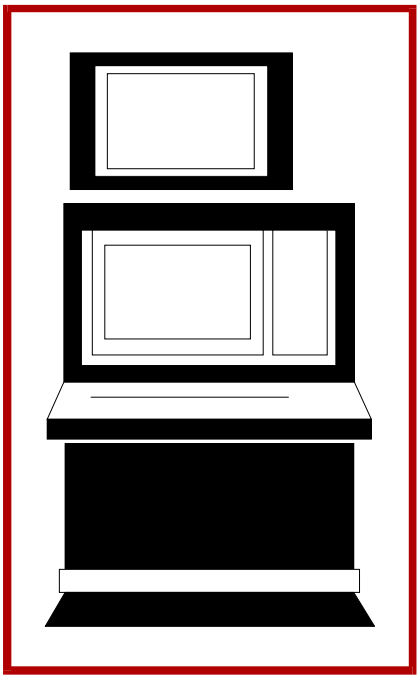
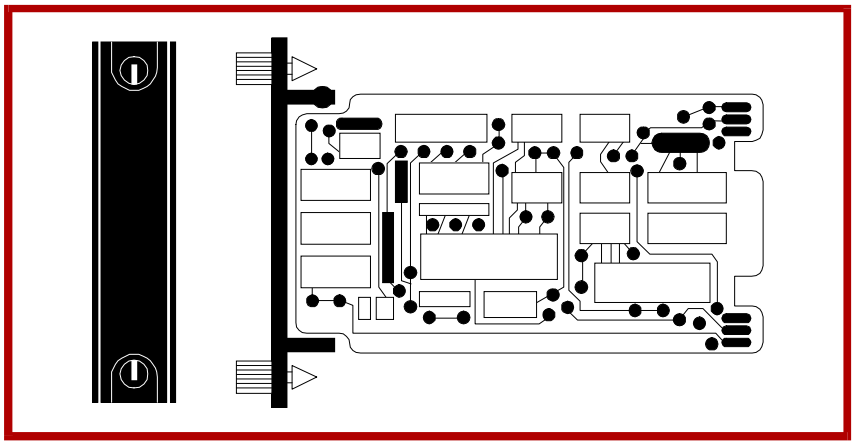
Bailey® infi 90®

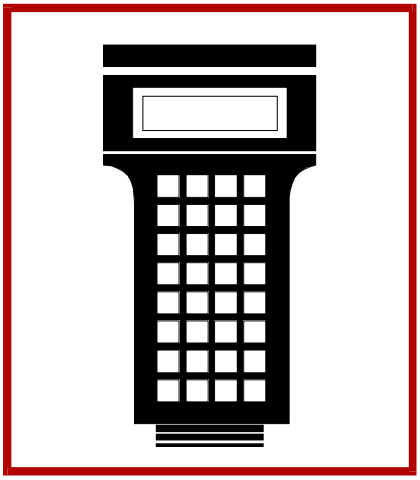
E96-405

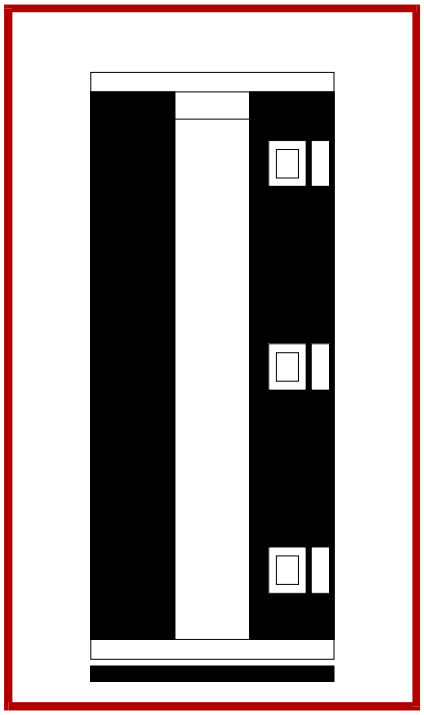
Instruction

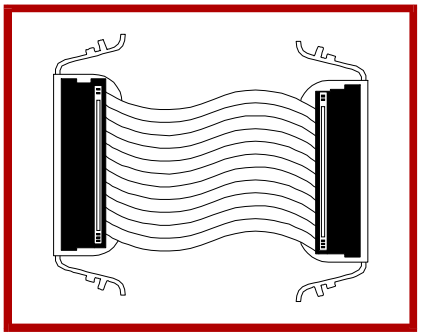
RTD Analog Input Termination Unit
(NTAI04)

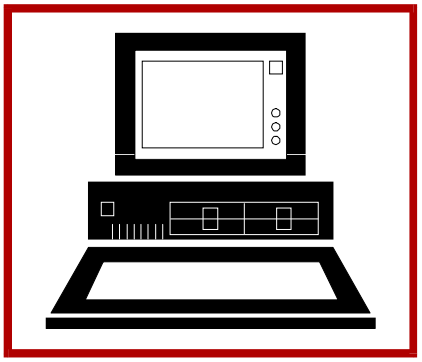












Bailey® Process Control and Automation Solutions from Elsag Bailey Group

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.

