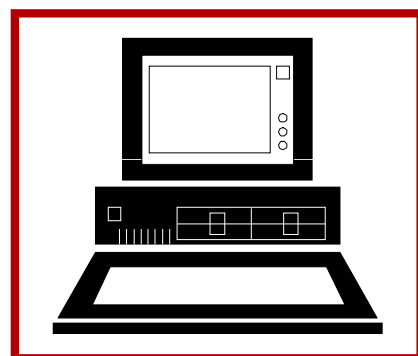
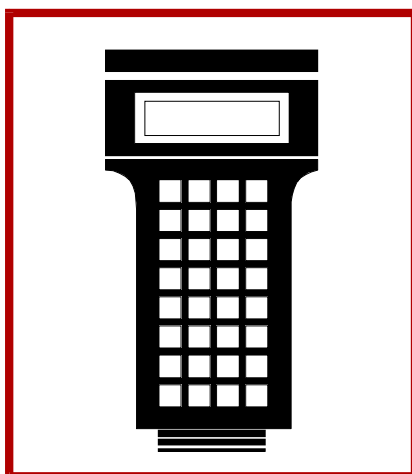
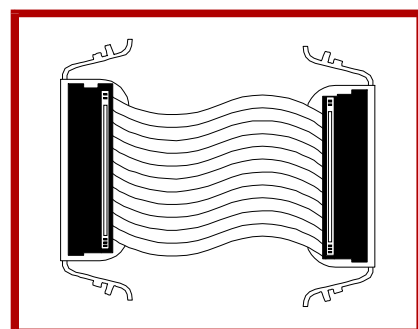
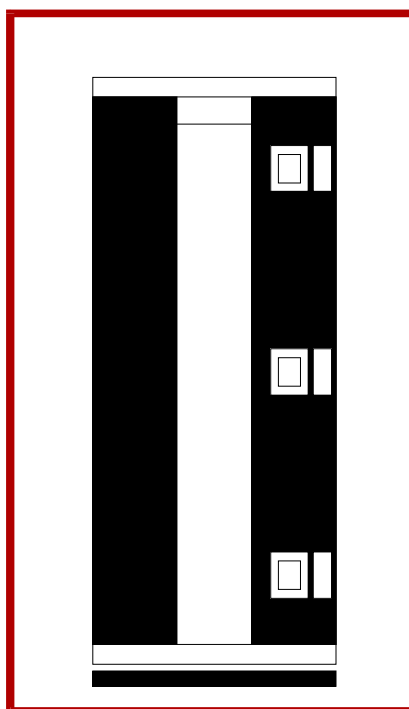
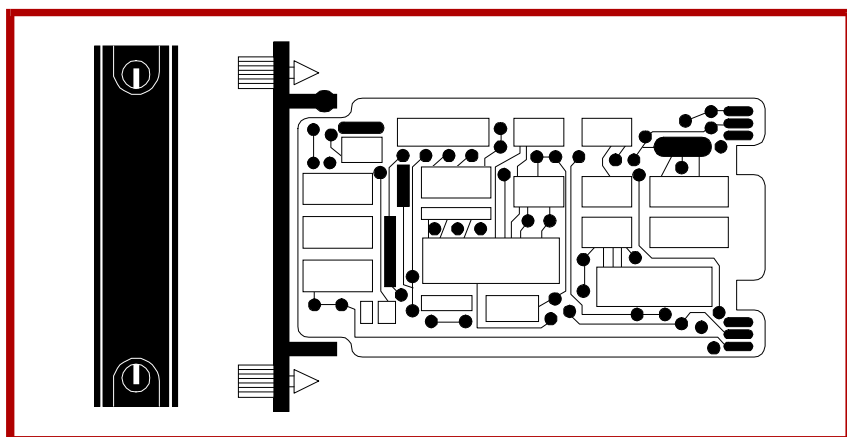
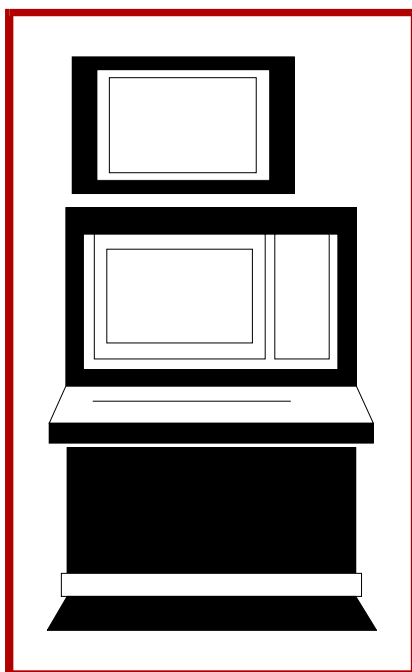


E96-429

Bailey®
infi 90

Instruction

Fiber Optic Remote Link and Electrical Remote Link Termination Units (NTRL02 and NTRL03)



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

Termination units provide a connection between plant equipment and INFI 90[®] process modules. The NTRL02 Fiber Optic Remote Link and NTRL03 Electrical Remote Link Termination Unit (TRL) provide:

- Termination of a communication link between IMRIO02 Remote I/O Slave Modules.
- Termination of station link communication from an IMRIO02 module to IISAC01 Analog Control Stations, NDCS03 Digital Control Stations, and NDIS01 Digital Indicator Stations.

This product instruction explains how to install and configure the TRL termination units.

List of Effective Pages

Total number of pages in this manual is 47, consisting of the following:

Page No.	Change Date
Preface	Original
List of Effective Pages	Original
iii through vii	Original
1-1 through 1-7	Original
2-1 through 2-17	Original
3-1	Original
4-1 through 4-2	Original
5-1	Original
A-1 through A-2	Original
B-1 through B-4	Original
C-1 through C-3	Original
D-1 through D-2	Original
Index-1	Original

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

NOTE: On an updated page, the changed text or table is indicated by a vertical bar in the outer margin of the page at 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.

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 ensure that contact with energized parts is avoided when servicing.

Special Handling

This unit uses electrostatic sensitive devices.

**SPECIFIC
CAUTIONS**

Remove a module from its assigned slot before installing or removing a cable assigned to that slot. Failure to do so could result in damage to the module. (p. 2-6)

Remove a station from its housing before installing or removing the station cable to the station housing. Failure to observe these precautions could result in equipment damage. (p. 2-6)

It is strongly recommended that all power (cabinet, I/O, etc.) be turned off before doing any wiring. Verify all connections before applying power. Failure to observe these precautions could result in equipment damage. (p. 2-14, 4-1)

Sommaire de Sécurité

AVERTISSEMENTS D'ORDRE GÉNÉRAL

Environnement de l'équipement

Nes pas soumettre les composantes a une atmosphere corrosive lors du transport, de l'entreposage ou de l'utilisation.

Risques de chocs electriques lor de l'entretien

S'assurer de debrancher l'alimentation ou de prendre les precautions necessaires a eviter tout contact avec des composants sous tension lors de l'entretien.

Precautions de Manutention

Ce module contient des composantes sensibles aux des charges electro-statques.

ATTENTIONS D'ORDRE SPÉCIFIQUE

Avant de retirer ou de brancher un câble, retirez le module logé dans la coulisse correspondante. Autrement, le module risque d'être endommagé. (p. 2-6)

Retirer le poste de son boitier avant d'installer ou de retirer le câble du poste du boiter. Un manquement à cette précaution pourrait causer des dommages à l'équipement. (p. 2-6)

Il est fortement recommandé de débrancher toute source d'alimentation (armoire, E/S, etc.) avante d'effectuer du travail au câblage. Vérifiez toutes les connexions avant de rétablir l'alimentation. Ces précautions permettent d'éviter des dommages à l'équipement. (p. 2-14, 4-1)

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SECTION 1 - INTRODUCTION

OVERVIEW

The NTRL02 Fiber Optic Remote Link Termination Unit and NTRL03 Electrical Remote Link Termination Unit provide connections for IMRIO02 slave modules, communication cables, control stations (no analog output bypass capability), and digital indicator stations. NTRL02 and NTRL03 termination units (TRL) can be connected to the NTCS04 termination unit. This enables the IMRIO02 slave module to communicate over the station link to stations for analog output bypass capability and allows the connection of additional stations. Figure 1-1 shows an example NTRL02 and NTRL03 termination unit application.

INTENDED USER

System engineers and technicians should read this manual before installing and placing the NTRL02 or NTRL03 termination unit into operation. Personnel installing this module should have a basic knowledge of fiber optic cables and connections.

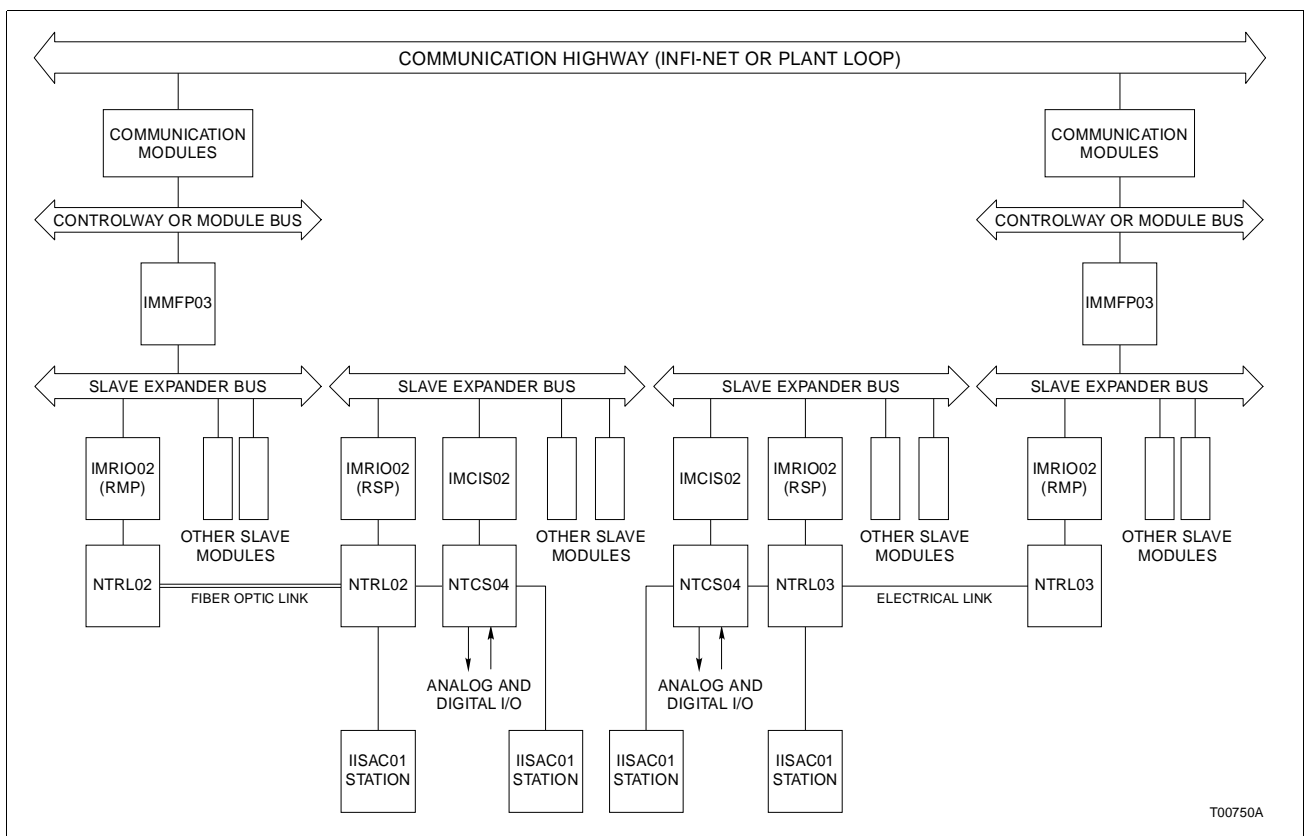


Figure 1-1. Possible NTRL02 and NTRL03 Termination Unit Applications

HARDWARE DESCRIPTION

The NTRL02 termination unit is a single printed circuit board that attaches to a NFTP01 Field Termination Panel located inside the INFI 90 cabinet. The NTRL02 termination unit has three socket connectors (P1, P2, and P3), two fiber optic cable connectors (TX and RX), and two terminal blocks (TB1 and TB2).

