

# MELSEC-F FX3 Series Clock Sample Ladder Reference Manual

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## Reference Manual Revision History

Reference No.	Manual	Date of Revision	Details of Revision
JY997D70601A		October, 2016	Newly Prepared

## 1. Outline

### Outline of sample ladder

This program is sample ladder for a system that uses the FX3 Series main unit's clock function.

### Applicable devices

The applicable devices for this sample ladder are indicated below.

Model	Description		
Main unit			
	Series	Model	
	MELSEC-F Series	FX3S, FX3G, FX3GC, FX3U, FX3UC	
Engineering tool	GX Works2		
	Series	Language	Supported software version
	MELSEC-F Series	English	Version 1.545T and later
	GX Developer		
	Series	Language	Supported software version
	MELSEC-F Series	English	Version 8.119Z and later

### System configuration

The configuration of a system using this sample ladder is shown below.

• FX3U(C)

Main unit FX3U(C)
----------------------

• FX3G(C)

Main unit FX3G(C)
----------------------

• FX3S

Main unit FX3S
-------------------

### Description of sample ladder function

The following functions are realized with this program.

No.	Project name	Description	Version
1	01_LD-FX3G_CPU_Clock_V100A_E	An operation equivalent to the STOH instruction is realized with ladder.	Ver. 1.00A
2	02_LD-FX3U_CPU_Clock_V100A_E	Two intervals are set for the year, and a random device is turned ON at the time zone specified for each interval. Two time zones can be set for each interval.	Ver. 1.00A
3	03_LD-FX3G_CPU_Clock_V100A_E	An operation equivalent to the STMR instruction is realized with ladder.	Ver. 1.00A
4	04_LD-FX3U_CPU_Clock_V100A_E	Calculates the date after the specified number of days.	Ver. 1.00A


## Prerequisites for using sample ladder

### ■ Changing the PLC type

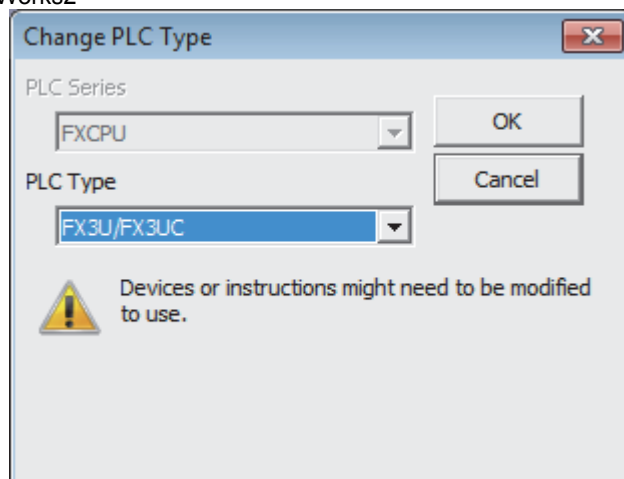
The sample ladder is provided with the model listed in the project name as shown below. When using with a model other than the provided project, change the PLC type using the engineering tool.

Example: With the following project name, the model is FX3U/FX3UC.

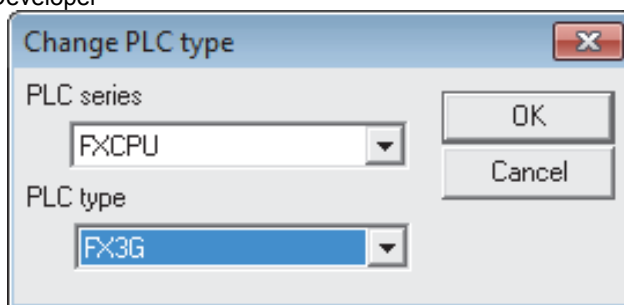
01\_LD-FX3U\_□□□\_□□□\_V100A\_E

 [Project] ⇒ [Change PLC Type]

- For GX Works2



- For GX Developer



When using a GX Developer project with FX3S, refer to the TECHNICAL BULLETIN "HIME-T-P-0118 Limitations and precautions when using FX3S Series with GX Developer".

The provided project is not guaranteed to run with the user's system. Check the device assignments and parameters, etc., and adjust them to the user's system specifications before starting use.

## Related manuals

FX3S/FX3G/FX3GC/FX3U/FX3UC Series Programming Manual - Basic & Applied Instruction Edition

## Notice

This manual explains the functions of the sample ladder. The restrictions for using and the restrictions for combining the programmable controller, various function expansion boards, special adapters, and extension devices are not covered. Always read the User's Manual for the target product before starting use.

## 2. Sample ladder

### 2. 1. STO instruction implementation (01\_LD-FX3G\_CPU\_Clock\_V100A\_E)

#### Outline of System

An operation equivalent to the STO instruction is realized with ladder.