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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

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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 MATÉREILS.

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Preface

Termination units terminate and connect plant equipment to the INFI 90® process modules. The NTAI04 RTD Analog Input Termination Unit terminates field wiring for the IMASM03 and IMASM04 or NASM03 and NASM04 Analog Slave Module.

This manual explains how to install and use the NTAI04 on the INFI 90 system. It has sections that describe the setup and cabling. The appendix contains quick reference information about the IMASM03 and IMASM04 module.

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List of Effective Pages

Total number of pages in this manual is 24, consisting of the following:

Page No.	Change Date
Preface	Original
List of Effective Pages	Original
iii through vi	Original
1-1 through 1-4	Original
2-1 through 2-7	Original
3-1	Original
4-1 through 4-2	Original
5-1	Original
A-1 through A-2	Original
Index-1	Original

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 insure that contact with energized parts is avoided when servicing.
SPECIFIC CAUTIONS	We strongly recommend turning off cabinet power before doing any termination unit wiring. Failure to do so could result in equipment damage. Do not apply power without verifying all wire connections (p.2-5). Remove modules from their multibus module unit slots before installing or removing a cable assigned to that slot. Failure to do so could result in damage to the module (p.2-4, 4-1). If input or output circuits are a shock hazard after disconnecting system power at the power entry panel, then the door of the cabinet containing these externally powered circuits must be marked with a warning stating that multiple power sources exist (p.2-5, 4-1).

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.
ATTENTIONS D'ORDRE SPÉCIFIQUE	Il est fortement recommande de debracher l'alimentation electrique du cabinet avant d'effectuer tout connexion aux cartes de raccordment des units. Des dommages aux equipments pourraient survenir dans le cas contraire. Ne pas rebrancher l'alimentation avant que toutes les connexions aient ete verifiees (p.2-5). Retirer les modules de leur position assignée avant d'installer un câble à cette position. Des dommages au module ou au poste pourraient résulter d'un manquement à cette procédure (p.2-4, 4-1). Si des circuits d'entree ou de sortie sont alimentes a partir de sources externes, ils presentent un risque de choc electrique meme lorsque l'alimentation du systeme est debranchee du panneau d'entree l'alimentation. Le cas echeant, un avertissement signalant la presence de sources d'alimentation multiples doit etre appose sur la porte de l'armoire (p.2-5, 4-1).

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SECTION 1 - INTRODUCTION

OVERVIEW

The NTAI04 RTD Analog Input Termination Unit is used by the IMASM03 and IMASM04 RTD Analog Slave Module. Each NTAI04 can input up to 16 three-wire RTD signals. An analog slave module accepts eight inputs. Therefore a single NTAI04 can terminate two analog slave modules. The signals pass through the slave module to the IMAMM03 Analog Master Module. This manual explains the purpose, setup, handling precautions and steps to install the NTAI04 termination unit.

INTENDED USER

System engineers and technicians should read this manual before installing and using the termination unit (TU). Put the termination unit and slave module into operation only after reading and understanding this instruction. Refer to the ***Table of Contents*** to find the information. Refer to the ***HOW TO USE THIS MANUAL*** entry in this section to get started.

TERMINATION UNIT DESCRIPTION

The NTAI04 is a single printed circuit board that mounts in a Field Termination Panel (NFTP01). The TU has three connectors P1, P2 and P3. Connector P1 and P2 each connect to a different slave module through separate termination cables. P3 is used to calibrate the input circuit with local on-card precision resistors. Either slave module can be connected to P3. The terminal blocks for field wiring are on the TU. Figure 1-1 shows an application example for the NTAI04.

FEATURES

The design of the NTAI04, as with all INFI 90 devices, allows for flexibility in creating a process management system. Refer to ***NOMENCLATURE*** for a list of devices that can be used with this TU in the INFI 90 system.

- A standard factory-wired cable connects the TU to the slave module.
- On-board terminal blocks accept field and I/O wiring.
- Each TU fits in a standard field termination panel.
- Field wire termination for 16 three-wire RTD inputs.
- Input channel transient and surge protection.