- Connector P1 allows the passage of signals from the termination unit to an IMRIO02 Remote I/O Slave Module.
- Connector P2 provides a station link (with analog bypass capability) to an NTCS04 termination unit.
- Connector P3 provides a station link to single or multiple control stations (no analog bypass capability) and/or indicator stations.
- The TX and RX connectors enable communication over fiber optic cable between local (master) and remote (slave) NTRL02 termination units. This communication link, using Bailey Controls recommended fiber optic cable, can have a maximum length of three kilometers (10,000 feet). The TX connector couples the output optical signals from the termination unit to the fiber optic cable. The RX connector couples the input optical signals from the fiber optic cable to the termination unit. Refer to the **FIBER OPTIC POWER BUDGET CALCULATION** in Section 2 for more information about maximum fiber optic cable lengths and allowable number of connections.
- Terminal block TB1 connects a station link between redundant NTRL02 termination units together. Terminal block TB2 is not used.

The NTRL03 termination unit is a single printed circuit board that attaches to a NFTP01 Field Termination Panel located inside the INFI 90 cabinet. The NTRL03 termination unit has three socket connectors (P1, P2, and P3), two coaxial cable connectors (J1 and J2), and two terminal blocks (TB1 and TB2).

- Connector P1 connects a cable from an IMRIO02 Remote I/O Slave Module that passes signals to the termination unit.
- Connector P2 provides a station link (with analog bypass capability) to a NTCS04 termination unit.
- Connector P3 provides a station link to single or multiple control stations (no analog bypass capability) and/or indicator stations.

- The J1 (IN) and J2 (OUT) connectors enable communication between a local (master) NTRL03 termination unit and one or more (a maximum of 16) remote (slave) NTRL03 termination units. The total communication link can have a maximum length of three kilometers (10,000 feet). The J1 connector couples input data from the cable to the termination unit. The J2 connector couples output data from the termination unit to the cable.
- Terminal block TB1 allows the wiring of the output communication signals (same output as connector J2).
- Terminal block TB2 allows the wiring of the input communication signals (same input as connector J1). TB2 is also used to connect station links between redundant NTRL03 termination units.

INSTRUCTION CONTENT

This manual contains five sections and four appendices:

Introduction	Contains an overview of the features, specifications and a description of the TRL termination units.
Installation	Describes precautions to observe when handling units and setup procedures required before unit operation. This section discusses jumper settings and installation procedures.
Maintenance	Provides a maintenance schedule.
Repair/Replacement Procedures	Details how to replace a TRL termination unit.
Support Services	Describes the support services (spare parts, training, documentation, etc.) available from Bailey Controls Company.
Appendices A through D	Provides quick reference information necessary for configuring stations and associated modules.

HOW TO USE THIS MANUAL

Read this manual through in sequence. Read the installation section thoroughly. Do the steps in order. Complete all steps in the installation section before using a TRL termination unit. Refer to the table of contents or index to find specific information after the termination unit is operating.

GLOSSARY OF TERMS AND ABBREVIATIONS

Table 1-1 lists definitions of the terms and abbreviations used in this instruction.

Table 1-1. Glossary of Terms and Abbreviations

Term	Definition
Analog	Continuously variable as opposed to discretely variable.
Bus	A channel or path for transferring data, electrical signals and power.
CIS	Control I/O slave module.
DCS	Digital control station. A panel mounted operator device that provides monitoring and allows manipulation of a single process control loop.
DIS	Digital indicator station. A panel mounted device that monitors and displays digital values.
Fiber Optic Cable	A data transmission cable made up of one or more tiny fibers of glass or plastic that transmit data, in the form of light pulses, at the speed of light.
FTP	Field termination panel. A panel inside the INFI 90 cabinet on which to mount termination units.
MFC	Multi-function controller module. A multiple loop controller with data acquisition and information processing capabilities.
MFP	Multi-function processor module. A multiple loop controller with data acquisition and information processing capabilities.
MMU	Module mounting unit. A card cage that provides electrical and communication support for INFI 90/Network 90 [®] modules.
QRS	Quick response slave module.
RMP	Remote master processor.
RSP	Remote slave processor.
SAC	Analog control station.
Termination Unit	Provides input/output connection between plant equipment and INFI 90/ Network 90 modules.

NOMENCLATURE

Table 1-2 is a list of related hardware.

Table 1-2. Nomenclature

Nomenclature	Description
IISAC01	Analog control station
IMCIS02	Control I/O slave module
IMQRS02	Quick response slave module
IMRIO02	Remote I/O slave module
NDCS03	Digital control station
NDIS01	Digital indicator station
NFTP01	Field termination panel
NKCL01	INFI-NET [®] coaxial cable (PVC)

[®] Network 90 is a registered trademark of Eltag Bailey Process Automation.

[®] INFI-NET is a registered trademark of Eltag Bailey Process Automation.

Table 1-2. Nomenclature (continued)

Nomenclature	Description
NKCL11	INFI-NET coaxial cable (non-PVC)
NKCS01	Station cable (PVC)
NKCS02	Station cable with series connector (PVC)
NKCS11	Station cable (non-PVC)
NKCS12	Station cable with series connector (non-PVC)
NKDS01	Station cable (PVC)
NKDS02	Station cable with series connector (PVC)
NKDS03	Station cable with series connector (PVC)
NKDS11	Station cable (non-PVC)
NKDS12	Station cable with series connector (non-PVC)
NKDS13	Station cable with series connector (non-PVC)
NKLM01	Loop interface cable (PVC)
NKLM11	Loop interface cable (non-PVC)
NKPL01	Plant loop twinaxial cable (PVC)
NKPL11	Plant loop twinaxial cable (non-PVC)
NKSE01	Serial extension cable (PVC)
NKSE11	Serial extension cable (non-PVC)
NKTL01	INFI-NET coaxial termination cable
NTCS04	Controller/station termination unit
NTRL02	Fiber optic remote link termination unit
NTRL03	Electrical remote link termination unit

REFERENCE DOCUMENTS

Table 1-3 lists the documents referenced in this instruction.

Table 1-3. Reference Documents

Number	Document
I-E93-902-1	NDCS03 Digital Control Station
I-E96-116	NDIS01 Digital Indicator Station
I-E96-117	IISAC01 Analog Control Station

Table 1-3. Reference Documents

Number	Document
I-E96-306	IMCIS02 Control I/O Slave Module
I-E96-316	IMQRS02 Quick Response Slave Module
I-E96-317	IMRIO02 Remote I/O Slave Module
I-E96-442	NTCS04 Controller/Station Termination Unit

SPECIFICATIONS

Refer to Table 1-4 for a list of the specifications of the NTRL02 and NTRL03 termination unit. Table 1-5 lists the specifications of the fiber optic cable required by the NTRL02 termination unit.

Table 1-4. NTRL02 and NTRL03 Termination Unit Specifications

Property	Characteristic/Value
Power Requirements NTRL02	+24 VDC (170 mA maximum) from the 24 VDC bus
NTRL03	+24 VDC (118 mA maximum) from the 24 VDC bus
Inputs	Communication link from another TRL termination unit Station serial communication link
Fiber Optic Receiver Signal Limits (NTRL02 only)	-30 dBm minimum -10 dBm maximum
Outputs	Communication link to another termination unit. (Minimum power output of the NTRL02 fiber optic transmitter is -15 dBm). Station serial communication link 24 VDC power to attached stations
Cable Insulation Specifications PVC (UL Rating CL2)	80°C (176°F) at 300 V
Non-PVC (UL Rating PLTC)	90°C (194°F) at 300 V
Mounting	Occupies one space in a standard INFI 90 field termination panel.
Electromagnetic/Radio Frequency Interference	Values are not available at this time. Keep the cabinet doors closed. Do not use communication equipment any closer than 2 m from the cabinet.
Ambient Temperature	0° to 70°C (32° to 158°F)
Relative Humidity	0% to 95% up to 55°C (131°F) (noncondensing) 0% to 45% up to 70°C (158°F) (noncondensing)

Table 1-4. NTRL02 and NTRL03 Termination Unit Specifications (continued)

Property	Characteristic/Value
Air Quality	Noncorrosive
Certification	CSA certified for use as process control equipment in an ordinary (nonhazardous) location.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

Table 1-5. Fiber Optic Cable Specifications¹

Property	Characteristic/Value
Fiber size	62.5/125 μm
Fiber attenuation	-3.3 dB/km (maximum)
Index	Graded
Wavelength	850 nm
Bandwidth	100 MHz/km
Connector type	Amphenol [®] 905 and 906 SMARt Series
Maximum supported link distance	3 km (10,000 ft)
Transmission mode	Multimode

NOTE:

1. Follow the cable manufacturers instructions for installation, testing, and maintenance of the fiber optic cable.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

[®] Amphenol is a registered trademark of Amphenol Corporation.

SECTION 2 - INSTALLATION

INTRODUCTION

This section explains how to configure and install the NTRL02 Fiber Optic Remote Link Termination Unit or NTRL03 Electrical Remote Link Termination Unit (TRL). Read, understand, and complete the steps in the order they appear before using a TRL termination unit.

SPECIAL HANDLING

Observe these steps when handling electronic circuitry:

NOTE: Always use Bailey Controls field static kit (part number 1948385A1 - consisting of two wrist straps, ground cord assembly, alligator clip, and static dissipating work surface) when working with the modules or units. The kit is designed to connect the technician and the static dissipating work surface to the same ground point to prevent damage to the modules or units by electrostatic discharge.

1. **Use Static Shielding Bag.** Keep the modules and units in the static shielding bag until you are ready to install them in the system. Save the packaging for future use.
2. **Ground Bags Before Opening.** Before opening a bag containing an assembly with MOS 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 MOS Device.** Verify that all devices connected to the module or unit are properly grounded before using them.
5. **Ground Test Equipment.**
6. **Use an Antistatic Field Service Vacuum.** Remove dust from the module and unit 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 is connected to the cabinet chassis ground.
8. **Do Not Use Lead Pencils to Set Dipswitches.** To avoid contamination of dipswitch contacts that can result in unnecessary circuit board malfunction, do not use a lead pencil to set a dipswitch.

UNPACKING AND INSPECTION

1. Examine the hardware immediately for shipping damage.
2. Notify the nearest Bailey Controls sales office of any such damage.
3. File a claim for any damage with the transportation company that handled the shipment.
4. Use the original packing material and container to store the hardware.
5. Store the hardware in an environment of good air quality, free from temperature and moisture extremes.

