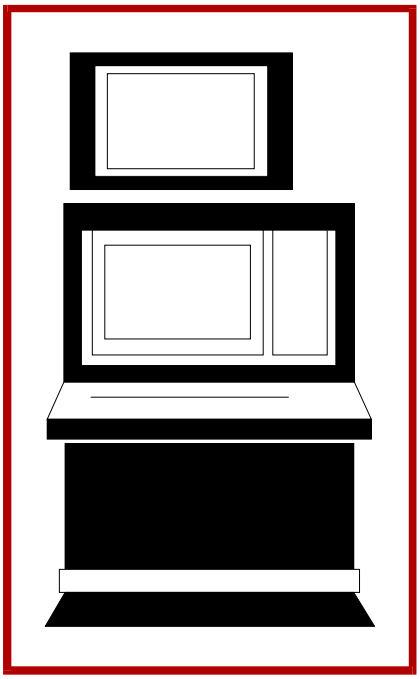
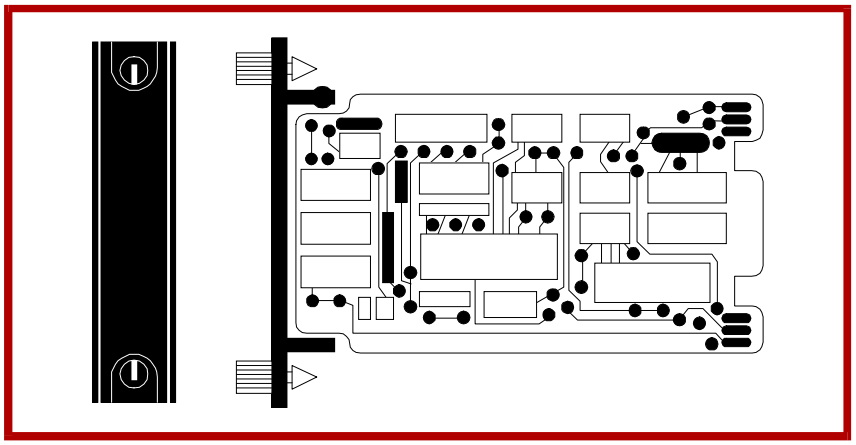
Bailey® infi 90®

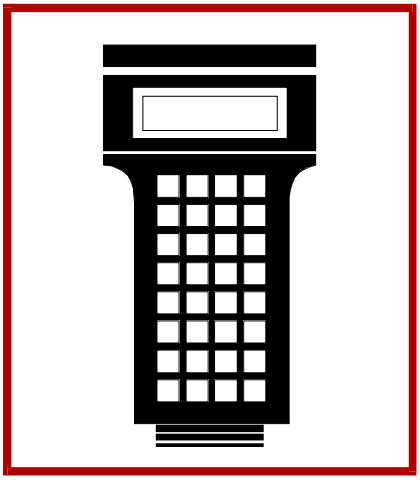
E96-221

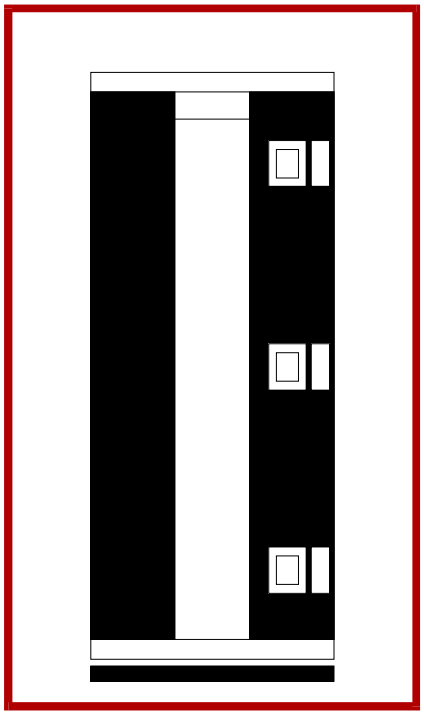
Instruction

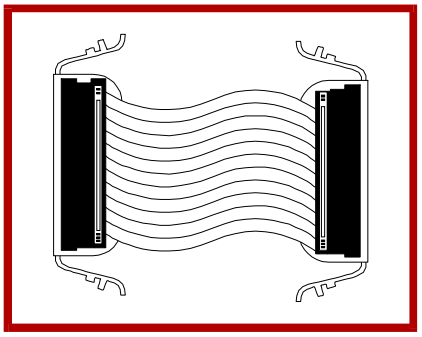
Communication Port Module
(IMCPM02)

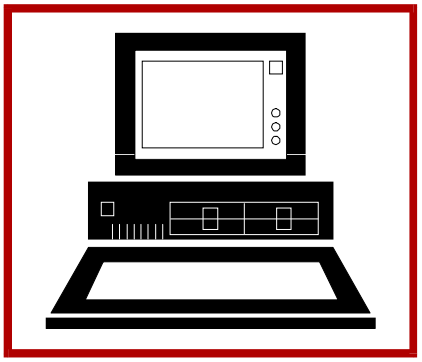












Bailey® Process Control and Automation Solutions from Elsag Bailey Group

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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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 MATÉREILS.

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Preface

The IMCPM02 Communication Port Module connects the CTT02 Configuration and Tuning Terminal and/or an engineering work station (EWS) to a single INFI 90® process control unit (PCU). This manual explains how to install and use the IMCPM02 module on the INFI 90 system. It has sections that describe the setup and cabling. The appendices contain information about the NIMP01 termination module and NTMP01 termination unit.

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List of Effective Pages

Total number of pages in this instruction is 52, 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 2-4	Original
3-1 through 3-11	Original
4-1 through 4-2	Original
5-1 through 5-9	Original
6-1	Original
7-1	Original
8-1	Original
A-1 through A-2	Original
B-1 through B-3	Original
C-1 through C-3	Original
Index-1 through Index-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.
SPECIFIC CAUTIONS	Early Network 90 systems applied -30 VDC to pins 3 and 4 of P1, (top connector of the module). This voltage can cause damage to INFI 90 modules. (p. 3-2) It is strongly recommended that cabinet power be turned off before doing any termination unit wiring. Failure to do so could result in equipment damage. Do not apply power until all wire connections are verified. Do not apply power to the termination unit when uncut dipshunts are installed. This may result in damage to the termination unit. (p. 3-11)

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.

ATTENTION D'ORDRE SPECIFIQUE	Les generations hatives des systemes Network 90 utilisaient une alimentation de -30 volts C.C. aux bornes 3 et 4 du connecteur P1 (connecteur superieur du module). Cette alimentation peut endommager les modules INFI 90. (p. 3-2) Il est fortement recommandé de mettre l'armoire hors tension avant de procéder au câblage de la carte de raccordement afin d'éviter tout dommage matériel. Ne rétablissez pas l'alimentation avant d'avoire vérifié toutes les connexions. Ne mettez pas la carte de raccordement sous tension tant que les dipshunts ne sont pas coupés, sinon la carte de raccordement pourrait étre endommagée. (p. 3-11)

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SECTION 1 - INTRODUCTION

OVERVIEW

The IMCPM02 Communication Port Module connects the CTT02 Configuration and Tuning Terminal and/or an engineering work station (EWS) to a single INFI 90 process control unit (PCU). The IMCPM02 Communication Port Module is directly compatible with existing Network 90® and INFI 90 IMSPM01 Serial Port Module and IMCPM01 Configuration Port Module. The IMCPM02 module provides all the functions of the IMSPM01 and IMCPM01 modules and can be installed in PCUs that use either Controlway or module bus.

This manual explains the purpose, operation and maintenance of the IMCPM02 module. It explains handling cautions and steps for installation. Figure 1-1 shows the INFI 90 communication levels and where the IMCPM02 module is within these levels. Refer to the ***Configuration and Tuning Terminal Type CTT02*** instruction manual for more details about the configuration tuning terminal (CTT).

GENERAL DESCRIPTION

The IMCPM02 module is a microprocessor based single slot wide INFI 90 interface module that provides a local (within the PCU) means for system configuration, tuning and diagnostics. It interfaces the CTT terminal and EWS station to the Controlway through faceplate connectors. The IMCPM02 module enables the user to configure, tune and monitor the master modules and their function blocks. It can communicate with master modules in the PCUs that use either module bus or Controlway.

The IMCPM02 module has one two-color (red/green) LED and eight red LEDs for module status indication. There are two eight pole dipswitches that set the Controlway or module bus address, select baud rate and enable diagnostic testing. A reset switch is available through the faceplate. The IMCPM02 faceplate has two connectors. A DB-25 connector for the EWS port and a round 5-pin connector for the CTT terminal. A jumper array selects DTE, DCE or loopback operating mode for the EWS port.

The IMCPM02 module occupies a single slot in a standard INFI 90 module mounting unit (MMU). An optional termination unit can be connected through a cable for permanent mounting.

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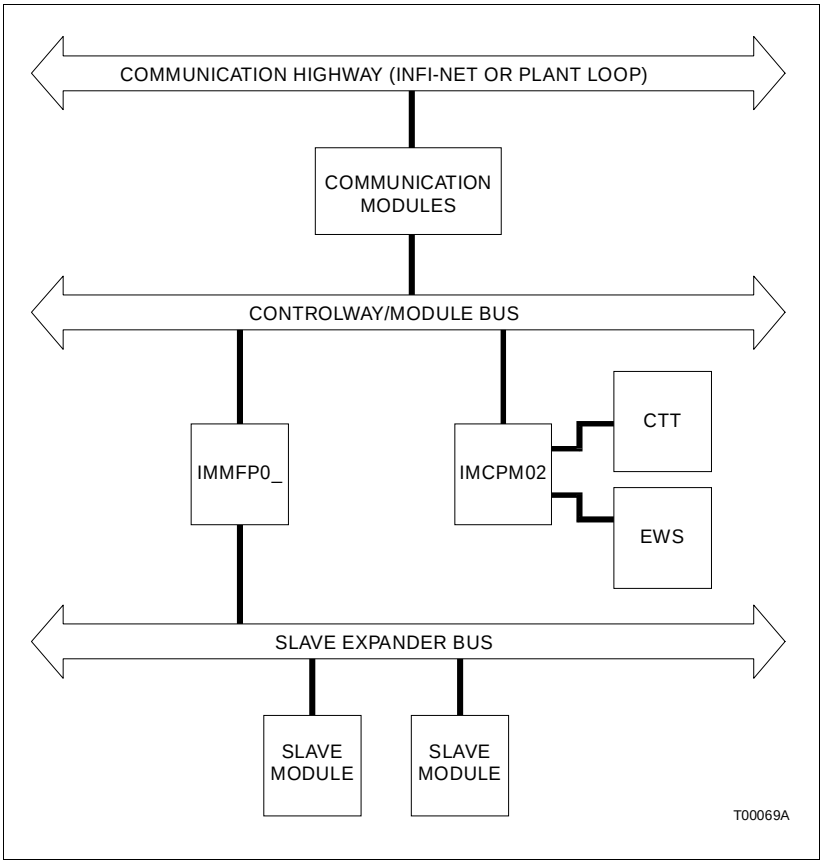

Figure 1-1. IMCPM02 Module Application Example

Faceplate

The faceplate measures 35.5 millimeters (1.4 inches) wide by 177.8 millimeters (7 inches) high. Two concentric screws lock the module assembly into the module mounting unit. A window on the faceplate shows the CPU LEDs during operation. Besides locking the module in place, the faceplate also protects the circuit components and creates a chimney for proper air flow within the cabinet.

The IMCPM02 module has two connectors on the faceplate. A CTT terminal plugs into the round connector and an RS-232-C cable from the EWS station plugs into the DB-25 connector.

