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Cat. No. W371-E1-03

SYSMAC
CPM2B
Programmable Controller

OPERATION MANUAL

OMRON

SYSMAC CPM2B Programmable Controller

Operation Manual

Revised July 2003

Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

⚠ DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ Caution Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation “Ch,” which appears in some displays and on some OMRON products, often means “word” and is abbreviated “Wd” in documentation in this sense.

The abbreviation “PLC” means Programmable Controller. “PC” is used, however, in some Programming Device displays to mean Programmable Controller.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

1,2,3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

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TABLE OF CONTENTS

About this Manual:

This manual describes the installation and operation of the CPM2B and includes the sections described below.

The CPM2B is a compact, high-speed board Programmable Controller (PLC) designed for control operations. There are two manuals describing the setup and operation of the CPM2B: The *CPM2B Operation Manual* (this manual) and the *CPM1/CPM1A/CPM2A/CPM2C/SRM1(-V2) Programming Manual* (W353). (The *CPM1/CPM1A/CPM2A/CPM2C/SRM1(-V2) Programming Manual* is referred to as simply the *Programming Manual* in this manual.)

This manual describes the system configuration and installation of the CPM2B and provides a basic explanation of operating procedures for the Programming Consoles. Read this manual first to acquaint yourself with the CPM2B.

The *Programming Manual* (W353) provides detailed descriptions of the CPM2B's programming functions. The *WS02-CXP□□-E CX-Programmer Operation Manual* (W414) provides details of operations for the WS02-CXP□□-E CX-Programmer.

Please read this manual carefully and be sure you understand the information provided before attempting to install and operate the CP2MB.

Section 1 describes the CPM2B's special features and functions, shows the possible system configurations, and outlines the steps required before operation. Read this section first when using the CPM2B for the first time. Refer to the *CPM1/CPM1A/CPM2A/CPM2C/SRM1(-V2) Programming Manual* (W353) for details on programming.

Section 2 provides the technical specifications of the CPM2B Boards and describes the main components of the Boards.

Section 3 provides information on installing and wiring a CPM2B PLC. Be sure to follow the directions and precautions in this section when installing the CPM2B in a panel or cabinet, wiring the power supply, or wiring I/O.

Section 4 describes the structure of the PLC memory areas and explains how to use them.

Section 5 provides a brief summary of the instruction set. Refer to the *CPM1/CPM1A/CPM2A/CPM2C/SRM1(-V2) Programming Manual* (W353) for details on specific instructions.

Section 6 provides an overview of Analog I/O Boards, including specifications, wiring, installation methods, basic settings, operations, and information on creating ladder programs.

Section 7 provides information on Programming Console operations.

Section 8 describes procedures for trial CPM2B operation, self-diagnosis functions, and error processing to identify and correct the hardware and software errors that can occur during PLC operation.

Appendices provides lists of standard models and Board dimensions.

⚠ **WARNING** Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

PRECAUTIONS

This section provides general precautions for using the Programmable Controller (PLC) and related devices.

The information contained in this section is important for the safe and reliable application of the Programmable Controller. You must read this section and understand the information contained before attempting to set up or operate a PLC system.

1 Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of installing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of managing FA systems and facilities.

2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

This manual provides information for programming and operating the Unit. Be sure to read this manual before attempting to use the Unit and keep this manual close at hand for reference during operation.

⚠WARNING It is extremely important that a PLC and all PLC Units be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying a PLC System to the above-mentioned applications.

3 Safety Precautions

⚠WARNING Do not attempt to take any board apart while the power is being supplied. Doing so may result in electric shock.

⚠WARNING Do not touch any of the terminals, terminal blocks or, for the CPM2B, the CPU board or expansion I/O board while the power is being supplied. Doing so may result in electric shock.

⚠WARNING When handling the Memory Backup Battery, never drop, disassemble, distort, short-circuit, heat to a high temperature, or throw into fire. Otherwise the Battery may explode, catch fire, or leak fluid.

⚠WARNING Do not attempt to disassemble, repair, or modify any Units. Any attempt to do so may result in malfunction, fire, or electric shock.

⚠WARNING Provide safety measures in external circuits (i.e., not in the Programmable Controller), including the following items, in order to ensure safety in the system if an abnormality occurs due to malfunction of the PLC or another external factor affecting the PLC operation. Not doing so may result in serious accidents.

- Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.
- The PLC will turn OFF all outputs when its self-diagnosis function detects any error or when a severe failure alarm (FALS) instruction is executed. As a countermeasure for such errors, external safety measures must be provided to ensure safety in the system.
- The PLC outputs may remain ON or OFF due to deposition or burning of the output relays or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.

