

## CLOCK FB LIBRARY REFERENCE MANUAL

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## Reference Manual Revision History

Reference Manual Number	Date	Description
FBM-M048-A	2011/03/22	First edition

## 1. M+CPU-Clock\_CompareDateZone (Clock data term comparison)

**FB Name**

M+CPU-Clock\_CompareDateZone

### Function Overview

Item	Description					
Function overview	Compares two values (term) with the clock data, and outputs the comparison result to the bit devices.					
Symbol	<div style="text-align: center;"> <p>The diagram shows a central block labeled 'M+CPU-Clock_CompareDateZone'. On the left side, there are three inputs: 'Execution command' (B : FB_EN), 'Comparison lower limit clock data' (W : i_LowerLimit), and 'Comparison upper limit clock data' (W : i_UpperLimit). On the right side, there are seven outputs: 'Execution status' (FB_ENO : B), 'Completed without error' (FB_OK : B), 'Error flag' (FB_ERROR : B), 'Error code' (ERROR_ID : W), 'Comparison result (Lower limit &gt; Clock)' (o_Result_Lower : B), 'Comparison result (Lower limit ≤ Clock ≤ Upper limit)' (o_Result_In : B), and 'Comparison result (Clock &gt; Upper limit)' (o_Result_Upper : B). Below the diagram, it is noted that the block is not applicable for QCPU (A mode).</p> </div>					
Applicable hardware and software	<p>Hardware details</p> <table border="1" style="margin-left: 20px;"> <tr> <td rowspan="2">Q series</td> <td>High performance model</td> </tr> <tr> <td>Universal model</td> </tr> <tr> <td>L series</td> <td>LCPU</td> </tr> </table> <p>*Not applicable for QCPU (A mode)</p> <p>Compatible software: GX Works 2 Version 1.31H or later</p>	Q series	High performance model	Universal model	L series	LCPU
Q series	High performance model					
	Universal model					
L series	LCPU					
Programming language	Ladder					
Number of steps (maximum value)	<p>For high performance model CPU: 1191*</p> <p>*The value is the number of steps in the ladder program, and is therefore stated as a reference value. For details, refer to the GX Works2 Version1 Operation Manual (Simple Project).</p>					
Function description	<p>1) By turning ON FB_EN (Execution command), two values (term) and the clock data are compared and the comparison result is outputted to the bit devices.</p> <p>The clock data consists of “year, month, day, hour, minute, and second”.</p> <p>2) When the input value is out of range, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code).</p> <p>Refer to the error code explanation section for details.</p>					

Item	Description
Compiling method	Macro type
Restrictions and precautions	<p>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</p> <p>2) The FB cannot be used in an interrupt program.</p>
FB operation type	Pulsed execution (1 scan execution type)
Application example	Refer to Appendix - Application examples.
Timing chart	<p>•Operation of I/O signals</p> <p>[When operation completes without error]    [When an error occurs]</p> <p>The timing chart illustrates the execution of the FB. On the left, 'When operation completes without error', the FB_EN (Execution command) signal is active, followed by FB_ENO (Execution status) becoming active. The Comparison result signal is active, and FB_OK (Completed without error) is active. The ERROR_IDX (Error code) signal is 0. On the right, 'When an error occurs', the FB_EN signal is active, followed by FB_ENO becoming active. The Comparison result signal is active, and FB_ERROR (Error) is active. The ERROR_IDX (Error code) signal is 10-13 (Decimal).</p>
Relevant manual	MELSEC-Q/L Programming Manual (Common Instructions)

## Error codes

### ■ Error code list

Error code	Description
10	Each value of i_LowerLimit (Comparison lower limit clock data) is not valid. Please try again after confirming the setting.
11	Each value of i_UpperLimit (Comparison upper limit clock data) is not valid. Please try again after confirming the setting.
12	Each value of i_Check_Date (Clock data) is not valid. Please try again after confirming the setting.
13	The time in the comparison lower limit clock data is larger than that of the comparison upper limit clock data. Set them so that the comparison lower limit clock data is smaller than the comparison upper limit clock data, and try again.

## Labels

### ■ Input labels

Name	Variable name	Data type	Setting range	Description
Execution command	FB_EN	B	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Comparison lower limit clock data	i_LowerLimit	W	+0 Year (1980~2079) +1 Month (1~12) +2 Day (1~31) +3 Hour (0~23) +4 Minute (0~59) +5 Second (0~59)	Specify the lower limit clock data to be compared.
Comparison upper limit clock data	i_UpperLimit	W	Same as the comparison lower limit clock data	Specify the upper limit clock data to be compared.
Clock data	i_Check_Date	W	Same as the comparison lower limit clock data	Specify the clock data to be compared.

■ Output labels

Name	Variable name	Data type	Initial value	Description
Execution status	FB_ENO	B	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	B	OFF	When ON, it indicates that the processing is completed.
Error flag	FB_ERROR	B	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	W	0	FB error code output.
Comparison result (Lower limit > Clock)	o_Result_Lower	B	OFF	ON: Lower limit clock data > Clock data OFF: Other than above
Comparison result (Lower limit ≤ Clock ≤ Upper limit)	o_Result_In	B	OFF	ON: Lower clock data ≤ Clock data ≤ Upper limit clock data OFF: Other than above
Comparison result (Clock > Upper limit)	o_Result_Upper	B	OFF	ON: Clock data > Upper limit clock data OFF: Other than above

**Processing description**

1) The clock data consists of the following 6 words.

Device	Item	Setting range
+ 0	Year	1980 ~ 2079
+ 1	Month	1 ~ 12
+ 2	Day	1 ~ 31
+ 3	Hour	0 ~ 23
+ 4	Minute	0 ~ 59
+ 5	Second	0 ~ 59

2) The clock data is compared with the comparison lower clock data and comparison upper clock data, and the comparison result is stored in the comparison result.

3) The input date data is checked. (In the case of February, the FB checks for leap years and the date.) If the date data is not correct, an error code is stored.

## Version Upgrade History

Version	Date	Description
1.00A	2011/03/22	First edition

## Note

This chapter includes information related to the M+CPU-Clock\_CompareDateZone function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

Before using any Mitsubishi products, please read all the relevant manuals.

## 2. M+CPU-Clock\_HourMeter (Hour meter)

### FB Name

M+CPU-Clock\_HourMeter

### Function Overview

Item	Description					
Function overview	Allows specification of the time to turn ON, measures the time by second while the execution command is ON, outputs the measurement time by hour and by second (3599 or less).					
Symbol	<div style="text-align: center;"> <p>The diagram shows a central box labeled 'M+CPU-Clock_HourMeter'. On the left side, there are four inputs: 'Execution command' (B : FB_EN), 'Start condition' (B : i_Input_Data), 'Start time' (W : i_Check_Hour), and 'Start device No. of measurement time current value' (W : io_Current_Data). On the right side, there are five outputs: 'FB_ENO : B' (Execution status), 'FB_OK : B' (Completed without error), 'FB_ERROR : B' (Error flag), 'ERROR_ID : W' (Error code), and 'io_Current_Data : W' (Start device No. of measurement time current value). At the bottom right, there is an output 'o_Output_Data : B' (Output result).</p> </div>					
Applicable hardware and software	<p>Hardware details</p> <table border="1" style="margin-left: 20px;"> <tbody> <tr> <td rowspan="2">Q series</td> <td>High performance model</td> </tr> <tr> <td>Universal model</td> </tr> <tr> <td>L series</td> <td>LCPU</td> </tr> </tbody> </table> <p>*Not applicable for QCPU (A mode)</p> <p>Compatible software: GX Works 2 Version 1.31H or later</p>	Q series	High performance model	Universal model	L series	LCPU
Q series	High performance model					
	Universal model					
L series	LCPU					
Programming language	Ladder					
Number of steps (maximum value)	<p>For high performance model CPU: 239*</p> <p>*The value is the number of steps in the label program, and is therefore stated as a reference value. For details, refer to the GX Works2 Version1 Operation Manual (Simple Project).</p>					



Item	Description
Function description	<p>The following processing operations are performed.</p> <ol style="list-style-type: none"> <li>1) When FB_EN is turned OFF, the measurement time current value is cleared.</li> <li>2) When FB_EN (Execution command) is turned ON and when the start condition is ON, the measurement time current value is updated by second.</li> <li>3) If the measurement time current value reaches the start time, ON is set in the output result. If not, OFF is set.</li> <li>4) When the input value is out of range, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.</li> </ol>
Compiling method	Macro type
Restrictions and precautions	<ol style="list-style-type: none"> <li>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</li> <li>2) The FB cannot be used in an interrupt program.</li> </ol>
FB operation type	Real-time execution
Application example	Refer to Appendix - Application examples
Timing chart	<p>•Operation of I/O signals</p> <p>[When operation completes without error]      [When an error occurs]</p> <p>The timing chart illustrates the sequence of events for the FB. On the left, 'When operation completes without error', FB_EN (Execution command) transitions from OFF to ON. Simultaneously, i_Input_Data (Execution condition) becomes active. io_Current_Data (Measurement time) begins to increase from a 'Setting value' at a rate of '+1 second'. After 1 second, FB_OK (Completed without error) turns ON. Once the cycle ends, io_Current_Data is 'Clear' and FB_OK turns OFF. On the right, 'When an error occurs', FB_EN turns ON, but i_Input_Data is not active. This results in 'No processing' occurring. FB_ERROR (Error) turns ON, and ERROR_ID (Error code) is set to 10 (Decimal). After the error, FB_ERROR turns OFF and ERROR_ID returns to 0.</p>
Relevant manual	MELSEC-Q/L Programming Manual (Common Instructions)

## Error codes

### ■ Error code list

Error code	Description
10	i_Check_Hour (Start time) is not valid. Please try again after confirming the setting.

## Labels

### ■ Input labels

Name	Variable name	Data type	Setting range	Description
Execution command	FB_EN	B	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Start condition	i_Input_Data	B	ON, OFF	ON: Start measuring the time. OFF: Stop measuring the time.
Start time	i_Check_Hour	W	1~32767	Set the time in units of hours to turn ON the output result.
Start device No. of measurement time current value	io_Current_Data	W	Valid device range +0 Current (hour) +1 Current (Seconds less than one hour)	Set the start number of the devices which store the current hour and current second of the ON status.

### ■ Output labels

Name	Variable name	Data type	Initial value	Description
Execution status	FB_ENO	B	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	B	OFF	When ON, it indicates that the processing is completed.
Error flag	FB_ERROR	B	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	W	0	FB error code output.

Name	Variable name	Data type	Initial value	Description
Start device No. of measurement time current value	io_Current_Data	W	-	Set the same device as the measurement time current value of the input. The updated value of the measurement time is set. If the start time has elapsed, the current value is not updated.
Output result	o_Output_Data	B	OFF	ON: The duration of ON status of the start condition reaches the start time. OFF: Other than above

### Processing description

- 1) When the execution command (FB\_EN) is on the rising edge, the measurement time current value is cleared.
- 2) When the start condition is turned ON and the one second pulse is turned ON, "seconds less than one hour" of the measurement time is incremented.
- 3) When "seconds less than one hour" of the measurement time reaches 3600 seconds (1 hour), the "hour" of the measurement time is incremented.
- 4) When "hour" of the measurement time reaches the start time, ON is set in the output result. For other situations, OFF is set.

### Version Upgrade History

Version	Date	Description
1.00A	2011/03/22	First edition

### Note

This chapter includes information related to the M+CPU-Clock\_HourMeter function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

Before using any Mitsubishi products, please read all the relevant manuals.