Circuit Board

The circuit board features state-of-the-art circuitry. On the IMCPM02 circuit board are static random access memory (SRAM) and read only memory (ROM), a processor running at 16 megahertz, direct memory access (DMA) circuits, Bailey

Controls custom bus circuits and support circuitry. The board attaches to the faceplate with two screws.

HARDWARE APPLICATION

Applications that require local tuning and configuration of modules in an INFI 90 PCU unit can use the IMCPM02 module. Since it interfaces to both a CTT terminal and an EWS station, the IMCPM02 module minimizes hardware requirements.

INTENDED USER

The installation engineer needs to know how to handle and work with electronic equipment safely. Installers should have formal training in INFI 90 processes and configuration.

INSTRUCTION CONTENT

This manual provides introductory, installation, operation, troubleshooting and maintenance information. Read and understand this manual thoroughly before putting the module into operation. Refer to the sections in this list as required for more information.

Introduction — Provides an overview of the module, a description of the hardware, a glossary of terms and abbreviations and a table of physical, electrical and environmental specifications.

Description and Operation — Uses block diagrams to explain what the key circuits do.

Installation — Takes you through the handling, inspection, configuration and installation aspects of the module.

Operation — Discusses the faceplate indicators and controls, and everyday operation.

Troubleshooting — Contains tables that explain LED codes and corrective actions.

Repair/Replacement Procedures — Describes how to maintain and replace the module.

Support Services — Lists replacement parts and warranty policy.

HOW TO USE THIS MANUAL

Read this manual in sequence. To get the best use out of this manual, read it from cover to cover, then go back to specific sections. Bailey Controls strongly advises against putting the module into operation until you have read and done all the installation steps.

1. Read and do all steps in Section 3.

2. Thoroughly read Section 4 before applying power to the module.

3. Refer to Section 5 if a problem occurs. This section will help you track down a problem and correct it.

4. Go to Section 7 if you need to replace your module.

5. Refer to Section 8 for replacement part and warranty information.

REFERENCE DOCUMENTS

Table 1-1 contains the reference documents for the IMCPM02 module.

Table 1-1. Reference Documents

Number	Title
I-E92-501-2	Configuration and Tuning Terminal Type CTT02
I-E96-413	Multi-Function Processor Termination Modules NIMP01/02
I-E96-427	Multi-Function Processor Termination Unit NTMP01

NOMENCLATURE

Table 1-2 contains the terms used in this manual.

Table 1-2. Nomenclature

Nomenclature	Description
CTT02	Configuration and tuning terminal
IMCPM02	Communication port module
IMMFP0_	Multi-function processor module
IMSPM01	Serial port module
NIMP01	Multi-function processor termination module
NKTU01	Termination unit cable
NKTU02	Termination module cable
NTMP01	Multi-function processor termination unit

GLOSSARY OF TERMS AND ABBREVIATIONS

Table 1-3 contains the glossary of terms and abbreviations for this manual.

Table 1-3. Glossary of Terms and Abbreviations

Term	Description
Controlway	High speed, redundant, peer-to-peer communication link. Used to transfer information between intelligent modules within a process control unit.
CSA	Canadian Standards Association.
CTT	Configuration tuning terminal. A handheld module used for local configuration, tuning, and monitoring of module values within a process control unit.
DCE	Data communication equipment or data circuit-terminating equipment. Equipment that establishes and terminates a communication link between two devices. In RS-232-C communication systems, the DCE nomenclature indicates the signals that appear at specified cable connection contacts. A modem is an example of this type of device.
Dipswitch	A dual in-line package that contains switches.
DTE	Data terminal equipment. Equipment comprising the data source, data sink or both that provides the communication control function. In RS-232-C communication systems, the DTE nomenclature indicates the signals that appear at specified cable connection contacts. Terminals and printers are examples of this type of device.
DMA	Direct memory access. A method by which data gets transferred directly to memory without processor intervention.
ESD	Electrostatic sensitive devices. Electronic components subject to damage or failure when exposed to an electrostatic charge; require special handling.
EWS	Engineering work station. An integrated hardware and software personal computer system for configuring and monitoring INFI 90/ Network 90 modules.
LED	Light emitting diode.
MFP	Multi-function processor module.
MMU	Module mounting unit. A card cage that provides electrical and communication support for INFI 90/Network 90 modules.
Module Address	A unique identifier of a specific device or a communication channel. It refers to Controlway or module bus address.
Module Bus	Peer to peer communication link used to transfer information between intelligent modules within a process control unit.
PCU	Process control unit. A node on the plant-wide communication network containing master and slave modules.
PLD	Programmable logic device.
ROS	Resident operating system.

GLOSSARY OF TERMS AND ABBREVIATIONS *(continued)*

Table 1-3. Glossary of Terms and Abbreviations (continued)

Term	Description
TMU	Termination mounting unit. A card cage that provides housing for INFI 90/ Network 90 termination modules.
TM	Termination module. Provides input/output connection between plant equipment and the INFI 90/Network 90 modules.
TU	Termination unit. Provides input/output connection between plant equipment and the INFI 90/Network 90 modules.

SPECIFICATIONS

Table 1-4 contains the specifications for the IMCPM02 module.

Table 1-4. Specifications

Property	Characteristics
Current Consumption	0.81 A maximum, 750 mA typical, at +5 VDC
Power Dissipation	4.1 W maximum, 3.8 W typical
Microprocessor	32 bit processor (16 bit external bus) running at 16 MHz
Memory	128 kbytes of ROM 256 kbytes of RAM
Serial Ports	1 - isolated RS-232-C at up to 19.2 kbaud
Electromagnetic/ Radio Frequency Interference	Values not available at this time. Keep cabinet doors closed. Do not use communication equipment any closer than 2 meters from the cabinet.
Dimensions	76.2 mm (3 in.) 279.4 mm (11 in.) 355.6 mm (14 in.)
Weight	0.68 kg (1.5 lb)
Environmental	
Ambient Temperature	0° to +70°C (32° to 158°F)
Relative Humidity	5% to 90% R.H. (5%) up to 55°C (131°F) (noncondensing) 5% to 40% R.H. (5%) at 70°C (158°F) (noncondensing)
Atmospheric Pressure	Sea level to 3 km (1.86 mi)
Certification	CSA certified for use as process control equipment in ordinary (non-hazardous) locations.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

SECTION 2 - DESCRIPTION AND OPERATION

INTRODUCTION

The IMCPM02 module hardware contains several functional blocks working together. To understand how they work, this section shows these in a block diagram and then explains each block in the text. See Figure 2-1.

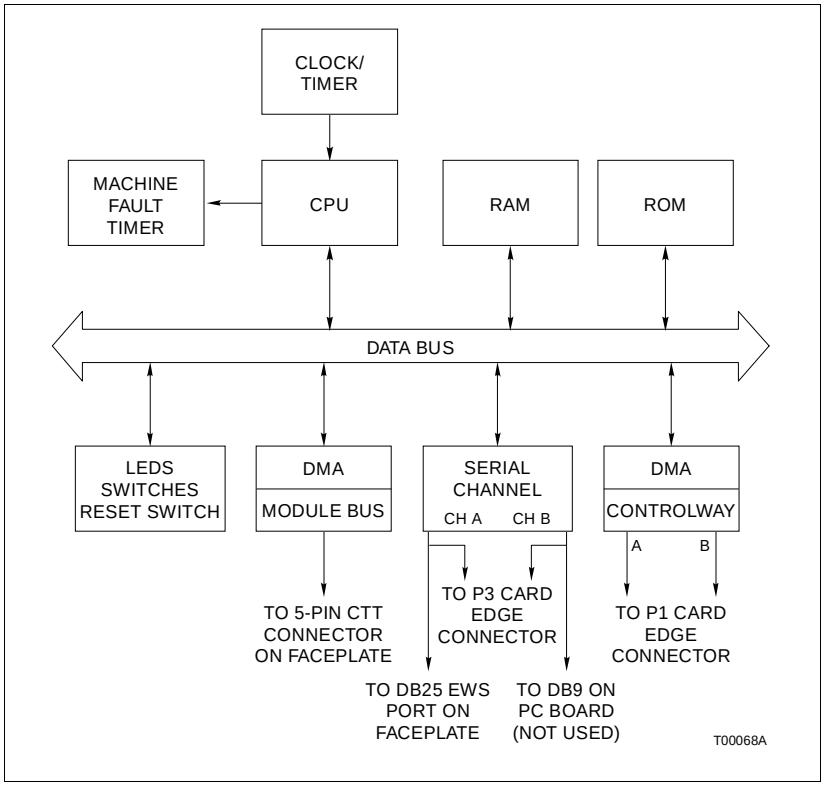

Figure 2-1. Block Diagram of the IMCPM02 Module

THEORY OF OPERATION

When functioning as a CTT interface, the IMCPM02 module accepts a module bus message from the CTT terminal and sends the message to the destination module through the Controlway or module bus. The module reply is then received by the IMCPM02 module and returned to the CTT interface.

When functioning as an EWS interface, the IMCPM02 module receives EWS commands, forwards them to the destination module, and sends the reply to the EWS station over the RS-232 channel. The CTT interface and EWS interface may both be used at the same time.

SERIAL PORT

The serial port on the IMCPM02 module is capable of supporting standard baud rates up to 19.2 kilobaud. It is a full duplex serial data EIA standard RS-232-C type Z (a Bailey Controls Company defined binary interchange). The standard D-type connector on the IMCPM02 faceplate is optically isolated. Optical isolation eliminates ground currents caused by isolated grounding of external computers.

The serial channel is normally used to interface the EWS station when the IMCPM02 module is in DCE mode (determined by jumper configuration). It also may be connected to a modem when the IMCPM02 module is in DTE mode (determined by jumper configuration). Dipswitch SW2 selects the desired baud rate and data framing options (Refer to ***DIPSWITCHES AND JUMPERS*** in Section 3). For more permanent installations, the IMCPM02 module can be connected to the NIMP01 termination module or NTMP01 termination unit through the NKTU02 and NKTU01 cables, respectively (refer to Appendix B and C). A DB-9 connector is located on the board (P6) for development and diagnostic purposes and is not available for customer use.

MICROPROCESSOR

A 16 megahertz microprocessor is responsible for module operation and control. The operating system instructions reside in the read only memory (ROM). The processor constantly retriggers the machine fault timer (MFT) circuit. If the processor or software fails and the MFT circuit is not reset, the MFT issues a board-wide reset and the status LED turns red. In this state, the IMCPM02 module will not function until it is reset.

CLOCK/TIMER

The clock section provides the clock signals to drive the module at 16 megahertz. Additionally, it supplies the clock signals for the on-board serial port. The timer section is the system clock that keeps the processor task scheduling at the proper intervals.

MEMORY

There are 128 kilobytes of ROM, 256 kilobytes of RAM. The ROM holds the operating system instructions for the processor. The RAM provides temporary storage.

A key feature of the ROM memory is that it requires no wait states. The processor does not need to wait any clock cycles before it can check the data in memory. This results in quicker operation.

MODULE BUS/CONTROLWAY

Controlway is a one megabaud peer-to-peer communication link capable of supporting up to 32 drops. The Controlway interface is provided by a custom Bailey Controls integrated circuit, that links the IMCPM02 module to Controlway. It has full direct memory access (DMA) capabilities (allowing for quicker operation), and two redundant, independent channels. Module bus is a nonredundant version of the peer to peer communication channel that operates at 83.33 kilobaud.

There are two separate traces on the MMU backplane circuit for Controlway. Data is transmitted over both channels simultaneously and received in separate receivers where it is checked for integrity. A failed channel on the Controlway is flagged and shut down to allow Controlway communication to continue on the other channel.

As the point data between modules travels on the bus, the Controlway does a bit-by-bit comparison that provides collision avoidance maximizing efficiency and throughput.

