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[Title] Precautions for replacing A/QnA (large type) series CPU with Universal model QCPU

[Date of Issue] December 2009 (Ver. D:July 2016)

[Relevant Models] A1NCPU, A2NCPU, A2NCPU-S1, A3NCPU, A2ACPU, A2ACPU-S1, A3ACPU, A2UCPU, A2UCPU-S1, A3UCPU, A4UCPU, Q2ACPU, Q2ACPU-S1, Q3ACPU, Q4ACPU, Q00UJCPU, Q00UCPU, Q01UCPU, Q02UCPU, Q03UDCPU, Q03UDVCPU, Q03UDECPU, Q04UDHCPU, Q04UDVCPU, Q04UDEHCPU, Q06UDHCPU, Q06UDVCPU, Q06UDEHCPU, Q10UDHCPU, Q10UDEHCPU, Q13UDHCPU, Q13UDVCPU, Q13UDEHCPU, Q20UDHCPU, Q20UDEHCPU, Q26UDHCPU, Q26UDVCPU, Q26UDEHCPU

Thank you for your continued support of Mitsubishi programmable controllers.
This technical bulletin describes precautions for replacing an A/QnA (large type) series CPU with a Universal model QCPU.
Note that the reference manuals or the references described in this bulletin are information as of July 2016.

Contents

GENERIC TERMS

Generic term	Description
ACPU (including CPU with link function)	A generic term for A1NCPU, A2NCPU, A2NCPU-S1, A3NCPU, A2ACPU, A2ACPU-S1, A3ACPU, A2UCPU, A2UCPU-S1, A3UCPU, and A4UCPU
QnACPU	A generic term for Q2ACPU, Q2ACPU-S1, Q3ACPU, and Q4ACPU
A/QnA (large type) series CPU (including CPU with link function)	A generic term for A1NCPU, A2NCPU, A2NCPU-S1, A3NCPU, A2ACPU, A2ACPU-S1, A3ACPU, A2UCPU, A2UCPU-S1, A3UCPU, A4UCPU, Q2ACPU, Q2ACPU-S1, Q3ACPU, and Q4ACPU
Universal model QCPU	A generic term for Q00UJCPU, Q00UCPU, Q01UCPU, Q02UCPU, Q03UDCPU, Q03UDVCPU, Q03UDECPU, Q04UDHCPU, Q04UDVCPU, Q04UDEHCPU, Q06UDHCPU, Q06UDVCPU, Q06UDEHCPU, Q10UDHCPU, Q10UDEHCPU, Q13UDHCPU, Q13UDVCPU, Q13UDEHCPU, Q20UDHCPU, Q20UDEHCPU, Q26UDHCPU, Q26UDVCPU, and Q26UDEHCPU
High-speed Universal model QCPU	A generic term for Q03UDVCPU, Q04UDVCPU, Q06UDVCPU, Q13UDVCPU, and Q26UDVCPU

1. Introduction

When replacing an A/QnA (large type) series CPU with a Universal model QCPU, please read this technical bulletin with the following handbooks and materials. (Among replacement to the Universal model QCPU, this bulletin describes contents that differ from those described in the following handbooks and materials.)

For contents not described in this bulletin, refer to the following handbooks.

Note that the Q00UJCPU, Q00UCPU, and Q01UCPU partly differ in specifications such as the number of I/O points and the number of device points, and functions such as available instructions.
When the Q00UJCPU, Q00UCPU, or Q01UCPU replaces the existing CPU module, refer to the related manuals to see if the CPU module after replacement meets the specifications and the functions of the existing system.

(Handbook for transition (released))	
Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook	
(Fundamentals)	L-08043ENG
(Intelligent Function Modules)	L-08046ENG
(Network Modules)	L-08048ENG
(Communications)	L-08050ENG
Transition from MELSEC-A0J2H Series to Q Series Handbook	L-08060ENG
Transition from MELSECNET/MINI-S3, A2C(I/O) to CC-Link Handbook	L-08061ENG
Transition from MELSEC-I/O LINK to CC-Link/LT Handbook	L-08062ENG
Transition from MELSEC-A/QnA Large Type Series to AnS/Q2AS Small Type Series Handbook	L-08064ENG
Transition of CPUs in MELSEC Redundant System Handbook (Transition from Q4ARCPU to QnPRHCPU)	L-08117ENG
(Renewal catalogue)	
MELSEC-A/QnA Series Transition Guide	L-08077E
(Renewal examples)	
MELSEC-A/QnA Series Transition Examples	L-08121E

2. Precautions for system configuration

This chapter describes precautions for system configuration when the Universal model QCPU replaces the existing CPU module.

2.1 Connection of the QA extension base unit

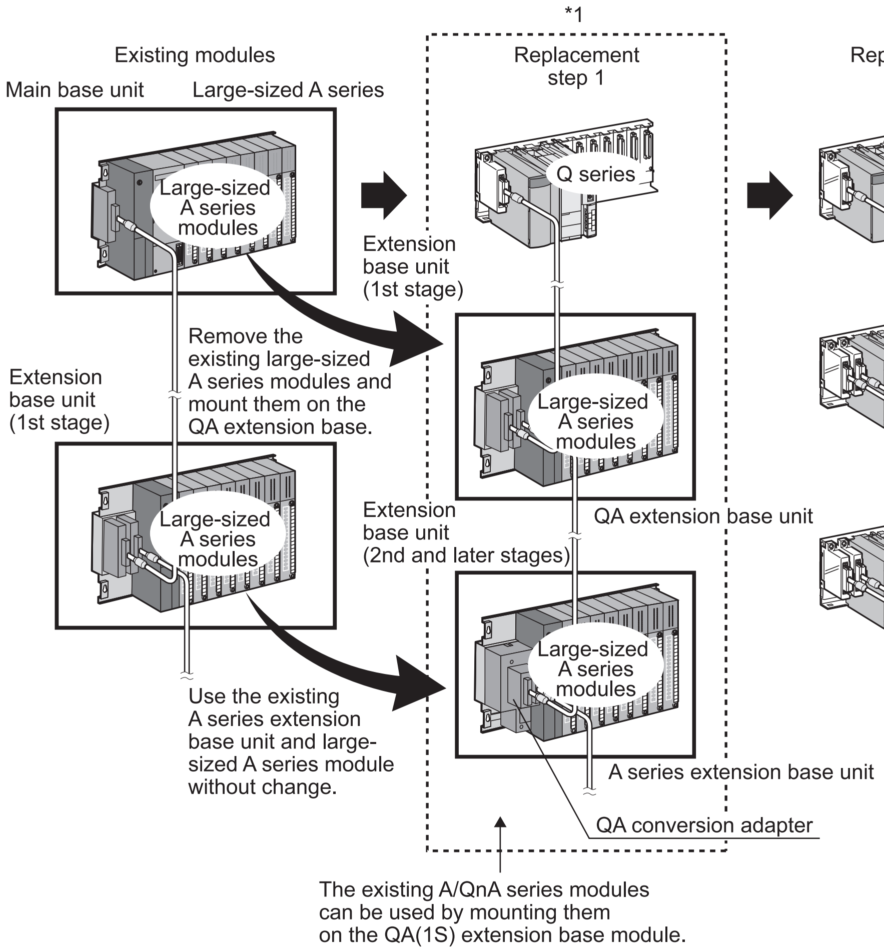
To connect the QA extension base unit for using the A/QnA (large type) series modules, the Universal model QCPU whose serial number (first five digits) is "13102" or later must be used.
When the Universal model QCPU whose serial number is "13101" or earlier is used, the QA extension base unit cannot be connected. This means that the A/QnA (large type) series modules cannot be used in the system. All modules need to be replaced with Q series modules.

(1) When the serial number (first five digits) of the replaced Universal model QCPU is "13102" or later

Table 2.1 Precautions for using the A/QnA (large type) series modules

Module	Precautions	Replacement method	Reference
A/QnA (large type) series module	Can be used.	Replace the module with a specified module.	• QCPU User's Manual (Hardware Design, Maintenance and Inspection) • Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook (Fundamentals) Section 1.2.2 (1) • MELSEC-A/QnA Series Transition Examples
AnS/Q2AS series module			• QCPU User's Manual (Hardware Design, Maintenance and Inspection) • Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook (Fundamentals) Section 1.2.2 (2) • MELSEC-A/QnA Series Transition Examples
MELSECNET (II, /B) data link module	MELSECNET (II, /B) data link is supported. Only the MELSECNET (II, /B)-compatible A1SJ71A□23Q (23BQ) can be used.		• QCPU User's Manual (Hardware Design, Maintenance and Inspection) • Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook (Network Modules) Section 1.1.3 • MELSEC-A/QnA Series Transition Examples

Example 1) Module replacement

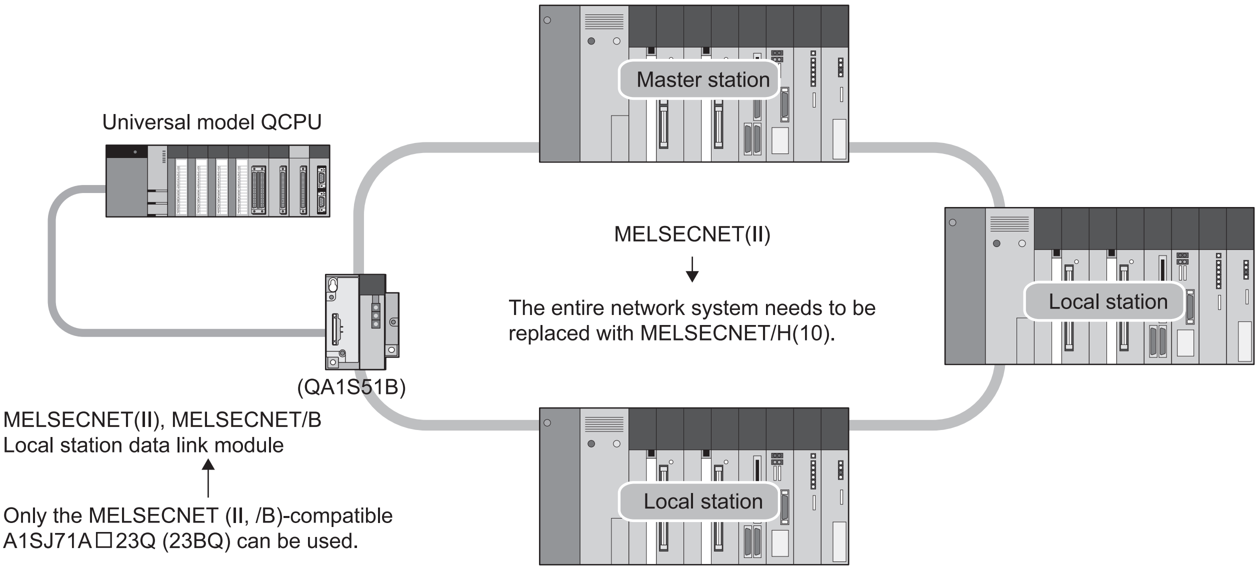

*1
Existing modules
Main base unit
Large-sized A series
Large-sized A series modules
Replacement step 1
Q series
Replacement step 2
Q series
Extension base unit (1st stage)
Remove the existing large-sized A series modules and mount them on the QA extension base.
Extension base unit (1st stage)
Large-sized A series modules
Q series
Large-sized A series modules
Extension base unit (2nd and later stages)
QA extension base unit
Q series
Large-sized A series modules
Use the existing A series extension base unit and large-sized A series module without change.
A series extension base unit
QA conversion adapter
The existing A/QnA series modules can be used by mounting them on the QA(1S) extension base module.

*1 To use the A/QnA series extension base units in the system after replacement, observe the following precautions.

- The extension base units shall be connected in the following order:
  Q5□B/Q6□B→QA1S5□B/QA1S6□B→QA6□B→QA6ADP+A5□B/A6□B.
- The QA1S6□B cannot be used together with the QA6ADP+A5□B/A6□B.
- Since the QA1S51B does not have the extension cable connector (OUT), it cannot be used together with the QA6□B or QA6ADP+A5□B/A6□B.

Example 2) Network configuration

Example of a MELSECNET(II) configuration including the Q series modules

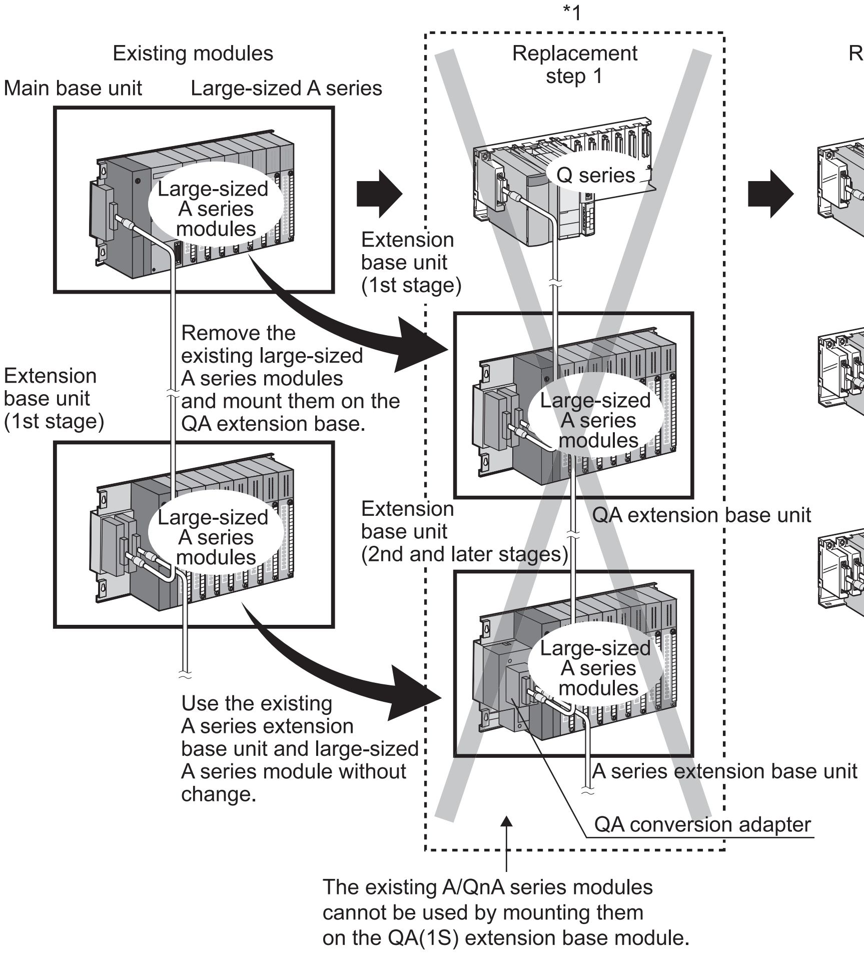

Universal model QCPU
Master station
MELSECNET(II)
↓
The entire network system needs to be replaced with MELSECNET/H(10).
Local station
Local station
(QA1S51B)
MELSECNET(II), MELSECNET/B
Local station data link module
Only the MELSECNET (II, /B)-compatible A1SJ71A□23Q (23BQ) can be used.