### 3. M+CPU-Clock\_DHourMeter (32-bit hour meter)

#### FB Name

M+CPU-Clock\_DHourMeter

#### Function Overview

Item	Description					
Function overview	Allows specification of the time to turn ON, measures the time by second while the execution command is ON, outputs the measurement time by hour and by second (3599 or less).					
Symbol	<div style="text-align: center;"> <p>The diagram shows a central box labeled 'M+CPU-Clock_DHourMeter'. On the left side, there are four inputs: 'Execution command' (B : FB_EN), 'Start condition' (B : i_Input_Data), 'Start time' (D : i_Check_Hour), and 'Start device No. of measurement time current value' (D : io_Current_Data). On the right side, there are five outputs: 'FB_ENO : B' (Execution status), 'FB_OK : B' (Completed without error), 'FB_ERROR : B' (Error flag), 'ERROR_ID : W' (Error code), and 'io_Current_Data : D' (Start device No. of measurement time current value). Below these, there is an output 'o_Output_Data : B' (Output result).</p> </div>					
Applicable hardware and software	<p>Hardware details</p> <table border="1" style="margin-left: 20px;"> <tbody> <tr> <td rowspan="2">Q series</td> <td>High performance model</td> </tr> <tr> <td>Universal model</td> </tr> <tr> <td>L series</td> <td>LCPU</td> </tr> </tbody> </table> <p>*Not applicable for QCPU (A mode)</p> <p>Compatible software: GX Works 2 Version 1.31H or later</p>	Q series	High performance model	Universal model	L series	LCPU
Q series	High performance model					
	Universal model					
L series	LCPU					
Programming language	Ladder					
Number of steps (maximum value)	<p>For high performance model CPU: 247*</p> <p>*The value is the number of steps in the label program, and is therefore stated as a reference value. For details, refer to the GX Works2 Version1 Operation Manual (Simple Project).</p>					

Item	Description
Function description	<p>The following processing operations are performed.</p> <ol style="list-style-type: none"> <li>1) When FB_EN is turned OFF, the measurement time current value is cleared.</li> <li>2) When FB_EN (Execution command) is turned ON and when the start condition is ON, the measurement time current value is updated by second.</li> <li>3) If the measurement time current value reaches the start time, ON is set in the output result. If not, OFF is set.</li> <li>4) When the input value is out of range, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.</li> </ol>
Compiling method	Macro type
Restrictions and precautions	<ol style="list-style-type: none"> <li>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</li> <li>2) The FB cannot be used in an interrupt program.</li> </ol>
FB operation type	Real-time execution
Application example	Refer to Appendix - Application examples.
Timing chart	<p>•Operation of I/O signals</p> <p>[When operation completes without error]      [When an error occurs]</p> <p>The timing chart consists of two parts. The left part, titled '[When operation completes without error]', shows a sequence of events: FB_EN (Execution command) transitions from OFF to ON. Simultaneously, i_ Input Data (Execution condition) transitions from OFF to ON. The io_ Current_Data (Measurement time) signal shows a 'Setting value' followed by a '+1 second' delay, then 'Current value retain', and finally 'Clear'. FB_OK (Completed without error) transitions from OFF to ON. o_ Output_Data (Output result) transitions from OFF to ON. FB_ERROR (Error) remains OFF. ERROR_ID (Error code) remains 0. A vertical dashed line indicates 'Start time elapsed'. The right part, titled '[When an error occurs]', shows FB_EN transitioning from OFF to ON. i_ Input Data transitions from OFF to ON. However, io_ Current_Data shows 'No processing'. FB_OK transitions from OFF to ON. FB_ERROR transitions from OFF to ON. ERROR_ID transitions from 0 to 10 (Decimal) and then back to 0.</p>
Relevant manual	MELSEC-Q/L Programming Manual (Common Instructions)

## Error codes

### ■ Error code list

Error code	Description
10	<p>i_Check_Hour (Start time) is not valid.</p> <p>Please try again after confirming the setting.</p>

## Labels

### ■ Input labels

Name	Variable name	Data type	Setting range	Description
Execution command	FB_EN	B	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Start condition	i_Input_Data	B	ON, OFF	ON: Start measuring the time. OFF: Stop measuring the time.
Start time	i_Check_Hour	D	1~2147483647	Set the time in units of hours to turn ON the output result.
Measurement time current value	io_Current_Data	D	Valid device range +0 Current (hour) +2 Current (Seconds less than one hour)	Set the start number of the devices which store the current hour and current second of ON status.

### ■ Output labels

Name	Variable name	Data type	Initial value	Description
Execution status	FB_ENO	B	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	B	OFF	When ON, it indicates that the processing is completed.
Error flag	FB_ERROR	B	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	W	0	FB error code output.
Measurement time current value	io_Current_Data	D	-	Set the same device as the measurement time current value for the input. The updated value of the measurement time is set. If the start time has elapsed, the current value is not updated.

Name	Variable name	Data type	Initial value	Description
Output result	o_Output_Data	B	OFF	ON: The duration of ON status of the start condition reaches the start time. OFF: Other than above

### Processing description

- 1) When the execution command (FB\_EN) is on the rising edge, the measurement time current value is cleared.
- 2) When the start condition is turned ON and the one second pulse is turned ON, "seconds less than one hour" of the measurement time is incremented.
- 3) When "seconds less than one hour" of the measurement time reaches 3600 seconds (1 hour), the "hour" of the measurement time is incremented.
- 4) When "hour" of the measurement time reaches the start time, ON is set in the output result. For other situations, OFF is set.

### Version Upgrade History

Version	Date	Description
1.00A	2011/03/22	First edition

### Note

This chapter includes information related to the M+CPU-Clock\_DHourMeter function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

Before using any Mitsubishi products, please read all the relevant manuals.

#### 4. M+CPU-Clock\_GetDayOfWeek (Day of week data get)

### FB Name

M+CPU-Clock\_GetDayOfWeek

### Function Overview

Item	Description																				
Function overview	Obtains the day of the week data from year, month and day data.																				
Symbol	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: auto;"> <p style="text-align: center;">M+CPU-Clock_GetDayOfWeek</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; vertical-align: top;">                     Execution command ———                 </td> <td style="width: 30%; text-align: center;">B : FB_EN</td> <td style="width: 30%; text-align: center;">FB_ENO : B</td> <td style="width: 10%; vertical-align: top;">Execution status</td> </tr> <tr> <td style="vertical-align: top;">                     Start device No. of year, month, and day data ———                 </td> <td style="text-align: center;">W : i_Check_Date</td> <td style="text-align: center;">FB_OK : B</td> <td style="vertical-align: top;">Completed without error</td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">FB_ERROR : B</td> <td style="vertical-align: top;">Error flag</td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">ERROR_ID : W</td> <td style="vertical-align: top;">Error code</td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">o_DayOfWeek : W</td> <td style="vertical-align: top;">Day of week data</td> </tr> </table> </div>	Execution command ———	B : FB_EN	FB_ENO : B	Execution status	Start device No. of year, month, and day data ———	W : i_Check_Date	FB_OK : B	Completed without error			FB_ERROR : B	Error flag			ERROR_ID : W	Error code			o_DayOfWeek : W	Day of week data
Execution command ———	B : FB_EN	FB_ENO : B	Execution status																		
Start device No. of year, month, and day data ———	W : i_Check_Date	FB_OK : B	Completed without error																		
		FB_ERROR : B	Error flag																		
		ERROR_ID : W	Error code																		
		o_DayOfWeek : W	Day of week data																		
Applicable hardware and software	<p>Hardware details</p> <table border="1" style="margin-left: 20px;"> <tr> <td style="padding: 5px;">Q series</td> <td style="padding: 5px;">High performance model</td> </tr> <tr> <td></td> <td style="padding: 5px;">Universal model</td> </tr> <tr> <td style="padding: 5px;">L series</td> <td style="padding: 5px;">LCPU</td> </tr> </table> <p>*Not applicable for QCPU (A mode)</p> <p>Compatible software: GX Works 2 Version 1.31H or later</p>	Q series	High performance model		Universal model	L series	LCPU														
Q series	High performance model																				
	Universal model																				
L series	LCPU																				
Programming language	Ladder																				
Number of steps (maximum value)	<p>For high performance model CPU: 426*</p> <p>*The value is the number of steps in the ladder program, and is therefore stated as a reference value. For details, refer to the GX Works2 Version1 Operation Manual (Simple Project).</p>																				
Function description	<p>1) By turning ON FB_EN (Execution command), the day of week data is created from the year, month and day data.</p> <p style="padding-left: 20px;">A consideration is made for leap years.</p> <p>2) When the input value is out of range, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code).</p> <p style="padding-left: 20px;">Refer to the error code explanation section for details.</p>																				
Compiling method	Macro type																				



Item	Description
Restrictions and precautions	<p>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</p> <p>2) The FB cannot be used in an interrupt program.</p>
FB operation type	Pulsed execution (1 scan execution type)
Application example	Refer to Appendix - Application examples.
Timing chart	<p>•Operation of I/O signals</p> <p>[When operation completes without error]      [When an error occurs]</p> <p>The timing chart illustrates the execution of the FB under two conditions: successful completion and error occurrence. The signals shown are FB_EN (Execution command), FB_ENO (Execution status), DayOfWeek (Day of week data), FB_OK (Completed without error), FB_ERROR (Error), and ERRORJD (Error code). In the successful case, the DayOfWeek signal is active during 'No processing' and 'Refreshing' phases, and FB_OK is set to ON after the 'Refreshing' phase. In the error case, the DayOfWeek signal is active during 'No processing', and FB_ERROR is set to ON, with ERRORJD outputting a decimal value between 10 and 12.</p>
Relevant manual	MELSEC-Q/L Programming Manual (Common Instructions)

## Error codes

### ■ Error code list

Error code	Description
10	The specified year is not valid. Please try again after confirming the setting.
11	The specified month is not valid. Please try again after confirming the setting.
12	The specified day is not valid. (No problem with leap year day of February 29) Please try again after confirming the setting.

## Labels

### ■ Input labels

Name	Variable name	Data type	Setting range	Description
Execution command	FB_EN	B	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Start device No. of year, month, and day data	i_Check_Date	W	Valid device range +0 Year (1980~2047) +1 Month (1~12) +2 Day (1~31)	Store the start number of devices that store year, month and day data, which is used to confirm the day of the week.

### ■ Output labels

Name	Variable name	Data type	Initial value	Description
Execution status	FB_ENO	B	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	B	OFF	When ON, it indicates that the processing is completed.
Error flag	FB_ERROR	B	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	W	0	FB error code output.
Day of week data	o_DayOfWeek	W	0	Store the day of the week data. 0: Sunday 1: Monday 2: Tuesday 3: Wednesday 4: Thursday 5: Friday 6: Saturday

## Processing description

- 1) The input year, month, and day data are checked. (In the case of February, the FB checks for leap years and the date.)
- 2) The date of the week is obtained based on Zeller's congruence.  
$$(Y+Y/4-Y/100+Y/400+(13*M+8)/5+D)\%7$$

Y=Year of the date data  
M=Month of the date data (January is considered as 13th month of the previous year, February is considered as 14th month of the previous year)  
D=Day of the date data
- 3) The remainder of the calculation above is stored as the date of the week.

## Version Upgrade History

Version	Date	Description
1.00A	2011/03/22	First edition

## Note

This chapter includes information related to the M+CPU-Clock\_GetDayOfWeek function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

Before using any Mitsubishi products, please read all the relevant manuals.