LEDS

The IMCPM02 module has one two-color status LED on the faceplate to indicate the execute/failed status of the IMCPM02 module. It has eight red status LEDs on the faceplate for diagnostic purposes and an activity indicator. The LEDs are arranged vertically and numbered from one through eight, top to bottom.

In normal operation mode, the IMCPM02 module uses the nine LEDs on the faceplate to indicate its status. The two-color status LED indicates the mode of the IMCPM02 module: green for execute mode and red for failed mode. When in execute mode, the IMCPM02 module uses LEDs 1 through 8 as activity indicators.

When the IMCPM02 module is in failed mode, LEDs 1 through 8 display a code indicating the error condition (Refer to ***LED ERROR CODES*** in Section 5). In diagnostic mode, the LEDs indicate the status of the diagnostic test (Refer to ***DIAGNOSTICS*** in Section 5).

DIPSWITCHES/JUMPERS

The IMCPM02 module has two configurable dipswitches and eight jumpers. Each dipswitch has eight poles. Dipswitch SW2 sets module options. Dipswitch SW3 sets the module address.

A reset switch (SW1) accessed through the faceplate resets the module.

- Jumpers J1 through J3 enable handshake functions for the EWS port.
- Jumper J4 connects the EWS connector cable shield to ground.
- Jumper array J5 selects DTE, DCE or loopback operating mode for the DB-25 EWS port (P4).
- Jumper array J6 selects DTE, DCE, or loopback operating mode for the DB-9 connector mounted on the circuit board.
- Jumper J11 allows the CTT terminal to connect directly to the module bus therefore disabling IMCPM02 module control. Jumper J11 causes the IMCPM02 module to operate as an IMCPM01 module.
- Jumper J12 disconnects -30 VDC from the module when installing it in an MMU backplane with modules that require -30 VDC. The Controlway can not be used in systems that use -30 VDC.

CTT INTERFACE

The IMCPM02 module communicates with the CTT terminal via the round five pin connector on the faceplate. Messages received from the CTT terminal are transmitted on Controlway, but using the source module address of the IMCPM02 module in place of the module address of the CTT terminal. Only replies to messages initiated by the CTT terminal are transmitted to the CTT terminal. A CTT terminal connected to the Controlway through an IMCPM02 module is a message initiating device only. The IMCPM02 module cannot relay messages to the CTT terminal that are initiated from other modules within the process control unit.

SECTION 3 - INSTALLATION

INTRODUCTION

This section explains how to install the IMCPM02 Communication Port Module. Do not proceed with operation until you read, understand and do the steps in the order in which they appear. Refer to the product instructions for NIMP01 and NIMP02 modules and NTMP01 unit for termination device wiring instructions.

> **NOTE:** This module uses connections to the MMU backplane that serve other functions in early Network 90 systems. To avoid potential module damage, your system must be checked for compatibility prior to module installation. In INFI 90 systems, pins 3 and 4 of pin 1 are used for the redundant Controlway bus. Set J12 for your application before installing the IMCPM02 module into the system.

SPECIAL HANDLING

> **NOTE:** Always use Bailey's Field Static Kit (P/N 1948385A2 - consists of wrist strap, ground cord assembly, 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.

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.

The IMCPM02 module uses electrostatic sensitive devices. Follow Steps 1 through 8 when handling:

1. ***Use Static Shielding Bags***. Keep the modules in the static shielding bag until they are ready to be used 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***. 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 is connected to the DC common bus.

8. ***Do Not Use Lead Pencils to Set Dipswitches***. To avoid contamination of switch contacts that can result in circuit board malfunction, do not use a lead pencil to set a dipswitch.

GENERAL HANDLING

1. Examine the hardware immediately to verify that it has not been damaged in transit.

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.

DIPSWITCHES AND JUMPERS

CAUTION	**Early Network 90 systems applied -30 VDC to pins 3 and 4 of P1, (top connector of the module). This voltage can cause damage to INFI 90 modules.**
ATTENTION	**Les generations hatives des systemes Network 90 utilisaient une alimentation de -30 volts C.C. aux bornes 3 et 4 du connecteur P1 (connecteur superieur du module). Cette alimentation peut endommager les modules INFI 90.**

The module has two configurable dipswitches and eight jumpers. The dipswitches have eight poles. See Figure 3-1 for locations. The poles of each dipswitch are numbered 1 through 8. Dipswitch SW2 sets module options. Dipswitch SW3 sets the module address.

- Jumpers J1 through J3 enable handshake functions for the EWS port.

- Jumper J4 connects the EWS connector cable shield to ground.

- Jumper array J5 selects DTE, DCE, or loopback operating mode for the DB-25 EWS port (P4).
- Jumper array J6 selects DTE, DCE, or loopback operating mode for the DB-9 connector mounted on the circuit board.
- Jumper J11 allows the CTT terminal to connect directly to the module bus therefore disabling IMCPM02 module control. Jumper J11 causes the IMCPM02 module to operate as an IMCPM01 module.
- Jumper J12 disconnects -30 VDC from the module when installing it in an MMU backplane with modules that require -30 VDC. The Controlway can not be used in systems that use -30 VDC.

NOTE: Since factory settings do not reflect default settings, it is imperative that all dipswitch settings are checked before you put the module into operation.

Dipswitch SW2 - Module Options and Diagnostics

Dipswitch SW2 sets a variety of module options. Refer to Table 3-1 for option setting information. Refer to Section 5 for diagnostic dipswitch setting information. This dipswitch provides the following functions in normal operation mode:

- One pole to select the display of the EWS port or CTT interface activity on the LEDs.

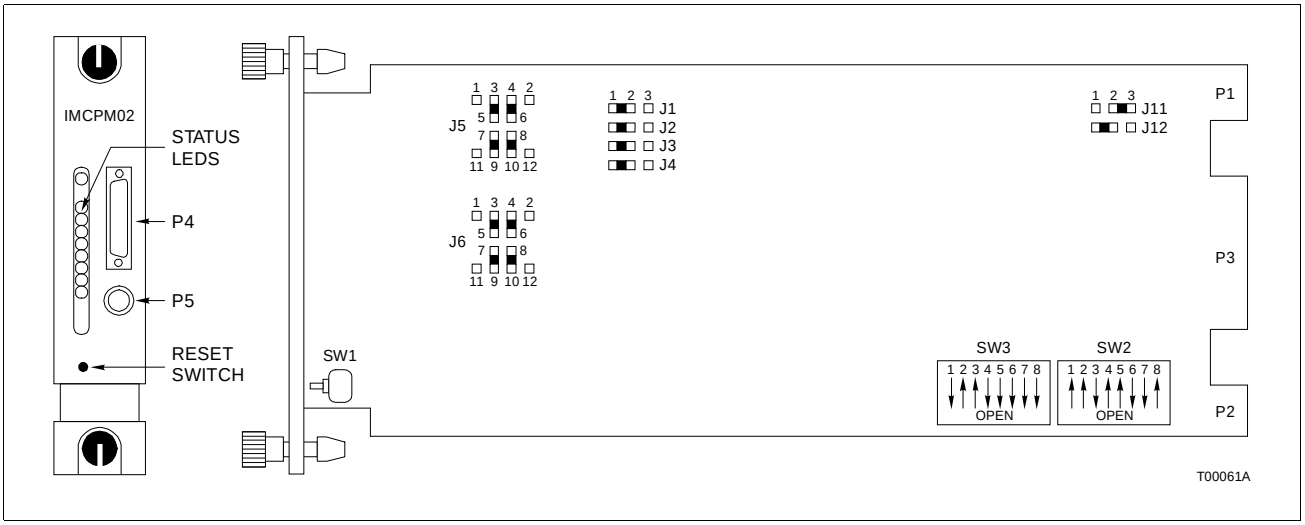

Figure 3-1. Switch and Jumper Positions

- One pole to enable the data base commands (available in in software release B_0 or later of the IMCPM02 module).
- One pole to enable the command/reply checksums for the EWS port.
- Two poles to select stop bits and parity bits for the EWS port.
- Three poles to select the baud rate for the EWS port..

Table 3-1. Dipswitch SW2 Settings for Normal Mode

Indicates default settings

<table>
<tr><th>Pole</th><th>Function</th><th>Settings</th></tr>
<tr><td>1</td><td>LED display</td><td>0 = EWS activity
1 = CTT activity</td></tr>
<tr><td>2</td><td>Data base commands</td><td>0 = Disabled
1 = Enabled</td></tr>
<tr><td>3</td><td>Command/reply checksums</td><td>0 = Disabled
1 = Enabled</td></tr>
<tr><td>4,5</td><td>EWS port characteristics</td><td>
<table>
<tr><th>Setting</th><th>Parity</th><th>Stop Bits</th></tr>
<tr><td>0 0</td><td>None</td><td>1</td></tr>
<tr><td>0 1</td><td>Even</td><td>1</td></tr>
<tr><td>1 0</td><td>Odd</td><td>1</td></tr>
<tr><td>1 1</td><td>None</td><td>2</td></tr>
</table>
</td></tr>
<tr><td>6, 7, 8</td><td>EWS port baud rate</td><td>
<table>
<tr><th>Setting</th><th>Baud Rate</th></tr>
<tr><td>0 0 0
0 0 1</td><td>150
300</td></tr>
<tr><td>0 1 0
0 1 1</td><td>600
1200</td></tr>
<tr><td>1 0 0
1 0 1</td><td>2400
4800</td></tr>
<tr><td>1 1 0
1 1 1</td><td>9600
19200</td></tr>
</table>
</td></tr>
</table>

NOTE: Open = OFF = Logic 1; closed = ON = Logic 0.

Switch SW3 - Module Address

Dipswitch SW3 sets the IMCPM02 module address on Control-way or module bus. The IMCPM02 module can have an address from 0 through 31.

NOTE: If a CTT terminal is used, set the CTT terminal and the IMCPM02 module to the same module address to avoid duplicate address conflicts with the other modules of the process control unit.

Figure 3-1 shows the dipswitch location and Table 3-2 lists the dipswitch assignments. Dipswitch SW3 provides the following functions:

- One pole to put the module in either diagnostic or normal operation mode.
- One pole to disable on-line ROM checksum verification.
- One pole to select Controlway or module bus mode.
- Five poles to select the module address.

NOTE: On-line ROM checksum verification is always used for normal operation. It should not be disabled.

Jumper Installation

Figure 3-1 shows the jumper locations. Figure 3-2 shows a schematic diagram of jumpers J1 through J6.

Table 3-2. Dipswitch SW3 Settings

Indicates default settings

Pole	Function	Settings
1	Operation mode diagnostics	***0 = Normal*** 1 = Hardware
2	On-line ROM checksum verification	***0 = Enabled*** 1 = Disabled[1]
3	Controlway communications mode	0 = Controlway (1 Mbaud) 1 = Module bus (83.3 kbaud)
4, 5, 6, 7, 8	Module address	See nested table below

Setting	Address
0 0 0 0 0 0 0 0 0 1	0 1
0 0 0 1 0 0 0 0 1 1	2 3
0 0 1 0 0 . . . 1 1 1 0 1	4 . . . 29
1 1 1 1 0 1 1 1 1 1	30 31

NOTES:
1. Do not disable on-line ROM checksum verification. This function is used for development purposes only.
Open = OFF = Logic 1; closed = ON = Logic 0.