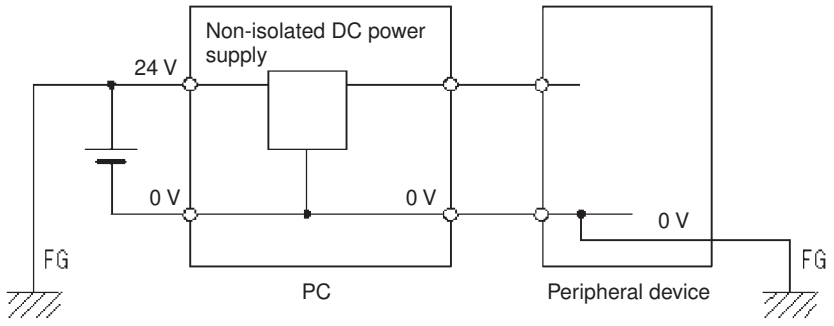
⚠WARNING When transferring programs to other nodes, or when making changes to I/O memory, confirm the safety of the destination node before transfer. Not doing so may result in injury.

⚠Caution Execute online edit only after confirming that no adverse effects will be caused by extending the cycle time. Otherwise, the input signals may not be readable.

⚠Caution Tighten the screws on the terminal block to the torque specified in the operation manual. The loose screws may result in burning or malfunction.

⚠Caution When connecting the PLC to a personal computer or other peripheral device, either ground the 0-V side of the PLC or do not ground the PLC at all. Although some grounding methods short the 24-V side, as shown in the following diagram, never do so with the PLC.

INCORRECT Grounding: Shorting the 24-V side of the Power Supply



4 Operating Environment Precautions

⚠ **Caution** Do not operate the control system in the following places:

- Locations subject to direct sunlight.
- Locations subject to temperatures or humidity outside the range specified in the specifications.
- Locations subject to condensation as the result of severe changes in temperature.
- Locations subject to corrosive or flammable gases.
- Locations subject to dust (especially iron dust) or salts.
- Locations subject to exposure to water, oil, or chemicals.
- Locations subject to shock or vibration.

⚠ **Caution** Take appropriate and sufficient countermeasures when installing systems in the following locations:

- Locations subject to static electricity or other forms of noise.
- Locations subject to strong electromagnetic fields.
- Locations subject to possible exposure to radioactivity.
- Locations close to power supplies.

⚠ **Caution** The operating environment of the PLC System can have a large effect on the longevity and reliability of the system. Improper operating environments can lead to malfunction, failure, and other unforeseeable problems with the PLC System. Be sure that the operating environment is within the specified conditions at installation and remains within the specified conditions during the life of the system.

5 Application Precautions

Observe the following precautions when using the PLC System.

⚠ **WARNING** Always heed these precautions. Failure to abide by the following precautions could lead to serious or possibly fatal injury.

- Always turn OFF the power supply to the PLC before attempting any of the following. Not turning OFF the power supply may result in malfunction or electric shock.
  - Mounting or dismounting the CPU board or expansion I/O board.
  - Setting switches or rotary switches.
  - Connecting or wiring the cables.
  - Connecting or disconnecting the connectors.

⚠ **Caution** Failure to abide by the following precautions could lead to faulty operation of the PLC or the system, or could damage the PLC. Always heed these precautions.

- Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.
- Construct a control circuit so that power supply for the I/O circuits does not come ON before power supply for the PLC. If power supply for the I/O circuits comes ON before power supply for the PLC, normal operation may be temporarily interrupted.
- If the operating mode is changed from RUN or MONITOR mode to PROGRAM mode, with the IOM Hold Bit ON, the output will hold the most recent status. In such a case, ensure that the external load does not exceed specifications. (If operation is stopped because of an operation error (including FALS instructions), the values in the internal memory of the CPU board will be saved, but the outputs will all turn OFF.)
- Always use the power supply voltage specified in the operation manuals. An incorrect voltage may result in malfunction or burning.
- Take appropriate measures to ensure that the specified power with the rated voltage is supplied. Be particularly careful in places where the power supply is unstable. An incorrect power supply may result in malfunction.
- Install external breakers and take other safety measures against short-circuiting in external wiring. Insufficient safety measures against short-circuiting may result in burning.
- Do not apply voltages to the input terminals in excess of the rated input voltage. Excess voltages may result in burning.
- Do not apply voltages or connect loads to the output terminals in excess of the maximum switching capacity. Excess voltage or loads may result in burning.
- Be sure that all the mounting screws, terminal screws, and cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction.
- When wiring the CPM2B, take countermeasures to prevent wiring cuttings from coming into contact with the product, such as covering the whole product with a dustproof cover. If wiring cuttings adhere to the PCB or circuit elements they may cause short-circuiting.
- Be sure to perform wiring in accordance with the relevant operation manual. Incorrect wiring may result in burning.
- Double-check all the wiring before turning ON the power supply. Incorrect wiring may result in burning.
- Be sure that the terminal blocks, expansion cables, and other items with locking devices are properly locked into place. Improper locking may result in malfunction.
- Be sure that terminal blocks and connectors are connected in the specified direction with the correct polarity. Not doing so may result in malfunction.
- Check the user program for proper execution before actually running it on the PLC. Not checking the program may result in an unexpected operation.
- Confirm that no adverse effect will occur in the system before attempting any of the following. Not doing so may result in an unexpected operation.
  - Changing the operating mode of the PLC.
  - Force-setting/force-resetting any bit in memory.