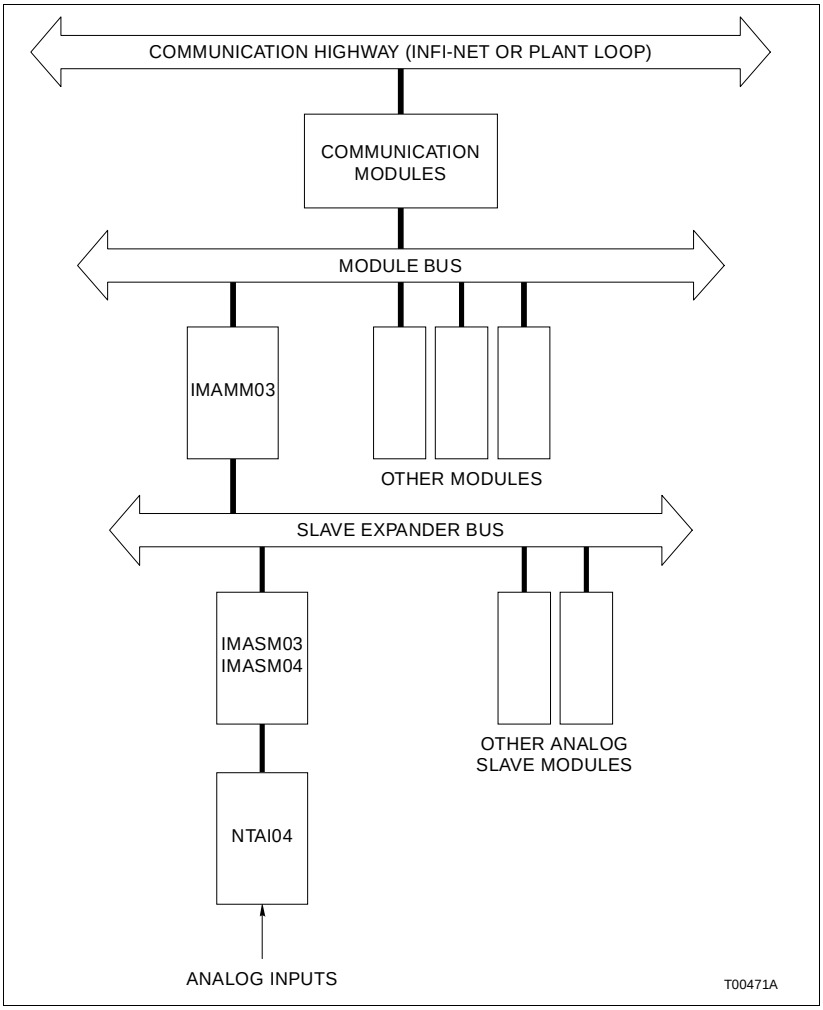

Figure 1-1. Application Example for NTAI04

INSTRUCTION CONTENT

This manual has five sections and an appendix.

Introduction — Is an overview of the features, description and specifications of the NTAI04.

Installation — Describes cautions to observe when handling the TU. It shows the steps to follow to install and connect the termination unit before applying power.

Maintenance — Provides a maintenance schedule.

Repair/Replacement Procedures — Details how to replace a TU.

Support Services — Describes the support services (spare parts, training, documentation, etc.) available from Bailey Controls Company.

Appendix A — Shows the jumper settings, board layout and cabling for the IMASM03 and IMASM04 Analog Slave Module.

HOW TO USE THIS MANUAL

Read this manual before handling the TU. Refer to the sections in this list as needed for more information.

1. Read Section 2 before connecting the NTAI04.

2. Refer to Appendix A for the IMASM03 and IMASM04 slave module.

3. Refer to Section 3 section for the maintenance schedule.

4. Refer to Section 4 procedures and Section 5 when needed.

GLOSSARY OF TERMS AND ABBREVIATIONS

Table 1-1 contains the glossary of terms for this manual.

Table 1-1. Glossary of Terms and Abbreviations

Term	Definition
Analog	Continuously variable as opposed to discretely variable.
RTD	Resistance temperature detector. A sensing device that changes resistance with changes in temperature.
Slave Address	A unique identifier of a specific device or a communication channel. Refers to slave expander bus.
Slave Expander Bus	Parallel communication bus between the master and slave modules.
Slave Module	One of a series of modules designed to perform high or low level operations as directed by a master module.
TU	Termination Unit. Provides input/output connection between plant equipment and the INFI 90/Network 90® modules.

