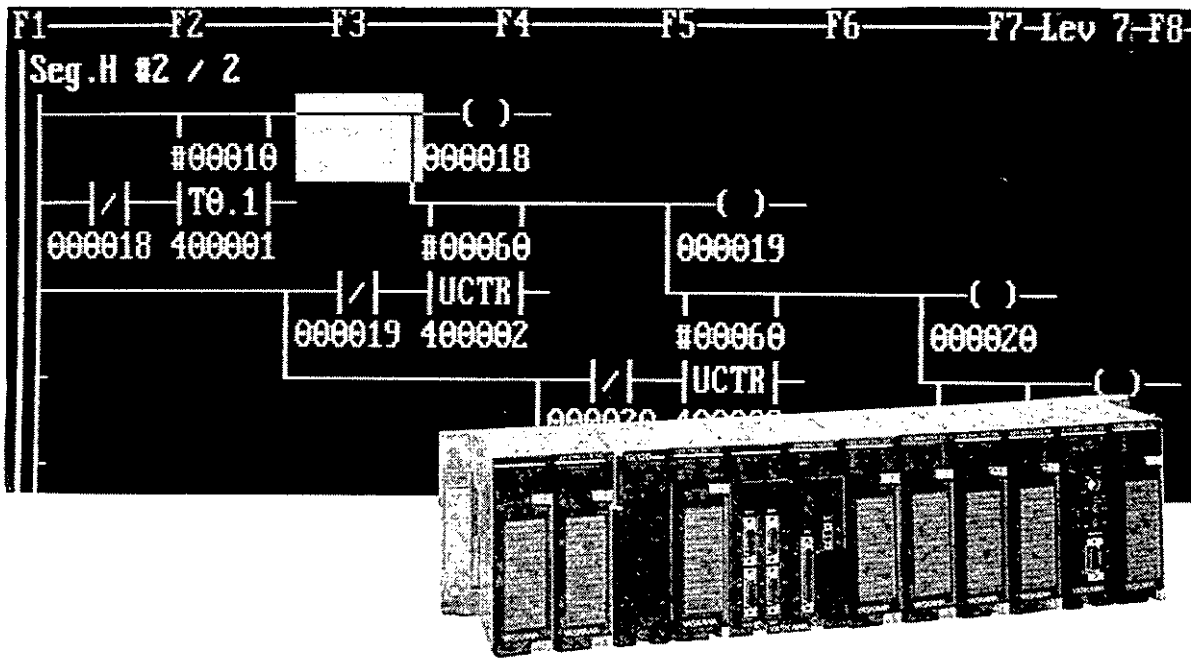
MEMOCON GL120, GL130

M-NET MODULE

USER'S MANUAL



YASKAWA

MANUAL NO. SIEZ-C825-70.12

Manual Contents

This manual describes specifications and applications of the M-NET Module as applicable to GL120 and GI130 Programmable Controllers.

Please read this manual carefully and be sure you understand the information provided before attempting to use the M-NET Module.

Visual Aids

The following aids are used to indicate certain types of information for easier reference.

Indicates references for additional information.

IMPORTANT — Indicates important information that should be memorized.

◀EXAMPLE▶ — Indicates application examples.

Indicates supplemental information.

◗SUMMARY — Indicates a summary of the important points of explanations.

Note — Indicates inputs, operations, and other information required for correct operation but that will not cause damage to the device.

Indicates definitions of terms used in the manual.

NOTICE

The following conventions are used to indicate precautions in this manual. Failure to heed precautions provided in this manual can result in injury to people or damage to the products.

⚠**WARNING** Indicates precautions that, if not heeded, could possibly result in loss of life or serious injury.

⚠**Caution** Indicates precautions that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation.

CONTENTS

CONTENTS

Introduction and Precautions

This chapter introduces this manual and provides precautions for the use of this manual and the product.
You must read this chapter before attempting to read the rest of the manual or using the product.

I.1 Overview

- This manual describes the functions, specifications, and uses of the M-NET Module for use with GL120 and GL130 PLCs.
- Read this manual carefully to properly use the M-NET Module. Also, keep this manual in a safe place so that it can be referred to whenever necessary.
- This manual is designed for use with the JAMSC-120NMN31000 M-NET Module.
- Refer to the following manuals for related peripheral devices and Modules.

	Manual Name	Manual Number	Contents
CPU Module	MEMOCON GL120, GL130 Hardware User's Manual	SIEZ-C825-20.1	Describes the various GL120 and GL130 system component devices, their functions, specifications, and how to operate them.
	MEMOCON GL120, GL130 Software User's Manual, Volume 1	SIEZ-C825-20.11	Describes the following for the GL120 and GL130: 1) Operating principles 2) I/O allocation 3) Overview of instructions 4) Instruction processing times
	MEMOCON GL120, GL130 Software User's Manual, Volume 2	SIEZ-C825-20.12	Describes the programming instructions used to create ladder programs for the GL120 and GL130. The following instructions are described in other manuals. 1) Expansion Math Instructions: Software User's Manual (Vol. 3) 2) Process Control Instructions: Software User's Manual (Vol. 4) 3) Communications Instructions COM: COM Instructions User's Manual FBUS: PC Link Module User's Manual MSTR: MEMOBUS PLUS User's Manual 4) Motion Control Instructions (ladder motion instructions) Motion Module MC20 Software User's Manual 5) Motion Language Motion Module MC20 Software User's Manual
I/O Modules	MEMOCON GL120, GL130 120-series I/O Modules User's Manual	SIEZ-C825-20.22	Describes the functions, specifications, and usage of the 120-Series Digital I/O Module.
Man-machine Interface	MEMOCON GL120, GL130 MEMOSOFT for DOS User's Manual	SIEZ-C825-60.10	Describes the functions and usage of the MEMOSOFT for DOS.
	FA Monitor ACGC4200 User's Manual	SIE-C825-60.57	Describes the functions, specifications, and usage of the FA Monitor ACGC4200.

- Thoroughly check the specifications and conditions or restrictions of the product before use.

I.2 Precautions

This section outlines general precautions that apply to using this manual and the product. **You must read this section first before reading the remainder of the manual.**

I.2.1 Safety Precautions

- The GL120 and GL130 were not designed or manufactured for use in devices or systems directly related to human life. Users who intend to use the product described in this manual for special purposes such as devices or systems relating to transportation, medical, space aviation, atomic power control, or underwater use must contact Yaskawa Electric Corporation beforehand.

- This product has been manufactured under strict quality control guidelines. However, if this product is to be installed in any location in which a failure of a GL120 or GL130 involves a life and death situation or in a facility where failure may cause a serious accident, safety devices MUST be installed to minimize the likelihood of any accident.

- Any illustrations, photographs, or examples used in this manual are provided as examples only and may not apply to all products to which this manual is applicable.

- The products and specifications described in this manual or the content and presentation of the manual may be changed without notice to improve the product and/or the manual. A new version of the manual will be released under a revised manual number when any changes are made.

- Contact your Yaskawa representative or a Yaskawa office listed on the back of this manual to order a new manual whenever this manual is damaged or lost. Please provide the manual number listed on the front cover of this manual when ordering.

- Contact your Yaskawa representative or a Yaskawa office listed on the back of this manual to order new nameplates whenever a nameplate becomes worn or damaged.

- Yaskawa cannot guarantee the quality of any products which have been modified. Yaskawa assumes no responsibility for any injury or damage caused by a modified product.

I.2.2 Installation Precautions

Abide by the following precautions when installing GL120 and GL130 systems.

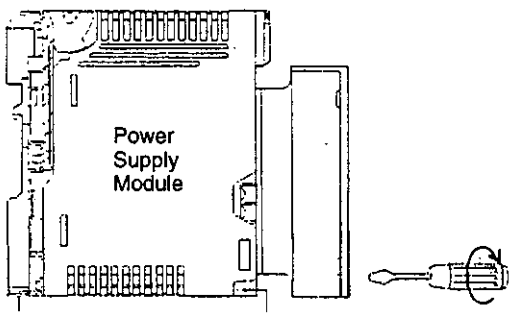
⚠Caution The installation environment must meet the environmental conditions given in the product catalog and manuals. Using the GL120 and GL130 in environments subject to high temperatures, high humidity, excessive dust, corrosive gases, vibration, or shock may lead to electrical shock, fire, or malfunction. Do not use the GL120 and GL130 in the following locations.

- Locations subject to direct sunlight or ambient temperatures not between 0°C and 60°C.
- Locations subject to relative humidity in excess of 95%, rapid changes in humidity, or condensation.
- Locations subject to corrosive or flammable gas.
- Locations that would subject the GL120 or GL130 to direct vibration or shock.
- Locations subject to contact with water, oil, chemicals, etc.

⚠Caution Install the GL120 and GL130 as described in this product manual. Improper installation can cause product failure, malfunctions, or Modules or other components to fall off.

Make sure that all mounting screws are securely tightened.

Make sure that all installation screws for Modules and terminal block for field connection are securely tightened so that they do not become loose. Loose screws will cause failures in the GL120/GL130.



Module mounting screw

I.2.3 Wiring Precautions

⚠Caution Wiring must be performed by qualified personnel.

Wrong or inappropriate wiring may cause fires, product failures, or malfunctions.

⚠Caution Do not let foreign matter such as cable chips into the Mounting Base or inside the Modules.

Foreign matter in the Mounting Base or Modules may cause fires, failures, and/or malfunctions.

⚠ **Caution** The M-NET Module is not protected from lightning surges. Do not install M-NET wiring overhead.

Lightening strikes can damage the product.

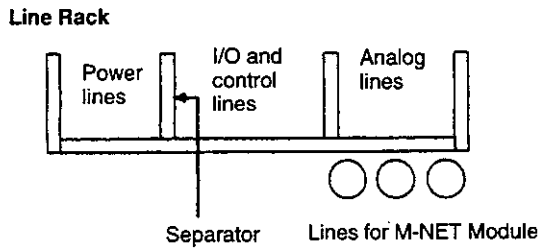
⚠ **Caution** Ground the protective ground terminal to a resistance of 100 Ω max.

Not grounding the protective ground terminal may result in electric shock or malfunctions.

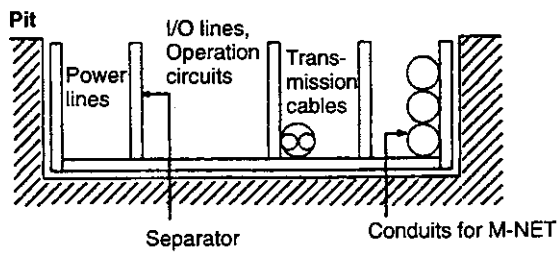
Select, Separate, and Lay External Wiring Correctly.

- I/O lines connecting external devices to the 120-series I/O Modules must be selected based on the following considerations: mechanical strength, resistance to noise, wiring distance, signal voltage, etc.

- I/O lines must be separated from power lines both inside and outside the control panel to minimize the affects of noise. Faulty operation may result if I/O lines are not sufficiently separated from power lines.



- When wiring M-NET Module cables outside the control panel, place them in a duct or conduit by themselves to minimize the affects of noise. Faulty operation can result if transmission cables are not sufficiently separated from power lines.



I.2.4 Applications Precautions

⚠ **WARNING** Do not touch terminals while the power is ON.

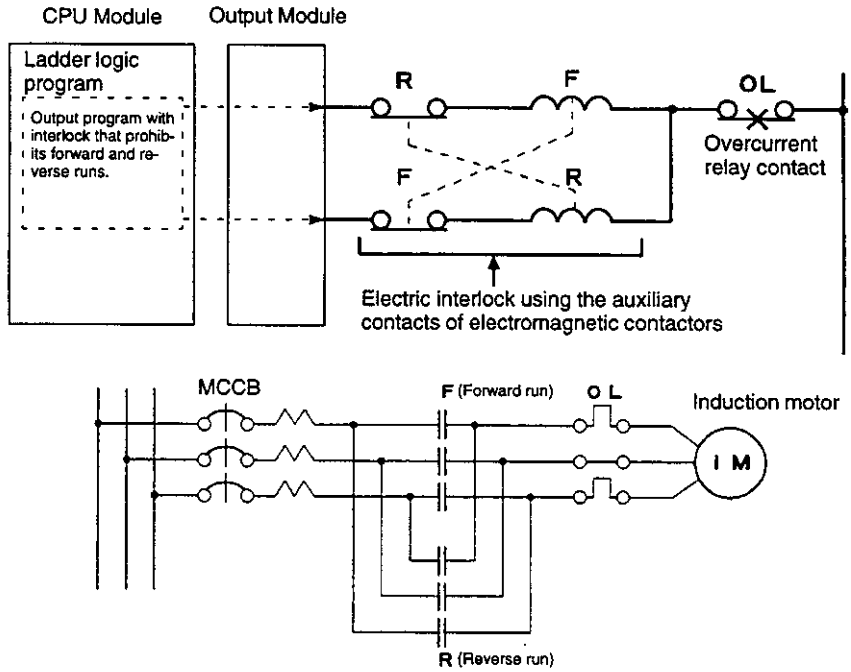
Touching line terminals can cause electric shock.

External Interlocks for the GL120 and GL130

Externally connect an interlock to the GL120 and GL130 if there is any chance that GL120 and GL130 failure could result in bodily harm or equipment damage.

Always use an external interlock system as shown in the following example when reciprocal operations (e.g., forward and reverse directions) are being performed with a motor.

An interlock circuit is generally programmed in the GL120/GL130 ladder logic program to ensure that forward and reverse signals are not simultaneously output. An external interlock circuit must also be provided using the auxiliary contacts of magnetic contactors.



I.2.5 Maintenance

⚠ **Caution** Do not disassemble or modify Modules and Mounting Bases.

Doing so can cause fires, product failures, or malfunctions.

I.3 Using this Manual

- This manual is written for those who already have a basic knowledge of GL120 or GL130 systems. We recommend reading the *MEMOCON GL120, GL130 Hardware User's Manual* before attempting to read this manual.

- **Meaning of Basic Terms**

  In this manual, the following terms are defined as follows, unless otherwise specified:

  - **M-NET = M-NET Module**
  - **PLC = Programmable (Logic) Controller**
  - **PP = Programming Panel**
  - **GL120, GL130 = MEMOCON GL120 and/or MEMOCON GL130 Programmable Controller**

- **Description of Technical Terms**

  The bold technical terms in this manual are briefly explained in the **Glossary** provided at the bottom of the page. An example is shown below.

Glossary

The following types of terms are described.

- Specific sequence control terms required for explanation of functions.
- Terms that are specific to Programmable Controllers and electronic devices.

Overview

1

This chapter outlines the M-NET Module.

1.1 Overview of Functions

This section gives an outline of the functions and describes the features of the M-NET Module.

1.1.1 Functions

1) The M-NET Module is one of the Communications Modules in the MEMOCON GL120 and GL130 Series. It can be used with GL120 and GL130 PLCs.

2) GL120 and GL130 PLCs with M-NET Modules can transfer I/O data between PLCs. Data communications are executed between Master and Slaves for a Master and up to 15 Slaves (see note).

3) The M-NET Module can be connected to GL60-series PLCs via a B2806 (2000-series M-NET Module) and to a U84 and other PLCs via a B1086 (1000-series M-NET Module).

Note If the Master is a B2806 or B1086, a maximum of 7 Slaves can be used.

1.1.2 Features

1) The M-NET features are as follows:

a) Interconnections between PLCs.

b) No special programs required.

c) Master-Slave communications format (up to 15 Slaves).

d) The same Module can serve as a Master or Slave (changed by software settings).

e) Several M-NET Modules can be used under one CPU Module.

f) External power source not required.

g) As with the I/O Modules, M-NET Modules can be mounted in any location.

h) Two communications ports per Module.

i) Master-Slave and baud rate settings specified separately for each port.

1.2 System Configuration

This section describes the M-NET system configuration.

1) The M-NET system configuration is shown in *Figure 1.1*.

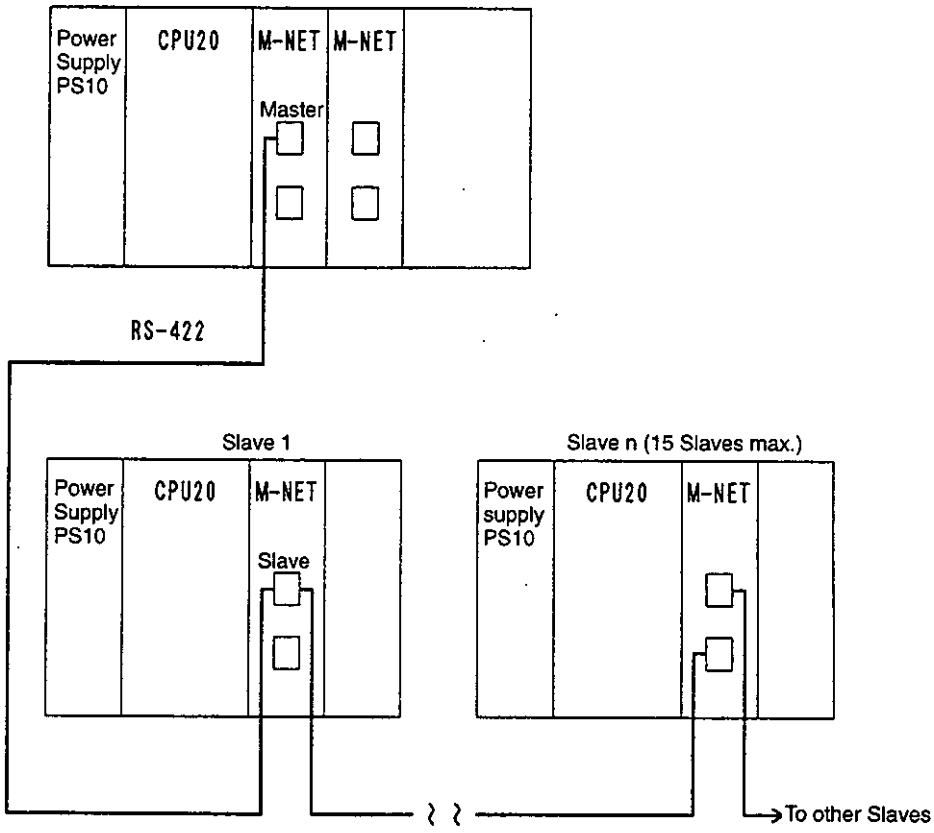


Figure 1.1 M-NET System Configuration

1.3 Data Transmission

There are two transmission modes in the M-NET Module: T Mode and Y Mode. This section describes data transmission in each of these modes.