(2) When the serial number (first five digits) of the replaced Universal model QCPU is "13101" or earlier

Table 2.2 Precautions for using the A/QnA (large type) series modules

Module	Precautions	Replacement method	Reference
A/QnA (large type) series module	**Cannot be used.** The following base units, for using A/QnA (large type) series modules, cannot be connected. • QA extension base unit • A series (large type) extension base unit + QA6ADP • QA1S extension base unit • A-A1S module conversion adapter (A1ADP-XY/SP)	Replace all modules with Q series modules.	• Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook (Fundamentals) Section 1.2.2 (1) • MELSEC-A/QnA Series Transition Examples
AnS/Q2AS series module			• Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook (Fundamentals) Section 1.2.2 (2) • MELSEC-A/QnA Series Transition Examples
MELSECNET (II, /B) data link module	MELSECNET (II, /B) data link is not supported. (The MELSECNET (II, /B)-compatible A1SJ71A□23Q (23BQ) cannot be used.)	Use other network systems, such as CC-Link IE Controller Network, CC-Link IE Field Network, and MELSECNET/H(10).	• Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook (Network Modules) Section 1.1.3 • MELSEC-A/QnA Series Transition Examples

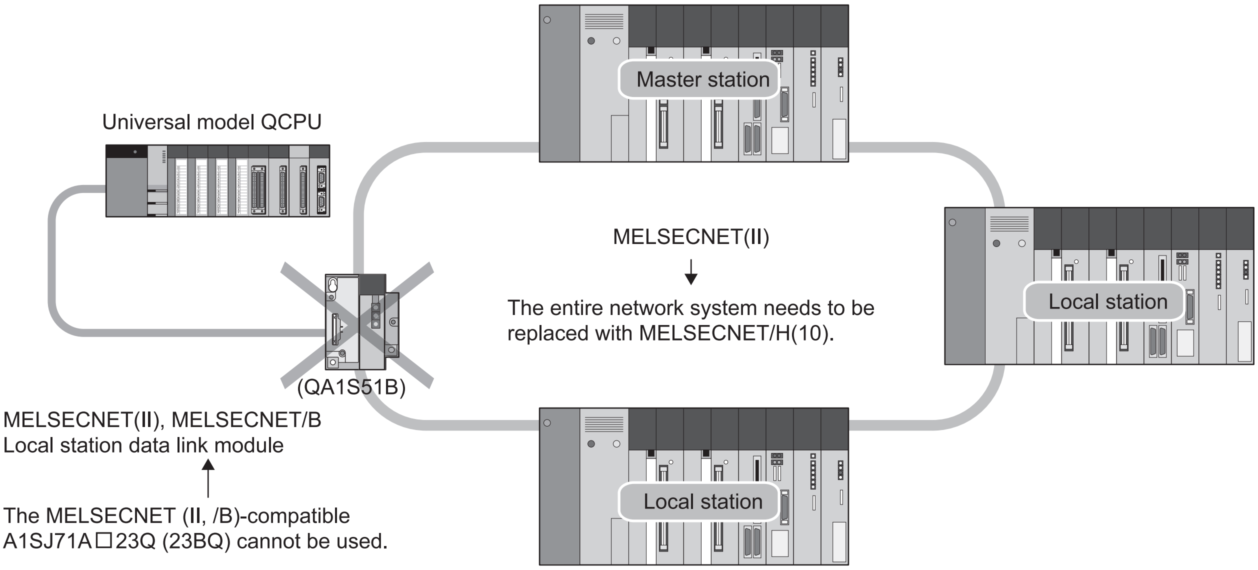
Example 1) Module replacement


*1
Existing modules
Main base unit
Large-sized A series
Large-sized A series modules
Extension base unit (1st stage)
Large-sized A series modules
Remove the existing large-sized A series modules and mount them on the QA extension base.
Use the existing A series extension base unit and large-sized A series module without change.
Replacement step 1
Q series
Extension base unit (1st stage)
Large-sized A series modules
Extension base unit (2nd and later stages)
QA extension base unit
Large-sized A series modules
A series extension base unit
QA conversion adapter
The existing A/QnA series modules cannot be used by mounting them on the QA(1S) extension base module.
Replacement step 2
Q series
Q series
Q series

[*1] The replacement step 1, which is written in Section 1.2.2 of the Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook (Fundamentals), is not available.
Skip the step 1 and perform the step 2.

Example 2) Network configuration

Example of a MELSECNET(II) configuration including the Q series modules


Master station
Universal model QCPU
MELSECNET(II)
The entire network system needs to be replaced with MELSECNET/H(10).
Local station
(QA1S51B)
MELSECNET(II), MELSECNET/B
Local station data link module
The MELSECNET (II, /B)-compatible
A1SJ71A□23Q (23BQ) cannot be used.
Local station

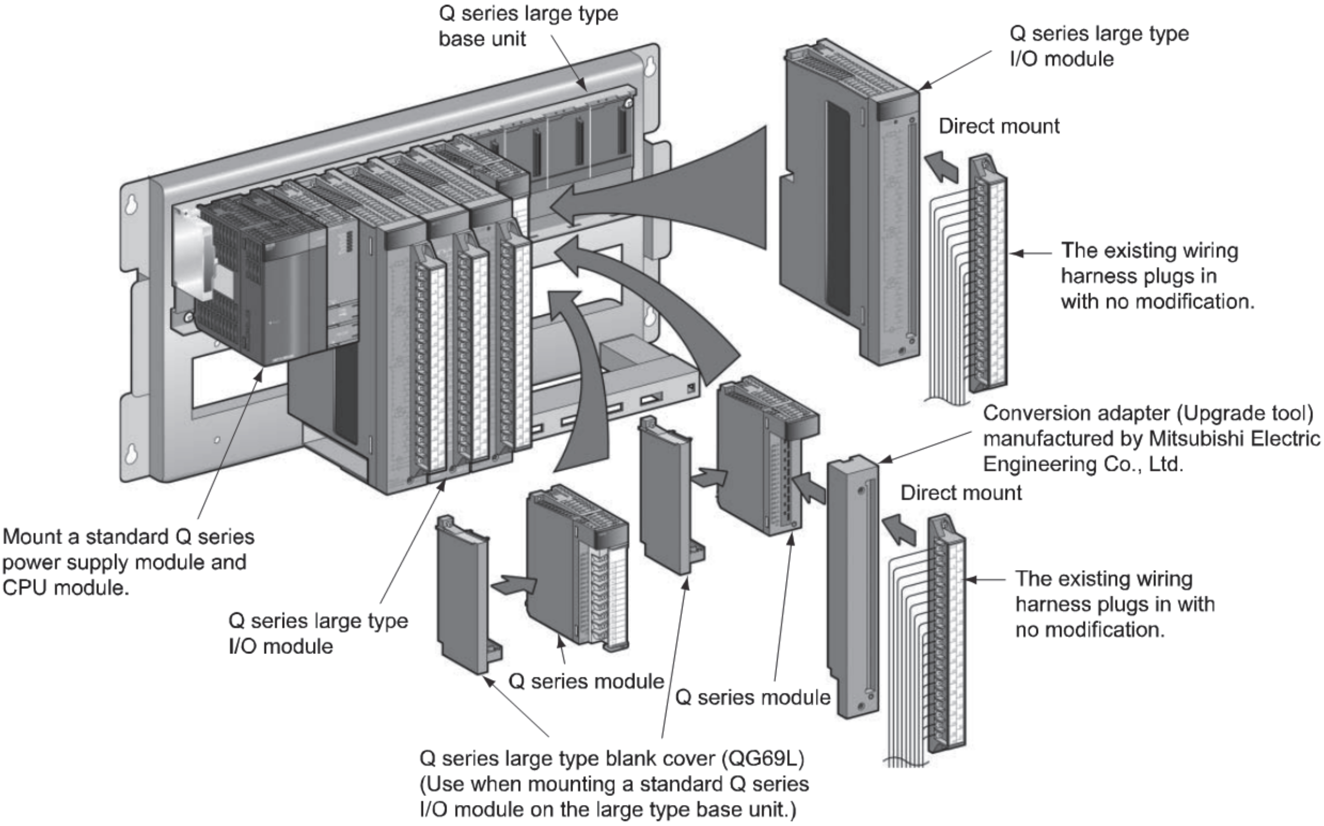
2.2 Use of the Q series large type base unit

When the Q series large type base unit, Q series large type I/O modules, and renewal tool manufactured by Mitsubishi Electric Engineering Co., Ltd. are used, the terminal block of an existing A/QnA (large type) series I/O module can be used without rewiring. This helps to reduce time for wiring.

Table 2.2 Precautions for using the Q series large type base unit

Module	Precautions	Replacement method	Reference
Q series large type base unit	**Can be used except the following cases:** • When the Q00UJCPU is used • In multiple CPU configuration	**No restrictions**[*1]	• Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook (Fundamentals) Section 1.2.2 (3) • MELSEC-A/QnA Series Transition Examples
Renewal tool manufactured by Mitsubishi Electric Engineering Co., Ltd.	**No restrictions** (The Q series large type base unit can be used together.)	For details of specifications, precautions, and restrictions, contact your local Mitsubishi representative.	• Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook (Fundamentals) Section 1.2.2 (4) • MELSEC-A/QnA Series Transition Examples

*1 Example of using the Q series large type base unit with the Universal model QCPU


Q series large type base unit
Q series large type I/O module
Direct mount
The existing wiring harness plugs in with no modification.
Conversion adapter (Upgrade tool) manufactured by Mitsubishi Electric Engineering Co., Ltd.
Direct mount
The existing wiring harness plugs in with no modification.
Mount a standard Q series power supply module and CPU module.
Q series large type I/O module
Q series module
Q series module
Q series large type blank cover (QG69L) (Use when mounting a standard Q series I/O module on the large type base unit.)

2.3 GOT connection

Only GOT1000 series can be connected to the Universal model QCPU.
When GOT other than GOT1000 series is used, it must be replaced with GOT1000 series regardless of the connection method.

Table 2.3 Precautions for GOT connection

Item	Precautions	Replacement method	Reference
GOT connection	Only GOT1000 series can be connected to the Universal model QCPU regardless of the connection method (such as bus connection, CPU direct connection, and Ethernet connection).	Replace the connected GOT with GOT1000 series. GOT1000 series can be connected by any connection methods including bus connection, CPU direct connection, and Ethernet connection.[*1]	• GOT1000 Series Connection Manual (Mitsubishi Products)

*1 For the QnUDE(H)CPU, CPU direct connection is not available.

Product	Model	GT Designer2 OS version compatible with the Universal model QCPU[*2]						GT Works3 OS Version compatible with the Universal model QCPU[*2]
		Used with Q00UJ/Q00U/Q01UCPU	Used with Q02U/Q03UD/Q04UDH/Q06UDHCPU	Used with Q13UDH/Q26UDHCPU	Used with Q10UDH/Q20UDHCPU	Used with Q03UDE/Q04UDEH/Q06UDEH/Q13UDEH/Q26UDEHCPU	Used with Q10UDEH/Q20UDEHCPU	Used with High-speed Universal model QCPU
GOT1000	• GT15□-□ • GT11□-□	Version 2.91V or later	Version 2.60N or later	Version 2.76E or later	Version 2.91V or later	Version 2.81K or later	Version 2.91V or later	Version 1.64S or later
	• GT10□-□	Version 2. 91V or later	Version 2.76E or later	Version 2.76E or later	Version 2.91V or later	Version 2.81K or later	Version 2.91V or later	Version 1.64S or later

*2 There are no restrictions on GOT version.

3. Utilizing programs

The following section contains some instructions that cannot be converted into those for the Universal model QCPU or instructions whose specifications differ from those for the Universal model QCPU.
(Relevant handbook)
Transition from MELSEC-A/QnA (Large Type) Series to Q Series Handbook (Fundamentals)
7.2 Instruction Conversion

This chapter explains instructions for the Universal model QCPU whose descriptions differ from those described in the above section.

3.1 Sequence instructions requiring a review before replacing the ACPU

This section describes instructions requiring a review before replacing the ACPU with the Universal model QCPU.

Table 3.1 Instructions requiring a review before replacing the ACPU (common instructions)

Symbol	Instruction	Replacing method	Reference
PR	Print ASCII code instruction	• It is recommended to use GOT as an ASCII code display device. ASCII codes stored in devices are directly displayed as characters on GOT. • Instructions can be replaced using a replacement program.	Section 3.1.1
PRC	Print comment instruction	• It is recommended to use GOT as an ASCII code display device. Device comments can be displayed on GOT. • Comment data can be output to a display device in the replacement program of the PR instruction after reading data using the reading device comment data instruction (COMRD(P)).	

Table 3.2 Instructions requiring a review before replacing the ACPU (AnA/AnU-dedicated instructions)

Symbol	Instruction	Replacing method	Reference
IX IXEND	Index modification of entire ladder	Use alternative programs.	Section 3.2.1
KEY	Numerical key input instruction	• It is recommended to use GOT as a numeral input device. • Instructions can be replaced using a replacement program.	Section 3.1.2

3.1.1 Replacement example of the PR instruction

The following shows the example of a program for replacement using the PR instruction.

(1) Example of device assignment

(Before replacement)

Application	Device
Output string	D0 to D3
ASCII code output signal	Y100 to Y107
Strobe signal	Y108
In-execution flag	Y109

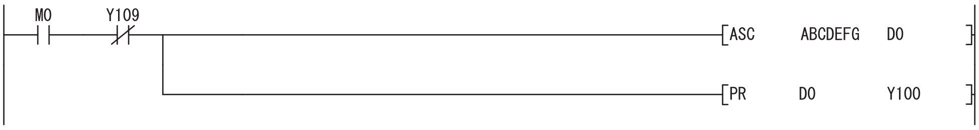
⇨

(After replacement)

Application	Device
Output string	D0 to D3
ASCII code output signal	Y100 to Y107
Strobe signal	Y108
In-execution flag	Y109
Output string storage address (BIN32)	D20 to D21
Output string storage address (BIN32) (Used for sub-routine programs and interrupt programs)	D200 to D201
Number of output characters	D202
Output module start Y number	D203
Character extraction position	D204
Number of extracted characters	D205
String output status value	D206
Result of string extraction by the MIDR instruction	D207
String output in-execution flag	M200
For index modification	Z0

If the device numbers in the example above are used for other applications, assign unused device numbers instead.

