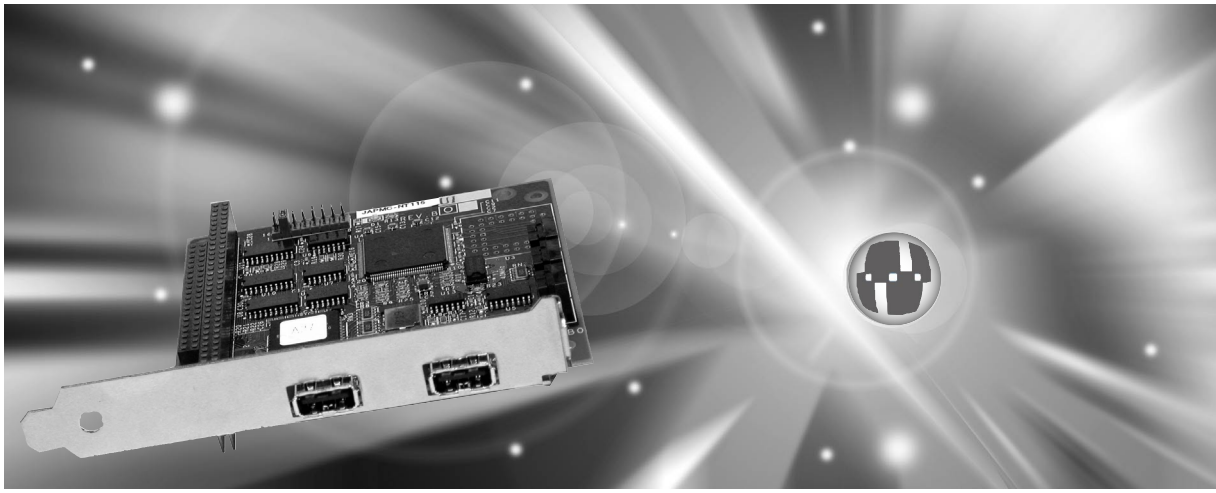
PC/104-compliant MECHATROLINK-Ⅱ Interface Card
USER'S MANUAL

MODEL: JAPMC-NT115□



YASKAWA

MANUAL NO. SIEPC88070008A

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Using this Manual

Please read this manual to ensure correct usage of the MECHATROLINK-II Interface Card JAPMC-NT115□. Keep this manual in a safe place for future reference.

■ Basic Terms

Unless otherwise specified, the following definitions are used:

- NT115 : Generic term for PC/104-compliant MECHATROLINK-II Interface Cards, JAPMC-NT115I/NT115P/NT115M
- MECHATROLINK : Generic term for Motion Network MECHATROLINK-I and MECHATROLINK-II
- PC : Generic term for personal computer or other general-purpose computers
- Master : Primary station composed of MECHATROLINK-II Interface Card
- Slave : Secondary station composed of MECHATROLINK-II compatible devices

■ Manual Configuration

Read the chapters of this manual as required by the purpose.

Chapter	Selecting Models and Peripheral Devices	Studying Specifications and Ratings	Designing the System	Installation and Wiring	Trial Operation	Maintenance and Inspection
Chapter 1 NT115 Overview	–	–	Applicable	–	–	–
Chapter 2 MECHATROLINK-II System	–	–	Applicable	–	Applicable	–
Chapter 3 NT115 Details	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
Chapter 4 Mounting and Connecting the NT115	Applicable	–	Applicable	Applicable	Applicable	Applicable
Chapter 5 Communication and Control Function	Applicable	–	Applicable	Applicable	Applicable	Applicable
Chapter 6 Communication Software	Applicable	–	Applicable	–	Applicable	Applicable

■ Visual Aids

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

IMPORTANT — Indicates important information that should be memorized.

Indicates supplemental information.

◀ EXAMPLE ▶ — Indicates application examples.

Describes technical terms that are difficult to understand, or appear in the text without an explanation being given.

■ Indication of Reverse Signals

In this manual, the names of reverse signals (ones that are valid when low) are written with a forward slash (/) before the signal name, as shown in the following example:

- $\overline{\text{S-ON}}$ = /S-ON
- $\overline{\text{P-CON}}$ = /$\overline{\text{P}}$-CON

■ Related Manuals

Refer to the following related manuals as required.

Manual Name	Manual Number	Contents
Σ-III Series SGM□S/SGDS User's Manual For MECHATROLINK-II communications	SIEPS80000011	Describes the models, capacities, selection methods, ratings, characteristics, diagrams, cables, peripheral devices, wiring, panel installation, trial operation, adjustment, function application methods, maintenance, inspection, and MECHATROLINK communication of the Σ-III Series SERVOPACKs and servomotors.
Σ-II Series SGDH MECHATROLINK-II Application Module User's Manual	SIEPC71080001	Describes the MECHATROLINK communication of the JUSP-NS115 Application Module mounted in the Σ-II Series SERVOPACK.
Machine Controller MP900/MP2000 Series MECHATORLINK System User's Manual	SIE-C887-5.1	Describes how to use the MECHATROLINK-I and MECHATORLINK-II communications and MECHATROLINK-compatible devices.

Safety Information

The following conventions are used to indicate precautions in this manual. Failure to heed precautions provided in this manual can result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.

⚠ 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.

Safety Precautions

The following precautions are for checking products on delivery, storage, transportation, installation, wiring, operation, maintenance, inspection, and disposal. These precautions are important and must be observed.

⚠ WARNING

- Before starting operation in combination with the machine, ensure that an emergency stop procedure has been provided and is working correctly.

  There is a risk of injury.
- Do not touch anything inside the MECHATROLINK devices.

  There is a risk of electrical shock.
- Always keep the front cover attached when power is being supplied.

  There is a risk of electrical shock.
- Observe all procedures and precautions given in this manual for trial operation.

  Operating mistakes while the servomotor and machine are connected can cause damage to the machine or even accidents resulting in injury or death.
- Do not remove the front cover, cables, connector, or options while power is being supplied.

  There is a risk of electrical shock.
- Do not allow installation, disassembly, or repairs to be performed by anyone other than specified personnel.

  There is a risk of electrical shock or injury.
- Do not damage, pull on, apply excessive force to, place heavy objects on, or pinch cables.

  There is a risk of electrical shock, operational failure or burning of the Interface Card.
- Do not attempt to modify the Interface Card in any way.

  There is a risk of injury or device damage.
- Do not approach the machine when there is a momentary interruption to the power supply. When power is restored, the machine may start operation suddenly. Provide suitable safety measures to protect people when operation restarts.

  There is a risk of injury.

■ Storage and Transportation

⚠ CAUTION

- Do not store or install the Interface Card in the following locations.

  There is a risk of fire, electrical shock, or device damage.
  - Direct sunlight
  - Ambient temperature exceeds the storage or operating conditions
  - Ambient humidity exceeds the storage or operating conditions
  - Rapid changes in temperature or locations subject to condensation
  - Corrosive or flammable gas
  - Excessive dust, dirt, salt, or metallic powder
  - Water, oil, or chemicals
  - Vibration or shock
- Do not overload the Interface Card during transportation.

  There is a risk of injury or an accident.

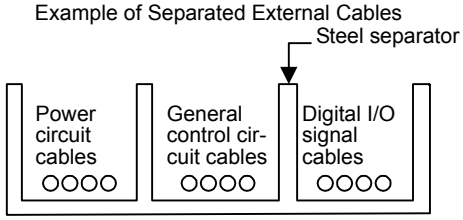
■ Installation

⚠ CAUTION
• Never use the Interface Card in locations subject to water, corrosive atmospheres, or flammable gas, or near burnable objects. There is a risk of electrical shock or fire. • Do not step on the Interface Card or place heavy objects on the Interface Card. There is a risk of injury. • Do not block the air exhaust port or allow foreign objects to enter the PC. There is a risk of element deterioration inside, an accident, or fire. • Always mount the Interface Card in the specified orientation. There is a risk of an accident. • Do not subject the Interface Card to strong shock. There is a risk of an accident.

■ Wiring

⚠ CAUTION
• Check the wiring to be sure it has been performed correctly. There is a risk of motor run-away, injury, or an accident. • Always use a power supply of the specified voltage. There is a risk of burning. • In places with poor power supply conditions, take all steps necessary to ensure that the input power supply is within the specified voltage range. There is a risk of device damage. • Install breakers and other safety measures to provide protection against shorts in external wiring. There is a risk of fire. • Provide sufficient shielding when using the Interface Card in the following locations. There is a risk of device damage. • Noise, such as from static electricity • Strong electromagnetic or magnetic fields • Radiation • Near power lines

■ Selecting, Separating, and Laying External Cables

⚠ CAUTION
• Consider the following items when selecting the I/O signal lines (external cables) to connect the MECHATROLINK device to external devices. • Mechanical strength • Noise interference • Wiring distance • Signal voltage, etc. • Separate the I/O signal lines from the power lines both inside and outside the control box to reduce the influence of noise from the power lines. If the I/O signal lines and power lines are not separated properly, malfunctioning may result. Example of Separated External Cables 

■ Maintenance and Inspection

⚠ CAUTION
• Do not attempt to disassemble the MECHATROLINK device. There is a risk of electrical shock or injury. • Do not change wiring while power is being supplied. There is a risk of electrical shock or injury.

■ Disposal

⚠ CAUTION
• Dispose of the Interface Card as general industrial waste.

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NT115 Overview

1.1 Checking the NT115 - - -

1.1 Checking the NT115

1.1.1 Check Items

Check the following items as soon as the product is delivered.