1.3.1 Data Transmission in T Mode

1. Digital I/O

Data transmission in T Mode is shown in *Figure 1.2.*

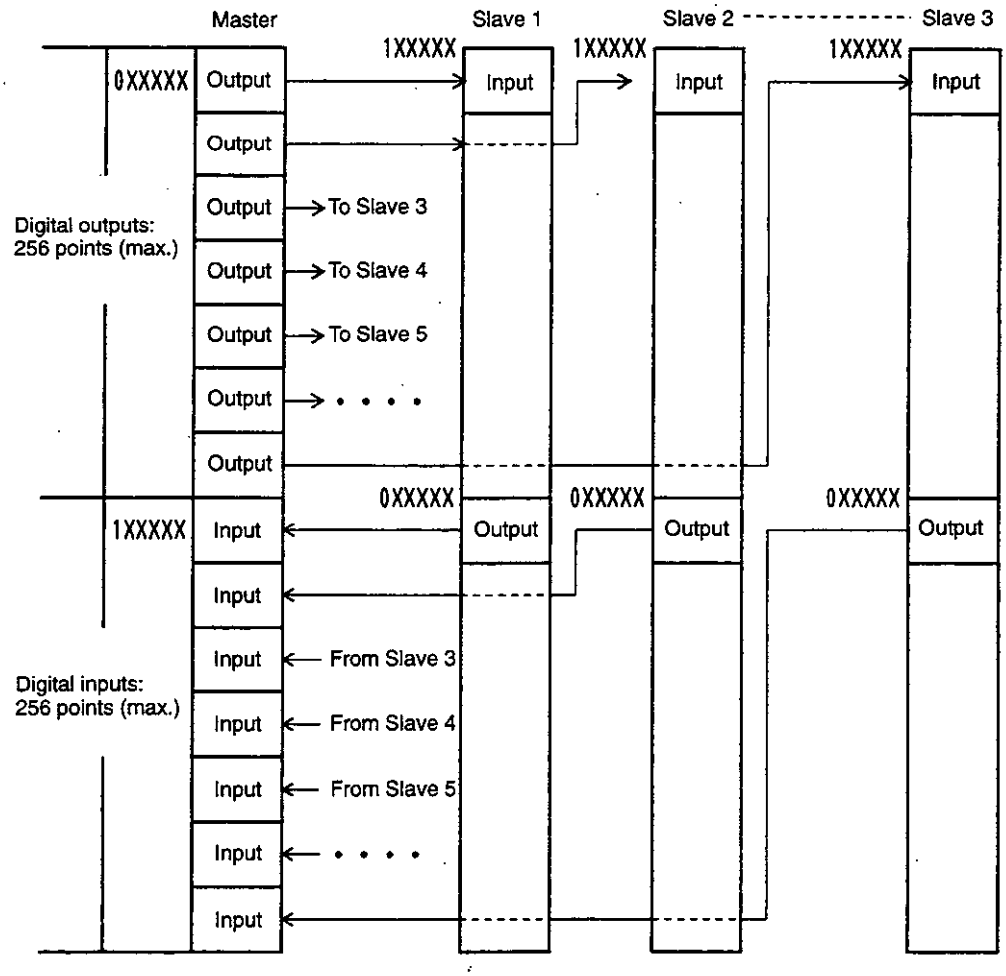


Figure 1.2 Outline of Data Transmission in T Mode

2. Contents of Data Transmission in T Mode

1) The digital output reference numbers (0XXXXX) and digital input reference numbers (1XXXXX) are set in the I/O allocation table in the CPU Module.

2) The setting unit for digital I/O references is 8 points.

3) The digital output signal for the same reference number cannot be transmitted to more than one Slave.

4) The number of digital I/O points for the Master will be the same as the total number of digital I/O points for the Slaves.

5) Transmission status between Master and Slave can be monitored by allocating one input register.

6) The number of digital I/O points that can be transmitted at one time to one Slave is as follows:

   • Digital inputs: 192 points

   • Digital outputs: 192 points

7) When there is more than one Slave, the number of digital input points and the number of digital output points transmitted to each Slave will all be the same.

1.3.2 Data Transmission in Y Mode

1. Digital I/O and Register I/O: Monitoring Disabled

Data transmission in Y Mode with monitoring disabled is shown in *Figure 1.3.*

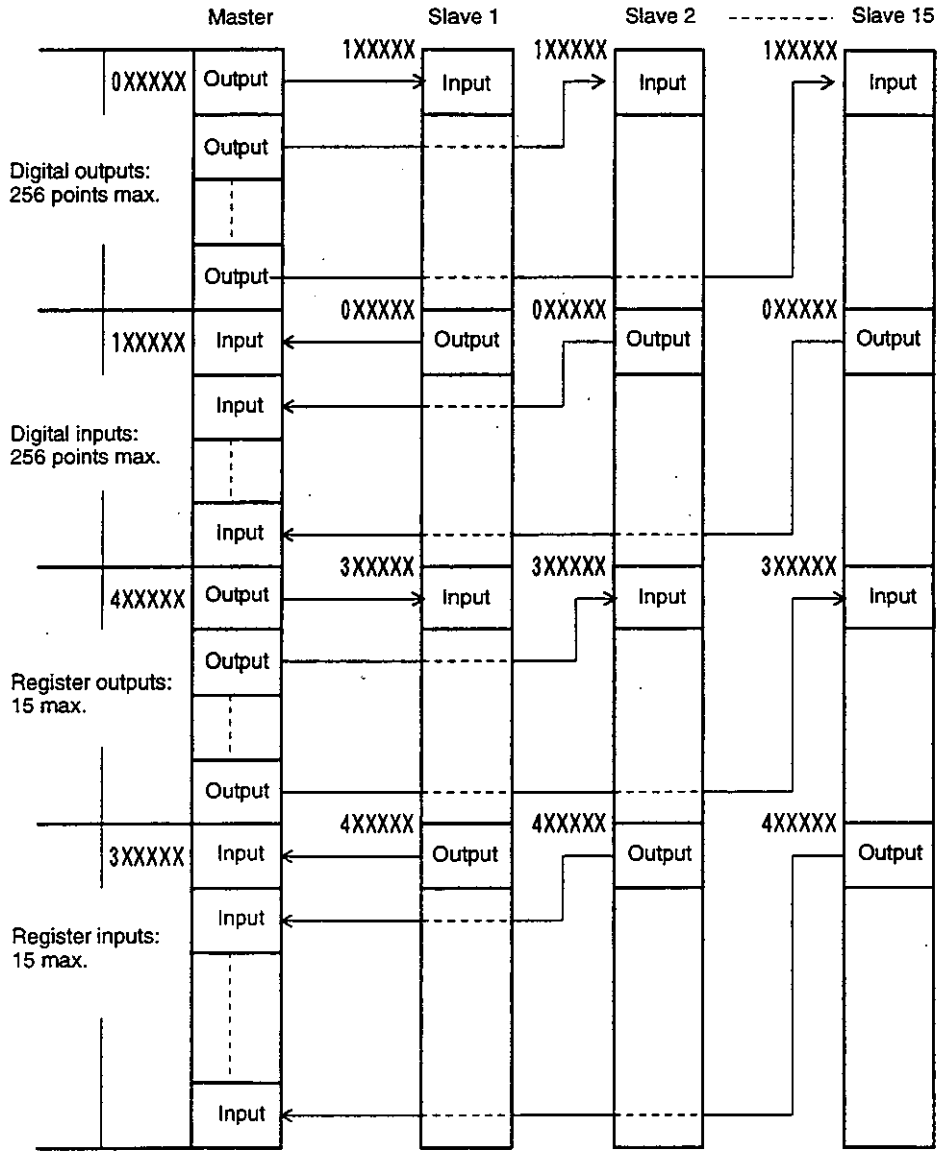


Figure 1.3 Outline of Data Transmission in Y Mode with Monitoring Disabled

2. Digital I/O and Register I/O with Monitoring Enabled

Data transmission in Y Mode with monitoring enabled is shown in *Figure 1.4.*

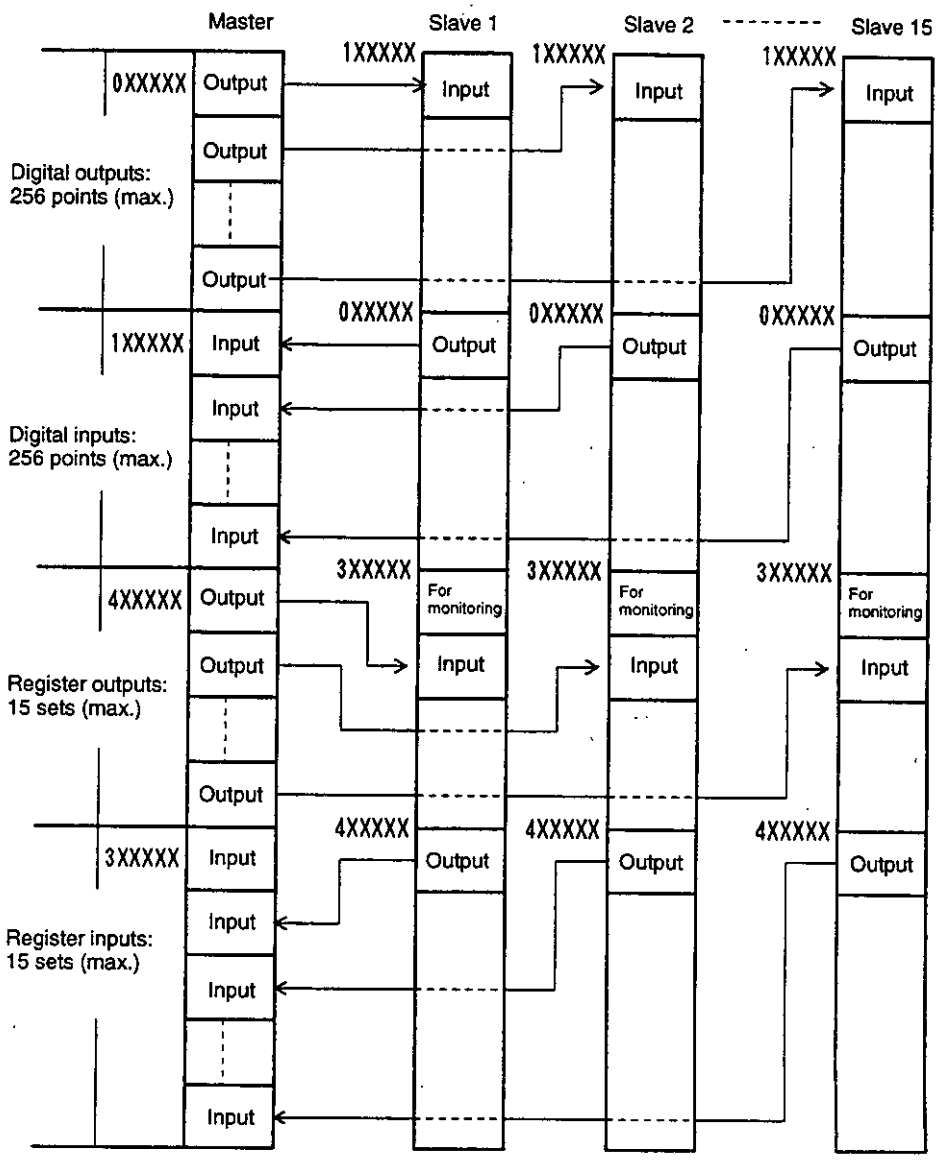


Figure 1.4 Outline of Data Transmission in Y Mode with Monitoring Enabled

3. Contents of Data Transmission in Y Mode

1) The digital output reference numbers (0XXXXX), digital input reference numbers (1XXXXX), register output numbers (4XXXXX), and register input numbers (3XXXXX) are set in the I/O allocation table in the CPU Module.

2) The setting unit for digital I/O references is 8 points.

3) The digital output signal for the same reference number cannot be transmitted to more than one Slaves

4) The number of digital I/O points for the Master will be the same as the total number of digital I/O points for the Slaves.

5) Transmission status between Master and Slave can be monitored by allocating one input register.

6) The maximum number of digital I/O points and the maximum number of register I/O points that can be transmitted to one Slave are as follows:

- Digital inputs: 192 points
- Digital outputs: 192 points
- Register inputs: 7 registers
- Register outputs: 7 registers

7) When there is more than one Slave, the number of digital input and output points and the number of register inputs and outputs transmitted to each Slave will all be the same.

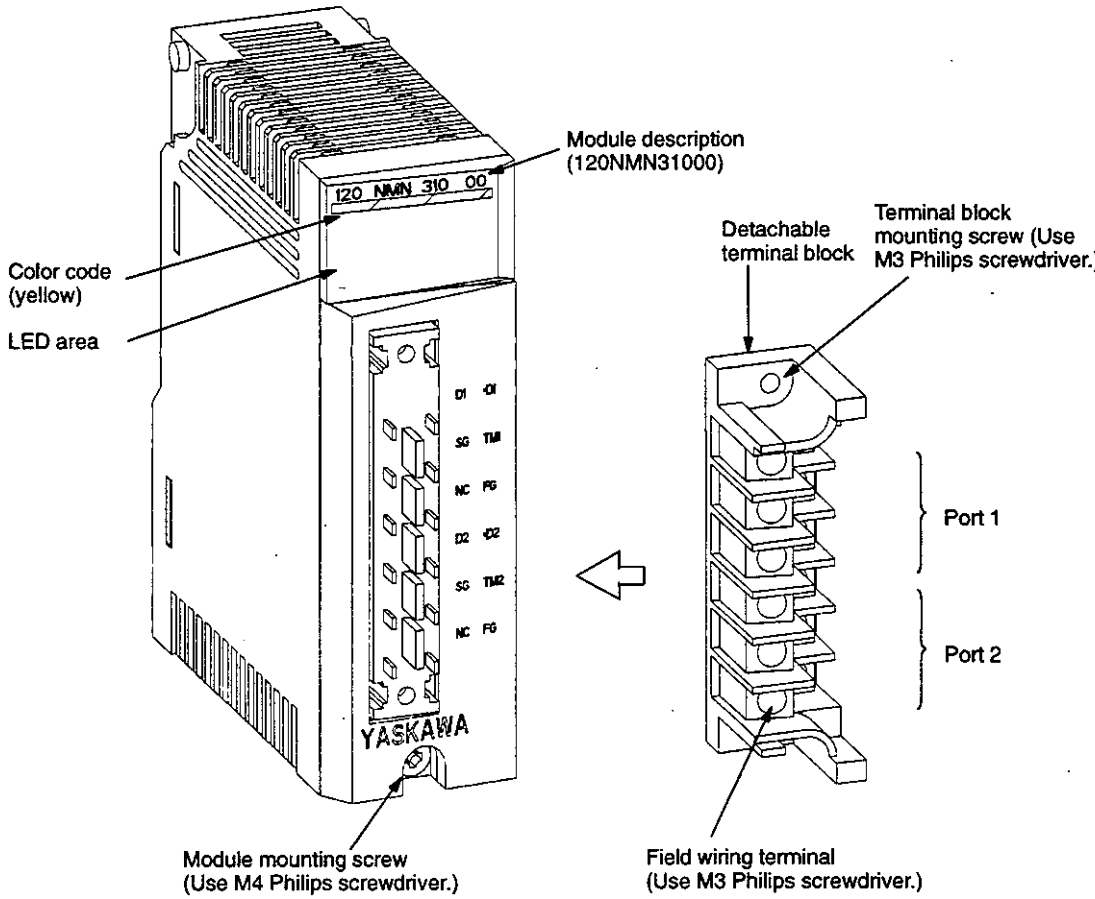
Appearance and Specifications

2

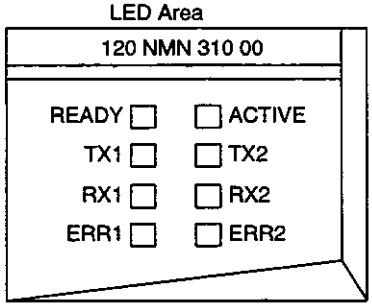
This section provides the appearance and specifications of the M-NET Module.

2.1 Module Appearance

This section shows the appearance of the M-NET Module.



LED Area



LED	Color	Indication when ON
READY	Green	Module is operating normally.
ACTIVE	Green	Module is being serviced by CPU Module.
TX1	Green	Module is sending data from port 1.
RX1	Green	Module is receiving data from port 1.
ERR1	Red	An error has occurred in the Module transmission from port 1.
TX2	Green	Module is sending data from port 2.
RX2	Green	Module is receiving data from port 2.
ERR2	Red	An error has occurred in the Module transmission from port 2.

2.2 Specifications

This section provides the specifications of the M-NET Module.

2.2.1 General Specifications

The general specifications of the M-NET Module are shown in the following table.

Item		Specifications
Environment Conditions	Ambient Operating Temperature	0 to 60°C
	Ambient Storage Temperature	–25 to 85°C
	Ambient Operating Humidity	30% to 95% RH (with no condensation)
	Ambient Storage Humidity	5% to 95% RH (with no condensation)
	Pollution Level	Conforms to JIS B 3501: Pollution level 1
	Corrosive Gas	No corrosive gas
	Operating Altitude	Less than 2,000 m above sea level
Mechanical Operating Conditions	Vibration Resistance	Conforms to JIS B 3502: 10 to 57 Hz with half-amplitude of 0.075 mm 57 to 150 Hz with fixed acceleration of 9.8 m/s^2 (1G) 10 sweep times each for 8 min in X, Y, and Z directions.
	Shock Resistance	Conforms to JIS B 3502: Peak acceleration value of 147 m/s^2 (15G) twice for 11 ms in ±X, ±Y, and ±Z directions
Electrical Operating Conditions	Noise Resistance	Conforms to JIS B 3502: 1,500 V in either normal or common mode with pulse widths of 100 ns/1 µs and rise time of1 ns (with impulse noise simulator)
Dielectric Strength		Between all I/O terminals and internal circuit and between each I/O common: 1,500 VAC (1 min.), 1,800 VAC (1 s)
Insulation Resistance		Between all I/O terminals and ground: 100 MΩ min. via 500-VDC insulation resistance meter (at normal temperature and humidity)
Installation Requirements	Ground	Ground to 100 Ω or less
	Configuration	Building-block, wall-mounted, or DIN track-mounted
	Cooling Method	Natural cooling

2.2.2 Performance Specifications

1) The M-NET Module specifications are shown in the following table.