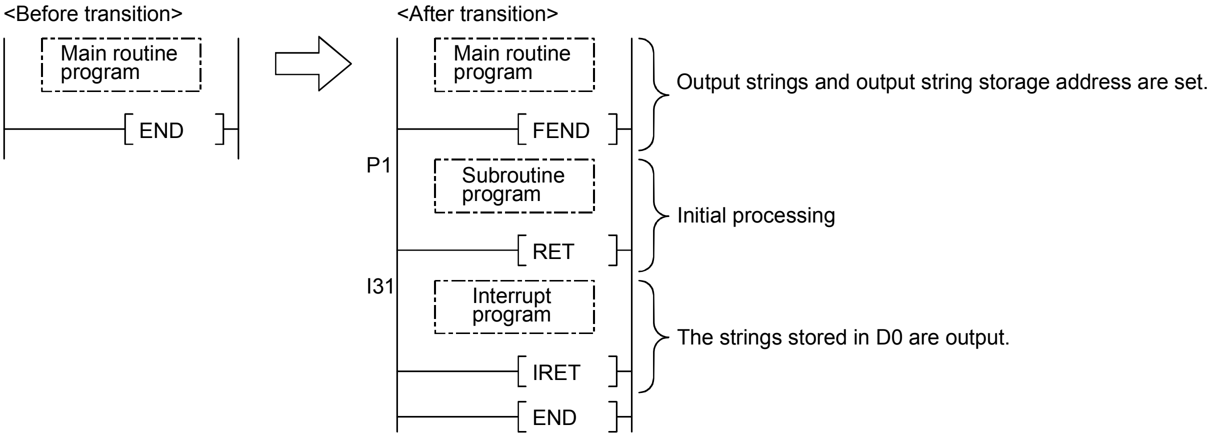
(2) Program before replacement



The strings stored in D0 or later are output to Y100 to Y107.

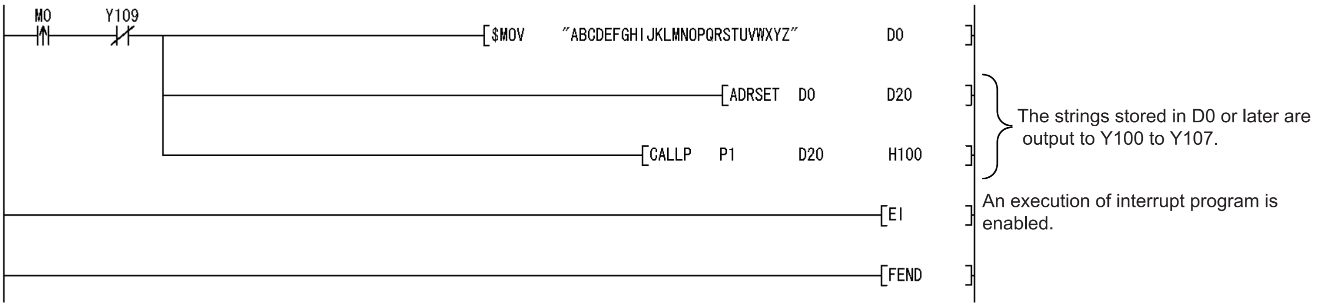
(3) Program after replacement

In the sequence program after replacement, three programs are required as shown below.



(a) Main routine program

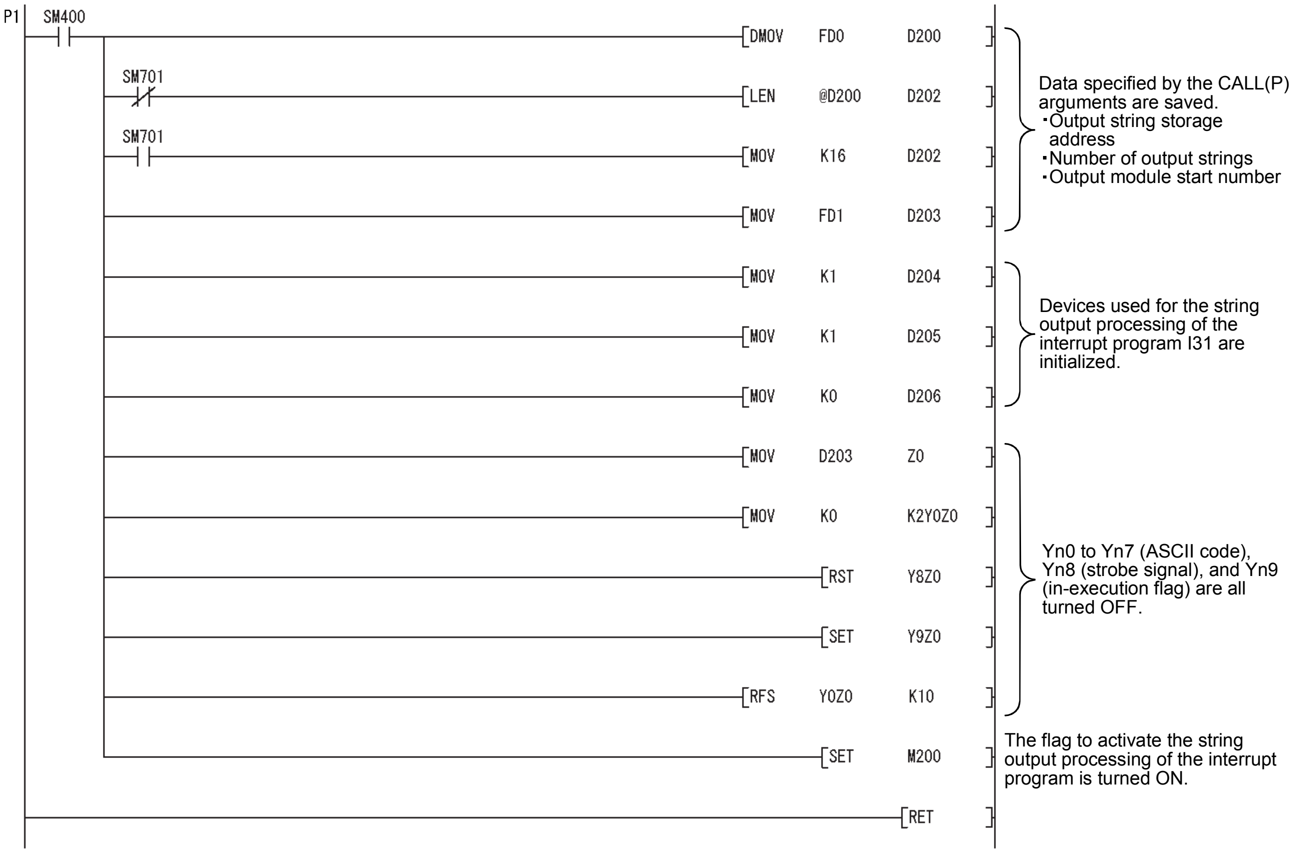
- Replace the PR instruction with the CALL instruction so that a subroutine program is called.
- Output string storage device (‘D0’ in the program below) cannot be specified directly with the CALL instruction.
  Use the ADRSET instruction to acquire the indirect address for the CALL instruction.
- Y device (‘Y100’ in the program before replacement shown in (2)) cannot be specified directly as output Y number with the CALL instruction. Specify the output Y number in integer.
- An interrupt program is used to output character codes via the output module. Enable the execution of interrupt program using the EI instruction.


M0
Y109
$MOV "ABCDEFGHIJKLMNOPQRSTUVWXYZ" D0
ADRSET D0 D20
CALLP P1 D20 H100
EI
FEND
The strings stored in D0 or later are output to Y100 to Y107.
An execution of interrupt program is enabled.

(b) Subroutine program

- In the subroutine program, the data for outputting ASCII codes using a fixed scan interrupt program (10ms) are set to work devices. Also, the flag for activating the processing in the fixed scan interrupt program is turned on.
- Specify the following arguments for the subroutine program.

First argument	Output string storage address	(Input)
Second argument	Output module start Y number	(Input)



Data specified by the CALL(P) arguments are saved.
・Output string storage address
・Number of output strings
・Output module start number

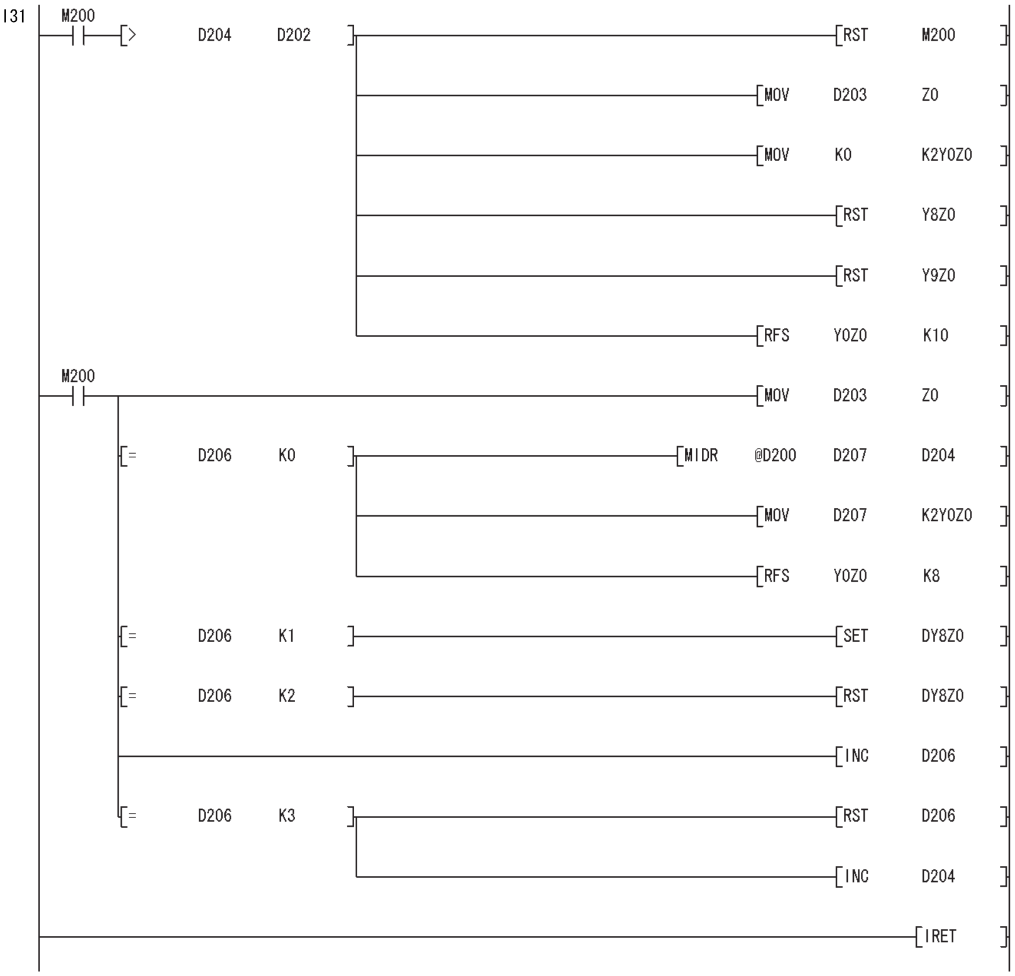
Devices used for the string output processing of the interrupt program I31 are initialized.

Yn0 to Yn7 (ASCII code), Yn8 (strobe signal), and Yn9 (in-execution flag) are all turned OFF.

The flag to activate the string output processing of the interrupt program is turned ON.

(c) Interrupt program

The following processing is added to a fixed scan interrupt program (10ms).
The fixed scan interrupt program outputs ASCII codes from the output module and controls the strobe signal.



```
I31  M200
     -| |--[>  D204  D202 ]--+-----------------[RST   M200    ]
                             +-------------[MOV  D203   Z0    ]
                             +-------------[MOV  K0     K2Y0Z0]
                             +-----------------[RST   Y8Z0    ]
                             +-----------------[RST   Y9Z0    ]
                             +-------------[RFS  Y0Z0   K10   ]
     M200
     -| |--+-------------------------------[MOV  D203   Z0    ]
           [=  D206  K0 ]--+-------[MIDR  @D200  D207   D204  ]
                           +---------------[MOV  D207   K2Y0Z0]
                           +---------------[RFS  Y0Z0   K8    ]
           [=  D206  K1 ]--------------------------[SET  DY8Z0]
           [=  D206  K2 ]--------------------------[RST  DY8Z0]
           +---------------------------------------[INC  D206 ]
           [=  D206  K3 ]--+-----------------------[RST  D206 ]
                           +-----------------------[INC  D204 ]
     ----------------------------------------------------[IRET]
```

The following signals are all turned OFF when all strings are output.
・Yn0 to Yn7 (ASCII code)
・Yn8 (strobe signal)
・Yn9 (in-execution flag)

Status 0:
One character is extracted from the output string using the MIDR instruction and output to the Y module.
The strobe signal is turned OFF for 10ms.

Status 1:
The strobe signal is turned ON for 10ms.

Status 2:
The strobe signal is turned OFF for 10ms.

The status value is incremented by one.

Status 3:
The status value is returned to 0 since the output processing of one character is completed. The next character is extracted.

3.1.2 Replacement example of the KEY instruction

The following shows the example of a program for replacement using the KEY instruction.

(1) Example of device assignment

(Before replacement)

Application	Device
Numeric input execution instruction	M0
Input complete flag	M1
ASCII code input signal	X100 to X107
Number of input digits	D10
Data storage device	D20 to D21

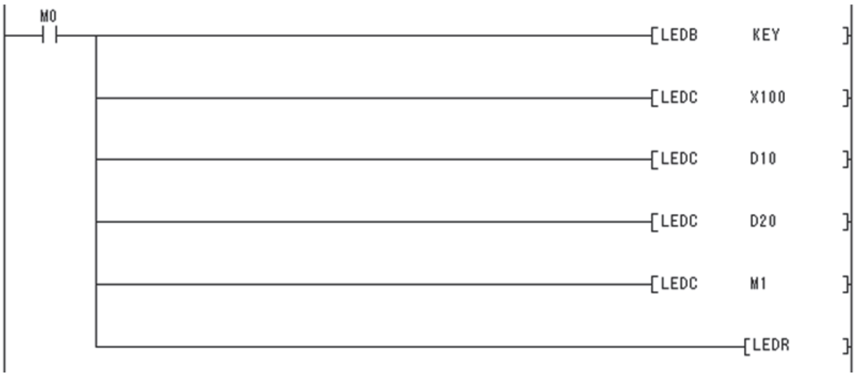
⇨

(After replacement)

Application	Device
Numeric input execution instruction	M0
Input complete flag	M1
Input data area	D200 to D202
ASCII code input signal	X100 to X107
Strobe signal	X108
Input data area address (BIN32)	D210 to D211
(Input data area + 0) address (BIN32)	D212 to D213
(Input data area + 1) address (BIN32)	D214 to D215
(Input data area + 2) address (BIN32)	D216 to D217
For shifting input data	D218
For converting input data	D219 to D220

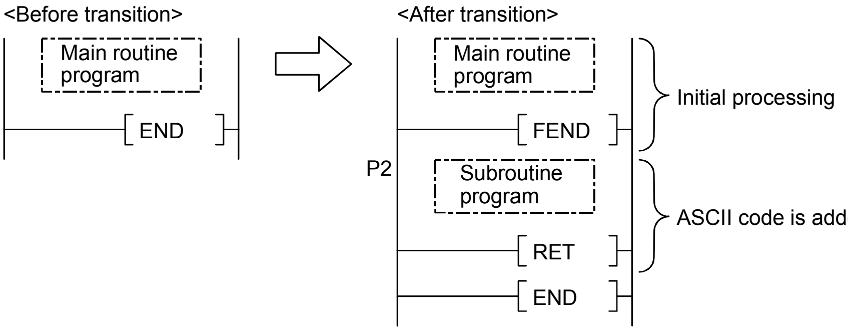
If the device numbers in the example above are used for other applications, assign unused device numbers instead.