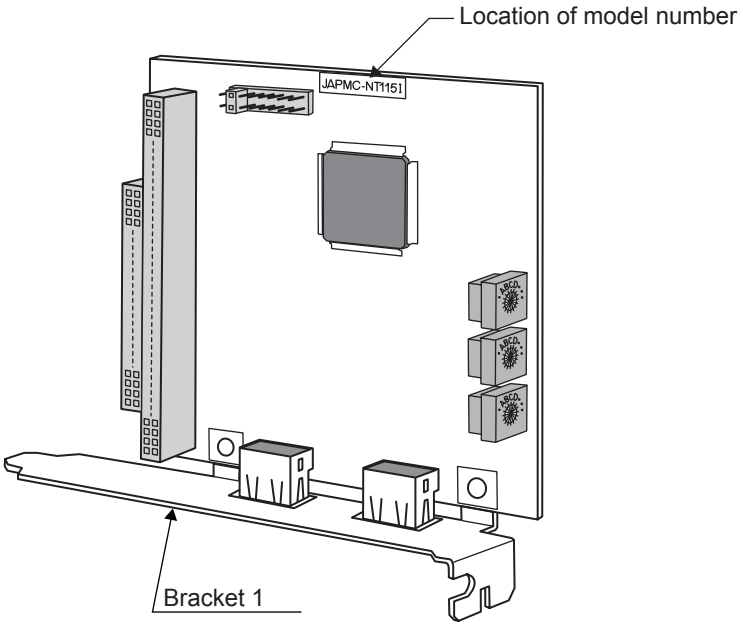
Check Item	Remarks
Is the delivered product the one that was ordered?	Check the model number given on the Interface Card to be sure the correct product was delivered. (Refer to the following pages.)
Is there any damage?	Check the overall appearance, and check for damage or scratches that may have occurred during shipping.

If any of the above items are faulty or incorrect, contact your Yaskawa representative or the dealer from whom you purchased the products.

1.1.2 External Appearance and Model Number Location

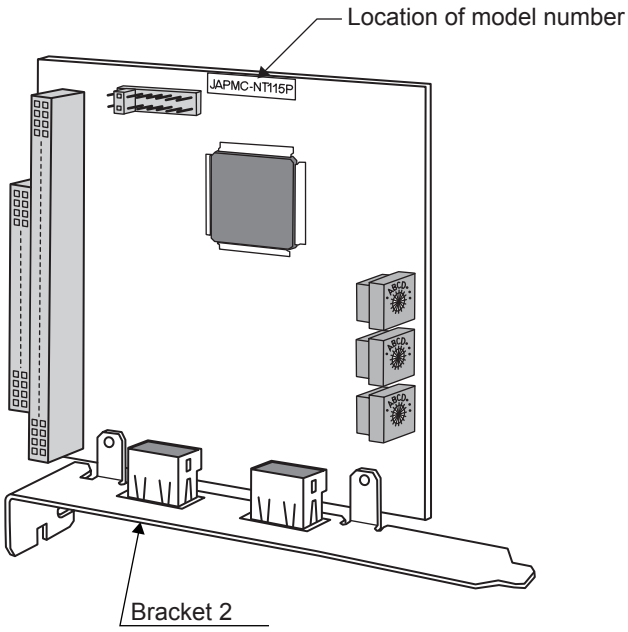
(1) JAPMC-NT115I

The NT115I has installation bracket 1 mounted to it.



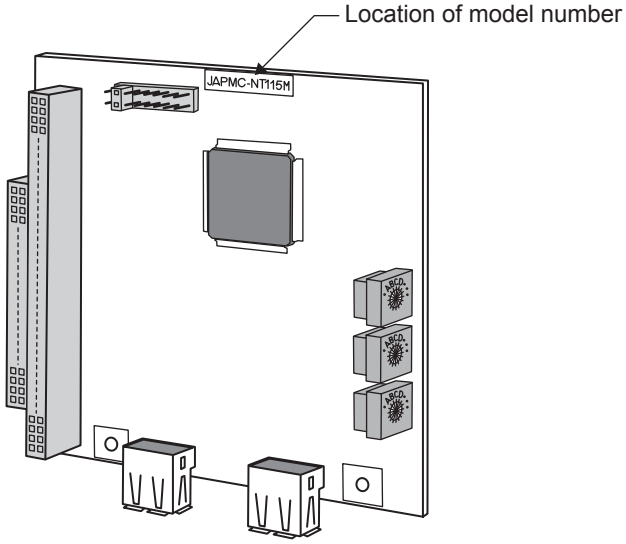
(2) JAPMC-NT115P

The NT115P has installation bracket 2 mounted to it.



(3) JAPMC-NT115M

The NT115M has no installation bracket.



1.2 Model Numbers and Component Names

1.2.1 Reading Model Numbers

The model numbers used to select and confirm NT115s are interpreted as shown below.

JAPMC - NT115 □

Bracket
I: Bracket 1 attached
P: Bracket 2 attached
M: No bracket attached

1.2.2 Component Names

The names of the NT115 components are given in the following figure using the NT115I (Bracket 1 attached) as an example.

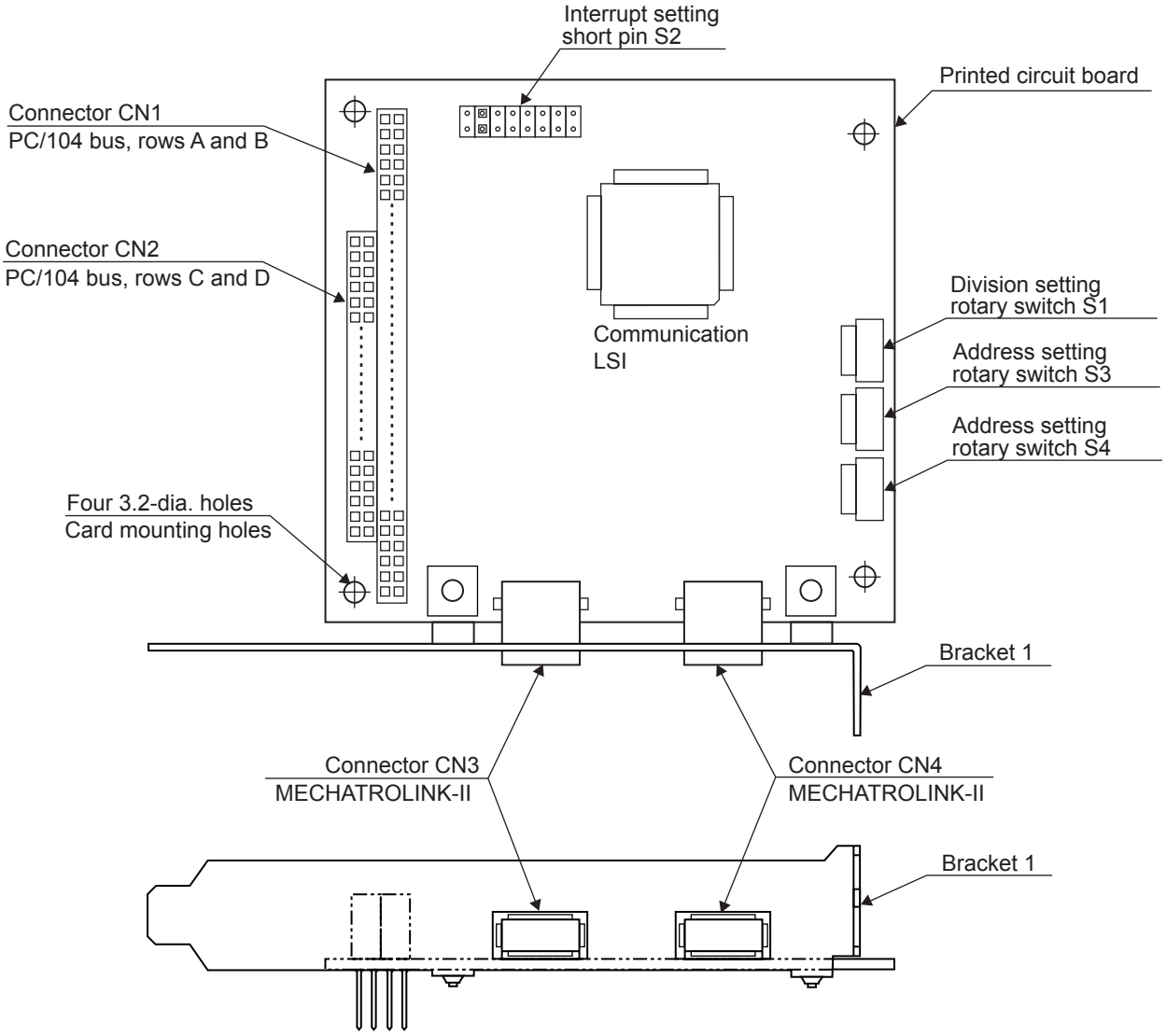


Fig. 1.1 JAPMC-NT115I Component Names

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MECHATROLINK-II System

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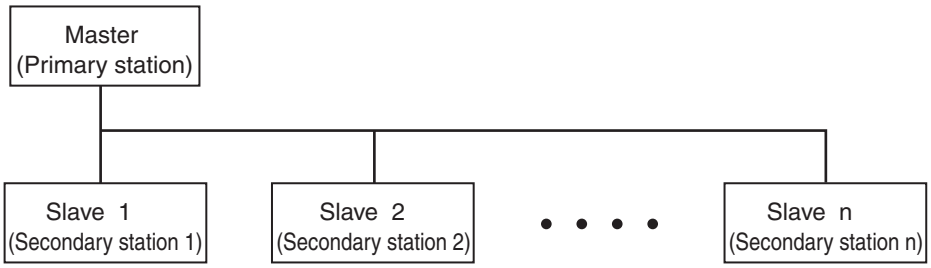
2.1 Overview of MECHATROLINK-II System

This section provides an overview of the MECHATROLINK-II System and describes its features.

2.1.1 Overview of MECHATROLINK-II System Using NT115

A MECHATROLINK-II System with the NT115 uses a master-slave system.



Note: The maximum number of stations, n, is 30. A Repeater is required for systems with 15 stations or more or 16 stations or more. (Refer to *2.2.3 Maximum Number of Slaves*.)

The MECHATROLINK-II System performs cyclic bidirectional communication for 17-byte/32-byte data between one master (the primary station) and up to 30 slaves (secondary stations) at a communication cycle of between 250 μs to 8 ms.