SETUP AND PHYSICAL INSTALLATION

This section explains how to configure and install a TRL termination unit. The required procedures are fuse installation, installing the termination unit itself, cable connections, and termination wiring.

Fuse Installation

NTRL02 termination units contain two 0.25-inch by 1.25-inch fuses. A 0.25-amp and 250-volt fuse (Bailey Controls part number 194776A12500) should be installed in fuse clip F1. A five-amp and 250-volt fuse (Bailey Controls part number 194776A15001) should be installed in fuse clip F2.

NTRL03 termination units with an assembly revision level of 6637359A2 contain two 0.25-inch by 1.25-inch fuses. A one-amp and 250-volt fuse (Bailey Controls part number 194776A11001) should be installed in fuse clip F1. A five-amp and 250-volt fuse (Bailey Controls part number 194776A15001) should be installed in fuse clip F2.

NTRL03 termination units with an assembly revision level of 6637359K2 contain two 5-millimeter by 20-millimeter fuses. A one-amp and 250-volt fuse (Bailey Controls part number 1948182A31001) should be installed in fuse clip F1. A five-amp and 250-volt fuse (Bailey part number 1948182A35001) should be installed in fuse clip F2.

If the fuses are not already installed, insert the fuses into the proper fuse clips. See Figure 2-1, 2-2, or 2-3 for fuse clip locations.

Jumper Configuration

Configure the NTRL02 termination unit for the operating mode by setting jumper JP1. Table 2-1 shows the JP1 jumper

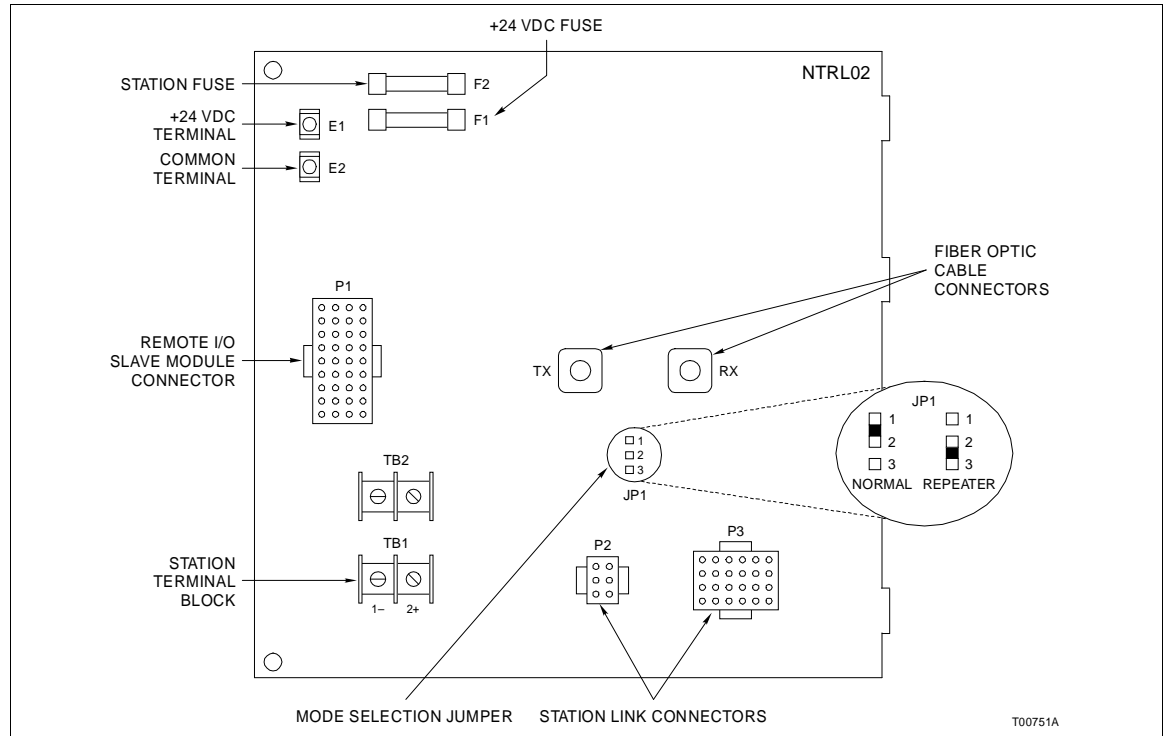


Figure 2-1. NTRL02 Termination Unit Layout

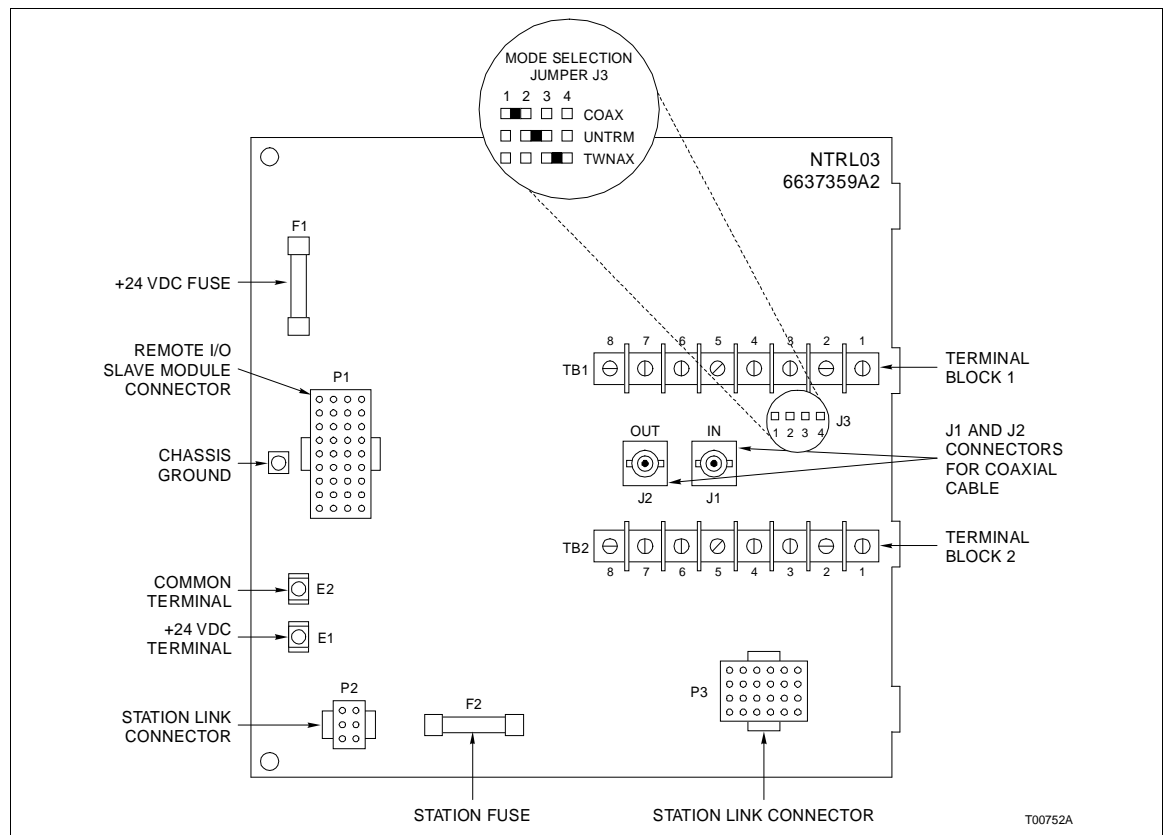


Figure 2-2. NTRL03 Termination Unit Layout (Assembly 6637359A2)

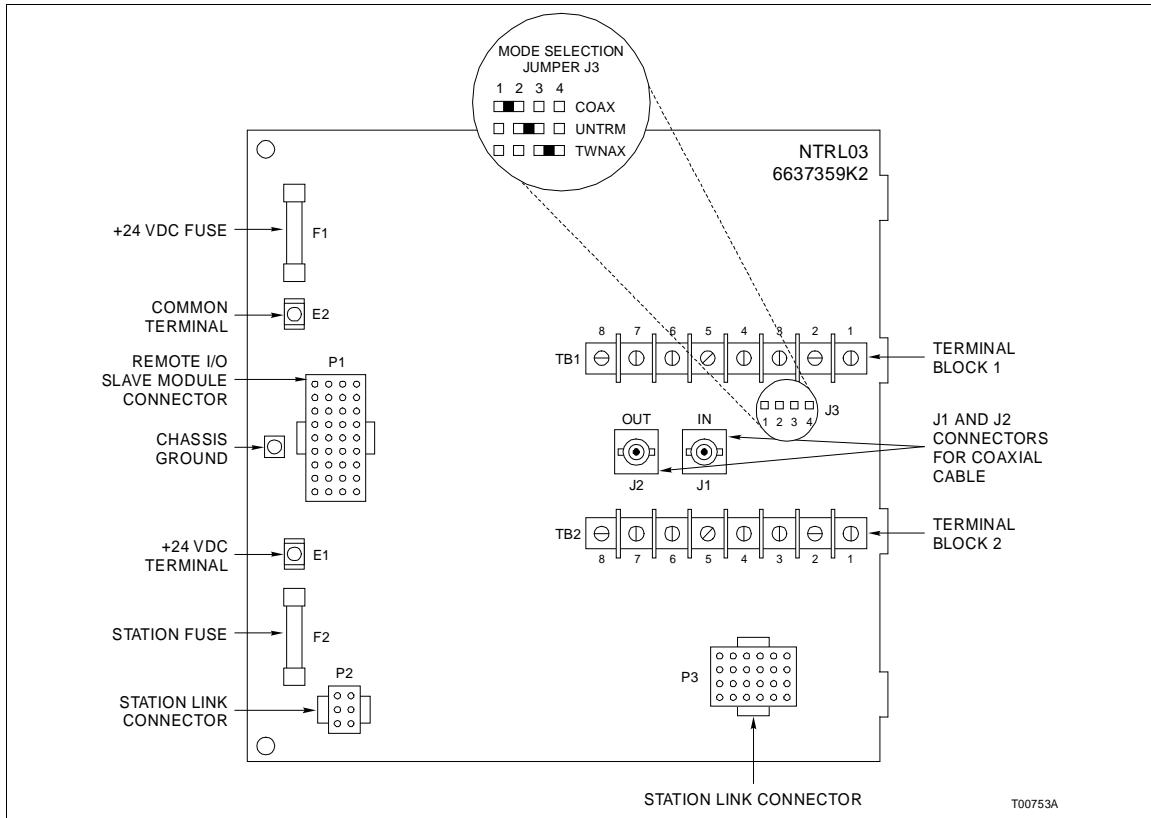


Figure 2-3. NTRL03 Termination Unit Layout (Assembly 6637359K2)

settings. Configure the NTRL03 termination unit for node type and type of communication cable used by setting jumper J3. Table 2-2 shows the J3 jumper settings. Figure 2-4 illustrates the difference between middle and end node types for NTRL03 termination units.

Installing the Termination Unit

TRL termination units mount on the NFTP01 Field Termination Panel. Figure 2-5 shows how to secure the TRL termination unit to the field termination panel.