(2) Program before replacement



(3) Program after replacement

In the sequence program after replacement, two programs are required as shown below.

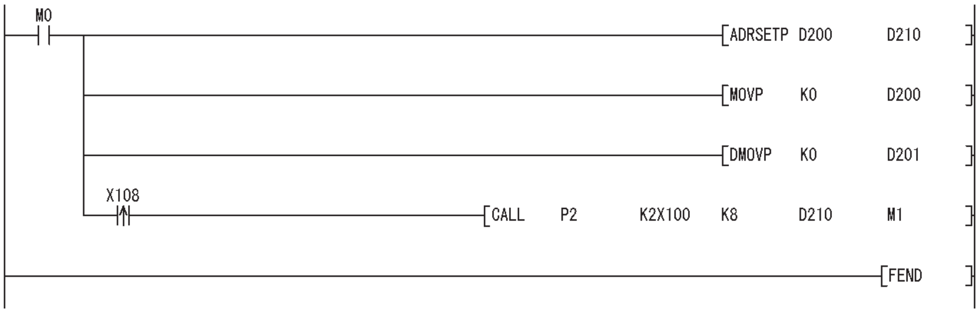


Initial processing

ASCII code is added to the input data area.

(a) Main routing program

- Set ‘0’ in the input data area on the rising edge of the execution instruction (‘M0’ in the program below) and initialize the program.
- Execute the CALL instruction on every rising edge of the strobe signal (‘X108’ in the program below) so that a subroutine program is called.
- In the subroutine program, input codes are added to the input data area and the completion status is checked.
- Pass the following data to the subroutine program at the execution of the CALL instruction.
  - ASCII code input value from the input module (Xn0 to Xn7)
  - Number of digits to be input.
  - Indirect address of the input data area (Use the ADRSET instruction to acquire the indirect address for the input data area.)
  - Bit devices to be turned on when input is completed.



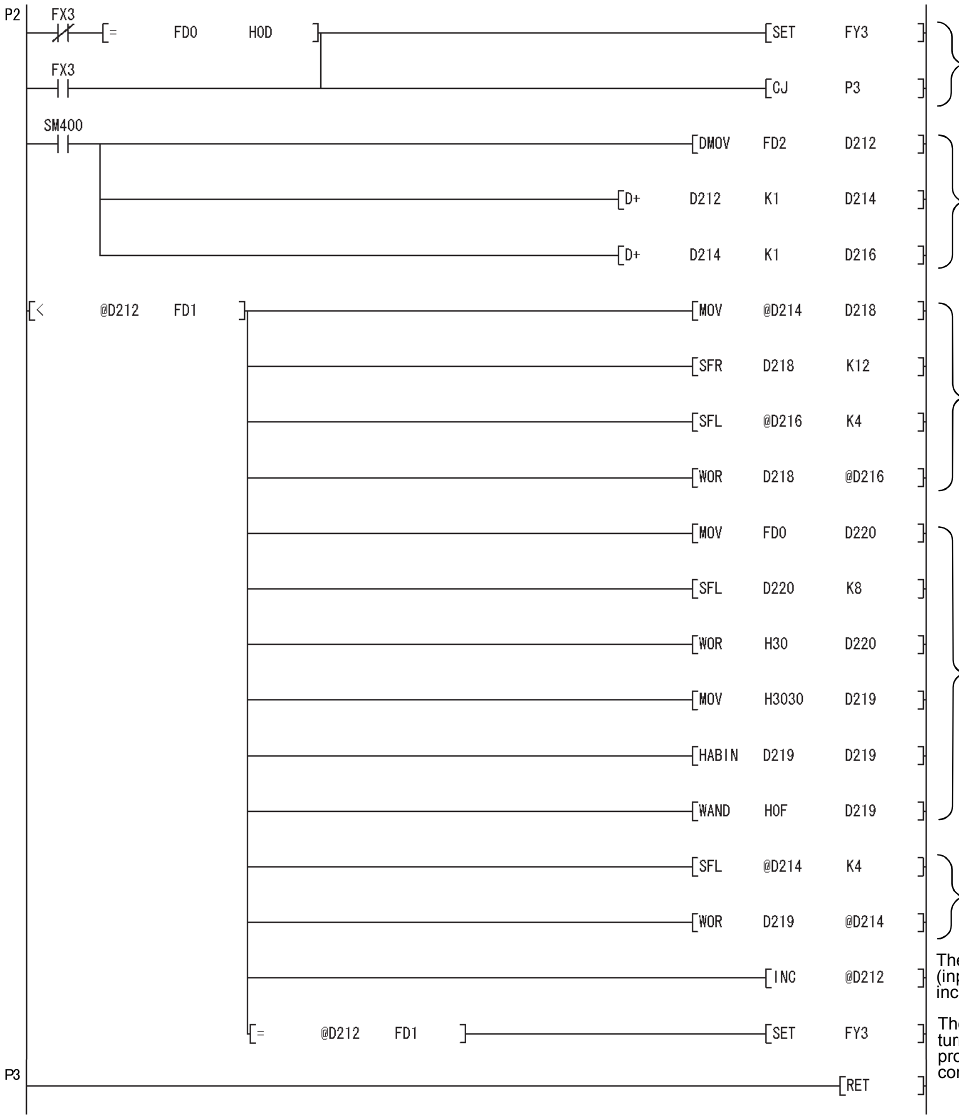
The input data area is initialized.

A subroutine program is called at the rising edge of the strobe signal.

(b) Subroutine program

- In the subroutine program, ASCII codes specified by an argument are added to the input data area and the completion status is checked.
- Specify the following arguments for the subroutine program.

First argument	ASCII code input from the input module (K2Xn)	(Input)
Second argument	Number of digits to be input	(Input)
Third argument	Indirect address of the input data area	(Input)
Fourth argument	Bit device turned on when input is completed	(Output)



Numeric entry is ended when the at-completion ON signal is ON or 0DH is input.

Addresses of the input data area are saved in the work devices.

The 1st to 4th digit numerals in (input data area +2) areshifted for one digit to the left.

Numeral entered in ASCII code is converted into one numeral in BIN data using the HABIN instruction.

The 5th to 8th digit numerals in (input data area +1) are shifted for one digit to the left and the converted numeral is set to the 8th digit.

The number of digits to be input in (input data area +0) is incremented by one.

The at-completion ON signal is turned ON when the input processing for specified digits is completed.

3.2 Sequence instructions requiring a review before replacing the QnACPU

This section describes instructions requiring a review before replacing the QnACPU with the Universal model QCPU.

Table 3.3 Instructions requiring a review before replacing the QnACPU

Symbol	Instruction	Replacing method	Reference
IX IXEND	Index modification of entire ladder	Use alternative programs.	Section 3.2.1
IXDEV IXSET	Modification value specification in index modification of entire ladder	Change the program so that the device offset values specified by the IXSET instruction are directly set to the index modification table using the MOV instruction.	Section 3.2.2
PR	Print ASCII code instruction	• It is recommended to use GOT as an ASCII code display device. ASCII codes stored in devices are directly displayed as characters on GOT. • Instructions can be replaced using a replacement program.	Section 3.2.3
PRC	Print comment instruction	• It is recommended to use GOT as an ASCII code display device. Device comments can be displayed on GOT. • Comment data can be output to a display device in the replacement program of the PR instruction after reading data using the reading device comment data instruction (COMRD(P)).	
CHKST CHK	Specific format failure check instruction	Instructions can be replaced using a replacement program.	Section 3.2.4
CHKCIR CHKEND	Format change instruction for CHK instruction	Failure detection ladder patterns can be changed in a replacement program.	
PLOW	Program low-speed execution registration instruction	• Use the PSCAN instruction instead of this instruction when low-speed execution type programs are replaced with scan execution type programs. • No instruction can be used if low-speed execution type programs are replaced with fixed scan execution type programs.	-
PCHK	Program execution status check instruction	Check a program execution status on the Program monitor list screen of GX Developer. For details, refer to Section 3.13.1 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals).	
KEY	Numerical key input instruction	• It is recommended to use GOT as a numeral input device. • Instructions can be replaced using a replacement program.	Section 3.2.5

3.2.1 Replacement example of the IX and IXEND instructions

A replacement example of program using the IX and IXEND instructions is shown below.
To save index register data using the ZPUSH instruction, a 23-word index register save area is required.

(1) Example of device assignment

(Before replacement)

Application	Device
Index modification table	D100 to D115

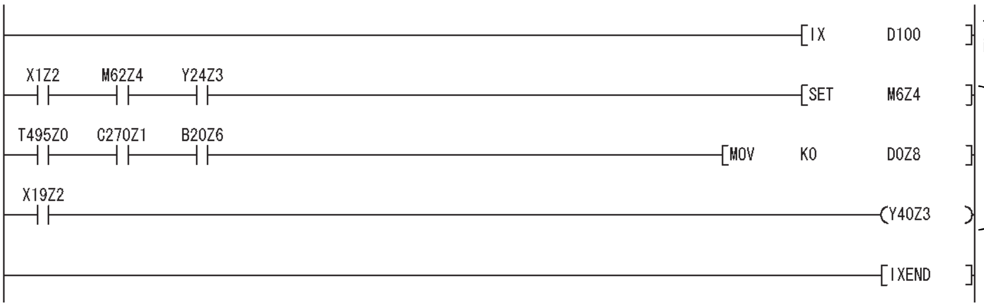
⇨

(After replacement)

Application	Device
Index modification table	D100 to D115
Index register save area	D200 to D222

If the device numbers in the example above are used for other applications, assign unused device numbers instead.

(2) Program before replacement

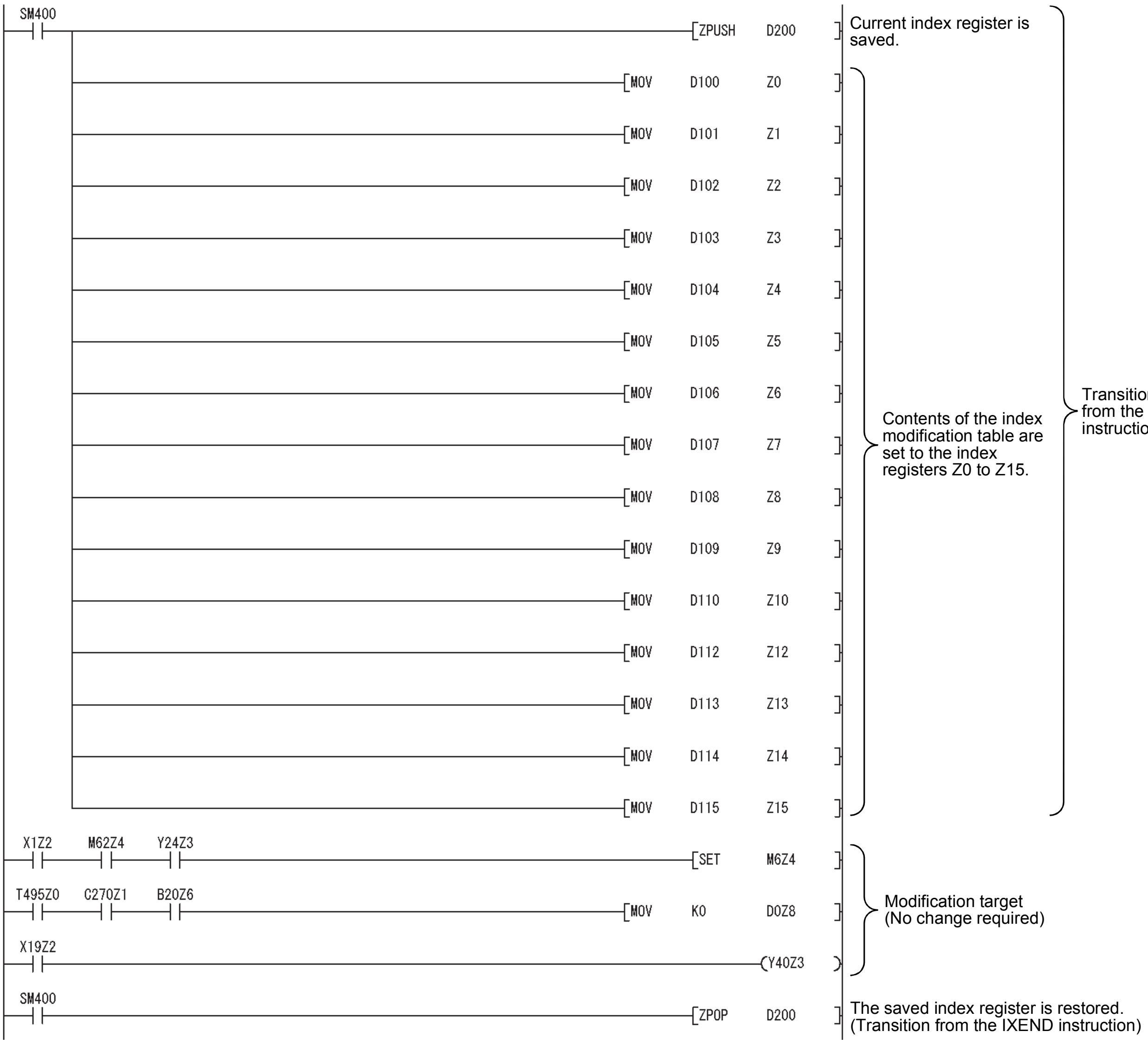


The modification value set in the index modification table is added.

Modification target
(No change required)

(3) Program after replacement

- Replace the IX instruction with the ZPUSH instruction and set the contents of index modification table in the to index register.
- Replace the IXEND instruction with the ZPOP instruction.



Current index register is saved.

Contents of the index modification table are set to the index registers Z0 to Z15.