Item	Specification
Name	M-NET Module
Abbreviation	M-NET
Model No.	JAMSC-120NMN31000
Internal Current Consumption	300 mA
Heat Generation	1.5 W max.
Hot Swapping	Possible
External Dimensions	Width: 40.34 mm Height: 130.00 mm Depth: 103.85 mm (Depth is 143.35 mm including connector terminals.)

Item	Specification		
Communications Ports Specifications	Number of Ports	2	
	Communications Method	Half-duplex, asynchronous	
	Transmission Level	Conforms to RS-422	
	Media (Transmission Medium)	JKEV-SB 0.75 mm^2 x 2P: Polyethylene-insulated cable with copper braid shield **Note** JKEV-SB conforms to the specifications of the Japanese Electric Wire and Cable Makers' Association.	
	Baud Rate	9.6, 19.2, 38.4, or 57.6 Kbps	
	Number of Stations	15 Slaves max.	
	Station Address	1 to 15 **Note** 1 to 7 when B1086 and B2806 are used as Slaves	
	Transmission Distance	Up to 1 km (total length)	
	Data Format	Transmission between Master and Slave is in the following data format: 1) Start bits: 1 2) Data bit length: 7 3) Parity check: Yes 4) Parity: Even 5) Stop bits: 1	
	Transmission Error Detection	Detects vertical parity (even parity) Detects horizontal parity (even parity)	
	Transmission Mode	T Mode	Y Mode
	Number of Digital Transmission Points	Input points: 256 Output points: 256	Input points: 256 Output points: 256
	Number of Register Transmission Points	Input registers: 0 Output registers: 0	Input registers: 15 Output registers: 15
	Error Measures (RAS)	Automatic removal and recovery function for error stations: None	Automatic removal and recovery function for error stations: Yes
	Insulation Method	Photocoupler	
	External Connection	Detachable terminal block (using M3 Philips screws)	

2) Transmission Specifications

a) Transmission Points for One Slave

The maximum number of digital I/O points and I/O registers that can be transmitted to one Slave are as follows:

- Digital inputs: 192 points
- Digital outputs: 192 points

- Register inputs: 7 registers
- Register outputs: 7 registers

b) Transmission Points for Multiple Slaves

When there is more than one Slave, the number of digital I/O points and I/O registers transmitted to each Slave will all be the same.

c) Master Allocation Points

Up to 64 bytes of input points and 64 bytes of output points can be allocated to the Master for both ports. The numbers of bytes for digital and register I/O are as follows:

- Eight digital input points: 1 byte
- Eight digital output points: 1 byte
- One input register: 2 bytes
- One output register: 2 bytes

d) Connecting to Previous Models

The following restrictions apply when connecting GL120 and GL130-series M-NET Modules to the GL60, U84, and other previous PLC models.

Item	GL60 M-NET with B2806 Master	U84 M-NET with B1806 Master
Baud Rate	38.4 Kbps max.	19.2 Kbps max.
Number of Slaves	7 max.	7 max.
Number of Transmission Points	256 max.	256 max.

Removal/Recovery Function

When an error is detected in communications between the Master and Slaves, the Slaves that generated the error are isolated and communications continue with the normally functioning Slaves. This is called the **Automatic Removal Function**. The Master will access the isolated Slaves every two cycles and will reopen communications with those Slaves once the Master has determined that the Slaves have regained normal functions. This is called the **Automatic Recovery Function.**

• Transmission Cables

JKEV-SB Transmission Cables conform to the specifications of the Japanese Electric Wire and Cable Makers' Association.

- Sumitomo Electric Industries, Ltd.: DPEV-SB
- Fujikura Ltd.: IPEV-SB
- Furukawa Denki Kogyo: KPEV-SB

2.3 M-NET Transmission

This section describes the M-NET transmission procedures.

2.3.1 Transmission Procedures

1. Startup Procedure

Figure 2.1 shows processing when the power is turned ON when both the Master and Slave have the same power source.

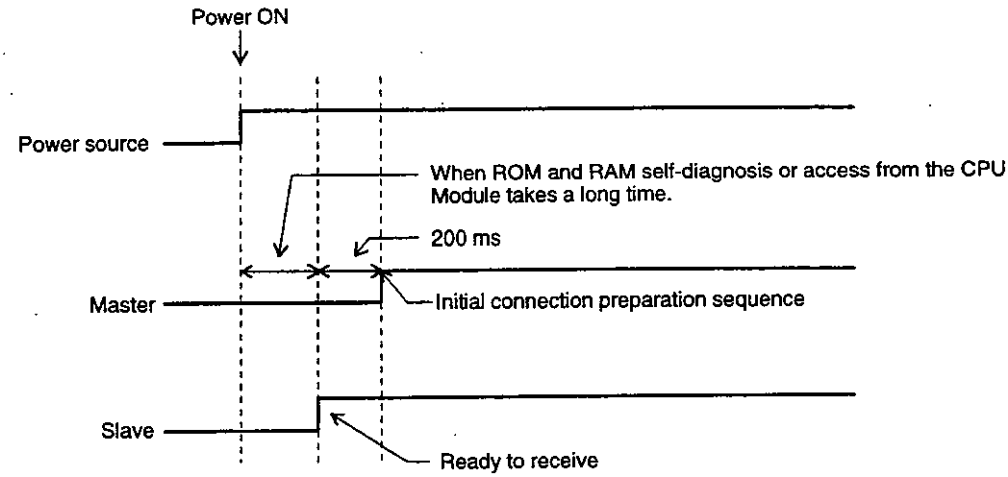


Figure 2.1 Process at Startup

2. Connection Preparation Sequence

The data transmission procedures for the connection preparation sequence to confirm allocations for each Module is shown in *Figure 2.2*.

When the monitor timer has timed out or the Master has received a NAK code, it will retry the transmission to the same Slave. The Master will retry 3 times in T Mode and 6 times in Y Mode (including the first transmission).

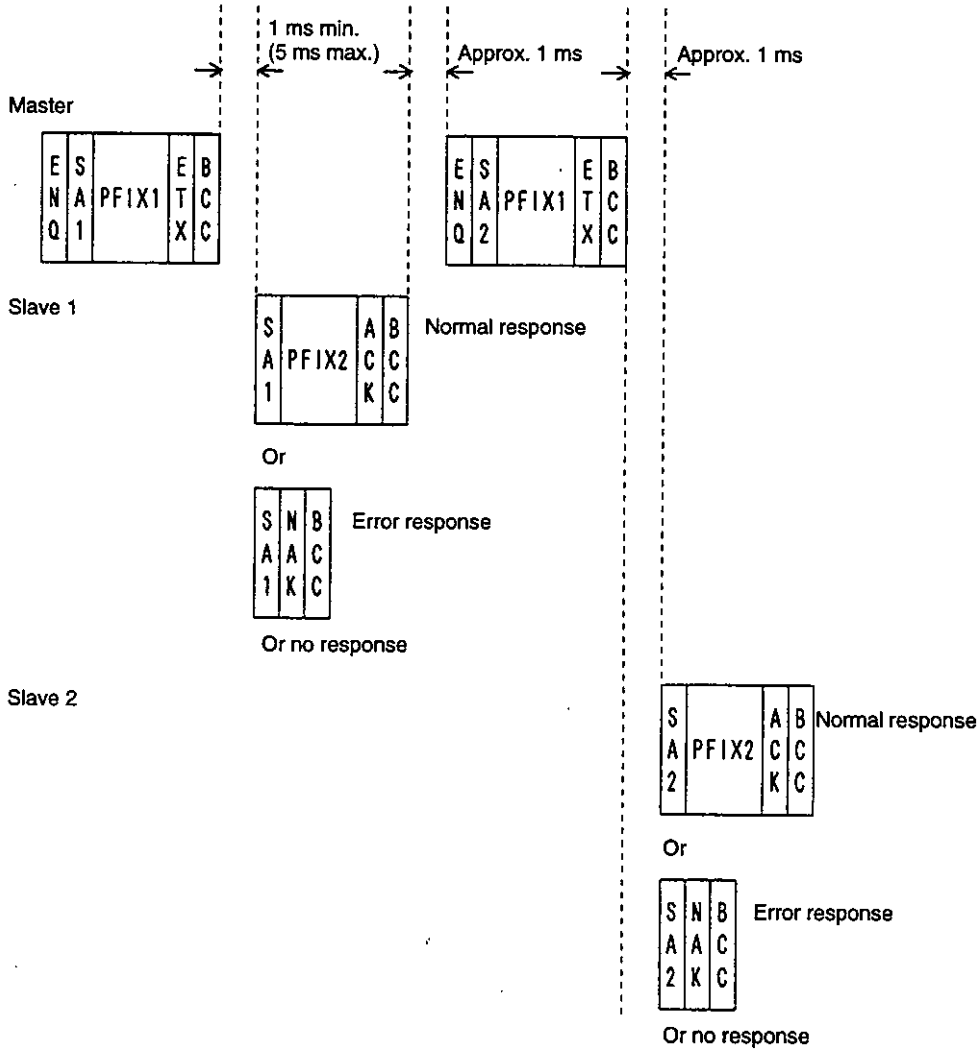


Figure 2.2 Data Transmission in Connection Preparation Sequence

3. Normal Sequence

The data transmission procedures for the normal sequence whereby I/O data is transmitted according to each Module allocation are shown in *Figure 2.3.*

1) The Master repeats cyclic data transmission to the specified Slaves only and in the order determined for the normal sequence.

2) When the monitor timer has timed out or the Master has received a NAK code, it will retry the transmission to the same Slave. As with the connection preparation sequence outlined in 2. *Connection Preparation Sequence*, the Master will retry 3 times in T Mode and 6 times in Y Mode (including the first transmission).

3) Communications will stop if an error is detected in T Mode (removal function disabled). In Y Mode, the Slave where the error is detected will be bypassed and the normal sequence will be continued with the Slaves that are operating normally (removal function enabled.)

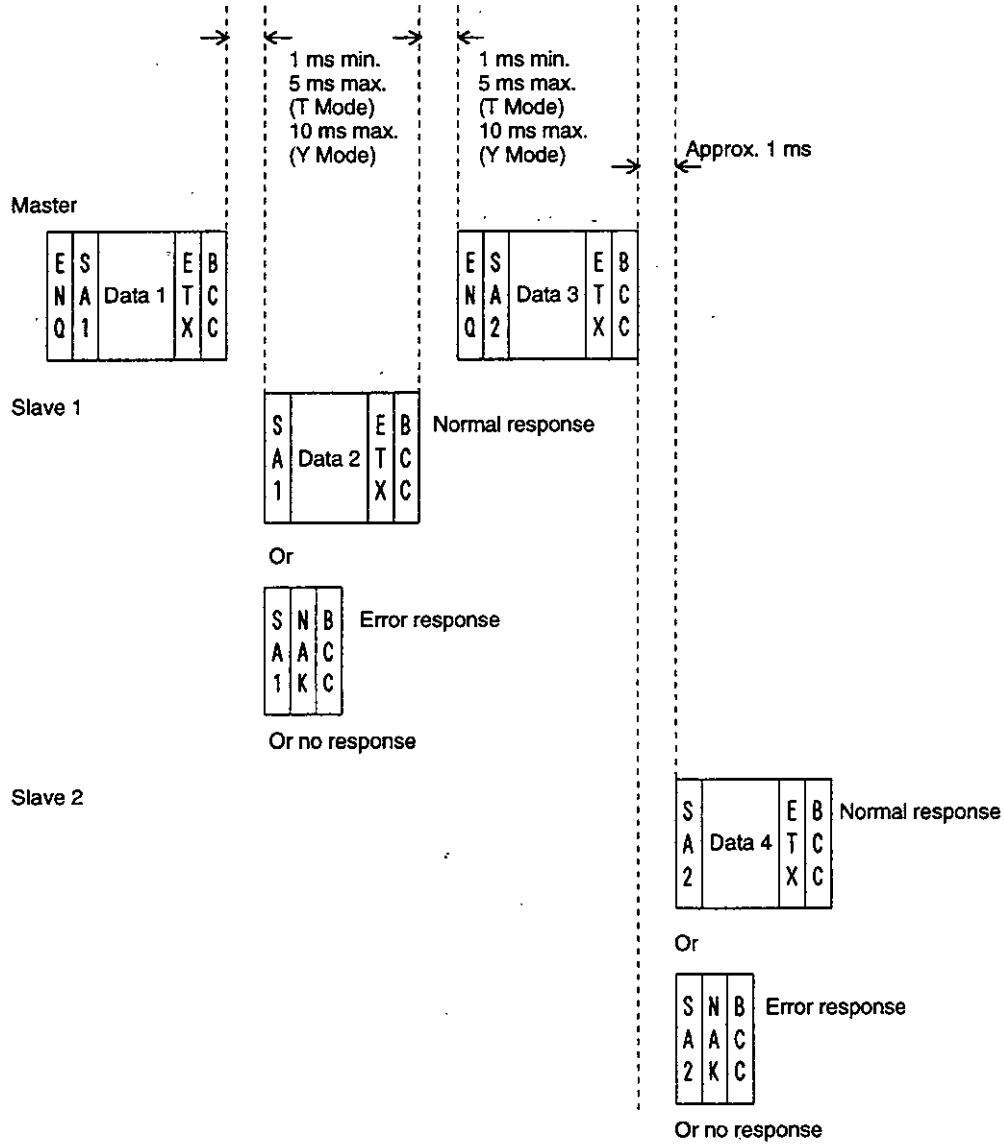


Figure 2.3 Data Transmission for Normal Sequence

2.3.2 Data Flow and Data Processing Time

1. Data Flow

The data flow between the CPU Module and the Master, and between the Master and the Slaves is shown in *Figure 2.4.*

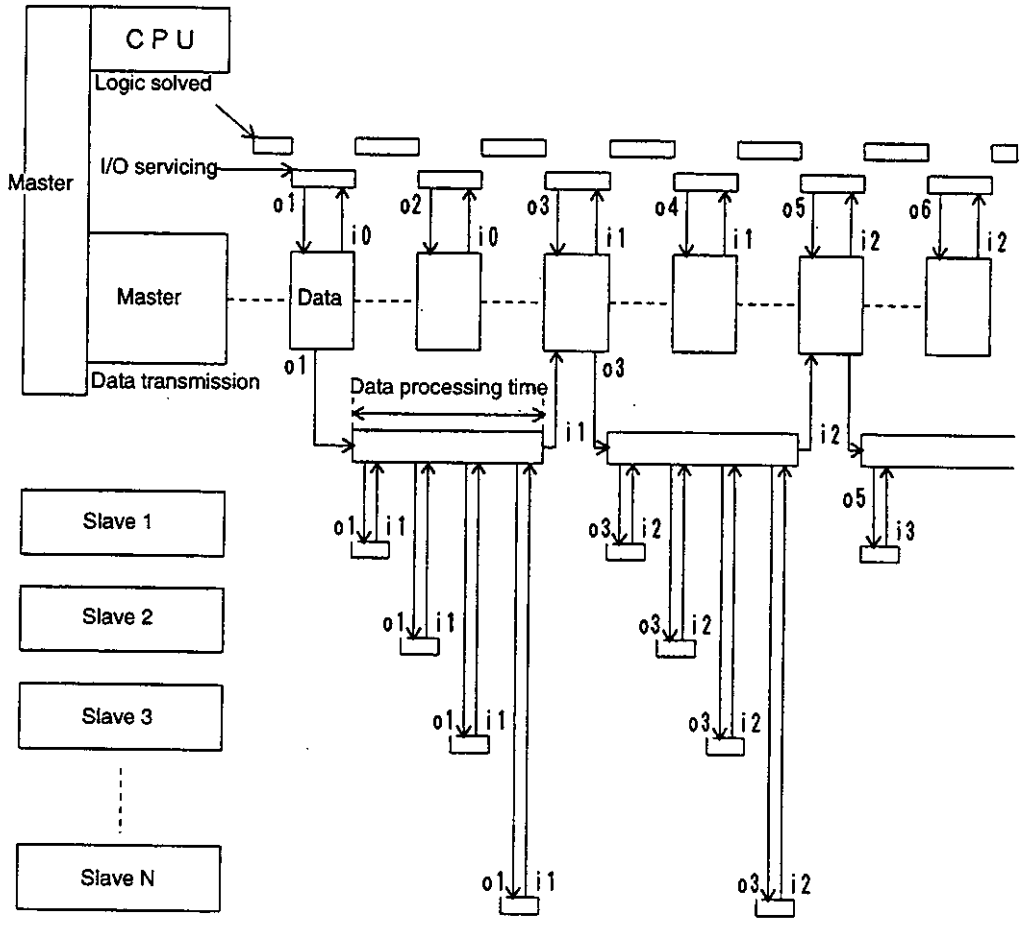


Figure 2.4 Data Flow

2. Data Processing Time

The method for calculating the data processing time for T Mode and Y Mode will be outlined here.

A. Data Processing Time in T Mode

1) The data precessing time when there are no transmission errors between Master and Slave is as follows:
Data processing time = $\{(2 \times A + 6) \times T1 + 0.05 \times A + 3\} \times N$ (ms)

TERMS

Data Processing Time

Data processing time refers to the time required for one cycle to send and receive data from all Slaves with I/O allocations.

2) The maximum data processing time when a transmission error has occurred and each Slave has been re-tried 3 times is as follows:
Data processing time = {3 × (2 × B + 3) × T1 + 3 × T2 +12} × N (ms)

A = Number of set digital bytes (number of set points/8, Master allocation status: Number of bytes transmitted to one Slave) (DI + DO)

B = Number of set digital output bytes (DO)

N = Number of Slaves (15 max.)

Baud Rate (Kbps)	T1 (ms)	T2 (ms)	Max. Value for (1) (ms) (N = 15)	Max. value for (2) (ms) (N = 15)
57.6	0.28	100	110	4.8
38.4	0.28	100	110	4.8
19.2	0.52	100	160	4.9
9.6	1.04	100	270	5.1

B. Data Processing Time in Y Mode

1) The data processing time when there are no transmission errors between Master and Slave is as follows:
Data processing time = {(2 × C + 8) × T1 + 0.1 × C + 3.5} × N (ms)

2) The maximum data processing time when a transmission error has occurred and each Slave has been re-tried 6 times is as follows:
Data processing time = {6 × (2 × D + 4) × T1 + 6 × T2 + 28} × N (ms)

C = Number of set digital bytes + number of set registers × 2 (Master allocation status: Number of bytes transmitted to one Slave) (DI + DO + RI + RO)

D = Number of set digital output bytes + number of set output register × 2 (DO + RO)

N = Number of Slaves

Baud Rate (Kbps)	T1 (ms)	T2 (ms)	Max. value for (1) (ms) (N = 15)	Max. value for (2) (ms) (N = 15)
57.6	0.28	100	170	9.8
38.4	0.28	100	170	9.8
19.2	0.52	100	260	10.0
9.6	1.04	100	440	10.6

3. Data Format

The data format (bit configuration) between Master and Slave is as follows:

Bit Configuration

Start bits:	1 bit	
Data bits:	7 bits	
Parity bits:	1 bit	(even parity)
Stop bits:	1 bit	
Total:	10 bits	

4. Function Character Codes

The function character codes used when transmitting data between the Master and a Slave are shown in *Table 2.1*.

