

Art.No. 60878
2001 11 06
IB-66660-A

MITSUBISHI

**AJ71QE71 (B5)
Ethernet Interface Module**

**User's Manual
(Hardware)**

Thank you for choosing the Mitsubishi MELSEC-QnA Series of General Purpose Programmable Controllers. To ensure correct use of this equipment, please read this manual carefully before operating it



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IB(NA)-66660 A (9604) MEE

Related Manuals

The following manuals are available for this equipment. Refer to the table given below to choose suitable manuals

Manual Name	Manual No (Type Code)
<p>User's Manual for AJ71QE71 (B5) Ethernet Interface Module</p> <p>The manual explains how data communication is done between AJ71QE71 (B5) and other nodes via the fixed buffer or RAM buffer and in the read/write of data in the CPU module</p>	<p>IB-66661 (13J844)</p>
<p>User's Manual for AJ71E71 Ethernet Interface Module</p> <p>This manual explains the control procedure for the read/write of data with E71 commands in the CPU module and how to use each E71 command</p> <p>For the 71E commands, read Chapter 9 of User's Manual For AJ71QE71 (B5) together with this one</p>	<p>IB-66310 (13J661)</p>
<p>Reference Manual For MELSECNET and MELSECNET/B Data Link Systems</p> <p>This manual explains the general descriptions, specifications, how to set and run link parameters, and troubleshooting of MELSECNET (II) and MELSECNET/B data link systems</p> <p>Read this manual when you want to access via the data link systems to other stations</p>	<p>IB-66350 (13JF70)</p>
<p>Reference Manual For QnA Corresponding MELSECNET/10 Network System</p> <p>This manual explains the general descriptions, specifications, how to set and run parameters, programming and troubleshooting of MELSECNET/10 data link system</p> <p>Read this manual when you want to access via the data link system to other stations</p>	<p>IB-66620 (13JF77)</p>

● Safety Precautions ●

Before using this equipment, please read this and related manuals thoroughly. Also pay special attention to safe and correct use of the equipment.

The safety precautions given in this section relate to this equipment only. For precautions regarding the programmable controller system, refer to the User's Manual for the CPU Module.

The following two safety precaution categories are used in this manual

- ⚠ DANGER:** Describes precautions that should be observed to prevent the danger of serious injury or death to the user in case of incorrect use of the equipment
- ⚠ CAUTION:** Describes precautions that should be observed to prevent the danger of medium or light injury to the user or physical damage to the equipment in case of incorrect use of the equipment

However, note that incorrect use denoted by " ⚠ CAUTION " may result in serious accident in some cases. Make sure that all the precautions given in this section are strictly observed.

Keep the manual in a safe place so that it can be referred to whenever necessary. Also make sure that this manual is forwarded to the final user.

[Precautions regarding system design]

- ⚠ CAUTION**
- Do not bundle the AUI cable (for transceiver) and coaxial cable together with the main circuitry or power cables when laying them. Do not also get them close to each other.
 - Make sure that they are placed at least 100 mm away from the main circuit and power cables. Failure to observe this may result in malfunction of the equipment due to noise.

[Precautions regarding installation]

- ⚠ CAUTION**
- Make sure that the equipment is used in the operating environment specified in this manual, otherwise electric shock, fire, malfunction, damage or deterioration of the equipment may result.
 - When installing the equipment, make sure that the fixing projections provided at the base of the equipment are inserted into the holes on the base unit properly. If they are not properly inserted, a malfunction, breakdown or fall of the equipment may result.

[Precautions regarding wiring]

- ⚠ CAUTION**
- Do not connect the 10BASE5 interface coaxial cable when the power switch for a station to which the module is to be mounted has been ON.
 - Make sure that each terminal screw is tightened with the specified torque. If the terminal screws are loose, short-circuit or malfunction may result.
 - Take care not to allow any foreign matter, such as cutting refuse or wire bits, to enter the equipment. If they enter, fire, breakdown or malfunction may result.