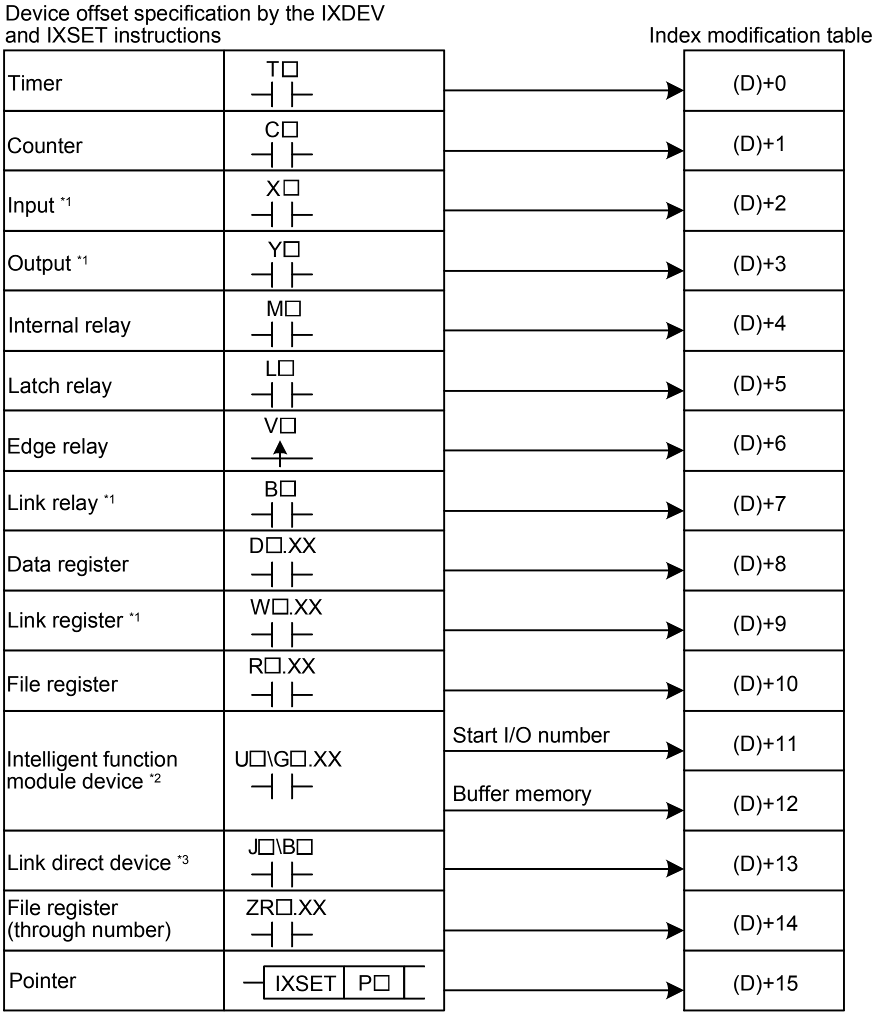
Transition from the IX instruction

Modification target (No change required)

The saved index register is restored. (Transition from the IXEND instruction)

3.2.2 Replacement example of the IXDEV and IXSET instructions

The following shows the example of a program for replacement using the IXDEV and IXSET instructions. Change the program so that the device offset values specified for the contacts between the IXDEV and IXSET instructions are directly set to the index modification table using the MOV instruction.
For a device whose offset value is not specified by the IXDEV and IXSET instructions, set the value to 0 in the program after replacement.
The following figure shows correspondence between device offset specification and index modification table set by the IXDEV and IXSET instructions.



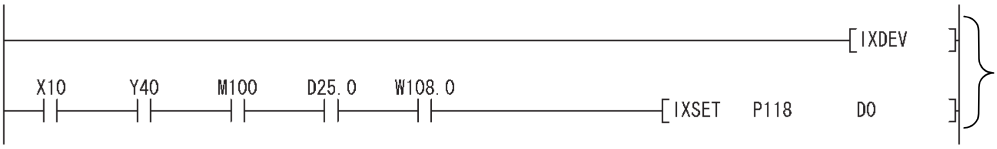
Device offset specification by the IXDEV and IXSET instructions			Index modification table
Timer	T□ ┤├	→	(D)+0
Counter	C□ ┤├	→	(D)+1
Input [*1]	X□ ┤├	→	(D)+2
Output [*1]	Y□ ┤├	→	(D)+3
Internal relay	M□ ┤├	→	(D)+4
Latch relay	L□ ┤├	→	(D)+5
Edge relay	V□ ↑	→	(D)+6
Link relay [*1]	B□ ┤├	→	(D)+7
Data register	D□.XX ┤├	→	(D)+8
Link register [*1]	W□.XX ┤├	→	(D)+9
File register	R□.XX ┤├	→	(D)+10
Intelligent function module device [*2]	U□\G□.XX ┤├	Start I/O number →	(D)+11
		Buffer memory →	(D)+12
Link direct device [*3]	J□\B□ ┤├	→	(D)+13
File register (through number)	ZR□.XX ┤├	→	(D)+14
Pointer	┤ IXSET │ P□ ├	→	(D)+15

*1 Device numbers are represented in hexadecimal. Use hexadecimal constants (H□) when setting values in the index modification table.

*2 Start I/O numbers (U□) are represented in hexadecimal. Use hexadecimal constants (H□) when setting values in the index modification table.

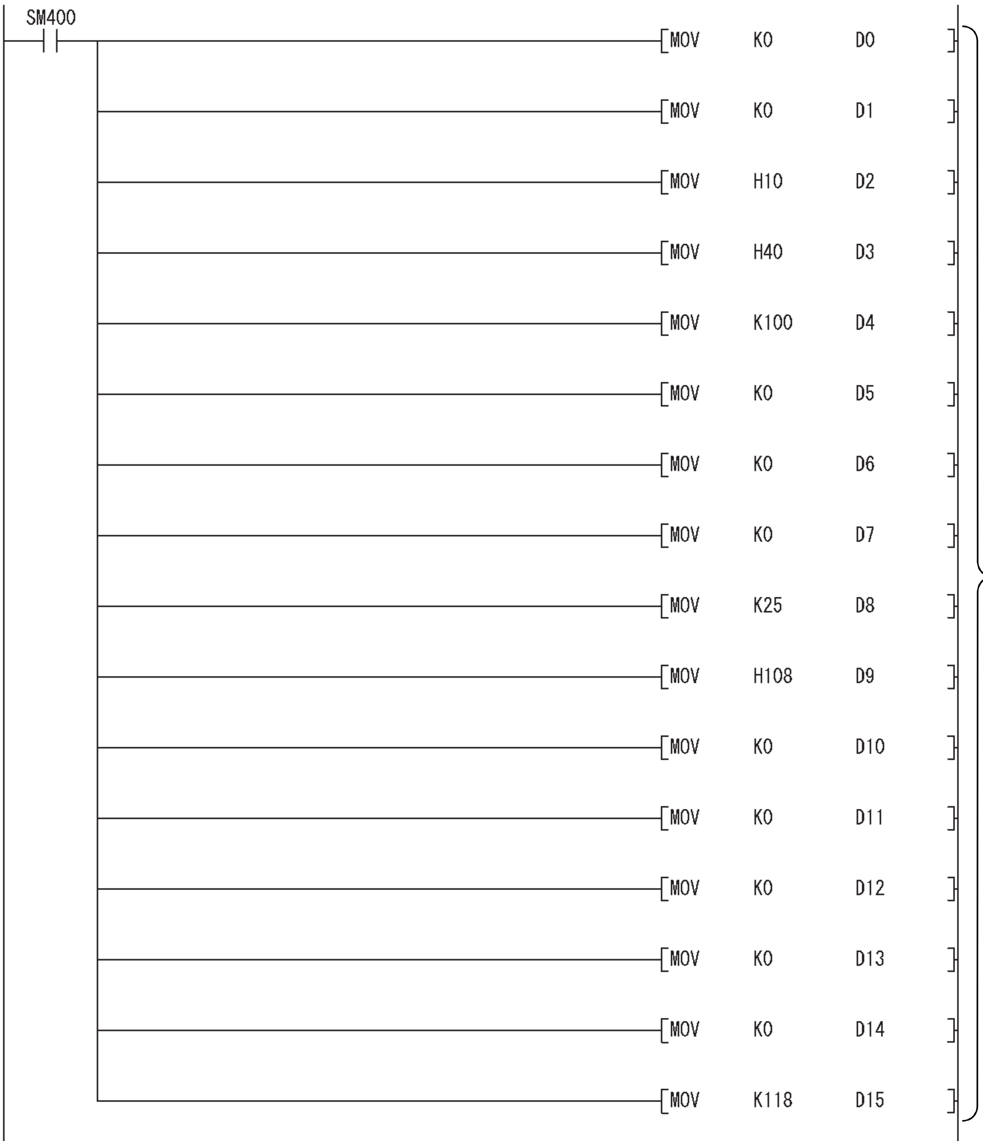
*3 Devices B, W, X, or Y can be specified following J□\. Set device numbers for B, W, X, and Y as device offset values of each device in the index modification table.
For example, if 'J10\Y220' is specified by the IXDEV or IXSET instruction, set 'K10' in (D)+13 and 'H220' in (D)+3 in the replacement program. ((D) indicates the start device in the index modification table.)

(1) Program before replacement



The device offset values for input (X), output (Y), internal relay (M), data register (D), link register (W), and pointer (P) are set to the index modification table starting from D0.

(2) Program after replacement



The device offset values specified by the IXDEV and IXSET instructions are set to the index modification table starting from D0.

3.2.3 Replacement example of the PR instruction

The following shows the example of a program for replacement using the PR instruction.
The number of output characters can be switched by turning on/off SM701.

(1) Example of device assignment

(Before replacement)

Application	Device
Output string	D0 to D3
ASCII code output signal	Y100 to Y107
Strobe signal	Y108
In-execution flag	Y109

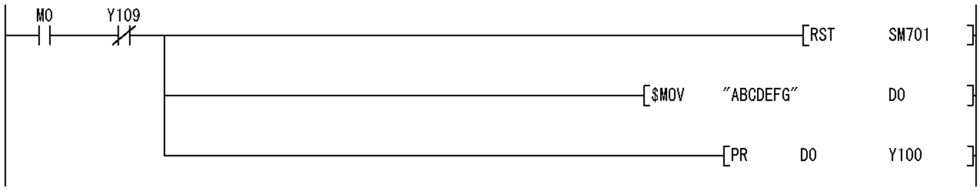
⇨

(After replacement)

Application	Device
Output string	D0 to D3
ASCII code output signal	Y100 to Y107
Strobe signal	Y108
In-execution flag	Y109
Output string storage address (BIN32)	D20 to D21
Output string storage address (BIN32) (Used for sub-routine programs and interrupt programs)	D200 to D201
Number of output characters	D202
Output module start Y number	D203
Character extraction position	D204
Number of extracted characters	D205
String output status value	D206
Result of string extraction by the MIDR instruction	D207
String output in-execution flag	M200
For index modification	Z0

If the device numbers in the example above are used for other applications, assign unused device numbers instead.

(2) Program before replacement

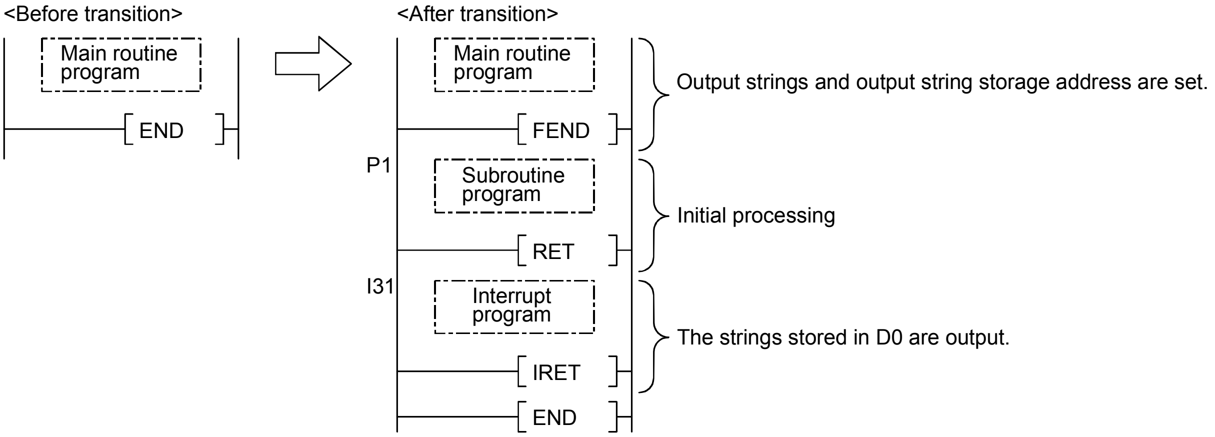


The number of output strings is set to variable. (Output until ASCII code 00H appears.)

The strings stored in D0 or later are output to Y100 to Y107.

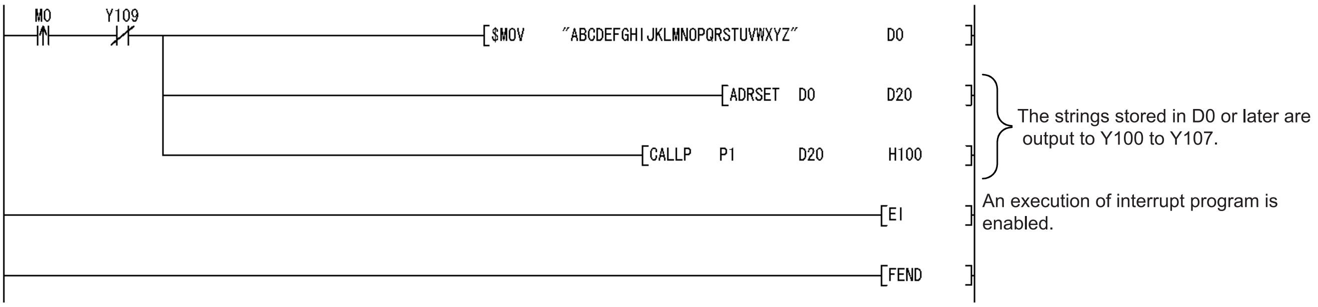
(3) Program after replacement

In the sequence program after replacement, three programs are required as shown below.



(a) Main routine program

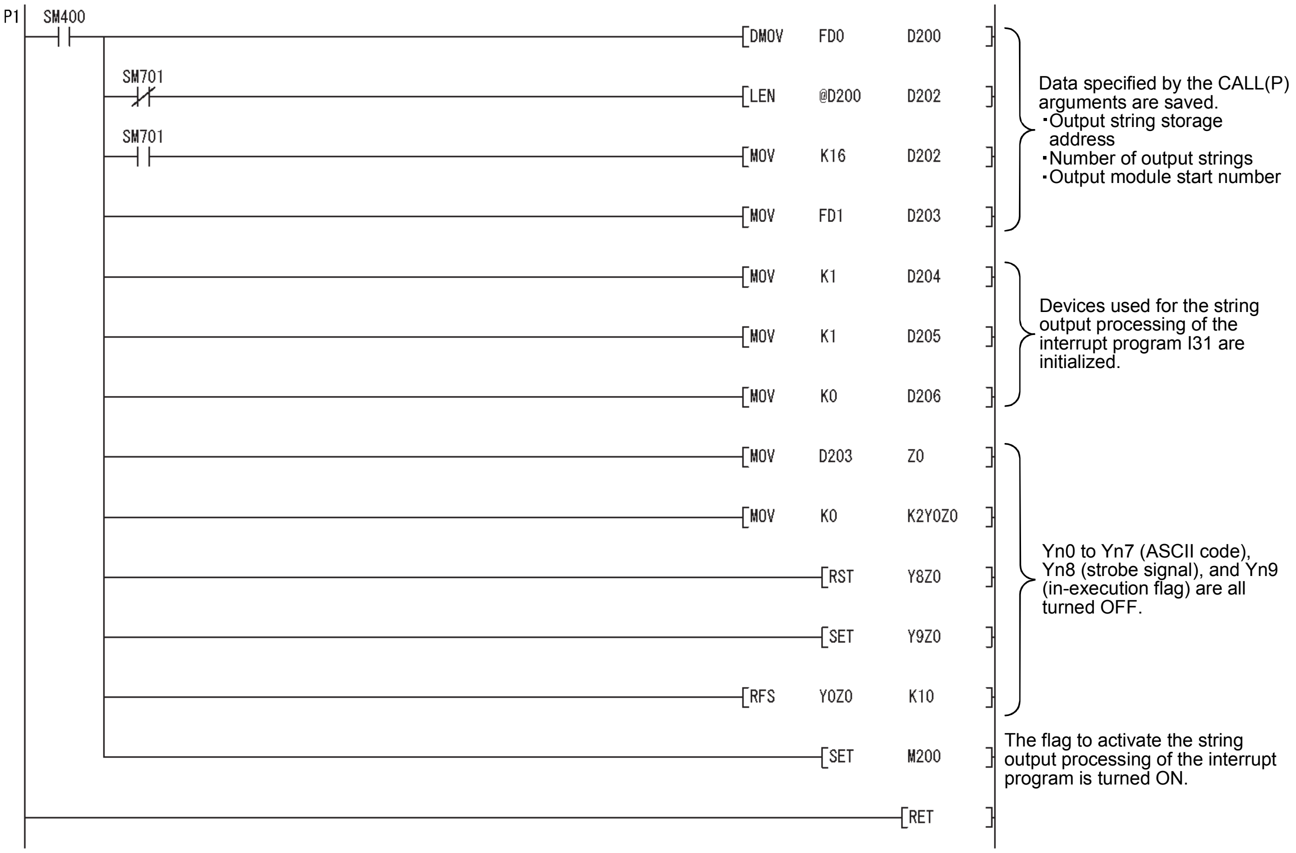
- Replace the PR instruction with the CALL instruction so that a subroutine program is called.
- Output string storage device (‘D0’ in the program below) cannot be specified directly with the CALL instruction.
  Use the ADRSET instruction to acquire the indirect address for the CALL instruction.
- Y device (‘Y100’ in the program before replacement shown in (2)) cannot be specified directly as output Y number with the CALL instruction. Specify the output Y number in integer.
- An interrupt program is used to output character codes via the output module. Enable the execution of interrupt program using the EI instruction.