- Changing the present value of any word or any set value in memory.

- Resume operation only after transferring to the new CPU board the contents of the DM and HR Areas required for resuming operation. Not doing so may result in an unexpected operation.
- Do not pull on the cables or bend the cables beyond their natural limit. Doing either of these may break the cables.
- Do not place objects on top of the cables. Doing so may break the cables.
- Under no circumstances should batteries be short-circuited between positive (+) and negative (–) terminals, charged, disassembled, heated, or thrown into fire.
- When replacing parts, be sure to confirm that the rating of a new part is correct. Not doing so may result in malfunction or burning.
- When transporting or storing the CPM2B, cover the circuit boards in antistatic material to protect them from static electricity and maintain the proper storage temperature.
- Before touching the Unit, be sure to first touch a grounded metallic object in order to discharge any static build-up. Not doing so may result in malfunction or damage.
- Do not touch the expansion I/O connecting cable while the power is being supplied in order to prevent any malfunction due to static electricity.
- Do not touch CPM2B circuit boards or the components mounted to them with your bare hands. There are sharp leads and other parts on the boards that may cause injury if handled improperly.
- When disposing the product, observe local ordinances and regulations.

6 EC Directives

6-1 Applicable Directives

- EMC Directives
- Low Voltage Directive

6-2 Concepts

EMC Directives

OMRON devices that comply with EC Directives also conform to the related EMC standards so that they can be more easily built into other devices or the overall machine. The actual products have been checked for conformity to EMC standards (see the following note). Whether the products conform to the standards in the system used by the customer, however, must be checked by the customer.

EMC-related performance of the OMRON devices that comply with EC Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed. The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

Note Applicable EMC (Electromagnetic Compatibility) standards are as follows:

EMS (Electromagnetic Susceptibility): EN61131-2
EMI (Electromagnetic Interference): EN50081-2
(Radiated emission: 10-m regulations)

Low Voltage Directive

Always ensure that devices operating at voltages of 50 to 1,000 V AC and 75 to 1,500 V DC meet the required safety standards for the PLC (EN61131-2).

6-3 Conformance to EC Directives

The CPM2B PLCs comply with EC Directives. To ensure that the machine or device in which the CPM2B PLC is used complies with EC directives, the PLC must be installed as follows:

1,2,3...

1. The CPM2B PLC must be installed within a control panel.
2. Reinforced insulation or double insulation must be used for the DC power supplies used for the communications and I/O power supplies.
3. CPM2B PLCs complying with EC Directives also conform to the Common Emission Standard (EN50081-2). Radiated emission characteristics (10-m regulations) may vary depending on the configuration of the control panel used, other devices connected to the control panel, wiring, and other conditions. You must therefore confirm that the overall machine or equipment complies with EC Directives.

6-4 Relay Output Noise Reduction Methods

The CPM2B PLCs conform to the Common Emission Standards (EN50081-2) of the EMC Directives. However, the noise generated when the PLC is switched ON or OFF using the relay output may not satisfy these standards. In such a case, a noise filter must be connected to the load side or other appropriate countermeasures must be provided external to the PLC.

Countermeasures taken to satisfy the standards vary depending on the devices on the load side, wiring, configuration of machines, etc. Following are examples of countermeasures for reducing the generated noise.

Countermeasures

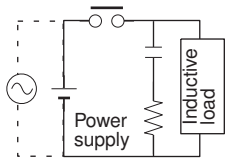
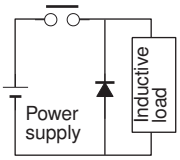
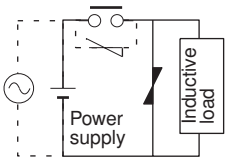
(Refer to EN50081-2 for more details.)

Countermeasures are not required if the frequency of load switching for the whole system with the PLC included is less than 5 times per minute.

Countermeasures are required if the frequency of load switching for the whole system with the PLC included is 5 times or more per minute.

Countermeasure Examples

When switching an inductive load, connect a surge protector, diodes, etc., in parallel with the load or contact as shown below.