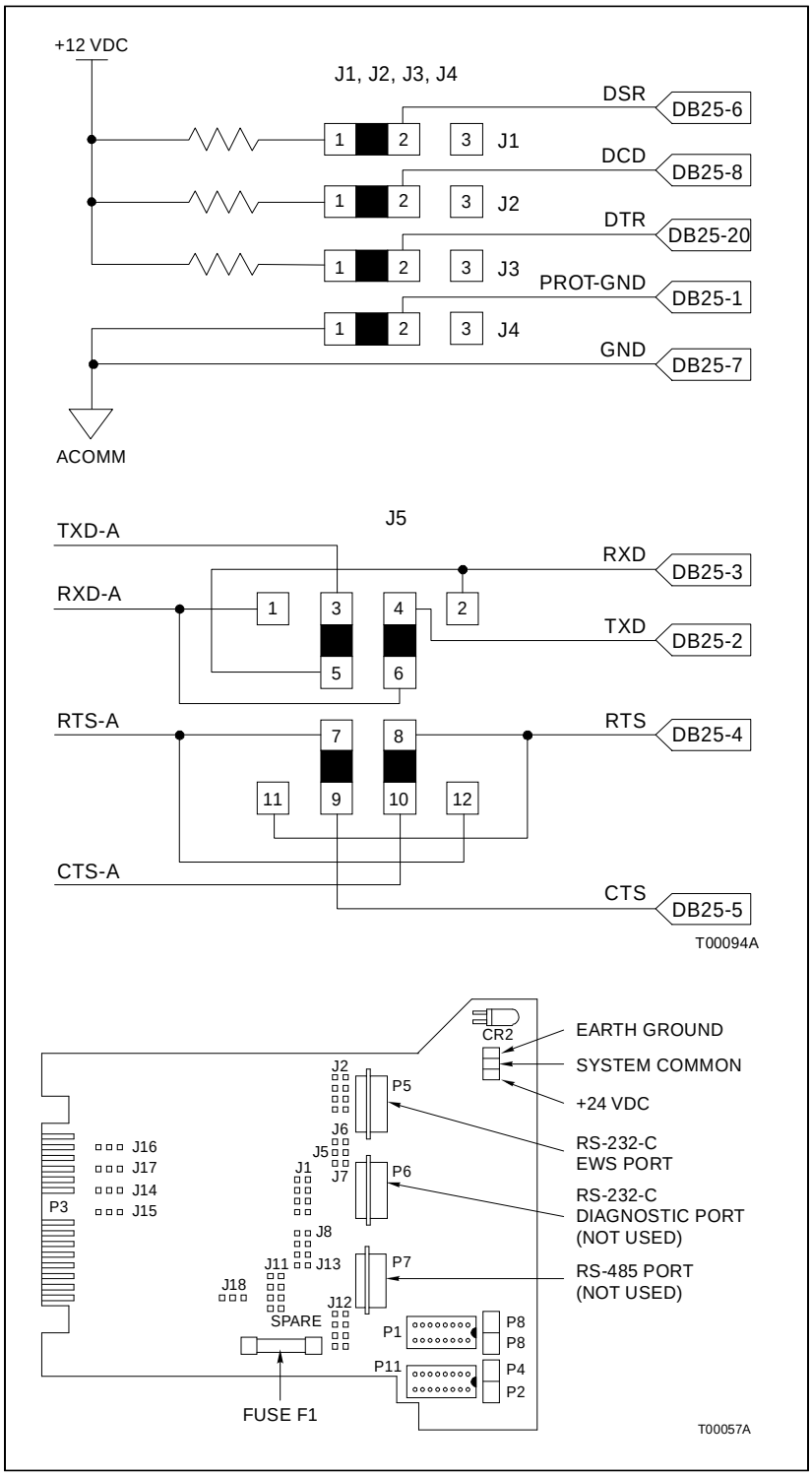

Figure 3-2. Schematic Diagram of Jumpers J1 through J6

JUMPERS J1 THROUGH J3

Jumpers J1, J2 and J3 enable the handshake functions for the serial (EWS) port and must be set to match the equipment used. The IMCPM02 module is shipped with these jumpers installed for +12 VDC (logic 0). Removing the jumpers allows the signals to float and may prevent the IMCPM02 module from communicating with the EWS station.

JUMPER J4

Jumper J4 connects the shield of the RS-232-C connector cable to chassis ground through the IMCPM02 module. The cable shield should be grounded at either end, but never both ends. If the cable shield is grounded at the computer end, short pins 2 and 3 of jumper J4. This opens the ground connection between the cable shield and the IMCPM02 module.

JUMPER ARRAYS J5 AND J6

Set jumper arrays J5 and J6 to match the type of equipment (DTE or DCE mode) communicating with the IMCPM02 module. Jumper array J5 selects DTE, DCE, or loopback operating mode for the serial port (P4). Jumper array J6 selects DTE, DCE or loopback operating mode for the unused utility port mounted on the circuit board. Either port can be DCE or DTE mode.

For connection to DCE equipment (modems) set up the IMCPM02 module as DTE mode. For connection to DTE equipment (computers such as the EWS) set up the IMCPM02 module as DCE mode.

For DCE type equipment (modems), install CPM jumpers J5 and J6 as shown in Figure 3-3. For DTE type equipment (computers such as the EWS), install the jumpers as shown in Figure 3-4. Confirm the equipment pinout to verify the RS-232-C standard before setting jumpers. Figure 3-5 shows the settings for jumper arrays J5 and J6 during diagnostics (loopback mode).

JUMPERS J11 AND J12

Jumper J11 is normally set shorting pin 2 to pin 3. This allows the CTT02 terminal to talk on the Controlway under IMCPM02 module control. If all the modules on the controlway are operating in module bus mode, you can connect the CTT02 terminal directly to the module bus. Do this by shorting pin 1 to pin 2; when the CTT terminal is connected directly to the module bus, the EWS port will not communicate on the module bus.

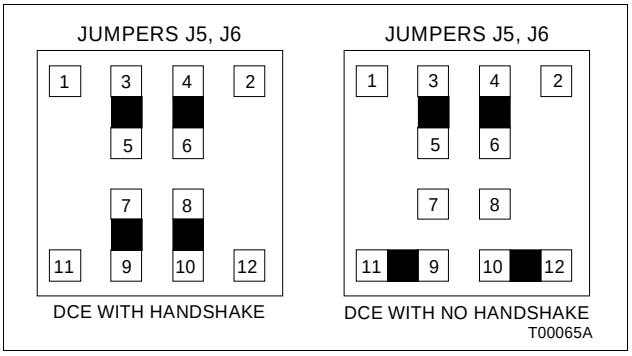

Figure 3-3. DCE Setting for Jumper Array J5 and J6

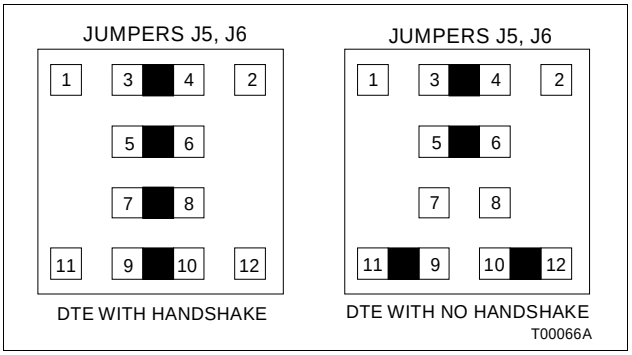

Figure 3-4. DTE Setting for Jumper Array J5 and J6

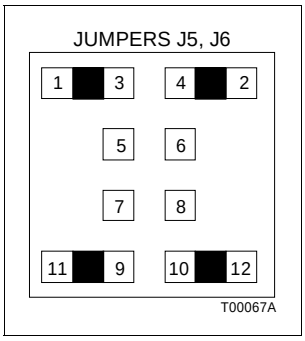

Figure 3-5. Loopback Setting for Jumper Array J5 and J6

Jumper J12 is normally set shorting pin 1 to pin 2. This avoids potential damage if the board is connected to the MMU backplane in early Network 90 systems. Early Network 90 systems applied -30 VDC to pins 3 and 4 of connector P1. This voltage can cause damage to INFI 90 modules. In INFI 90 systems, pins 3 and 4 of connector P1 are used for the redundant Controlway bus. In this case, pins 2 and 3 of jumper J12 are shorted to allow the IMCPM02 module to use the Controlway in redundant mode. See Figure 3-6 for the schematic of jumpers J11 and J12.

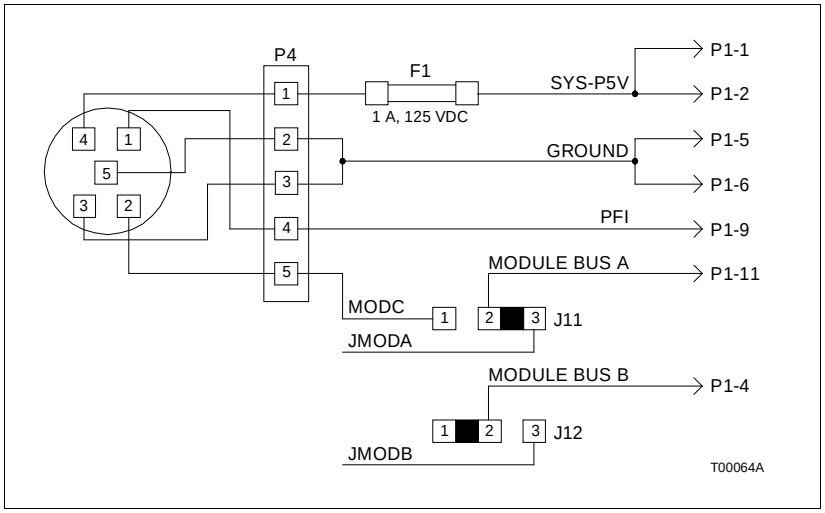

Figure 3-6. Schematic Diagram of Jumpers J11 and J12

PREPARING THE MODULE MOUNTING UNIT

Controlway Cable

This section explains how to connect the Controlway to two MMU backplanes. Figure 3-7 shows the location of the Controlway cable.

Verify the Controlway cable installation as follows:

1. Verify connection of one end of the (twisted 3-wire) to the second column of two tabs on the lower left of the MMU backplane.

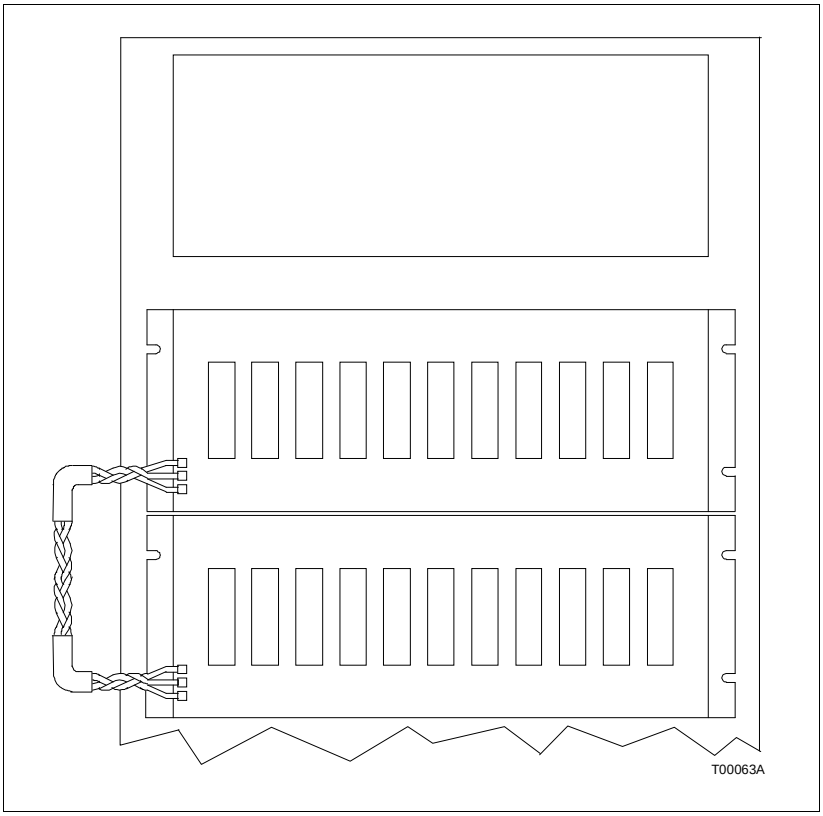

Figure 3-7. Controlway Cable Installation

2. Verify connection of the other end of the cable to the first column of two tabs on the lower left of the next MMU backplane.