## 5. M+CPU-Clock\_GetLastDayOfMonth (Last day of month get)

### FB Name

M+CPU-Clock\_GetLastDayOfMonth

### Function Overview

Item	Description																				
Function overview	Obtains the last day data of the corresponding month from the year and month data.																				
Symbol	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: auto;"> <p style="text-align: center; margin: 0;">M+CPU-Clock_GetLastDayOfMonth</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; vertical-align: top;">                     Execution command ———                 </td> <td style="width: 30%; vertical-align: top;">B : FB_EN</td> <td style="width: 30%; vertical-align: top;">FB_ENO : B</td> <td style="width: 10%; vertical-align: top;">— Execution status</td> </tr> <tr> <td style="vertical-align: top;">                     Start device No. of year and month data ———                 </td> <td style="vertical-align: top;">W : i_Check_Date</td> <td style="vertical-align: top;">FB_OK : B</td> <td style="vertical-align: top;">— Completed without error</td> </tr> <tr> <td></td> <td></td> <td style="vertical-align: top;">FB_ERROR : B</td> <td style="vertical-align: top;">— Error flag</td> </tr> <tr> <td></td> <td></td> <td style="vertical-align: top;">ERROR_ID : W</td> <td style="vertical-align: top;">— Error code</td> </tr> <tr> <td></td> <td></td> <td style="vertical-align: top;">o_EndDay : W</td> <td style="vertical-align: top;">— Last day of month data</td> </tr> </table> </div>	Execution command ———	B : FB_EN	FB_ENO : B	— Execution status	Start device No. of year and month data ———	W : i_Check_Date	FB_OK : B	— Completed without error			FB_ERROR : B	— Error flag			ERROR_ID : W	— Error code			o_EndDay : W	— Last day of month data
Execution command ———	B : FB_EN	FB_ENO : B	— Execution status																		
Start device No. of year and month data ———	W : i_Check_Date	FB_OK : B	— Completed without error																		
		FB_ERROR : B	— Error flag																		
		ERROR_ID : W	— Error code																		
		o_EndDay : W	— Last day of month data																		
Applicable hardware and software	<p>Hardware details</p> <table border="1" style="margin-left: 20px;"> <tr> <td style="width: 20%;">Q series</td> <td>High performance model</td> </tr> <tr> <td></td> <td>Universal model</td> </tr> <tr> <td>L series</td> <td>LCPU</td> </tr> </table> <p>*Not applicable for QCPU (A mode)</p> <p>Compatible software: GX Works 2 Version 1.31H or later</p>	Q series	High performance model		Universal model	L series	LCPU														
Q series	High performance model																				
	Universal model																				
L series	LCPU																				
Programming language	Ladder																				
Number of steps (maximum value)	<p>For high performance model CPU: 337*</p> <p>*The value is the number of steps in the ladder program, and is therefore stated as a reference value. For details, refer to the GX Works2 Version1 Operation Manual (Simple Project).</p>																				
Function description	<p>1) By turning ON FB_EN (Execution command), the last day data of the month is created from the year and month data.</p> <p>2) When the input value is out of range, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.</p>																				
Compiling method	Macro type																				

Item	Description
Restrictions and precautions	<p>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</p> <p>2) The FB cannot be used in an interrupt program.</p>
FB operation type	Pulsed execution (1 scan execution type)
Application example	Refer to Appendix - Application examples.
Timing chart	<p>•Operation of I/O signals</p> <p>[When operation completes without error]    [When an error occurs]</p>
Relevant manual	MELSEC-Q/L Programming Manual (Common Instructions)

## Error codes

### ■ Error code list

Error code	Description
10	The specified year is not valid. Please try again after confirming the setting.
11	The specified month is not valid. Please try again after confirming the setting.

## Labels

### Input labels

Name	Variable name	Data type	Setting range	Description
Execution command	FB_EN	B	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Start device No. of year and month data	i_Check_Date	D	Valid device range +0 Year (1980~2047) +1 Month (1~12)	Store the start number of devices that store the date data to confirm the last day of the month.

### Output labels

Name	Variable name	Data type	Initial value	Description
Execution status	FB_ENO	B	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	B	OFF	When ON, it indicates that the processing is completed.
Error flag	FB_ERROR	B	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	W	0	FB error code output.
Last day of month data	o_EndDay	W	0	Store the last day data of the month.

## Processing description

- 1) The input year and month data are checked.
- 2) The last day of the specified month is calculated.
  - January/March/May/July/August/October/December: 31
  - February: 28 (Except leap year), 29 (leap year)
  - April/June/September/November: 30

## Version Upgrade History

Version	日付	Description
1.00A	2011/03/22	First edition

## Note

This chapter includes information related to the M+CPU-Clock\_GetLastDayOfMonth function block. It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

Before using any Mitsubishi products, please read all the relevant manuals.

## 6. M+CPU-Clock\_WeeklyTimer (Weekly timer)

### FB Name

M+CPU-Clock\_WeeklyTimer

### Function Overview

Item	Description					
Function overview	Provides a weekly timer that allows registration of the time for each day of the week regarding when to turn ON/OFF the given contact.					
Symbol	<div style="text-align: center;"> <p style="text-align: center;">M+CPU-Clock_WeeklyTimer</p> <p>Execution command — B : FB_EN                      FB_ENO : B — Execution status</p> <p>Start device No. of Sunday ON/OFF time — W : i_Sunday                      FB_OK : B — Completed without error</p> <p>Start device No. of Monday ON/OFF time — W : i_Monday                      FB_ERROR : B — Error flag</p> <p>Start device No. of Tuesday ON/OFF time — W : i_Tuesday                      ERROR_ID : W — Error code</p> <p>Start device No. of Wednesday ON/OFF time — W : i_Wednesday                      o_OutPut : B — Control contact output</p> <p>Start device No. of Thursday ON/OFF time — W : i_Thursday</p> <p>Start device No. of Friday ON/OFF time — W : i_Friday</p> <p>Start device No. of Saturday ON/OFF time — W : i_Saturday</p> <p>Each day of week enable/disable setting — W : i_Enable_Disable</p> </div>					
Applicable hardware and software	<p>Hardware details</p> <table border="1" style="width: 100%;"> <tr> <td rowspan="2" style="width: 30%;">Q series</td> <td>High performance model</td> </tr> <tr> <td>Universal model</td> </tr> <tr> <td>L series</td> <td>LCPU</td> </tr> </table> <p>*Not applicable for QCPU (A mode)</p> <p>Compatible software: GX Works 2 Version 1.31H or later</p>	Q series	High performance model	Universal model	L series	LCPU
Q series	High performance model					
	Universal model					
L series	LCPU					
Programming language	Ladder					
Number of steps (maximum value)	<p>For high performance model CPU: 1248*</p> <p>*The value is the number of steps in the label program, and is therefore stated as a reference value. For details, refer to the GX Works2 Version1 Operation Manual (Simple Project).</p>					



Item	Description
Function description	<p>By turning ON FB_EN (Execution command), the following processing operations are performed continuously.</p> <ol style="list-style-type: none"> <li>1) The clock data is read.</li> <li>2) When the enable/disable setting of the corresponding day of the week is ON. <ul style="list-style-type: none"> <li>Current time <math>\geq</math> Hour and minute to turn ON: Control contact output = ON</li> <li>Current time <math>\geq</math> Hour and minute to turn OFF: Control contact output = OFF</li> </ul> </li> <li>3) No processing is performed when the enable/disable setting of the corresponding day of the week is OFF.</li> <li>4) If the control contact output remains ON until the following day, the control contact output remains ON.</li> <li>5) The input data is checked only when FB_EN is turned ON from OFF.</li> <li>6) The time to turn ON must be smaller than the time to turn OFF.</li> <li>7) When the input value is out of range, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.</li> </ol>
Compiling method	Macro type
Restrictions and precautions	<ol style="list-style-type: none"> <li>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</li> <li>2) The FB cannot be used in an interrupt program.</li> <li>3) If the hour and minute data to turn ON and the hour and minute data to turn OFF are the same, the priority is given to the hour and minute data to turn OFF.</li> <li>4) Set the time to turn ON/OFF using 24-hour clock (0:00 to 23:59) rather than AM/PM.</li> <li>5) Set the time to turn ON/OFF in BCD format. (Example: For 13:40, enter H1340.)</li> <li>6) It is not possible to set ON or OFF only. Make sure to set the time for both ON and OFF.</li> <li>7) This FB uses index registers Z9 and Z8. Please do not use these index registers in an interrupt program.</li> </ol>
FB operation type	Real-time execution
Application example	Refer to Appendix - Application examples.

Item	Description
Timing chart	<p>•Operation of I/O signals</p> <p>[When operation completes without error]      [When an error occurs]</p>
Relevant manual	MELSEC-Q/L Programming Manual (Common Instructions)

## Error codes

### ■ Error code list

Error code	Description
10	The hour and minute to turn ON on Sunday are not valid. Please try again after confirming the setting.
11	The hour and minute to turn OFF on Sunday are not valid. Please try again after confirming the setting.
12	The hour and minute to turn ON on Monday are not valid. Please try again after confirming the setting.
13	The hour and minute to turn OFF on Monday are not valid. Please try again after confirming the setting.
14	The hour and minute to turn ON on Tuesday are not valid. Please try again after confirming the setting.
15	The hour and minute to turn OFF on Tuesday are not valid. Please try again after confirming the setting.
16	The hour and minute to turn ON on Wednesday are not valid. Please try again after confirming the setting.
17	The hour and minute to turn OFF on Wednesday are not valid. Please try again after confirming the setting.
18	The hour and minute to turn ON on Thursday are not valid. Please try again after confirming the setting.

Error code	Description
19	The hour and minute to turn OFF on Thursday are not valid. Please try again after confirming the setting.
20	The hour and minute to turn ON on Friday are not valid. Please try again after confirming the setting.
21	The hour and minute to turn OFF on Friday are not valid. Please try again after confirming the setting.
22	The hour and minute to turn ON on Saturday are not valid. Please try again after confirming the setting.
23	The hour and minute to turn OFF on Saturday are not valid. Please try again after confirming the setting.
24	The time to turn ON is larger than the time to turn OFF. Please try again after confirming the setting.