Circuit	Current		Characteristic	Required element
	AC	DC		
CR method 	Yes	Yes	If the load is a relay or solenoid, there is a time lag between the moment the circuit is opened and the moment the load is reset. If the supply voltage is 24 to 48 V, insert the surge protector in parallel with the load. If the supply voltage is 100 to 200 V, insert the surge protector between the contacts.	The capacitance of the capacitor must be 1 to 0.5 μF per contact current of 1 A and resistance of the resistor must be 0.5 to 1 Ω per contact voltage of 1 V. These values, however, vary with the load and the characteristics of the relay. Decide these values from experiments, and take into consideration that the capacitance suppresses spark discharge when the contacts are separated and the resistance limits the current that flows into the load when the circuit is closed again. The dielectric strength of the capacitor must be 200 to 300 V. If the circuit is an AC circuit, use a capacitor with no polarity.
Diode method 	No	Yes	The diode connected in parallel with the load changes energy accumulated by the coil into a current, which then flows into the coil so that the current will be converted into Joule heat by the resistance of the inductive load. This time lag, between the moment the circuit is opened and the moment the load is reset, caused by this method is longer than that caused by the CR method.	The reversed dielectric strength value of the diode must be at least 10 times as large as the circuit voltage value. The forward current of the diode must be the same as or larger than the load current. The reversed dielectric strength value of the diode may be two to three times larger than the supply voltage if the surge protector is applied to electronic circuits with low circuit voltages.
Varistor method 	Yes	Yes	The varistor method prevents the imposition of high voltage between the contacts by using the constant voltage characteristic of the varistor. There is time lag between the moment the circuit is opened and the moment the load is reset. If the supply voltage is 24 to 48 V, insert the varistor in parallel with the load. If the supply voltage is 100 to 200 V, insert the varistor between the contacts.	---

SECTION 1
Introduction

This section describes the CPM2B's special features and functions, shows the possible system configurations, and outlines the steps required before operation. Read this section first when using the CPM2B for the first time.

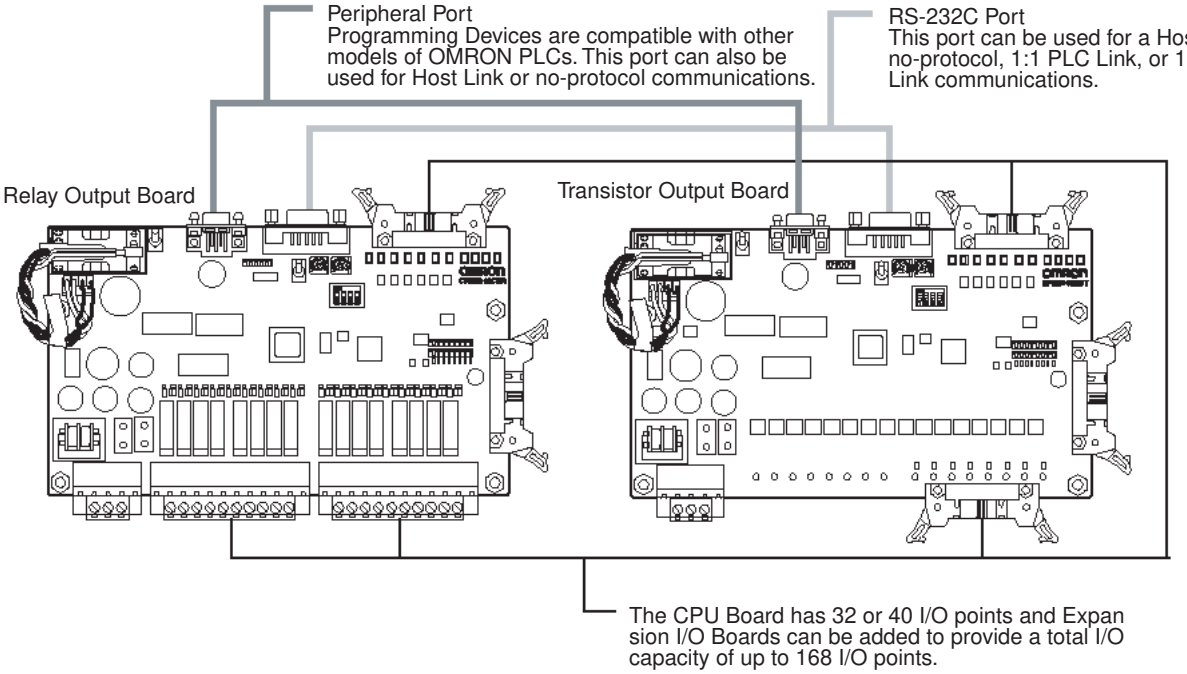
Refer to the *CPM1/CPM1A/CPM2A/CPM2C/SRM1(-V2) Programming Manual* (W353) for details on programming.

1-1 CPM2B Features and Functions

1-1-1 CPM2B Features

The CPM2B PLCs are compact Board PLCs that can be incorporated easily into control equipment. The PLCs are equipped with a variety of advanced features including synchronized pulse control, interrupt inputs, high-speed counters, pulse outputs, and a clock function.