[Precautions regarding set-up and maintenance]

- ⚠ DANGER**
- Never touch the terminals while the power is supplied, otherwise malfunction may result.
 - Before cleaning the equipment or re-tightening terminal screws, make sure that the power is turned OFF. If cleaning or re-tightening is carried out while the power is ON, breakdown or malfunction of the equipment may result.

- ⚠ CAUTION**
- Never attempt to disassemble or modify the equipment, otherwise breakdown, malfunction, injury or fire may result.
 - Before installing or removing the equipment, make sure that the power is turned OFF.
 - If the equipment is installed or removed while the power is ON, breakdown or malfunction of the equipment may result.

[Precautions regarding disposal]

- ⚠ CAUTION**
- When disposing of the equipment, treat it as industrial waste.

1. General Description

The manual contains the specifications, features and setting for the operation of Ethernet interface module, which is used to interface between the QnA Series PLC and a computer in Ethernet's TCP/IP or UDP/IP method

POINTS.

- (1) The manual describes how to use AJ71QE71 functions which support 10BASE5 (Ethernet) and 10BASE2 (Cheapernet) interfaces. For use of the AJ71QE71-B5 module, disregard the sections related to the 10BASE2 interface.
- (2) The manual uses the generic name "QE71" for both AJ71QE71 and AJ71QE71-B5 modules and "Ethernet" for a network(s) configured with both 10BASE5 and 10BASE2 interfaces.

(1) Ethernet interface modules handled in the manual

- ① AJ71QE71 Ethernet interface module
 - This module supports both 10BASE5 (Ethernet) and 10BASE2 (Cheapernet) interfaces, and functions as a node on Ethernet.
 - To switch the 10BASE5/10BASE2 interfaces, use the selector switch on the front face of AJ71QE71.
- ② AJ71QE71-B5 Ethernet interface module
 - This module supports the 10BASE5 (Ethernet) interface only, and functions as a node on Ethernet.

(2) Applicable CPU units and the number of mountable CPU units

The following table shows CPU module units and network units (for remote stations) which can be used with QE71. The allowable number of both units to be installed is also given.

Applicable CPU		No. of CPU	Remarks
CPU units	Q2ACPU	4 modules	The allowable number of units is decided according to a usable range of I/O signal points of CPU modules and remote stations.
	Q2ACPU-S1		
	Q3ACPU		
	Q4ACPU		
Network unit (MELSECNET/10)	AJ72QLP25		
	AJ72QBR15		

(3) Mountable base units

QE71 can be used by mounting to an arbitrary slot of the base unit or expansion unit, except the following cases.

- ① Expansion (A52B, A55B, AD8B) units may lack power capacity because they are not provided with any power unit. Avoid mounting to any of them as much as possible.
If you want to mount and use, in order to select adequate power unit and cable extension, take into careful consideration the base unit's current capacity and the cable extension's voltage drop. (For detailed information, refer to User's Manual for CPU modules.)
- ② QE71 can be mounted on the base unit where CPU module is QnACPU and to remote stations in a QnA corresponding MELSECNET/10 network system. However, it cannot be mounted to any station where CPU module is other than QnACPU and to any remote station in MELSECNET (II) and MELSECNET/B data link systems.

(4) After unpacking the product (QE71), be sure to make certain that the following module and parts have been contained in the package. The user should prepare other than the below at his own expense.

For AJ71QE71

Product name	Qty
AJ71QE71 Ethernet interface module	1
BNC T-type adapter UG-274/U	1

For AJ71QE71-B5

Product name	Qty
AJ71QE71-BT Ethernet interface module	1

Ethernet is a registered trademark of Xerox.
Cheapernet is formally called 10BASE2.
Cheapernet is not a registered trademark of any company.

