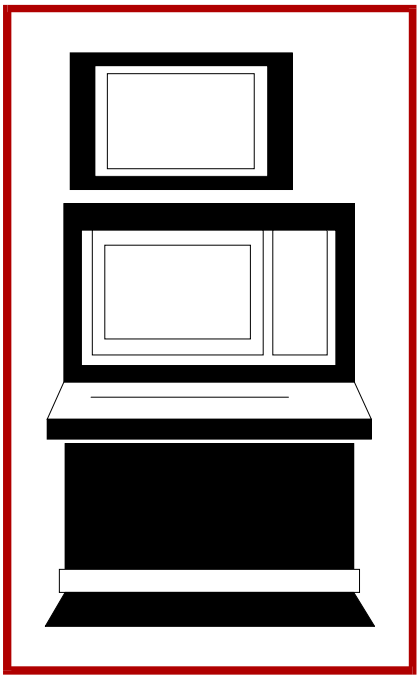
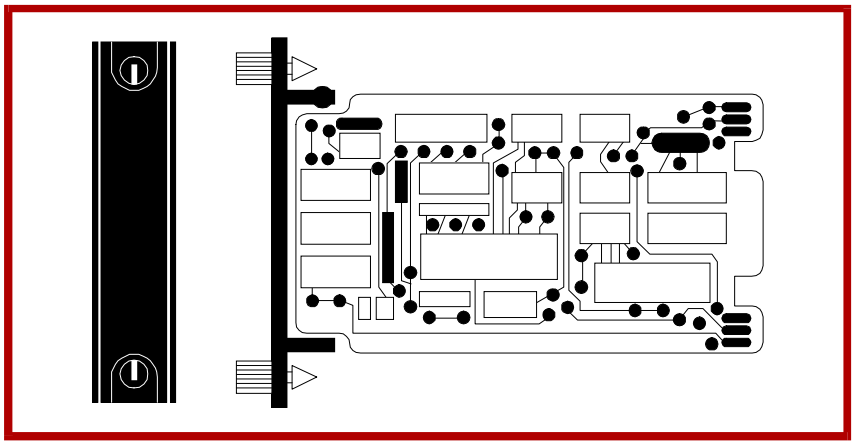
Bailey® infi 90®

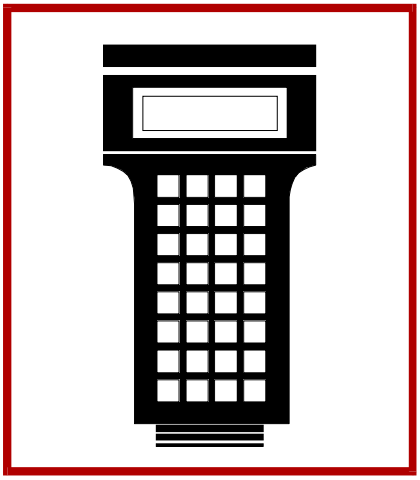
E96-621

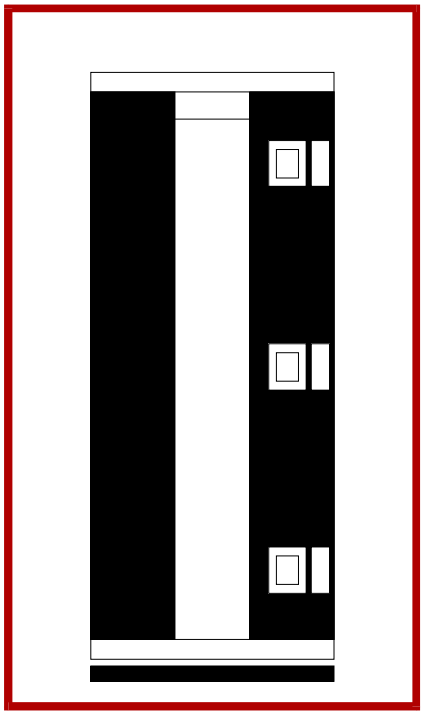
Instruction

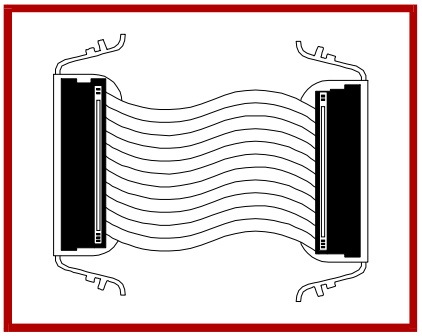
Plant Loop to Computer Interface
(INPCI02)

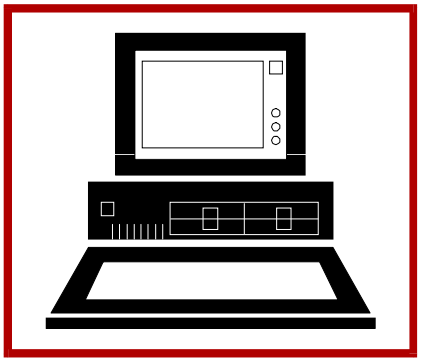












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WARNING notices as used in this instruction apply to hazards or unsafe practices that could result in personal injury or death.

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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Preface

Plant Loop to Plant Loop Computer Interface (INPCI02) enables communication between a host computer and any node on the INFI 90 Plant Loop. The interface consists of three modules, the Plant Loop to Computer Transfer Module (INPCT01), the Bus Transfer Module (INBTM01) and the Loop Interface Module (INLIM03). The PCI is upwardly compatible to a Network 90 NCIU02/03 and can be used as a direct replacement.

This instruction explains PCI features, specifications, and operation. It also includes installation and troubleshooting procedures for the interface.

The system engineer or technician using the INPCI02 should read and understand this instruction before installing the interface modules. In addition, a complete understanding of the INFI 90 system is beneficial to the user.

List of Effective Pages

Total number of pages in this instruction is 50, consisting of the following:

Page No.	Change Date
Preface	Original
List of Effective Pages	Original
iii through vii	Original
1-1 through 1-6	Original
2-1 through 2-2	Original
3-1 through 3-11	Original
4-1 through 4-11	Original
5-1 through 5-3	Original
6-1	Original
7-1	Original
8-1	Original
A-1 through A-2	Original
B-1 through B-2	Original
C-1	Original
D-1 through D-2	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.

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 module uses Electrostatic Sensitive Devices (ESD).
SPECIFIC WARNINGS	Disconnect power before installing dipshunts for slave modules on the MMU backplane (slave expander bus). Failure to do so could result in severe or fatal shock. (p. 3-10)
SPECIFIC CAUTIONS	Ensure that the end marked J1 is connected to P1 on the NICL01, and J2 is connected to the LIM. Failure to do so could result in module damage (see Figure D-1). (p. D-1)

Sommaire de Sécurité

AVERTISSEMENT D'ORDRE GENERAL	**Environment de l'equipement** 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 prende les precautions necessaires a eviter tout contact avec des composants sours tension lors de l'entretien. **Precautions de Manutention** Ce module contient des composantes sensibles aux decharges electro-statiques.

AVERTISSEMENT D'ORDRE SPECIFIQUE	Couper l'alimentation avant d'installer les dipshunts sur la plaque arrlere du chassis de montage de modules (MMU). Toute negligence a cet egard constitue un risque de choc pouvant entrainer des blessures graves, voire moretlles (p. 3-10)

ATTENTION D'ORDRE SPECIFIQUE	S'assuree que L'extremite identifiee par J1 est reliee a P1 du module NICL01 et que J2 est reliee au module LIM. Sinon, les nodules pouiraient etre endommages (voir la figure D-1). (p. D-1).

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SECTION 1 - INTRODUCTION

OVERVIEW

The Plant Loop to Computer Interface (INPCI02) enables a computer to communicate with any node on the INFI 90 Plant Loop through a RS-232-C interface or an optional IEEE-488 parallel interface. Three modules make up the Plant Loop to Computer Interface: the Plant Loop to Computer Transfer Module (INPCT01), the Bus Transfer Module (INBTM01), and the Loop Interface Module (INLIM03). One optional module, the Parallel Bus Slave (INPBS01), is a General Purpose Interface Bus (GPIB) providing parallel communication. Figure 1-1 shows the PCI in a typical application.

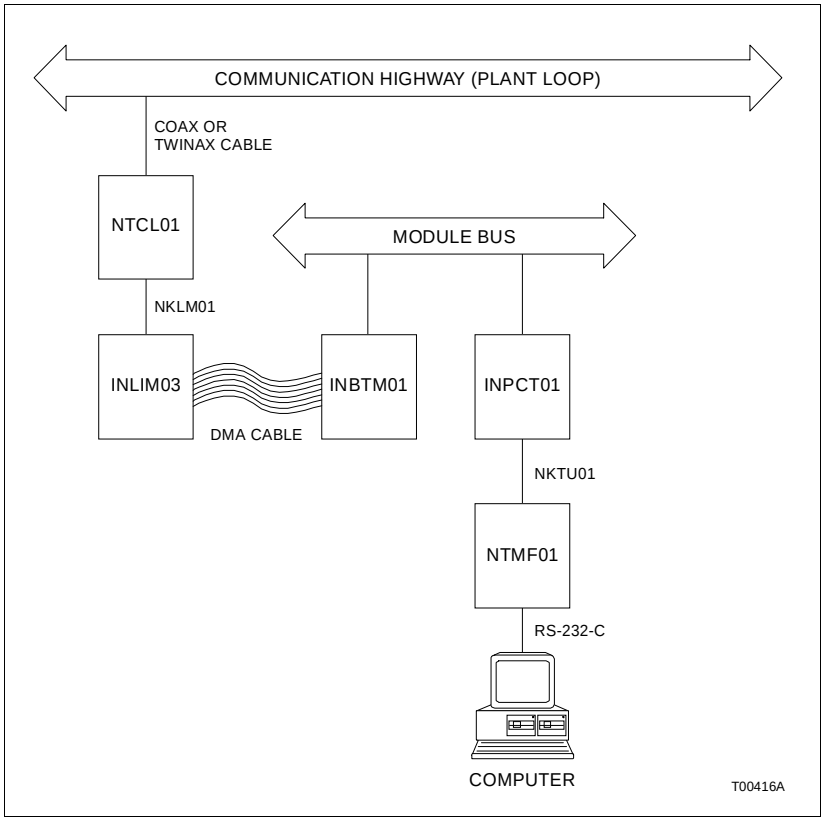


Figure 1-1. Diagram of Plant Loop to Computer Interface within the INFI 90 Hierarchy

INTENDED USER

Engineers and technicians should read this manual before installing the modules and operating the PCI. ***DO NOT*** place the PCI in operation before reading this instruction. You can refer to the Table of Contents to find specific information after the module is operating.

INTERFACE DESCRIPTION

The Plant Loop to Computer Interface enables a host computer to communicate with any node on a Plant Loop. PCI software enables the computer to acquire data, do process monitoring and control (execute control algorithms), and carry out routine system functions (security, time, configuration and tuning).

This interface is made up of three INFI 90 Communication Modules. The Plant Loop to Computer Transfer Module provides two RS-232-C ports on the computer side of the interface. The Loop Interface Module provides a serial interface on the Plant Loop side. The Bus Transfer Module transfers information from the Plant Loop to the Module Bus. An optional interface module, the Parallel Bus Slave provides one IEEE-488 parallel port.