> **NOTE:** Because of high-speed transaction constraints, install a maximum of eight related (Controlways linked by cable) MMU backplanes within one cabinet. Do not cable link Controlways in separate cabinets. Connecting three-wire lengths between MMU backplanes should be minimized to prevent crosstalk and interference.

INSTALLING THE MODULE

> **NOTE:** Before installing the IMCPM02 module, check the MMU backplane for -30 VDC. If the system uses an NAMM01, NAMM02, NLMM01, NCOM01 or NCOM02 module, then -30 VDC is required. Set J12 for before installing the IMCPM02 module into the system.

1. Face the rear of the cabinet. Locate the -30 VDC faston. It is the second faston from the top of the MMU backplane.

2. Check for -30 VDC with respect to system common at the -30 VDC faston. The -30 VDC is not connected in INFI 90 systems.

3. If the system does not require -30 VDC, disconnect the -30 VDC supply wiring faston or set jumper J12 before installing the IMCPM02 module.

4. Set jumper J12 correctly.

5. If you require additional information and/or assistance, please contact Bailey Controls technical support.

6. Before installing the module, check all dipswitch and jumper settings, and ensure that respective module cables are attached to the MMU backplane.

Modules can be installed and removed under power. Installing the module with power applied causes the Status LED to turn red momentarily and then turn green. If it does not, refer to Section 5.

To install module:

1. Guide the top and bottom edges along the top and bottom rails of the MMU backplane.

2. Slide the module into the slot. Push it until the rear edge is firmly seated in the backplane connectors.

3. Turn the two concentric screws ½ turn clockwise to lock the modules in place.

INSTALLING THE TERMINATION UNIT/MODULE

CAUTION	**It is strongly recommended that cabinet power be turned off before doing any termination unit wiring. Failure to do so could result in equipment damage. Do not apply power until all wire connections are verified. Do not apply power to the termination unit when uncut dipshunts are installed. This may result in damage to the termination unit.**
ATTENTION	**Il est fortement recommandé de mettre l'armoire hors tension avant de procéder au câblage de la carte de raccordement afin d'éviter tout dommage matériel. Ne rétablissez pas l'alimentation avant d'avoire vérifié toutes les connexions. Ne mettez pas la carte de raccordement sous tension tant que les dipshunts ne sont pas coupés, sinon la carte de raccordement pourrait étre endommagée.**

For permanent mounting, the IMCPM02 module can connect to a termination unit or termination module. Refer to Appendix B and Appendix C (NIMP01 module and NTMP01 unit) for information about these termination devices.

SECTION 4 - OPERATION

INTRODUCTION

This section explains what happens during start-up, the LED indicators and what they mean, and how to reset the module.

START-UP

At start-up, the IMCPM02 module checks its hardware using power up diagnostics to verify that it is working. The eight red status LEDs turn off when this operation is complete. The IMCPM02 module performs a series of tests at power up to verify correct operation of the hardware before enabling communications with the Controlway/module bus and serial channels. Any error causes the IMCPM02 module to halt immediately and display an error code on the faceplate LEDs.

RED/GREEN STATUS LED

The status LED is a red/green LED that shows IMCPM02 module operating condition. There are three possible states:

Off No power (momentarily off when processor initializes on power up).

Green Execute mode.

Red The IMCPM02 module has detected a hardware failure or an internal error and stopped the module. Additionally the eight status LEDs light to display the error code (refer to Section 5).

FACEPLATE LEDS 1 THROUGH 8

In normal operation, the IMCPM02 module uses the LEDs on the faceplate to indicate its status. The two-color status LED indicates the mode of the IMCPM02 module, green for execute mode and red for failed state. When in execute mode, the IMCPM02 module uses LEDs 1 through 8 as activity indicators.

If pole 1 of dipswitch SW2 is set to 0 (EWS activity), LEDs 1 through 8 display the number of commands and replies transferred through the EWS port. The LEDs increment once for each command, and once for each reply.

If pole 1 of dipswitch SW2 is set to 1 (CTT interface activity), LEDs 1 through 6 display the number of messages and replies transferred through the CTT interface. The LEDs increment once for each message received from the CTT terminal, and

once for each reply sent to the CTT terminal. LED 7 displays the status of the Controlway channel A, and LED 8 displays the status of Controlway channel B (see Figure 5-1).

When the IMCP02 is in the failed mode, these LEDs indicate module error codes. If an error occurs, the IMCPM02 module status LED turns red and LEDs 1 through 8 light up to display the error code (refer to Table 5-1). Note that LEDs 1 through 8 are all on when the system first starts up. This is normal. It means that the module is not yet on-line. In diagnostic operation mode, the LEDs indicate the status of the diagnostic test (refer to ***DIAGNOSTICS*** in Section 5).

RESET SWITCH

The reset switch resets the module. Access this switch through the opening on the faceplate below the LEDs. Use a thin, non-metalic object to press the switch. Press the switch once to recover from an error condition.

ON-LINE HARDWARE DIAGNOSTICS

The IMCPM02 module provides periodic on-line testing of the Controlway communication channels (if Controlway communication mode is enabled). If the module finds a failed channel, it disables the failed channel. LEDs 7 and 8 indicate the status of the Controlway communication channels A and B, if CTT terminal activity is selected on SW2 pole 1. The module also performs periodic ROM checksum verification.

SECTION 5 - TROUBLESHOOTING

INTRODUCTION

This section contains faceplate LED error codes, edge connector pinouts, cable connector pinouts, and explains the use of diagnostic tests.

LED DISPLAY

The IMCPM02 module has one two-color status LED on the faceplate to indicate the execute or failed status of the IMCPM02 module (see Figure 5-1). It has eight red status LEDs on the faceplate for diagnostic purposes and as an activity indicator. The LEDs are arranged vertically and numbered from one through eight, top to bottom. Refer to Table 3-1.

In normal operation, the LEDs indicate activity through either the CTT or EWS port. When the IMCPM02 module is in a failed state, LEDs 1 through 8 display a code indicating the error condition (refer to ***LED ERROR CODES***).

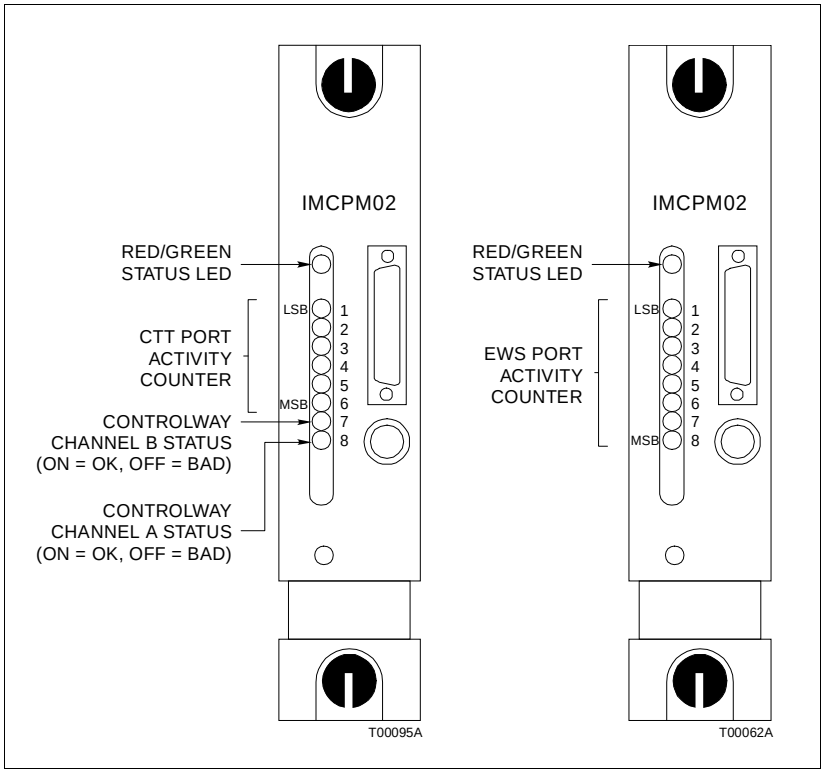

Figure 5-1. IMCPM02 Faceplate and LED Status Indicators

If pole 1 of dipswitch SW2 is set to 0 (EWS activity), LEDs 1 through 8 display the number of commands and replies transferred through the EWS port. The LEDs increment once for each command, and once for each reply.

If pole 1 of dipswitch SW2 is set to 1 (CTT interface activity), LEDs 1 through 6 display the number of messages and replies transferred through the CTT interface. The LEDs increment once for each message received from the CTT terminal, and once for each reply sent to the CTT terminal. LED 7 displays the status of the Controlway channel A, and LED 8 displays the status of Controlway channel B.

When the IMCPM02 module is in failed state, LEDs 1 through 8 display a code indicating the error condition. In diagnostic operation mode, the LEDs indicate the status of the diagnostic test (refer to ***DIAGNOSTICS***).

LED ERROR CODES

If an error occurs within the IMCPM02 module, the two-color status LED on the front panel turns red and LEDs 1 through 8 display the applicable error code from Table 5-1. The LEDs are numbered 1 through 8 from top to bottom. For undefined LED error codes, reset the IMCPM02 module. If the error recurs, replace the module.

Table 5-1. Red Status LED Error Codes

Code (Hex)	LEDs 8 7 6 5 4 3 2 1	Error Condition	Corrective Action
13	0 0 0 1 0 0 1 1	ROM checksum	Replace the IMCPM02 module.
17	0 0 0 1 0 1 1 1	Duplicate controlway address	Change the IMCPM02 module Controlway address to an unused address (dipswitch SW3, poles 4 through 8).
18	0 0 0 1 1 0 0 0	Data base enabled in network PCU	Disable data base commands (dipswitch SW2, pole 2 = 0).
31	0 0 1 1 0 0 0 1	Memory or CPU fault	Replace IMCPM02 module.
32	0 0 1 1 0 0 1 0	Address or bus error	Reset IMCPM02 module. If error recurs, replace the module.
33	0 0 1 1 0 0 1 1	Illegal instruction	Reset IMCPM02 module. If error recurs, replace the module.
34	0 0 1 1 0 1 0 0	Trace or privilege violation	Reset IMCPM02 module. If error recurs, replace the module.
35	0 0 1 1 0 1 0 1	Spurious interrupt	Reset IMCPM02 module. If error recurs, replace the module.
36	0 0 1 1 0 1 1 0	Divide by zero	Reset IMCPM02 module. If error recurs, replace the module.
38	0 0 1 1 1 0 0 0	Board level hardware error	Replace the IMCPM02 module.

CONNECTORS

The IMCPM02 module interfaces to external devices through cable connections of five separate connectors.

P1 - Power

The IMCPM02 module connects to the signals of the MMU backplane through the P1 edge connector as described by Table 5-2.

Table 5-2. Module Mounting Unit Signals

Pin	Signal	Pin	Signal
1	+5 VDC	7	+15 VDC (NC)
2	+5 VDC	8	-15 VDC (NC)
3	Power status (NC)	9	Power fail interrupt
4	Controlway channel B	10	(NC)
5	Common	11	Controlway channel A
6	Common	12	(NC)

P3 - Input/Output

The IMCPM02 module provides the signals required for a termination unit or termination module on the P3 edge connector as described by Table 5-3.