2. Performance Specifications

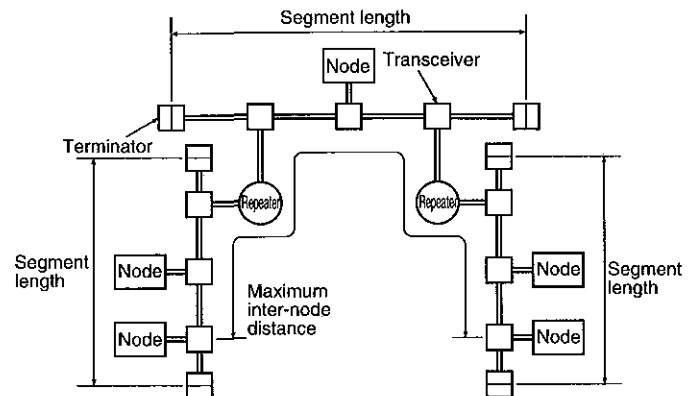
3.1 Communications

The communications specifications of the equipment is given below.

Item	Specifications	
	10BASE5	10BASE2
Transmission	Data transmission speed	10Mbps
	Transmission system	Base band
	Inter node length max.	2500m
	Segment length max.	500m
	No. of nodes max.	100/segment
Transmission data storage memory	Fixed buffer	1k word x 8
	RAM buffer	6k word x 1
No. of EEPROM write times	10,000 in respect to the same area	
I/O data points	32	
DC5V internal demand (A)	0.8	
Dimensions (mm)	250(H)×37.5(W)×119(D)	
Weight (kg)	0.6	

Remarks.

A block diagram of the nodes and segments is shown below.



3. Equipment Required For Network Construction

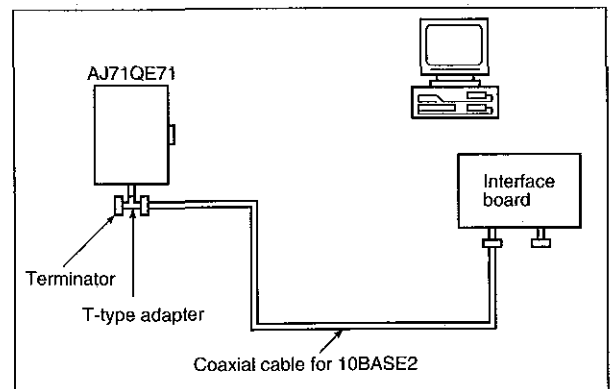
(1) For connection to the 10BASE2 interface, the devices shown in the figure below are required. Other than T-type adapter, the user should prepare at his own expense.

- ① 10BASE2 interface coaxial cable

	10BASE2
Transmission medium	Coaxial cable (50Ω) RG58A/U

- ② T-type adapter (for connection to AJ71QE71, packed together) UG-274/U (DDK Electronics LTD.) or equivalent

- ③ Terminator
Plug-type terminator, BNC-type terminator



Example of Network System Layout

4. Set-up Procedure Up To Operation

(2) For connection to the 10BASE5 interface, the devices shown in the figure below are required. The user should prepare all of them at his own expense.

③ Use the 10BASE5 interface coaxial cable, N-type connector, N-type terminator, transceiver and AUI cable that should all satisfy Ethernet standards.

The transceiver should have a signal function called SQETEST or heart-beat (which is one of the transceiver functions used to check whether or not the transceiver has operated normally after signals were transmitted).

10BASE5			
Transmission medium	Coaxial cable (50Ω) in compliance with Ethernet standards		
AUI cable (for transceiver)	Twisted pair cable with 15-pin D connector Signal Array on 10BASE5 for QE71		
Pin No.	Signal	Pin No.	Signal
1	FG	9	Collision detection (-)
2	Collision detection (+)	10	Transmission (-)
3	Transmission (+)	11	N.C.
4	N.C.	12	Reception (-)
5	Reception (+)	13	+12
6	12G	14	N.C.
7	N.C.	15	N.C.
8	N.C.	Shell	FG

④ Use DC12V power sources for the transceivers. The power sources should satisfy the specifications of the transceivers and cables taking into account a voltage drop (0.8V max) in QE71.