Plant Loop to Computer Transfer Module (INPCT01)

This module processes incoming and outgoing computer commands and messages, buffers data, and communicates with the BTM on the module bus. The PCT is a double circuit board module. It has a memory board and CPU board. The user selects general operating characteristics, control commands and point definitions through software configuration. Other characteristics such as port data characteristics and options are user-configured through dipswitches on the CPU board.

Bus Transfer Module (INBTM01)

The BTM is responsible for translating messages from the LIM and placing them on the module bus. It also receives messages from the PCT. It translates those messages and sends them to the LIM through a direct memory access (DMA) cable.

Loop Interface Module (INLIM03)

The LIM provides the communication link between the Plant Loop and the PCT. It receives messages from Plant Loop nodes and monitors loop status. The LIM forwards messages from the loop to the PCT (though the BTM) via a direct memory access (DMA) cable. Additionally, it receives messages from the PCT (through the BTM) and sends them to the proper node on the loop.

FEATURES

The Plant Loop to Computer Interface provides communication between a host computer and INFI 90 Plant Loop. The modular design of the interface modules, as with all INFI 90 modules, allows for flexibility when creating a process management system strategy.

The PCI gives the user up to 5,000 point definitions. The LIM/BTM pair provides data security and integrity through on-board diagnostics, module time checks and handshaking. Interface firmware combined with PCT microprocessor based hardware makes this interface a powerful control tool that the user can configure for almost any application.

INSTRUCTION CONTENT

This document is divided into eight sections. ***Introduction*** provides an overview of the individual modules of the PCI, a list of related documents, glossary of terms and abbreviations, and specifications. ***Description and Operation*** explains how PCI communication occurs. Installation covers preliminary module setup, physical installation and configuration. ***Operating Procedures*** explains faceplate LEDs, controls, and interface operating modes. ***Troubleshooting*** explains how to troubleshoot problems with the interface modules using error codes and status byte information, and lists the corrective action. ***Maintenance*** contains a maintenance schedule for the slave module. ***Repair/Replacement Procedures*** explain how to replace the PCI modules. ***Support Services*** explains the customer training Bailey Controls Company provides and information about ordering replacement parts.

HOW TO USE THIS MANUAL

Read this manual in sequence. It is important to become familiar with the entire contents of this manual before using the PCI. The organization of this manual enables the user to find needed information quickly.

1. Read and do the steps in Section 3.

2. Read Section 4 thoroughly before powering up the interface.

3. Refer to Section 5 if a problem occurs.

4. Refer to Section 6 for scheduled maintenance requirements.

5. Use Section 8 for a list of replacement parts and warranty information.

GLOSSARY OF TERMS AND ABBREVIATIONS

Term	Definition
DCE	Data Circuit-Terminating Equipment - The termination point of a communication circuit such as a line driver or modem.
DTE	Data Terminal Equipment - End-user machine of a communication circuit such as a terminal or computer.
Dipshunt	A dual in-line package with shorting bars.
Module Bus	The serial communication link between a process control module and other process control modules.
Node	Device(s) on the INFI 90/Network 90 Plant Loop, Superloop or INFI-NET (maximum of 63 on Plant Loop, 250 on Superloop/INFI-NET). A node can be a Operator Interface Station (OIS), a Process Control Unit (PCU) or Engineering Work Station (EWS) in any combination.
PCI	Plant Loop to Computer Interface (INPCI01/02) - A Plant Loop communication interface that provides configuration and control of the Plant Loop through a host computer.
PCU	Process Control Unit - rack type industrial cabinet that contains master, slave and communication modules, and their communication paths.
Plant Loop	INFI 90 data communication highway with 63 node capacity.
RS-232-C	One in a series of standards developed by the Electronics Industry Association (EIA) that specifies what signals and voltages will be used to transmit data from DTE (computer) to DCE (modem).
Slave Expander Bus	Parallel address/data bus between the master module and the slave.
XR	Exception Report - A function block that reports a monitored point value when that value changes and is polled by a communication or master module.

REFERENCE DOCUMENTS

The following documents provide additional information about INPCI02 support hardware and software.

Document Name	Document Number
Enhanced CIU Programmer's Reference Manual	I-E93-905-2
Function Code Application Manual	I-E93-900-20
Loop Interface/Bus Interface Module (INLIM03/ INBIM02)	I-E96-611
Plant Loop to Computer Interface (INPCI01)	I-E96-620
Site Prep and Planning	I-E93-900-5
Termination Unit Manual	I-E93-911

SPECIFICATIONS

Ports	2 Full duplex serial data EIA standard RS-232-C Type Z (A Bailey defined binary interchange) One optional IEEE-488 Parallel
Memory	
PCT	UVR0M: 128 kbytes RAM: 512 kbytes NVRAM: 8 kbytes
LIM	RAM: 2 kbytes ROM: 4 kbytes
BTM	RAM: 32 kbytes ROM: 16 kbytes
Power Requirements	
PCT	+5 VDC at 6 amps; 30 watts nominal +15 VDC at 37 mA; 0.55 watts nominal -15 VDC at 18 mA; 0.27 watts nominal
LIM	+5 VDC at 2.0 amps: 10 watts nominal ±15 VDC at 80 mA; 1.2 watts nominal
BTM	+ 5 VDC at 1.0 amps; 5 watts nominal + 15 VDC at 150 mA; 2.25 watts nominal - 15 VDC at 120 mA; 1.80 watts nominal
Communication Rates	50 to 19,200 baud (user-selectable)
Mounting	Occupies four slots in standard INFI 90 Module Mounting Unit (MMU). Occupies five slots with the optional INPBS01.
Environmental	
Electromagnetic/Radio Frequency Interference	Values are not available at this time. Keep cabinet doors closed. Do not use communication equipment any closer than two meters from the cabinet.
Ambient Temperature	0^{o} to 70^{o}C (32^{o}F to 158^{o}F)
Relative Humidity	0 to 95% up to 55^{o}C (131^{o}F) (non-condensing) 0 to 45% at 70^{o}C (158^{o}F) (non-condensing)
Altitude	Sea level to 3 Km (1.86 miles)
Air Quality	Non-corrosive
Certification	All INPCI02 modules have been individually CSA certified for use as process control equipment in an ordinary (non-hazardous)environment.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

NOMENCLATURE

Hardware	Nomenclature
Communication Termination Module Cable	NICL01 NKLS04
Communication Termination Unit Cable	NTCL01 NKLS03
Field Termination Panel	NFTP01
Module Mounting Unit	IEMMU01/02
Multi-Function Controller Termination Module Cable	NIMF01 NKTM01
Multi-Function Controller Termination Unit Cable	NTMF01 NKTU01
Termination Mounting Unit	NTMU01/02

SECTION 2 - DESCRIPTION AND OPERATION

INTRODUCTION

The Plant Loop to Computer Interface (INPCI02) enables a host computer to interact with all nodes on an INFI 90 Plant Loop. The Plant Loop is a unidirectional serial data highway that all nodes (and other data users) share. The PCI provides an RS-232-C serial interface and an optional IEEE-488 parallel interface that links the Plant Loop to the host computer. This section covers the functional operation of the modules that make up the PCI.

INTERFACE OPERATION

The INPCI02 consists of three modules:

- Loop Interface Module (INLIM03)
- Bus Transfer Module (INBTM01)
- Plant Loop to Computer Transfer Module (INPCT01)

The Parallel Bus Slave (INPBS01) is an optional module that provides parallel communication between the host computer and the PCT. The PBS is an IEEE-488 compatible General Purpose Interface Bus (GPIB) device. Modules making up the PCI occupy four slots in the Module Mounting Unit (five when using a PBS).

Loop Interface Module INLIM03

The Loop Interface Module is the communication interface to the Plant Loop. The LIM sends and receives messages from other LIMs on the Plant Loop. LIMs can transmit and receive messages simultaneously at any time. There is no loop master or traffic director. LIM start-up/shutdown is localized requiring no interaction with other LIMs on the loop. Each LIM receives all incoming messages and transmits a new stream of messages in a store and forward fashion to the next LIM.

The LIM can originate messages in its transmit buffer; however, messages usually come from the INBTM01. The LIM communicates directly with the BTM. It has access to the BTM memory through a direct memory access (DMA) cable. Besides sending messages from the BTM, the LIM informs the BTM when it successfully sends a message or discards a message destined for off-line nodes. The LIM can count events and errors (refer to Table 3-4 and 3-5) and display those counts on the faceplate LEDs.

Bus Transfer Module INBTM01

The Bus Transfer Module handles communication between the LIM and PCT modules. It channels Plant Loop information to local modules on the module bus. It also gathers data from the Module Bus and prepares it for transmission by placing it in the Plant Loop message format. The BTM places the formatted message in a 512 byte circular transmit buffer and sends an interrupt request to the LIM. The message moves into the LIM transmit buffer when it is free. If message transmission is successful, the LIM informs the BTM that the message was sent.

In the unlikely event of a message error, the BTM responds with message retries up to 127 times. If transmission is unsuccessful after 127 retries, the destination node is marked off-line. When the node is marked off-line, the LIM informs the BTM that further communications with that destination must be deferred until it responds normally.

The LIM and BTM maintain handshakes so that each can tell if the other is operational. There are timers associated with both modules that are set by one module and reset by the other. If the module responsible for reset finds the timer already reset, it is assumed that the other module failed.

Plant Loop to Computer Transfer Module INPCT01

The PCT provides the electronics needed to direct the operation of the interface. It handles all communication with the host computer through an RS-232-C serial communication port and communicates directly with the BTM over the module bus. When communicating through the serial port, the PCT acts as Data Circuit-Terminating Equipment (DCE).

The PCT has enough memory that it can store up to 5,000 point definitions. INPCI02 firmware enables the host computer to issue commands for data acquisition, process monitoring and control, and system functions (security, time and configuration control). The PCT maintains the point table and interprets commands coming from the host computer. Thus, it directs all interaction between the computer and the Plant Loop.

SECTION 3 - INSTALLATION

INTRODUCTION

This section explains how to prepare the Plant Loop to Computer Interface (INPCI02) modules for installation. It covers handling procedures, switch settings for each module, termination unit/module and cable, and module installation. ***DO NOT*** attempt to operate the PCI before reading and completing the steps in this section.

SPECIAL HANDLING

The interface modules use CMOS devices. Follow the special handling procedures below:

> **NOTE:** Always use Bailey's Field Static Kit (P/N 198385A2 - consists of wrist strap, ground cord assembly, and alligator clip) when working with modules. The kit is designed to connect a technician and the static dissipative work surface to the same ground point to prevent damage to the modules by electrostatic discharge.

1. Keep the modules in the special anti-static bag until you are ready to install them in the system. Save the bag for future use.

2. Ground the anti-static bag before opening.

3. Verify that all devices connected to the modules are properly grounded before using them.

4. Avoid touching the circuitry when handling the modules.

UNPACKING AND INSPECTION

1. Examine the modules immediately to verify 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 transportation company that handled the shipment.

4. Use the original packing material and/or container to store the modules.

5. Store the modules in an environment of good air quality, and free from temperature and moisture extremes.

INPCT01 SWITCH SETTINGS

The INPCT01 consists of two circuit boards, a memory board and a CPU board. The memory board has no user-configurable operating options. The CPU board has three dipswitches that set the module operating characteristics. These switches provide the means of establishing I/O functions, serial port communication rate, and port address. Figure 3-1 shows the dipswitch locations on the CPU board.