Table 5-3. Termination Unit Signals

Pin	Signal	Pin	Signal
1	(NC)	16	(NC)
2	(NC)	17	(NC)
3	(NC)	18	(NC)
4	(NC)	19	(NC)
5	(NC)	20	(NC)
6	(NC)	21	(NC)
7	Serial RXD A-	22	Serial RXD A+
8	Serial RXD B-	23	Serial RXD A+
9	Serial CTS A-	24	Serial CTS A+
10	Serial CTS B-	25	Serial CTS B+
11	Serial TXD A-	26	Serial TXD A+
12	Serial TXD B-	27	Serial TXD B+
13	Serial RTS A-	28	Serial RTS A+
14	Serial RTS B-	29	Serial RTS B+
15	(NC)	30	(NC)

NOTE: Serial Channel A is the EWS port. Serial Channel B is the utility port and is unavailable.

P4 - CTT Port

The IMCPM02 module supports the signals required for the CTT terminal listed in Table 5-4 through the round, five-pin male connector (P4). Jumper P4 is mounted on the faceplate of the IMCPM02 module.

Table 5-4. CTT Port Signals

Pin	Signal
1	+5 VDC
2	Common
3	Common
4	Power fail interrupt
5	Module bus

P5 - EWS Port

The IMCPM02 module supports the signals required for the EWS port (serial channel A) as described by Table 5-5 through the DB-25 female connector (P5) mounted on the faceplate. Jumper J5 configures DCE or DTE operation.

Table 5-5. EWS Port Signals

Pin	Signal
1	Protective ground
2	Transmitted data (TXD)
3	Received data (RXD)
4	Request to send (RTS)
5	Clear to send (CTS)
6	Data set ready (DSR)
7	Common
8	Data carrier detect (DCD)
20	Data terminal ready (DTR)

P6 - Utility Port

The IMCPM02 provides a DB-9 connector on board for development and diagnostic purposes. It is not available for customer use.

DIAGNOSTICS

The IMCPM02 module firmware contains diagnostic routines that can be invoked from power up. When in the diagnostic mode, it does not function as an IMCPM02 module. The

diagnostic routines test the operation of the module components and circuitry. This section describes how to use the diagnostic routines and provides a brief description of each test routine.

Set pole 1 of SW3 to off (OPEN) to enable hardware diagnostics. Faceplate LEDs display the test results. SW2 selects the group test or individual tests to be run.

Select a diagnostic test to run, then set the dipswitches and reset the module. Observe the test results on the faceplate LED display. The selected test runs repeatedly until the IMCPM02 module is reset or another test is selected on dipswitch SW2.

Dipswitch Selection

This section describes the settings and function of dipswitches SW2 and SW3. Figure 5-2 shows the dipswitch location on the IMCPM02 module.

Pole 1 of dipswitch SW2 selects the LED display mode. Pole 2 of dipswitch SW2 selects a halt on error feature. In this mode, the IMCPM02 module will halt test execution whenever the selected test detects an error. The number of the failing test is displayed on the front panel LEDs.

On dipswitch SW2, poles 3 through 8 select a diagnostic test to run. Pole 8 is the least significant bit (binary weight 1). Pole 3 is the most significant bit (binary weight 32). Refer to Table 5-6 for dipswitch SW2 settings for diagnostic mode. Refer to Table 5-7 for test ID values.

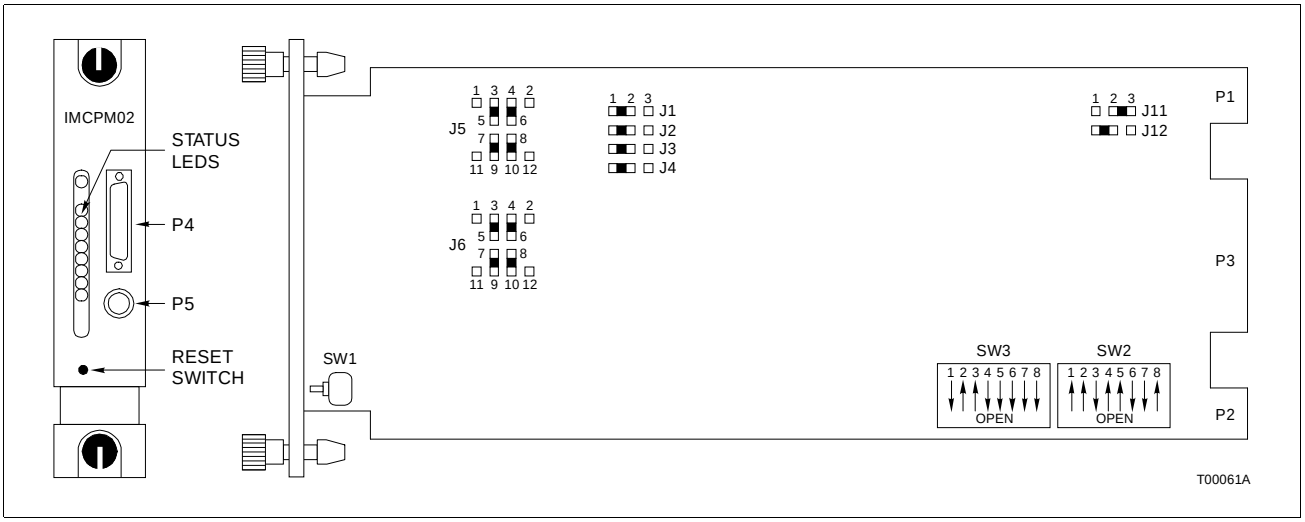

Figure 5-2. Switch Positions

Table 5-6. Dipswitch SW2 Settings for Diagnostic Mode

Pole	Function	Settings
1	LED display	0 = test number 1 = success/failure tally
2	Action on error	0 = continue 1 = halt
3, 4, 5, 6, 7, 8	Test number	

Setting	Test
0 0 0 0 0 0	00
0 0 0 0 0 1	01
0 0 0 0 1 0	02
0 0 0 1 0 0	04
0 0 1 0 0 1	09
0 0 1 0 1 0	0A
0 0 1 0 1 1	0B
0 0 1 1 0 0	0C
0 0 1 1 0 1	0E
0 0 1 1 1 1	0F
0 1 0 0 0 0	10
0 1 0 0 0 1	11

Table 5-7. Diagnostic Tests

Test ID (Hex)	Test Name	Dipswitch SW2
		3 4 5 6 7 8
00	Switches and LEDs	0 0 0 0 0 0
01	CPU	0 0 0 0 0 1
02	ROM (verify ROM checksum)	0 0 0 0 1 0
04	RAM	0 0 0 1 0 0
09	Module bus/Controlway	0 0 1 0 0 1
0A	DUART timer interrupt	0 0 1 0 1 0
0B	Dispatcher interrupt	0 0 1 0 1 1
0C	DUART serial channels (local loopback mode)	0 0 1 1 0 0
0E	CTT module bus	0 0 1 1 1 0
0F	Null test	0 0 1 1 1 1
10	Group test (runs tests 01 through 0F)	0 1 0 0 0 0
11	DUART serial channels external loopback (Set jumpers J5 and J6 to loopback settings[1])	0 1 0 0 0 1

NOTE: 1. See Figure 3-6 for loopback settings.

Set pole 1 of dipswitch SW3 to 1 (OFF position) to put the module into the diagnostic mode. Pole 2 of dipswitch SW3 is not used in diagnostic mode. The remaining poles select module address and Controlway or module bus. The function of each pole of dipswitch SW3 is the same in either diagnostic or normal mode (except pole 2).

LED Display

The faceplate LEDs display test results during diagnostic mode operation. See Figure 5-3. On module reset, all eight LEDs illuminate. Next, the dipswitches are read, the selected test is executed and the result is displayed on the LEDs. The format of the LED display depends upon the setting of SW2, pole 1. If this pole is in the ON position, the test number is displayed in LEDs 1 through 6. LED 8 illuminates if the test fails. This display format is latched on for 1/4 second for viewing ease, then the LEDs blank out for about 1/8 second, and the test is repeated. If SW2, pole 1 is OFF, a running tally of successes and failures will be displayed on the LEDs. LEDs 1 through 4 tally the passes, LEDs 5 through 8 the failures.

If a test fails with Halt-On Error selected (SW2, pole 2 OFF), the status LED turns red one second after the test status is displayed.

For the group test (10), each test is run in numerical order. On a failure, the test number that failed is displayed when the test number display mode is selected. A failure of a test within the group terminates the group test at that point. All tests after the failing test in the group will not be run until the fault is removed.

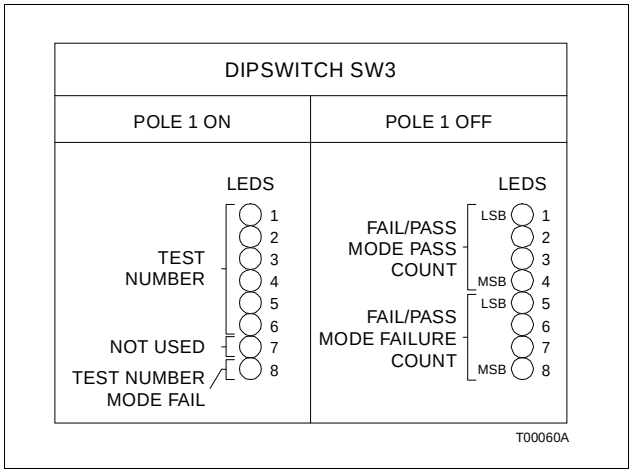

Figure 5-3. LEDs - Pass/Fail

TESTS

00 - Switches and LEDs

The byte values of the two switches are exclusive OR'd and the result displayed on the LEDs. The 0 and 1 states of each pole on both switches are summed, and the status LED is turned off for an even sum or turned on (green) for an odd sum.

01 - CPU Test

The CPU test verifies that the processor instruction set is operational.

02 - ROM Test

The ROM test calculates a checksum value of the EPROM and verifies that this value matches the checksum value which was stored in the EPROM during EPROM programming.

04 - Static RAM Test

In this test, data words containing fifteen 0s and one 1 are written and read from the full range of static RAM. The 1 is then shifted to the next of 16 bit places and the new data word is written and read from RAM. Similarly, a zero test is executed. Next, all RAM is cleared and verified, then all RAM is set and verified. The test includes byte, word and long word accesses.

09 - Module Bus/Controlway Test

After initializing the Controlway integrated circuit, this test sends a series of bytes to the module bus in loopback mode. The module address and bus speed are determined by dipswitch SW3. The timing and status of the transfer must be within tolerance.

0A - Timer Interrupt Test

This test initializes the timer for a one-millisecond timer interrupt, then waits for the timer interrupt event to occur. The test fails if a second interrupt does not occur within 1.008 milliseconds.

0B - Dispatcher Interrupt Test

This test issues a software dispatcher request (sets latch) and waits for an interrupt to occur. If an interrupt does not occur, the test fails.

0C - RS232 DUART Test

This test exercises both serial channels of the DUART in local loopback mode. If all parts of the test pass, the DUART is functioning properly.

0E - CTT Module Bus Test

This test sends a series of bytes to the CTT terminal module bus in loopback mode. The timing and status of the transfer must be within tolerance.

0F - Null Test

The IMCPM02 module always passes this test.

10 - Group Test

This test runs tests 01 through 0F in sequence, and is intended to verify proper operation of a IMCPM02 module with no external slaves or cables required. It is a single IMCPM02 module stand-alone test that can run continuously. For a more complete checkout of IMCPM02 module functionality, the following individual tests should also be executed: 00 (switches/LEDs), 11 (DUART external loopback test).

11 - RS232 DUART External Loopback Test

This test exercises both channels of the DUART in external loopback mode; jumpers J5 and J6 must be positioned in their loopback settings. If all parts of the test pass, the DUART and its support circuitry are functioning properly.