#### ■ Description of functions

- (1) When the execution command (M0) turns ON, the same operation as the STO instruction that converts the second data into hour, minute, second is executed.
- (2) If the input value is incorrect, Abnormal End (Y000) turns ON, and the process is halted. The error code is stored in error code (D100). For the error codes, refer to error code in devices used (D100).
- (3) To obtain the operation results again, turn OFF and ON the execution command (M0).

#### Programs Used

This program is targeted for FX3S, FX3G and FX3GC. Use the STO instruction with the FX3U and FX3UC.

The projects used in this program are indicated below.

No.	Project name	Function name	Remark
1	01_LD-FX3G_CPU_Clock_V100A_E	STO instruction implementation	This product is created with FX3G/FX3GC. When using with a model other than the provided project, change the PLC type using the engineering tool.

#### Devices used

The devices used in this program are indicated below.

##### Input device

No.	Device name	Data type	Kind	Device comment	Remark
1	M0	Bit	Input	Execution command	ON: The program starts. OFF: The program does not start.
2	D0	Word	Input	Conversion target data (second)	Sets the conversion target second data. [Valid range (decimal)] 0 --- 32767

##### Output device

No.	Device name	Data type	Kind	Device comment	Remark
1	Y000	Bit	Output	Abnormal end	When ON, it means an error has occurred in the program.
2	M100	Bit	Output	Execution status	ON: The execution command is ON. OFF: The execution command is OFF.
3	M101	Bit	Output	Normal end	When ON, it means that the process has ended.
4	D100	Word	Output	Error code	Stores the error code that occurred in the program. [Error code (decimal)] 10: Conversion target data is out-of-range.
5	D101 --- D103	Word	Output	Conversion results data	Stores the conversion results data. D101: Conversion result data (Hour) D102: Conversion result data (Minute) D103: Conversion result data (Second)

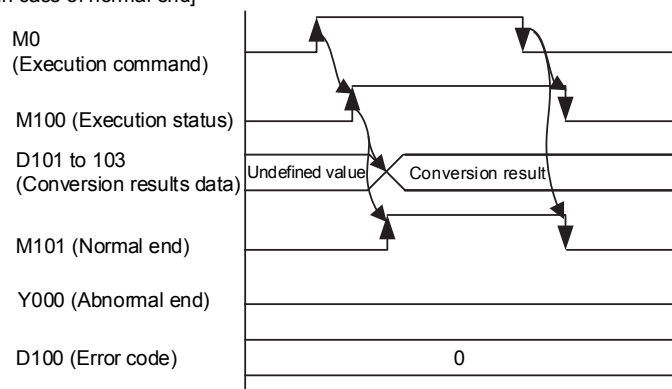
# Internal device

No.	Device name	Data type	Kind	Device comment	Remark
1	M200	Bit	Internal	Setting data check command	Holds the check command flag for the set data.
2	M201	Bit	Internal	Main process execution command	Holds the execution command flag for the main process.
3	M203	Bit	Internal	Program completed	Holds the program completed flag.
4	M204	Bit	Internal	Main process execution completed	Holds the execution completed flag for the main process.
5	M205	Bit	Internal	Program error	Holds the program error flag.
6	M206	Bit	Internal	Pulsed execution command	Holds the pulse conversion flag for the execution command.

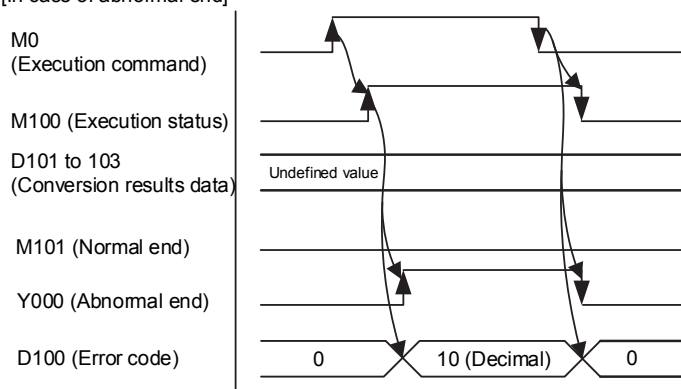
## Operation of I/O signals

- The timing chart for this program is shown below.

[In case of normal end]



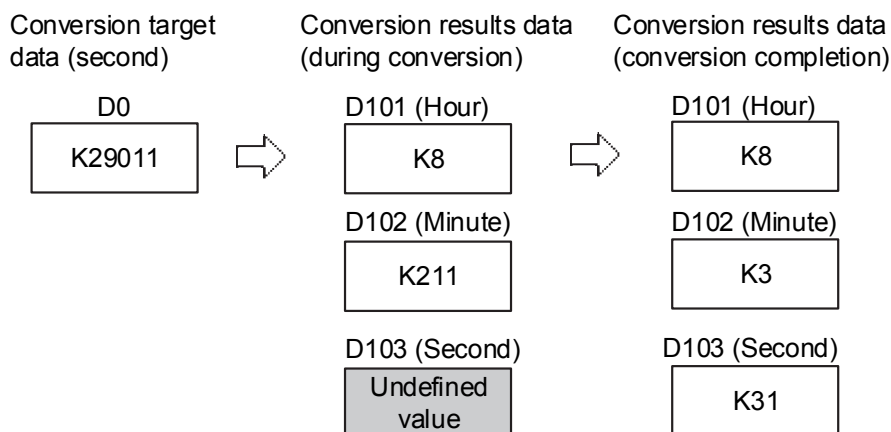
[In case of abnormal end]



- The processes of this program are given below.