REFERENCE DOCUMENTS

Table 1-2 contains the reference documents for the NTAI04.

Table 1-2. Reference Documents

Number	Description
I-E96-205	Analog Master Module and Analog Slave Modules (IMAMM03 and IMASM01/02/03/04)
I-E96-500	Site Planning and Preparation

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NOMENCLATURE

Table 1-3 contains the modules and equipment that can be used with the NTAI04.

Table 1-3. Nomenclature

Nomenclature	Description
IMAMM03	Analog Master Module
IMASM03/04	Analog Slave Module
NKTU01	Cable, Termination Unit (PVC)
NKTU11	Cable, Termination Unit (non-PVC)
NTFP01	Field Termination Panel

SPECIFICATIONS

Refer to Table 1-4 the specifications of the NTAI04 Termination Unit.

Table 1-4. Specifications

Property	Characteristic/Value
Power Requirements	+24 VDC
Mounting	Mounts in the Field Termination Panel (NFTP01).
Environmental	
Electromagnetic/Radio Frequency Interference	No values available at this time. Keep cabinet doors closed. Do not use communication equipment closer than 2 m from the cabinet.
Ambient 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)
Atmospheric Pressure	Sea Level to 3 km (1.86 mi)
Air Quality	Noncorrosive
Cooling Requirements	No cooling is necessary when used in Bailey Controls cabinets and operated within stated limits.
Certification	CSA certified for use as process control equipment in an ordinary (nonhazardous) location.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

SECTION 2 - INSTALLATION

INTRODUCTION

This section explains how to install the NTAI04 RTD Analog Input Termination Unit into operation. Read, understand, and complete the steps in the order they appear before using the NTAI04.

SPECIAL HANDLING

Observe these steps when handling electronic circuitry:

> **NOTE:** Always use the 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 modules. 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 by electrostatic discharge.
>
> Use the static grounding wrist strap when installing and removing modules. Static discharge may damage MOS devices on modules in the cabinet. Use grounded equipment and static safe practices when working with modules.

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 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*** to 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 DC common bus.

UNPACKING AND INSPECTION

These are steps to follow for general handling:

1. Examine the unit to make sure that no damage has occurred in transit.

2. Notify the nearest Bailey Controls sales office of any damage.

3. File a claim for any damage with the shipping company that handled the shipment.

4. Use the original packing material or container to store the unit.

5. Store the unit in a place with clean air; free of extremes of temperature and humidity.

SETUP/INSTALLATION

This section explains how to install the NTAI04. The required procedures are installing the termination unit into the field termination panel and connecting the field wiring and termination cables.

Fuses

The TU has a fuse (F1) for the +24 VDC power. It is a 0.25 amp, 250 volt fuse, (Bailey Controls part number 194776A12500). The TU is shipped with the fuse in fuse holder F1.

Termination Unit Configuration

No configuration is necessary to operate the TU. The jumpers on the TU are used to calibrate the slave module inputs. Two channel-select jumpers select the input to be calibrated. One resistance-select jumper selects the appropriate 10 or 100 ohm zero and span for calibration. To calibrate the TU, follow the procedure in the ***Analog Master Module and Analog Slave Modules (IMAMM03 and IMASM01/02/03/04)*** manual.

Physical Installation

The TU mounts on a standard NFTP01 Field Termination Panel. Figure 2-1 shows how to secure the termination unit to the FTP.

To install the termination unit:

1. Make sure power is off to the cabinet.

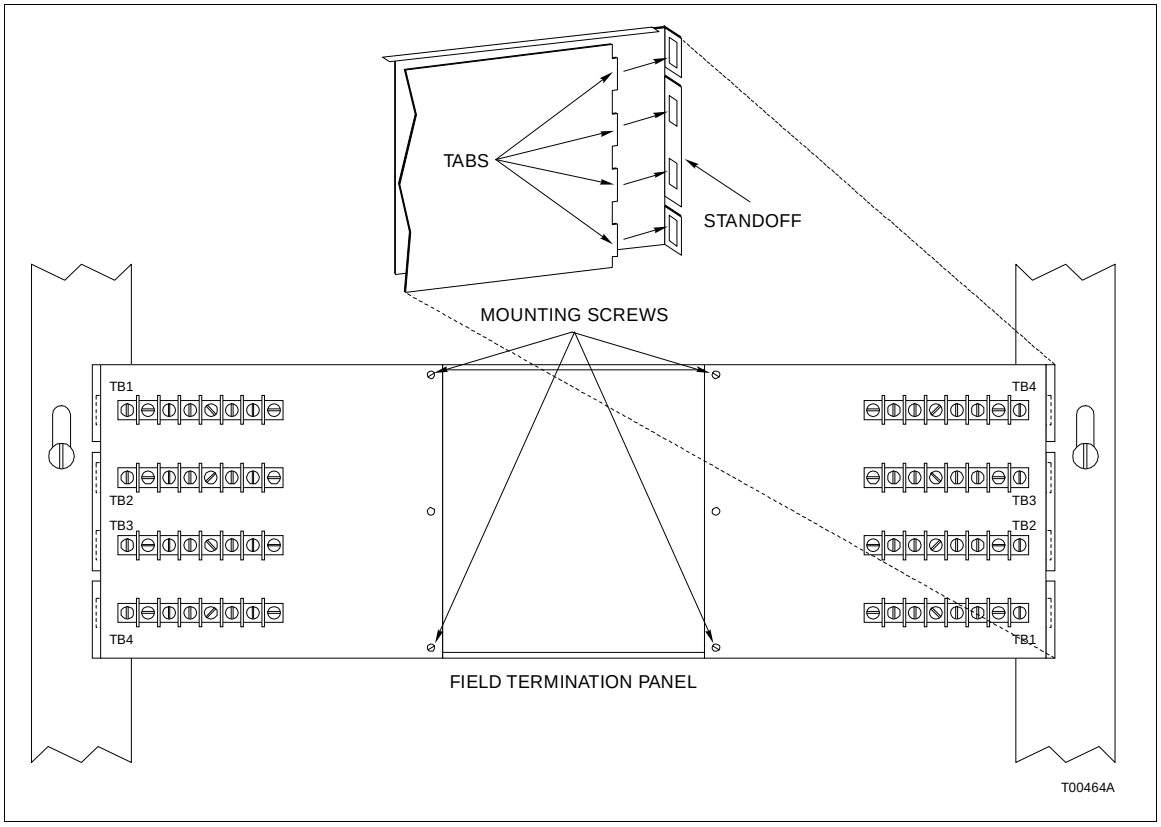

Figure 2-1. Installation for NTAI04

2. Insert the termination unit tabs into the slots in the outside edge of the termination panel.

3. Mount the TU to the field termination panel with 2, number 10, ¾ inch screws. Do not over-tighten the screws. See Figure 2-1.

Cable Connections

The NTAI04 has three cable connectors, P1, P2 and P3. Connector P1 and P2 connect through separate communication TU cables to two slave modules. Connector P3 connects either TU cable to calibrate the slave inputs. Install the NKTU01 and NKTU11 cable into P1 and P2 connectors on the TU. The NKTU01 and NKTU11 is a round, shielded cable that connects the TU to the IMASM03and IMASM04 slave module. The NKAS01 cable has a PVC jacket and is rated for 80 degrees Celsius at 300 volts (UL rated type CL2). The NKAS11 cable has a non-PVC jacket and is rated for 90 degrees celsius at 300 volts (UL rated type PLTC). See

Figure 2-2 for the cable connections from the termination unit to the slave modules. Table 2-1 lists the NTAI04 cable applications.

CAUTION	**Remove modules from their multibus module unit slots before installing or removing a cable assigned to that slot. Failure to do so could result in damage to the module.**
ATTENTION	**Retirer les modules de leur position assignée avant d'installer un câble à cette position. Des dommages au module ou au poste pourraient résulter d'un manquement à cette procédure.**

Make connections to the TU after it is mounted in the field termination panel. To install the TU cable follow these steps.

1. Insert the hooded end of each cable into the module mounting unit backplane slot assigned to the slave modules. The cables should latch securely in place. Card edge connector P3 of the slave module connects to this end of the cable.

2. Insert the male 36 pin connector end of the cable from the first slave module into the P1 connector of the TU. The cable should latch securely in place.

3. Insert the 36 pin connector end of the cable from the second slave module into the P2 connector of the TU. The cable should latch securely in place.