SECTION 6 - MAINTENANCE

INTRODUCTION

The IMCPM02 module requires minimal maintenance. If you do the tasks in Table 6-1, the module will provide long, trouble-free service. Please note that only qualified personnel should perform maintenance.

MAINTENANCE SCHEDULE

Table 6-1 is the maintenance schedule. These tasks are to be performed at the specified intervals.

Table 6-1. 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: Modules Module mounting unit Fan assembly Power entry panel	

SECTION 7 - REPAIR/REPLACEMENT PROCEDURES

INTRODUCTION

Repair procedures are limited to module replacement. If the IMCPM02 module fails, remove and replace it with another. Verify that firmware revision levels match and that replacement switch settings are the same as the failed module. Refer to Table 7-1 for a list of recommended spare parts.

MODULE REPLACEMENT

Follow Steps 1 through 5 to replace the IMCPM02 module.

> **NOTE:** The IMCPM02 module can be removed when power is applied.

1. Turn the two concentric screws ½ turn either way to release them.

2. Grasp the screws and slide the module out.

3. Set switches SW1 and SW2 on the replacement to match the settings of the CPM module recently removed.

4. Verify jumpers J5 and J6, and J11 and J12.

5. Hold the module by the faceplate and slide it into the slot; push until the rear edges are firmly seated in the backplane connectors.

6. Turn the two concentric screws ½ turn clockwise either way to lock the module into the module mounting unit.

Table 7-1. Recommended Spare Parts List

Description	Part Number	Quantity
Module, communication port module	IMCPM02	1
Termination module, multi-function processor	NIMP01	1
Termination unit, multi-function processor	NTMP01	1
Cable, IMCPM02 to termination unit	NKTU01	1
Cable, IMCPM02 to termination module	NKTU02	1

SECTION 8 - SUPPORT SERVICES

INTRODUCTION

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

REPLACEMENT PARTS AND ORDERING INFORMATION

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

1. Part description, part number and quantity.

2. Model and serial numbers (if applicable).

3. Bailey instruction manual number, page number and reference figure that identifies the part.

When you order standard parts from Bailey Controls, use part numbers and descriptions from the recommended spare parts lists. Order parts without commercial descriptions from the nearest Bailey Controls sales office.

TRAINING

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

TECHNICAL DOCUMENTATION

Obtain additional copies of this manual from the nearest Bailey Controls sales office at a reasonable charge.

APPENDIX A - ENHANCED MODULE STATUS

ENHANCED MODULE STATUS

This section contains the enhanced module status format of the IMCPM02 module status (refer to Table A-1 and A-2). For more information, refer to Section 5).

Table A-1. Enhanced Module Status Block

Status Byte	Bit							
	7	6	5	4	3	2	1	0
0	ES	MODE (= 3)		Module type (= 21)				
1			RIO	LIO				
2		MEM						
3, 4	(not used)							
5	Enhanced module type (= 41)							
6	CWA	CWB						
7...12	(not used)							
13	Module nomenclature (= 2 for IMCPM02)							
14	Major revision level (ASCII letter, ie `A')							
15	Minor revision level (ASCII letter, ie `O')							

Table A-2. Enhanced Module Status Block Description

Field	Description
ES (Error summary)	0 = no errors 1 = error exists (check other fields)
MODE	1 = failed (not used) 2 = error (not used) 3 = execute
Module type (= 21)	Enhanced module type (refer to enhanced module type field)
RIO	0 = no remote I/O errors 1 = remote I/O error exists
LIO	0 = no local I/O errors 1 = local I/O error exists
MEM	0 = configuration memory available 1 = configuration memory exhausted

Table A-2. Enhanced Module Status Block Description (continued)

Field	Description
Enhanced module type (= 41)	IMCPM02
CWA	0 = Controlway channel A OK 1 = Controlway channel A failure
CWB	0 = Controlway channel B OK 1 = Controlway channel B failure

APPENDIX B - NIMP01 TERMINATION MODULE CONFIGURATION

INTRODUCTION

The IMCPM02 module can use the NIMP01 termination module for termination. Figure B-1 shows the dipshunt configuration required for connection to a modem. Figure B-2 shows the dipshunt configuration required to operate as an EWS port. Figure B-3 shows the jumper assignments for handshake signals. These jumpers are normally installed. Figure B-4 shows the required jumper settings for J14 through J17. Figure B-5 shows the required jumper setting for J18. Figure B-6 shows the NIMP01 connector assignments and jumper locations. Figure B-7 shows the cable connection.

NOTE: Port 1 is the EWS port. Port 2 is the utility port and is unavailable.

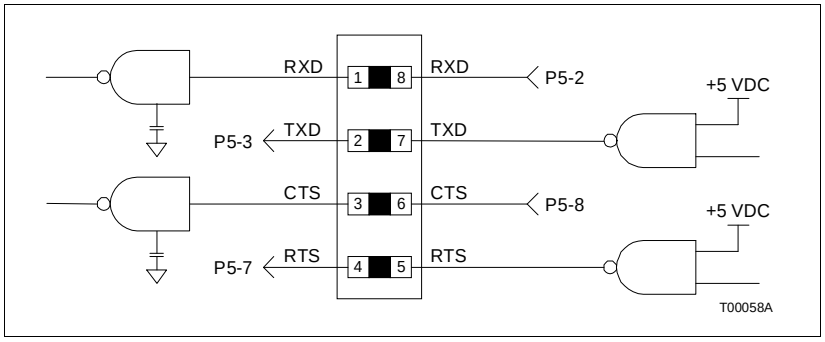

Figure B-1. NIMP01 Dipshunt Configuration for Modem (DCE) Connection

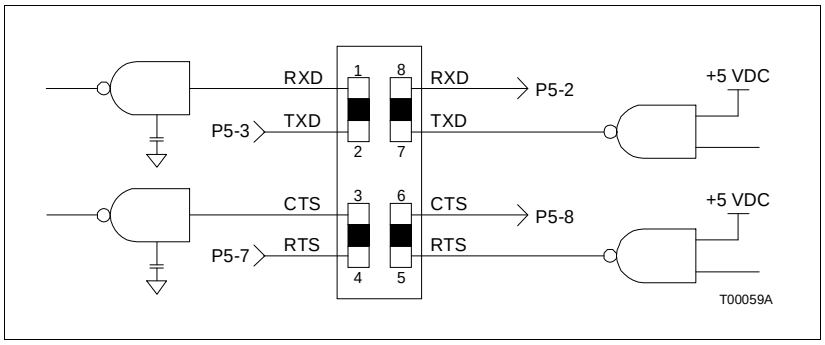

Figure B-2. NIMP01 Dipshunt Configuration for EWS (DCE) Connection

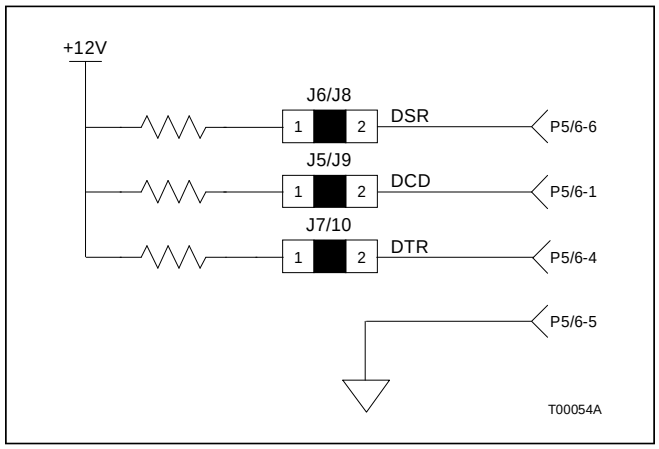

Figure B-3. NIMP01 Handshake Signal Schematic (Normally Installed)