- The compact Board design is ideal for incorporation into control equipment.
- The CPU Board itself can handle a wide range of machine control applications, so it is ideal for use as a built-in control unit in control equipment.
- The CPM2B is equipped with a full complement of communications functions to provide communications with personal computers, other OMRON PLCs, and OMRON Programmable Terminals. These communications capabilities allow the user to design a low-cost distributed production system.



Basic Functions

CPU Board I/O

The CPM2B CPU Board itself is equipped with 32 or 40 I/O points in I/O terminals or I/O connectors. There are 2 types of outputs available (relay outputs and sinking transistor outputs). The power supply for the CPM2B CPU Board is either 12 V DC or 24 V DC only.

Expansion I/O Boards

Up to two 64-point Expansion I/O Boards can be connected to the CPU Board to increase the PLC's I/O capacity to a maximum of 168 I/O points. There are also four types of 32-point Expansion I/O Boards available: two with relay outputs and the other with sinking transistor outputs. Up to three 32-point Expansion I/O Boards can be connected to the CPU Board.

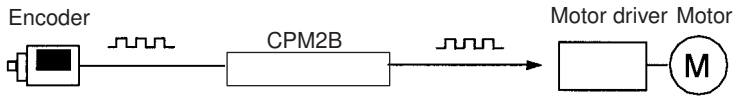
Share Programming Devices

The CX-Programmer (Ver.1.2 or later) or Programming Console can be used for programming and monitoring the CPM2B. Programming can also be performed from the SYSMAC Support Software (SSS).

Built-in Motor Control Capability

Synchronized Pulse Control (Transistor Outputs Only)

Synchronized pulse control provides an easy way to synchronize the operation of a peripheral piece of equipment with the main equipment. The output pulse frequency can be controlled as some multiple of the input pulse frequency, allowing the speed of a peripheral piece of equipment (such as a supply conveyor) to be synchronized with the speed of the main piece of equipment.



Pulses are output as a fixed multiple of the input frequency.

High-speed Counters and Interrupts

The CPM2B has a total of five high-speed counter inputs. The one high-speed counter input has a response frequency of 20 kHz/5 kHz and the four interrupt inputs in counter mode have a response frequency of 2 kHz.

The high-speed counter can be used in any one of the four input modes: differential phase mode (5 kHz), pulse plus direction input mode (20 kHz), up/down pulse mode (20 kHz), or increment mode (20 kHz). Interrupts can be triggered when the count matches a set value or falls within a specified range.

The interrupt inputs in counter mode can be used for incrementing counters or decrementing counters (2 kHz) and trigger an interrupt (executing the interrupt program) when the count matches the target value.

Easy Position Control with Pulse Outputs (Transistor Outputs Only)

CPM2B PLCs with transistor outputs have two outputs that can produce 10 Hz to 10 kHz pulses (single-phase outputs).

When used as single-phase pulse outputs, there can be two outputs with a frequency range of 10 Hz to 10 kHz with a fixed duty ratio or 0.1 to 999.9 Hz with a variable duty ratio (0 to 100% duty ratio).

When used as pulse plus direction or up/down pulse outputs, there can be just one output with a frequency range of 10 Hz to 10 kHz.

High-speed Input Capabilities for Machine Control

High-speed Interrupt Input Function

There are four inputs used for interrupt inputs (shared with quick-response inputs and interrupt inputs in counter mode) with a minimum input signal width of 50 μs and response time of 0.3 ms. When an interrupt input goes ON, the main program is stopped and the interrupt program is executed.

Quick-response Input Function

There are four inputs used for quick-response inputs (shared with interrupt inputs and interrupt inputs in counter mode) that can reliably read input signals with a signal width as short as 50 μs.

Stabilizing Input Filter Function

The input time constant for all inputs can be set to 1 ms, 2 ms, 3 ms, 5 ms, 10 ms, 20 ms, 40 ms, or 80 ms. The effects of chattering and external noise can be reduced by increasing the input time constant. (The input time constant is fixed to 1 ms for 40-point and 64-point Input Expansion I/O Board.)

Other Functions

Interval Timer Interrupts

The interval timer can be set between 0.5 and 319,968 ms and can be set to generate just one interrupt (one-shot mode) or periodic interrupts (scheduled interrupt mode).

Analog Settings

There are two controls on the CPU Board that can be turned to change the analog settings (0 to 200 BCD) in IR 250 and IR 251. These controls can be used to easily change or fine-tune machine settings such as a conveyor belt's pause time or feed rate.

DIP Switch Inputs

A DIP switch is provided that controls the status of four input bits.