NOTE: Jumpers J1 through J3 are factory set. Do not change the jumper settings.

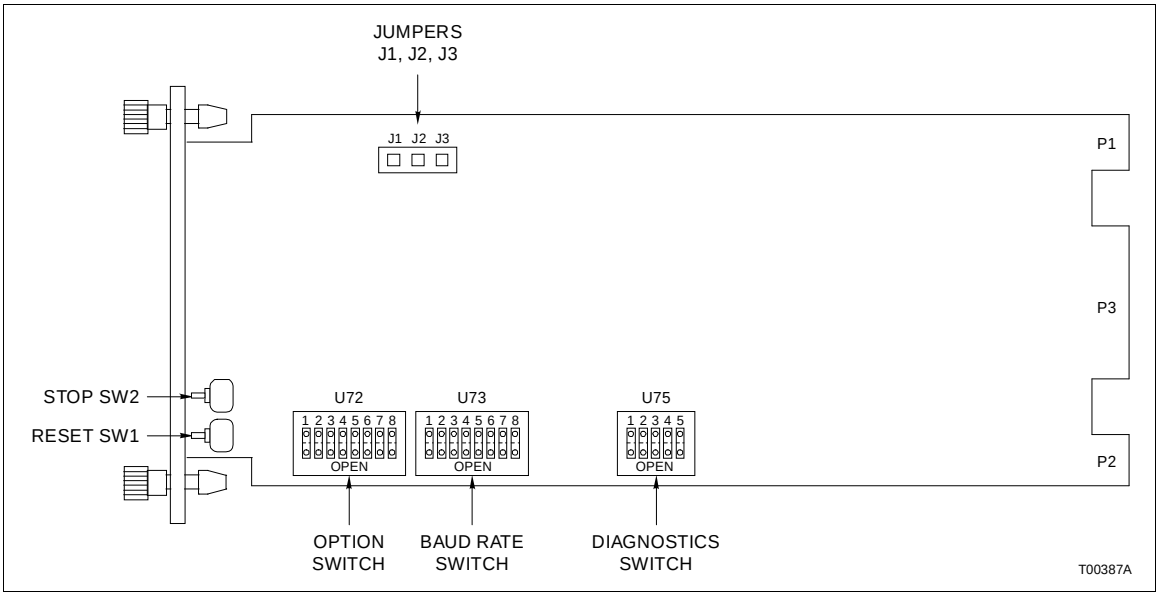


Figure 3-1. Switch Locations on the PCT (CPU Board)

Option Switch (U72)

U72 is an eight position dipswitch that determines the operating options of the module. Table 3-1 lists the U72 option settings. Record the U72 settings in the space provided.

Serial Port Communication Rate (U73)

U73 is an eight pole dipswitch that sets the serial port communication rate. The communication rate directly affects data throughput. Refer to Tables 3-2 for communication rates. Record the U73 setting in the space provided.

Table 3-1. Option Switch (U72) Settings

Position	Setting[1]	Function	User Setting
1	0 1	ROM checksumming enabled ROM checksumming disabled	
2/3	0/0 0/1 1/0 1/1	Ports 0 and 1 data characteristics. 8 data bits, 1 stop bit, no parity 8 data bits, 1 stop bit, even parity 8 data bits, 1 stop bit, odd parity 8 data bits, 2 stop bit, no parity	
4	0 1	Port 1 option serial port to host Port 1 utility option[2]	
5	0 1	Modem password protection disabled Modem password protection enabled	
6	0 1	Port addressing mode disabled Port addressing mode enabled[3]	
7	0 1	Checksumming option disabled Checksumming option enabled[4]	
8	NA	This dipswitch position is undefined.	

NOTES:

1. 0 = Closed (on)
   1 = Open (off)

2. If this option is selected, port 1 data characteristics are automatically set to 8 data bits, 1 stop bit, no parity. Otherwise, port 1 data characteristics are set by dipswitch positions 2/3.

3. When this option is enabled, the PCT will expect all commands from the host to send the port address selected on dipswitch U75 as the first character of each command.

4. When this option is enabled, the PCT will expect all commands from the host to include a checksum byte as the last character before the carriage return. The PCT includes a checksum in each reply.

Table 3-2. Serial Port Communication Rate (U73)

Baud Rate	Switch Position								User Setting							
	Port 0				Port 1				Port 0				Port 1			
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
50	0	0	0	0	0	0	0	0								
75	1	0	0	0	1	0	0	0								
110	0	1	0	0	0	1	0	0								
134.5	1	1	0	0	1	1	0	0								
150	0	0	1	0	0	0	1	0								
300	1	0	1	0	1	0	1	0								
600	0	1	1	0	0	1	1	0								
1200	1	1	1	0	1	1	1	0								
1800	0	0	0	1	0	0	0	1								
2000	1	0	0	1	1	0	0	1								
2400	0	1	0	1	0	1	0	1								
3600	1	1	0	1	1	1	0	1								
4800	0	0	1	1	0	0	1	1								
7200	1	0	1	1	1	0	1	1								
9600	0	1	1	1	0	1	1	1								
19200	1	1	1	1	1	1	1	1								

0 = Closed (on)
1 = Open (off)

Port Address (U75)

Dipswitch U75 sets the port address of the PCI. To use the port address enable the port addressing mode (U72, position 6). Use the port addressing mode if more than one PCI is connected to the RS-232-C communication port of the host computer. The computer communicates with an interface by preceding a command with the port address of the PCI. Only the PCI with the corresponding port address can respond; other PCIs will ignore the command. Valid port addresses are 0 through 31. Table 3-3 shows examples of switch settings for the port address. Record the port address in the space provided.

Table 3-3. U75 PCT Port Address

EXAMPLE SETTINGS						
Address Example	**Switch Position Binary Value**	**1 16**	**2 8**	**3 4**	**4 2**	**5 1**
0		0	0	0	0	0
9		0	1	0	0	1
26		1	1	0	1	0

USER SETTING (U75)						
User Address	**Switch Position Binary Value**	**1 16**	**2 8**	**3 4**	**4 2**	**5 1**

0 = Closed (on)
1 = Open (off)

INLIM03 SWITCH SETTINGS

The Loop Interface Module (INLIM03), shown in Figure 3-2, has two user-configurable dipswitches: Event/Error Counter Address Switch SW1 and Address Switch SW2. Tables 3-4 and 3-5 list the switch settings for the Event and Error Counters. The LIM faceplate LEDs display the contents of the event/error counters. Switch SW2 poles 1 and 2 are CLOSED for normal operation. Refer to Table 3-6 for SW2 settings. The LIM can have any address from 1 to 63.

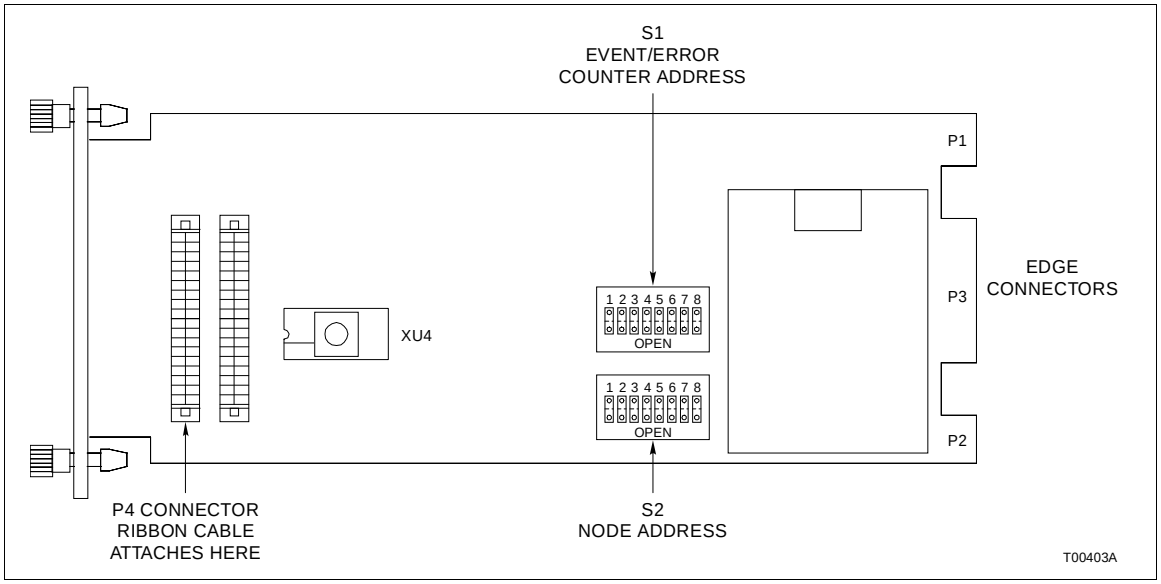


Figure 3-2. LIM Switch Locations

Table 3-4. LIM Event Counter Addresses (SW1)

Counter Address	Hex Address	Switch Position 1	2	3	4	5	6	7	8	Description	User Setting
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 BTM 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 BTM transmit buffer.	
52	34	0	0	1	1	0	1	0	0	Messages stored in BTM receive buffer.	
53	35	0	0	1	1	0	1	0	1	Interrupt Requests (IRQs) sent by BTM.	
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 BTM.	
57	39	0	0	1	1	1	0	0	1	Missed BTM 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 BTM) 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).	

0 = Closed (on)
1 = Open (off)

Table 3-5. LIM Error Counter Addresses (SW1)

Counter Address	Hex Address	Switch Position 1	2	3	4	5	6	7	8	Description	User Setting
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 BTM 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 on 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.	

0 = Closed (on)
1 = Open (off)

Table 3-6. LIM Node Address Setting (SW2)

EXAMPLE SETTINGS						
Address Example	Switch Position Binary Value	1 16	2 8	3 4	4 2	5 1
1		0	0	0	0	1
9		0	1	0	0	1
26		1	1	0	1	0

USER SETTING (SW2)						
User Address	Switch Position Binary Value	1 16	2 8	3 4	4 2	5 1

0 = Closed (on)
1 = Open (off)

INBTM01 SWITCH SETTINGS

The Bus Transfer Module (INBTM01), shown in Figure 3-3, has one user-configured dipswitch (SW1). SW1 enables module diagnostics. Refer to Table 3-7 and set SW1 for normal operation.