Table 2-1. Jumper JP1 Settings (NTRL02)

Jumper	Jumper Position	Function
JP1	1 - 2	Normal mode
	2 - 3	Repeater mode

Table 2-2. Jumper J3 Settings (NTRL03)

Jumper	Jumper Position	Node Type	Cable Type	Termination Resistance
J3	1 - 2	End node only	Coaxial	50 Ω
	2 - 3	Middle node only	Coaxial, twinaxial, or serial link wire	None
	3 - 4	End node only	Twinaxial or serial link wire	100 Ω

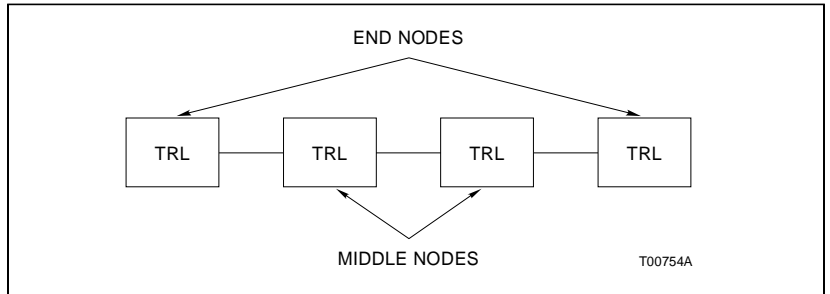


Figure 2-4. Node Positions for NTRL03 Termination Unit Connections

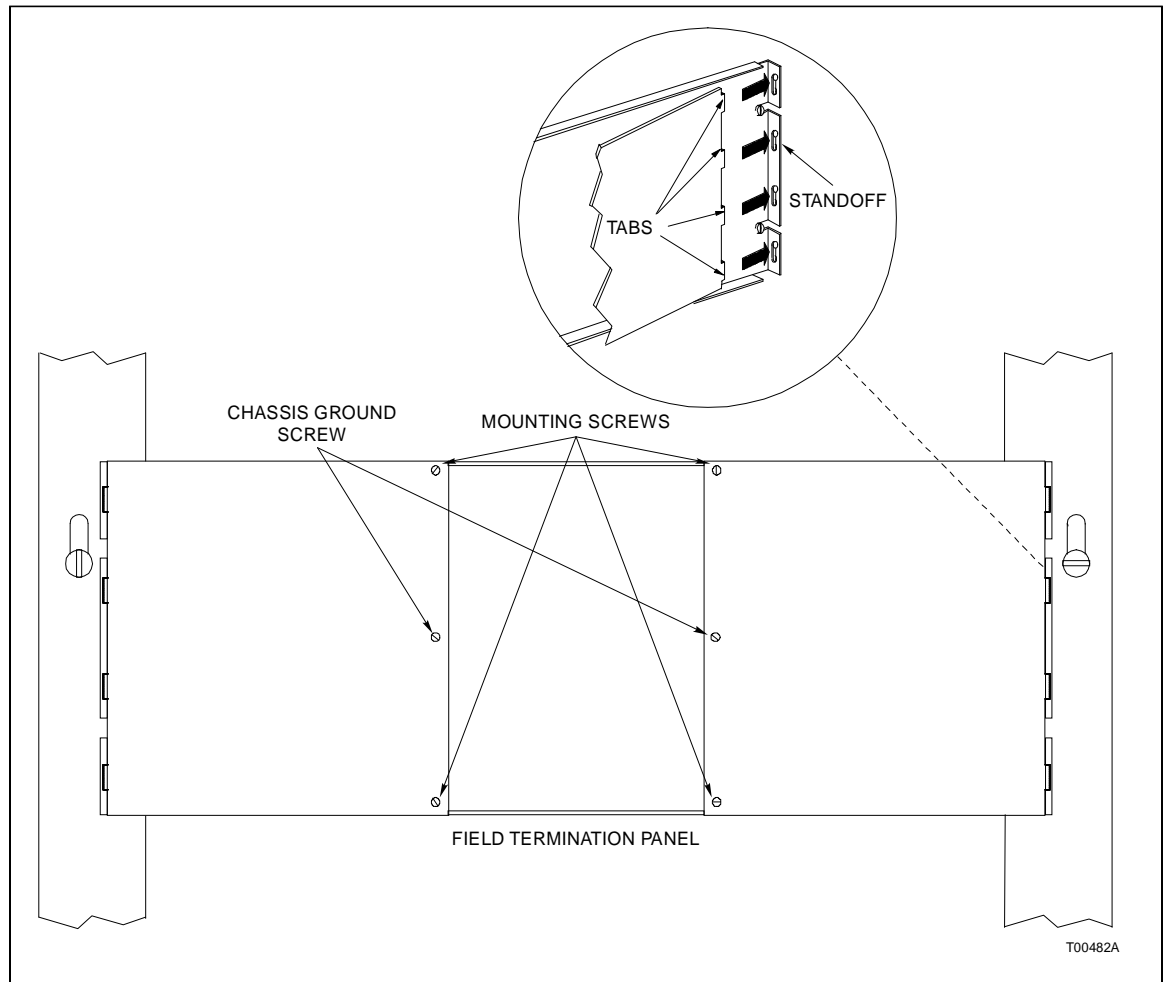


Figure 2-5. Installation of NTRL02 and NTRL03 Termination Units

To install the TRL termination unit:

1. Verify the power is turned off to the cabinet.
2. Insert the termination unit tabs into the slots in the outside edge of the field termination panel.
3. Secure the termination unit to the field termination panel with two number 10, 3/4-inch long, self-tapping screws. Do not overtighten the screws.
4. For NTRL03 termination units, connect the chassis ground by installing a number 10, 3/4-inch long, self-tapping screw with external star lock washer into the chassis ground hole. Do not overtighten the screw.

Cable Connections

The NTRL02 Fiber Optic Remote Link and NTRL03 Electrical Remote Link Termination Units terminate communication links between IMRIO02 modules. Figures 2-6 through 2-8 show the cables to use and the cable connections required for several example applications of TRL termination units. Table 2-3 lists each cable and its application.

Cable Installation

Use the following procedures when installing cables.

CAUTION	Remove a module from its assigned slots before installing or removing a cable assigned to that slot. Failure to do so could result in damage to the module.
ATTENTION	Avant de retirer ou de brancher un câble, retirez le module logé dans la coulisse correspondante. Autrement, le module risque d'être endommagé.

CAUTION	Remove a station from its housing before installing or removing the station cable to the station housing. Failure to observe these precautions could result in equipment damage.
ATTENTION	Retirer le poste de son boîtier avant d'installer ou de retirer le câble du poste du boîtier. Un manquement à cette précaution pourrait causer des dommages à l'équipement.

NKCL01 AND NKCL11 CABLES

This cable connects a local NTRL03 termination unit to the associated remote NTRL03 termination unit or units using

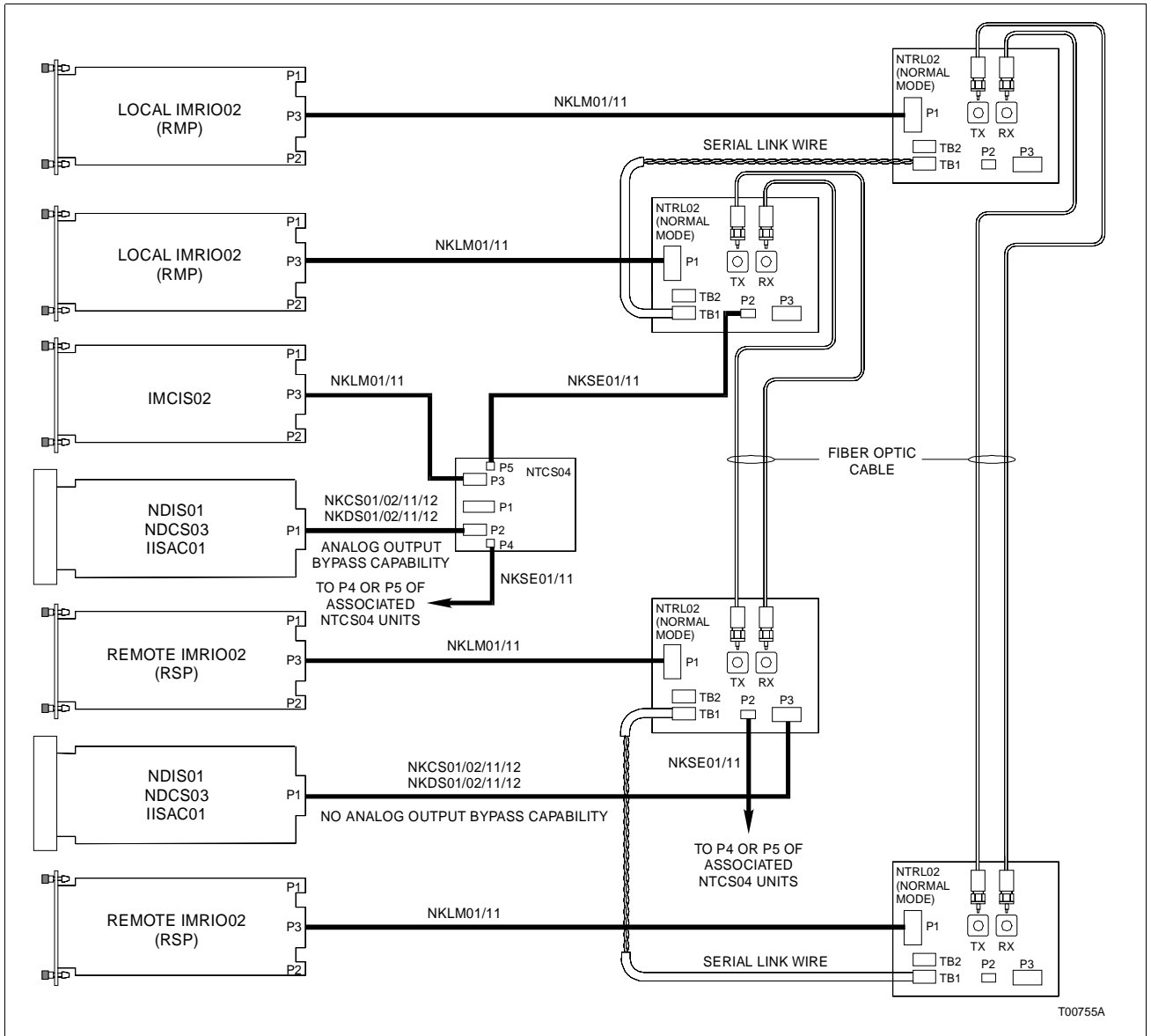


Figure 2-6. Redundant NTRL02 Cable Connections (Normal Mode)

adapter cables connected to each termination unit. To install the cable:

1. Connect one end of the cable to the NKTL01 cable connected to the local NTRL03 termination unit.
2. Connect the other end of the cable to the NKTL01 cable connected to the remote NTRL03 termination unit.