M0
Y109
$MOV "ABCDEFGHIJKLMNOPQRSTUVWXYZ" D0
ADRSET D0 D20
CALLP P1 D20 H100
EI
FEND
The strings stored in D0 or later are output to Y100 to Y107.
An execution of interrupt program is enabled.

(b) Subroutine program

- In the subroutine program, the data for outputting ASCII codes using a fixed scan interrupt program (10ms) are set to work devices. Also, the flag for activating the processing in the fixed scan interrupt program is turned on.
- Specify the following arguments for the subroutine program.

First argument	Output string storage address	(Input)
Second argument	Output module start Y number	(Input)



```
P1  SM400
    -| |-----+------------------------------[DMOV   FD0     D200   ]
             |  SM701
             +--|/|-------------------------[LEN    @D200   D202   ]
             |  SM701
             +--| |-------------------------[MOV    K16     D202   ]
             |
             +------------------------------[MOV    FD1     D203   ]
             |
             +------------------------------[MOV    K1      D204   ]
             |
             +------------------------------[MOV    K1      D205   ]
             |
             +------------------------------[MOV    K0      D206   ]
             |
             +------------------------------[MOV    D203    Z0     ]
             |
             +------------------------------[MOV    K0      K2Y0Z0 ]
             |
             +--------------------------------------[RST    Y8Z0   ]
             |
             +--------------------------------------[SET    Y9Z0   ]
             |
             +------------------------------[RFS    Y0Z0    K10    ]
             |
             +--------------------------------------[SET    M200   ]

    ----------------------------------------------------------[RET ]
```

Data specified by the CALL(P) arguments are saved.
･Output string storage address
･Number of output strings
･Output module start number

Devices used for the string output processing of the interrupt program I31 are initialized.

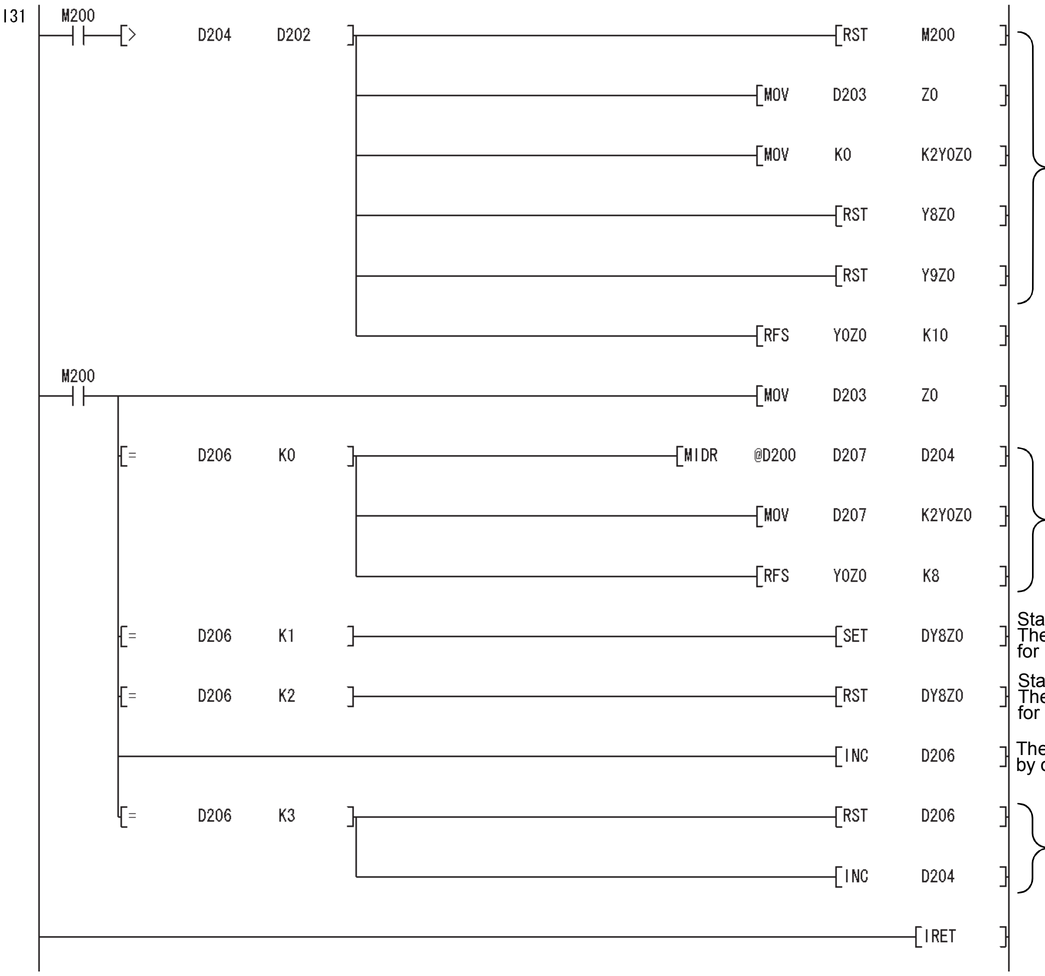
Yn0 to Yn7 (ASCII code), Yn8 (strobe signal), and Yn9 (in-execution flag) are all turned OFF.

The flag to activate the string output processing of the interrupt program is turned ON.

(c) Interrupt program

The following processing is added to a fixed scan interrupt program (10ms).

The fixed scan interrupt program outputs ASCII codes from the output module and controls the strobe signal.



```
I31  M200
     -| |--[>  D204  D202 ]--+--------------------[RST   M200   ]
                             +-------------[MOV   D203   Z0     ]
                             +-------------[MOV   K0     K2Y0Z0 ]
                             +--------------------[RST   Y8Z0   ]
                             +--------------------[RST   Y9Z0   ]
                             +-------------[RFS   Y0Z0   K10    ]
     M200
     -| |--+-----------------------------------[MOV   D203   Z0     ]
           [=  D206  K0 ]--+-------------[MIDR  @D200  D207   D204   ]
                           +-------------------[MOV   D207   K2Y0Z0 ]
                           +-------------------[RFS   Y0Z0   K8     ]
           [=  D206  K1 ]----------------------------[SET   DY8Z0  ]
           [=  D206  K2 ]----------------------------[RST   DY8Z0  ]
           +-----------------------------------------[INC   D206   ]
           [=  D206  K3 ]--+-------------------------[RST   D206   ]
                           +-------------------------[INC   D204   ]
     ----------------------------------------------------[IRET   ]
```

The following signals are all turned OFF when all strings are output.
・Yn0 to Yn7 (ASCII code)
・Yn8 (strobe signal)
・Yn9 (in-execution flag)

Status 0:
One character is extracted from the output string using the MIDR instruction and output to the Y module. The strobe signal is turned OFF for 10ms.

Status 1:
The strobe signal is turned ON for 10ms.

Status 2:
The strobe signal is turned OFF for 10ms.

The status value is incremented by one.

Status 3:
The status value is returned to 0 since the output processing of one character is completed. The next character is extracted.

3.2.4 Replacement example of the CHKST and CHK instructions

The following shows the example of a program for replacement using the CHKST and CHK instructions.
In the example below, if the replacement program for the CHKST and CHK instructions detects failure, the failure number (contact number + coil number) is stored in D200 and the annunciator F200 turns on.

(1) Example of device assignment

(Before replacement)

Application	Device
Advance end detection sensor input 1	X100
Retract end detection sensor input 1	X101
Advance end detection sensor input 2	X102
Retract end detection sensor input 2	X103
Advance end detection sensor input 3	X104
Retract end detection sensor input 3	X105
Advance end detection sensor input 4	X106
Retract end detection sensor input 4	X107
Failure detection output 1	Y100
Failure detection output 2	Y102
Failure detection output 3	Y104
Failure detection output 4	Y106

⇨

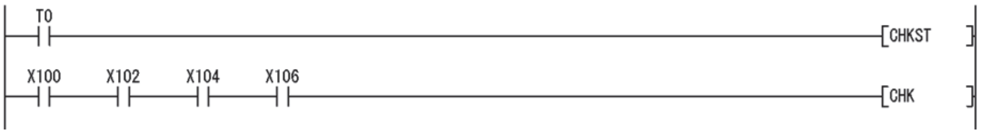
(After replacement)

Application	Device
Advance end detection sensor input 1	X100
Retract end detection sensor input 1	X101
Advance end detection sensor input 2	X102
Retract end detection sensor input 2	X103
Advance end detection sensor input 3	X104
Retract end detection sensor input 3	X105
Advance end detection sensor input 4	X106
Retract end detection sensor input 4	X107
Failure detection output 1	Y100
Failure detection output 2	Y102
Failure detection output 3	Y104
Failure detection output 4	Y106
Coil number (failure type detected)	D100
Contact number	D101
Failure number	D200
Failure detection display	F200
For index modification	Z0

If the device numbers in the example above are used for other applications, assign unused device numbers instead.
When the advance end detection sensor input performs a failure detection of Xn, assign device numbers for the retract end detection sensor input and the failure detection output as described below.

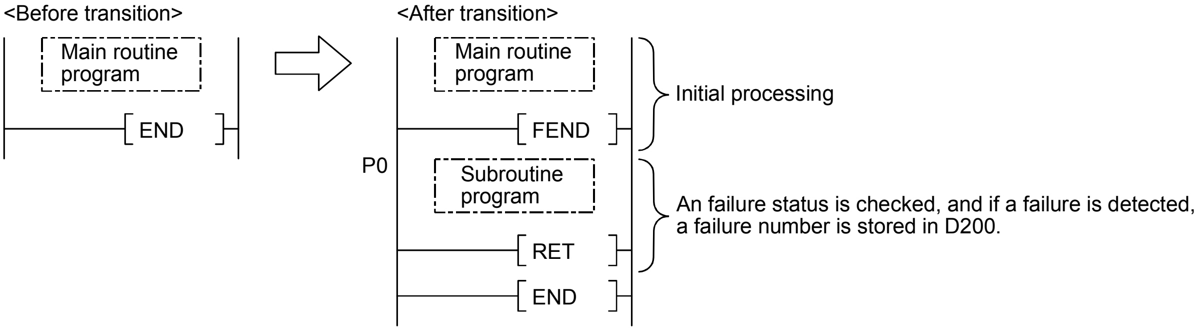
Advance end detection sensor input	Xn
Retract end detection sensor input	Xn+1
Failure detection output	Yn

(2) Program before replacement



(3) Program after replacement

In the sequence program after replacement, two programs are required as shown below.

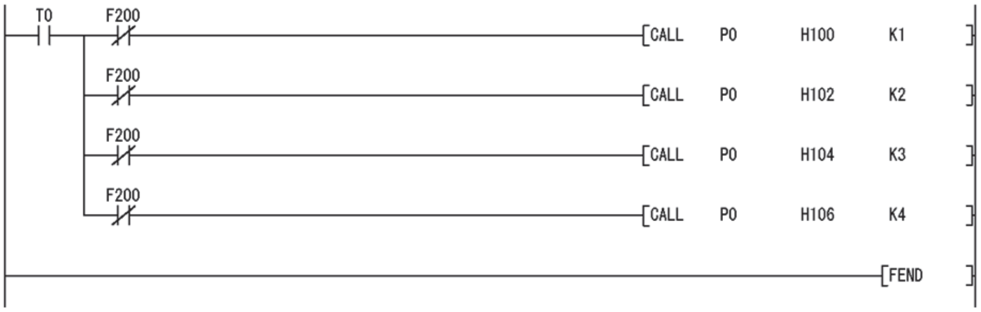


Initial processing

An failure status is checked, and if a failure is detected, a failure number is stored in D200.

(a) Main routine program

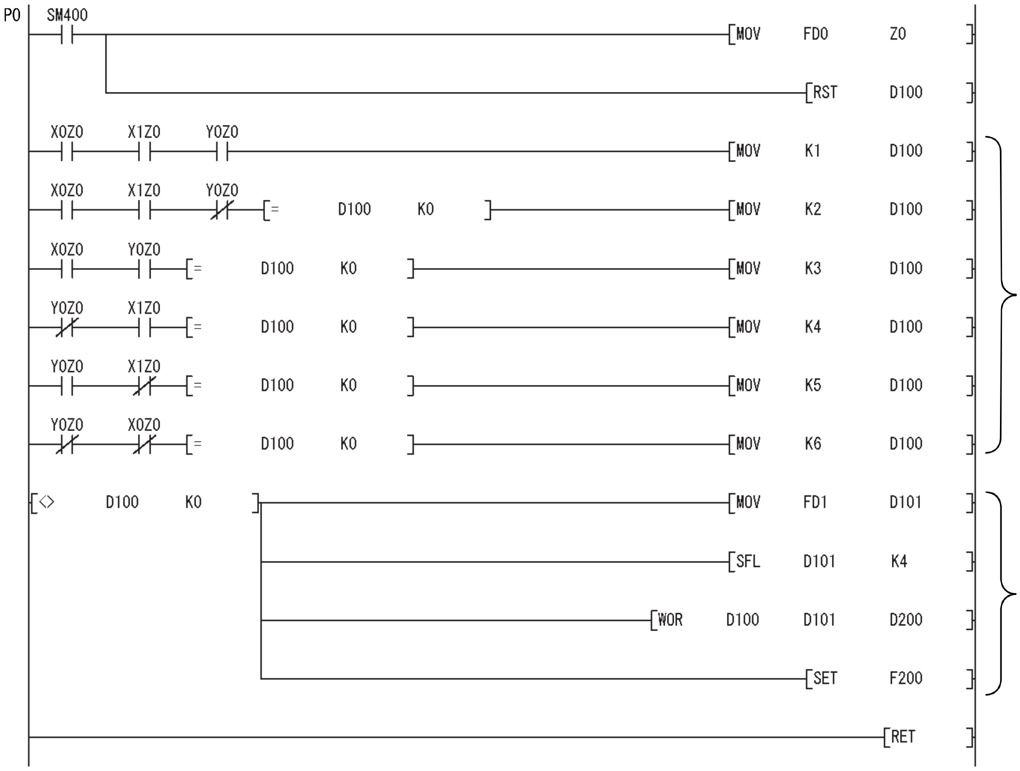
- Replace the CHKST and CHK instructions with the CALL instructions so that a subroutine program is called.
- One CALL instruction is required for each device specified as check condition before the CHK instruction. (In the program before replacement shown in (2), four CALL instructions need to be added since there are four check conditions before the CHK instruction.)
- Device number and contact number of X devices (check condition) are specified in each CALL instruction.
- Contact number is used to display failure number when a failure is detected.