Calendar/Clock

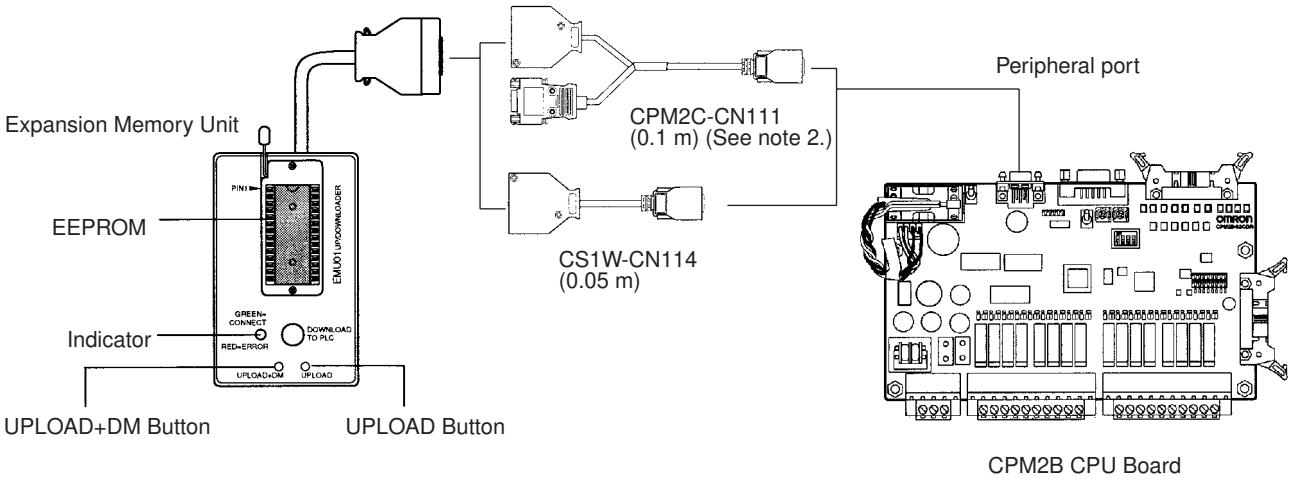
The built-in clock (accuracy within 1 minute/month) can be read from the program to show the current year, month, day, day of the week, and time. The clock can be set from a Programming Device (such as a Programming Console) or the time can be adjusted by rounding up or down to the nearest minute.

Long-term Timer

TIML(—) is a long-term timer that accommodates set values up to 99,990 seconds (27 hours, 46 minutes, 30 seconds). When combined with the SECONDS TO HOURS conversion instruction (HMS(—)), the long-term timer provides an easy way to control equipment scheduling.

Expansion Memory Unit

The CPM1-EMU01-V1 Expansion Memory Unit is a program loader for small-size or micro PLCs. Using the CPM1-EMU01-V1, simple on-site transfer of user programs and data memory is possible with PLCs.

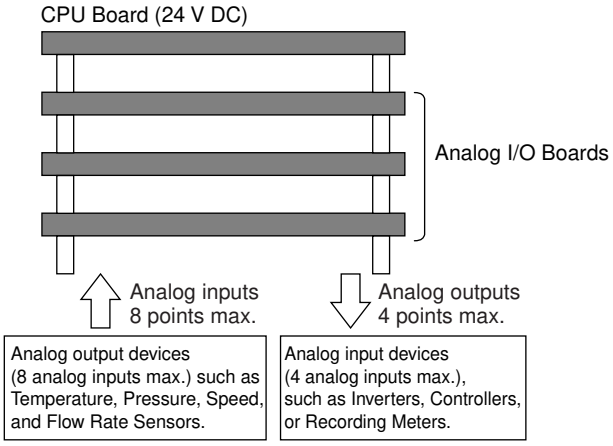


Note

1. Refer to the *CPM 2A Operation Manual* (W352) or *CPM2C Operation Manual* for details on the CPM1-EMU01-V1.
2. The CPM2C-CN111 can be connected only to the peripheral port.

Capable of Analog I/O Control

A CPU Board with a 24-V DC power supply can be connected with up to three Analog I/O Boards, to which external analog I/O devices can be connected using up to eight inputs and four outputs.



- Select the Analog I/O Boards that are appropriate for the system being used from the following three models.

Model	Number of inputs	Number of outputs	Maximum No. of connectable Units
CPM2B-MAD63	6 points	3 points	1
CPM2B-MAD42	4 points	2 points	2
CPM2B-MAD21	2 points	1 point	3

(If two CPM2B-MAD42 Analog I/O Boards are connected, there will be 8 inputs and 4 outputs.)

- Analog I/O signals correspond to various voltage/current signals, enabling connection of various analog devices.