## Labels

### ■ Input labels

Name	Variable name	Data type	Setting range	Description
Execution command	FB_EN	B	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Start device No. of Sunday ON/OFF time	i_Sunday	W	Valid device range	Set the start device of the ON/OFF time for Sunday. Set the hour (0~23) for the upper 8 bits of the specified device and minute (0~59) for the lower 8 bits in BCD. +0 Hour and minute to turn ON +1 Hour and minute to turn OFF
Start device No. of Monday ON/OFF time	i_Monday	W	Same as above	Set the start device of the ON/OFF time for Monday. Set the hour (0~23) for the upper 8 bits of the specified device and minute (0~59) for the lower 8 bits in BCD. +0 Hour and minute to turn ON +1 Hour and minute to turn OFF

Name	Variable name	Data type	Setting range	Description
Start device No. of Tuesday ON/OFF time	i_Tuesday	W	Same as above	Set the start device of the ON/OFF time for Tuesday. Set the hour (0~23) for the upper 8 bits of the specified device and minute (0~59) for the lower 8 bits in BCD. +0 Hour and minute to turn ON +1 Hour and minute to turn OFF
Start device No. of Wednesday ON/OFF time	i_Wednesday	W	Same as above	Set the start device of the ON/OFF time for Wednesday. Set the hour (0~23) for the upper 8 bits of the specified device and minute (0~59) for the lower 8 bits in BCD. +0 Hour and minute to turn ON +1 Hour and minute to turn OFF
Start device No. of Thursday ON/OFF time	i_Thursday	W	Same as above	Set the start device of the ON/OFF time for Thursday. Set the hour (0~23) for the upper 8 bits of the specified device and minute (0~59) for the lower 8 bits in BCD. +0 Hour and minute to turn ON +1 Hour and minute to turn OFF
Start device No. of Friday ON/OFF time	i_Friday	W	Same as above	Set the start device of the ON/OFF time for Friday. Set the hour (0~23) for the upper 8 bits of the specified device and minute (0~59) for the lower 8 bits in BCD. +0 Hour and minute to turn ON +1 Hour and minute to turn OFF

Name	Variable name	Data type	Setting range	Description
Start device No. of Saturday ON/OFF time	i_Saturday	W	Same as above	Set the start device of the ON/OFF time for Saturday. Set the hour (0~23) for the upper 8 bits of the specified device and minute (0~59) for the lower 8 bits in BCD. +0 Hour and minute to turn ON +1 Hour and minute to turn OFF
Each day of week enable/disable setting	i_Enable_Disable	W	ON: Enabled OFF: Disabled	Set the enable/disable setting for each day of the week. B0: Sunday B1: Monday B2: Tuesday B3: Wednesday B4: Thursday B5: Friday B6: Saturday

#### ■ Output labels

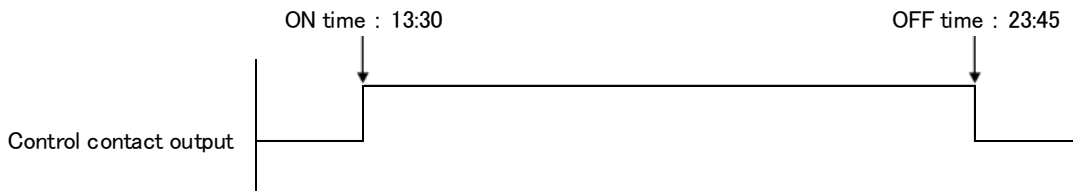
Name	Variable name	Data type	Initial value	Description
Execution status	FB_ENO	B	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	B	OFF	When ON, it indicates that the processing is completed.
Error flag	FB_ERROR	B	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	W	0	FB error code output.
Control contact output	o_OutPut	B	0	Return the result of the output control.

#### Processing description

- 1) When FB\_EN is turned ON from OFF, the input data is checked. If there is an error, the result is outputted to FB\_ERROR. If the data is valid, the input setting data is put in the internal variable.
  - 2) The clock data (DATERD) is read.
  - 3) When the enable/disable setting of the corresponding day of the week is turned ON, the current time is compared with the set hour and minute data of the corresponding day of the week (internal variable).
    - When ON time < OFF time
- Current time ≥ ON hour and minute AND Current time ≤ OFF hour and minute → Control contact output=ON

Operation details 1:

- To set the time (13:30) to turn ON on Sunday for D0 → Set 1330H (4912<sup>Decimal</sup>) for D0  
To set the time (23:45) to turn OFF on Sunday for D10 → Set 2345H (9029<sup>Decimal</sup>) for D10  
To set the data used to enable Sunday for D20 → Set 1 for D20



### Version Upgrade History

Version	Date	Description
1.00A	2011/03/22	First edition

### Note

This chapter includes information related to the M+CPU-Clock\_WeeklyTimer function block.  
It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

Before using any Mitsubishi products, please read all the relevant manuals.

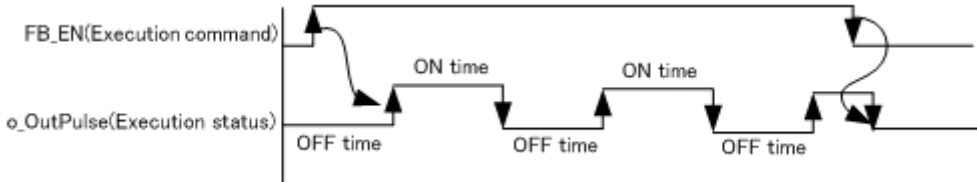
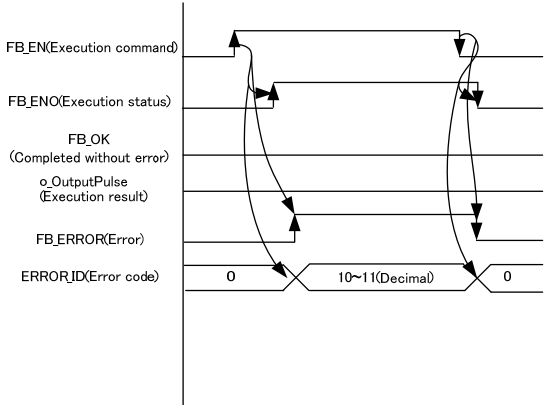
## 7. M+CPU-Clock\_MakeClockPulse (Clock pulse generation)

### FB Name

M+CPU-Clock\_MakeClockPulse

### Function Overview

Item	Description					
Function overview	Generates the clock pulse for which ON time and OFF time are specified, and outputs in FB_ENO.					
Symbol	<div style="text-align: center;"> </div>					
Applicable hardware and software	<p>Hardware details</p> <table border="1" style="margin-left: 20px;"> <tr> <td rowspan="2">Q series</td> <td>High performance model</td> </tr> <tr> <td>Universal model</td> </tr> <tr> <td>L series</td> <td>LCPU</td> </tr> </table> <p>*Not applicable for QCPU (A mode)</p> <p>Compatible software: GX Works 2 Version 1.31H or later</p>	Q series	High performance model	Universal model	L series	LCPU
Q series	High performance model					
	Universal model					
L series	LCPU					
Programming language	Ladder					
Number of steps (maximum value)	<p>For high performance model CPU: 216*</p> <p>*The value is the number of steps in the label program, and is therefore stated as a reference value. For details, refer to the GX Works2 Version1 Operation Manual (Simple Project).</p>					
Function description	<p>By turning ON FB_EN (Execution command), the following processing operations are repeated.</p> <p>1) o_OutPulse is turned OFF during “OFF time (units of 100 ms)”.</p> <p>2) o_OutPulse is turned ON during “ON time (units of 100 ms)”.</p>					
Compiling method	Macro type					

Item	Description
Restrictions and precautions	<p>1) Timers are used in this FB inside. Timers can only be used in the FB inside and two timers are used: one for ON time, and the other for OFF time. (The timer devices to be used are assigned automatically)</p> <p>2) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</p> <p>3) The FB cannot be used in an interrupt program.</p>
FB operation type	Real-time execution
Application example	Refer to Appendix - Application examples.
Timing chart	<p>•Operation of I/O signals</p> <p>[When operation completes without error]</p>  <p>[When an error occurs]</p> 
Relevant manual	MELSEC-Q/L Programming Manual (Common Instructions)



## Error codes

### Error code list

Error code	Description
10	The ON time is not valid. Please try again after confirming the setting.
11	The OFF time is not valid. Please try again after confirming the setting.

## Labels

### Input labels

Name	Variable name	Data type	Setting range	Description
Execution command	FB_EN	B	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
ON time (units of 100 ms)	i_OnTime	W	1~32767	Set the ON time of the pulse in the units of 100 msec.
OFF time (units of 100ms)	i_OffTime	W	1~32767	Set the OFF time of the pulse in the units of 100 msec.

### Output labels

Name	Variable name	Data type	Initial value	Description
Execution status	FB_ENO	B	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	B	OFF	When ON, it indicates that the processing is completed.
Error flag	FB_ERROR	B	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	W	0	FB error code output.
Pulse output status	o_OutPulse	B	OFF	ON: During ON time OFF: During OFF time

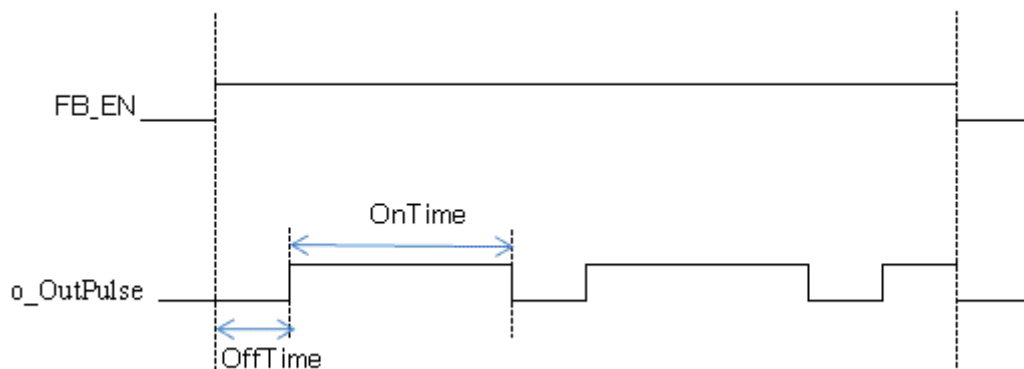
## Processing description

1) When FB\_EN (Execution command) is turned ON, the execution status of each timer is outputted to FB\_ENO.

During "OFF time" (units of 100 ms): o\_OutPulse=OFF

During "ON time" (units of 100 ms): o\_OutPulse =ON

2) When FB\_EN (Execution command) is turned OFF, OFF is outputted to FB\_ENO



## Version Upgrade History

Version	Date	Description
1.00A	2011/03/22	First edition

## Note

This chapter includes information related to the M+CPU-Clock\_MakeClockPulse function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

Before using any Mitsubishi products, please read all the relevant manuals.

## 8. M+CPU-Clock\_CnvCalenderToSec (Seconds elapsed conversion)

**FB Name**

M+CPU-Clock\_CnvCalenderToSec

### Function Overview

Item	Description																				
Function overview	Converts the number of seconds elapsed since 00:00:00 Jan/01/1980 to the date data.																				
Symbol	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: auto;"> <p style="text-align: center; margin: 0;">M+CPU-Clock_CnvCalenderToSec</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; border: none;">Execution command</td> <td style="width: 30%; border: none;">B : FB_EN</td> <td style="width: 30%; border: none;">FB_ENO : B</td> <td style="width: 10%; border: none;">Execution status</td> </tr> <tr> <td style="border: none;">Start device No. of date data</td> <td style="border: none;">W : i_Src_Date</td> <td style="border: none;">FB_OK : B</td> <td style="border: none;">Completed without error</td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;">FB_ERROR : B</td> <td style="border: none;">Error flag</td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;">ERROR_ID : W</td> <td style="border: none;">Error code</td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;">o_Result_Second : D</td> <td style="border: none;">Seconds elapsed data</td> </tr> </table> </div>	Execution command	B : FB_EN	FB_ENO : B	Execution status	Start device No. of date data	W : i_Src_Date	FB_OK : B	Completed without error			FB_ERROR : B	Error flag			ERROR_ID : W	Error code			o_Result_Second : D	Seconds elapsed data
Execution command	B : FB_EN	FB_ENO : B	Execution status																		
Start device No. of date data	W : i_Src_Date	FB_OK : B	Completed without error																		
		FB_ERROR : B	Error flag																		
		ERROR_ID : W	Error code																		
		o_Result_Second : D	Seconds elapsed data																		
Applicable hardware and software	<p>Hardware details</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Q series</td> <td>High performance model</td> </tr> <tr> <td></td> <td>Universal model</td> </tr> <tr> <td>L series</td> <td>LCPU</td> </tr> </table> <p>*Not applicable for QCPU (A mode)</p> <p>Compatible software: GX Works 2 Version 1.31H or later</p>	Q series	High performance model		Universal model	L series	LCPU														
Q series	High performance model																				
	Universal model																				
L series	LCPU																				
Programming language	Ladder																				
Number of steps (maximum value)	<p>For high performance model CPU: 641*</p> <p>*The value is the number of steps in the label program, and is therefore stated as a reference value. For details, refer to the GX Works2 Version1 Operation Manual (Simple Project).</p>																				