Table 2.1 Function Character Codes

Type	Character Code	Hex Code	Function
Transmission Control Characters	ETX	03	End of text
	STX	02	Start of text
	ACK	06	Positive acknowledgement
	ENQ	05	Enquiry
	NAK	15	Negative acknowledgement
Address Characters	SA0	61	Master address
	SA1	62	Slave 1 address
	SA2	63	Slave 2 address
	:	:	:
	SA15	70	Slave 15 address
Data Characters	DATL	30 to 39 41 to 46	Hexadecimal JIS code for the lower-place 4 bits of transmission data
	DATH	30 to 39 41 to 46	Hexadecimal JIS code for the higher-place 4 bits of transmission data
Error Control Characters	BCC	00	Set the horizontal parity of the transmitted text (including the BCC from the leading character) to even parity. **Note** Indicates end of transmitted text.

Note If BCC is between 61 and 70 in Y Mode, the parity sometimes will be odd because the inverse of BCC is output.

External Connections

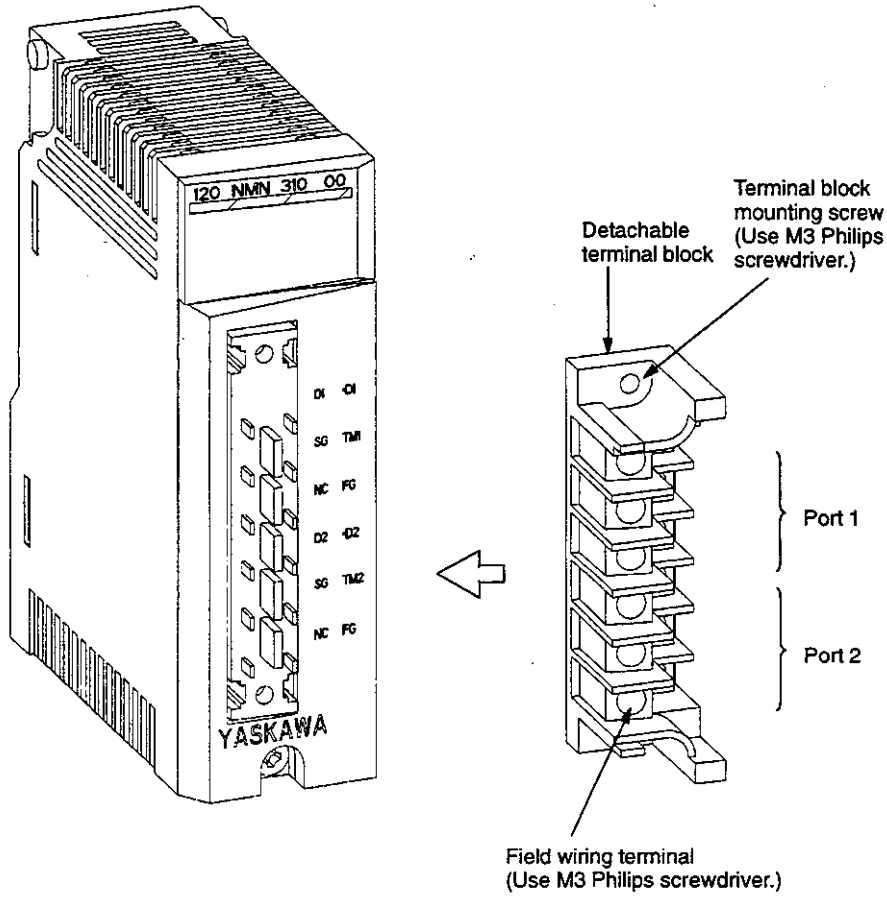
3

This chapter provides information on connecting and wiring the M-NET Module.

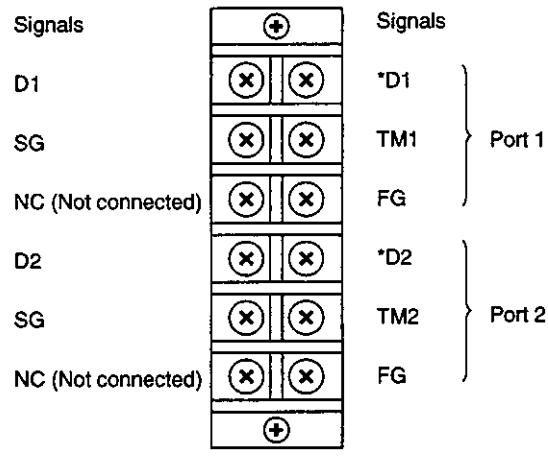
3.1 Communications Ports

This section gives an outline of the M-NET Module communications ports.

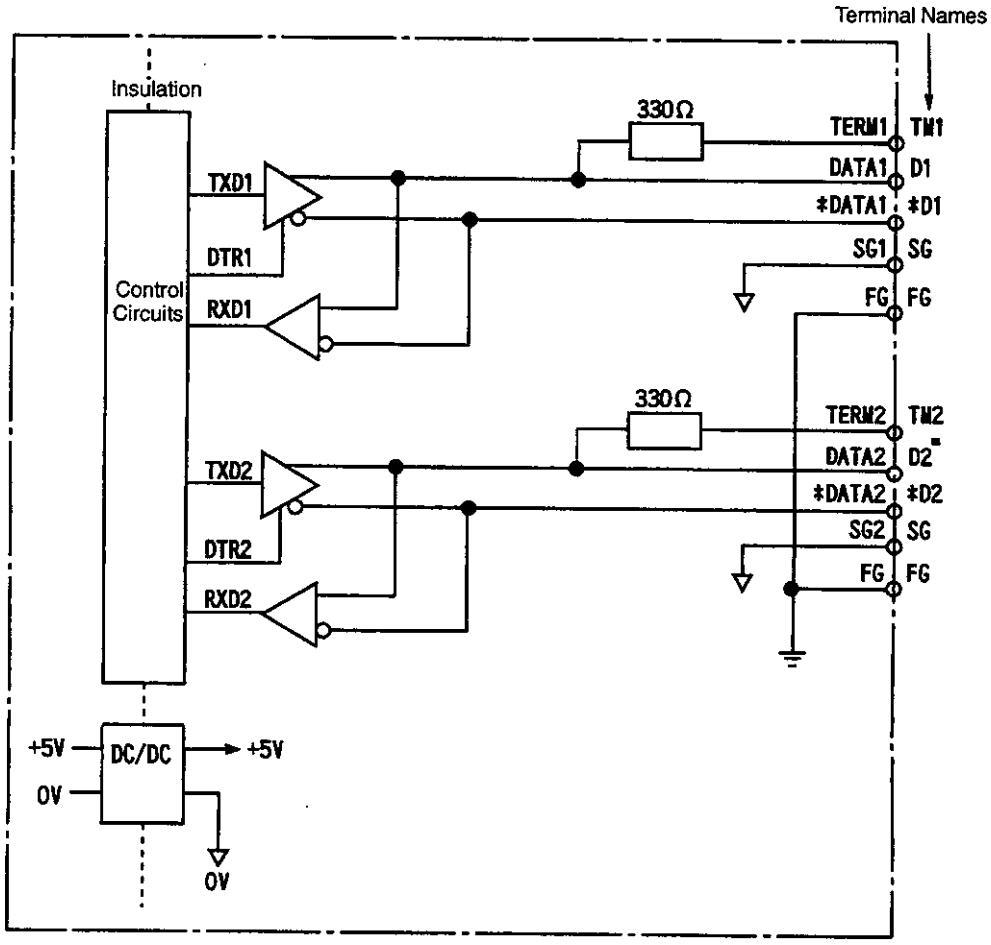
1) Module Appearance



2) Terminal Arrangement



3) Circuit Configuration



3.2 Wiring

This section provides information on connecting, wiring, and grounding M-NET Modules.

3.2.1 Connecting M-NET

1) M-NET Modules are connected as follows:

a) The Modules are connected using cascade connecting method: Master to Slave 1 to Slave 2 to Slave n. Do not branch connections. Branching will reduce communications performance.

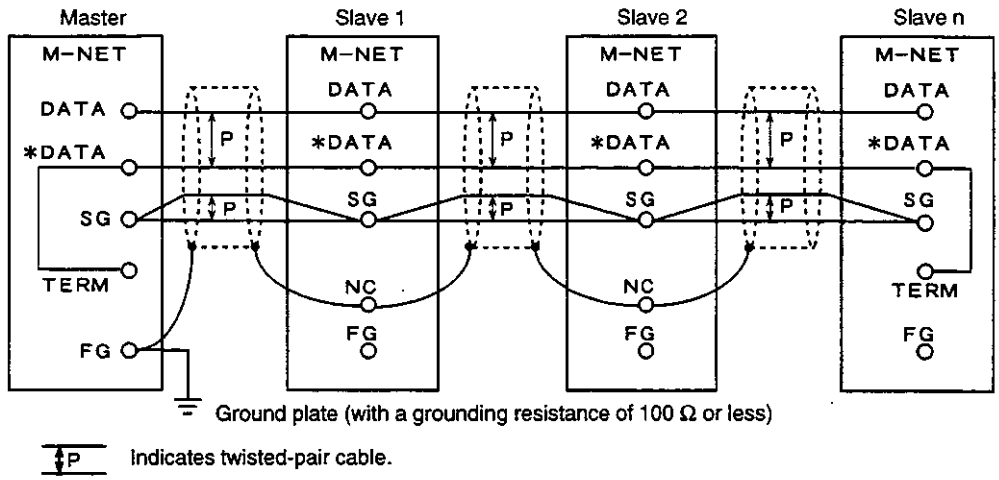
b) Connect the TERM terminal to the *DATA terminal between the Master and the last Slave.

c) Ground the shield of the shielded cable to the protective ground terminal (FG) at one point only. Normally, an independent ground plate is connected to the Master. It is possible, however, to connect the ground plate to the last Slave instead. Connecting incorrectly may cause unstable signal transmission and result in malfunctions.

d) The NC terminals are not internally connected to any other Module terminals. Use these terminals as relay terminals for the shield.

e) Ground the protective ground terminal (FG) at one point only, i.e., at either the Master or the last Slave.

f) Use M3 crimp terminals for the terminal block.



Turn OFF the power supply to each Rack before making any connections.

2) Cable Specifications

JKEV-SB 0.75 mm^2 x 2P (Polyethylene-insulated cable with copper braid shield)

INFO **• Transmission Cables**

The JKEV-SB Transmission Cable conforms to the specifications of the Japanese Electric Wire and Cable Makers' Association. The following models are available from other manufacturers.

- Sumitomo Electric Industries, Ltd.: DPEV-SB
- Fujikura Ltd.: IPEV-SB
- Furukawa Denki Kogyo: KPEV-SB

3.2.2 Internal Panel Wiring

1. Cable Specifications

Cable Name	Model
Polyethylene-insulated cable with copper braid shield	JKEV-SB 0.75 mm^2 x 2P

2. Shield Treatment

Ground the shield for the data transmission cable at one point (with ground resistance of 100 Ω max.). See *3.2.5 Grounding* for further details on grounding.

3. Wiring Separation

Wire the transmission cable independently and separate from other wiring systems as described below.

A. Separation from Low-voltage Cables

Keep the transmission cables at least 100 mm away from low-voltage cables.

B. Separation from Control Circuit Cables

Keep the transmission cables at least 100 mm away from the control circuit cables. Alternatively shield the control circuit cables.

C. Separation from Main Circuit Cables

Keep the transmission cables away from the main circuit cables at least by the recommended distances given in the following table. Alternatively, shield the main circuit cables.

Table 3.1 Recommended Distance

Main Circuit	Recommended Distance
125 V, 10 A	300 mm min.
250 V, 50 A	450 mm min.
440 V, 200 A	600 mm min.
3 to 6 kV, 800 A	1,200 mm min.

3.2.3 Indoor Panel-to-panel Wiring

1. Transmission Cable Specifications

Cable Name	Model
Polyethylene-insulated cable with copper braid shield	JKEV-SB 0.75mm^2 x 2P

2. Shield Treatment

As a rule, ground the transmission cable shield at one point (with ground resistance of 100 Ω max.). See *3.2.5 Grounding* for details.

3. Wiring Separation

1) Transmission cables must be run in a separate metal conduit or metal duct and lay. (See *Figure 3.1.*)

2) Ground both ends of the metal wiring pipe or metal duct and ground at as many points as possible in between.

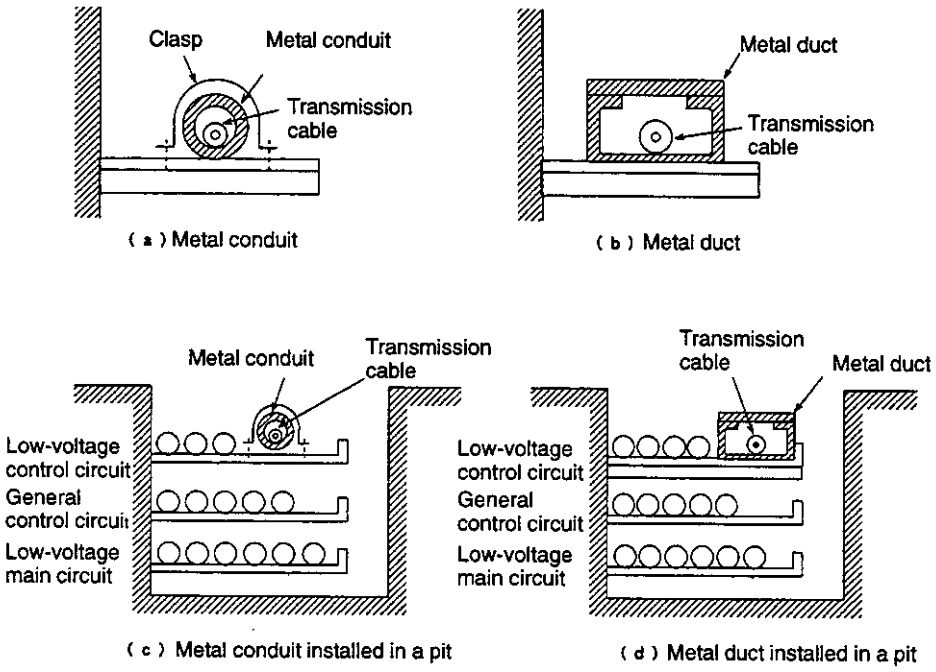


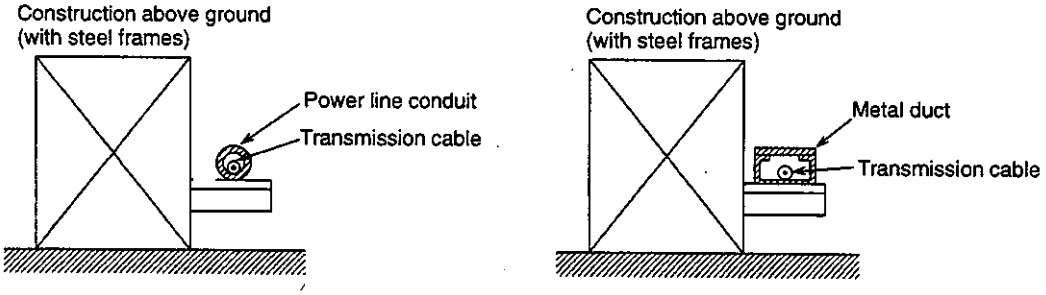
Figure 3.1 Laying Transmission Cables

3.2.4 Outdoor Panel-to-panel Wiring

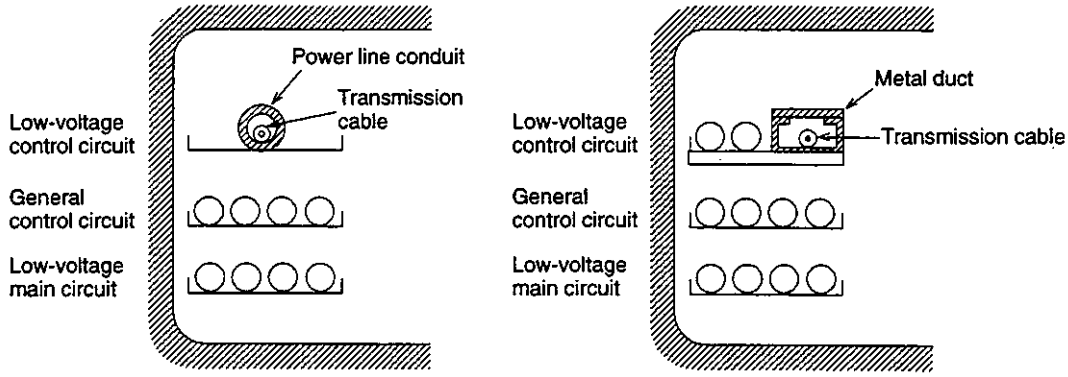
1) The procedures for laying transmission cables are basically the same as those described in *3.2.3 Indoor Panel-to-panel Wiring*, but note the following differences.

a) For outdoor wiring, always lay them along above ground structure (steel frames). If no structure is available, accommodate the cables in an underground pit or tunnel, or bury them in the ground.

(1) Construction above Ground



(2) Underground Pit or Tunnel



(3) Burying in the Ground

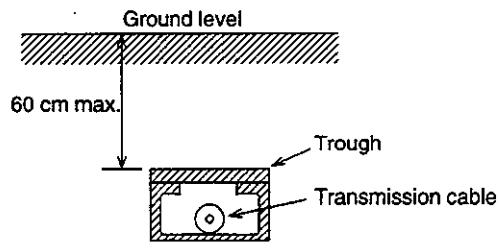


Figure 3.2 Laying Cable Between Buildings

b) Do not route bare cables overhead. The cables may receive induction noise from air borne electric waves and cause transmission errors.

⚠ **Caution** The M-NET Module is not protected from lightning surges. Do not install M-NET wiring overhead. Lightening strikes can damage the product.