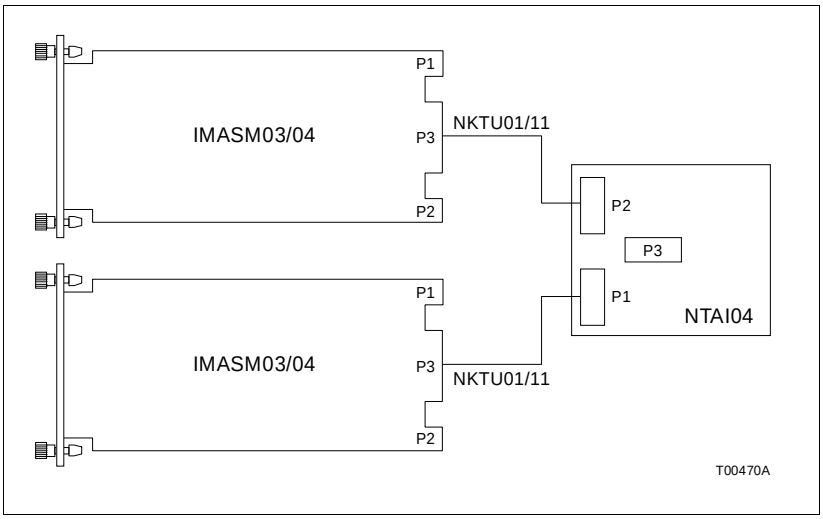

Figure 2-2. Cable Connections for NTAI04

Table 2-1. NTAI04 Cable Applications

Nomenclature/ Description	Application	Connector	Maximum Length
NKTU01 (PVC)	Connects TU inputs 1-8 to IMASM03/04	P1 on TU to MMU back-plane.	61m (200 ft)
	Connects TU inputs 9-16 to IMASM03/04	P2 on TU to MMU back-plane.	
NKTU11 (non-PVC)	Connects TU inputs 1-8 to IMASM03/04	P1 on TU to MMU back-plane.	61m (200 ft)
	Connects TU inputs 9-16 to IMASM03/04	P2 on TU to MMU back-plane.	

4. Slide the IMASM03 and IMASM04 module into the MMU until the module is fully seated and the faceplate is flush with the other modules in the rack.

Terminal Block Wiring

Connect the wiring from the RTDs to the TU terminals. See Figure 2-3 for terminal block assignments and terminal polarity. Field wiring should be 12 to 22 AWG wire. Refer to the Site Planning and Preparation manual for information on field wiring such as noise immunity and spacing requirements.

CAUTION

If input or output circuits are a shock hazard after disconnecting system power at the power entry panel, then the door of the cabinet containing these externally powered circuits must be marked with a warning stating that multiple power sources exist.

ATTENTION

Si des circuits d'entree ou de sortie sont alimentes a partir de sources externes, ils presentent un risque de choc electrique meme lorsque l'alimentation du systeme est debranchee du panneau d'entree l'alimentation. Le cas echeant, un avertissement signalant la presence de sources d'alimentation multiples doit etre appose sur la porte de l'armoire.

CAUTION

We strongly recommend turning off cabinet power before doing any termination unit wiring. Failure to do so could result in equipment damage. Do not apply power without verifying all wire connections.

ATTENTION

Il est fortement recommande de debracher l'alimentation electrique du cabinet avant d'effectuer tout connexion aux cartes de raccordment des units. Des dommages aux equipments pourraient survenir dans le cas contraire. Ne pas rebrancher l'alimentation avant que toutes les connexions aient ete verifiees.