Item	Description
Function description	<p>By turning ON FB_EN, the following processing operations are performed.</p> <ol style="list-style-type: none"> <li>1) The total number of days since Jan/1/1980 to the date data is calculated.</li> <li>2) The total number of seconds is calculated from the total number of days. (total number of days* 24*60*60)</li> <li>3) The total number of seconds from 00:00:00 is calculated.</li> <li>4) 2)+3) is considered the total number of seconds.</li> <li>5) When the input value is out of range, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.</li> </ol>
Compiling method	Macro type
Restrictions and precautions	<ol style="list-style-type: none"> <li>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</li> <li>2) The FB cannot be used in an interrupt program.</li> <li>3) The data type of the number of seconds elapsed is double word (32 bits). Therefore, the date data after 23:59:59 Dec/31/ 2047 cannot be converted.</li> <li>4) This FB uses index register Z9. Please do not use this index register in an interrupt program.</li> </ol>
FB operation type	Pulsed execution (1 scan execution type)
Application example	Refer to Appendix - Application examples.
Timing chart	<p>•Operation of I/O signals</p> <p>[When operation completes without error]      [When an error occurs]</p> <p>The timing chart illustrates the state of various signals during the execution of the FB. It is divided into two parts: successful completion and error occurrence.</p> <ul style="list-style-type: none"> <li><b>Successful Completion:</b> When FB_EN (Execution command) is turned ON, FB_ENO (Execution status) turns ON. The o_Result_Second (Seconds elapsed data) signal shows a period of 'No processing', followed by 'Refreshing', and then another 'No processing' period. FB_OK (Completed without error) turns ON at the end of the refreshing period. FB_ERROR (Error) remains OFF, and ERROR_ID (Error code) is 0.</li> <li><b>Error Occurrence:</b> When FB_EN is turned ON, FB_ENO turns ON. The o_Result_Second signal shows a period of 'No processing'. FB_OK turns ON, but FB_ERROR turns ON shortly after. ERROR_ID (Error code) changes from 0 to a value between 10 and 15 (Decimal).</li> </ul>
Relevant manual	MELSEC-Q/L Programming Manual (Common Instructions)

## Error codes

### ■ Error code list

Error code	Description
10	The year of the date data is not valid. Please try again after confirming the setting.
11	The month of the date data is not valid. Please try again after confirming the setting.
12	The day of the date data is not valid. Please try again after confirming the setting.
13	The hour of the date data is not valid. Please try again after confirming the setting.
14	The minute of the date data is not valid. Please try again after confirming the setting.
15	The second of the date data is not valid. Please try again after confirming the setting.

## Labels

### ■ Input labels

Name	Variable name	Data type	Setting range	Description
Execution command	FB_EN	B	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Start device No. of date data	i_Src_Date	W	Valid device range	Set the start word device that stores the date data, or conversion source. Use 6 words of devices. +0 Year (1980~2047) +1 Month (1~12) +2 Day (1~31) +3 Hour (0~23) +4 Minute (0~59) +5 Second (0~59)

## ■ Output labels

Name	Variable name	Data type	Initial value	Description
Execution status	FB_ENO	B	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	B	OFF	When ON, it indicates that the processing is completed.
Error flag	FB_ERROR	B	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	W	0	FB error code output.
Seconds elapsed data	o_Result_Second	D	0	Return the calculated total number of seconds.

## Processing description

1) The total number of days since Jan/1/ 1980 is calculated.

The total number of days= $((Y-1)*365)+(Y/4-Y/100+Y/400)+(M-\text{No. of days to 1})+D)-722815$

Yet, if M is January or February when it is a leap year, 1 must be subtracted from the total number of days.

Y: set year, M: set month, D: set day

722815=the total number of days since Jan/1/1980

2) The total number of days is converted into seconds.

The total number of days/seconds= The total number of days\*24\*60\*60

3) The hours, minutes and seconds of the set date are converted into seconds.

Seconds=set hour\*60\*60+set minute\*60+set seconds

4) Set 2) + 3) in the seconds elapsed.

## Version Upgrade History

Version	Date	Description
1.00A	2011/03/22	First edition

## Note

This chapter includes information related to the M+CPU-Clock\_CnvCalenderToSec function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

Before using any Mitsubishi products, please read all the relevant manuals.

## 9. M+CPU-Clock\_CnvSecToCalender (Year-month-day conversion)

### FB Name

M+CPU-Clock\_CnvSecToCalender

### Function Overview

Item	Description																				
Function overview	Converts the number of seconds elapsed since 00:00:00 Jan/1/1980 into date data.																				
Symbol	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: auto;"> <p style="text-align: center; margin: 0;">M+CPU-Clock_CnvSecToCalender</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">Execution command</td> <td style="width: 30%; padding: 5px;">B : FB_EN</td> <td style="width: 30%; padding: 5px;">FB_ENO : B</td> <td style="width: 10%; padding: 5px;">Execution status</td> </tr> <tr> <td style="padding: 5px;">Seconds elapsed data</td> <td style="padding: 5px;">D : i_Src_Second</td> <td style="padding: 5px;">FB_OK : B</td> <td style="padding: 5px;">Completed without error</td> </tr> <tr> <td></td> <td></td> <td style="padding: 5px;">FB_ERROR : B</td> <td style="padding: 5px;">Error flag</td> </tr> <tr> <td></td> <td></td> <td style="padding: 5px;">ERROR_ID : W</td> <td style="padding: 5px;">Error code</td> </tr> <tr> <td></td> <td></td> <td style="padding: 5px;">o_Result_Date : W</td> <td style="padding: 5px;">Start device No. of date data</td> </tr> </table> </div>	Execution command	B : FB_EN	FB_ENO : B	Execution status	Seconds elapsed data	D : i_Src_Second	FB_OK : B	Completed without error			FB_ERROR : B	Error flag			ERROR_ID : W	Error code			o_Result_Date : W	Start device No. of date data
Execution command	B : FB_EN	FB_ENO : B	Execution status																		
Seconds elapsed data	D : i_Src_Second	FB_OK : B	Completed without error																		
		FB_ERROR : B	Error flag																		
		ERROR_ID : W	Error code																		
		o_Result_Date : W	Start device No. of date data																		
Applicable hardware and software	<p>Hardware details</p> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Q series</td> <td style="padding: 5px;">High performance model</td> </tr> <tr> <td></td> <td style="padding: 5px;">Universal model</td> </tr> <tr> <td style="padding: 5px;">L series</td> <td style="padding: 5px;">LCPU</td> </tr> </table> <p>*Not applicable for QCPU (A mode)</p> <p>Compatible software: GX Works 2 Version 1.31H or later</p>	Q series	High performance model		Universal model	L series	LCPU														
Q series	High performance model																				
	Universal model																				
L series	LCPU																				
Programming language	Ladder																				
Number of steps (maximum value)	<p>For high performance model CPU: 987*</p> <p>*The value is the number of steps in the label program, and is therefore stated as a reference value. For details, refer to the GX Works2 Version1 Operation Manual (Simple Project).</p>																				

Item	Description
Function description	<p>By turning ON FB_EN (Execution command), the following processing operations are performed.</p> <ol style="list-style-type: none"> <li>1) The number of seconds elapsed is converted into the number of days elapsed and number of hours, minutes and seconds elapsed.</li> <li>2) The number of hours, minutes and seconds elapsed is converted into hours, minutes and seconds data.</li> <li>3) The number of days elapsed is converted into year, month and day data.</li> <li>4) When the input value is out of range, the FB_ERROR output turns ON, processing is interrupted, and the error code is stored in ERROR_ID (Error code). Refer to the error code explanation section for details.</li> </ol>
Compiling method	Macro type
Restrictions and precautions	<ol style="list-style-type: none"> <li>1) The FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.</li> <li>2) The FB cannot be used in an interrupt program.</li> <li>3) This FB uses index register Z9. Please do not use this index register in an interrupt program.</li> </ol>
FB operation type	Pulsed execution (1 scan execution type)
Application example	Refer to Appendix - Application examples.
Timing chart	<p>•Operation of I/O signals</p> <p>[When operation completes without error]      [When an error occurs]</p>
Relevant manual	MELSEC-Q/L Programming Manual (Common Instructions)

## Error codes

### ■ Error code list

Error code	Description
10	<p>i_Src_Second (Seconds elapsed data) is not valid. Please try again after confirming the setting.</p>



## Labels

### ■ Input labels

Name	Variable name	Data type	Setting range	Description
Execution command	FB_EN	B	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
Seconds elapsed data	i_Src_Second	D	0~2147483647	Set the number of seconds elapsed since 00:00:00 Jan/1/1980.

### ■ Output labels

Name	Variable name	Data type	Initial value	Description
Execution status	FB_ENO	B	OFF	ON: Execution command is ON. OFF: Execution command is OFF.
Completed without error	FB_OK	B	OFF	When ON, it indicates that the processing is completed.
Error flag	FB_ERROR	B	OFF	When ON, it indicates that an error has occurred.
Error code	ERROR_ID	W	0	FB error code output.
Start device No. of date data	o_Result_Date	W	0	Store the converted date data in the devices starting from the specified start device. +0 Year (1980~2048) +1 Month (1~12) +2 Day (1~31) +3 Hour (0~23) +4 Minute (0~59) +5 Second (0~59)

## Processing description

- 1) The number of seconds elapsed is converted into the number of days elapsed and the number of hours, minutes and seconds elapsed.

$\text{Seconds elapsed} / 24 * 60 * 60$ , Quotient=Days elapsed, Remainder= Hours, minutes and seconds elapsed

- 2) The number of hours, minutes and seconds elapsed is converted into hours, minutes and seconds.

Hours=the number of hours, minutes and seconds elapsed/ $60 * 60$

Minutes=(the number of hours, minutes and seconds elapsed-hours\* $60 * 60$ )/60

Seconds=remainder of (the number of hours, minutes and seconds elapsed-hours\* $60 * 60$ )/60

- 3) The number of days elapsed is converted into year, month and day.

## Version Upgrade History

Version	Date	Description
1.00A	2011/03/22	First edition

## Note

This chapter includes information related to the M+CPU-Clock\_CnvSecToCalender function block.

It does not include information on restrictions of use such as combination with modules or programmable controller CPUs.

Before using any Mitsubishi products, please read all the relevant manuals.