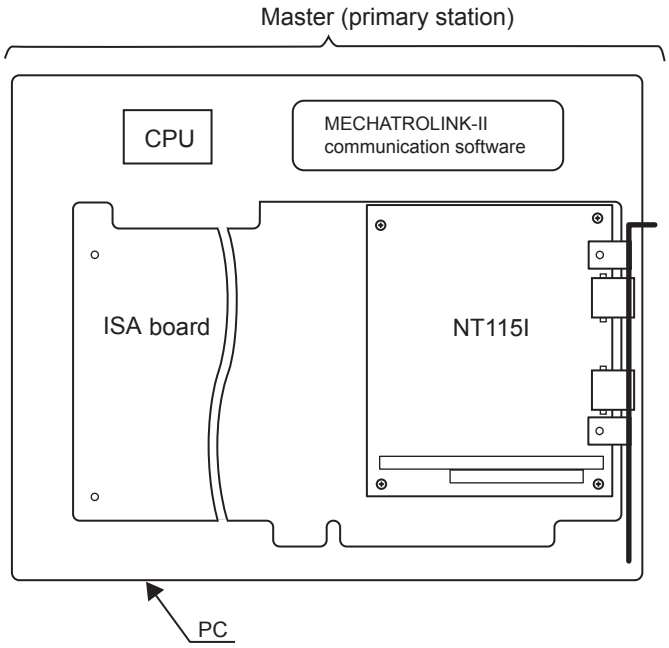
IMPORTANT

The above communication cycle may be restricted by the slaves that are connected.

MECHATROLINK-II communication is effective for locus control between multiple axes with complete synchronization for all stations. The MECHATROLINK-II System consists of the master and slaves described next.

(a) Master

The master is a PC equipped with software for executing MECHATROLINK-II communication in which a JAPMC-NT115□ Interface Card is mounted to an ISA motherboard via a PC/104-compliant bus.



The communication software must be created by the user using an access library CD-ROM as reference. The access library CD-ROM, called the CPMC-MAL700 NT115 Access Library, is available from Yaskawa free of charge upon request.

(b) Slaves

Refer to *2.2.2 MECHATROLINK-II compatible devices* for details on applicable slaves.

2.1.2 Features of a MECHATROLINK-II System Using the NT115

The NT115 has the following features as a MECHATROLINK-II Interface Card connected to a PC/104-compliant bus.

- The NT115 contains a MECHATROLINK-II communication LSI, facilitating communication control.
- The NT115 mounts to an ISA motherboard via a PC/104-compliant bus. This means the communication LSI (JL-080) can be accessed directly from the ISA motherboard.
- The MECHATROLINK-II System performs bidirectional communication between one primary station (the master) and up to 30 secondary stations (slaves).
- The sync signal generated by the NT115 (250 μs to 8 ms or a division thereof) can be used as an interrupt signal to synchronize PC operation and communication.
- If the NT115 is used, data can be exchanged between the primary station and secondary stations through the built-in 2-port RAM so that data communication are automatically checked for errors, reducing the load on the PC software.
- The communication line is connected using only one, 2-conductor twisted-pair cable. A pulse transformer is used for isolation. Therefore, high-speed, highly reliable communication can be achieved with simple connections.
- An access library and sample software are provided for the primary station (master) so that MECHATROLINK-II communication software can be easily developed.

2.2 MECHATROLINK-II System Configuration

2.2.1 MECHATROLINK-II System Configuration Example

A MECHATROLINK-II System configuration example using the NT115 is shown in *Fig. 2.1 MECHATROLINK-II System Configuration Example*. Up to 30 slaves can be connected to one master. If there are 15 stations or more, or 16 stations or more, however, a Repeater must be used.

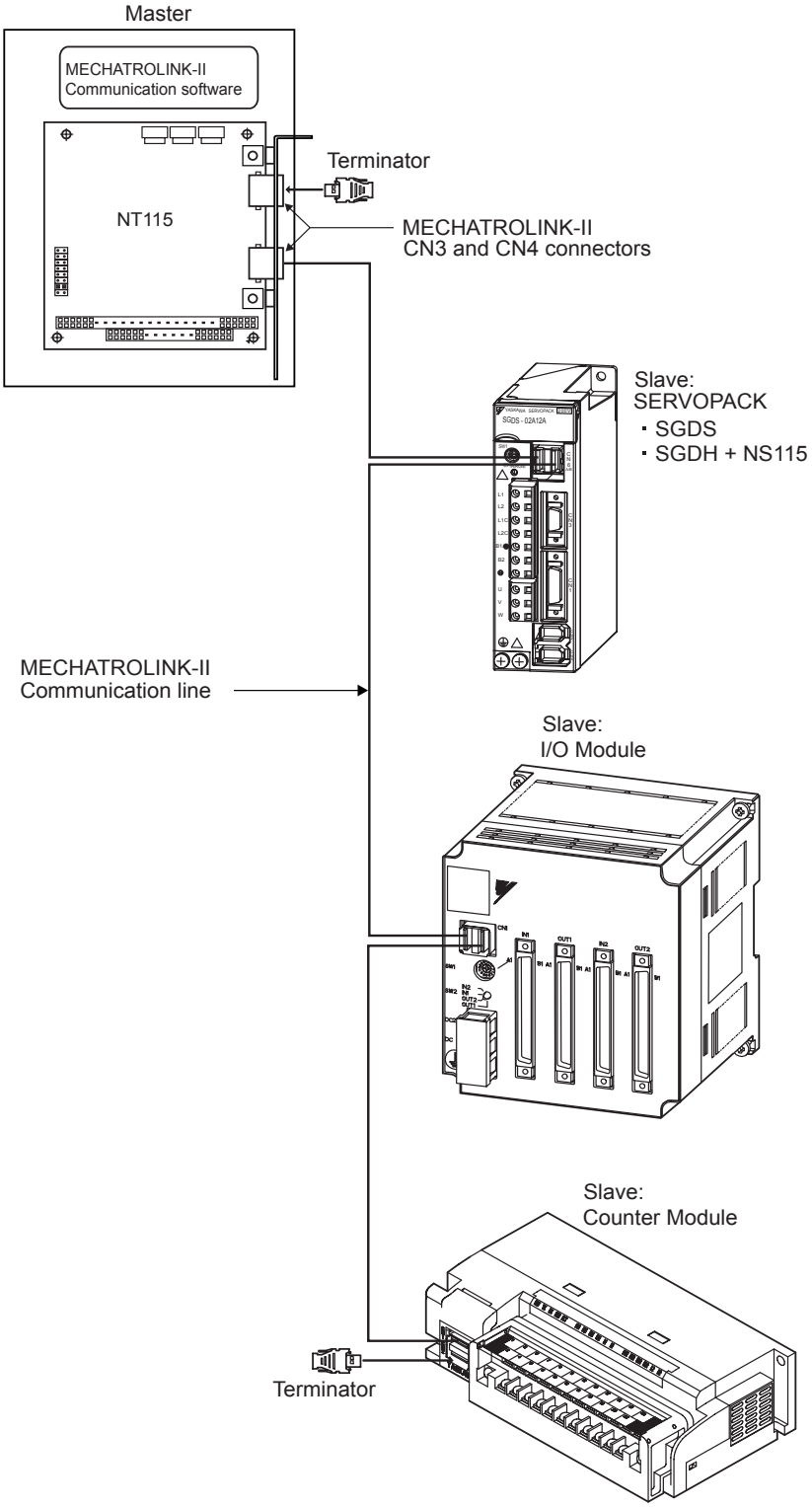


Fig. 2.1 MECHATROLINK-II System Configuration Example

2.2.2 MECHATROLINK-II compatible devices

Devices compatible with MECHATROLINK-II are listed in the following table.

Classification	Model Number	Contents
SERVOPACK	SGDH-□□□E + JUSP-NS115	SGDH SERVOPACK + NS115 MECHATROLINK-II Interface Module
	SGDS-□□□12□□	SGDS SERVOPACK
I/O Module	JEPMC-IO2310	64-point I/O Module 24 VDC, 64 inputs, 64 outputs
Counter Module	JEPMC-PL2900	Counter Module Reversible counters, 2 channels
Pulse Output Module	JEPMC-PL2910	Pulse Output Module Pulse outputs, 2 channels

2.2.3 Maximum Number of Slaves

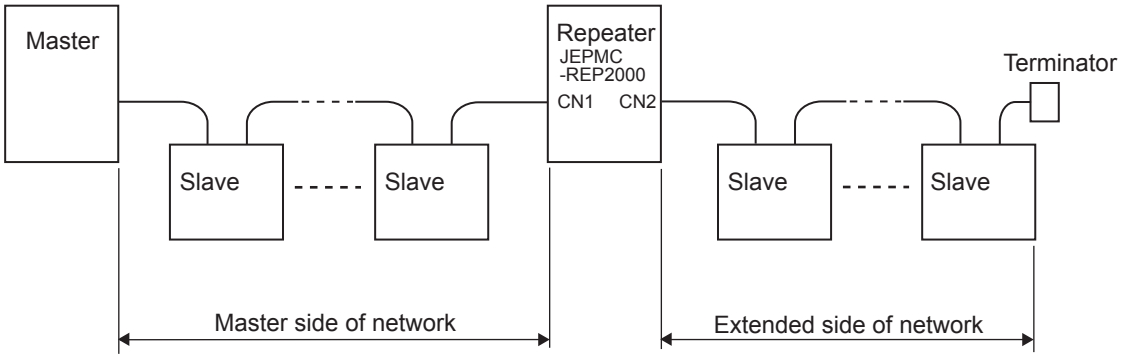
A maximum of 30 slaves can be connected to one master using the NT115.

If a certain number of slaves is exceeded, however, a Repeater is required.

The restrictions in the number of stations that can be connected on the master side of the network and the extended side of the network are listed in *Table 2.1 Restrictions in the Number of Slave Stations* based on the length of MECHATROLINK-II cable.

Table 2.1 Restrictions in the Number of Slave Stations

Type	Cable Length	Number of Slave Stations
Master side of network	30 m max.	15 stations max.
	50 m max.	14 stations max.
Extended side of network	30 m max.	16 stations max.
	50 m max.	15 stations max.



Note: 1. Regardless of the above conditions, no network can contain more than 30 slave stations. This restriction is based on the specifications of the master.
2. The Repeater is not counted as one of the stations.
3. The minimum distance between stations if 0.5 m regardless of whether a Repeater is used.