3.2.5 Grounding

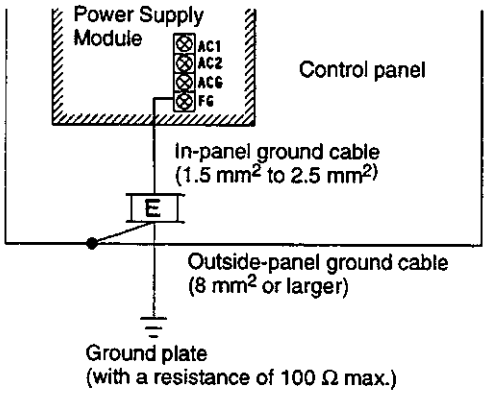
1. Grounding Methods

A. Mounting Devices

The Mounting Bases to which Modules of the PLC are mounted must be installed on an integrated steel base (frame).

B. Ground Cables

Mount a ground terminal (E) in the control panel, and connect the terminal to the cabinet of the control panel. Also, connect the protective ground terminal (FG) of the Power Supply Module to the ground terminal (E). For the ground cable between the ground terminal and the ground plate, use a ground cable of at least 8 mm^2 (AWG 8) and also make sure the length of the ground cable is as short as possible. If a long distance is required from the ground terminal to the ground plate, use a thicker ground cable so that the sum of the ground resistance and the ground cable resistance is less than 100 Ω.



C. Ground Plate

The ground plate should be as close to the GL120 or GL130 control panel as possible and kept at least 15 m away from the ground plates of other high-voltage control panels (Group B in Table 3.2 below). The ground resistance must be less than 100 Ω.

D. Sharing Ground

Basically, the GL120 or GL130 should have its own ground. If ground cable or ground plate must be shared with other control panels, use the following information as guidelines.

Table 3.2 Sharing Ground Cable or Ground Plate

Group	Details
Group A (can be shared)	Computer panels, instrumentation control panels, I/O relay panels, and general control circuit panels, etc.
Group B (cannot be shared)	High-power main circuit panels, large-capacity thyristor panels, etc.

2. Transmission Cables

Ground the shield of the transmission cable at one point only.

3. Metal Conduits and Metal Ducts

Always ground both ends of metal conduits or ducts. Each metal conduit or duct should be grounded at as many points as possible.

3.2.6 Installation of Control Panel

1. Isolating from High-voltage Control Panels

Do not install a PLC panel and a high-voltage control panel (Group B in the Table 3.2) side by side. If a PLC panel must be installed near a high-voltage control panel, always keep the PLC panel at least 60 cm away from the high-voltage control panel. Likewise, keep the ground cable at least 60 cm away from that of the high-voltage control panel and keep the ground plate at least 15 m away from that of the high-voltage control panel.

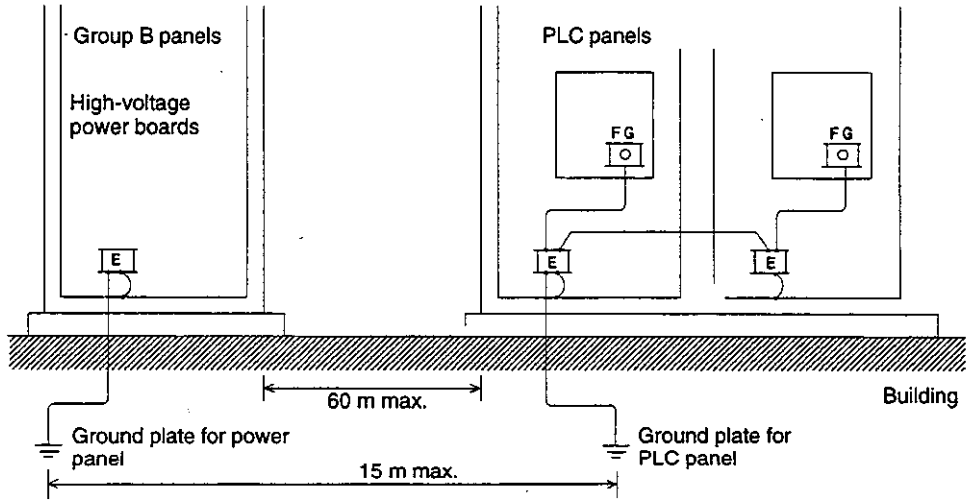


Figure 3.3 Isolation from Power Distribution Board

2. Installing PLC Panels and Other Control Panels Side by Side

PLC panels and Group A control panels can be installed side by side. In this case, these control panels are electrically connected to each other through the channel base. To further ensure safe grounding, connect the ground terminals (E) of these control panels with a ground cable of at least 8 mm^2 as shown in the figure below. Then, connect one of the ground terminals to the ground plate.

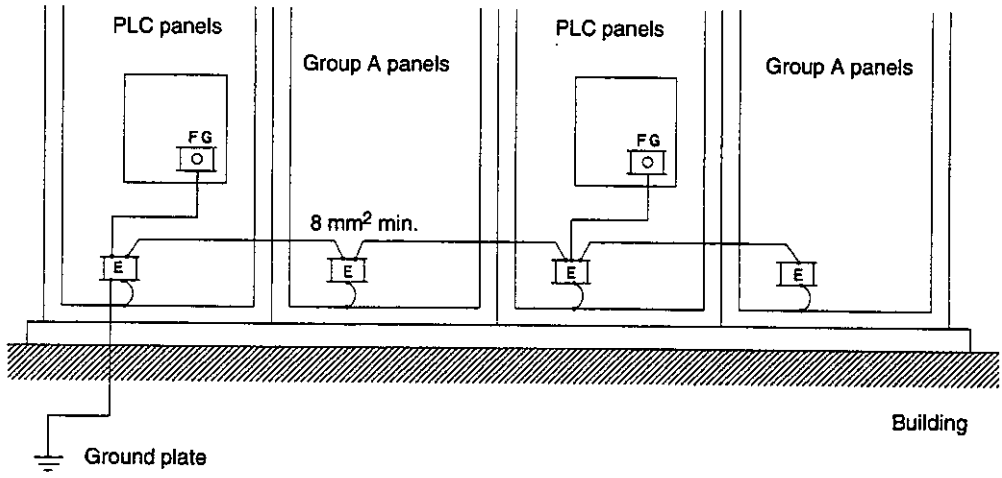


Figure 3.4 Separation from Group A Panels

3. Insulating PLC Panels

When a PLC panel is installed in a steel-frame building, it is grounded through the building. This will not normally cause a problem. However, if a PLC panel is installed near a high-voltage control panel, a ground current from the high-voltage control panel will cause ground noise at the PLC panel. To prevent this, insulate the PLC panel from the building as shown in the figure below. Then, connect the ground terminal (E) of the PLC panel to its own ground plate.

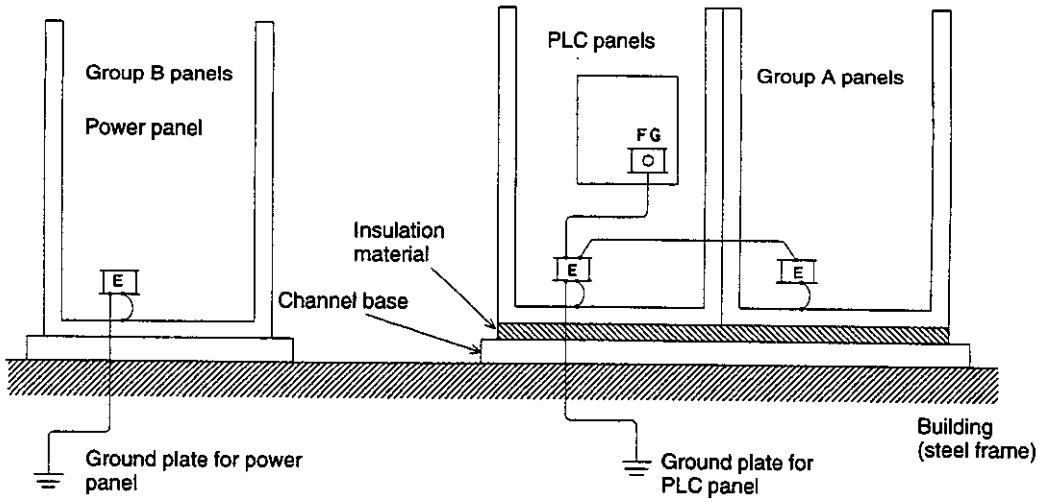


Figure 3.5 PLC Panel Insulation

I/O Allocations

4

This chapter describes I/O allocations for M-NET.

4.1 I/O Allocations

This section describes M-NET Module I/O allocations.

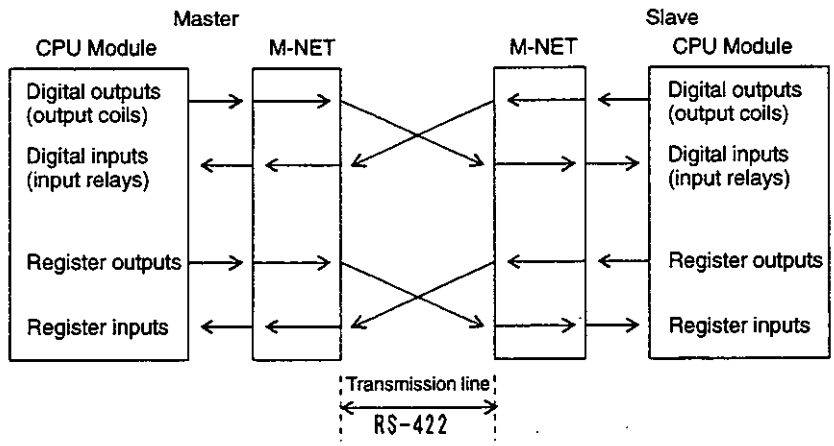
4.1.1 I/O Allocations

1) The interface between the CPU Module and the M-NET Module is performed by allocating input relays, output coils, and I/O registers.

2) Reference numbers are allocated in the same way as for 120-series I/O Modules. Compound allocations are possible, i.e., both input relays and output coils, or input registers and output registers can be allocated to an M-NET Modules.

3) All parameters including the mode and the number of transmission points are made in the MEMOSOFT's Module Zoom Screen. These allocations are made for each Master and Slave CPU Module. See *4.2 MEMOSOFT Settings* for details on allocation operations.

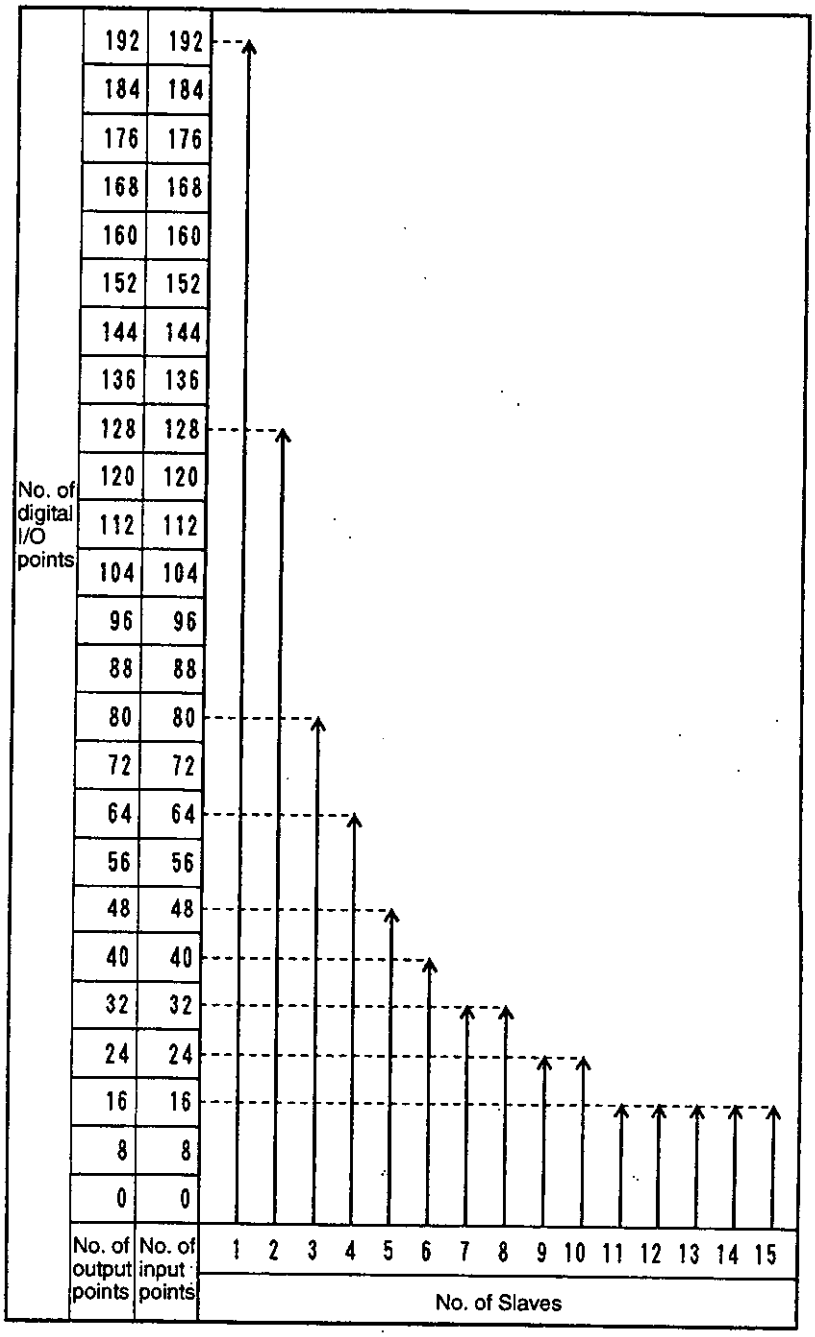
4) Data flow when there is one Master and one Slave is shown in the following diagram.



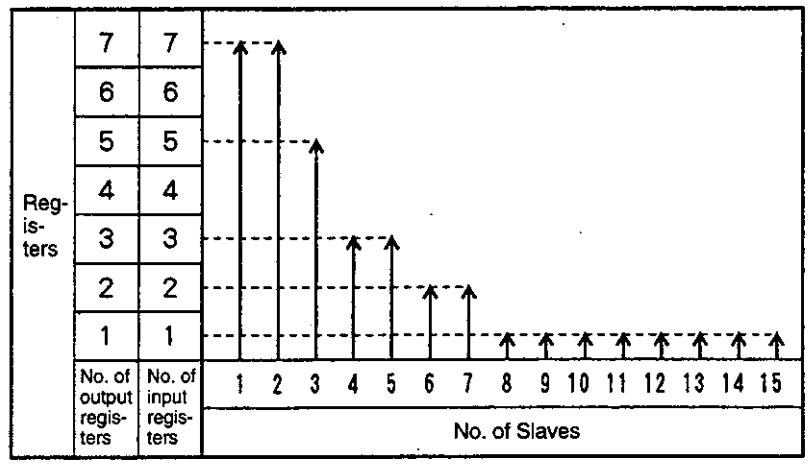
4.1.2 I/O Allocations and Number of Transmission Points

1) The numbers of data transmission points that can be allocated to one Slave for the various numbers of Slaves connected are shown in the following diagram.

a) Digital Data



b) Register I/O



2) Transmission Points

a) Transmission Points for One Slave

The maximum number of digital I/O points and I/O registers that can be transmitted to one Slave are as follows:

- Digital inputs: 192 points
- Digital outputs: 192 points
- Register inputs: 7 registers
- Register outputs: 7 registers

b) Transmission Points for Multiple Slaves

When there is more than one Slave, the number of digital I/O points and I/O registers transmitted to each Slave will all be the same.

c) Master Allocation Points

Up to 64 bytes of input points and 64 bytes of output points can be allocated to the Master for the 2 ports. The number of bytes for the digital I/O points and the register I/O is as follows:

- Eight digital input points: 1 byte
- Eight digital output points: 1 byte

- One input register: 2 bytes
- One output register: 2 bytes

4.1.3 Communications Monitoring

The M-NET Module provides a function to monitor the status of M-NET communications.

1. Communications Monitor Function

1) The M-NET communications can be monitored to see if they are operating normally, Monitor information is transmitted to the CPU Module. The communications status at each Slave is transmitted using individual bits of the input register.

2) The monitor function is operated by enabling the Monitor Mode on the Module Zoom Screen.

3) When the CPU Module switches from stop to start, it takes a few seconds before the M-NET Module begins communicating normally. During this time, the input relays and input register values do not necessarily agree with the status of connected Slaves. Until communications are correctly established, these bits do not become 1, so the validity of input data can be determined by these bits.

4) When the bits are 0 (= error), one of the following three conditions is indicated.

   a) An appropriate allocation number is not set for the connected Slave.

   b) Communications have not been initiated correctly after the CPU Module was started.

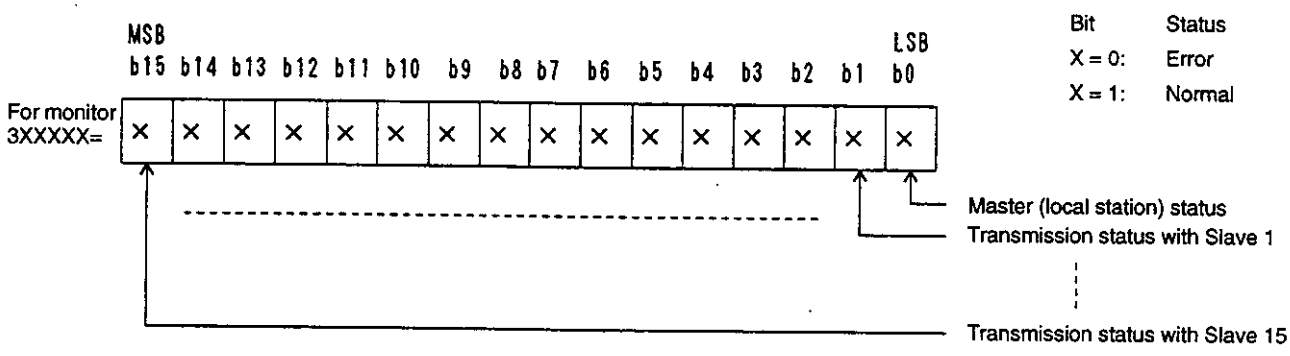
   c) Communications with the Slave being monitored are disabled as a result of a communications error.

5) The input register used for monitoring is the leading register of the input registers allocated in the I/O allocation. When the Monitor Mode switches from NONE (disabled) to EXIST (enabled), the input register allocation for each Slave will shift by 1 register.