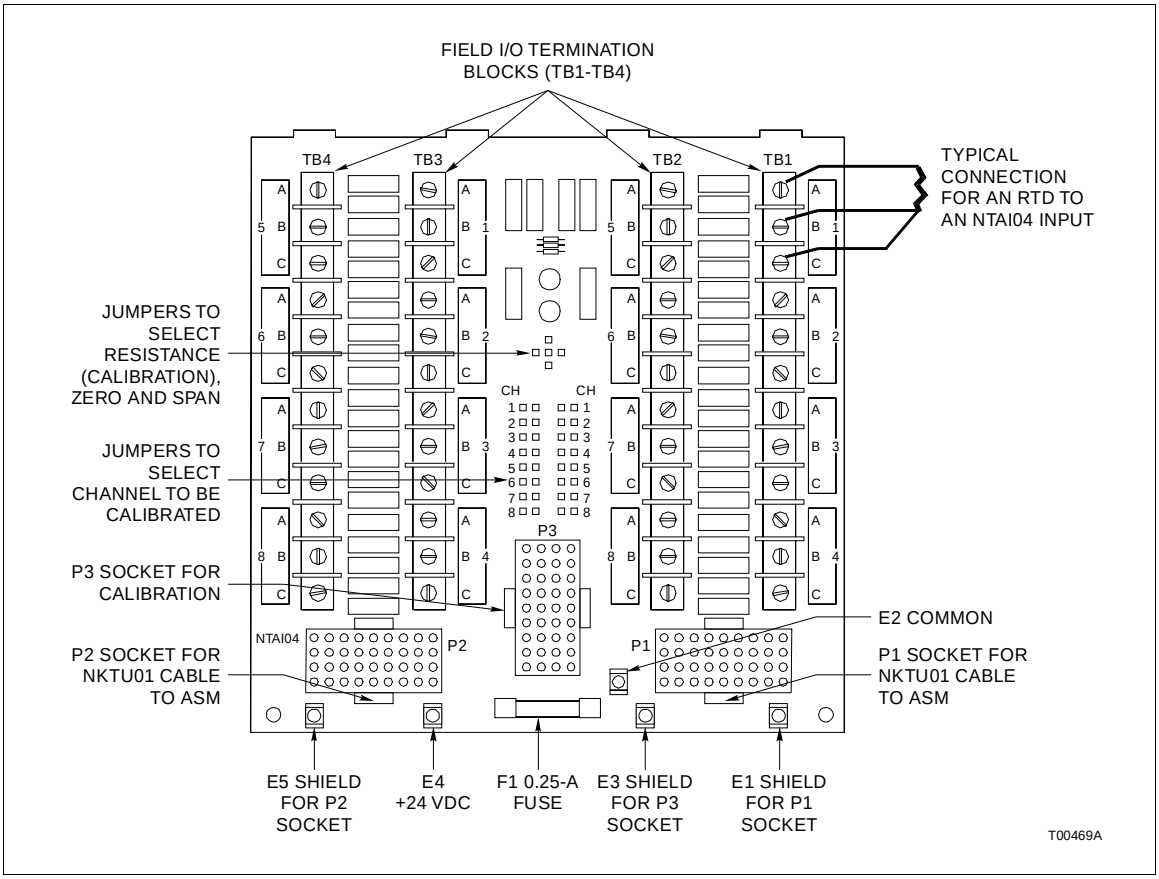

Figure 2-3. Terminal Assignments and Input Example for NTAI04

Power Wiring

There are five terminals that provide power and ground connections. See Figure 2-3 for terminal locations. Terminal E4 is the +24 VDC power connection. Terminal E2 is the I/O common. Terminal E1, E3 and E5 are shield connections.

Make power connections to the TU after it is mounted in the NFTP01. Make sure cabinet and I/O power are turned off before connecting ground and power wiring. Refer to the following steps when installing the TU into a cabinet that uses the modular power supply system.

1. Attach a 14 AWG wire from the +24 VDC power source within the cabinet or an external +24 VDC source to the E4 terminal on the TU.

2. Attach one 14 AWG wire from the DC bus bar at the bottom of the cabinet to the E2 terminal (I/O common) of the TU.

3. Attach a 14 AWG wire from the shield bus bar to the E1 terminal of the TU.

4. Attach a jumper wire from the E1 terminal to the E3 terminal.

5. Attach a jumper wire from the E3 terminal to the E5 terminal.

The NTAI04 is ready for operation if:

1. The circuit board is mounted in the field termination panel.

2. All required cables are connected to the termination unit.

3. All required field wires are connected to the termination unit and have been verified.

4. Power is connected and applied to the termination unit.

SECTION 3 - MAINTENANCE

INTRODUCTION

The RTD analog input termination unit requires 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 grounding connections	Every 6 months or during plant shutdown, whichever occurs first.
Use a static safe vacuum cleaner to remove dust from: Field Termination Panel Termination Units	

SECTION 4 - REPAIR/REPLACEMENT PROCEDURES

INTRODUCTION

This section explains the replacement procedures for the RTD analog input termination unit.

REPLACEMENT PROCEDURES

If a TU is faulty, replace it with a new one. DO NOT try to repair the module. Replacing components may affect performance and certification.

CAUTION	**Remove modules from their multibus module unit slots before installing or removing a cable assigned to that slot. Failure to do so could result in damage to the module.**
ATTENTION	**Retirer les modules de leur position assignée avant d'installer un câble à cette position. Des dommages au module ou au poste pourraient résulter d'un manquement à cette procédure.**

CAUTION	**If input or output circuits are a shock hazard after disconnecting system power at the power entry panel, then the door of the cabinet containing these externally powered circuits must be marked with a warning stating that multiple power sources exist.**
ATTENTION	**Si des circuits d'entree ou de sortie sont alimentes a partir de sources externes, ils presentent un risque de choc electrique meme lorsque l'alimentation du systeme est debranchee du panneau d'entree l'alimentation. Le cas echeant, un avertissement signalant la presence de sources d'alimentation multiples doit etre appose sur la porte de l'armoire.**

To replace a termination unit:

1. Turn OFF the INFI 90 cabinet power.

   NOTE: The I/O power supplies providing the power to the TU may not be located in the same cabinet as the TU. Make sure to turn OFF power to any external supplies providing I/O power.