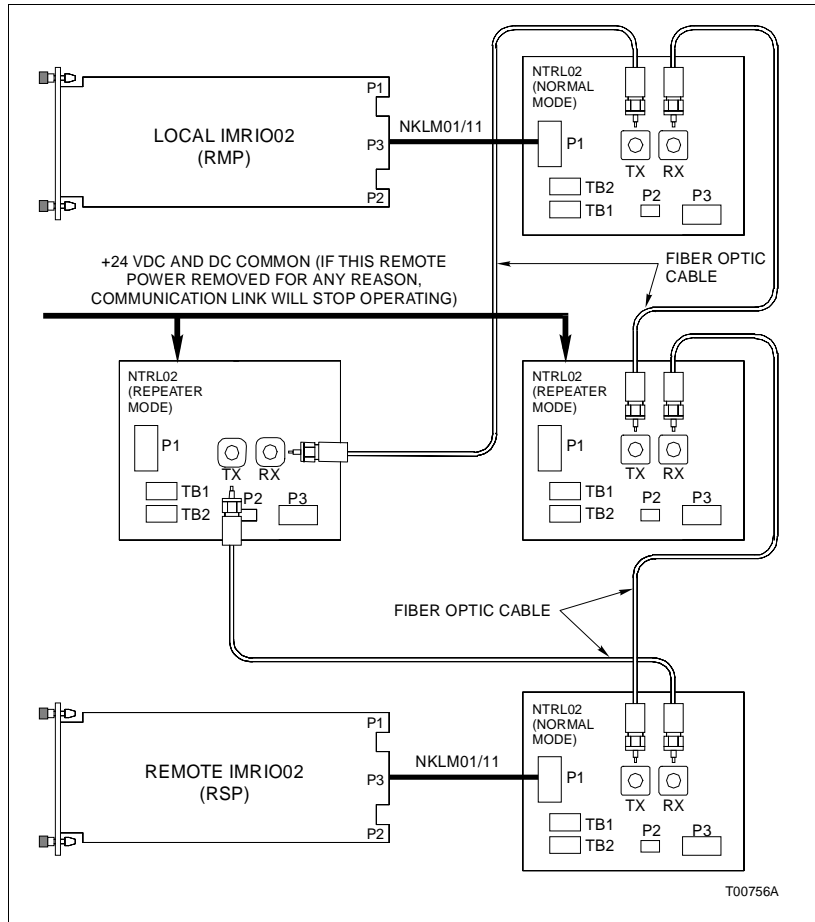


Figure 2-7. NTRL02 Cable Connections (Repeater Mode)

NKCS01, NKCS11, NKDS01, AND NKDS11 CABLES

This cable connects a NTRL02, NTRL03, or NTCS04 termination unit to a single NDIS01, NDCS03, or IISAC01 station. To install the cable:

1. Remove the NDIS01, NDCS03, or IISAC01 station from the station housing.
2. Insert the J2 end of the cable into the station housing slot. Viewing the station from the back, the cable inserts into the right slot (use the left slot for a NDCS03 station without analog output bypass capability). The cable should latch securely into place. Card edge connector P1 of the station circuit board connects to this end of the cable.
3. Connect the J1 end of the cable to the P3 (NTRL02 and NTRL03 termination unit), P4 (NTCS04 termination unit), or P5 (NTCS04 termination unit) connector. The cables should latch securely into place.

Table 2-3. NTRL02 and NTRL03 Cable Applications

Cable	Connections				Maximum Length	
	From		To		Meters	Feet
	Device	Connector	Device	Connector		
NKCL01 (PVC)	NKTL01 cable	N-type plug	NKTL01 cable	N-type plug	3,000	10,000
NKCL11 (non-PVC)	NKTL01 cable	N-type plug	NKTL01 cable	N-type plug	3,000	10,000
NKCS01 (PVC)	NTRL02/03	P3	Station	P1	122	400
	NTCS04	P2 or P3	Station	P1	122	400
NKCS11 (non-PVC)	NTRL02/03	P3	Station	P1	122	400
	NTCS04	P2 or P3	Station	P1	122	400
NKCS02 (PVC)	NTRL02/03	P3	Station	P1	Station configuration dependent	
	NTCS04	P2 or P3	Station	P1	Station configuration dependent	
NKCS12 (non-PVC)	NTRL02/03	P3	Station	P1	Station configuration dependent	
	NTCS04	P2 or P3	Station	P1	Station configuration dependent	
NKDS01 (PVC)	NTRL02/03	P3	Station	P1	122	400
	NTCS04	P2 or P3	Station	P1	122	400
NKDS11 (non-PVC)	NTRL02/03	P3	Station	P1	122	400
	NTCS04	P2 or P3	Station	P1	122	400
NKDS02 (PVC)	NTRL02/03	P3	Multiple stations	P1 of station and J1 of NKDS03/13 cable	Station configuration dependent	
	NTCS04	P2 or P3	Multiple stations	P1 of station and J1 of NKDS03/13 cable	Station configuration dependent	
NKDS12 (non-PVC)	NTRL02/03	P3	Multiple stations	P1 of station and J1 of NKDS03/13 cable	Station configuration dependent	
	NTCS04	P2 or P3	Multiple stations	P1 of station and J1 of NKDS03/13 cable	Station configuration dependent	
NKDS03 (PVC)	NKCS02/12 cable	J3	Multiple stations	P1 of station and J3 of NKDS03/13 cable	3	10
	NKDS02/12 cable	J3	Multiple stations	P1 of station and J3 of NKDS03/13 cable	3	10
NKDS13 (non-PVC)	NKCS02/12 cable	J3	Multiple stations	P1 of station and J3 of NKDS03/13 cable	3	10
	NKDS02/12 cable	J3	Multiple stations	P1 of station and J3 of NKDS03/13 cable	3	10
NKLM01 (PVC)	NTRL02/03	P1	IMRIO02 module	P3	13.7	45
NKLM11 (non-PVC)	NTRL02/03	P1	IMRIO02 module	P3	13.7	45
NKPL01 (PVC)	NTRL03	TB1 (input) or TB2 (output)	NTRL03	TB1 (input) or TB2 (output)	1,371	4,500

Table 2-3. NTRL02 and NTRL03 Cable Applications (continued)

Cable	Connections				Maximum Length	
	From		To		Meters	Feet
	Device	Connector	Device	Connector		
NKPL11 (non-PVC)	NTRL03	TB1 (input) or TB2 (output)	NTRL03	TB1 (input) or TB2 (output)	1,371	4,500
NKSE01 (PVC)	NTRL02/03	P2	NTCS04	P4 or P5	61	200
NKSE11 (non-PVC)	NTRL02/03	P2	NTCS04	P4 or P5	61	200
NKTL01 (non-PVC)	NTRL02/03	J1 or J2	NKCL01/11	P1 or P2	1	3.25
Serial link wire ¹	Primary NTRL02	TB1-1 and TB1-2	Secondary NTRL02	TB1-1 and TB1-2	N/A	
	Primary NTRL03	DCS+ and DCS-	Secondary NTRL03	DCS+ and DCS-	N/A	
Standard 12 to 22 AWG wire	Field and power wiring	Field device or power source	NTRL02/03	Appropriate terminal blocks	N/A	

NOTE:

1. Serial link wire is composed of two insulated 22-gauge wires twisted together. Each wire of the twisted pair consists of seven strands of 30-gauge wire. This twisted pair is shielded with a 36-gauge woven shield drain wire. Bailey raw material part number R2041-0397.

NKCS02, NKCS12, NKDS02, AND NKDS12 CABLES

This cable connects a NTRL02, NTRL03, or NTCS04 termination unit to multiple NDIS01, NDCS03, or IISAC01 stations. To install the cable:

1. Remove the NDIS01, NDCS03, or IISAC01 station from the station housing.
2. Insert the J2 end of the cable into the station housing slot. Viewing the station from the back, the cable inserts into the right slot (use the left slot for a NDCS03 station without analog output bypass capability). The cable should latch securely into place. Card edge connector P1 of the station circuit board connects to this end of the cable.
3. Connect the J1 end of the cable to the P3 (NTRL02 and NTRL03 termination unit), P4 (NTCS04 termination unit), or P5 (NTCS04 termination unit) connector. The cables should latch securely into place.
4. Connect the J3 end of the cable to the J1 end of any required NKDS03 or NKDS13 cable. The cables should latch together securely.
5. Install the NDIS01, NDCS03, or IISAC01 station into the station housing.

NKDS03 AND NKDS13 CABLES

This cable connects the NKCS02, NKCS12, NKDS02, NKDS03, NKDS12, or NKDS13 cable to interconnected NDIS01, NDCS03, or IISAC01 stations. To install the cable:

1. Remove the NDIS01, NDCS03, or IISAC01 station from the station housing.
2. Insert the J2 end of the cable into the station housing slot. Viewing the station from the back, the cable inserts into the right slot (use the left slot for a NDCS03 station without analog output bypass capability). The cable should latch securely into place. Card edge connector P1 of the station circuit board connects to this end of the cable.
3. Connect the J1 end of the cable to the J3 end of the NKCS02, NKCS12, NKDS02, or NKDS12 cable. The cables should latch together securely.
4. Connect the J3 end of the cable to the J1 end of any additional NKDS03 or NKDS13 cable. The cables should latch together securely.
5. Install the NDIS01, NDCS03, or IISAC01 station into the station housing.

NKLM01 AND NKLM11 CABLES

This cable connects a IMRIO02 Remote I/O Slave Module to the NTRL02 or NTRL03 termination unit. To install the cable:

1. Pull the IMRIO02 module out several inches from the MMU backplane.
2. Insert the J2 end of the cable into the MMU backplane slot assigned to the IMRIO02 module.
3. Insert the J1 end of the cable into the P1 connector of the TRL termination unit.
4. Insert the IMRIO02 module into the MMU until it locks into place.

NKPL01 AND NKPL11 CABLES

This cable directly connects a local NTRL03 termination unit to an associated remote NTRL03 termination unit (see Figure 2-9 for an example cable connection).

To install the cable:

1. Connect one conductor (with black band) from terminal TB2-5 of the local NTRL03 termination unit to terminal TB1 1 of the associated remote NTRL03 termination unit.

NOTE: If the black band that identifies the (+) lead of the cable is removed, identify the lead by looking for one tined strand of wire within the stranded conductors of that lead.

2. Connect the other conductor from terminal TB2-6 of the local NTRL03 termination unit to terminal TB1-2 of the associated remote NTRL03 termination unit.

3. Connect the shield conductor from terminal TB2-7 of the local NTRL03 termination unit to terminal TB1-3 of the associated remote NTRL03 termination unit.