Remarks:

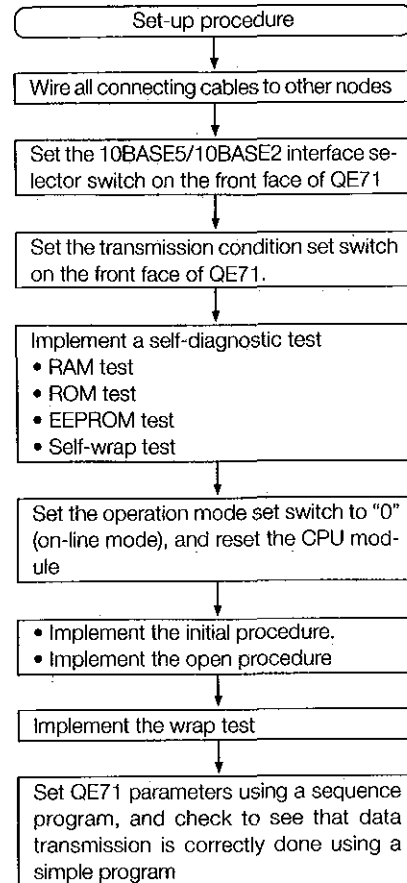
About transceiver power

As electrical characteristic specifications of the transceiver,

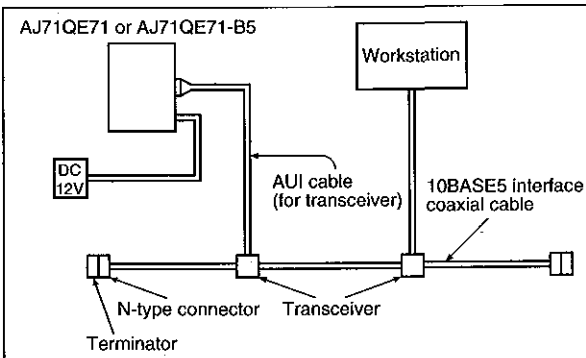
- input terminal voltage is 12V-6% to 15V+5%,
- AUI cable's DC resistance is less than 40Ω/km, whose length is 50m max, and
- maximum current demand is less than 500mA

Taking a voltage drop of 0.8V in the body of QE71 into consideration, a rule of thumb for appropriate transceiver power is around 14.08V to 15.75V.

This section describes the set-up procedure up to the operation of QE71 in a network system.



Set for AJ71QE71 only
No setting is needed for AJ71QE71-B5



Example of Network System Layout

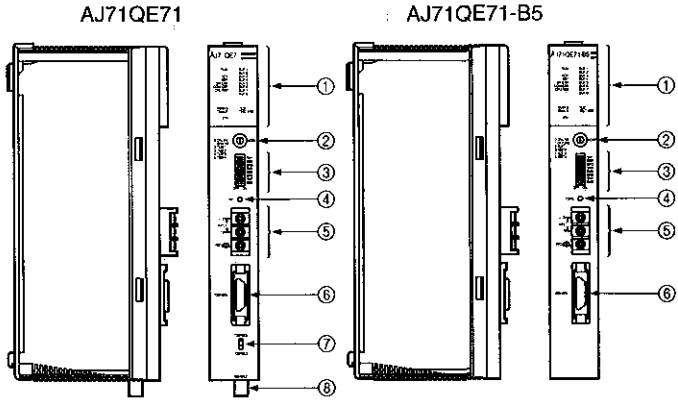
POINTS:

(1) Installation of the 10BASE5 and 10BASE2 interfaces requires sufficient knowledge of safety measures. Ask a special vendor for the installation work.

For installation environments, refer to JISX5252.

(2) Lay the AUI cable at least 100mm away from the power cables and main circuitry where large current is being carried. Otherwise, an erroneous operation may be caused.