## Appendix 1 - Application Examples

### Clock FB application example

#### System configuration

<b>Power supply module</b>	<b>CPU Module</b>	<b>QX40</b> (X10~X1F)	<b>QY40</b> (Y20~Y2F)
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## Device list

### External input (commands)

Device	FB function name	Application (ON details)
X10	Hour meter	Start condition
X11	32-bit hour meter	Start condition

### External output (checks)

Device	FB function name	Application (ON details)
Y20	Clock data term comparison	Clock data term comparison FB error
Y21	Hour meter	Hour meter FB error
Y22		Output result
Y23	32-bit hour meter	32-bit hour meter FB error
Y24		Output result
Y25	Day of week data get	Day of week data get FB error
Y26	Last day of month get	Last day of month get FB error
Y27	Weekly timer	Weekly timer FB error
Y28		Control contact output
Y29	Clock pulse generation	Clock pulse generation FB error
Y2A	Seconds elapsed conversion	Seconds elapsed conversion FB error
Y2B	Year-month-day conversion	Year-month-day conversion FB error

### Data register

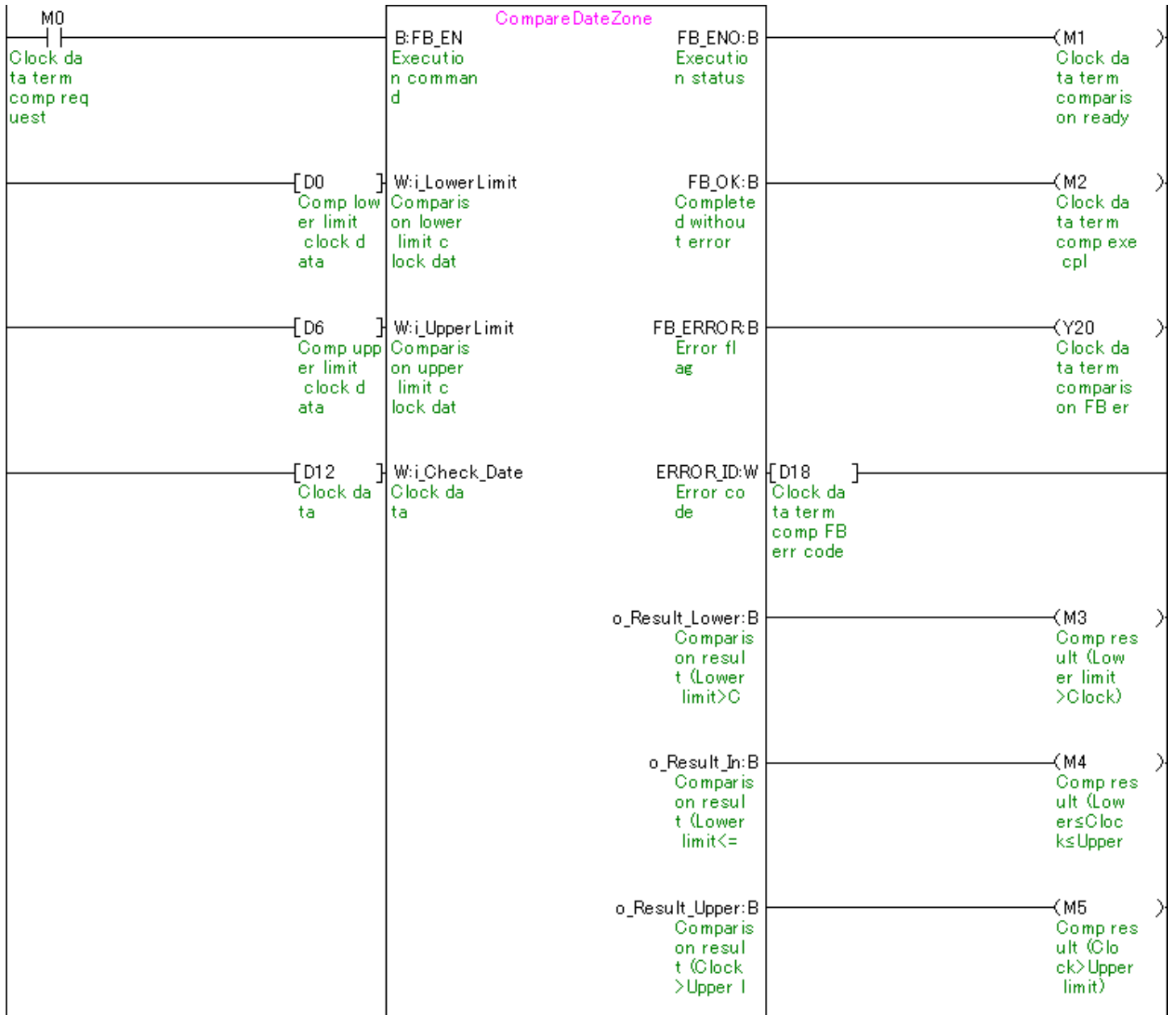
Device	FB function name	Application (ON details)
D0	Clock data term comparison	Comparison lower limit clock data
D6		Comparison upper limit clock data
D12		Clock data
D18		Clock data term comparison FB error code
D19	Hour meter	Hour meter FB error code
D20		Start device of measurement time current value
D22	32-bit hour meter	32-bit hour meter FB error code
D23		Start device of measurement time current value
D26		Start device No. of day of week data
D29	Day of week data get	Day of week data get FB error code
D30		Day of week data
D31	Last day of month get	Start device No. of year and month data
D33		Last day of month get FB error code
D34		Last day of month data
D35	Weekly timer	Start device No. of Sunday ON/OFF time
D37		Start device No. of Monday ON/OFF time
D39		Start device No. of Tuesday ON/OFF time
D41		Start device No. of Wednesday ON/OFF time
D43		Start device No. of Thursday ON/OFF time
D45		Start device No. of Friday ON/OFF time
D47		Start device No. of Saturday ON/OFF time
D49		Weekly timer FB error code
D50	Clock pulse generation	Clock pulse FB error code
D51	Seconds elapsed conversion	Start device No. of date data
D57		Seconds elapsed conversion FB error code
D58		Seconds elapsed data
D60	Year-month-day conversion	Seconds elapsed data
D62		Year-month-day conversion FB error code
D63		Start device No. of date data

### Relay

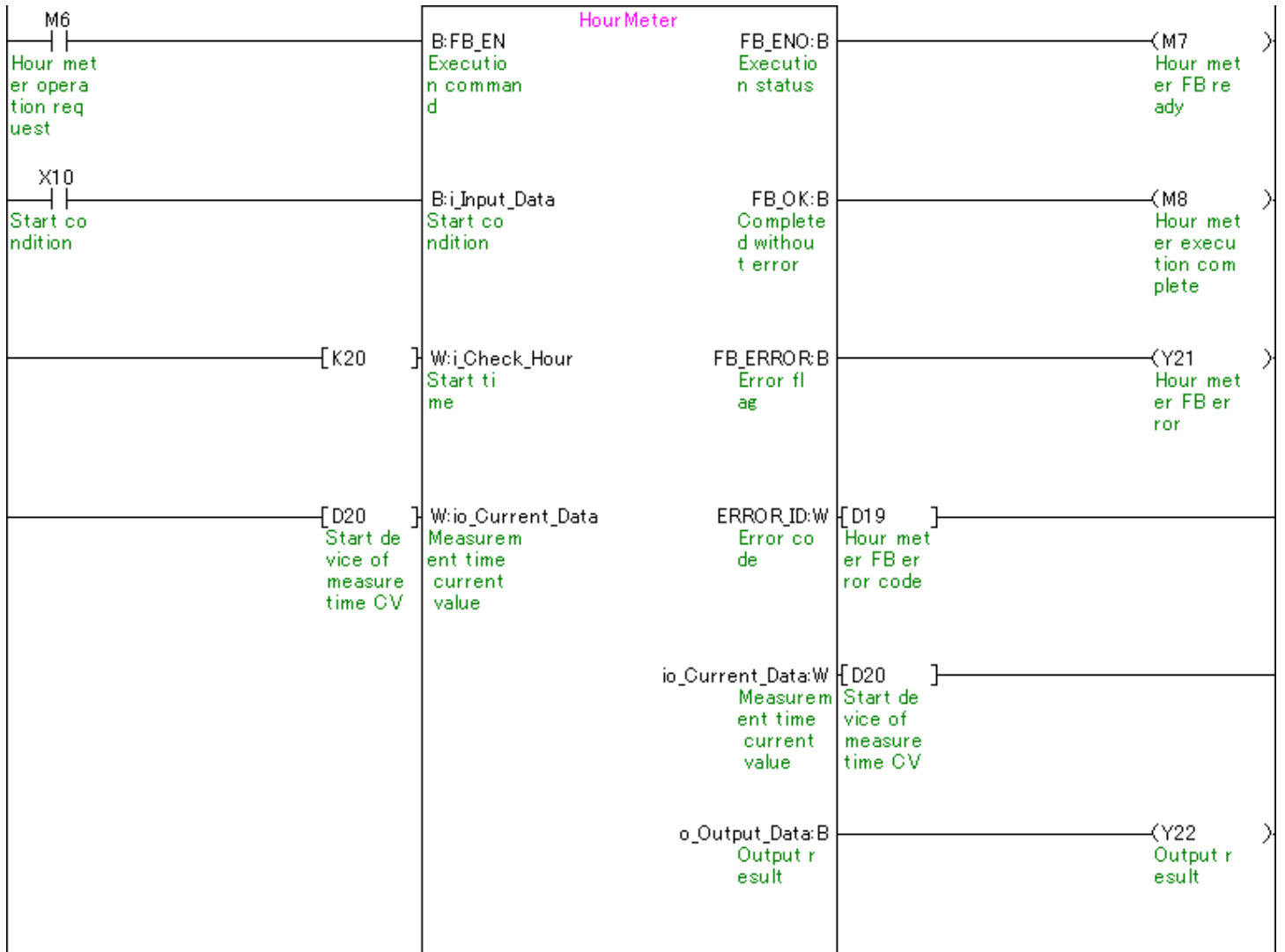
Device	FB function name	Application (ON details)
M0	Clock data term comparison	Clock data term comparison request
M1		Clock data term comparison ready
M2		Clock data term comparison complete
M3		Comparison result (Lower limit>Clock)
M4		Comparison result (Lower limit?Clock?Upper limit)
M5	Comparison result (Clock>Upper limit)	
M6	Hour meter	Hour meter operation request
M7		Hour meter FB ready
M8		Hour meter execution complete
M9	32-bit hour meter	32-bit hour meter operation request
M10		32-bit hour meter FB ready
M11		32-bit hour meter execution complete
M12	Day of week data get	Day of week data get request
M13		Day of week data get FB ready
M14		Day of week data get complete
M15	Last day of month get	Last day of month get request
M16		Last day of month get FB ready
M17		Last day of month get complete
M18	Weekly timer	Weekly timer operation request
M19		Weekly timer FB ready
M20		Weekly timer execution complete
M21	Clock pulse generation	Clock pulse generation request
M22		Clock pulse generation execution status
M23		Clock pulse generation normal completion
M24		Clock pulse output status
M25	Seconds elapsed conversion	Seconds elapsed conversion request
M26		Seconds elapsed conversion FB ready
M27		Seconds elapsed conversion complete
M28	Year-month-day conversion	Year-month-day conversion request
M29		Year-month-day conversion FB ready
M30		Year-month-day conversion complete