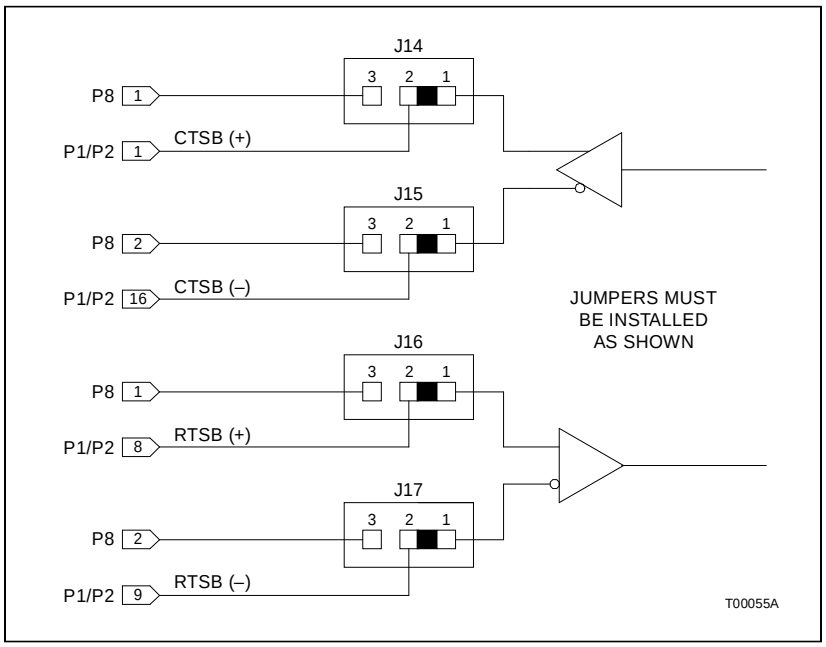

Figure B-4. NIMP01 Jumper Settings for J14 through J17

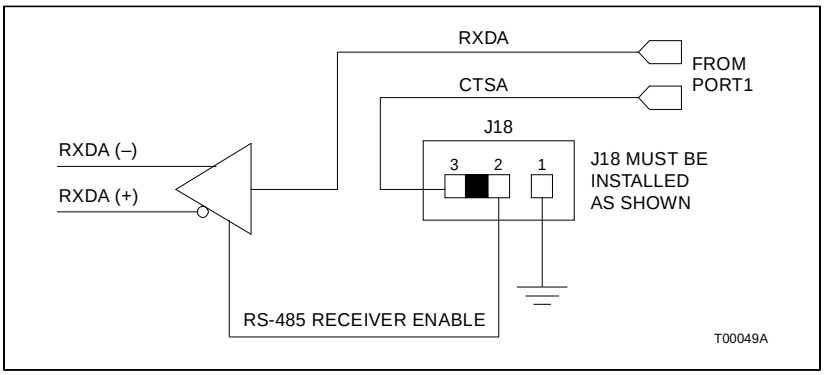

Figure B-5. NIMP01 Jumper Settings for J18

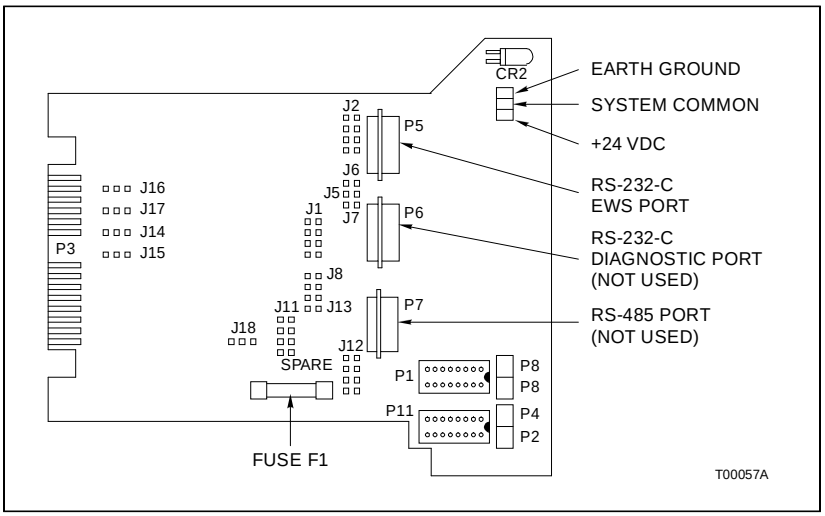

Figure B-6. NIMP01 Connector Assignments and Jumper Locations

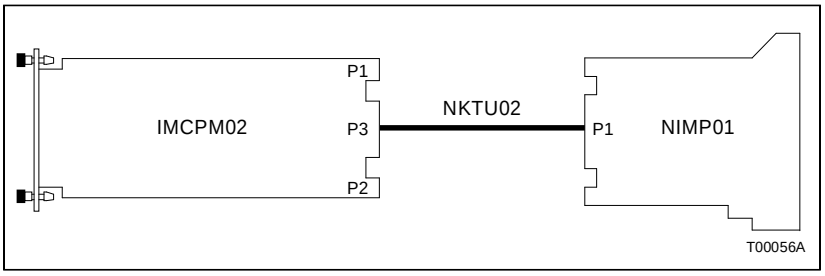

Figure B-7. NIMP01 Cable Connection

APPENDIX C - NTMP01 TERMINATION UNIT CONFIGURATION

INTRODUCTION

The IMCPM02 module can use the NTMP01 termination unit for termination. Figure C-1 shows the dipshunt configuration required for connection to a modem. Figure C-2 shows the dipshunt configuration required to operate as an EWS port. Figure C-3 shows the jumper assignments for handshake signals. These jumpers are normally installed. Figure C-4 shows the required jumper settings for J14 through J17. Figure C-5 shows the required jumper setting for J18. Figure C-6 shows the NTMP01 connector assignments and jumper locations. Figure C-7 shows the NTMP01 cable connection.

NOTE: Port 1 is the EWS port. Port 2 is the utility port and is unavailable.

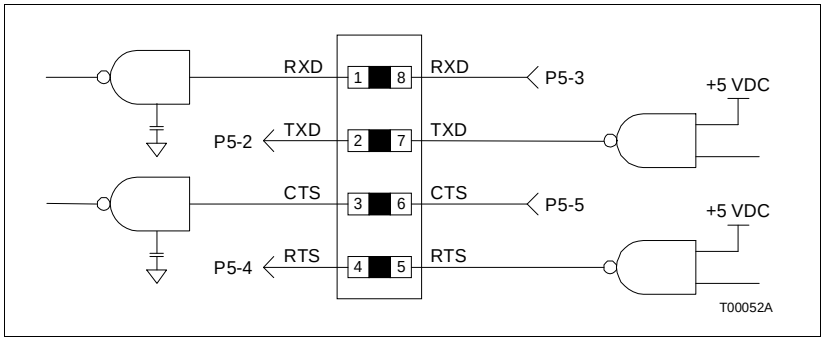

Figure C-1. NTMP01 Dipshunt Configuration for Modem (DCE) Connection

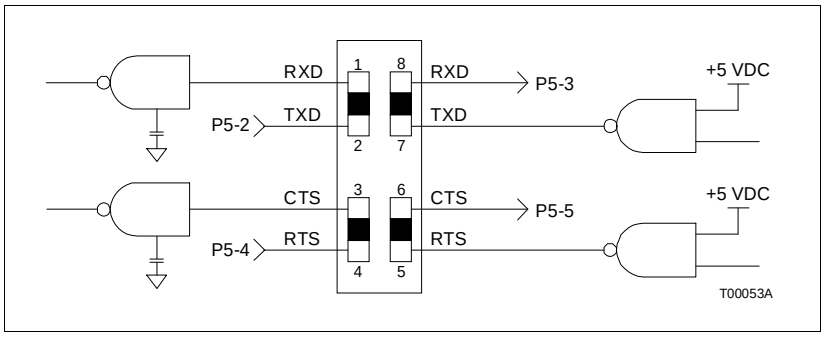

Figure C-2. NTMP01 Dipshunt Configuration for EWS (DTE) Connection

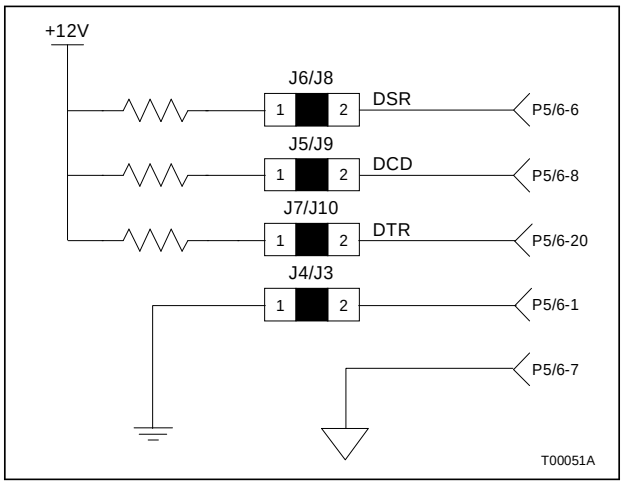

Figure C-3. NTMP01 Handshake Signal Schematic (Normally Installed)

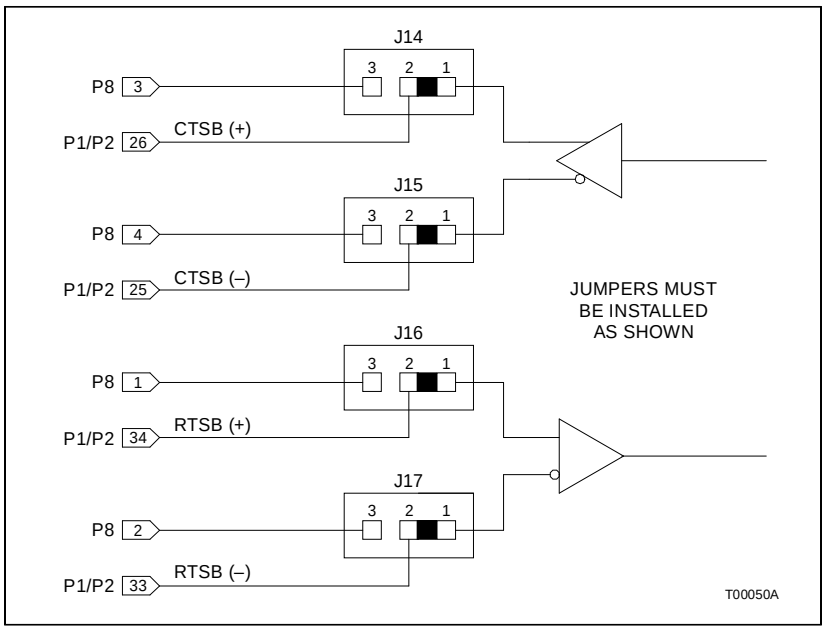

Figure C-4. NTMP01 Jumper Settings for J14 through J17

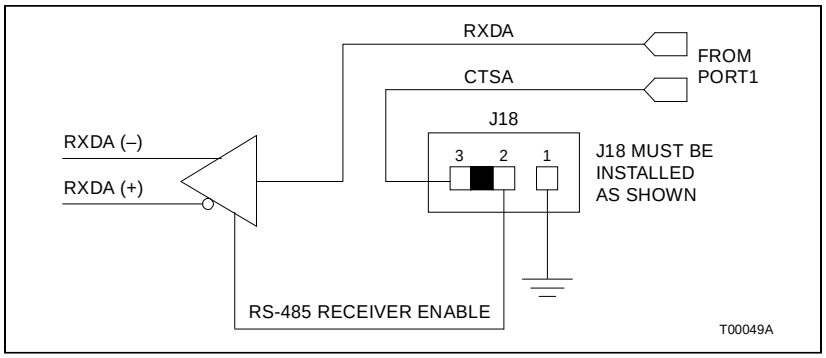

Figure C-5. NTMP01 Jumper Settings for J18

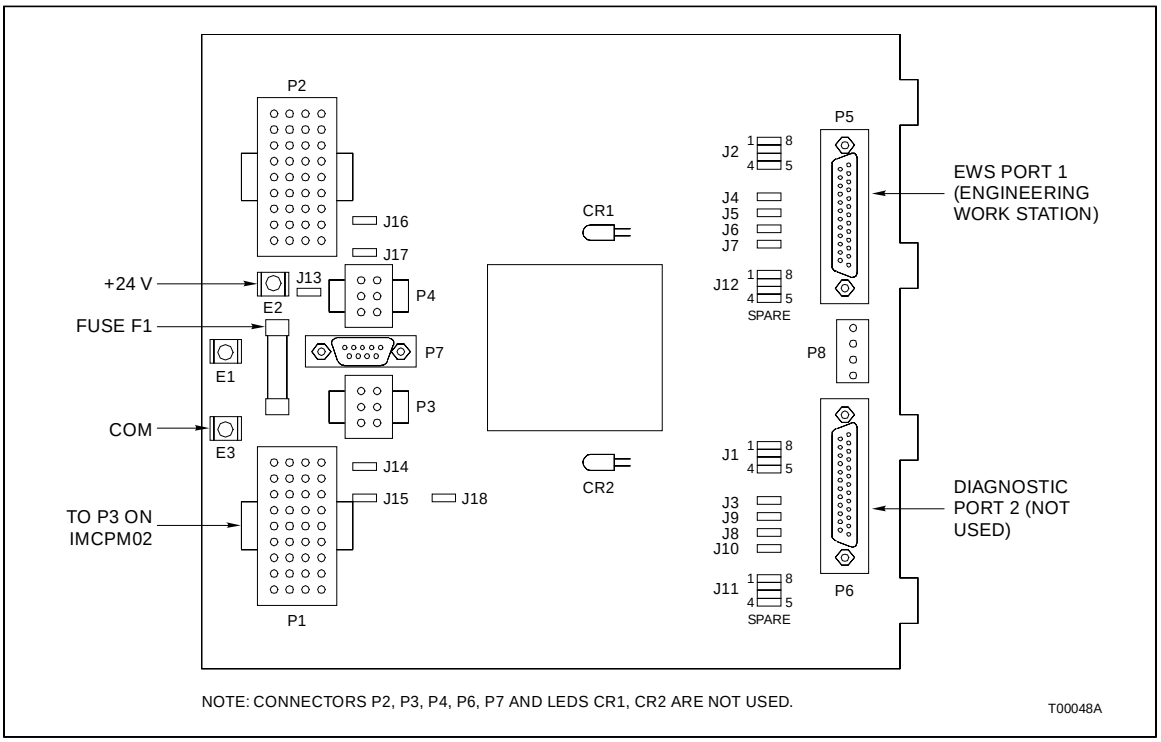

Figure C-6. NTMP01 Connector Assignments and Jumper Locations

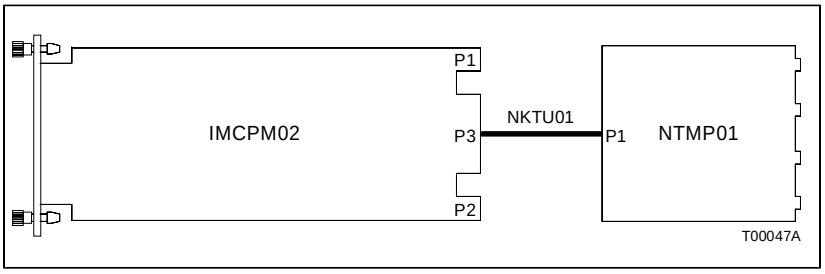

Figure C-7. NTMP01 Cable Connection

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Singapore 189721
Telephone 65-391-0800
Telefax 65-292-9011

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16154 Genoa, Italy
Telephone 39-10-6582-943
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