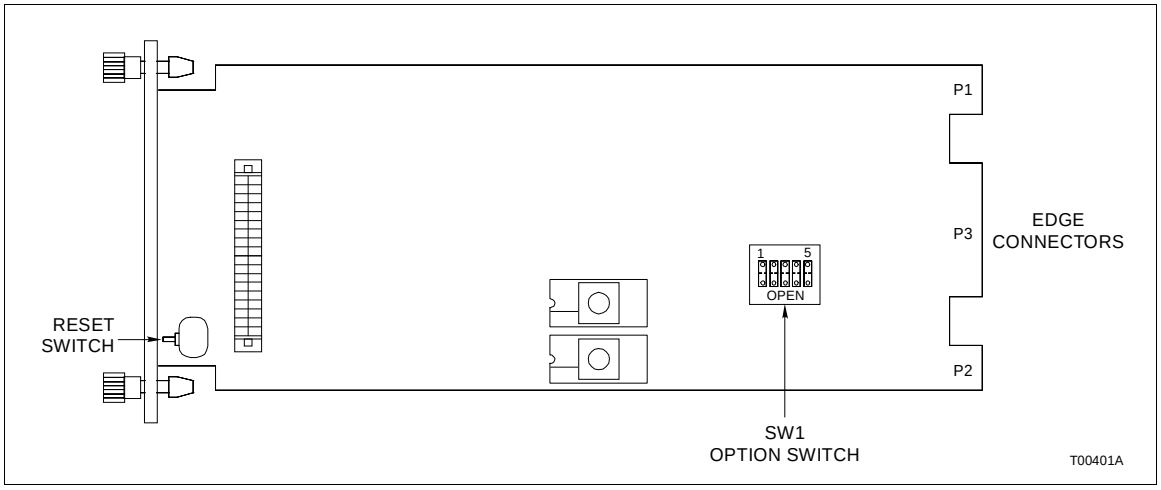


Figure 3-3. BTM Switch (SW1) Location

Table 3-7. BTM Options (SW1)

Switch Position					Function	User Setting
1	2	3	4	5		
0	0	0	0	0	Normal operation.	
0	0	0	1	0	Normal BTM operation without catastrophic error checking (for Test Purposes ONLY).	
0	0	1	0	0	RAM test mode. If Status LED turns red, the module has failed the test.	
0	0	1	1	0	ROM test mode. If Status LED turns red, the module has failed the test.	
0	1	0	0	0	Execute Interrupt Request (IRQ) LIM handshake diagnostic. Used in combination with the LIM off-line diagnostics.	

0 = Closed (on)
1 = Open (off)

INPBS01 SWITCH SETTINGS

The INPBS01 is an optional board that has two user-configured dipswitches (SW1 and SW2), shown in Figure 3-4. SW1 sets the PBS device number on the General Purpose Interface Bus (GPIB). The PBS can have a device number of 0 through 15. Refer to Table 3-8, select a device number and record the setting in the space provided. SW2 sets PBS slave expander bus address (0 to 63). Table 3-9 lists example settings of the slave expander bus address. Record the PBS slave expander bus address in the space provided.

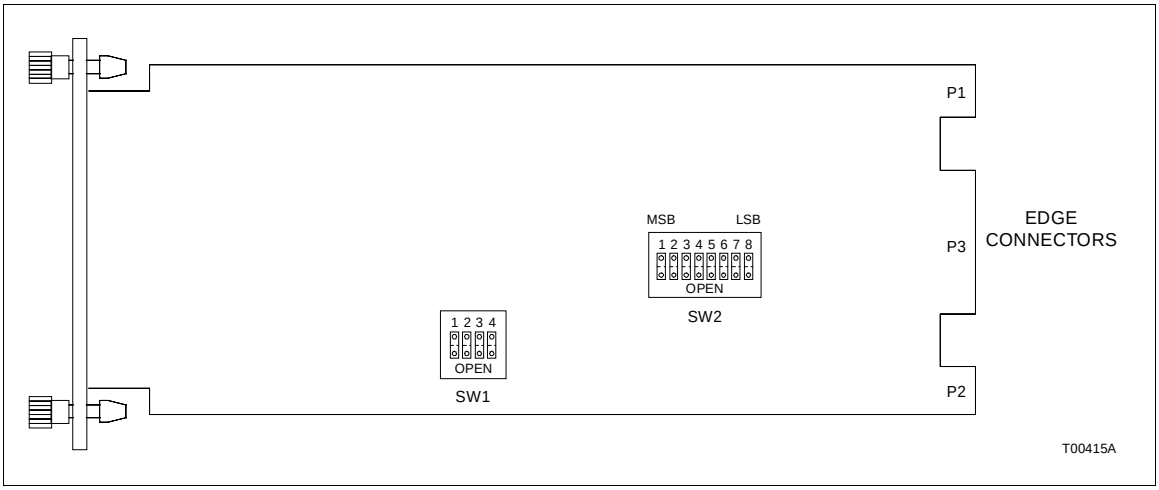


Figure 3-4. PBS Switch Locations

Table 3-8. SW1 PBS Device Number

EXAMPLE SETTINGS					
Example Device Number	Switch Position Binary Value	1 8	2 4	3 2	4 1
0		0	0	0	0
1		0	0	0	1
15		1	0	1	0

USER SETTING (SW1)					
User Device Number	Switch Position Binary Value	1 8	2 4	3 2	4 1

0 = Closed (on)
1 = Open (off)

Table 3-9. SW2 PBS Slave Expander Bus Address

EXAMPLE SETTINGS									
Example Address	Switch 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
63		0	0	0	1	1	1	1	1

USER SETTING (SW2)									
User Address	Switch Position Binary Value	1 128	2 64	3 32	4 16	5 8	6 4	7 2	8 1

0 = Closed (on)
1 = Open (off)

TERMINATION UNIT (MODULE) CONFIGURATION AND INSTALLATION

Two of the interface modules (INLIM03, INPCT01) require termination. The INPCT01 terminates with the NTMF01 or NIMF01. The IMF/TMF dipshunts select the RS-232-C signals required for various applications. The INLIM03 terminates with the NTCL01 or NICL01. Set the jumpers on the ICL/TCL to operate with the type of cable that connects the Plant Loop. Appendices A, B, C, and D contain disphunt and jumper configuration information. Refer to the Termination Unit Manual, I-E93-911, for complete information about installing the termination unit/module.

INSTALLING THE INTERFACE MODULES

If the switch settings on the interface modules are complete, they are ready to be installed in the Module Mounting Unit (MMU).

Installing the INPCT01

To install the PCT:

1. Verify the PCT slot assignment in the MMU.

WARNING	**Disconnect power before installing dipshunts for slave modules on the MMU backplane (slave expander bus). Failure to do so could result in severe or fatal shock.**
AVERTISSEMENT	**Couper l'alimentation avant d'installer les dipshunts sur la plaque arrlere du chassis de montage de modules (MMU). Toute negligence a cet egard constitue un risque de choc pouvant entrainer des blessures graves, voire moretlles.**

2. Attach the hooded end of the cable (NTKU01 for the NTMF01; NKTM01 for the NIMF01) to the MMU backplane cable connector opening for the PCT. The other end of the cable attaches to the termination unit or backplane of the Termination Mounting Unit (NTMU01).

3. Guide the top and bottom edges of the circuit card along the top and bottom rails of MMU.

4. Slide the module into the slot; push the module until the front panel is flush with the top and bottom of the MMU frame.

5. Turn the two captive latches a half turn to lock the module in place.

Installing the INLIM03 and INBTM01

The LIM and BTM should be installed as a pair in adjacent slots. To install the LIM/BTM:

1. Verify the MMU slot assignments for the modules.

2. Attach the hooded end of the cable (NKLS03 for NTCL01; NKLS04 for the NICL01) to the MMU backplane cable connector opening for the LIM. The other end of the cable attaches to the termination unit or TMU backplane.

3. Connect one end of the Bailey supplied ribbon cable (DMA cable) to the P4 connector on the LIM. Connect the other end of the DMA cable to the P4 connector on the BTM (see Figures 3-2 and 3-3).

4. Guide the top and bottom edges of both circuit cards along the top and bottom rails of adjacent slots in the MMU.

5. Slide the modules into the slot; push the modules until the front panels are flush with the top and bottom of the MMU frame.

6. Turn the two captive latches a half turn to lock the module in place.

Installing the INPBS01

To install the INPBS01:

1. Verify the MMU slot assignment for the PBS.

2. Attach the hooded end of the NKPB01 cable to the MMU backplane cable connector opening for the PBS. The other end of the cable attaches to the computer using the parallel interface.

3. Guide the top and bottom edges of the circuit card along the top and bottom rails of MMU.

4. Slide the module into the slot; push the module until the front panel is flush with the top and bottom of the MMU frame.

5. Turn the two captive latches a half turn to lock the module in place.

SECTION 4 - OPERATING PROCEDURES

INTRODUCTION

This section explains how to place the INPCI02 in operation. It covers the use of faceplate LEDs and controls, modes of operation, security functions and use of the utilities terminal.

PLANT LOOP TO COMPUTER TRANSFER MODULE LEDs AND CONTROLS

The faceplate of the PCT has the following components (see Figure 4-1):

1. Status LED
2. 8 CPU LEDs
3. 2 Memory Status LEDs
4. Stop pushbutton
5. Reset pushbutton

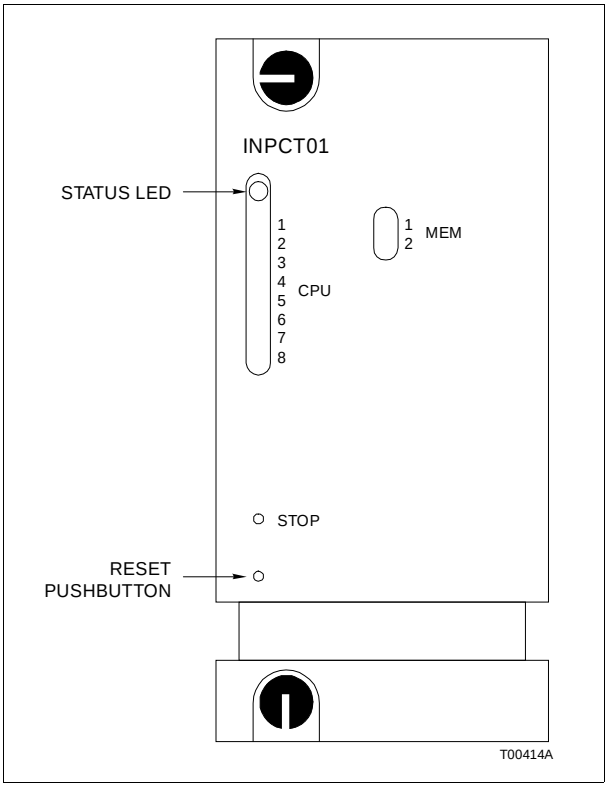


Figure 4-1. PCT Faceplate LEDs and Controls

Status LED

The Status LED is a red/green LED that displays the operating status of the PCT. It has three possible states. Table 4-1 lists the meaning of the status LED states. Refer to Section 5 for corrective action if the status LED indicates that an operating error exists.

Table 4-1. PCT Status LED States

LED State	Meaning
Off	No power to the PCT.
Solid Green	The PCT is in the EXECUTE Mode.
Solid Red	The PCT diagnostics detect a hardware failure or configuration problem. CPU LEDs display an error code when the status LED is red.

CPU LEDs

During normal operation, the CPU LEDs keep a count of the commands and replies that pass through the PCT. If a communication error occurs, these LEDs display an error code and the Status LED turns RED. Refer to Table 5-1 for a list of CPU LED error codes and corrective action.

Memory LEDs

There are two Memory LEDs. The MEM LED 2 is on while the module is correcting single bit errors. Both LEDs are on when a two-bit error or a complete memory failure occurs.

Stop Pushbutton

Push the stop pushbutton and wait for the status LED to turn red before removing a PCT from the Module Mounting Unit. Using the stop pushbutton allows any NVM write in progress to complete before the module halts operation.

Reset Pushbutton

Pressing the reset pushbutton causes:

1. Restoration of PCT to power-up values after a halt.

2. Recovery from an operator-initiated stop or a module time-out.

LOOP INTERFACE MODULE LEDs

There are eight LEDs on the LIM faceplate (see Figure 4-2). These LEDs display the contents of event and error counters, and pass/fail information when on-board diagnostics are run (refer to Tables 3-4 and 3-5 for a list of event and error counter codes).