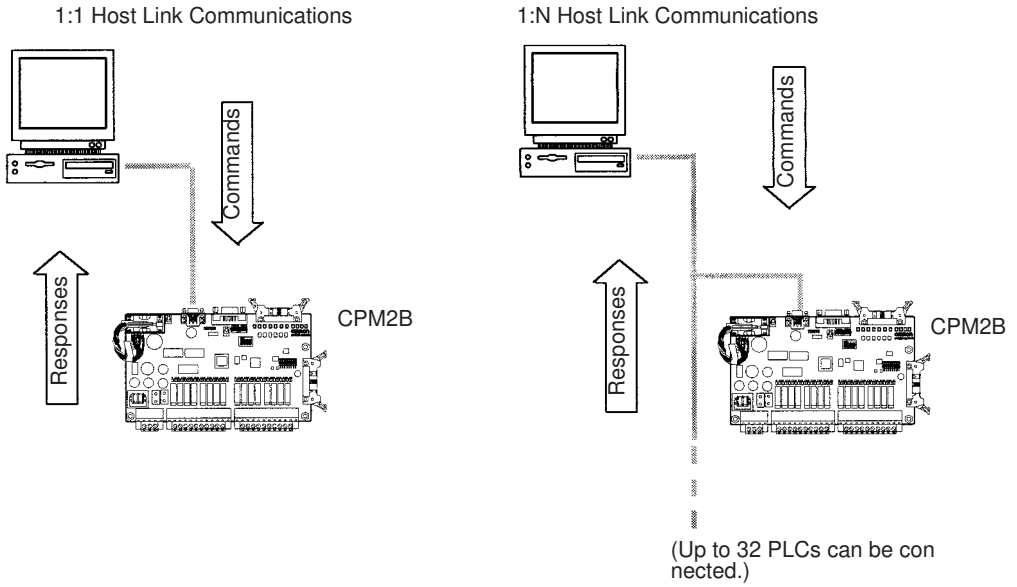
Input signal ranges	Output signal ranges	Resolution
0 to 5 V, 1 to 5 V, 0 to 10 V, −10 to 10 V, 0 to 20 mA, and 4 to 20 mA	1 to 5 V, 0 to 10 V, −10 to 10 V, 0 to 20 mA, and 4 to 20 mA	6,000 (full scale)

- If input signals are subject to minute fluctuations, average processing can be used to read the input signals as a stable signal. Average processing can be set separately for each input using the DIP switch.
- When analog inputs are used in the range of 1 to 5 V or 4 to 20 mA, line disconnection detection will function. When the input signal level recovers, the line disconnection status is automatically cleared.

Complete Communications Capabilities

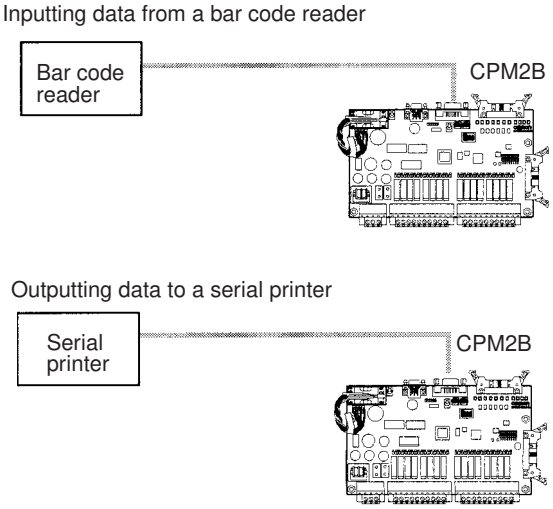
Host Link

A Host Link connection can be made through the PLC's RS-232C port or Peripheral port. A personal computer or Programmable Terminal connected in Host Link mode can be used for operations such as reading/writing data in the PLC's I/O memory or reading/changing the PLC's operating mode. (Only 1:1 connections are possible with a Programmable Terminal.)



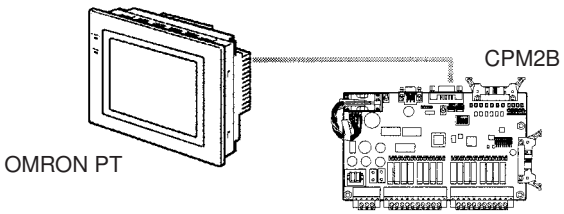
No-protocol Communications

The TXD(48) and RXD(47) instructions can be used in no-protocol mode to exchange data with standard serial devices. For example, data can be received from a bar code reader or transmitted to a serial printer. The serial devices can be connected to the RS-232C port or Peripheral port.



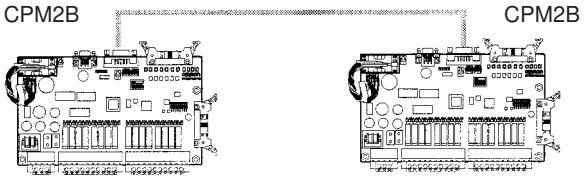
High-speed 1:1 NT Link Communications

In a 1:1 NT Link, an OMRON Programmable Terminal (PT) can be connected directly to the CPM2B. The PT must be connected to the RS-232C port; it cannot be connected to the Peripheral port.