5. Name of Each Part



No.	Name	Description		
①	LED indicators RUN ○ BUF 1 ○ RDY ○ BUF 2 ○ BSY ○ BUF 3 ○ SW ERR ○ BUF 4 ○ COM ERR ○ BUF 5 ○ CPU R/W ○ BUF 6 ○ ○ BUF 7 ○ ○ BUF 8 ○ TRAN S ○ TRAN R ○ FTP ○ TEST TEST ERR	LED name	Meaning of indication	
		LED name	Meaning of indication	
		RUN	Normal operation	Lights up in normal operation
		RDY *1	Ready for communications	Blinks when getting operated
		BSY *2	Communications under way	Lights up during communications
		SW ERR	Abnormality in CPU or rotary switch	Lights up in abnormality
		COM ERR	Abnormality detection during communications	Lights up in abnormality
		CPU R/W	Communications with CPU module under way	Lights up during communications
		TRAN S	Data link instruction request under way (future plan)	
		TRAN R	Data link instruction RECV request wait under way (future plan)	
		FTP	FTP server function under way (future plan)	
		BUF 1	Connection No 1 connection	Lights up in connection (open ended)
		BUF 2	Connection No 2 connection	
		BUF 3	Connection No 3 connection	
		BUF 4	Connection No 4 connection	
		BUF 5	Connection No 5 connection	
		BUF 6	Connection No 6 connection	
		BUF 7	Connection No 7 connection	
		BUF 8	Connection No 8 connection	
		TEST	Self-diagnostic test under way	Lights up during diagnosis
		TEST ERR	Self-diagnostic test result indication under way	Lights up if abnormally ended
②	Operation mode set switch 	Used to select an operation mode from On-line, Off-line or Self-diagnostic test mode. Normally, it should be set at "0". The factory default setting is "0" (for On-line).		
		Set No	Mode	How to set
		0	On-line	Set this # for communicating with other stations.
		1	Off-line	<ul style="list-style-type: none"> Set this # for freeing own station from other stations Set this # for no communication with other nodes and CPU module, as well.
	2	Test 1	Set this # for running a self-wrap test	

No.	Name	Description			
		3	Test 2	Set this # for running a RAM test.	
		4	Test 3	Set this # for running a ROM test.	
		5	Test 4	Set this # for running an EEPROM test.	
		6 ~F	—	Unused	
③	Communications condition set switches 	These switches select whether or not there are start conditions, communications procedure conditions, code identification during communications, and TCP time-out error processing. The factory default setting is "OFF".			
		SW.	Set item	Description	
		SW1	Line processing at a TCP time-out error	Sets line processing at a TCP time-out error. OFF Closes the line due to a TCP time-out error. ON Does not close the line even if a TCP time-out error occurs.	
		SW2	Data code	Sets data code identification for communications with other nodes. OFF Communications in binary codes. ON Communications in ASCII codes.	
		SW3	Auto start mode	Sets how to start QE71. OFF Operates in accordance with Y19 (initial procedure request number). ON After power on and reset, reads parameters in EEPROM out to buffer memory without regard to Y19 (initial procedure request number), and implements the initial procedure with the parameters.	
		SW4-6	Unused	—	
		SW7	CPU communication timing	Sets authorization/inhibition of writing data to CPU module when the CPU is being run. OFF Inhibits writing of data from other nodes when CPU module is being run. ON Writes data from other nodes when CPU module is being run.	
		SW8	Initial timing	Sets initial timing. OFF Quick start (implements the initial procedure without wait time). Set this timing when configured in a single network. ON Normal start (waits 20 seconds, then implements the initial procedure). Set this timing when configured in multiple networks.	
		④	External power source check lamp	When used as a 10BASE5 interface, checks whether power has been supplied to transceivers	
		⑤	External power source terminal	In QE71, power is supplied via this terminal to transceivers Splice length 13mm Applicable wire size 0.5 to 2mm ²	

7. Self-diagnostic Tests

No.	Name	Description
⑥	10BASE5 interface connector	Connects between QE71 and 10BASE 5 interface
⑦	10BASE5 and 10BASE2 switching	Switches 10BASE5 to 10BASE2 interface and vice versa Upper side. 10BASE5 Lower side. 10BASE2
⑧	10BASE2 interface connector	Connects between QE71 and 10BASE2 interface

*1 RDY blinks when an on-line operation gets started, but waits about 20 seconds to blink when an on-line operation in normal start mode gets started