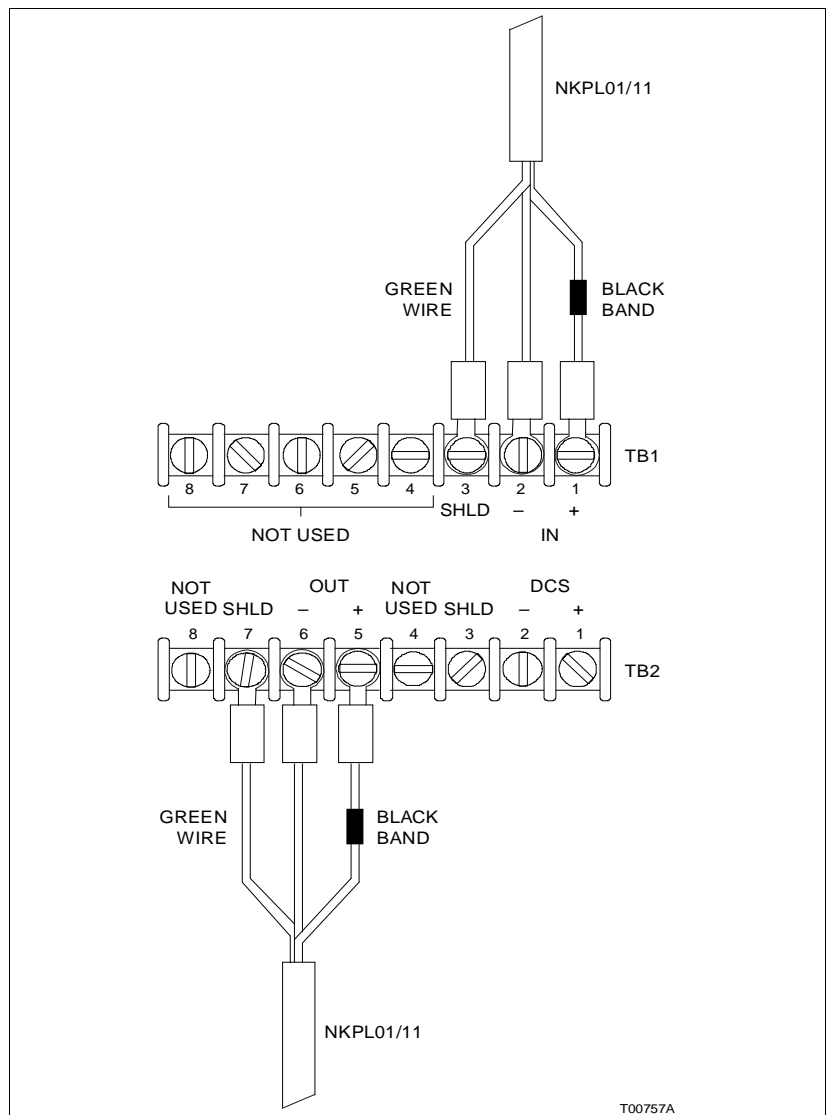


Figure 2-9. Example Middle Node NKPL01 or NKPL11 Cable Connections (NTRL03 Termination Units)

NKSE01 AND NKSE11 CABLES

This cable connects a NTRL02 or NTRL03 termination unit to a NTCS04 termination unit. To install the cable:

1. Connect one end of the cable to the P2 connector of the TRL termination unit.
2. Connect the other end of the cable to the P4 or P5 connector of the NTCS04 termination unit.

NKTL01 CABLE

This adapter cable connects a NKCL01 or NKCL11 cable to a NTRL03 termination unit. To install the cable:

1. Connect one end of the cable to the J2 (of the local node) or J1 (of the remote node) connector of the NTRL03 termination unit.
2. Connect the other end of the cable to the NKCL01 or NKCL11 cable.

Terminal Wiring

Station serial link wiring must be connected to the terminal blocks. See Figure 2-1 (NTRL02) or 2-10 and 2-11 (NTRL03) for terminal block assignments. The station serial link provides a communication path between an IMRIO02 slave module and stations. Station link wiring should be Bailey serial link wire.

CAUTION

It is strongly recommended that all power (cabinet, I/O, etc.) be turned off before doing any wiring. Verify all connections before applying power. Failure to observe these precautions could result in equipment damage.

ATTENTION

Il est fortement recommandé de débrancher toute source d'alimentation (armoire, E/S, etc.) avant d'effectuer du travail au câblage. Vérifiez toutes les connexions avant de rétablir l'alimentation. Ces précautions permettent d'éviter des dommages à l'équipement.

NOTE: Proper polarity of all signals must be maintained.

To connect field and power wiring:

1. Feed the station serial link, redundancy, and communication wiring into the terminal block area and connect them to the appropriate terminals.

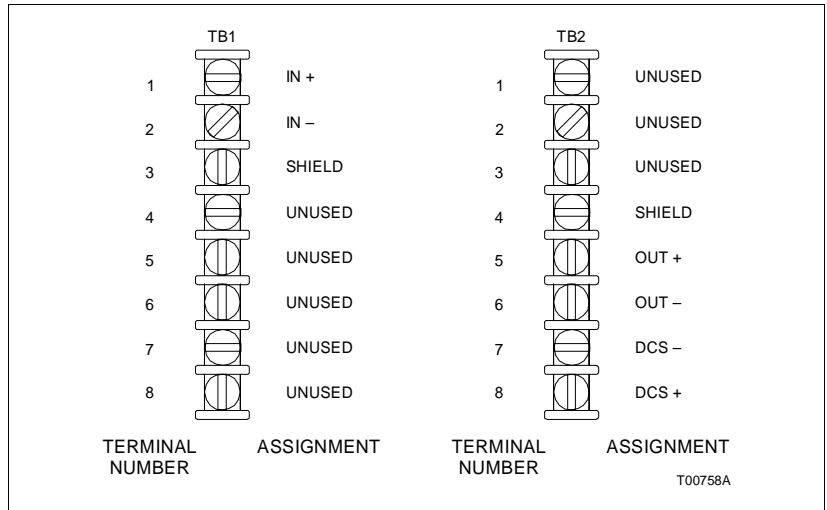


Figure 2-10. NTRL03 Terminal Block Assignments (Assembly 6637359A2)

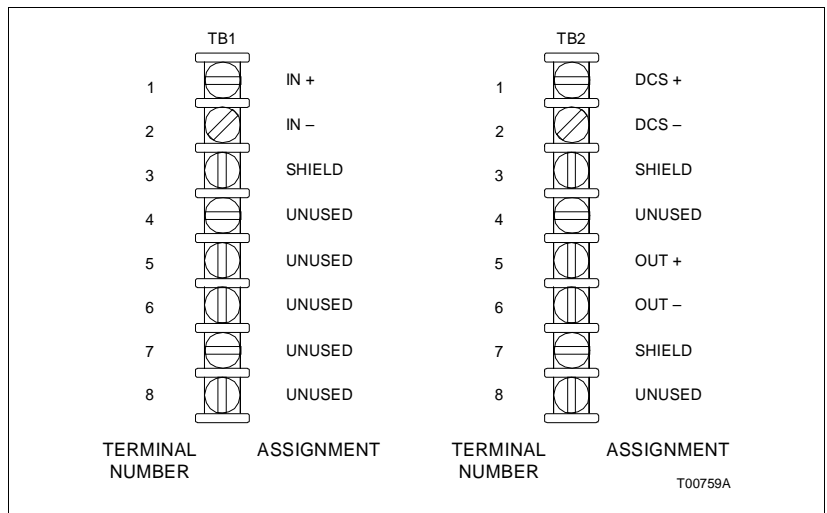


Figure 2-11. NTRL03 Terminal Block Assignments (Assembly 6637359K2)

2. Connect a 14 AWG wire from the +24 VDC source within the cabinet to the E1 terminal of the TRL termination unit.
3. Connect a 14 AWG wire from the DC common bus bar at the bottom of the cabinet to the E2 terminal of the TRL termination unit.

The NTRL02 and NTRL03 termination units are ready for operation if:

1. The fuses are installed.
2. The jumpers are configured for the node type and type of communication cable used.
3. All required cables and wires are installed and verified.
4. Power is connected and applied to the TRL termination unit.

FIBER OPTIC POWER BUDGET CALCULATION

The power budget formula is used to calculate the strength of the signal entering the optical receiver. The power budget formula sums up fiber optic link losses and the power output of the optical transmitter yielding the strength of the signal entering the optical receiver. Losses include anything that reduces the signal strength such as the fiber optic cables themselves, splices in cables, and cable connections. The optical transmitter on the NTRL02 termination unit has a minimum output of -15 decibel milliwatts. Signals entering the optical receiver on the NTRL02 termination unit must be at least -30 decibel milliwatts or stronger but can be no greater than -10 decibel milliwatts. Bailey Controls recommends maintaining a signal strength excess of at least -2 decibel milliwatts to allow for component degradation.

An example power budget calculation is as follows:

Two NTRL02 termination units are installed such that it requires three kilometers of cable to link them together. The output of the optical transmitter is measured at -15 decibel milliwatts. A two kilometer length and a one kilometer length of Bailey Controls recommended fiber optic cable (62.5/125 micrometer fiber size) are used for the link. Each fiber optic connection causes a -1 decibel milliwatt loss. The losses in this system are caused by the fiber optic cables and connections. The resulting power budget formula would be as follows:

Transmitter Power Output	=	-15 dBm
+		+
Two Kilometer Cable Loss (-3.3 dBm/km x 2 km)	=	-6.6 dBm
+		+
One Kilometer Cable Loss (-3.3 dBm/km x 1 km)	=	-3.3 dBm
+		+
Cable Connection Losses (-1 dBm/connection x 3 connections)	=	-3 dBm
Signal Strength Entering Receiver	=	-27.9 dBm

In this example, the signal strength excess is equal to -2.1 decibel milliwatts which is better than the Bailey Controls recommended minimum of -2.0 decibel milliwatts. It is important to remember that the optical transmitter output may be more than the -15 decibel milliwatts minimum. Also consider that losses associated with fiber optic cables and connections vary widely from manufacturer to manufacturer. Because of these variables, Bailey Controls recommends using the appropriate test equipment at the optical receiver end of the fiber optic link to verify that the signal is within the sensitivity range of the optical receiver.

SECTION 3 - MAINTENANCE

INTRODUCTION

The electrical remote link and fiber optic remote link termination units require limited maintenance. This section contains a maintenance schedule.

MAINTENANCE SCHEDULE

Execute the tasks in Table 3-1 at the specified intervals.

Table 3-1. Maintenance Schedule

Task	Interval
Clean and tighten all power and field wiring connections.	Every 6 months or during plant shut-down, whichever occurs first.
Use a static safe vacuum cleaner to remove dust from: Modules Module mounting unit Termination units Field termination panel	

SECTION 4 - REPAIR/REPLACEMENT PROCEDURES

INTRODUCTION

This section explains how to replace a failed NTRL02 or NTRL03 termination unit.

UNIT REPLACEMENT PROCEDURES

If a TRL termination unit is faulty, replace it with a new one. To replace a TRL termination unit:

CAUTION

It is strongly recommended that all power (cabinet, I/O, etc.) be turned off before doing any wiring. Verify all connections before applying power. Failure to do so could result in equipment damage.

ATTENTION

Il est fortement recommandé de débrancher toute source d'alimentation (armoire, E/S, etc.) avant d'effectuer du travail au câblage. Vérifiez toutes les connexions avant de rétablir l'alimentation. Ces précautions permettent d'éviter des dommages à l'équipement.

1. Turn off power to the cabinet containing the defective TRL termination unit.
2. Label and remove all wiring and cables from the defective TRL termination unit.
3. Remove the two number 10, 3/4-inch long, self-tapping screws that hold the TRL termination unit in place.
4. For NTRL03 termination units, remove the number 10, 3/4-inch long, self-tapping screw and star lock washer from the chassis ground hole of the termination unit.
5. Remove the defective TRL termination unit from the field termination panel.
6. Verify the fuses are installed on the replacement NTRL02 or NTRL03 unit.
7. Set the jumpers on the replacement TRL termination unit to match the jumper settings of the defective TRL termination unit.
8. Insert the replacement TRL termination unit into the slots in the outside edge of the field termination panel.

9. Secure the termination unit to the field termination panel with two number 10, 3/4-inch long, self-tapping screws. Do not overtighten the screws.
10. For NTRL03 termination units, connect the chassis ground by installing a number 10, 3/4-inch long, self-tapping screw with external star lock washer into the chassis ground hole. Do not overtighten the screw.
11. Connect all wiring and cables removed in Step 2 to the replacement TRL termination unit.
12. Verify proper wiring connections to the replacement TRL termination unit.
13. Apply power to the cabinet containing the replacement TRL termination unit.