One-to-one PLC Link

A CPM2B can be linked directly to another CPM2B, CQM1, CPM1, CPM1A, CPM2A, CPM2C, SRM1(-V2), C200HS or C200HX/HG/HE PLC. The 1:1 PLC Link allows automatic data link connections. The PLCs must be connected through the RS-232C ports; they cannot be connected through the Peripheral ports.



1-1-2 Overview of CPM2B Functions

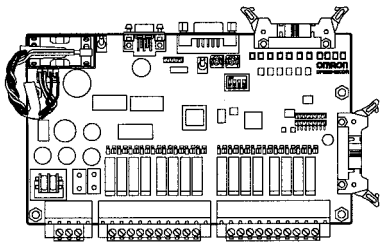
Main function	Variations/Details	
Interrupts	Interrupt inputs 4 inputs, see note 1. Response time: 50 μs	
	Interval timer interrupts 1 input Set value: 0.5 to 319,968 ms Precision: 0.1 ms	Scheduled interrupts
		One-shot interrupt
High-speed counters	High-speed counter 1 input, see note 2. Differential phase mode (5 kHz) Pulse plus direction input mode (20 kHz) Up/down input mode (20 kHz) Increment mode (20 kHz)	No interrupt
		Count-check interrupt (An interrupt can be generated when the count equals the set value or the count lies within a preset range.)
	Interrupt inputs in counter mode 4 inputs, see note 1. Incrementing counter (2 kHz) Decrementing counter (2 kHz)	No interrupt
		Count-up interrupt
Pulse outputs	2 outputs: Single-phase pulse output without acceleration/deceleration (See note 3.) 10 Hz to 10 kHz 2 outputs: Variable duty ratio pulse output (See note 3.) 0.1 to 999.9 Hz, duty ratio 0 to 100% 1 output: Pulse output with trapezoidal acceleration/deceleration (See note 3.) Pulse plus direction output, up/down pulse output, 10 Hz to 10 kHz	
Synchronized pulse control	1 point, see notes 2 and 3. Input frequency range: 10 to 500 Hz, 20 Hz to 1 kHz, or 300 Hz to 20 kHz Output frequency range: 10 Hz to 10 kHz	
Quick-response input	4 inputs, see note 1. Maximum input signal width: 50 μs	
Analog settings	2 controls (setting ranges: 0 to 200 BCD)	
Input time constant	Determines the input time constant for all inputs. (Settings: 1, 2, 3, 5, 10, 20, 40, or 80 ms)	
Calendar/Clock	Shows the current year, month, day of the week, day of the month, hour, minute, and second.	
Error log	Records the time of occurrence and error code.	

Note
1. These four inputs are shared by interrupt inputs, interrupt inputs in counter mode, and quick-response inputs, but each input can be used for only one purpose.
2. This input is shared by the high-speed counter and synchronized pulse control functions.
3. This output is shared by the pulse output and synchronized pulse control functions. These functions can be used with transistor outputs only.

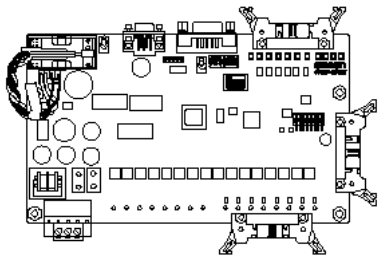
1-2 System Configurations

1-2-1 CPU Boards

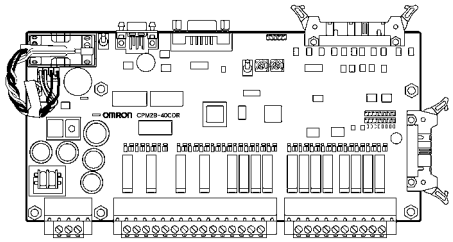
CPU Board with 32 I/O points (Relay outputs)



CPU Board with 32 I/O points (Transistor outputs)



CPU Board with 40 I/O points (Relay outputs)



Power supply voltage	CPU Board	Inputs	Outputs	Built-in functions	Model
				Battery, Clock, and RS-232C port	
24 V DC	32 I/O points (16 inputs, 16 outputs)	16 inputs, 24 V DC	16 relay outputs (Terminal-block)	---	CPM2B-32C1DR-D
				Yes	CPM2B-32C2DR-D
		16 inputs, 24 V DC	16 sinking transistor outputs (Connector)	---	CPM2B-32C1DT-D
				Yes	CPM2B-32C2DT-D
	40 I/O points (24 inputs, 16 outputs)	24 inputs, 24 V DC	16 relay outputs (Terminal-block)	Yes	CPM2B-40C2DR-D
12 V DC	32 I/O points (16 inputs, 16 outputs)	16 inputs, 12 V DC	16 sinking transistor outputs (Connector)	---	CPM2B-32C1D1T-D12
				Yes	CPM2B-32C2D1T-D12