*2 BSY continues to request commands in the following cases

- ④ For transmission procedure
 - From command transmission up to response reception
 - From command transmission up to transmission error generation (or time-out)
- ⑤ For reception procedure
 - From command reception up to response return

6. Handling QE71

6.1 Notes On Handling

This section describes notes on handling the QE71 module

- (1) QE71 is housed in a resin case. Do not impart strong impact to the case
- (2) Do not remove the printed board from the QE71 case. Otherwise, a malfunction of QE71 may result
- (3) Handle QE71 so that any foreign matter such as wiring refuse will not get into the module from top. If it entered, remove it
- (4) Tighten the module terminal screws and fixing screws in the following torque range

Screw	Tightening Torque
Power cable terminal connection screws (M4 screw)	98 to 137.2N cm (10 to 14kg cm)
Module fixing screw (not needed normally) (M4 screw)	78.4 to 117.6N cm (8 to 12kg cm)

7.1 RAM test

This section describes how to implement a RAM test for checking the QE71's RAM

How to implement a RAM test.

- ① Set the operation mode set switch on the front face of QE71 to "3"
- ② Set the RUN/STOP key switch for the CPU module to "STOP"
- ③ Reset the CPU module to start a RAM test

How to check the test results.

- ① If the LED indicator for TEST goes out, it means that the RAM test has just completed
- ② Check to see the test results viewing the LED indicator for TEST ERR. When the results are normal, the LED indicator goes out. If the results are not normal, the LED indicator continues to light up
- ③ It is conceivable that abnormality causes are
 - QE71 might have some trouble in its hardware
 - QE71 might have some trouble in its RAM

How to operate after the test.

- ① Change the operation mode set switch on the front face of QE71 to on-line mode or another test mode
- ② Reset the CPU module

POINTS.

If the RAM test failed and the LED indicator died out, repeat the same test again.
If the RAM test failed again, it is conceivable that QE71 might have some trouble in its hardware. In this case, please consult your distributor or our branch near you.

7.2 ROM test

This section describes how to implement a ROM test for checking the QE71's ROM

How to implement a ROM test.

- ① Set the operation mode set switch on the front face of QE71 to "4"
- ② Set the RUN/STOP key switch for the CPU module to "STOP"
- ③ Reset the CPU module to start a ROM test

How to check the test results.

- ① If the LED indicator for TEST goes out, it means that the ROM test has just completed
- ② Check to see the test results viewing the LED indicator for TEST ERR. When the results are normal, the LED indicator goes out. If the results are not normal, the LED indicator continues to light up
- ③ It is conceivable that abnormality causes are
 - QE71 might have some trouble in its hardware
 - WE71 might have some trouble in its ROM

How to operate after the test.

- ① Change the operation mode set switch on the front face of QE71 to on-line mode or another test mode
- ② Reset the CPU module

POINTS.

In the ROM test failed and the LED indicator died out, repeat the same test again.
If the ROM test failed again, it is conceivable that QE71 might have some trouble in its hardware. In this case, please consult your distributor or our branch near you.

7.3 EEPROM test

This section describes how to implement an EEPROM test for checking the QE71's EEPROM

How to implement an EEPROM test

- ① Set the operation mode set switch on the front face of QE71 to "5"
- ② Set the RUN/STOP key switch for the CPU module to "STOP"
- ③ Reset the CPU module to start an EEPROM test

How to check the test results.

You may judge the test results viewing the LED indicator on the front face of QE71

- ① If the LED indicator for TEST goes out, it means that the EEPROM test has just completed
- ② Check to see the test results viewing the LED indicator for TEST ERR
When the results are normal, the LED indicator goes out
If the results are not normal, the LED indicator continues to light up
- ③ It is conceivable that abnormality causes are
 - QE71 might have some trouble in its hardware
 - QE71 might have some trouble in its EEPROM
 - QE71 might have some trouble in the EEPROM checksum

How to operate after the test

First, change the operation mode set switch on the front face of QE71 to on-line mode or another test mode, then reset the CPU module

POINTS.