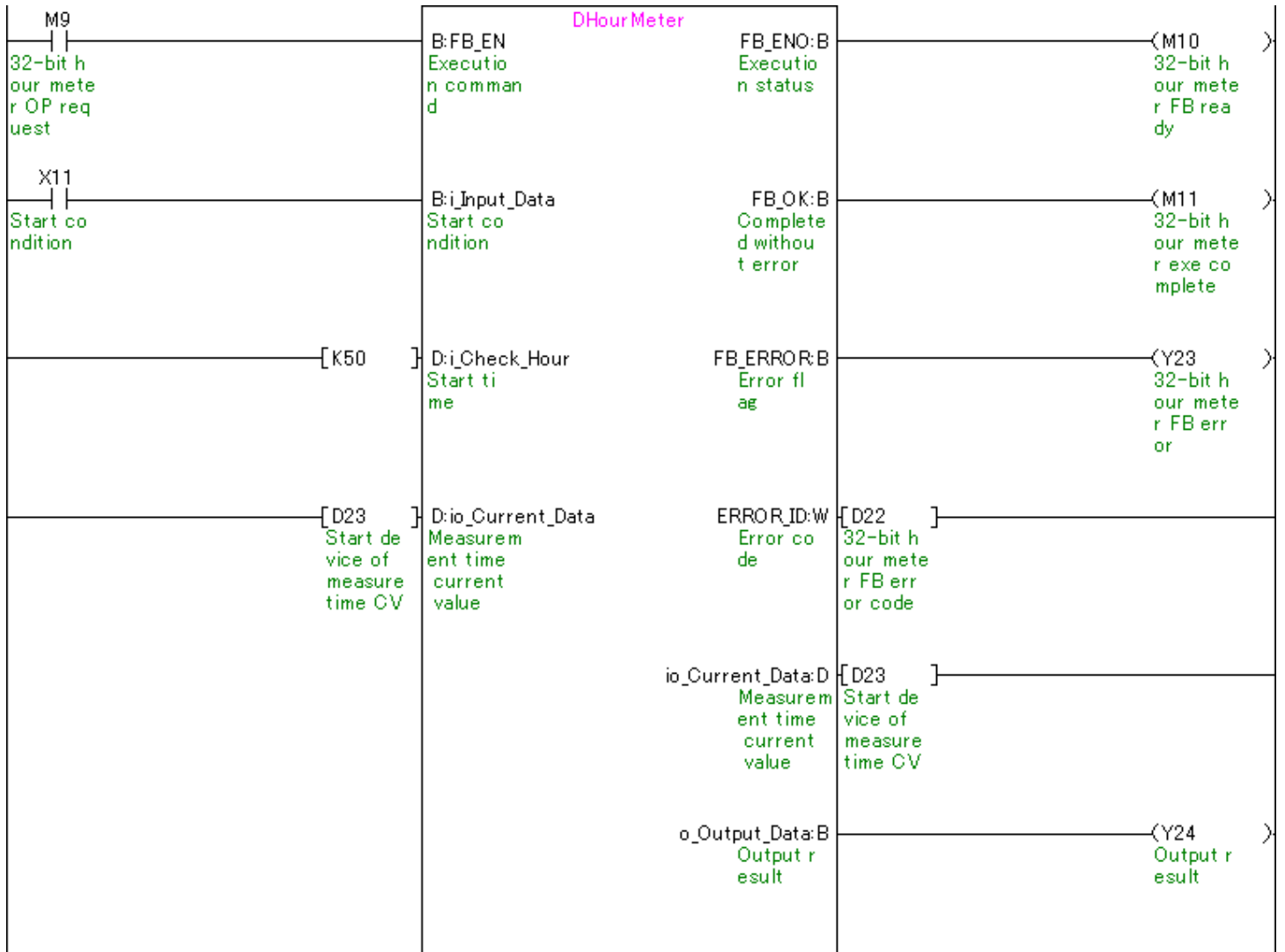
M+CPU-Clock\_CompareDateZone (Clock data term comparison)



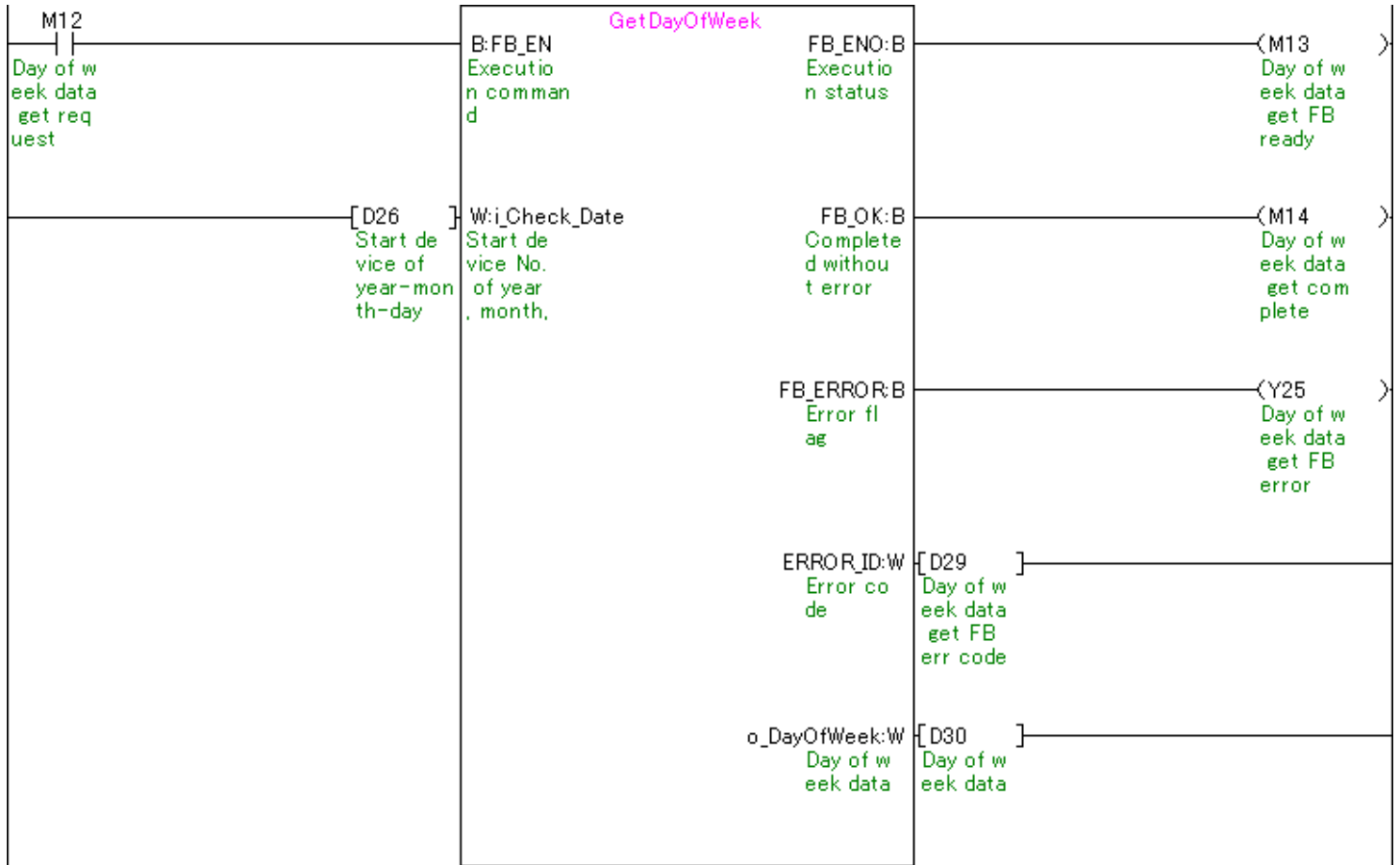
M+CPU-Clock\_HourMeter (Hour meter)



M+CPU-Clock\_DHourMeter (32-bit hour meter)

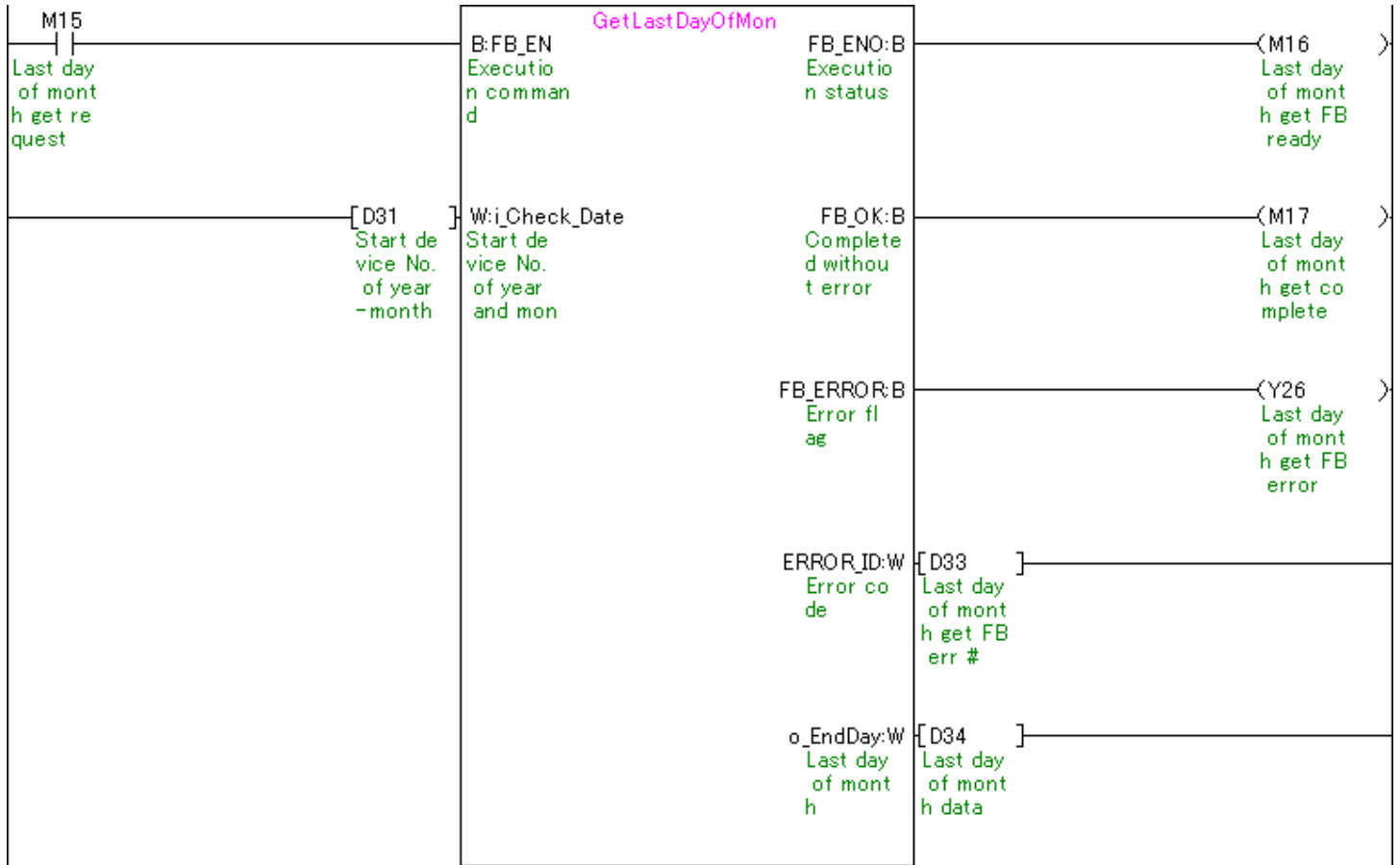


M+CPU-Clock\_GetDayOfWeek (Day of week data get)