Use a Repeater with the following model number.

- JEPMC-REP2000

3

NT115 Details

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3.1 Specifications and Dimension Diagrams

3.1.1 NT115 Specifications

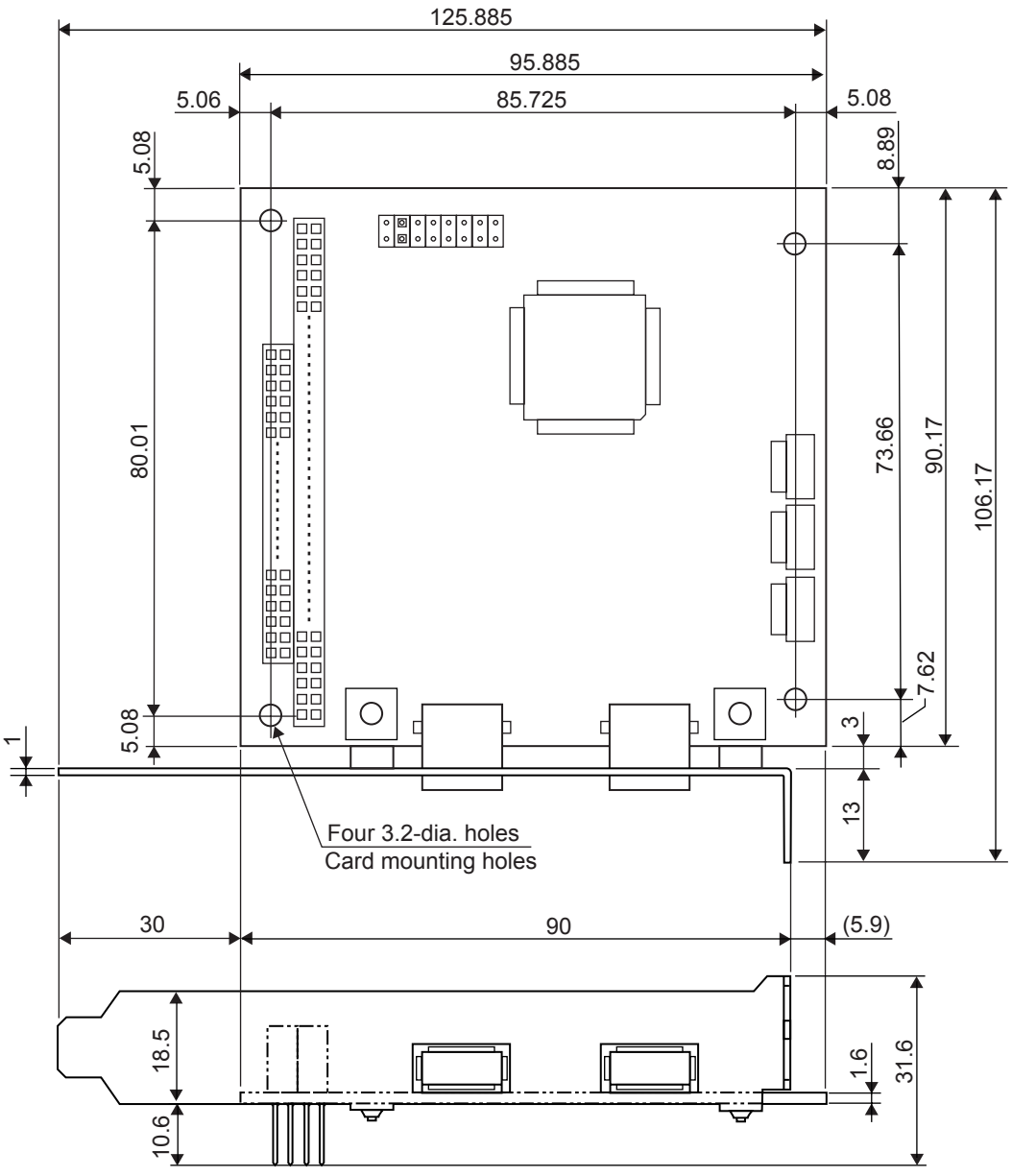
The specifications of the NT115 are listed in the following table.

Item		Specifications
Board Size		PC/104-compliant size (approx. 90 × 95 mm)
PC/104 Bus Connector		PC/104-compliant bus
Bus Data Width		16 bits
Operation Timing		Conforms to ISA bus.
Input Power Supply		5 V (±5 %), 50 mA
MECHATROLINK Port		1 port
MECHATROLINK Connector		USB type A
Communication Clock Frequency		Selected from 4 or 10 MHz.
Communication Cycle		Selected from 250 µs to 8 ms. (The connected devices, however, may limit the communication cycle.)
Number of Transmission Bytes		Selected from 17 or 32 bytes.
Address Selection		Selected from C8000h to FFFFFh using rotary switch.
Interrupt Signals		Selected from 0.250 to 32 ms using software setting and rotary switch selection.
Interrupt Signal Allocations		Selected by changing a short pin.
External Sync Signal		Selected by changing a short pin.
Environmental Conditions	Operating Temperature	0 to 55°C
	Storage Temperature	–25 to 85°C
	Humidity	30% to 95% (with no condensation)
	Vibration Resistance	15.7 m/s^2
	Shock Resistance	98 m/s^2

3.1.2 NT115 Dimension Diagrams

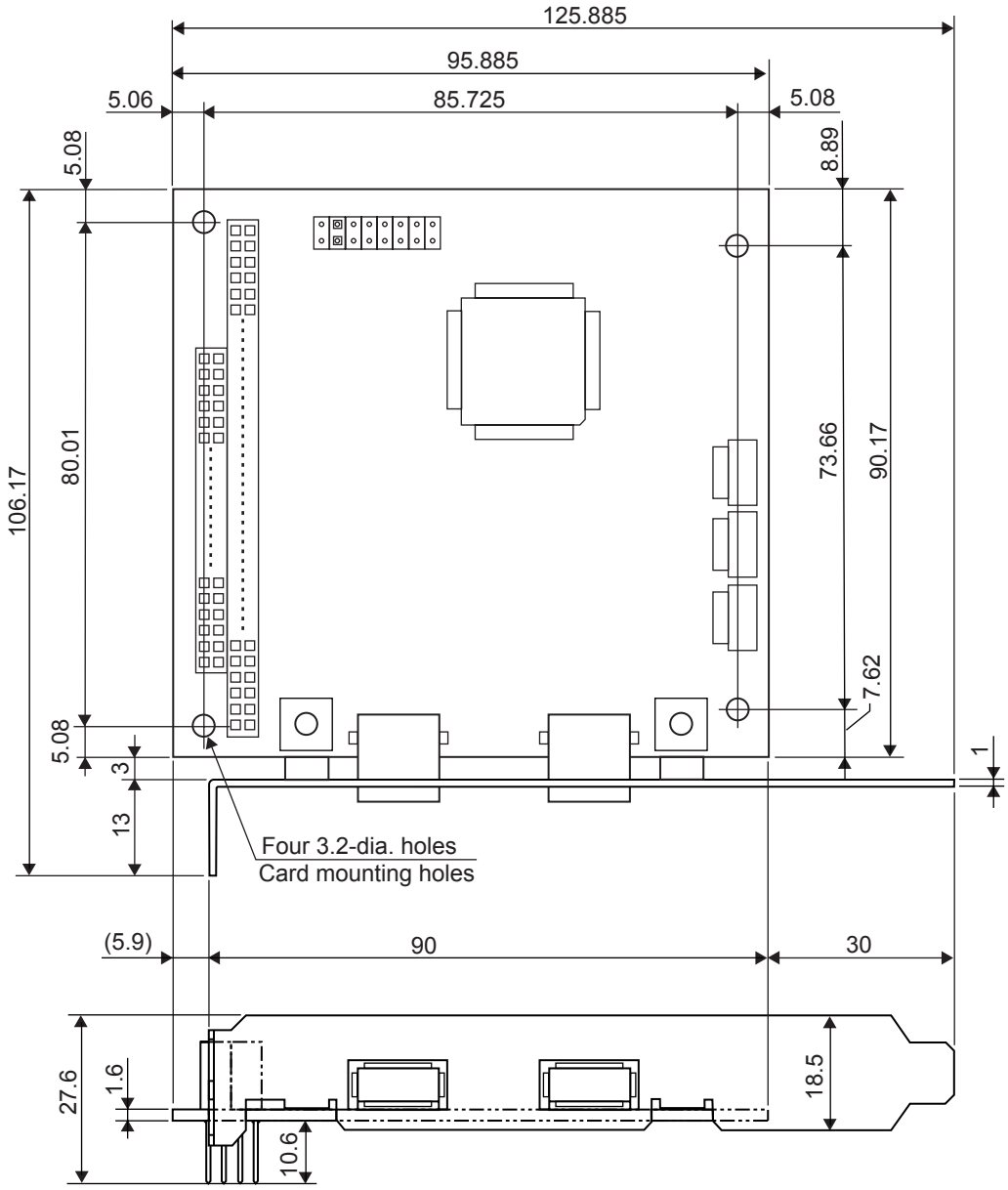
Dimension diagrams of the three models of NT115 are provided below.

