CRC errors en route to destination.                                        |
| 75              | 4B          | 0                                    | 1 | 0 | 0 | 1 | 0 | 1 | 1 | Transmission failures.                                                                              |
| 76              | 4C          | 0                                    | 1 | 0 | 0 | 1 | 1 | 0 | 0 | Watchdog timer expirations.                                                                         |
| 77              | 4D          | 0                                    | 1 | 0 | 0 | 1 | 1 | 0 | 1 | Data length errors.                                                                                 |
| 78              | 4E          | 0                                    | 1 | 0 | 0 | 1 | 1 | 1 | 0 | Loop - 1 Receive (RCV) failure.                                                                     |
| 79              | 4F          | 0                                    | 1 | 0 | 0 | 1 | 1 | 1 | 1 | Loop - 2 Receive failures.                                                                          |
| 80              | 50          | 0                                    | 1 | 0 | 1 | 0 | 0 | 0 | 0 | Loop - 1 Transmit (TX) failure.                                                                     |
| 81              | 51          | 0                                    | 1 | 0 | 1 | 0 | 0 | 0 | 1 | Loop - 2 Transmit failures.                                                                         |

Table B-3. PCU Address Settings (S2)

| PCU Address | Switch Number<br>1 2 3 4 5 6 7 8 | PCU Address | Switch Number<br>1 2 3 4 5 6 7 8 |
|-------------|----------------------------------|-------------|----------------------------------|
| 1           | 0 0 0 0 0 0 0 1                  | 33          | 0 0 1 0 0 0 0 1                  |
| 2           | 0 0 0 0 0 0 1 0                  | 34          | 0 0 1 0 0 0 1 0                  |
| 3           | 0 0 0 0 0 0 1 1                  | 35          | 0 0 1 0 0 0 1 1                  |
| 4           | 0 0 0 0 0 1 0 0                  | 36          | 0 0 1 0 0 1 0 0                  |
| 5           | 0 0 0 0 0 1 0 1                  | 37          | 0 0 1 0 0 1 0 1                  |
| 6           | 0 0 0 0 0 1 1 0                  | 38          | 0 0 1 0 0 1 1 0                  |
| 7           | 0 0 0 0 0 1 1 1                  | 39          | 0 0 1 0 0 1 1 1                  |
| 8           | 0 0 0 0 1 0 0 0                  | 40          | 0 0 1 0 1 0 0 0                  |
| 9           | 0 0 0 0 1 0 0 1                  | 41          | 0 0 1 0 1 0 0 1                  |
| 10          | 0 0 0 0 1 0 1 0                  | 42          | 0 0 1 0 1 0 1 0                  |
| 11          | 0 0 0 0 1 0 1 1                  | 43          | 0 0 1 0 1 0 1 1                  |
| 12          | 0 0 0 0 1 1 0 0                  | 44          | 0 0 1 0 1 1 0 0                  |
| 13          | 0 0 0 0 1 1 0 1                  | 45          | 0 0 1 0 1 1 0 1                  |
| 14          | 0 0 0 0 1 1 1 0                  | 46          | 0 0 1 0 1 1 1 0                  |
| 15          | 0 0 0 0 1 1 1 1                  | 47          | 0 0 1 0 1 1 1 1                  |
| 16          | 0 0 0 1 0 0 0 0                  | 48          | 0 0 1 1 0 0 0 0                  |
| 17          | 0 0 0 1 0 0 0 1                  | 49          | 0 0 1 1 0 0 0 1                  |
| 18          | 0 0 0 1 0 0 1 0                  | 50          | 0 0 1 1 0 0 1 0                  |
| 19          | 0 0 0 1 0 0 1 1                  | 51          | 0 0 1 1 0 0 1 1                  |
| 20          | 0 0 0 1 0 1 0 0                  | 52          | 0 0 1 1 0 1 0 0                  |
| 21          | 0 0 0 1 0 1 0 1                  | 53          | 0 0 1 1 0 1 0 1                  |
| 22          | 0 0 0 1 0 1 1 0                  | 54          | 0 0 1 1 0 1 1 0                  |
| 23          | 0 0 0 1 0 1 1 1                  | 55          | 0 0 1 1 0 1 1 1                  |
| 24          | 0 0 0 1 1 0 0 0                  | 56          | 0 0 1 1 1 0 0 0                  |
| 25          | 0 0 0 1 1 0 0 1                  | 57          | 0 0 1 1 1 0 0 1                  |
| 26          | 0 0 0 1 1 0 1 0                  | 58          | 0 0 1 1 1 0 1 0                  |
| 27          | 0 0 0 1 1 0 1 1                  | 59          | 0 0 1 1 1 0 1 1                  |
| 28          | 0 0 0 1 1 1 0 0                  | 60          | 0 0 1 1 1 1 0 0                  |
| 29          | 0 0 0 1 1 1 0 1                  | 61          | 0 0 1 1 1 1 0 1                  |
| 30          | 0 0 0 1 1 1 1 0                  | 62          | 0 0 1 1 1 1 1 0                  |
| 31          | 0 0 0 1 1 1 1 1                  | 63          | 0 0 1 1 1 1 1 1                  |
| 32          | 0 0 1 0 0 0 0 0                  |             |                                  |

|                                               |  |                                    |
|-----------------------------------------------|--|------------------------------------|
| <b>C</b>                                      |  | Mounting ..... 2-3                 |
| Cable lead assignments ..... 2-7              |  | <b>N</b>                           |
| Cable lengths ..... 2-5                       |  | Nomenclature ..... 1-3             |
| Certification ..... 1-4                       |  | <b>O</b>                           |
| Circuit board revisions ..... 2-3             |  | Ordering information ..... 5-1     |
| Coaxial cable ..... 1-3, 2-5                  |  | <b>P</b>                           |
| Communication cable ..... 2-5                 |  | Power wiring ..... 2-7             |
| <b>D</b>                                      |  | <b>R</b>                           |
| Documentation ..... 5-1                       |  | Reference documents ..... 1-3      |
| <b>F</b>                                      |  | Repair procedure ..... 4-1         |
| Field termination panel ..... 1-3             |  | <b>S</b>                           |
| Fuse Replacement ..... 4-1                    |  | Spare parts ..... 4-1              |
| <b>G</b>                                      |  | Special handling ..... 2-1         |
| Glossary of terms and abbreviations ..... 1-3 |  | Specifications ..... 1-4           |
| <b>H</b>                                      |  | <b>T</b>                           |
| Hardware description ..... 1-2                |  | Termination unit ..... 1-3         |
| <b>I</b>                                      |  | Termination unit cables ..... 2-4  |
| INLIM03 ..... B-1                             |  | Training ..... 5-1                 |
| INNIS01 ..... A-1                             |  | TU replacement ..... 4-1           |
| Installation                                  |  | Twinaxial cable ..... 1-3, 2-5     |
| Cable ..... 2-4                               |  | <b>U</b>                           |
| Fuse ..... 2-2                                |  | Unpacking and inspection ..... 2-1 |
| Jumpers ..... 2-3                             |  |                                    |
| Mounting ..... 2-3                            |  |                                    |
| Power wiring ..... 2-7                        |  |                                    |
| Intended user ..... 1-1                       |  |                                    |
| <b>M</b>                                      |  |                                    |
| Maintenance ..... 3-1                         |  |                                    |

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