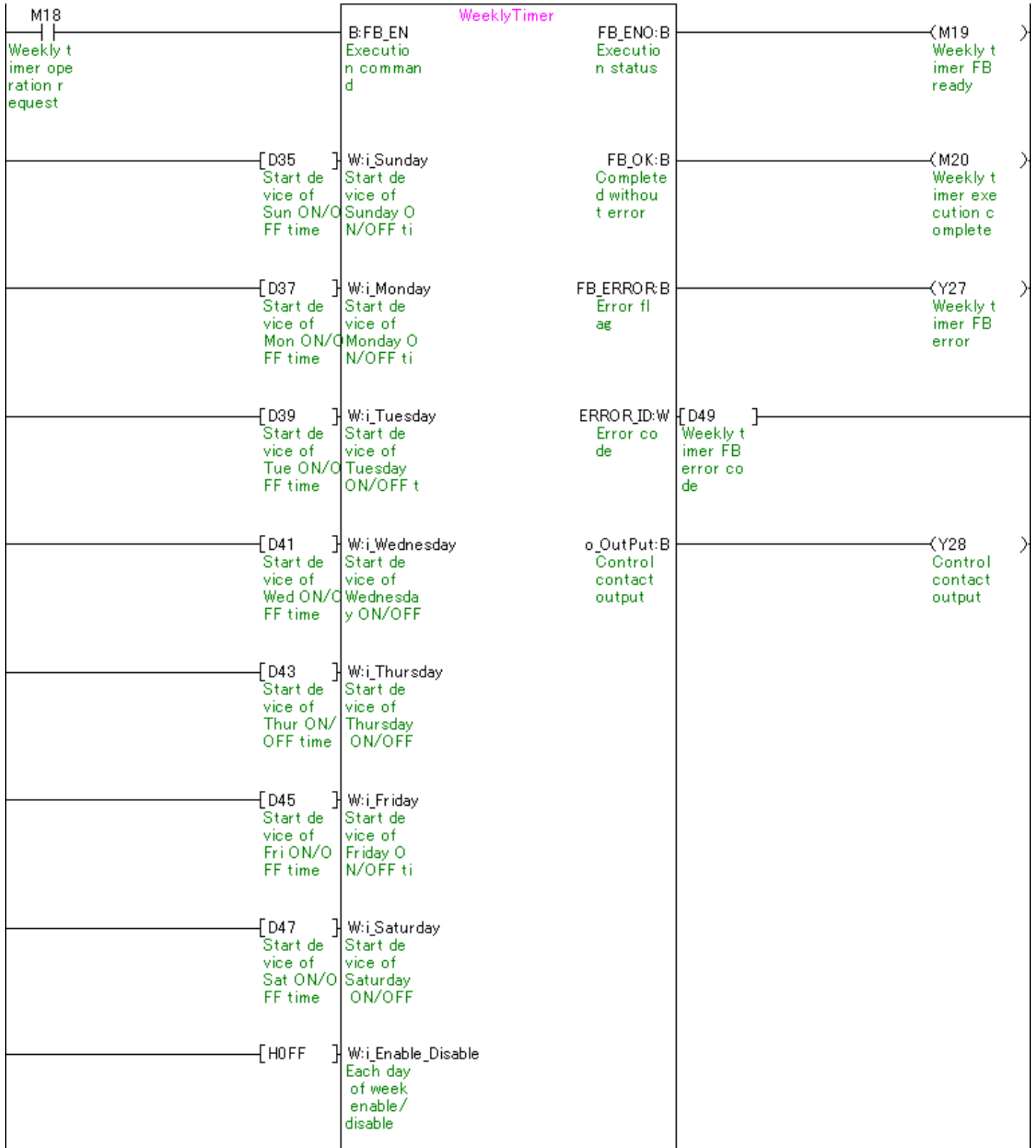




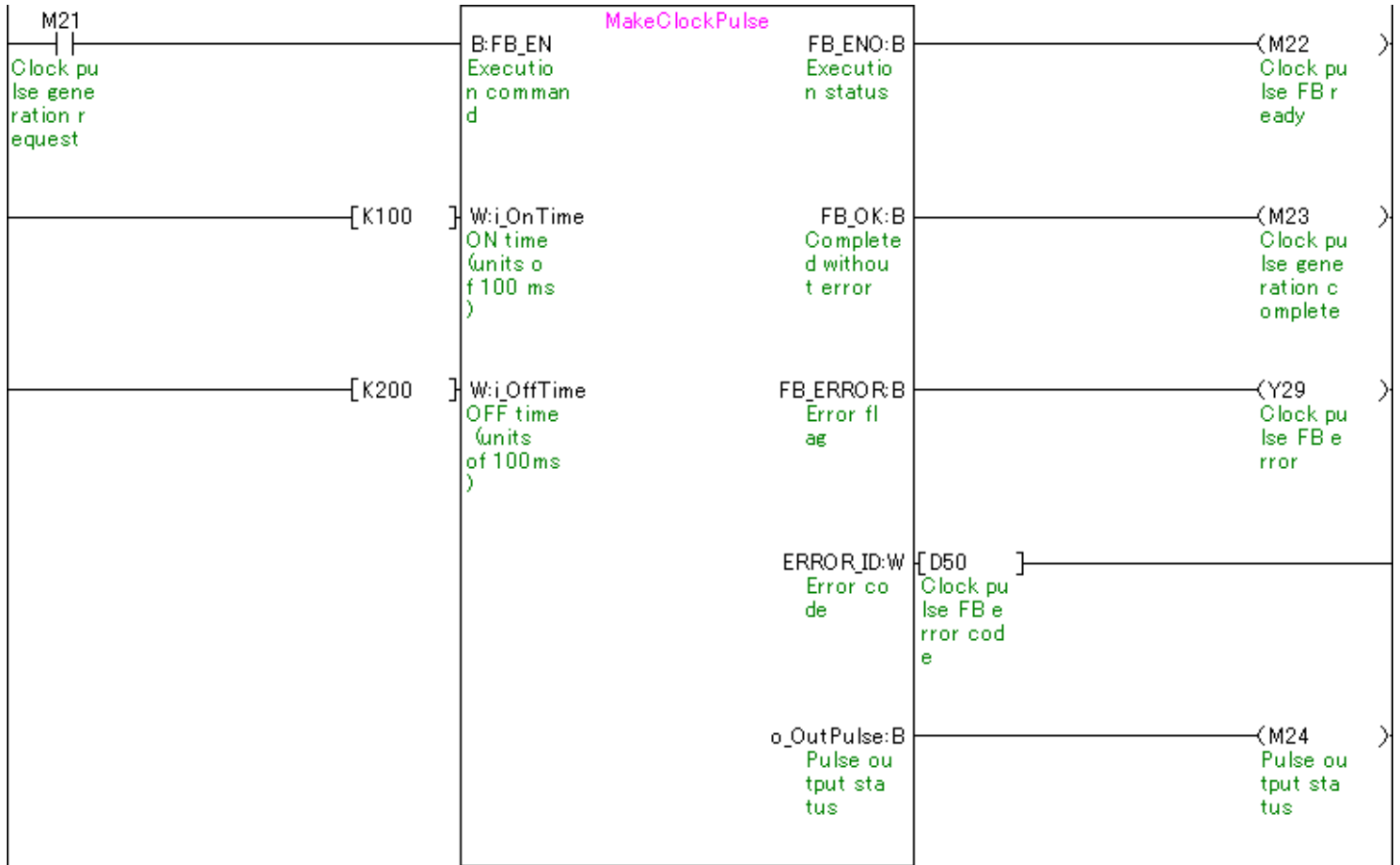
M+CPU-Clock\_GetLastDayOfMonth (Last day of month get)



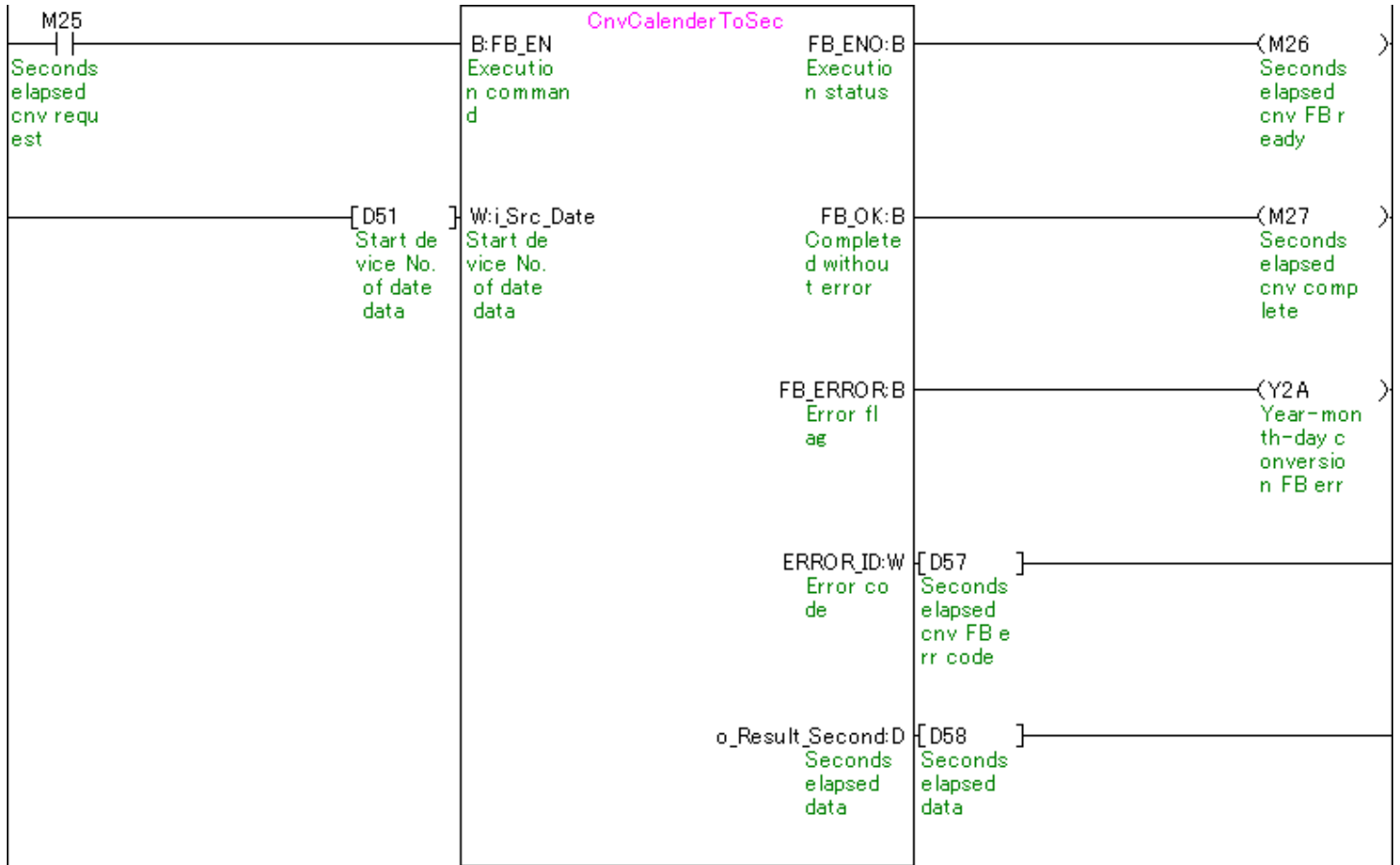
M+CPU-Clock\_WeeklyTimer (Weekly timer)



M+CPU-Clock\_MakeClockPulse (Clock pulse generation)



M+CPU-Clock\_CnvCalenderToSec (Seconds elapsed conversion)



M+CPU-Clock\_CnvSecToCalender (Year-month-day conversion)