(a) JAPMC-NT115I Dimension Diagram



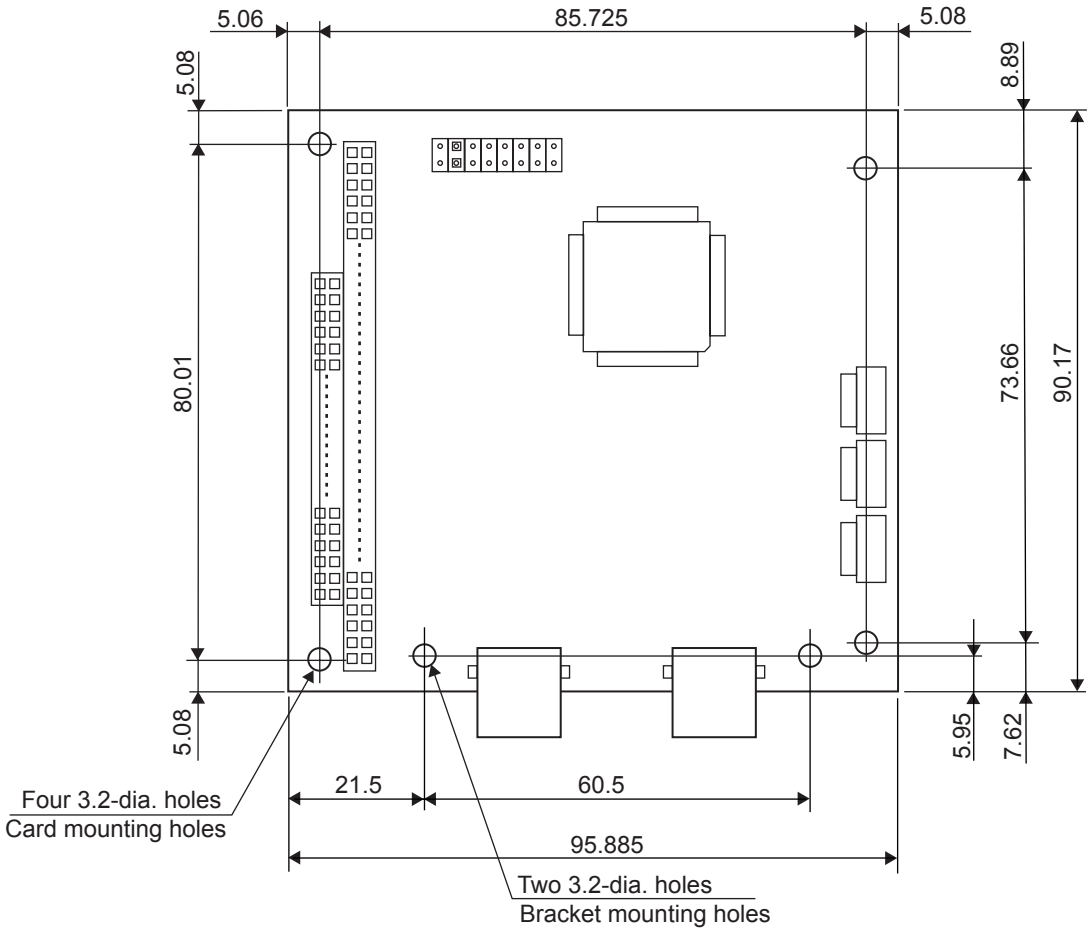
Unit: mm

(b) JAPMC-NT115P Dimension Diagram



Unit: mm

(c) JAPMC-NT115M Dimension Diagram

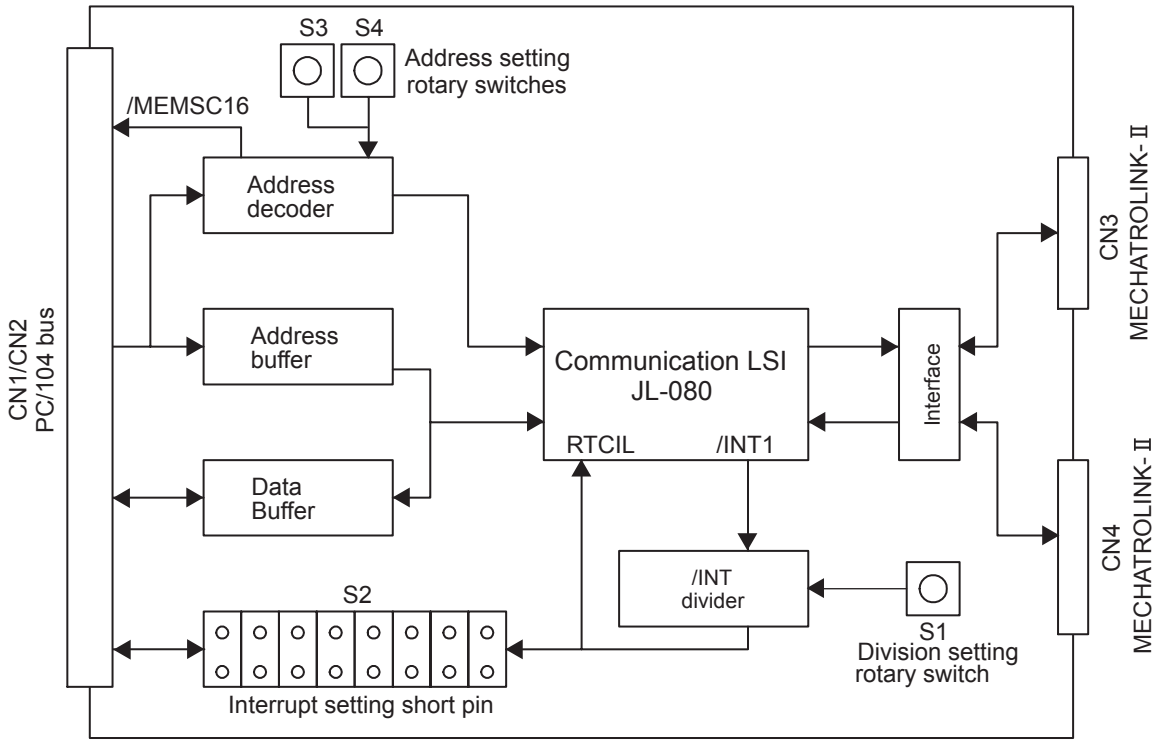


Unit: mm

3.2 Internal Block Diagrams and Connectors

3.2.1 Internal Block Diagrams

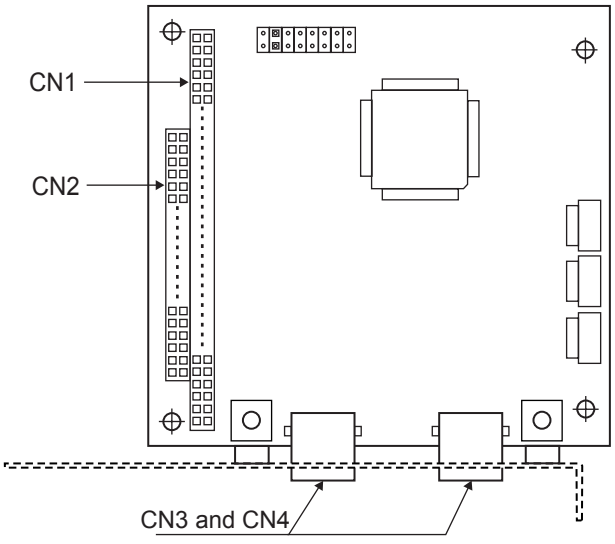
An internal block diagram of an NT115 is provided below.



3.2.2 Applicable Connector

The connectors used with the NT115 are listed below.

Connector Name	Applicable Connector	Application
CN1	ESQ-132-14-G-D (manufactured by SAMTEC)	PC/104 bus row A and row B
CN2	ESQ-120-14-G-D (manufactured by SAMTEC)	PC/104 bus row C and row D
CN3, CN4	USB type A	MECHATROLINK



3.2.3 Connector Pin Numbers and Signal Names

The pin numbers and signal names of connectors CN1, CN2, CN3, and CN4 are given below.

(1) CN1: PC/104 Bus, Row A and Row B

The connections to the control devices conform to PC/104. Set electrical specifications accordingly.

Pin No.	Row A Signal Names	Row B Signal Names
1	–	0V
2	SD7	RESETDRV
3	SD6	+5V
4	SD5	IRQ9
5	SD4	–
6	SD3	–
7	SD2	–
8	SD1	–
9	SD0	–
10	IOCHRDY	–
11	–	/SMEMWR
12	SA19	/SMEMRD
13	SA18	–
14	SA17	–
15	SA16	–
16	SA15	–
17	SA14	–
18	SA13	–
19	SA12	/REFRESH
20	SA11	SYSCLK
21	SA10	–
22	SA9	–
23	SA8	–
24	SA7	–
25	SA6	–
26	SA5	–
27	SA4	–
28	SA3	–
28	SA2	+5V
30	SA1	–
31	SA0	0V
32	0V	0V

(2) CN2: PC/104 Bus, Row C and Row D

The connections to the control devices conform to PC/104. Set electrical specifications accordingly.

Pin No.	Row C Signal Name	Row D Signal Name
0	0V	OV
1	–	/MEMSC16
2	LA23	–
3	LA22	IQR10
4	LA21	IQR11
5	LA20	–
6	LA19	IQR15
7	LA18	–
8	LA17	–
9	–	–
10	–	–
11	SD8	–
12	SD9	–
13	SD10	–
14	SD11	–
15	SD12	–
16	SD13	+5V
17	SD14	–
18	SD15	0V
19	–	0V

Note: Signal lines not used for the NT115 are not given. All signal lines that are not used conform to PC/104 and are connected through to the PC/104 connector.

(3) CN3 and CN4: MECHATROLINK

Pin No.	Signal Name	Remarks
1	NC	Not used.
2	/DATA	Signal, negative side
3	DATA	Signal, positive side
4	Shield	Connect the shield wire.