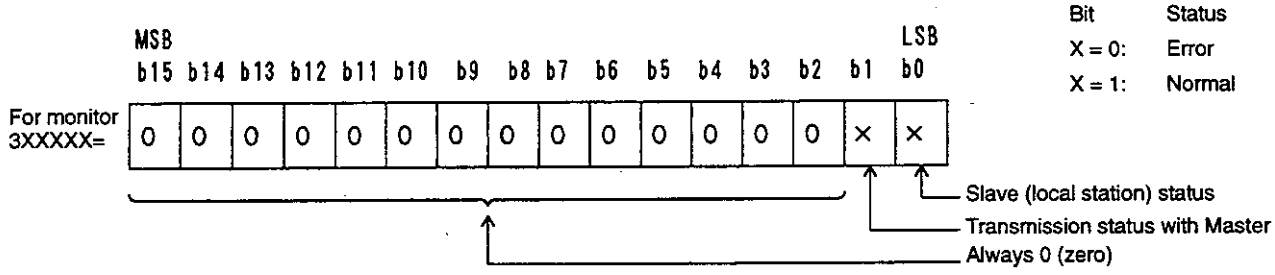
2. Monitor Register Content

The contents of the monitor register are as follows:

A. Master Register



B. Slave Registers



4.1.4 I/O Allocation Screen

This section gives information on the MEMOSOFT I/O Traffic Cop Screen and the Parameter Setting Screen.

1) The I/O Traffic Cop (i.e., I/O Allocation) Screen is shown below.

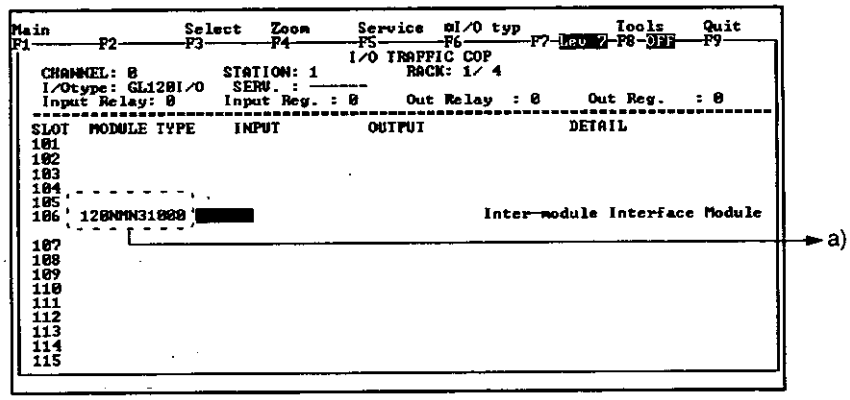


Figure 4.1 MEMOSOFT I/O Traffic Cop Screen

a) Module Type

Enter the M-NET Module (120NMN31000).

Note After setting the Module type, select **Zoom**, set the parameters, and then set the I/O references.

2) The Parameter Setting Screen is shown below.

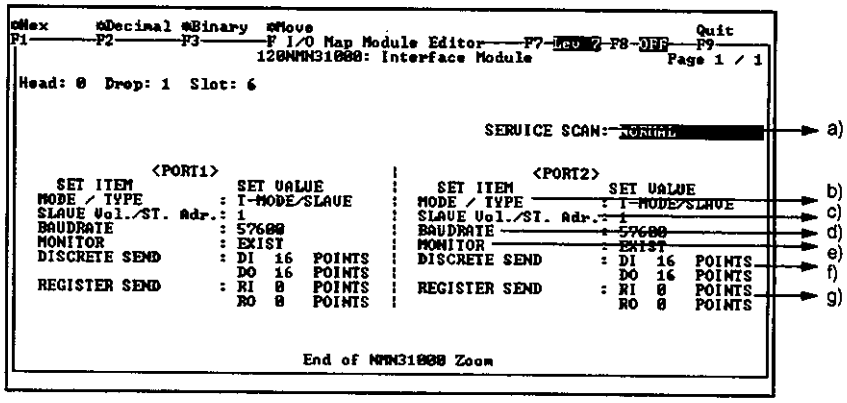


Figure 4.2 M-NET Module Parameter Setting Screen

a) Service Scan

Set whether the I/O data changes are to be conducted in the normal scan cycle or in the high-speed scan cycle.

b) Mode/Type

- Mode: Set either Y Mode or T Mode. If not using ports, specify this in the settings.
- Type: Set either Master or Slave.

c) Slave Volume/Station Address

Different settings are required for Master and Slave stations as follows:

- Master: Set the number of Slaves.
- Slave: Set the station address.

d) Baud Rate

Set the baud rate.

e) Monitor

Set whether or not the M-NET communications status is to monitored. See *4.1.3 Communications Monitoring* for details on the monitor function.

f) Discrete Send

- Master: Use multiples of 8 points to set digital I/O points for each Slave.

- Slave: Use multiples of 8 points to set digital I/O points for transmissions with Master.

g) Register Send

- Master: Set number of I/O registers for each Slave.

- Slave: Set number of I/O registers for transmissions with Master.

3) After completing settings in the Parameter Setting Screen, return to the I/O Traffic Cop Screen. The settings made in the I/O Traffic Cop Screen are explained next.

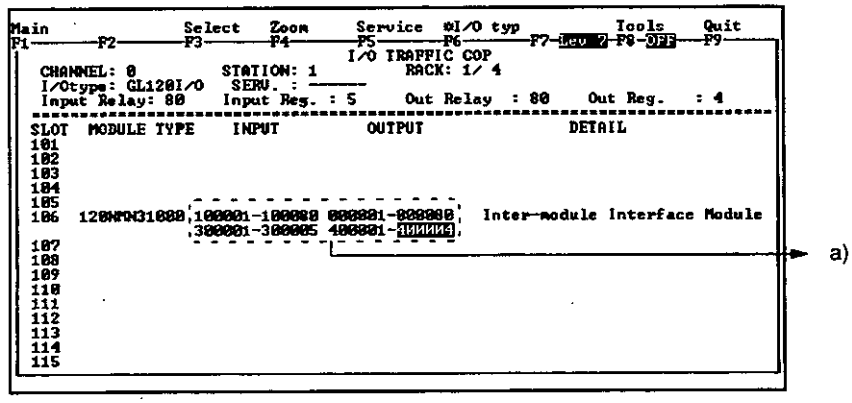


Figure 4.3 I/O Traffic Cop Screen

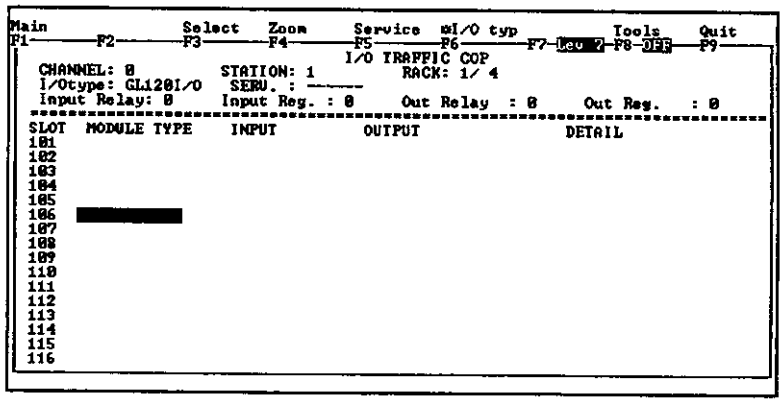
a) Set the I/O references to be used in the M-NET Module.
Enter the leading reference number. Move the cursor to the last reference number and the allocations set in the Parameter Setting Screen will be displayed in reverse video (two ports: Port 1 and Port 2).

4.2 MEMOSOFT Settings

This section explains the MEMOSOFT setting operations required to use the M-NET Module.

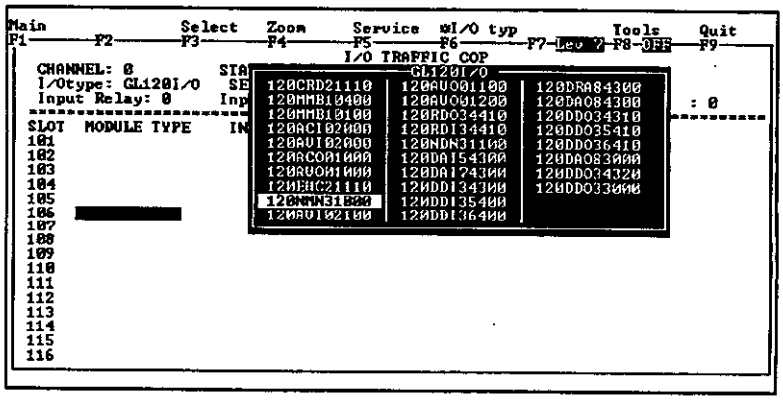
The following procedure is used to allocate I/O using the MEMOSOFT.

1) In the I/O Traffic Cop Screen, move the cursor to the slot position to be allocated using the Cursor Keys and press the Enter Key.



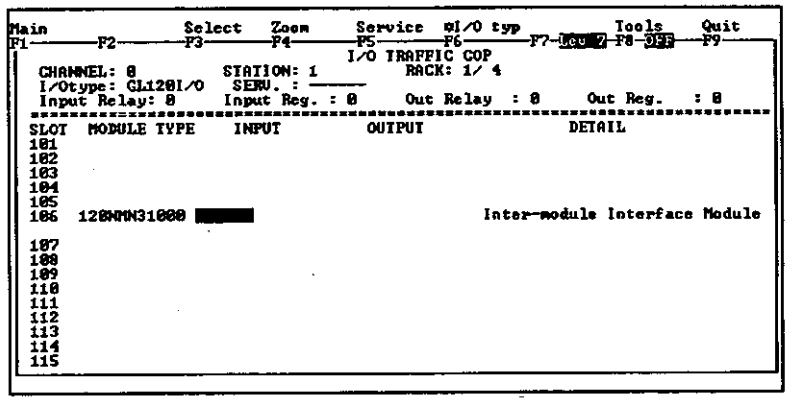
2) Press the **?** Key and a list of the Modules that can be allocated will be displayed.

3) Select the 120NMN31000 using the Cursor Keys and press the Enter key.



The Module type will be displayed and the cursor will move to the leading reference position.

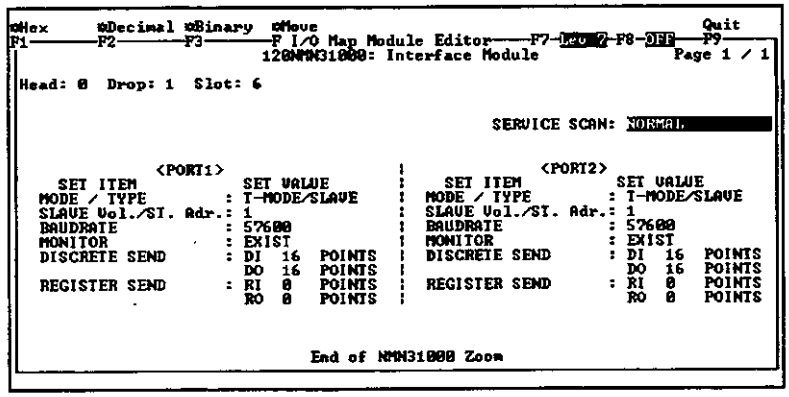
4) Press the F4 Key to select **Zoom**.



Do not enter the reference number before selecting Zoom..

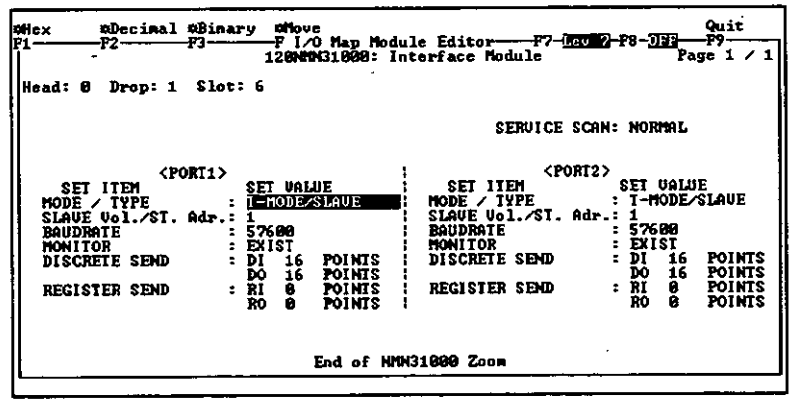
Note After setting the Module type, select **Zoom** and set the parameters. Then set the I/O references.

The M-NET Module Parameter Setting Screen will be displayed.



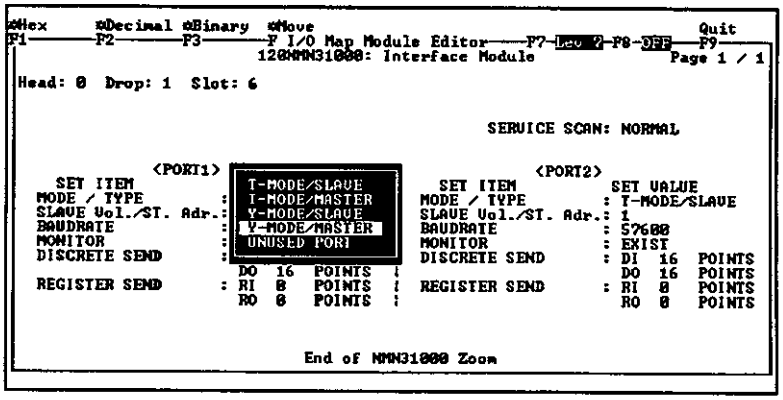
5) Set the parameters as follows:

Move the cursor to the position of the parameter to be set using the Cursor Keys and press the Enter Key.



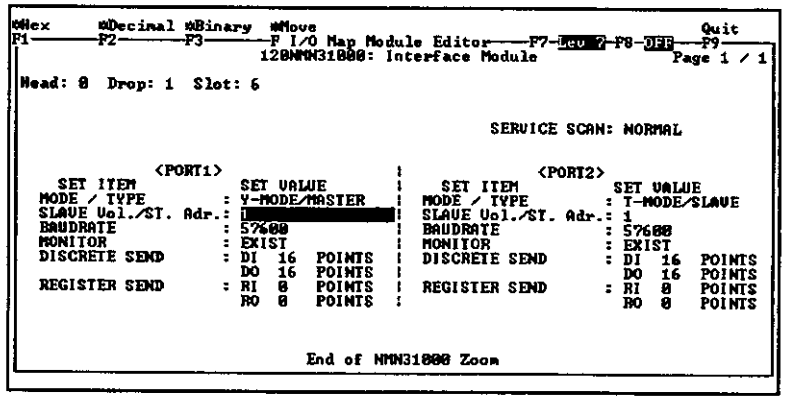
The settings menu will be displayed.

6) Move the cursor to the position of the condition to be set using the Cursor Keys and press the Enter Key.

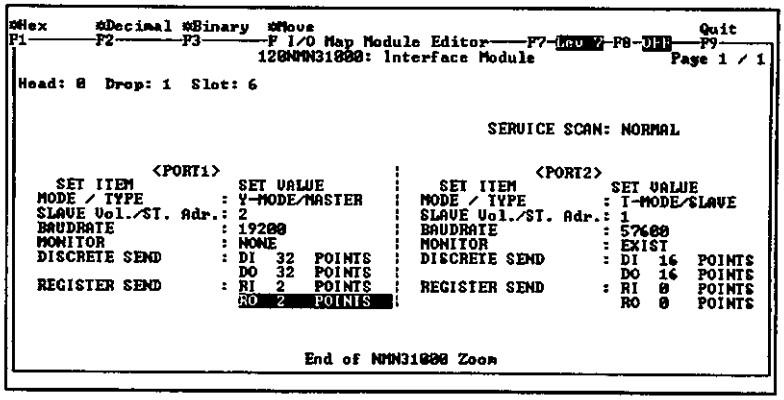


The specified parameter is now set.

7) Set all the parameters following the same procedure.

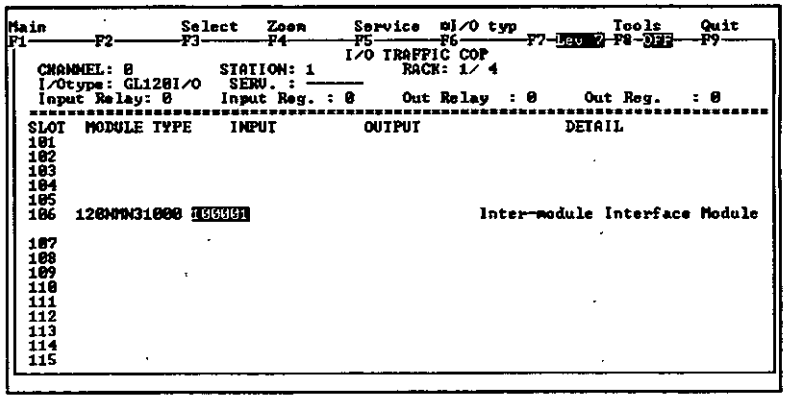


8) After all the parameters have been set, press the Esc Key.



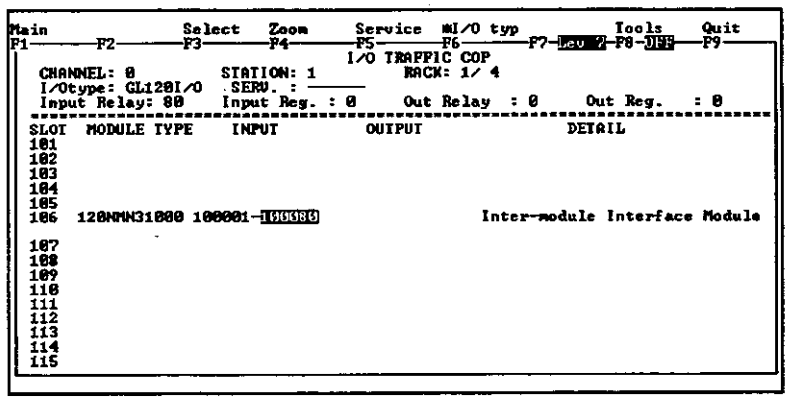
The screen will return to the I/O Traffic Cop Screen.

9) Set the reference numbers by enter the leading reference numbers of the I/O relay (**100001** in this example) and press the Enter Key.