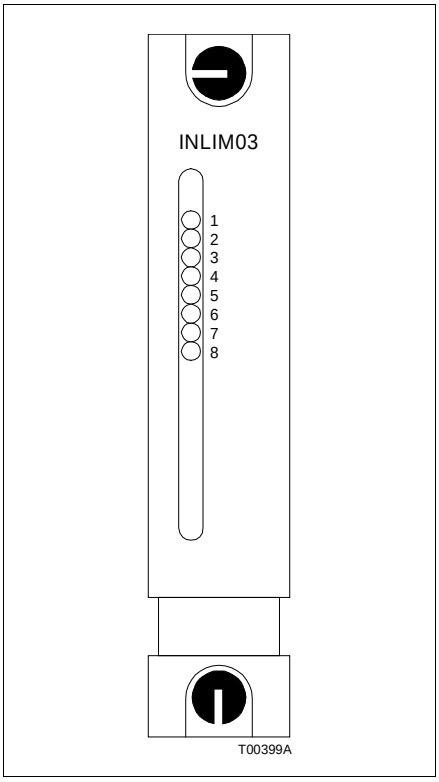


Figure 4-2. LIM Faceplate LEDs

BUS TRANSFER MODULE LED

The Bus Transfer Module has one red/green LED that displays the module's operating condition (see Figure 4-3). The BTM Status LED has three possible states. Refer to Table 4-2 for BTM Status LED states and their meaning. Section 5 explains the corrective action to take if the Status LED displays a BTM hardware failure.

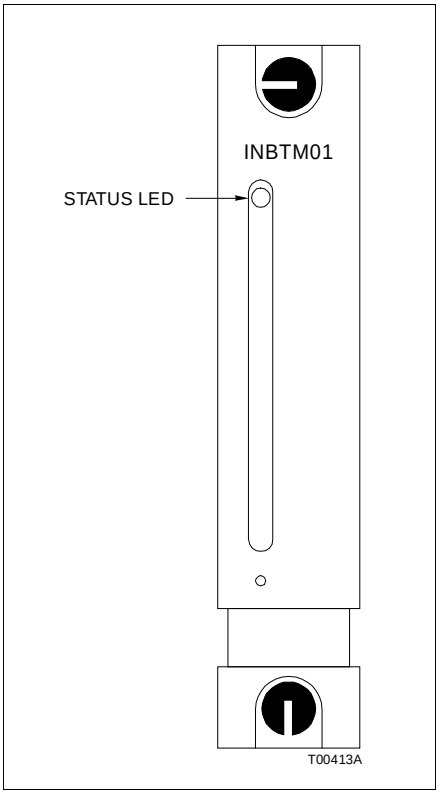


Figure 4-3. BTM Faceplate LEDs

Table 4-2. BTM Status LEDs States

LED States	Meaning
Off	No power to the BTM.
Solid Green	Normal operation.
Solid Red	BTM hardware failure.

MODES OF OPERATION

The Plant Loop to Computer Interface has two modes of operation: Execute, and Error.

Execute Mode

This mode applies to the INPCT01 module and is the normal mode of operation for the PCI. In the execute mode, the host computer and the INFI 90 Plant Loop interact through the PCI. PCI firmware and software allows the user to configure the interface modules through the host computer. Refer to the Function Code Applications Manual (I-E93-900-20) and the Enhanced CIU Programmers Reference Manual (I-E93-905-2) for more information about interface configuration. The PCT can request exception reports (XRs), collect XRs, exercise control, allow the operator to adjust tunable module specifications, configure modules on the Plant Loop and do routine system security functions.

Error Mode

The PCT enters this mode if the built-in system diagnostics detect a hardware or execution error. If the PCT detects an error, the module halts and displays an error code on the CPU LEDs. Refer to Section 5 for corrective action when the PCT enters the error mode.

SECURITY FUNCTIONS

The PCT performs both hardware and software security checks to insure module integrity.

Hardware Checks

The PCT does the following hardware checks:

1. ***Error Detection and Correction*** - Detects single bit and double bit errors in the dynamic RAM. Corrects single bit errors; halts PCT operation on double bit errors.

2. ***Illegal Address Detection*** - Detecting an illegal address generates a bus error and the PCT halts operation.

3. ***Machine Fault Timer*** - The microprocessor updates this timer. A machine fault timeout halts module operation.

Software Checks

The PCT does the following software checks:

1. ***Module Diagnostics*** - Module diagnostics execute automatically on system power up. PCT faceplate LEDs display error conditions if the diagnostic tests fail, the PCT status LED goes red, and the PCT halts.

2. ***ROM Checksum Check*** - This test verifies checksums of the UVROM. Discrepancies cause the PCT Status LED to go solid red and PCT operation halts.

Utilities

The utilities menu shown in Figure 4-4 is available to the user by attaching a diagnostic monitor to port 1. Enable this option through the PCT dipswitches. To use the INPCT01 utilities:

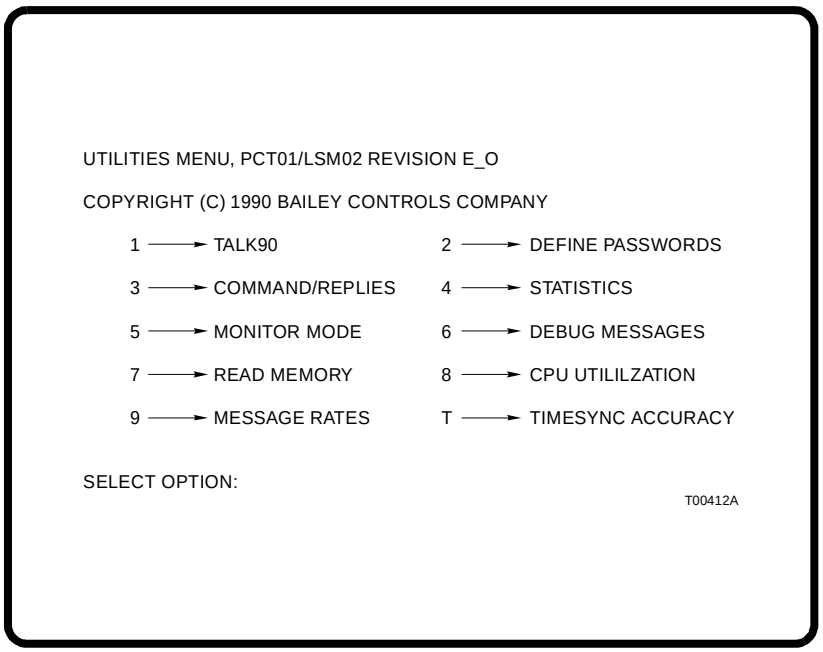


Figure 4-4. Utilities Menu

Select Item 1 - *TALK90*

1. A menu of all CIU commands appear on the screen (see Figure 4-5).

2. The first command must be the CIU RESTART command to put the PCI on-line. To execute this command, select command 19 from the TALK90 menu. Enter the following values for questions asked:

KEY - 0
WATCHDOG - 0
OPTIONS - 10
REPLY DELAY - 0
INTERRUPT INTERVAL - 0

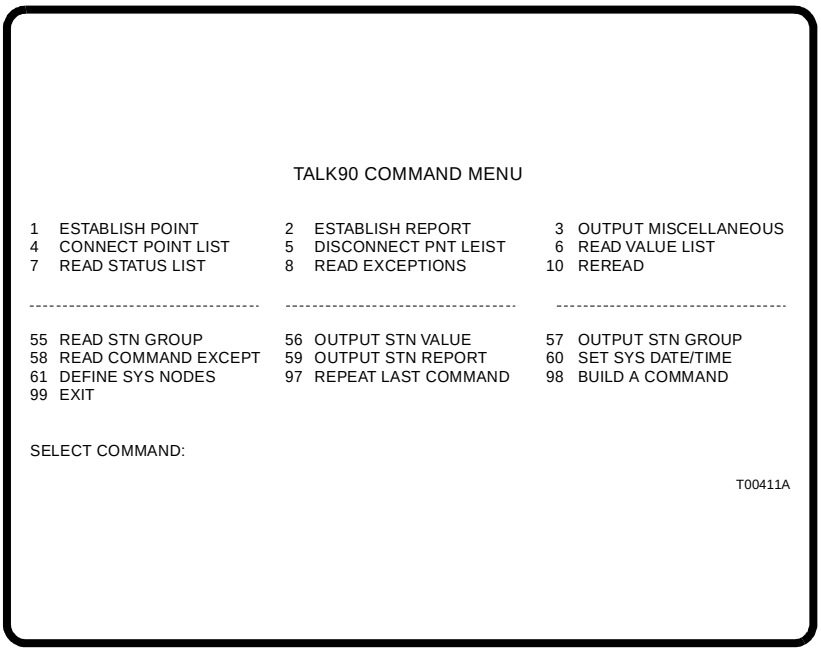


Figure 4-5. TALK90 Command Menu

Refer to the CIU Programmers Reference Manual for an explanation of the fields shown in Figure 4-5. If the hardware is functioning properly, the interface should return a reply code of 0 followed by the node address and a spare byte as follows:

CIU RESPONSE—> 0
NO ERROR

PCU NUMBER: 3
SPARE: 0

<RET> TO CONTINUE

NOTES:

1. 1. The number displayed should be equal to the LIM address switch setting.

2. 2. If the interface response is other than 0, the PCT is not set up properly. Check the password protection switch, port characteristics and communication rate.

3. The CPU LEDs on the PCT will display the count of messages sent and received. The LIM should then go on-line and the interface will be able to communicate to Plant Loop nodes. The interface will reset itself, and the system menu will reappear on the diagnostic terminal.

4. Use any of the available commands on the TALK90 menu to check the system.

Select Item 2 - *Define passwords*

1. The terminal reads:

   Password Undefined!
   Defining New Password (Y/N)?

2. If a password has been defined the terminal screen displays the current password.

3. If the response is - **Yes** - the terminal reads:

   INPUT 8 HEXADECIMAL PASSWORD
   BYTES, EXAMPLE

   ? BB CC DD EE FF 11 22 33 <RETURN>

4. If the response is - **No** - the terminal returns to the Utilities Menu (Figure 4-4).

   NOTE: This option defines the password for the PCT ports. To use this feature, the password protection option (U73 dipswitch, position 5) on the PCT must be enabled.

Select Item 3 - *Command/Replies*

Figure 4-6 shows an example of a RESTART command followed by a DEMAND MODULE STATUS command. The Enhanced CIU Programmers Reference Manual explains how to use this information.

1. This feature toggles on and off by pressing the - 3 - key.

2. If on: This causes the interface to echo computer commands and replies in hexadecimal format on the terminal. Commands on the serial port are preceded by a CS, replies on the serial port are preceded by a RS. Commands on the parallel port are preceded by a CP, replies on the parallel port are preceded by a RP.

3. If off: No echoing of commands and replies occurs.

   NOTE: This option slows PCI response time and should be off when not in use.