4

Mounting and Connecting the NT115

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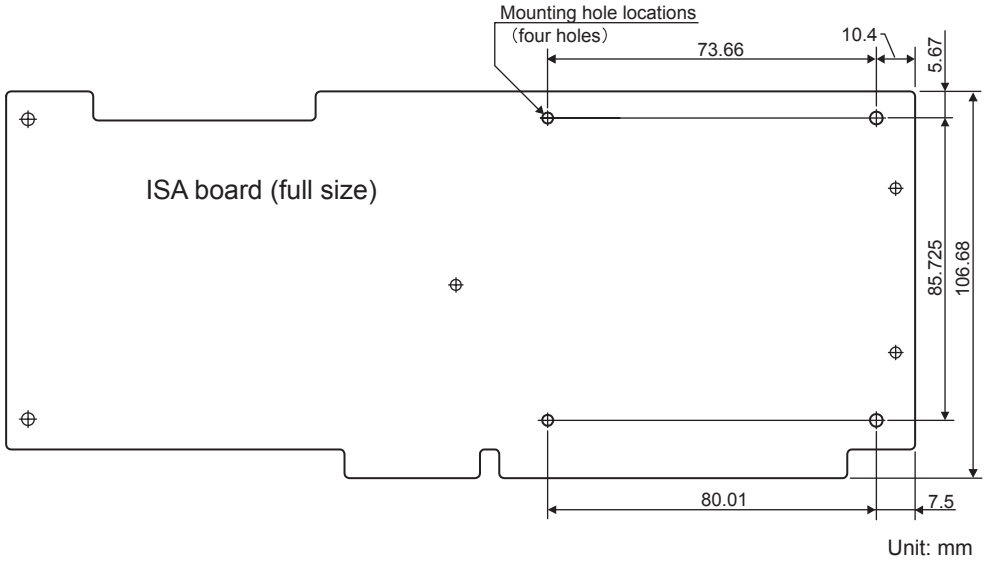
4.1 Mounting the NT115

4.1.1 Locations of ISA Board Card Mounting Holes

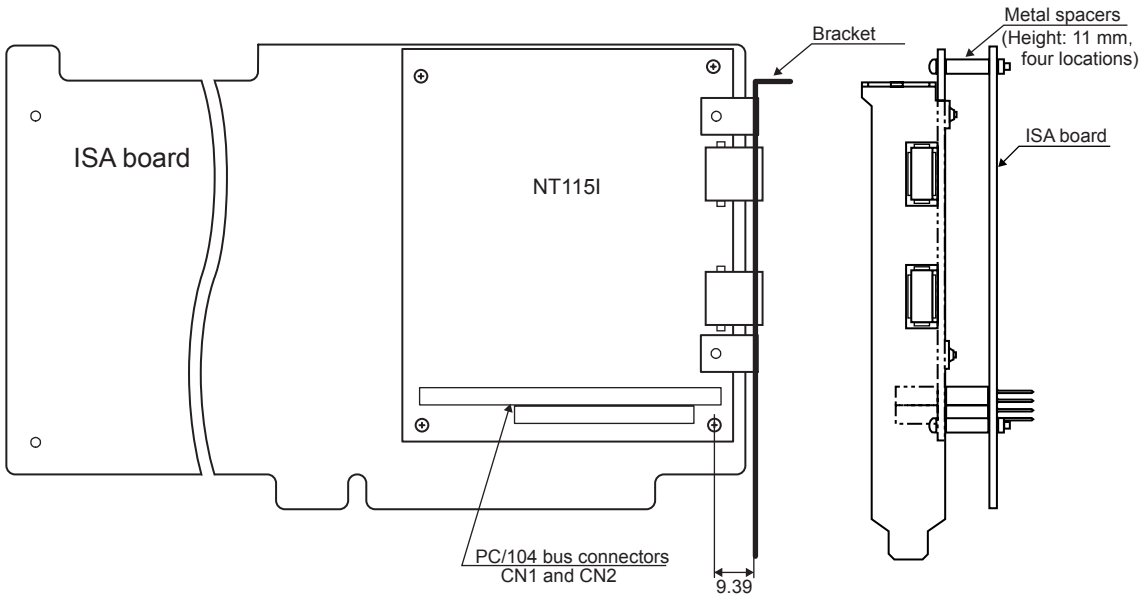
The locations of the mounting holes on the ISA board for mounting the NT115 to the ISA board with screws are shown in the following figure.



4.1.2 Mounting the NT115 to the ISA Board

Use the following procedure to mount the NT115 to the ISA board.

1. Prepare four sets of metal spacers that match the height (11 mm) of the PC/104 bus connector and matching 3-mm screws and nuts.
2. Insert the pins on the PC/104 bus connectors (CN1 and CN2) on the NT115 into the PC/104 bus connectors on the ISA board.
3. Place the metal spacers between the ISA board and NT115 and secure the board and NT115 with the screws and nuts, aligning the four Interface Card mounting holes on the ISA board.
   The following figure shows the Card mounted to the ISA board.



4.1.3 Installing the ISA Board in the PC

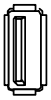
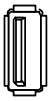
Refer to the user documentation provided with your PC for instructions on installing the ISA board with the NT115 mounted to it in your PC.

4.2 Connecting MECHATROLINK-II Devices

4.2.1 MECHATROLINK-II Connectors

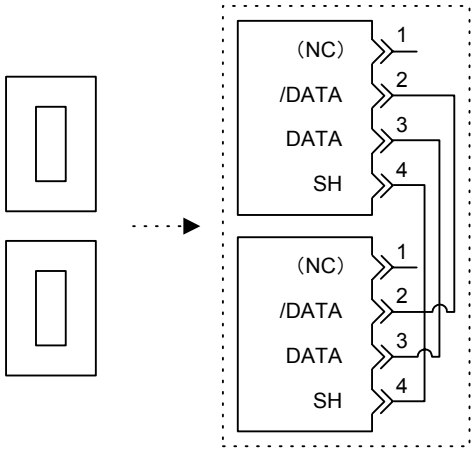
(1) Connector Shape

The shape of the MECHATROLINK-II connectors on the NT115 is shown in the following table.

Number of Connectors	Connector Shape	Connector Name
2		CN3
		CN4

(2) Internal Connections

The two MECHATROLINK-II connector ports are internally connected as shown in the following figure.



Connect a Terminator JEPMC-W6022 (for MECHATROLINK-II) to any connector that is not being used.

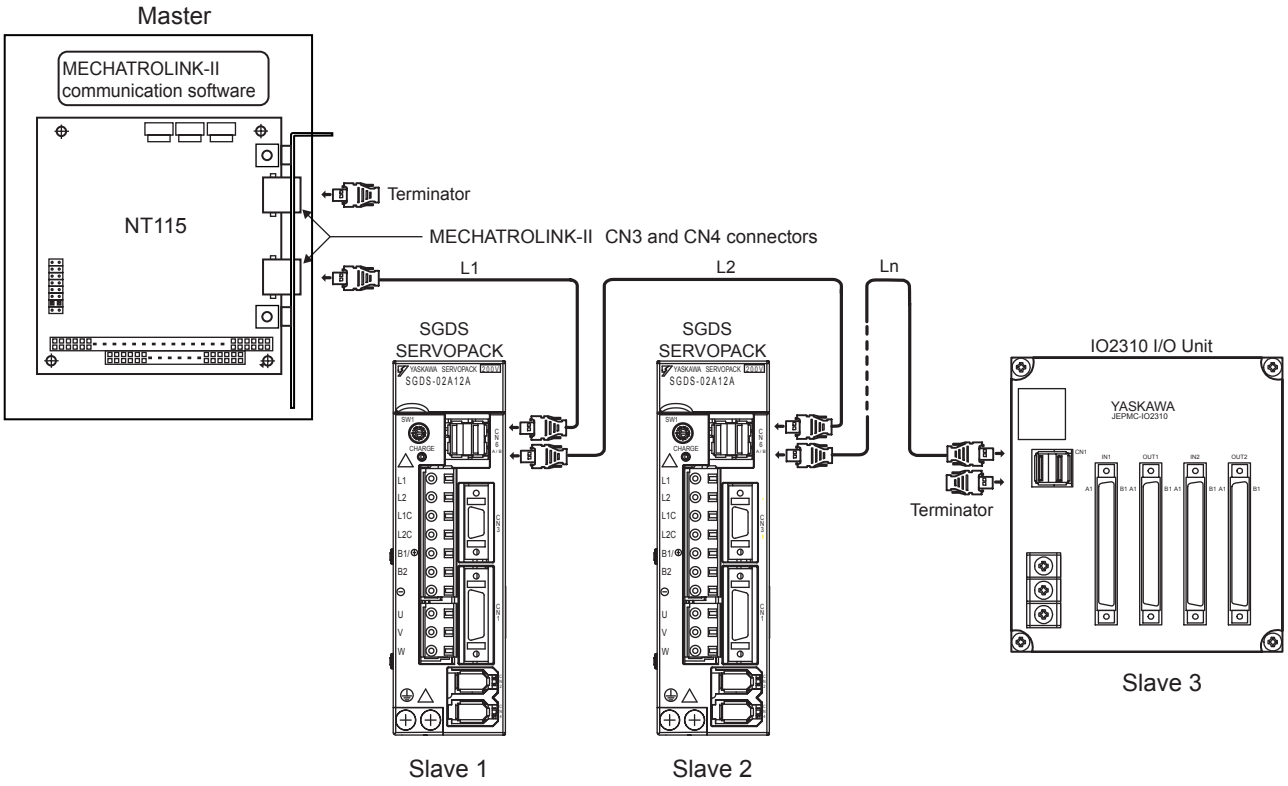
4.2.2 MECHATROLINK-II Cables

The following standard MECHATROLINK-II Cables are available from Yaskawa.

Name and Specifications	Model Number	Length (m)
MECHATROLINK-II Cable USB connector - USB connector	JEPMC-W6002-A5	0.5
	JEPMC-W6002-01	1
	JEPMC-W6002-03	3
	JEPMC-W6002-05	5
	JEPMC-W6002-10	10
	JEPMC-W6002-20	20
	JEPMC-W6002-30	30
MECHATROLINK-II Cable USB connector - USB connector (with core)	JEPMC-W6003-A5	0.5
	JEPMC-W6003-01	1
	JEPMC-W6003-03	3
	JEPMC-W6003-05	5
	JEPMC-W6003-10	10
	JEPMC-W6003-20	20
	JEPMC-W6003-30	30
Terminator (terminating resistance)	JEPMC-W6022	–

4.2.3 MECHATROLINK-II System Connection Example

An example of MECHATROLINK-II communications connections using a JAPMC-NT115□ Interface Card is shown in the following figure.



Either connector CN3 or CN4 can be used.

Connect a Terminator to each end of the network.

5

Communication and Control Functions

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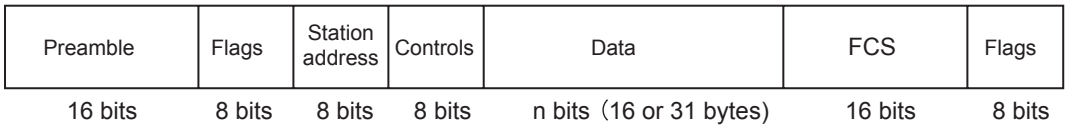
5.1 Communication Functions

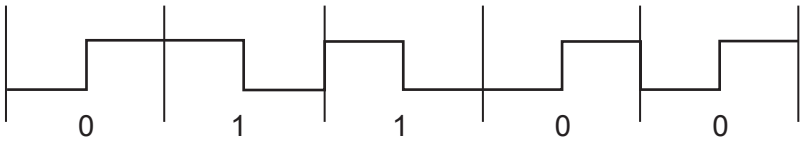
5.1.1 Frame Format

The MECHATROLINK-II frame format is shown in the following figure.