(b) Subroutine program

- In the subroutine program, a failure status is checked using a failure detection ladder pattern.
- If a failure is detected, a failure number is stored in D200 and the annunciator F200 is turned on.
- Specify the following arguments for the subroutine program.

First argument	Device number of X device targeted for failure check	(Input)
Second argument	Contact number of X device targeted for failure check	(Input)



<Failure detection target>
If a failure is detected, the coil number corresponding to the failure type is set to D100.

If a failure is detected, a failure number is created by combining the coil number corresponding to the failure type and the contact number.
The annunciator is turned ON.

(4) Replacement method when failure detection ladder patterns are changed by the CHKCIR and CHKEND instructions

Failure detection ladder patterns can be changed in the subroutine program described in (3).

3.2.5 Replacement example of the KEY instruction

The following shows the example of a program for replacement using the KEY instruction.

(1) Example of device assignment

(Before replacement)

Application	Device
Numeric input execution instruction	M0
Input complete flag	M1
Input data area	D200 to D203
ASCII code input signal	X100 to X107
Strobe signal	X108

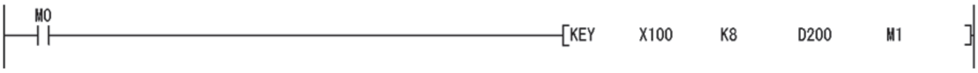
⇨

(After replacement)

Application	Device
Numeric input execution instruction	M0
Input complete flag	M1
Input data area	D200 to D202
ASCII code input signal	X100 to X107
Strobe signal	X108
Input data area address (BIN32)	D210 to D211
(Input data area + 0) address (BIN32)	D212 to D213
(Input data area + 1) address (BIN32)	D214 to D215
(Input data area + 2) address (BIN32)	D216 to D217
For shifting input data	D218
For converting input data	D219 to D220

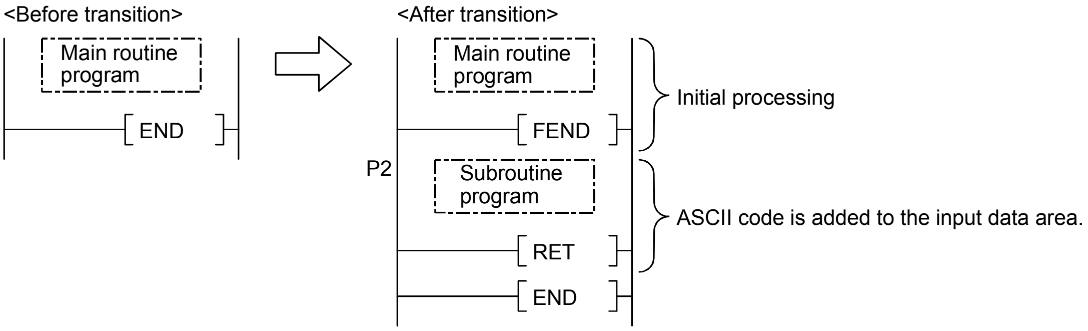
If the device numbers in the example above are used for other applications, assign unused device numbers instead.

(2) Program before replacement



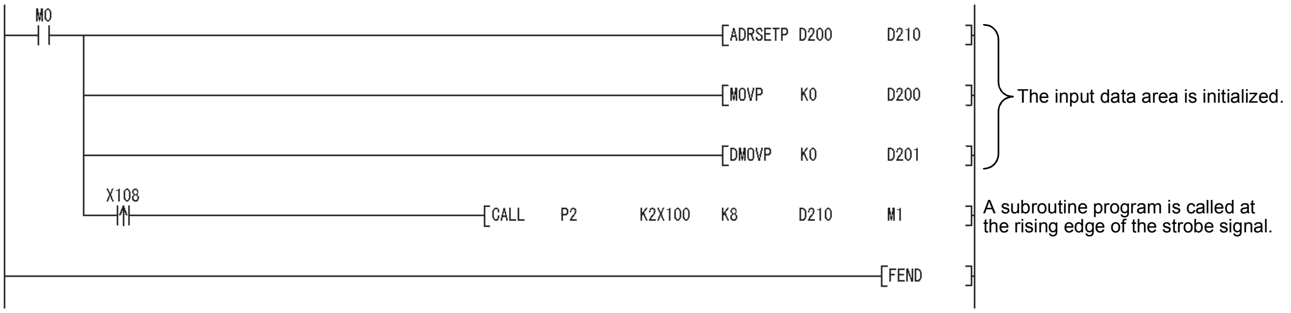
(3) Program after replacement

In the sequence program after replacement, two programs are required as shown below.



(a) Main routing program

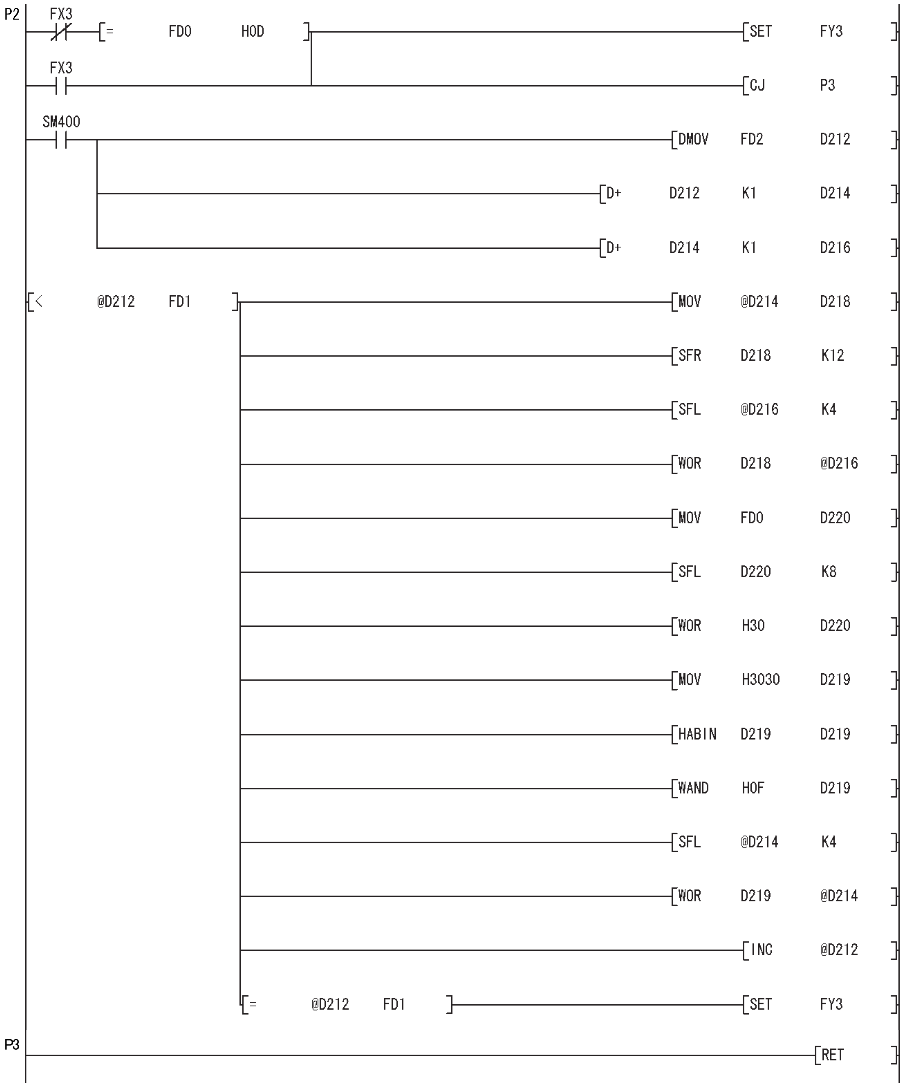
- Set ‘0’ in the input data area on the rising edge of the execution instruction (‘M0’ in the program below) and initialize the program.
- Execute the CALL instruction on every rising edge of the strobe signal (‘X108’ in the program below) so that a subroutine program is called.
- In the subroutine program, input codes are added to the input data area and the completion status is checked.
- Pass the following data to the subroutine program at the execution of the CALL instruction.
  - ASCII code input value from the input module (Xn0 to Xn7)
  - Number of digits to be input.
  - Indirect address of the input data area (Use the ADRSET instruction to acquire the indirect address for the input data area.)
  - Bit devices to be turned on when input is completed.


M0
ADRSETP D200 D210
MOVP K0 D200
DMOVP K0 D201
X108
CALL P2 K2X100 K8 D210 M1
FEND
The input data area is initialized.
A subroutine program is called at the rising edge of the strobe signal.

(b) Subroutine program

- In the subroutine program, ASCII codes specified by an argument are added to the input data area and the completion status is checked.
- Specify the following arguments for the subroutine program.

First argument	ASCII code input from the input module (K2Xn)	(Input)
Second argument	Number of digits to be input	(Input)
Third argument	Indirect address of the input data area	(Input)
Fourth argument	Bit device turned on when input is completed	(Output)



```
P2  FX3 (NC)  [= FD0 H0D]  ---------------- [SET FY3]
    FX3 (NO)  ----------------------------- [CJ P3]
    SM400 ---------------------------------- [DMOV FD2 D212]
          ---------------------------------- [D+ D212 K1 D214]
          ---------------------------------- [D+ D214 K1 D216]
    [< @D212 FD1] -------------------------- [MOV @D214 D218]
                  -------------------------- [SFR D218 K12]
                  -------------------------- [SFL @D216 K4]
                  -------------------------- [WOR D218 @D216]
                  -------------------------- [MOV FD0 D220]
                  -------------------------- [SFL D220 K8]
                  -------------------------- [WOR H30 D220]
                  -------------------------- [MOV H3030 D219]
                  -------------------------- [HABIN D219 D219]
                  -------------------------- [WAND H0F D219]
                  -------------------------- [SFL @D214 K4]
                  -------------------------- [WOR D219 @D214]
                  -------------------------- [INC @D212]
                  [= @D212 FD1] ------------ [SET FY3]
P3  ---------------------------------------- [RET]
```

Numeric entry is ended when the at-completion ON signal is ON or 0DH is input.

Addresses of the input data area are saved in the work devices.

The 1st to 4th digit numerals in (input data area +2) areshifted for one digit to the left.

Numeral entered in ASCII code is converted into one numeral in BIN data using the HABIN instruction.

The 5th to 8th digit numerals in (input data area +1) are shifted for one digit to the left and the converted numeral is set to the 8th digit.

The number of digits to be input in (input data area +0) is incremented by one.

The at-completion ON signal is turned ON when the input processing for specified digits is completed.

3.3 SFC (MELSAP-II/MELSAP3)

3.3.1 Functions requiring a review before replacing the ACPU with SFC (MELSAP-II)

If the ACPU with SFC (MELSAP-II) is replaced by the Universal model QCPU, some functions of the ACPU will be unavailable.
The following table shows the functions unavailable for the Universal model QCPU.

Table 3.4 Functions unavailable for the Universal model QCPU

Item	Precautions	Replacement method	Reference
Step transition monitoring timer	The step transition monitoring timer is not supported.	Change the program as described in Appendix 3.1 in the MELSEC-Q/L/QnA Programming Manual (SFC).	Section 4.6 and Appendix 3.1 in the MELSEC-Q/L/QnA Programming Manual (SFC)
Number of blocks	Maximum 128 blocks can be used for the Q00UJCPU, Q00UCPU, Q01UCPU, and Q02UCPU.	If the number of blocks or the number of steps is insufficient, select the Q03UDCPU or higher model.	Chapter 3 in the MELSEC-Q/L/QnA Programming Manual (SFC)

3.3.2 Functions and instructions requiring a review before replacing the QnACPU with SFC (MELSAP3)

If the QnACPU with SFC (MELSAP-3) is replaced by the Universal model QCPU, some functions and some SFC control instructions of the QnACPU will be unavailable.
The following tables show the functions and SFC control instructions unavailable for the Universal model QCPU.

Table 3.5 Functions unavailable for the Universal model QCPU

Item	Precautions	Replacement method	Reference
Step transition monitoring timer	The step transition monitoring timer is not supported.	Change the program as described in Appendix 3.1 in the MELSEC-Q/L/QnA Programming Manual (SFC).	Section 4.6 and Appendix 3.1 in the MELSEC-Q/L/QnA Programming Manual (SFC)
SFC operation mode setting	The periodic execution block setting is not supported.	Change the program as described in Appendix 3.2 in the MELSEC-Q/L/QnA Programming Manual (SFC).	Section 4.7.4 and Appendix 3.2 in the MELSEC-Q/L/QnA Programming Manual (SFC)
	Use the Universal model QCPU whose serial number (first five digits) is "12052" or later when selecting an operation mode at double block START. When the Universal model QCPU whose serial number (first five digits) is "12051" or earlier is used, the operation mode is fixed to "WAIT".	-	Section 4.7.5 in the MELSEC-Q/L/QnA Programming Manual (SFC)
	An operation mode at transition to active step (Operation mode at double step START) cannot be selected. (Fixed to "TRANSFER".)	Consider to execute an SFC program with the operation mode at transition to active step "TRANSFER" (Operation mode at double step START).	Section 4.7.6 in the MELSEC-Q/L/QnA Programming Manual (SFC)
SFC program for program execution management	SFC programs for program execution management are not supported.	Consider to execute a program with one normal SFC program.	Section 5.2.3 in the MELSEC-Q/L/QnA Programming Manual (SFC)
SFC control instruction	Some SFC control instructions are not supported.	Table 3.6 shows unavailable instructions and replacement methods.	Section 4.4 in the MELSEC-Q/L/QnA Programming Manual (SFC)
Number of blocks	Maximum 128 blocks can be used for the Q00UJCPU, Q00UCPU, Q01UCPU, and Q02UCPU.	If the number of blocks or the number of steps is insufficient, select the Q03UDCPU or higher model.	Chapter 3 in the MELSEC-Q/L/QnA Programming Manual (SFC)
Number of SFC steps	Maximum 1024 steps can be used for the Q00UJCPU, Q00UCPU, Q01UCPU, and Q02UCPU.		