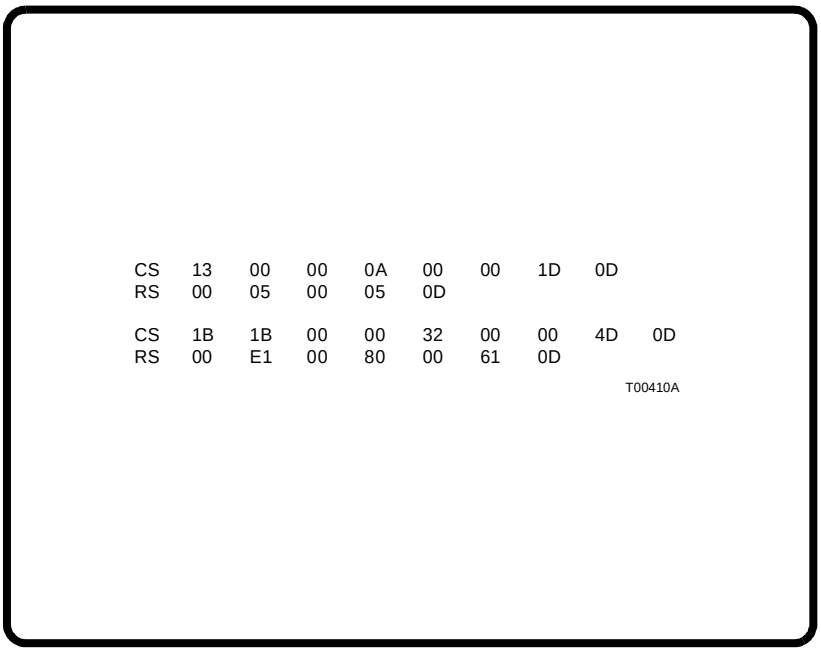


Figure 4-6. RESTART/DEMAND MODULE STATUS Commands/Replies

Select Item 4 - *Statistics*

This option displays exception report statistics the PCI receives from the Plant Loop.

1. Selecting this option displays the menu shown in Figure 4-7. Displays update every two seconds.

2. Hit any key to return to the Utilities Menu.

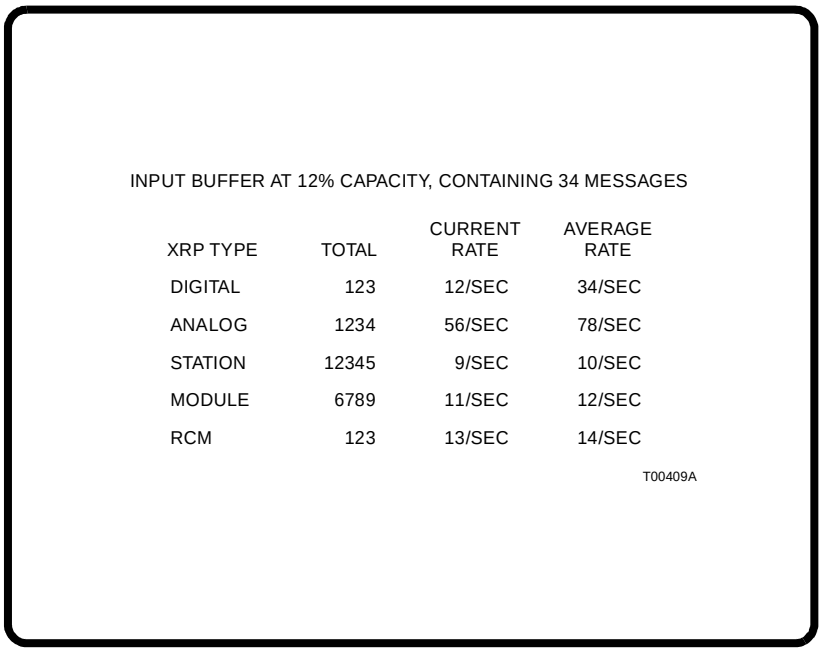
Select Item 5 - *Monitor Mode*

1. This option toggles on and off by pressing the - 5 - key.

2. If on: Monitor Mode disables any control command from the terminal or the host computer.

The terminal or host computer can only monitor data.

3. If off: the monitor mode is disabled.



INPUT BUFFER AT 12% CAPACITY, CONTAINING 34 MESSAGES

XRP TYPE	TOTAL	CURRENT RATE	AVERAGE RATE
DIGITAL	123	12/SEC	34/SEC
ANALOG	1234	56/SEC	78/SEC
STATION	12345	9/SEC	10/SEC
MODULE	6789	11/SEC	12/SEC
RCM	123	13/SEC	14/SEC

T00409A

Figure 4-7. Plant Loop Statistics

Select Item 6 - *Debug messages*

This option displays encoded messages that are useful only to qualified Bailey personnel.

Select Item 7 - *Read memory*

This option displays the PCI memory and is useful only to qualified Bailey personnel.

Select Item 8 - *CPU utilization*

This option displays the CPU utilization for each PCI task and is useful only to qualified Bailey personnel.

Select Item 9 - *Message rates*

This option allows the operator to tune the rates of the establish and disconnect Plant Loop messages sent by the PCI so that they have a minimal affect on Plant Loop traffic.

1. The menu shown in Figure 4-8 appears on the terminal screen.

2. Selecting: 1—> Establishes displays the current rate and a prompts the operator to enter a new rate. This option sets the rate the PCI establishes points to PCUs. The default rate is 5 point per second per PCU.

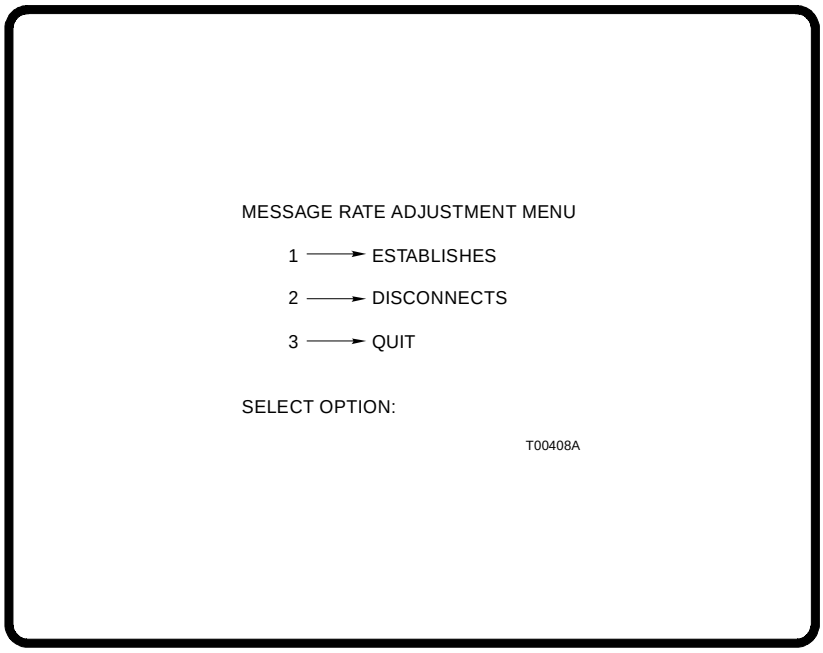


Figure 4-8. Message Rate Adjustment Menu

3. Selecting: 2—> Disconnects displays the current rate and prompts the operator to enter a newrate. This option sets the rate the PCI disconnects points and the number of disconnects packed per message. The default setting is one message every two seconds with 20 disconnects per message.

Select Item T - *TimeSync accuracy*

This option sets the accuracy of the Plant Loop time synchronization message output by the PCT as a result of the SET SYSTEM DATE AND TIME command. Selecting this option displays the current time synchronization accuracy and prompts the operator to enter a new rating. The rating indicates the accuracy (lack of drift) of the host's clock device where:

0 = no clock (lowest accuracy rating)

3 = default

6 = Low accuracy battery-backed clock

9 = high accuracy battery-backed clock

12 = satellite clock (highest accuracy rating)

SECTION 5 - TROUBLESHOOTING

INTRODUCTION

If errors occur while the interface is operating, the CPU LEDs on the PCT faceplate display error codes. Table 5-1 below lists the error codes and corrective action. The PCT displays error codes only when it is halted. Five status bytes provide information about Plant Loop to Computer Transfer Module status. Refer to the Enhanced CIU Programmer's Reference Manual for a list of module status bytes and their meaning.

Table 5-1. PCT CPU Codes

LED								Meaning	Corrective Action
8	7	6	5	4	3	2	1		
0	0	0	0	0	0	0	1	An error affecting the NVM checksum has occurred.	Reset PCT dipswitch U72 position 7.
0	0	0	0	0	0	1	1	A bad status message for a slave module was received on the slave expander bus (wrong type of slave or slave not responding).	Check slave module switch settings, termination unit dipshunt configuration and specifications of applicable function codes.
0	0	0	1	0	0	0	1	An error occured during PCT write to NVM.	Check configuration. Correct any faulty values. Place the PCT in execute.
0	0	0	1	0	0	1	0	BTM not responding.	Replace the BTM.
0	0	0	1	0	0	1	1	ROM checksum error.	Reset the PCT.
0	0	1	1	0	0	0	1	A fault in either the CPU or MEM boards exists.	Replace the PCT.
0	0	1	1	0	0	1	0	An addressing error occurred on internal microprocessor address bus.	Check slave addresses and correct any errors. If no addressing errors are found, slave expander bus or module bus have failed. Contact Bailey Controls Company.
0	0	1	1	0	0	1	1	Attempt to execute an illegal processor instruction.	None.
0	0	1	1	0	1	1	0	A divide by 0 or CHK instruction was expected.	None.
0	0	1	1	0	1	1	1	TRAP instruction was executed.	None.
0	0	1	1	1	1	1	1	The PCT has stopped because the user pressed the Stop pushbutton.	Reset the PCT.

NOTE: Codes are displayed only when the PCT is halted and the Status LED is red. A 0 represents a LED that is off and a 1 represents a LED that is on.

Table 5-2. LIM Edge Connector P3 Pin Assignments

Pin No.	Signal	Pin No.	Signal
1	Loop 2 In (+)	13	Loop 2 Bypass Control
2	Loop 2 In (-)	14	Cable Shield
3	Cable Shield	A	Cable Shield
4	Loop 1 Out (+)	D	Loop 1 Out (-)
5	Loop 1 Out (+)	E	Loop 1 Out (-)
6	Loop 1 In (+)	F	Cable Shield
7	Loop 1 In (-)	H	Loop 2 Bypass Control
8	Cable Shield	K	Loop 2 Out (-)
9	Loop 2 Out (+)	L	Loop 2 Out (-)
10	Loop 2 Out (+)	M	Cable Shield
11	Cable Shield	S	Cable Shield

Table 5-3. BTM Edge Connector P1 Pin Assignments

Pin No.	Signal	Pin No.	Signal
1	+5 VDC	2	+5 VDC
3	N/C	4	N/C
5	Common	6	Common
7	+15 VDC	8	-15 VDC
9	Power Fail Interrupt	10	Power Fail Interrupt
11	Module Bus	12	Module Bus

Table 5-4. PCT CPU Board Edge Connector P2 Pin Assignments

Pin No.	Signal	Pin No.	Signal
1	Data Bit D1	2	Data Bit D0
3	Data Bit D3	4	Data Bit D2
5	Data Bit D5	6	Data Bit D4
7	Data Bit D7	8	Data Bit D6
9	Clock	10	Sync
11	N/C	12	N/C

NOTE: All data bits are low true.