5.1.2 Manchester Code

The MECHATROLINK-II communication LSI (JL-080) contains a converter circuit for Manchester Code. Manchester Code is a self-syncing code, which contains a clock signal in the data.



5.2 Control Functions

5.2.1 ISA Interrupt Signal Allocations

Any of the ISA interrupt signals, IRQ9, IRQ10, IRQ11, and IRQ15, can be allocated to the following two signals for the NT115.

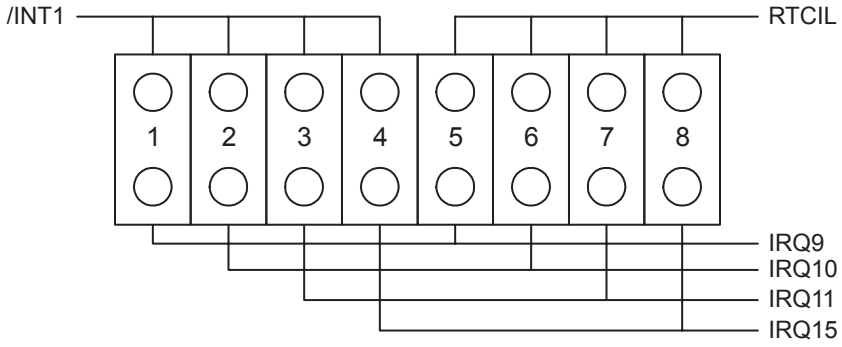
- /INT1: Interrupt signal
- RTCIL: External sync signal

The interrupt signals are allocated using the short pin S2.

(1) Using One NT115

When using one NT115, allocate one of the interrupt signals IRQ9, IRQ10, IRQ11, or IRQ15 for the /INT1 signal. Leave all of the short pins on the RTCIL side open.

The allocation is made by inserting a short pin into one of the positions 1 to 4 on short pin S2, as shown in the following figure.



(2) Using Two NT115s

When using two NT115s, allocate the same IRQ number as allocated for the first NT115 to the RTCIL signal on the second NT115. Leave all of the short pins on the /INT1 side open.

The allocation is made by inserting a short pin into one of the positions 5 to 8 on short pin S2.

5.2.2 Communication LSI Interrupt Signal

(1) Interrupt Signal

An interrupt signal (/INT1) is output every 250 μs to 8 ms at the start of the communication cycle to synchronize communication. This can be divided from between 1/1 to 1/16 by setting rotary switch S1 on the NT115.

The communication cycle, however, may be restricted by the performance of the slaves that are connected.

IMPORTANT

Set the communication cycle (250 μs to 8 ms) using the MECHATROLINK-II communication software in the master.

(2) Interrupt Time Setting

An interrupt signal (/INT1) is output each communication cycle.* The interrupt time will thus depend on the communication cycle setting.

* The interrupt signal (/INT1) is output when global data is sent.

The interrupt time is set on rotary switch S1. The interrupt time will be as listed in *Table 5.1 Interrupt Time Setting* according to the setting of rotary switch S1. Examples are given for communication cycles of 250 µs, 1 ms, and 8 ms.

Table 5.1 Interrupt Time Setting

Rotary Switch S1 Setting	Number of Divisions	Interrupt Time				
		Communication Cycle: 250 µs	…	Communication Cycle: 1 ms	…	Communication Cycle: 8 ms
0	1/1	250 µs	…	1 ms	…	8 ms
1	1/2	500 µs	…	2 ms	…	16 ms
2	1/3	750 µs	…	3 ms	…	24 ms
3	1/4	1000 µs	…	4 ms	…	32 ms
4	1/5	1250 µs	…	5 ms	…	40 ms
5	1/6	1500 µs	…	6 ms	…	48 ms
6	1/7	1750 µs	…	7 ms	…	56 ms
7	1/8	2000 µs	…	8 ms	…	64 ms
8	1/9	2250 µs	…	9 ms	…	72 ms
9	1/10	2500 µs	…	10 ms	…	80 ms
A	1/11	2750 µs	…	11 ms	…	88 ms
B	1/12	3000 µs	…	12 ms	…	96 ms
C	1/13	3250 µs	…	13 ms	…	104 ms
D	1/14	3500 µs	…	14 ms	…	112 ms
E	1/15	3750 µs	…	15 ms	…	120 ms
F	1/16	4000 µs	…	16 ms	…	128 ms

5.2.3 External Sync Functions

(1) Overview of External Sync Function

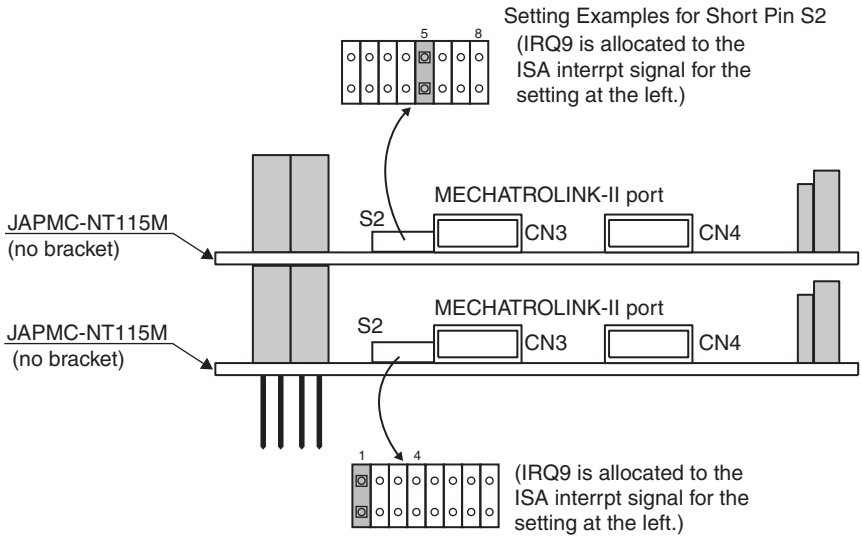
The NT115 executes communication cyclically every 250 μs to 8 ms. A trigger can be input using an external signal to provide a reference for the first cycle. The communication cycle, however, may be restricted by the performance of the slaves that are connected.

(2) External Sync Function for Multiple NT115s

An external sync can be input to synchronize more than one network administered by a single controller when NT115s are stacked.

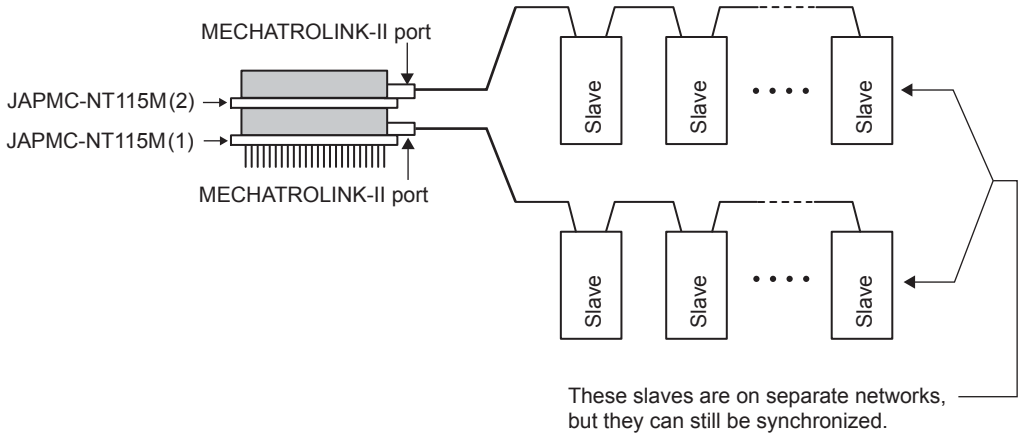
(a) Stacking Example

An example with JAPMC-NT115Ms (no brackets) that are stacked is shown in the following figure. For reference, the example shows allocating IRQ9 to the ISA interrupt signal.



(b) Network Connection Example

The following example shows a MECHATROLINK-II network configured using the above stacked JAPMC-NT115Ms.



IMPORTANT

- The sync mode must be set to use an external sync signal. Refer to *Communication Parameter Details* of *4.3 User Settings* in the following manual for details: *MECHATROLINK-II JL-080 Access Driver Instructions for C1 Master Station* (DE0404031). (For an overview of the manual, refer to *6.1.2 Overview of Manuals* in this manual.) This is the user documentation provided with the access library CD-ROM, which is provided by Yaskawa free of charge.

5.2.4 Address Selection Function

(1) Overview of Address Selection Function

CPU addresses can be allocated for NT115 memory and registers by setting rotary switches S3 and S4. Any of the addresses from C8000h to FEFFFh can be set. Settings are available every 2000h addresses. i.e., 2000h addresses are allocated for each setting.

This setting enables setting addresses that are not used by other devices, including other NT115s (i.e., it enables using more than one NT115).

(2) Address Selection

ISA memory area from C8000h to FEFFFh is divided into 28 areas of 8 KB address each. One of these areas is allocated to the communication LSI.

Addresses are allocated using the address setting rotary switches S3 and S4. The settings of S3 and S4 and the corresponding addresses allocated to the communication LSI are listed in *Table 5.2 Address Selection*.