FUSE REPLACEMENT PROCEDURES

If the fuse is faulty, replace it with a new one. To replace a fuse:

1. Turn off power to the cabinet containing the TRL termination unit.
2. Remove the faulty fuse.
3. Install the replacement fuse into the appropriate fuse clip.
4. Apply power to the cabinet containing the TRL termination unit.

SECTION 5 - SUPPORT SERVICES

INTRODUCTION

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

REPLACEMENT PARTS AND ORDERING INFORMATION

When making repairs, 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.

Order parts without commercial descriptions from the nearest Bailey Controls Company sales office.

Table 5-1. Spare Parts List

Part Number	Part Type	Rating	Size or Dimensions	Associated Termination Unit
1946984A1	Jumper	N/A	N/A	NTRL02/03
194776A11001	Fuse	1.0 A/250 V	0.25 in. x 1.25 in.	NTRL03 (Rev A2)
194776A12500	Fuse	0.25 A/250 V	0.25 in. x 1.25 in.	NTRL02
194776A15001	Fuse	5.0 A/250 V	0.25 in. x 1.25 in.	NTRL02 and NTRL03 (Rev A2)
1948182A31001	Fuse	1.0 A/250 V	5 mm x 20 mm	NTRL03 (Rev K2)
1948182A35001	Fuse	5.0 A/250 V	5 mm x 20 mm	NTRL03 (Rev K2)

TRAINING

Bailey Controls Company 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

Additional copies of this manual, or other Bailey Controls Company manuals, can be obtained from the nearest Bailey Controls Company sales office at a reasonable charge.

APPENDIX A - IMRIO02 REMOTE I/O SLAVE MODULE CONFIGURATION

INTRODUCTION

Figure A-1 shows the location of the dipswitches used to configure the IMRIO02 module. Tables A-1 through A-4 give the dipswitch settings to configure the module. This information is provided as a quick reference guide for personnel installing the NTRLO2 or NTRLO3 termination unit. Configuration consists of setting the node or slave address (dipswitch S1), diagnostic mode (dipswitch S2), and type of communication cables used (dipswitches S3 and S4). Refer to the **IMRIO02 Remote I/O Slave Module** instruction manual for detailed instructions.

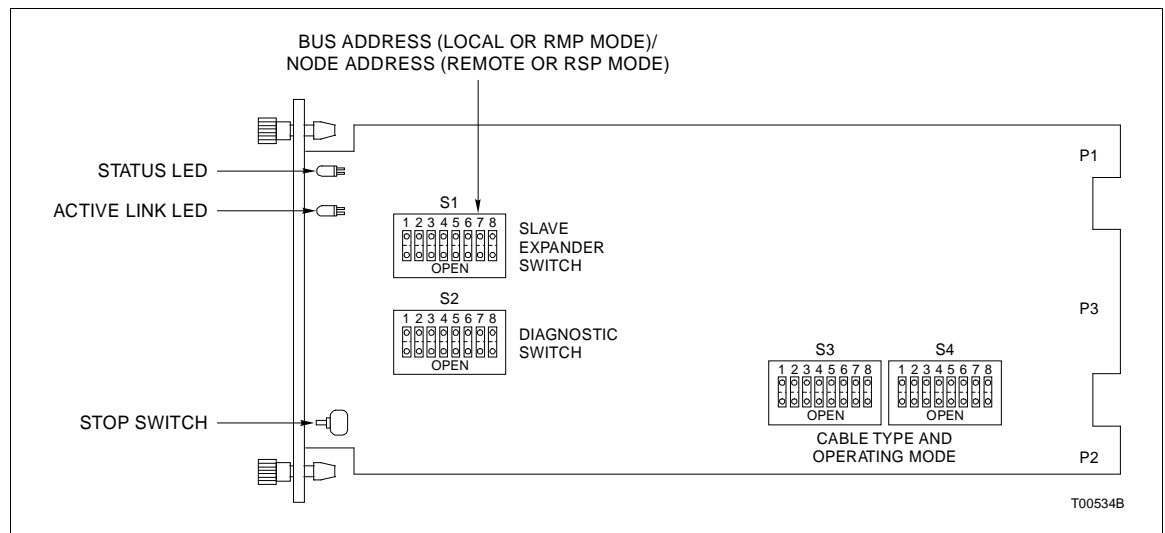


Figure A-1. Remote I/O Slave Module

Table A-1. IMRIO02 Example Dipswitch S1 Settings

Address Example	Dipswitch Position (Binary Value)							
	1 (128)	2 (64)	3 (32)	4 (16)	5 (8)	6 (4)	7 (2)	8 (1)
0	0	0	0	0	0	0	0	0
16	0	0	0	1	0	0	0	0
32	0	0	1	0	0	0	0	0
48	0	0	1	1	0	0	0	0
63	0	0	1	1	1	1	1	1

NOTE: 0 = CLOSED or ON, 1 = OPEN or OFF .

1. Dipswitch positions 1 and 2 must remain closed. In remote (RSP) mode this dipswitch selects the node address. In local (RMP) mode this dipswitch selects the slave expander bus address.

Table A-2. IMRIO02 Dipswitch S2 Settings

Dipswitch Position								Function
1	2	3	4	5	6	7	8	
0	0	0	0	0	0	0	0	Remote (RSP) mode
0	1	0	0	0	0	0	0	Local (RMP) mode

NOTE: 0 = CLOSED or ON, 1 = OPEN or OFF.

Table A-3. IMRIO02 Dipswitch S3 Settings

Dipswitch Position ¹								Function
1	2	3	4	5	6	7	8	
X	X	X	X ¹	1	0	0	0	Remote (RSP) mode
X	X	X	X ¹	0	1	1	1	Local (RMP) mode

NOTE: 0 = CLOSED or ON, 1 = OPEN or OFF, X = Not important.

1. Set dipswitch position 4 to 0 for electrical cables or to 1 for fiber optic cables.

Table A-4. IMRIO02 Dipswitch S4 Settings

Dipswitch Position								Function
1	2	3	4	5	6	7	8	
0	0	0	0	0	0	0	0	Remote (RSP) mode
1	1	1	1	1	1	1	1	Local (RMP) mode

NOTE: 0 = CLOSED or ON, 1 = OPEN or OFF.

APPENDIX B - IISAC01 ANALOG CONTROL STATION CONFIGURATION

INTRODUCTION

Figure B-1 shows the location of the dipswitches and jumpers used to configure the IISAC01 Analog Control Station. Tables B-1 through B-7 give the dipswitch and jumper settings to configure the station. This information is provided as a quick reference guide for personnel installing the NTRL02 or NTRL03 termination unit. Configuration consists of setting the operating mode, communications rate, and station address (dipswitch S1). The auto bypass, output, and electric drive options (dipswitch S2) along with the bar graph display option (dipswitches S3 and S4) must be set. Jumpers JP1 through JP3 set the manual override, electric drive type, and normal operation options. Refer to the **IISAC01 Analog Control Station** instruction manual for detailed instructions.

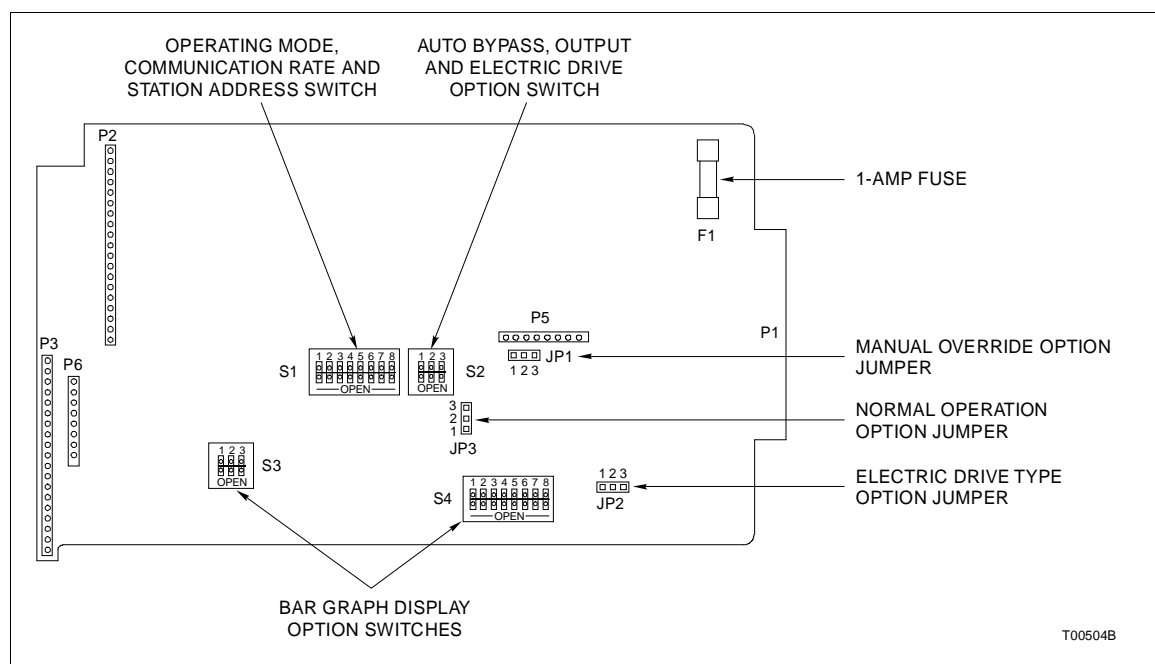


Figure B-1. Analog Control Station

Table B-1. IISAC01 Dipswitch SW1 Positions 1 and 2 Settings

Option	Position	Setting	Description
Diagnostics	1	1	Enable diagnostics. Do not use.
		0	Normal operation.
Communication rate	2	1	Enable 40 kbaud (> 8 stations)
		0	Enable 5 kbaud (\leq 8 stations)

NOTE: 0 = CLOSED or ON, 1 = OPEN or OFF.

Table B-2. IISAC01 Dipswitch SW1 Positions 3 through 8 Settings

Address Example	Dipswitch Position (Binary Value)					
	3 (32)	4 (16)	5 (8)	6 (4)	7 (2)	8 (1)
0	0	0	0	0	0	0
16	0	1	0	0	0	0
32	1	0	0	0	0	0
48	1	1	0	0	0	0
63	1	1	1	1	1	1

NOTE: 0 = CLOSED or ON, 1 = OPEN or OFF.

Table B-3. IISAC01 Dipswitch SW2 Settings

Option	Position	Setting	Description
Auto bypass	1	1	Enable auto bypass
		0	Disable auto bypass
Demand output	2	1	Reverse demand output
		0	Normal demand output
Electric drive	3	1	Enable electric drive
		0	Disable electric drive

NOTE: 0 = CLOSED or ON, 1 = OPEN or OFF.

Table B-4. IISAC01 Dipswitch SW3 Settings

Display Options	Position	Setting	VAR	SET	OUT	ALPHA
Stand-alone mode	1, 2, 3	0 0 0	Blank	Blank	Blank	DO
		0 0 1 ¹	Blank	Blank	AI1	DO ²
		0 1 0	Blank	Blank	AI1 / DO ³	Blank / DO
		0 1 1	AI1	Blank	Blank	DO
		1 0 0	Blank	Blank	DO	DO
		1 0 1	AI1	Blank	DO	DO
		1 1 0 ¹	AI2 ⁴	Blank	AI1	DO ²
		1 1 1 ¹	AI2 ⁴	Blank	DO2	DO ²

NOTES: 0 = CLOSED or ON, 1 = OPEN or OFF.