Table 5-5. PCT CPU Board Edge Connector P3 Pin Assignments

Pin No.	Signal	Pin No.	Signal
1	SAC/DCS Link (+)	A	SAC/DCS Link (-)
2	Redundancy Link Transmit Data (+)	B	Redundancy Link Transmit Data (-)
3	Redundancy Link Receive Data (-)	C	Redundancy Link Receive Data (+)
4	Terminal Port Transmit Data	D	Terminal Port Receive Data
5	Terminal Port Request to Send	E	Terminal Port Clear to Send
6	Terminal Port Data Carrier Detect	F	N/A
7	Printer Port Transmit Data	H	Printer Port Receive Data
8	Printer Port Request to Send	J	Printer Port Clear to Send
9	Printer Port Data Carrier Detect	K	N/A
10	Digital Output 1 (+)	L	Digital Output 1 (-)
11	Digital Output 2 (+)	M	Digital Output 2 (-)
12	N/A	N	N/A
13	N/A	P	N/A
14	N/A	R	N/A
15	N/A	S	N/A

SECTION 6 - MAINTENANCE

INTRODUCTION

The Plant Loop to Computer Interface (INPCI02) requires minimal maintenance. The following maintenance schedule will ensure trouble free service.

NOTE: Only qualified personnel should perform maintenance.

MAINTENANCE SCHEDULE

The PCI maintenance schedule is shown in Table 6-1. Perform these tasks at the specified intervals.

Table 6-1. Maintenance Schedule

Task	Interval
Clean and check all cable connections to the INLIM03, INBTM01 and INPCT01.	Every 6 months or during plant shutdown, whichever occurs first
Use a static safe vacuum cleaner to remove dust from: Modules Module Mounting Unit Fan Assembly Power Entry Panel	Every 6 months or during plant shutdown, whichever occurs first

SECTION 7 - REPAIR/REPLACEMENT PROCEDURES

INTRODUCTION

This section explains the replacement procedures for the Plant Loop to Computer Interface (INPCI02). There are no special tools required to replace an interface module.

> **NOTE:** Always use the Bailey Field Static Kit (P/N 1948385A1) when working with the interface modules. This kit connects the static dissipative work surface and technician to the same ground point.

MODULE REPAIR/REPLACEMENT

If you determine an interface module is faulty, replace it with a new one. ***DO NOT*** try to repair the module; replacing components may affect the module performance. You can remove the module while system power is supplied. To replace a module:

1. Push and turn the two front panel captive retaining latches one half turn to unlatch the module. It is unlatched when the slots on the latches are vertical and the open end of the slots face away from the module.

2. Gently slide the module out of the MMU.

3. Configure the replacement module switch and jumper settings. Ensure they are set the same as the original module.

4. In the same slot assignment as the original module, align the replacement module with the plastic guide rails in the MMU; gently slide it in until the front panel is flush with the top and bottom of the MMU frame.

5. Push and turn the two captive retaining latches on the module faceplate one half turn to the latched position. It is latched when the slots on the latches are vertical and the open ends face the center of the module.

6. Return to normal operation.

SECTION 8 - SUPPORT SERVICES

INTRODUCTION

Bailey Controls is ready to assist in the use of its products. Requests for sales, applications services, installation, repair, overhaul and maintenance contract services should be made to the nearest sales office.

REPLACEMENT PARTS AND ORDERING INFORMATION

If you are making repairs at your own facility, replacement parts should be ordered through a Bailey sales office. Provide the following information for parts orders:

1. Part description, part number and quantity.

2. Model, serial number (if applicable) and ratings of the assembly containing the ordered part.

3. Bailey publication number and reference used in identifying the part.

When ordering standard parts from Bailey Controls, use the part number and description from the Replacement Parts section of the manual. Parts not having a commercial description in the Replacement Parts section must be ordered from a Bailey Controls sales office.

TRAINING

Bailey Controls has a modern training facility equipped to provide service and repair instructions. This facility is available for in-plant training of your personnel. Contact a Bailey Controls sales office for information on available classes and scheduling.

TECHNICAL DOCUMENTATION

You can obtain additional copies of this manual through the nearest Bailey sales office. Copies, over and above those provided with the original purchase, are available at a minimum charge to the customer. Contact a Bailey Controls sales office for information.

APPENDIX A - TERMINATION UNIT (NTMF01) CONFIGURATION

INTRODUCTION

The INPCT01 uses the NTMF01 for termination. Figure A-1 shows the dipshunt configurations required when connecting the PCT to a mainframe, modem, computer and terminal. Figure A-2 shows RS-232-C signals and the associated DB-25 pin assignments. Install dipshunts XU1 and XU2 to use port 0 and dipshunts XU3 and XU4 to use port 1.

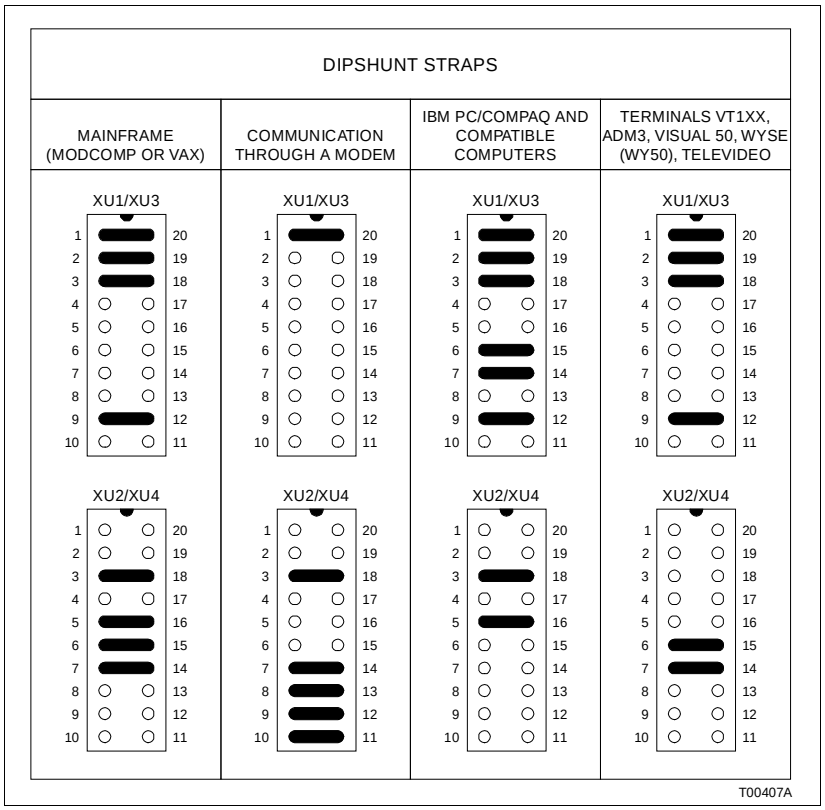


Figure A-1. NTMF01 Disphunt Configurations

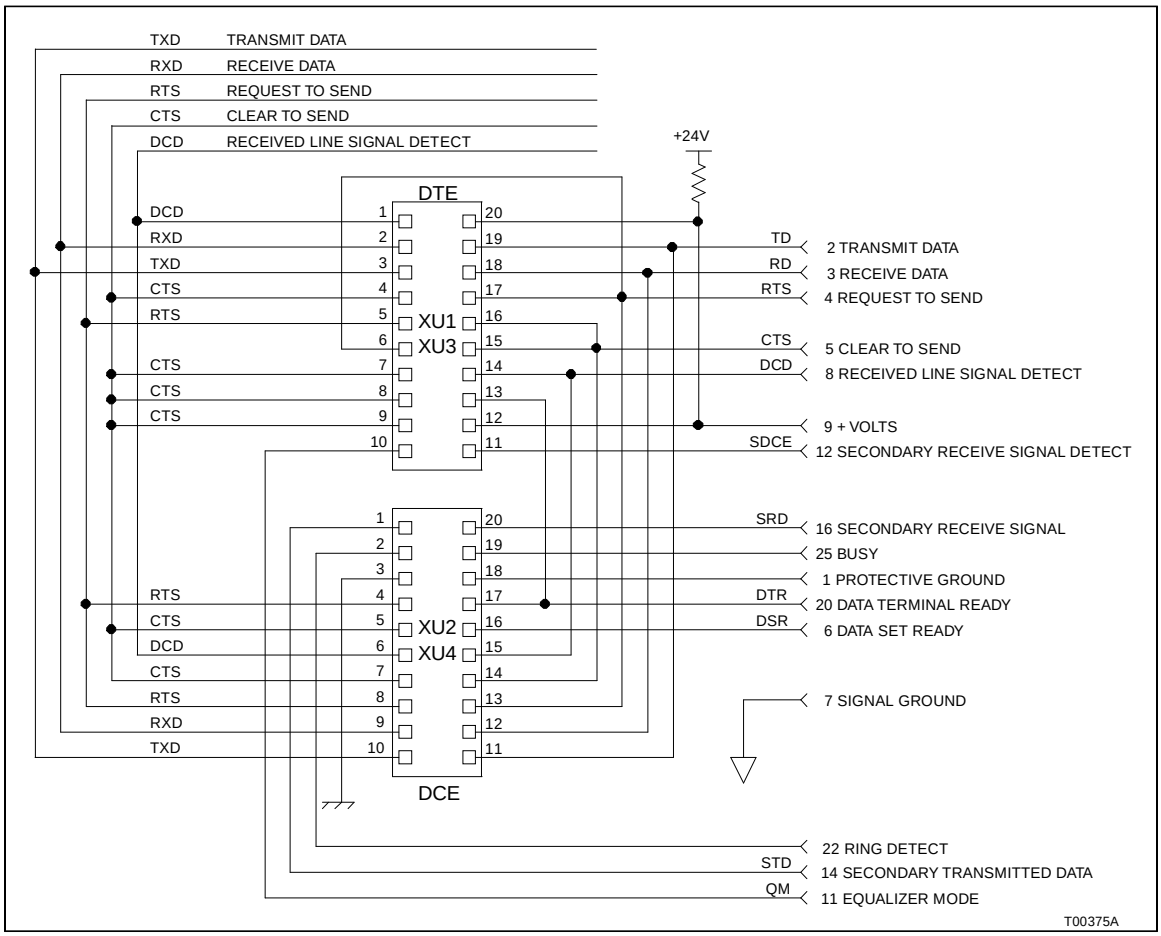


Figure A-2. DB-25 Pin Assignments and RS-232-C Signals

APPENDIX B - TERMINATION UNIT (NTCL01) CONFIGURATION

INTRODUCTION

The INLIM03 uses the NTCL01 for termination. Table B-1 lists the terminal assignments for the loop input/output connections. Figure B-1 provides jumper settings associated with cable type. Figure B-2 shows twinax cable connections for the NTCL01.

Table B-1. NTCL01 Terminal Assignments

TB1 Terminal	Assignments	TB3 Terminal	Assignments	BNC Number	Assignments
1	Loop 1 In, +	1	Loop 2 In, +	J1	Loop 1 In
2	Loop 1 In, –	2	Loop 2 In, –	J2	Loop 1 Out
3	Loop 1 In, Shield	3	Loop 2 In, Shield	J8	Loop 2 In
4	no connection	4	no connection	J9	Loop 2 Out
5	Loop 1 Out, +	5	Loop 2 Out, +		
6	Loop 1 Out, –	6	Loop 2 Out, –		
7	Loop 1 Out, Shield	7	Loop 2 Out, Shield		
8	Power System Status 1	8	Power System Status 2		

NOTE: Twinax cables connect to the terminals. Coax cables connect to the BNC connectors.