Table 3.6 SFC control instructions unavailable for the Universal model QCPU

Symbol	Instruction	Alternative method	Reference
LD TRn	Forced transition check instruction	When the programmable controller type is changed, these instructions are converted into SM1255. Modify programs as needed.	-
AND TRn			
OR TRn			
LDI TRn			
ANDI TRn			
ORI TRn			
LD BLm\TRn			
AND BLm\TRn			
OR BLm\TRn			
LDI BLm\TRn			
ANDI BLm\TRn			
ORI BLm\TRn			
SCHG(D)	Active step change instruction	Refer to Appendix 3 "Restrictions on Basic Model QCPU, Universal Model QCPU, and LCPU and Alternative Methods" in the MELSEC-Q/L/QnA Programming Manual (SFC).	The MELSEC-Q/L/QnA Programming Manual (SFC)
SET TRn	Transition control instruction		
SET BLm\TRn			
RST TRn			
RST BLm\TRn			
BRSET(S)[*1]	Block switching instruction	When the programmable controller type is changed, these instructions are converted into SM1255. Modify programs as needed.	

[*1] This instruction can be used with the Universal model QCPU whose serial number (first five digits) is "13102" or earlier.

4. Precautions for the performance and specifications of the CPU modules

An A/QnA (large type) series CPU and a Universal model QCPU partly differ in performance and specifications.

This chapter describes precautions for the performance and specifications of the CPU modules.

4.1 Precautions for performance and specifications when the ACPU is replaced

Table 4.1 Precautions for performance and specifications when the ACPU is replaced

Item	Precautions	Replacement method	Reference
Program size	The program size for each CPU module is as follows: Q00UJCPU: 10K steps Q00UCPU: 10K steps Q01UCPU: 15K steps Q02UCPU: 20K steps Q03UD(E)CPU: 30K steps Q04UD(E)HCPU: 40K steps Q06UD(E)HCPU: 60K steps Q10UD(E)HCPU: 100K steps Q13UD(E)HCPU: 130K steps Q20UD(E)HCPU: 200K steps Q26UD(E)HCPU: 260K steps	Select a CPU module having enough size to store the programs used in the existing system.	Section 6.2 in the QCPU User's Manual (Hardware Design, Maintenance and Inspection)
Number of I/O points	The number of I/O points for each CPU module is as follows: Q00UJCPU: 256 points Q00UCPU, Q01UCPU: 1024 points Q02UCPU: 2048 points	Select a CPU module having the number of I/O points greater than or equal to that of the existing system.	
Latch setting	If latch ranges of internal user devices are specified, the processing time is added in proportion to the device points set to be latched. (For example, if 8K points are latched for the latch relay (L) with the QnUD(E)(H)CPU, the processing time is 28.6μs.)	The latch function of the Universal model QCPU is enhanced. (1) Large-capacity file register (R, ZR) (2) Writing/reading device data to the standard ROM (SP.DEVST and S(P).DEVLD instructions) (3) Latch range specification of internal devices Change the latch method to the method described in (1) to (3) above according to the application.	• Section 4.3 • Section 3.3 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
Interrupt program	Interrupt counter is not supported.	Check the numbers of executions for interrupt programs on the Interrupt program monitor list screen of GX Developer.	-
SM/SD	Use the Universal model QCPU whose serial number (first five digits) is "10102" or later when using the A series-compatible special relay and special register (SM1000 to SM1255/SD1000 to SD1255). When the Universal model QCPU whose serial number (first five digits) is "10101" or earlier is used, replace them with the Universal model QCPU-compatible special relay and special register by using the conversion function of a programming tool. Note, however, that the ones which are not compatible with the Universal model QCPU are replaced with SM1255 and SD1255. Modify programs as needed.	-	Appendix 2 and Appendix 3 in the QCPU User's Manual(Hardware Design, Maintenance and Inspection)

Item	Precautions	Replacement method	Reference
Processing time	Scan time and other processing times are different.	Modify programs as needed, checking the processing timing.	-
MC protocol (dedicated protocol)	The following frame types cannot be used when accessing the Universal model QCPU.[1] • A-compatible 1C frame • A-compatible 1E frame	Use the frame types below. • QnA-compatible 2C/3C/4C frame • QnA-compatible 3E frame • 4E frame	MELSEC-Q/L MELSEC Communication Protocol Reference Manual
	The following commands cannot specify monitoring conditions. • Randomly reading data in units of word (Command: 0403) • Device memory monitoring (Command: 0801) The applicable frame types are as follows: • QnA-compatible 3C/4C frame • QnA-compatible 3E frame • 4E frame	-	
LED indication priority setting	LED indication priority cannot be set. Only LED indication setting at error occurrence is supported.	-	Section 3.20.2 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
Others	Specifications including the processing time of instructions and processing methods of timer and counter depend on the CPU module. The scan time and activation timing of interlock signals may depend on the performance, specifications, and functions of the CPU module. After starting a system after replacement, check operations of the whole system first and then move to the actual operation.		-

[1] Applicable to the Q02UCPU, Q03UDCPU, Q04UDHCPU, Q06UDHCPU, Q13UDHCPU, and Q26UDHCPU if the serial number (first five digits) is "10101" or earlier.

4.2 Precautions for performance and specifications when the QnACPU is replaced

Table 4.2 Precautions for performance and specifications when the QnACPU is replaced

Item	Precautions	Replacement method	Reference
Program size	The program size for each CPU module is as follows: Q00UJCPU: 10K steps Q00UCPU: 10K steps Q01UCPU: 15K steps Q02UCPU: 20K steps Q03UD(E)CPU: 30K steps Q04UD(E)HCPU: 40K steps Q06UD(E)HCPU: 60K steps Q10UD(E)HCPU: 100K steps Q13UD(E)HCPU: 130K steps Q20UD(E)HCPU: 200K steps Q26UD(E)HCPU: 260K steps	Select a CPU module having enough size to store the programs used in the existing system.	Section 6.2 in the QCPU User's Manual (Hardware Design, Maintenance and Inspection)
Number of I/O points	The number of I/O points for each CPU module is as follows: Q00UJCPU: 256 points Q00UCPU, Q01UCPU: 1024 points Q02UCPU: 2048 points	Select a CPU module having the number of I/O points greater than or equal to that of the existing system.	
Program execution type	Low-speed execution type programs are not supported.	Use scan execution type programs or fixed scan execution type programs.	Section 2.10 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
	A program execution type cannot be changed by remote operation.	Use instructions for switching program execution types, such as PSTOP, POFF, and PSCAN.	Section 2.10.5 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
Latch setting	If latch ranges of internal user devices are specified, the processing time is added in proportion to the device points set to be latched. (For example, if 8K points are latched for the latch relay (L) with the QnUD(E)(H)CPU, the processing time is 28.6μs.)	The latch function of the Universal model QCPU is enhanced. (1) Large-capacity file register (R, ZR) (2) Writing/reading device data to the standard ROM (SP.DEVST and S(P).DEVLD instructions) (3) Latch range specification of internal devices Change the latch method to the method described in (1) to (3) above according to the application.	• Section 4.3 • Section 3.3 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
Interrupt program	Interrupt counter is not supported.	Check the numbers of executions for interrupt programs on the Interrupt program monitor list screen of GX Developer.	-
	The interrupt pointer (I32 to I40) for an error is not supported.	-	-
ZPUSH instruction	The number of index registers is increased to 20 for the Universal model QCPU. The area for saving the data in the index register with the ZPUSH instruction is increased as well.	Increase the save areas used for the ZPUSH instruction as needed.	Section 7.18.8 in the MELSEC-Q/L Programming Manual (Common Instruction)

Item	Precautions	Replacement method	Reference
File usability setting for each program	The following file usability setting for each program is not available.[*1] • File register • Initial device value • Comment	When file usability has been set, modify the program.	Section 2.10 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
SM/SD	Usage of a part of the special relay and special register is different.	Check the specifications of the special relay and special register and modify the program as needed.	Appendix 2 and Appendix 3 in the QCPU User's Manual (Hardware Design, Maintenance and Inspection)
	Use the Universal model QCPU whose serial number (first five digits) is "10102" or later when using the A series-compatible special relay and special register (SM1000 to SM1255/SD1000 to SD1255). When the Universal model QCPU whose serial number (first five digits) is "10101" or earlier is used, replace them with the Universal model QCPU-compatible special relay and special register by using the conversion function of a programming tool. Note, however, that the ones which are not compatible with the Universal model QCPU are replaced with SM1255 and SD1255. Modify programs as needed.	-	
Processing time	Scan time and other processing times are different.	Modify programs as needed, checking the processing timing.	-
Module service interval time read	The module service interval time cannot be read.	-	-
MC protocol (dedicated protocol)	The following frame types cannot be used when accessing the Universal model QCPU. [*2] • A-compatible 1C frame • A-compatible 1E frame	Use the frame types below. • QnA-compatible 2C/3C/4C frame • QnA-compatible 3E frame • 4E frame	MELSEC-Q/L MELSEC Communication Protocol Reference Manual
	The following commands cannot specify monitoring conditions. • Randomly reading data in units of word (Command: 0403) • Device memory monitoring (Command: 0801) The applicable frame types are as follows: • QnA-compatible 3C/4C frame • QnA-compatible 3E frame • 4E frame	-	
Error history	Error history data cannot be stored in the memory card.	The Universal model QCPU stores all storable data (up to 100) in the built-in memory.	Section 3.18 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
LED indication priority setting	LED indication priority cannot be set. Only LED indication setting at error occurrence is supported.	-	Section 3.20.2 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)

Item	Precautions	Replacement method	Reference
Monitor[*3]	The monitoring condition cannot be set.	Use the sampling trace function for checking device data under the specified monitoring condition. With this function, changes of the specified device data can be recorded at the following timings: • at the execution of the specified step • at the rising/falling edge of bit devices • when the value of word devices coincide with the setting value • at every specified time (settable range: 1ms to 5000ms)	Section 3.11.1 and 3.14 in the QnUCPU User's Manual (Function Explanation, Program Fundamentals)
Others	Specifications including the processing time of instructions and processing methods of timer and counter depend on the CPU module. The scan time and activation timing of interlock signals may depend on the performance, specifications, and functions of the CPU module. After starting a system after replacement, check operations of the whole system first and then move to the actual operation.		-

*1 The local device file usability setting is also not available for the Universal model QCPU if the serial number (first five digits) is "10011" or earlier.

*2 Applicable to the Q02UCPU, Q03UDCPU, Q04UDHCPU, Q06UDHCPU, Q13UDHCPU, and Q26UDHCPU if the serial number (first five digits) is "10101" or earlier.

*3 Applicable to the Q02UCPU, Q03UDCPU, Q04UDHCPU, Q06UDHCPU, Q13UDHCPU, and Q26UDHCPU if the serial number (first five digits) is "10041" or earlier.

4.3 Device latch function

The device latch function[*1] for the Universal model QCPU is more enhanced compared to that for the A/QnA (large type) series CPU.
This section describes the enhanced device latch function in the Universal model QCPU.

*1 The latch function is used to hold device data even when the CPU module is powered off or reset.

(1) Device data latch methods

Device data of the Universal model QCPU can be latched by:

- using a large-capacity file register (R, ZR),
- writing/reading device data to/from the standard ROM (with the SP.DEVST and S(P).DEVLD instructions), or
- specifying a latch range of internal user devices.

(2) Details of each latch method

(a) Large-capacity file registers (R, ZR)

File register size is larger and processing speed is higher in the Universal model QCPU, compared to the A/QnA (large type) series CPU.
To latch a lot of data (many device points), use of a file register is effective.

Table 4.3 shows capacities of file registers for each CPU module.

Table 4.3 File register size available for each CPU module

Model	File register (R, ZR) size in the standard RAM
Q00UCPU, Q01UCPU, and Q02UCPU	64K points
Q03UDCPU and Q03UDECPU	96K points
Q04UDHCPU and 04UDEHCPU	128K points
Q06UDHCPU and 06UDEHCPU	384K points
Q10UDHCPU, Q10UDEHCPU, Q13UDHCPU and Q13UDEHCPU	512K points
Q20UDHCPU, Q20UDEHCPU, Q26UDHCPU and Q26UDEHCPU	640K points

(b) Writing/reading device data to/from the standard ROM (SP.DEVST/S(P).DEVLD instructions)

Device data of the Universal model QCPU can be latched using the SP.DEVST and S (P).DEVLD instructions (instructions for writing/reading data to/from the standard ROM).
Utilizing the standard ROM allows data backup without batteries. This method is effective for latching data that will be updated less frequently.

(c) Specifying the latch range of internal user devices

Device data of the Universal model QCPU can be latched by specifying a latch range of internal user devices in the same way as for the A/QnA (large type) series CPU.
The ranges can be set in the Device tab of the PLC parameter dialog box.
Internal user devices that can be latched are as follows:

- Latch relay (L)
- Link relay (B)
- Annunciator (F)
- Edge relay (V)
- Timer (T)
- Retentive timer (ST)
- Counter (C)
- Data register (D)
- Link register (W)

POINT

- If latch ranges of internal user devices are specified in the Universal model QCPU, the processing time will increase in proportion to the points of the device to be latched. (For example, if 8K points are latched for the latch relay (L) with the QnUD(E)(H)CPU, the processing time is 28.6μs.)
  To shorten the scan time, remove unnecessary latch device points to minimize the latch range.
- The scan time will not increase when a latch range of the file register (R, ZR) is specified.

(3) How to shorten the scan time

When data to be latched are stored in a file register (R or ZR), the processing time is shorter than that for latching internal user device.

Example Reducing the latch points of the data register (D) from 8K points to 2K points, and using the file register (ZR) instead (when the Q06UDVCPU is used).

Table 4.4 Differences between before and after moving latch points of the data register (D) to the file register (ZR)

Item		Before	After
Latch points for data register (D)		8192 (8K) points	2048 (2K) points (6K points are moved to file register.)
Number of devices in the program	Data register (D) (Latch range)	400	100
	File register (ZR) (Standard RAM)	0	300
Additional scan time		0.37ms	0.11ms[*1]
Number of steps increased		-	300 steps

*1 Indicates the time required additionally when file register data are stored in the standard RAM.

REVISIONS

Version	Print Date	Revision
-	December 2009	First edition
A	July 2011	The descriptions of the reference manuals or the references have been changed in accordance with the composition changes of the manuals.
B	December 2011	Revision on the new functions of the Universal model QCPU whose serial number (first five digits) is "13102" or later.
C	December 2011	Precautions for using MELSECNET (II, /B) data link modules in Section 2.1 (1) (Table 2.1 and Example 2) are corrected.
D	July 2016	Descriptions are revised in accordance with the partial correction of the description in the Method of replacing High Performance model QCPU with Universal model QCPU [FA-A-0001].