1. Only display options available when electric drive option is enabled.
2. Display is blanked when electric drive option is enabled.
3. VAR dipswitch toggles the display from AI1 to DO.
4. Only available when using termination modules, not termination units.

IISAC01 ANALOG CONTROL STATION CONFIGURATION

Table B-5. IISAC01 Dipswitch SW4 Position 1 Settings

Option	Position	Setting	Description
Square root (AI2 only)	1	1	Enable square root display option
		0	Disable square root display option

NOTE: 0 = CLOSED or ON, 1 = OPEN or OFF.

Table B-6. IISAC01 Dipswitch SW4 Positions 2 through 8 Settings

Display Options	Position	Setting	VAR	SET	OUT	ALPHA
Normal mode	2, 3, 4	0 0 0	PV	SP	CO	PV,SP,CO
		0 0 1	PV	SP	AI1	PV,SP,CO
		0 1 0	PV	SP	Blank	PV,SP,CO
		0 1 1	PV	SP	All on	PV,SP,CO
		1 0 0	AI2 ¹	SP	CO	PV,SP,CO ²
		1 0 1	AI2 ¹	SP	AI1	PV,SP,CO ²
		1 1 0	AI2 ¹	SP	Blank	PV,SP,CO ²
		1 1 1	AI2 ¹	SP	All on	PV,SP,CO ²
Bypass mode	5, 6, 7, 8	0 0 0 0 ³	Blank	Blank	AI1	DO ⁴
		0 0 0 1	Blank	Blank	DO	DO
		0 0 1 0	AI1	Blank	DO	DO
		0 0 1 1	DO	Blank	DO	DO
		0 1 0 0	DO	Blank	AI1	DO
		0 1 0 1 ³	AI2 ¹	Blank	AI1	DO ⁴
		0 1 1 0	AI2 ¹	Blank	DO	DO
		0 1 1 1	PV(MFP) ⁵	Blank	AI1	PV, DO
		1 0 0 0	PV(MFP) ⁵	Blank	DO	PV, DO
		1 0 0 1 ³	AI2 ¹	Blank	Blank	DO ⁴

NOTES: 0 = CLOSED or ON, 1 = OPEN or OFF.

1. Only available when using termination modules, not termination units.
2. PV displayed is the S1 input to function code 80.
3. Only display options available when electric drive option is enabled.
4. Display is blanked when electric drive option is enabled.
5. Upon loss of communication, last known value is displayed.

Table B-7. IISAC01 Jumper JP1, JP2, and JP3 Settings

Option	Jumper	Jumper Position	Function
Manual override switch	JP1	1-2	Enable manual override switch
		2-3	Disable manual override switch
Electric drive type	JP2 ¹	1-2	RW type electric drive
		2-3	Universal type electric drive
Microprocessor mode of operation	JP3	1-2	Normal operation
		2-3	Factory setting. Do not use.

NOTE:

1. This jumper is labeled JP4 on stations that are revision 6638095A1.

APPENDIX C - NDCS03 DIGITAL CONTROL STATION CONFIGURATION

INTRODUCTION

Figures C-1 and C-2 show the location of the dipshunt, dipswitch, and jumpers used to configure the NDCS03 station. Tables C-1 through C-4 give the dipswitch, dipshunt, and jumper settings to configure the station. This information is provided as a quick reference guide for personnel installing the NTRL02 or NTRL03 termination unit. Configuration consists of setting the analog input type (dipshunt XU16) and control output type (jumper J1 and J2) on the bypass board. Setting the station address (dipswitch S1) and options (jumper JP1 through JP5) on the station board is also required. Refer to the **NDCS03 Digital Control Station** instruction manual for detailed instructions.

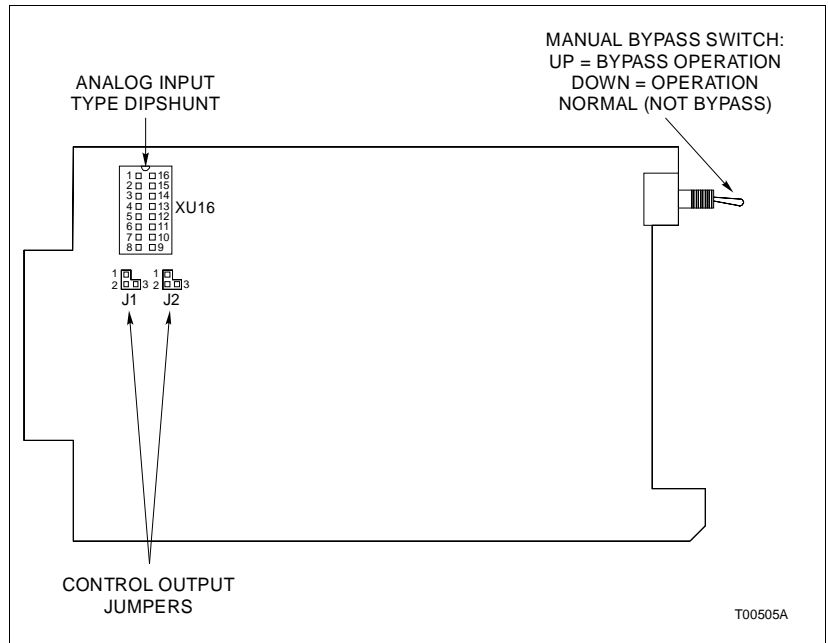


Figure C-1. Bypass Board

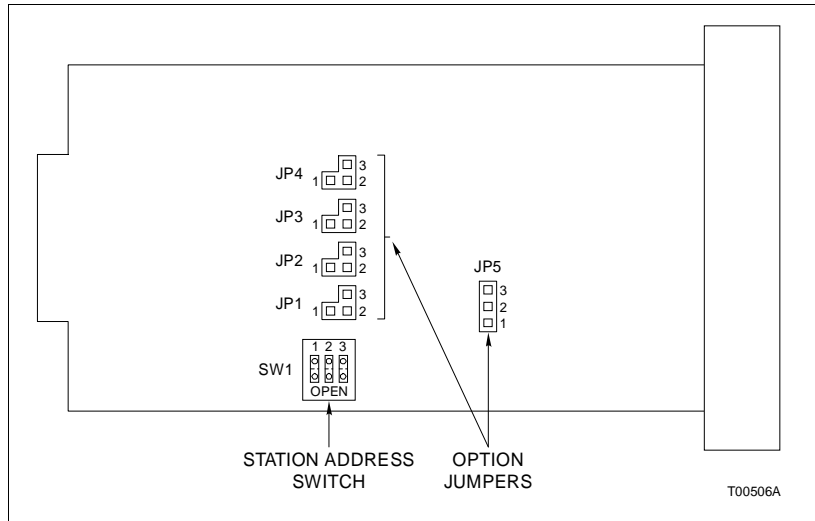


Figure C-2. Digital Control Station Board

Table C-1. NDCS03 Dipshunt XU16 Settings

Strap Numbers								Function
1	2	3	4	5	6	7	8	
0	0	1	1	0	0	1	1	4 to 20 mA analog input ¹
1	1	0	0	1	1	0	0	Universal actuator analog input
0	0	0	0	1	1	0	0	RW electric drive analog input ¹
1	1	0	0	0	0	1	1	4 to 20 mA analog input

NOTE: 0 = OPEN or CUT STRAP, 1 = INTACT or SHORTED STRAP.
 1. Connected to the 4 to 20 mA output locally.

Table C-2. NDCS03 Jumper J1 and J2 Settings

Jumper	Jumper Position	Function
J1	1-2	RW electric drive operation
J2		
J1	2-3	Universal electric drive operation
J2		

NOTE: Jumper settings do not effect 4 to 20 mA outputs.

Table C-3. NDCS03 Dipswitch S1 Settings

Station Address	Dipswitch Position		
	1	2	3
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
7	1	1	1

NOTE: 0 = CLOSED or ON, 1 = OPEN or OFF.

Table C-4. NDCS03 Jumper J1 through J5 Settings

Jumper	Jumper Position	Function
JP1	1-2	Enable auto bypass.
	2-3	Disable auto bypass.
JP2	1-2	Enable reverse acting output when in bypass.
	2-3	Disable reverse acting output when in bypass.
JP3	1-2	No external analog input displayed on OUT bar graph when in normal mode of operation.
	2-3	External analog input displayed on CO bar graph when in normal mode of operation.
JP4	1-2	External analog input displayed on CO bar graph when in bypass mode of operation.
	2-3	External analog input displayed on VAR bar graph when in bypass mode of operation.
JP5	1-2	Select bright intensity.
	2-3	Select dim intensity.

APPENDIX D - NDIS01 DIGITAL INDICATOR STATION CONFIGURATION

INTRODUCTION

Figure D-1 shows the location of the dipswitch and jumpers used to configure the NDIS01 station. Tables D-1 and D-2 give the dipswitch and jumper settings to configure the station. This information is provided as a quick reference guide for personnel installing the NTRL02 or NTRL03 termination unit. Configuration consists of setting the station address (dipswitch S1) and display brightness (jumper JP1). Refer to the **NDIS01 Digital Indicator Station** instruction manual for detailed instructions.

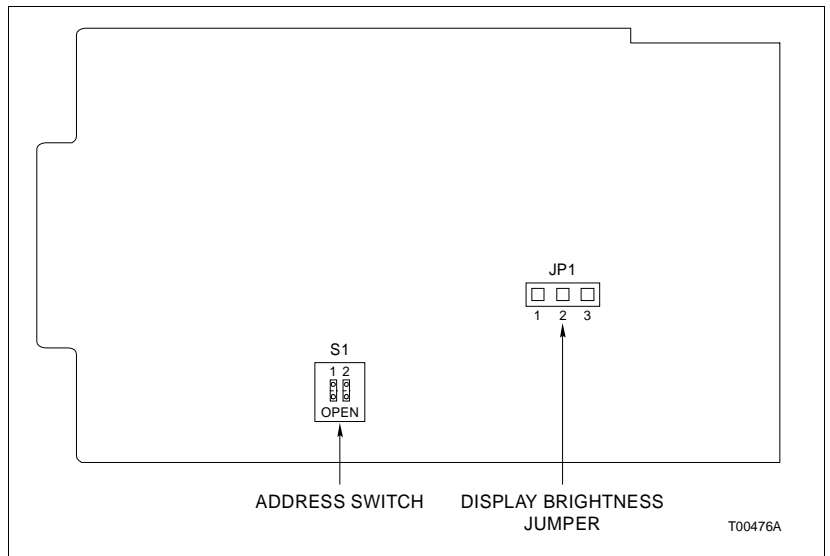


Figure D-1. Digital Indicator Station

Table D-1. NDIS01 Dipswitch S1 Settings

Station Address	Dipswitch Position	
	1	2
8	0	0
9	0	1
10	1	0
11	1	1

NOTE: 0 = CLOSED or ON, 1 = OPEN or OFF.

Table D-2. NDIS01 Jumper JP1 Settings

Jumper	Jumper Position	Function
JP1	1-2	Select bright intensity
	2-3	Select dim intensity

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