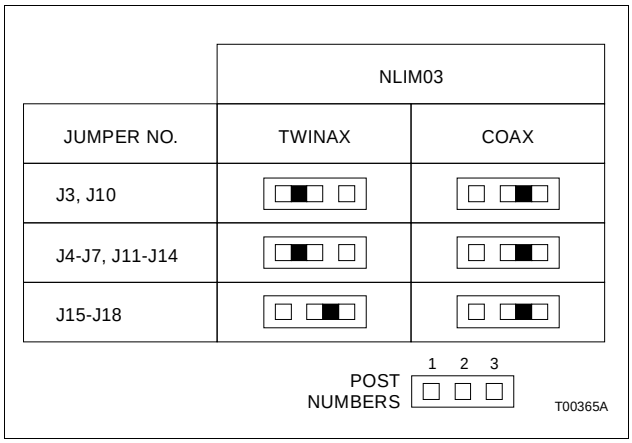


Figure B-1. Jumper Settings and Cable Types

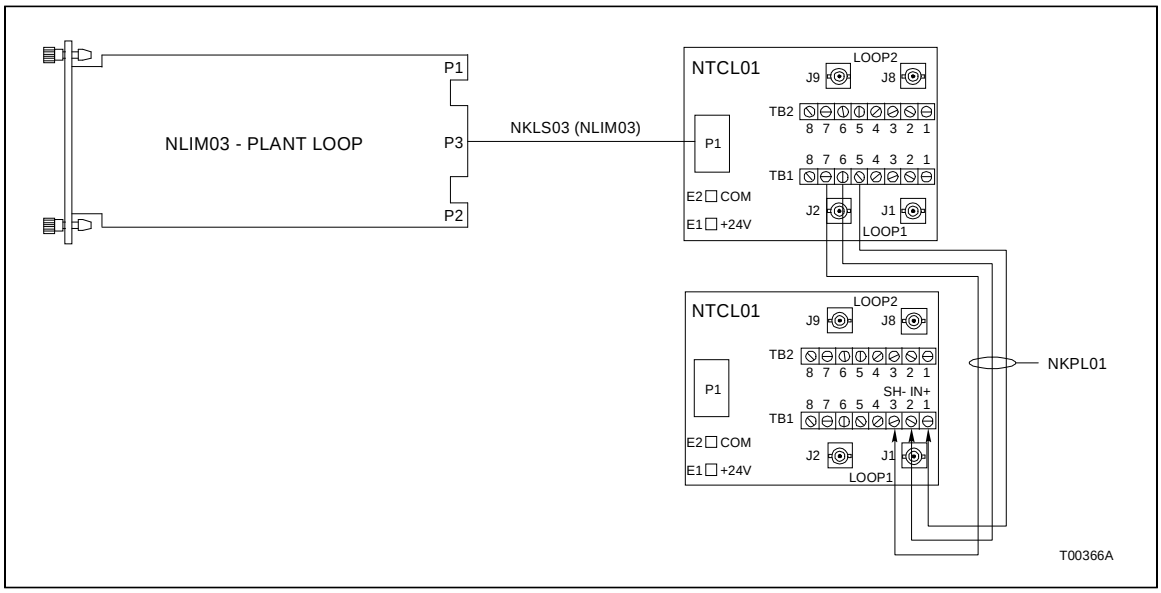


Figure B-2. NTCL01 Termination Unit and Terminal Assignments

APPENDIX C - TERMINATION MODULE (NIMF01) CONFIGURATION

INTRODUCTION

The INPCT01 can use the NIMF01 for termination. Figure C-1 shows the dipshunt configuration required when connecting the PCT to a mainframe, modem, computer and terminal. Install disphunts XU1 and XU2 to use port 0 and dipshunts XU3 and XU4 to use port 1.

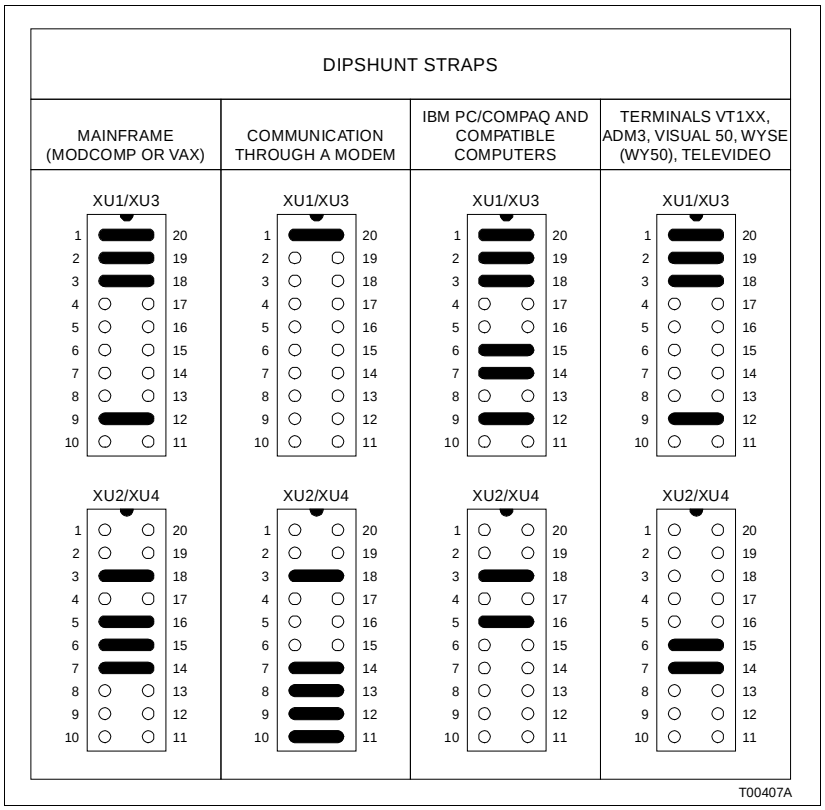


Figure C-1. NIMF01 Dipshunt Configurations

APPENDIX D - TERMINATION MODULE (NICL01) CONFIGURATION

INTRODUCTION

The INLIM03 can use the NICL01 for termination. Table D-1 lists the terminal assignments for the loop input/output connections. Table D-2 lists BNC connector assignments. Figure D-1 provides jumper settings associated with cable type. Figure D-2 shows twinax cable connections for NICL01.

NOTE: Twinax cables connect to the terminals. Coax cables connect to the BNC connectors.

CAUTION	**Ensure that the end marked J1 is connected to P1 on the NICL01, and J2 is connected to the LIM. Failure to do so could result in module damage (see Figure D-2).**
ATTENTION	**S'assuree que L'extremite identifiee par J1 est reliee a P1 du module NICL01 et que J2 est reliee au module LIM. Sinon, les nodules pouiraient etre endommages (voir la figure D-2).**

Table D-1. NICL01 Terminal Assignments

TB1 Terminal	Assignments	TB2 Terminal	Assignments	TB3 Terminal	Assignments
1	Gound	4	Power System Status 1	25	Loop 1 Out, Shield
2	Common	5	Power System Status 2	26	Loop 1 Out, -
3	+ 24 VDC	6	Loop 2 In, +	27	Loop 1 Out, +
		7	Loop 2 In, -	28	Loop 1 In, Shield
		8	Loop 2, Shield	29	Loop 1 In, -
		9	Loop 2 Out, +	30	Loop 1 In, +
		10	Loop 2 Out, -	31	no connection
		11	Loop 2 Out, Shield	32	no connection

Table D-2. D-2. BNC Connector Assignments

BNC Number	Assignments
J1	Loop 1 In
J2	Loop 1 Out
J8	Loop 2 In
J9	Loop 2 Out

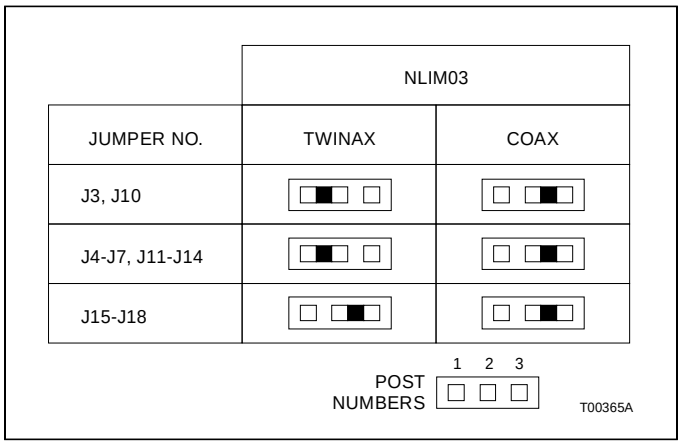


Figure D-1. Jumper Settings and Cable Types

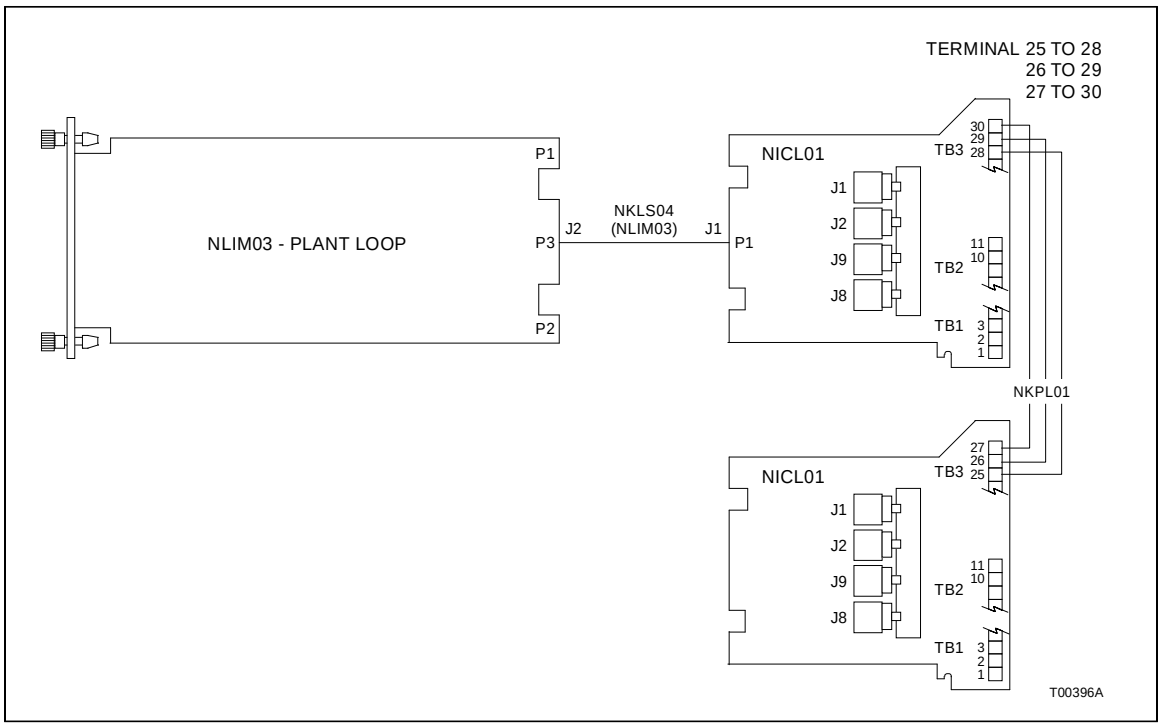


Figure D-2. Typical Twinax Cable Connection for the NICL01

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