2. Pull the slave module out of the the cable connector.

3. Label and remove all field wiring from the terminal blocks.

4. Label and disconnect all cables connected to the TU.

5. Label and disconnect system I/O power, ground and shield wires from the terminals.

6. Remove the two number 10 screws securing the TU to the field termination panel.

7. Insert the tabs of the replacement circuit board into the proper slots of the field termination panel stand-off and slide the circuit board into position.

8. Secure the termination unit circuit board to the field termination panel with the two number 10 screws.

9. Connect all field wiring removed in Step 3 and verify connections.

10. Connect the system I/O power, ground and shield wires removed in Step 5 and verify connections.

11. Connect all cables removed in Step 4 and verify connections.

12. Energize the cabinet power supply that provides power to the TU.

13. Turn on any external power supplies providing I/O power.

14. Plug in the slave module to the MMU backplane.

Replacing Fuses

Fuse F1 is shipped installed in the TU. It is a 0.25 amp, 250 volt fuse, (Bailey Controls P/N 194776A12500). The fuse is shipped installed on the termination unit in fuse clip F1. Replace the fuse as follows:

1. Turn off power to the termination unit.

2. Remove the open fuse.

3. Install the replacement 0.25 amp fuse into fuse clip F1.

4. Turn on power to the 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 Controls sales office. Provide this information:

1. Part description, part number and quantity.

2. Model and serial numbers (if applicable).

3. Bailey Controls 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

Component	Description	Part Number
Fuse F1	0.25 A 125 V (0.25 x 1.25 in)	194776A12500

TRAINING

The Bailey Controls Company has a modern training facility that provides service and repair instruction. This facility is available for in-plant training of personnel. Contact a Bailey Controls Company 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 - ANALOG SLAVE MODULE (IMASM03/04)

INTRODUCTION

The IMASM03 and IMASM04 Analog Slave Module uses the NTAI04 to terminate three-wire RTD inputs. The NTAI04 RTD Analog Input Termination Unit (TU) has 16 inputs. Two IMASM03 and IMASM04 modules with eight inputs each can connect to the TU. Each NTAI04 accepts analog inputs for either 10 ohm copper, 100 ohm platinum or 120 ohm nickle three-wire RTD.

This appendix contains figures and tables that show the dipswitch location on the IMASM03 and IMASM04 and its settings. This information is provided as a quick reference guide for personnel installing the NTAI04.

Figure A-1 shows the address select switch (SW1). Table A-1 lists the binary addresses for setting SW1. Refer to the IMASM03 and IMASM04 instruction for more detailed information to install and configure the slave.

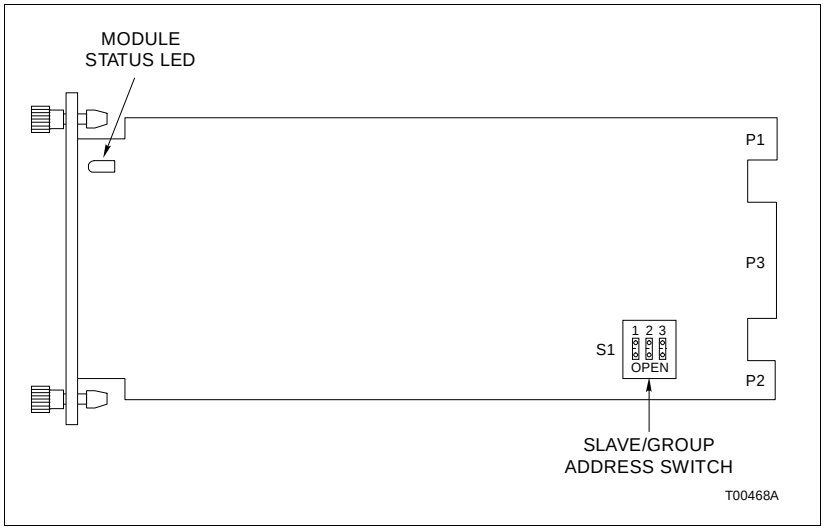

Figure A-1. Address Select Switch (SW1)

Table A-1. Address Switch Settings (SW1)

Address	MSB		LSB	Address	MSB		LSB
	1	2	3		1	2	3
0	0	0	0	4	1	0	0
1	0	0	1	5	1	0	1
2	0	1	0	6	1	1	0
3	0	1	1	7	1	1	1

NOTE: Open = OFF = 1, Closed = ON = 0

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