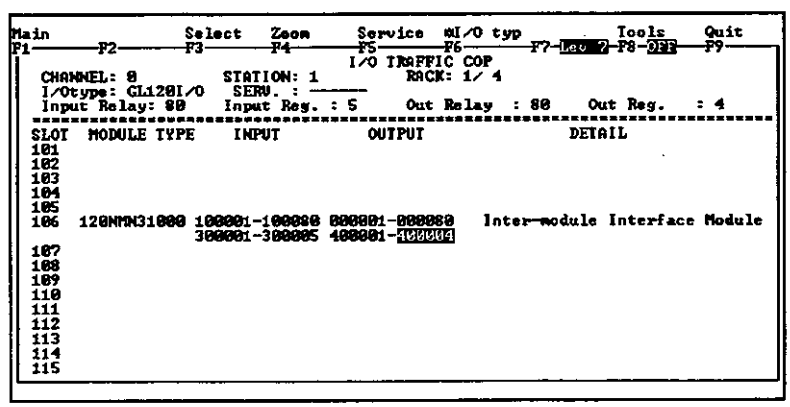
The cursor will move to the final reference number.

10) If no changes are required, press the Enter Key.



The I/O allocation set in the Parameter Setting Screen and displayed in reverse video when the cursor was moved is the final reference number (two ports: Port 1 and Port 2).

11) Allocate output relays, and I/O registers by following the same procedure.



Note Two ports, Port 1 and Port 2, can be allocated to one M-NET Module as I/O points. The maximum input is 64 bytes and the maximum output is 64 bytes. If these limits are exceeded, an error will be displayed when the cursor is moved to another slot. If there is an error, be sure that there are no more than two ports set in the Parameter Setting Screen.
The number of bytes for the number of I/O points and I/O registers is as follows:

- Eight digital input points: 1 byte
- Eight digital output points: 1 byte
- One input register: 2 bytes
- One output register: 2 bytes

Troubleshooting

5

This chapter explains how to troubleshoot M-NET Module errors.

5.1 Self-diagnostic Function

This section explains the M-NET Module's self-diagnostic function.

1) Self-diagnosis

The M-NET Module undertakes self-diagnosis when and after power is turned ON. If an error is detected, the type of error is displayed on the LED indicators on the front panel of the Module.

a) Self-diagnosis when Power is Turned ON

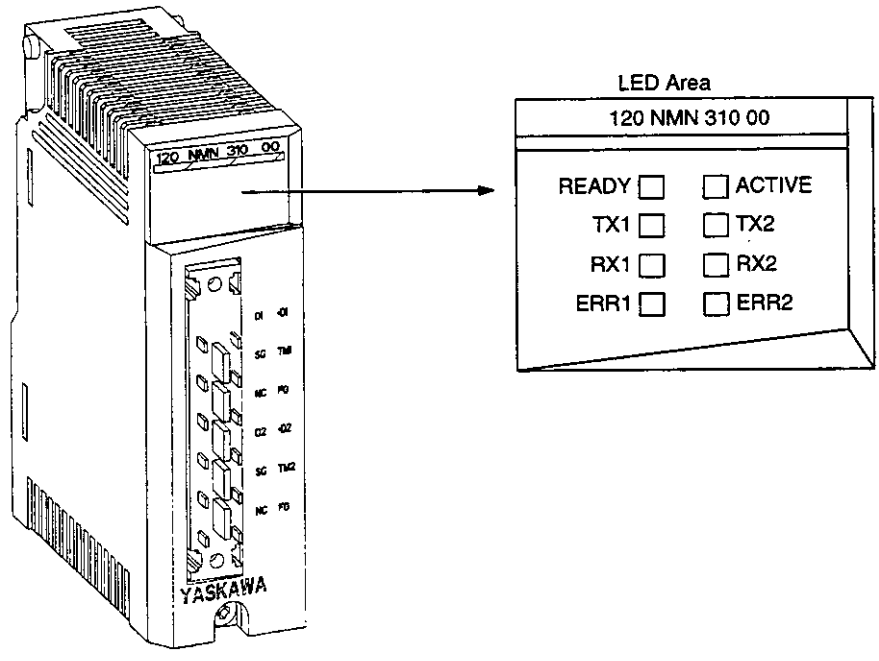
- CPU check
- RAM check
- ROM check

b) Self-diagnosis after Power is Turned ON with No Errors

- Watchdog timer check

2) Error Display

When an error occurs, the type of error is shown on the indicators in the LED area.



3) Error Display

LED Status						Mode	Port	Error	Remedy
Master			Slave						
READY	ERR 1	ERR 2	READY	ERR 1	ERR 2				
0	1	1	0	1	1	T Mode or Y Mode	-	CPU Module error Watchdog timer error	Replace the Module.
0	A	A	0	A	A		-	ROM/RAM error	Replace the Module.
1	A	A	1	A	A		1 or 2	Parameter setting error 1) Number of transmission points/registers exceeded at the Master (for inputs or outputs) 2) Number of transmission points for both input and output are zero. 3) Input allocation greater than 64 bytes (total for ports 1 and 2). 4) Output allocation greater than 64 bytes (total for ports 1 and 2).	Reset parameters.
1	B	-	1	1	-	T Mode	1	Connection preparation sequence error 1) Different allocations for Master and Slave. 2) Transmission line error. 3) Retry counter overflow 4) Exceeded normal reception time.	Reset parameters. Turn power OFF and ON. Replace Module. Check wiring. Recover Slave using the Master PFIX reception. Recover T Mode Master by using CPU Module's stop/start.
1	-	B	1	-	1		2		
1	-	-	1	1	-	Y Mode	1		
1	-	-	1	-	1		2		
1	C	-	1	1	-	T Mode	1	Normal sequence error Same as 2), 3) and 4) above.	
1	-	C	1	-	1		2		
1	1	-	1	1	-	Y Mode	1		
1	-	1	1	-	1	Y Mode	2		

Note 0: Not lit;1: Flashing; A: Flicker pattern A; B: Flicker pattern B; C: Flicker pattern C; -: Displays status of that port

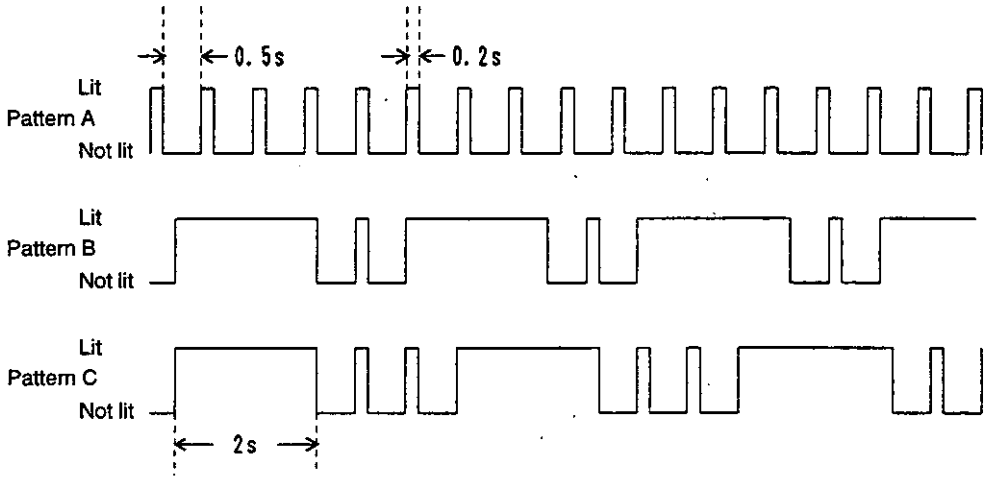
4) Displays for Connection Preparation Sequence Errors in Y Mode

a) If there are no normal Slaves at startup, a Connection Preparation Sequence Error will occur, and the indicators will repeatedly show one cycle of the connection preparation sequence and one flicker pattern B. Flicker pattern B will be shown as the error display at the Master.

b) If there is one or more normal Slaves and one or more error Slaves at startup, a Connection Preparation Sequence Error will occur for the error Slaves, but automatic removal and recovery will be performed. The indicators will therefore not flicker at the Master for an error display and the indicators will remain lit.

5) Flicker Patterns

When an error is generated, the type of error is indicated by the LED flicker. The flicker patterns are as follows:



5.2 Hot Swapping Function

This section provides information on hot swapping (removal/insertion under power).

1) Hot Swapping

a) For GL120 and GL130, the M-NET Module can be removed or mounted while the external power supply is turned ON to the Power Supply Module, and the CPU Module will still continue to operate normally. This function is called "hot swapping."

b) Hot swapping allows replacement of malfunctioning M-NET Modules without stopping the operation of the CPU Module.

c) If an M-NET Module is hot swapped, it requires a few seconds for the new Module to run normal I/O communications processing.

d) Use hot swapping effectively, remembering that some Modules cannot be mounted or removed while power is being supplied. Also be sure to consider the impact on the overall control system before removing a Module.

2) Hot Swapping Precautions

Take the following precautions when hot swapping (removal/insertion under power).

Note (1) Inserting or removing a Module which does not permit live mounting and removal may cause the CPU Module to stop.

(2) Do not hot swap more than one Module at the same time even if those Modules permit hot swapping. If multiple Modules are hot swapped at the same time, the CPU Module may reset or stop operation.

(3) When hot swapping, never short-circuit the terminal block or the connectors of the Module.

System Application Examples

6

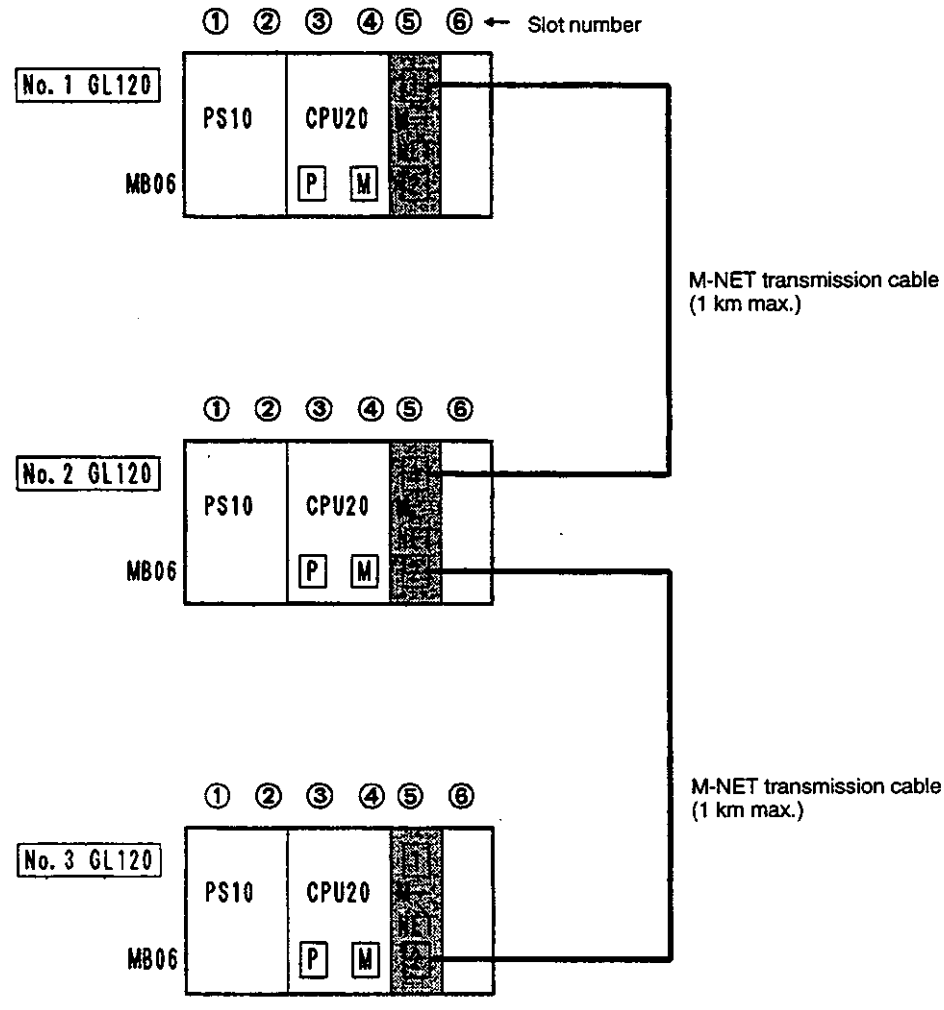
This chapter provides application examples of the M-NET System.

6.1 System Application Examples

This section provides application examples of the M-NET System.

1) System Configuration

Assume that the following system configuration is to be constructed.



PS10: Power Supply Module (7 A)
CPU20: CPU Module (16 kW)
M-NET: M-NET Module
MB06: 6-slot Mounting Base

"P" in CPU Module: MEMOBUS PLUS port
"M" in CPU Module: MEMOBUS port

M-NET Transmission Cable: JKEV-SB 0.75 mm² x 2P
(Polyethylene insulation cable with paired, stranded copper shield)

M-NET Module 1, 2: M-NET communications port 1, 2

Figure 6.1 System Configuration

2) Transmission Cable Connection

Connect transmission cables to the M-NET Module as shown below.

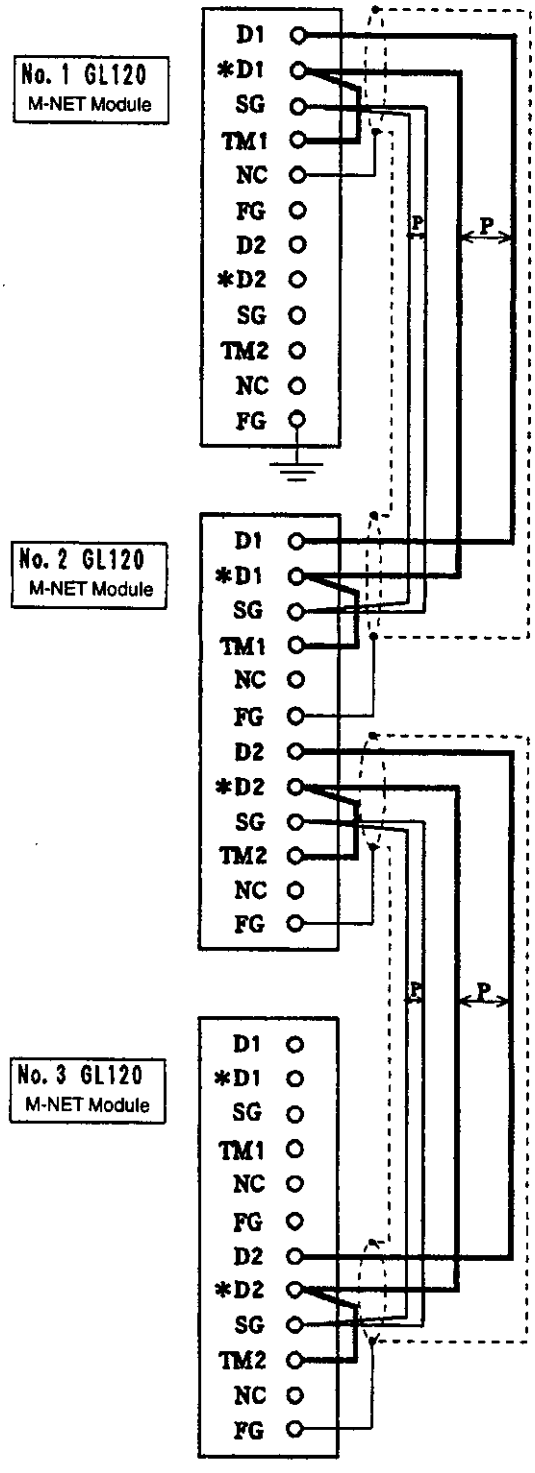


Figure 6.2 Transmission Cable Connection

3) Transmission

a) Assume that the following data is transmitted using the M-NET Module shown in Figure 6.1.

(1) Target 1: Transmit the following data from No. 1 GL120 to No. 2 GL120.

- Digital Signal: 32 points
- Register (Value) Signal: 2 sets (1 word/set)

(2) Target 2: Transmit the following data from No. 2 GL120 to No. 1 GL120.

- Digital Signals: 32 points
- Register (Value) Signal: 2 sets (1 word/set)

(3) Target 3: Transmit the following data from No. 2 GL120 to No. 3 GL120.

- Digital Signal: 32 points
- Register (Value) Signal: 2 sets (1 word/set)

(4) Target 4: Transmit the following data from No. 3 GL120 to No. 2 GL120.

- Digital Signal: 32 points
- Register (Value) Signal: 2 sets (1 word/set)

b) Assume that the transmission mode is set to Y mode and the baud rate is set to 57.6 Kbps and also that the transmission status of the M-NET Module is monitored through the Input Register.

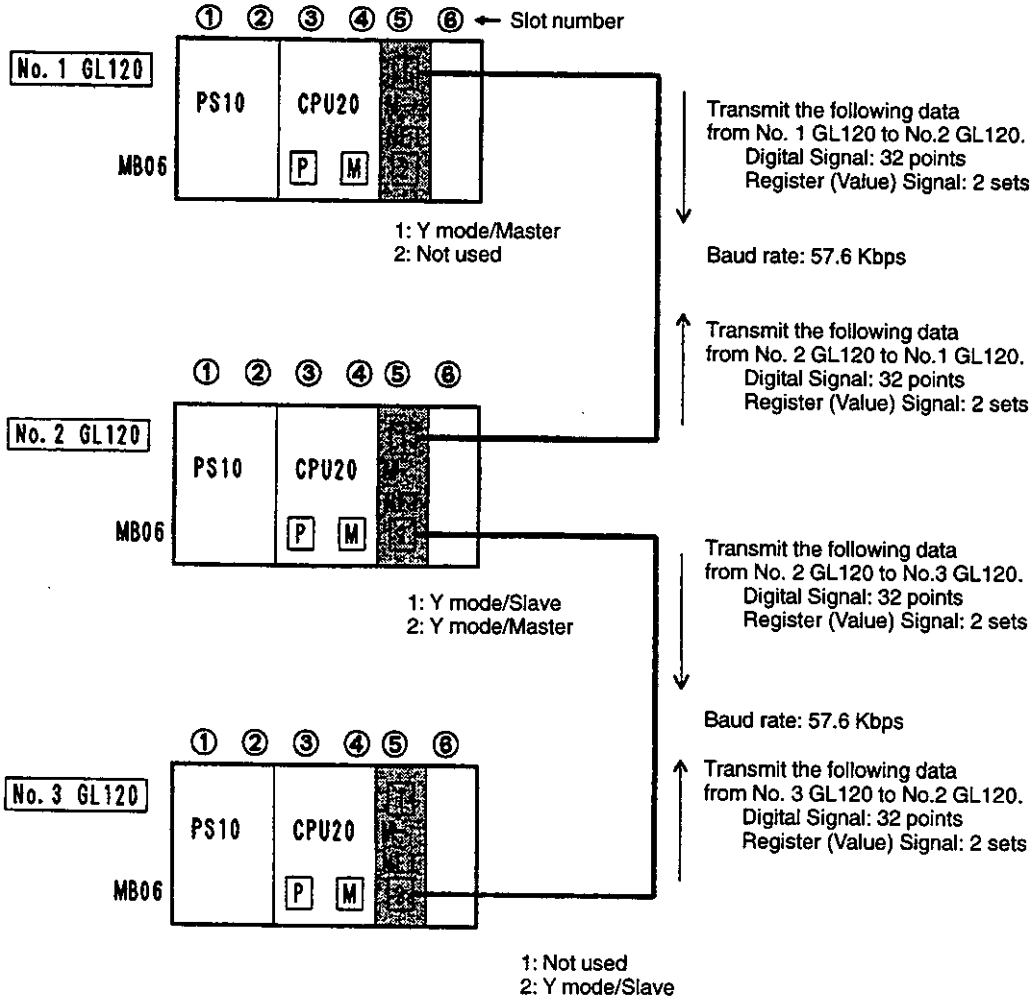


Figure 6.3 Transmission

4) I/O Reference Allocation

Allocate I/O references for each CPU Module as shown in the following diagram.