- ① Never turn OFF the power switch or reset the CPU module during EEPROM test, in order to prevent the destruction of EEPROM data
- ② If an error occurred, rewrite settings (parameters) to EEPROM in the sequence program, and implement an EEPROM test again (Even if an error occurs in the checksum, QE71 should recover)
If an error occurred again, it is conceivable that QE71 might have some trouble in its hardware In this case, please consult your distributor or our branch near you

7 4 Self-wrap test

A self-wrap test is to transmit a node test message to the lines of transmission in order to check the hardware including the QE71's transmitter-receiver circuitry, and to check whether the same test message can be received via the network

This test takes about five (5) seconds to complete

How to implement a self-wrap test.

- ① Connect QE71 to the lines
- ② Set the 10BASE5/10BASE2 selector switch (For AJ71QE71 only)
- ③ Set the operation mode set switch on the front face of QE71 to "2"
- ④ Set the RUN/STOP key switch for the CPU module to "STOP"
- ⑤ Reset the CPU module

How to check the test results.

You may judge the test results viewing the LED indicator on the front face of QE71

- ① If the LED indicator for TEST goes out, it means that the self-wrap test has just completed
- ② Check to see the test results viewing the LED indicator for TEST ERR
When the test results are normal, the LED indicator goes out
If the test results are not normal, the LED indicator continues to light up
- ③ It is conceivable that abnormality causes are
 - QE71 might have some trouble in its hardware
 - Ethernet might have some trouble in its lines of transmission

How to operate after the test

First, change the operation mode set switch on the front face of QE71 to on-line mode or another test mode, then reset the CPU module

POINTS.

Even if you implement a self-wrap test when other nodes have been in on-line mode, there should be no problem in terms of the hardware
If there are packets of data over the transmission lines, the collision of data takes place Because of this, a self-wrap test may not finish within five (5) seconds In this case, first of all, stop data communication between other nodes, then implement the test again

7 5 Wrap test

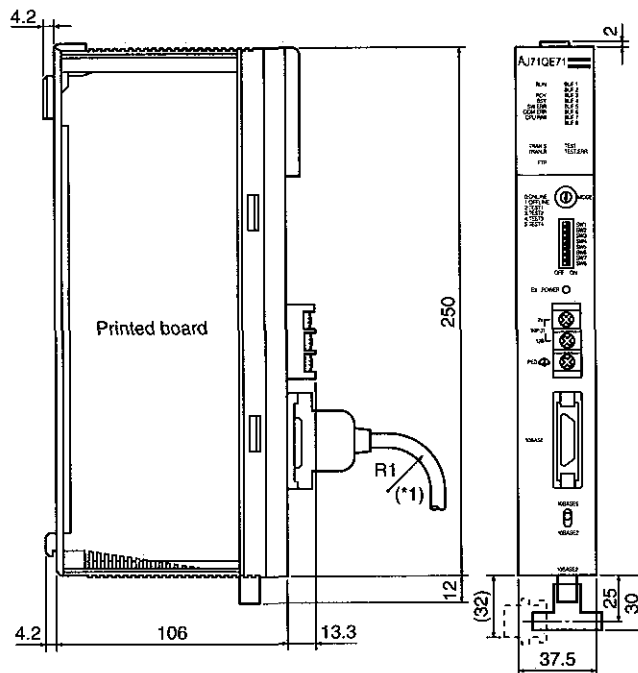
A wrap test is a function used to test whether or not data communications between other nodes and QE71's own station is properly done
In a wrap test, QE71 returns data transmitted from other nodes to the original transmit station as it has remained unchanged

A wrap test can be implemented by running wrap test commands in the reading/writing of data in the CPU module

For more details, refer to Section 10 9 in User's Manual for AJ71QE71 (B5) Ethernet Interface Module

The external dimensions of QE71 are common in the two models, excluding the 10BASE2 interface section

The following is the appearance of AJ71QE71



*1 A rule of thumb for the bend radius (R1) near the connector for AUI cable connection should be more than cable diameter x 4