Table 5.2 Address Selection

Rotary Switch S3 Setting	Rotary Switch S4 Setting	Communication LSI (JL-080) Address
6	4	C8000h to C8FFFh
6	5	CA000h to CAFFFh
6	6	CC000h to CCFFFh
6	7	CE000h to CEFFFh
6	8	D0000h to D0FFFh
6	9	D2000h to D2FFFh
6	A	D4000h to D4FFFh
6	B	D6000h to D6FFFh
6	C	D8000h to D8FFFh
6	D	DA000h to DAFFFh
6	E	DC000h to DCFFFh
6	F	DE000h to DEFFFh
7	0	E0000h to E0FFFh
7	1	E2000h to E2FFFh
7	2	E4000h to E4FFFh
7	3	E6000h to E6FFFh
7	4	E8000h to E8FFFh
7	5	EA000h to EAFFFh
7	6	EC000h to ECFFFh
7	7	EE000h to EEFFFh
7	8	F0000h to F0FFFh
7	9	F2000h to F2FFFh
7	A	F4000h to F4FFFh
7	B	F6000h to F6FFFh
7	C	F8000h to F8FFFh
7	D	FA000h to FAFFFh
7	E	FC000h to FCFFFh
7	F	FE000h to FEFFFh

6

Communication Software

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6.1 Overview of Access Library CD-ROM

Upon request, Yaskawa will provide an access library CD-ROM called the CPMC-MAL700 NT115 Access Library free of charge. This library contains information required to create MECHATROLINK-II communication software for the NT115.

6.1.1 Contents of Access Library CD-ROM

The CPMC-MAL700 NT115 Access Library contains the files listed in the following table.

Type	Folder Name/File Name		Contents
Files (2 files)	NTT115 License Agreement_Eng.pdf		NT115 Access library License Agreement (in English and Japanese)
	NTT115 License Agreement_Jap.pdf		
Files (3 files)	Access Library	jl080def.h	Drivers (source code) collectively called the CPMC-MAL700 NT115 Access Library
		jl080gbl.h	
		jl080ini.c	
		jl080lnk.c	
		mst_smpl.c	
	Doc	Jl080_drv_man_Eng_.pdf	Manuals for the above drivers (in English and Japanese)
		Jl080_drv_man_JP.pdf	
		NT115 UsersMan_JP.pdf	PDF files of this manual (in English and Japanese)
		NT115 UsersMan_Eng.pdf	
	DosSampSle	meldemo.zip	Executable Test Program and manual describing its application (in English and Japanese)
		README_EN.pdf	
		README_JP.pdf	

6.1.2 Overview of Manuals

The contents and application of the files (manuals) in the *Doc* folder are listed in the following table.

File Name	Document Name	Document No. (Number of Pages)	Application
Jl080_drv_man_Eng_.pdf	MECHATROLINK-II JL-080 Access Driver Instructions for C1 Master Station	DE0404031 (30 pages)	Required to create MECHATROLINK-II communication software.
NT115 UsersMan_Eng.pdf	PC/104-compliant MECHATROLINK-II Interface Card JAPMC-NT115□ User's Manual	SIEPC88070008 (48 pages)	Describes details on application methods of the NT115□ Interface Card.

6.2 CPMC-MAL700 Access Library

The folder named *Access Library* in the access library CD-ROM contains five drivers collectively called the CPMC-MAL700 Access Library. The file configuration of the drivers in the CPMC-MAL700 Access Library are described in this section.

6.2.1 Files Configuration

(1) Communication: Initialization Service Driver

- jl080ini.c: Includes the following two functions
  - yns_sequent_init(): .JL-080 communication initialization
  - yns_check_ram(): JL-080 RAM check

(2) Link Communication Service Driver

- jl080lnk.c: Includes the following nine functions.
  - yns_read_ldata(): Channel data read
  - yns_write_ldata(): Channel data write
  - yns_read_ldata2(): Channel data partial read
  - yns_write_ldata2(): Channel data partial write
  - yns_begin_link_acc(): Link access start processing (refreshing host monitor WDT)
  - yns_end_link_acc(): Link access end processing
  - yns_read_comstat(): JL-080 status check
  - yns_link_exchange(): Send/receive processing for all channel data
  - yns_set_netclk(): Network time write (only when using C2 master)

(3) Communication Driver Definitions

- jl080def.h

(4) Communication Driver External Reference Definitions

- jl080gbl.h

(5) Communication Sample Software

- mst_smpl.c

6.2.2 Using the Access Library

The above library is provided as C language source code. These functions can be used to create communication software for MECHATROLINK-II, which is then included in the master environment where the NT115 is mounted.

Refer to the following manual listed in *6.1.2 Overview of Manuals* for details on using the access library.

- *MECHATROLINK-II JL-080 Access Driver Instructions for C1 Master Station*

6.3 Test Program

6.3.1 Overview of Test Program

The contents of the files in the folder named *DosSample* are listed in the following table.

File Name	Contents
meldemo.zip	Executable Test Program files (zip compression)
README_EN.pdf	MECHATROLINK Test Program Application Procedures (Sample)

Extract the executable Text Program files (zip compression) named *meldemo.zip* before using it. When *meldemo.zip* is copied to a suitable folder and extracted, a folder named *meldemo* will appear containing the executable Test Program files. Of these, the file named *meldemo.exe* is the executable MECHATROLINK Test Program.

6.3.2 Using the Test Program

The Test Program named *meldemo.exe* operates in a DOS environment and it is the test software for sending MECHATROLINK-II commands. This executable Test Program can be included in a PC in which the NT115 is mounted so that the PC can operate as a master.

The file called *README_EN.pdf* contains the following manual, which provides specific application methods for using the Test Program named *meldemo.exe*. Always read this manual before attempting to use the Test Program.

- MECHATROLINK Test Program Application Procedures (Sample)

If the MECHATROLINK-II communication software created using the drivers in the CPMC-MAL700 Access Library does not operate properly, correct it using the Test Program as reference.

6.4 Software License Agreement

The contents of JAPMC-NT115 Access Library Software License Agreement (NTT115LicenseAgreement_Eng.pdf) are as follows in the CPMC-MAL700 Access Library.

Name of the software: JAPMC-NT115 Access Library

Software License Agreement

Yaskawa Electric Corporation (hereinafter referred to as "YEC") shall license the non-transferable and non-exclusive right to use this software provided with this Agreement to the customers (hereinafter referred to as "Recipient") who bought this product, under the condition that Recipient consents the following terms and conditions.

Accordingly, it shall be deemed to conclude this Agreement when Recipient opens this DISK PACKAGE. YEC should like to request Recipient to keep this Agreement.

Article 1 DEFINITION

The following terms have the following meanings respectively in this Agreement.

1. SOFTWARE means the computer program in the DISK PACKAGE and the amended computer program YEC may provide in the future according to sub-article 3 of Article 4.

   REFERENCE INFORMATION means all of the printed documentation in the DISK PACKAGE or the printed documentation YEC may provide in the future.

   PRODUCT means the software, reference documentation and duplicates of software in all YEC provided.

Article 2 COPYRIGHT

The right of possession and the copyright shall be reserved to YEC and shall be protected by the law of copyright and international treaty. However, Recipient shall be able to perform each of the following actions.

The action to duplicate only one copy of the software as the back-up

The action to edit or modify the software for purpose of trying compile this software in order to make run time object under the Recipient development environment

The action to install the object which is compiled under the Recipient development environment, to the computer with JAPMC-NT115 (No limit of number)

Receiver shall not be able to use, manufacture, delivery or publication etc. using this software in case of no description in this Agreement.

All of the right except being licensed clearly shall be reserved to YEC.

Article 3 PROHIBITION

Recipient shall consent to prohibit the following each sub-article.

Duplicating the software except the above article

Reengineer this software

Assigning or lending or sub-licensing this software to the third party

Renting or leasing or sub-licensing or assigning this software to the third party

Transferring the status in this Agreement

Removing or unclearing the indications such as YEC's copyright or trade mark

Article 4 SCOPE OF WARRANTY

YEC shall exchange the software free of charge in the limitation within 90 days (including 90) from the day Recipient bought it, if there are physical defects in the material or relevant documentation.

YEC shall not warrant the quality or the function of this software to fit the Recipient's purpose.

Receiver shall have the responsibility for selecting, introducing, using and its result.

YEC shall provide such amended computer program or relevant information in the limitation within 1 year from the day Recipient bought it, if YEC amended the software.

YEC, however, shall decide the necessity or the time to provide amended computer program or relevant information.

YEC shall not warrant the quality of the compiled object under Recipient development environment. And YEC shall not warrant the behavior of the JAPMC-NT115 with this compiled object. This is because it has the possibility that a difference occurs in the object after it is compiled by the Recipient development environment (compiler, compilation option, optimization, etc.).

Article 5 DURATION

This Agreement shall be into force at the time Recipient opens the DISK PACKAGE.

In the event that Recipient breaches each of the provision in this Agreement or infringes YEC's copy right, YEC shall have the right to cancel this Agreement and to terminate the use of the software by Recipient at the time when the notice arrives to Recipient from YEC.

In the event that Recipient decides to stop the use of this software, this Agreement shall automatically be terminated.

In the event that this Agreement is canceled or terminated, Recipient shall consent to destruct this software.

Article 6 NON-DISCLOSURE OF TRADE SECRET

Recipient and YEC each other shall keep to be confident of the trade secret known in the process of concluding or carrying this Agreement to the third party.

Article 7 GENERAL PROVISIONS

This Agreement constitutes the complete and exclusive agreement between YEC and Recipient with respect to

the subject matter hereof, and supersedes all prior oral or written understandings, communications or agreements not specifically incorporated herein.

Recipient and YEC shall submit to settle the exclusive jurisdiction of the Tokyo.

District Court of Japan with respect to any dispute arising from this Agreement.

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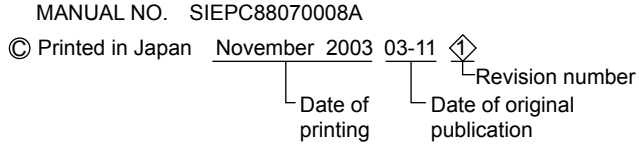
Revision History

The revision dates and numbers of the revised manuals are given on the bottom of the back cover.



Date of Printing	Rev. No.	Section	Revised Contents
November 2003	–		First edition

PC/104-compliant MECHATROLINK-Ⅱ Interface Card
USER'S MANUAL

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In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Regulations. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.

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MANUAL NO. SIEPC88070008A

Printed in Japan November 2003 03-11
03-10④