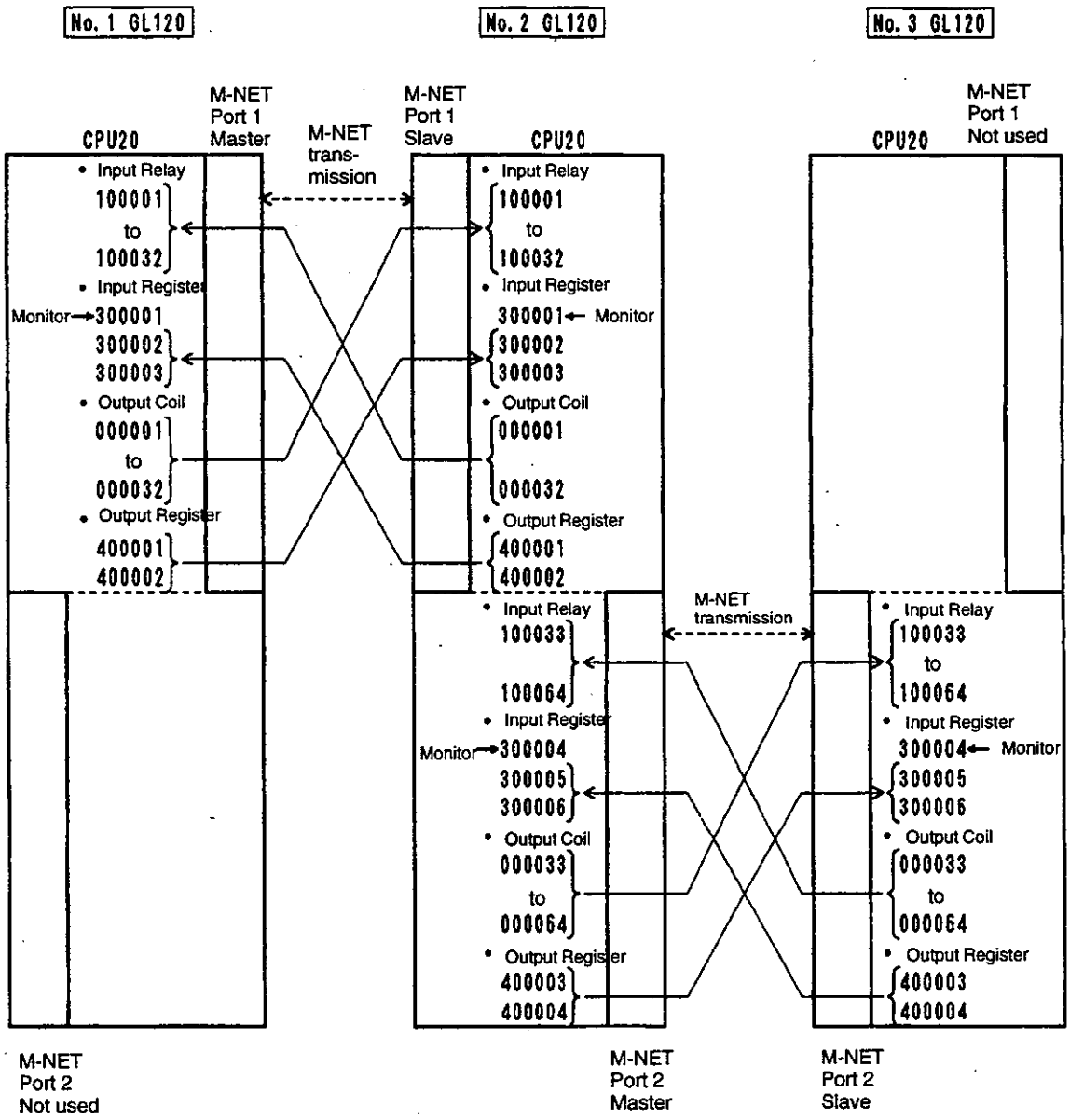


Figure 6.4 I/O Reference Allocation

5) I/O Allocation Operation

Perform I/O allocation operation using the MEMOSOFT according to the following procedure.

a) I/O Allocation for CPU20 of No. 1 GL120

(1) Display the I/O Traffic Cop (i.e., I/O Allocation) Screen. Enter the Module model number (120NMN31000) of the M-NET Module under the following settings; CHANNEL: 0, STATION: 1, RACK: 1/4, SLOT: 5
Directly input the Module model number of the M-NET Module or press the "?" Key to display the Module model number list and then select an appropriate number from the list.

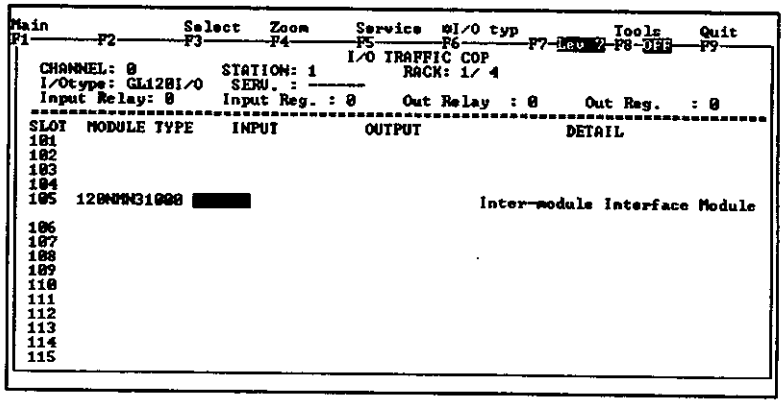


Figure 6.5 Module Model Number Setting

(2) Press the F4 Key (Zoom) to display the I/O Map Module Editor Screen for setting "Slot: 5."
Input the setting values for PORT1 and PORT2 of the M-NET Module as shown in the following screen. Move the Cursor to the desired setting item and press the "?" Key or Enter Key to display a list of values that can be set.
The SERVICE SCAN can either be set to NORMAL or HIGH-SPEED. It is set to NORMAL in the following screen.

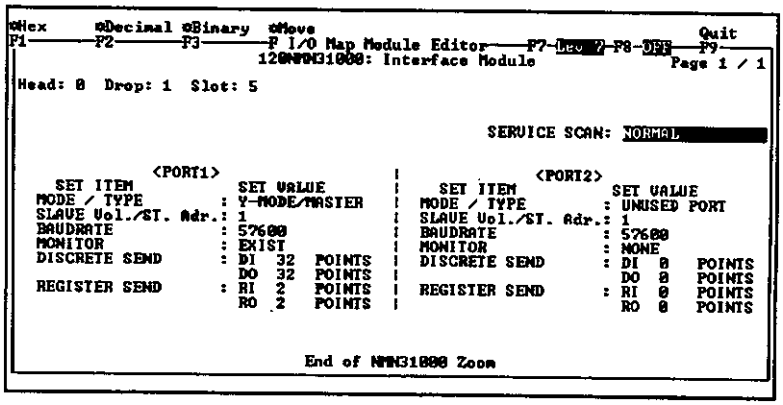


Figure 6.6 Communications Port Settings

(3) Press the Esc Key to display the I/O Traffic Cop Screen again. Input the leading reference numbers for each I/O allocation reference numbers to be allocated to the M-NET Module as shown in the following screen.

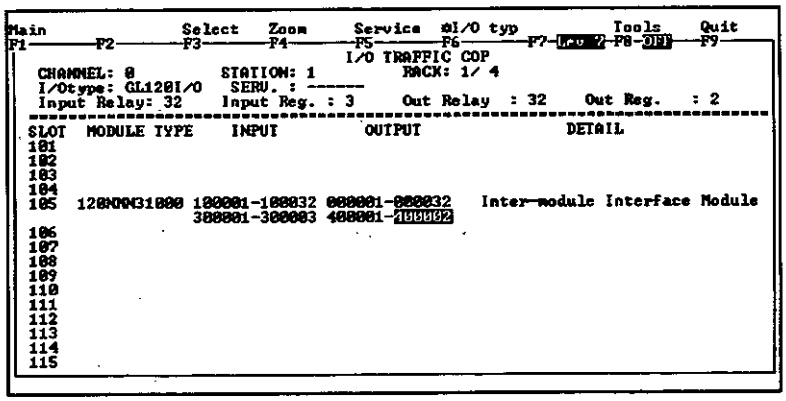


Figure 6.7 I/O Reference Number Setting

This completes the I/O allocation operation for the CPU20 of No. 1 GL120.

b) I/O Allocation for CPU20 of No. 2 GL120

Also perform I/O allocation operation for the CPU20 of No. 2 GL120. Figures 6.8 and 6.9 show the results of allocation. As for the operation procedure, refer to a), above.

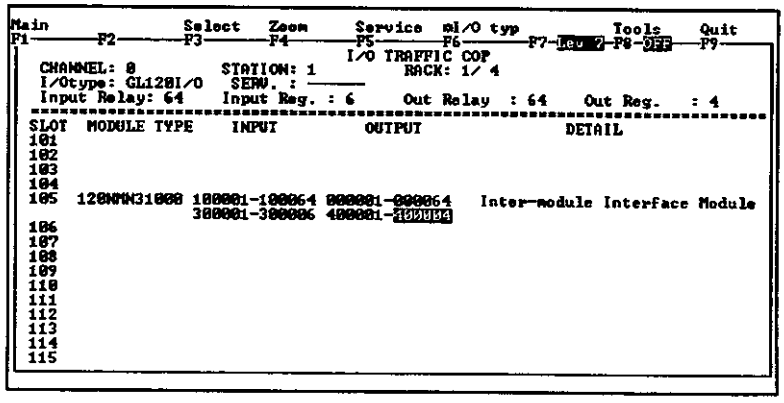


Figure 6.8 Module Name and I/O Reference Number Settings

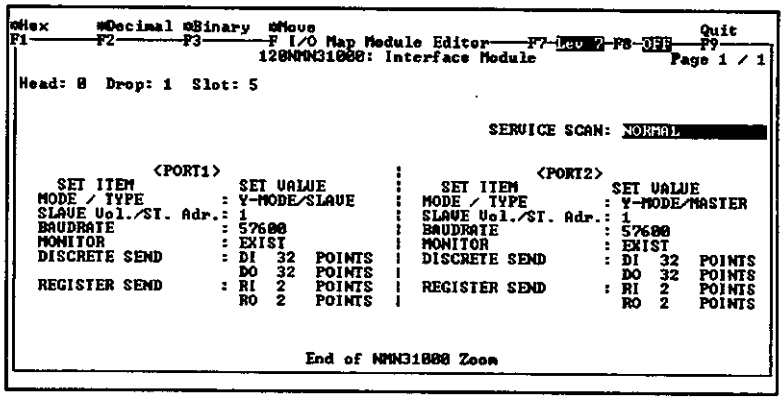


Figure 6.9 Communications Port Setting

c) I/O Allocation for CPU20 of No. 3 GL120

Also perform I/O allocation operation for the CPU20 of No. 3 GL120.
Figures 6.10 and 6.11 show the results of allocation. As for the operation procedure, refer to a), above.

```
Main              Select   Zoom     Service  @I/O typ          Tools    Quit
F1-------F2-------F3-------F4-------F5-------F6-------F7-Rev 2-F8-OFF--F9-------
                              I/O TRAFFIC COP
  CHANNEL: 0          STATION: 1          RACK: 1/ 4
  I/Otype: GL120I/O   SERV. : ------
  Input Relay: 32    Input Reg. : 3     Out Relay  : 32    Out Reg.   : 2
 ------------------------------------------------------------------------------
 SLOT  MODULE TYPE    INPUT          OUTPUT              DETAIL
 101
 102
 103
 104
 105  120NMN31000 100033-100064 000033-000064   Inter-module Interface Module
                  300004-300006 400003-400004
 106
 107
 108
 109
 110
 111
 112
 113
 114
 115
```

Figure 6.10 Module Name and I/O Reference Number Settings

```
@Hex     @Decimal @Binary  @Move                                      Quit
F1-------F2-------F3-------F I/O Map Module Editor----F7-Rev 2-F8-OFF--F9-------
                          120@MN31000: Interface Module          Page 1 / 1

Head: 0  Drop: 1  Slot: 5

                                                SERVICE SCAN: NORMAL

          <PORT1>                          :          <PORT2>
   SET ITEM          SET VALUE             :   SET ITEM          SET VALUE
 MODE / TYPE       : UNUSED PORT           : MODE / TYPE       : Y-MODE/SLAVE
 SLAVE Val./ST. Adr.: 1                    : SLAVE Val./ST. Adr.: 1
 BAUDRATE          : 57600                 : BAUDRATE          : 57600
 MONITOR           : NONE                  : MONITOR           : EXIST
 DISCRETE SEND     : DI  0   POINTS        : DISCRETE SEND     : DI  32  POINTS
                     DO  0   POINTS        :                     DO  32  POINTS
 REGISTER SEND     : RI  0   POINTS        : REGISTER SEND     : RI  2   POINTS
                     RO  0   POINTS        :                     RO  2   POINTS

                          End of NMN31000 Zoom
```

Figure 6.11 Communications Port Setting

Appendix A

Differences from Previous Products

This appendix explains the differences between the M-NET Module and Yaskawa's previous products.

A.1 Differences from Previous Products

The differences between the GL120/GL130 M-NET Modules and the GL60, U84, and other previous Yaskawa M-NET Modules are listed in the following table.

Table A.1 Differences between NMN31000 and B2806/B1086

Item		NMN31000	B2806	B1086
Number of Ports/ Module		2 ports	1 port	1 port
Baud Rate		9.6 Kbps, 19.2 Kbps, 38.4 Kbps, 57.6 Kbps	9.6 Kbps, 19.2 Kbps, 31.2 Kbps, 38.4 Kbps	4.8 Kbps, 9.6 Kbps, 19.2 Kbps, 31.2 Kbps
No. of Communications Points	T Mode	DO/DI points: 256/256 RO/RI points: 0/0	DO/DI points: 128/128 RO/RI points: 0/0	DO/DI points: 128/128 RO/RI points: 0/0
	Y Mode	DO/DI points: 256/256 RO/RI points: 15/15	DO/DI points: 128/128 RO/RI points: 7/7	DO/DI points: 128/128 RO/RI points: 8/7
Parameter Setting Method		Software settings in PP	Rotary switch DIP switch	Rotary switch DIP switch
Connection Station	T Mode	M:S = 1:15	M:S = 1:7	M:S = 1:7
	Y Mode	M:S = 1:15	M:S = 1:7	M:S = 1:4
External Power Source		Not required	Not required	Requires + 24 V
Applicable CPU		CPU10, CPU20, CPU21, and CPU30	GL20, GL60, and GL70	R84 and U84

Note M: Master; S: Slave

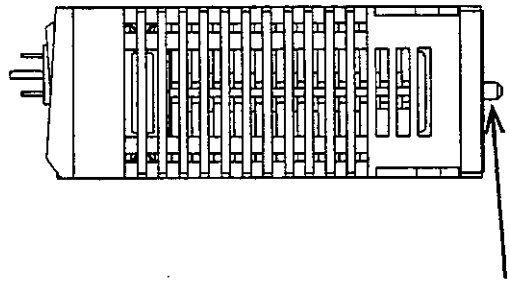
Appendix B

Dimensions

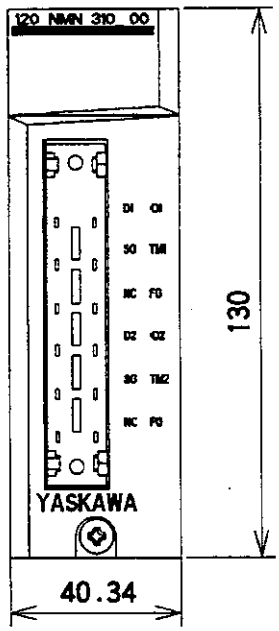
B.1 M-NET Module

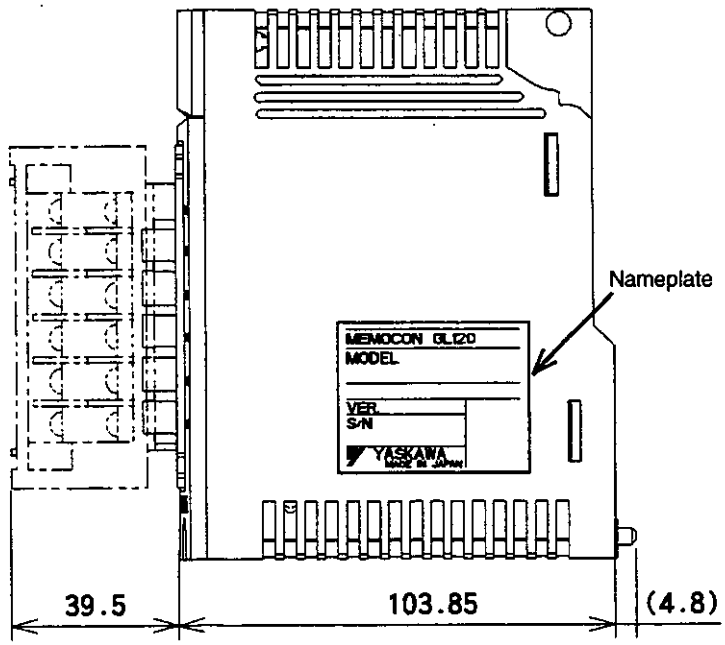
Model No. JAMSC-120NMN31000

Unit: mm
Approx. Mass: 300 g



Module mounting screw
(M4, Philips)





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