- Checks the input conversion target data (second).
  - Calculates the quotient and remainder obtained by dividing the conversion target data by 3600.
  - Calculates the quotient and remainder obtained by dividing the remainder obtained in step (2) by 60.
- The quotient calculated in step (2) is used as the hour data in the conversion results, and the quotient and remainder calculated in step (3) are used as the minute data and second data in each conversion result.

The operation when the conversion target data (second) is set to 29011 is shown below.

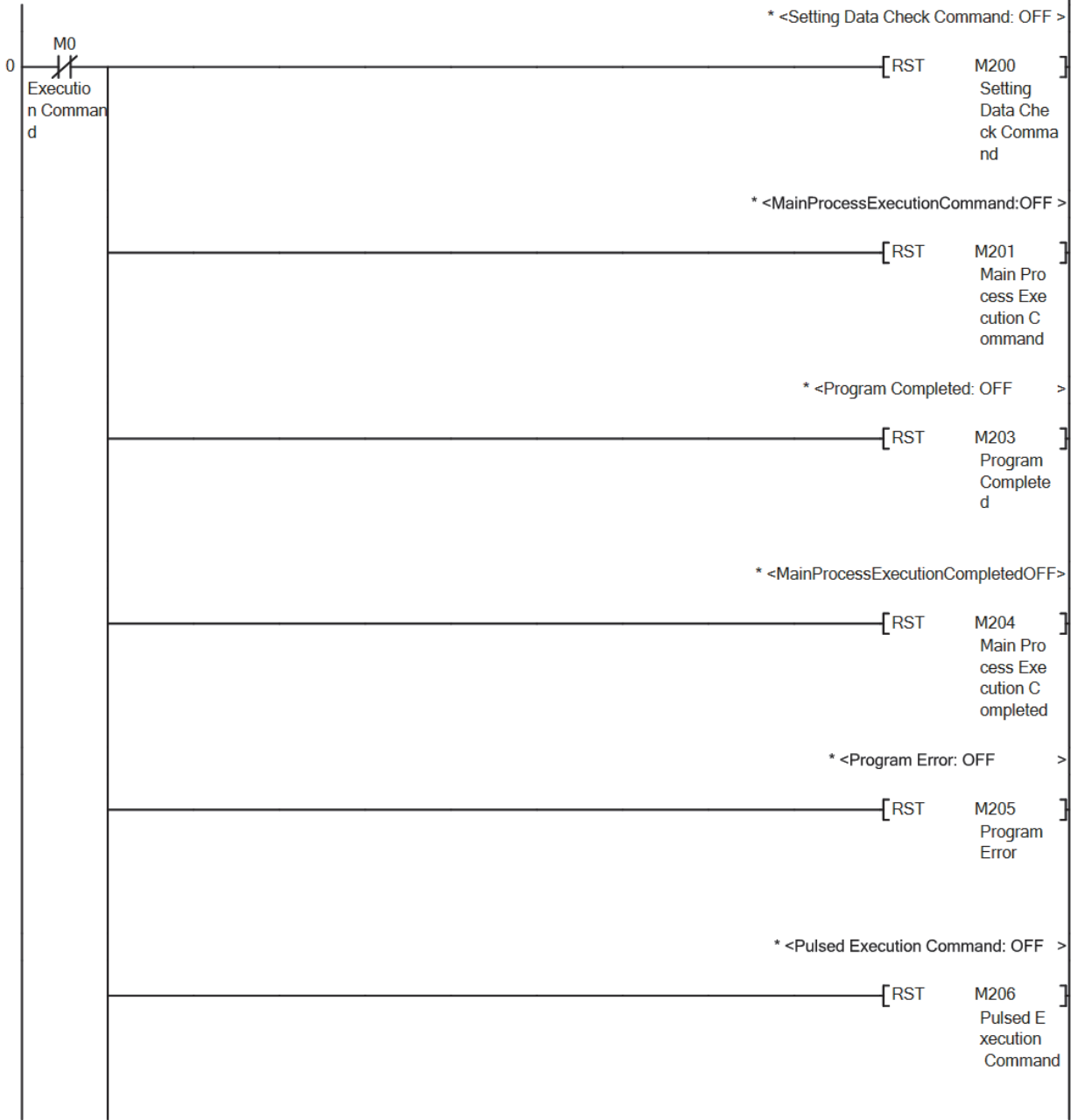


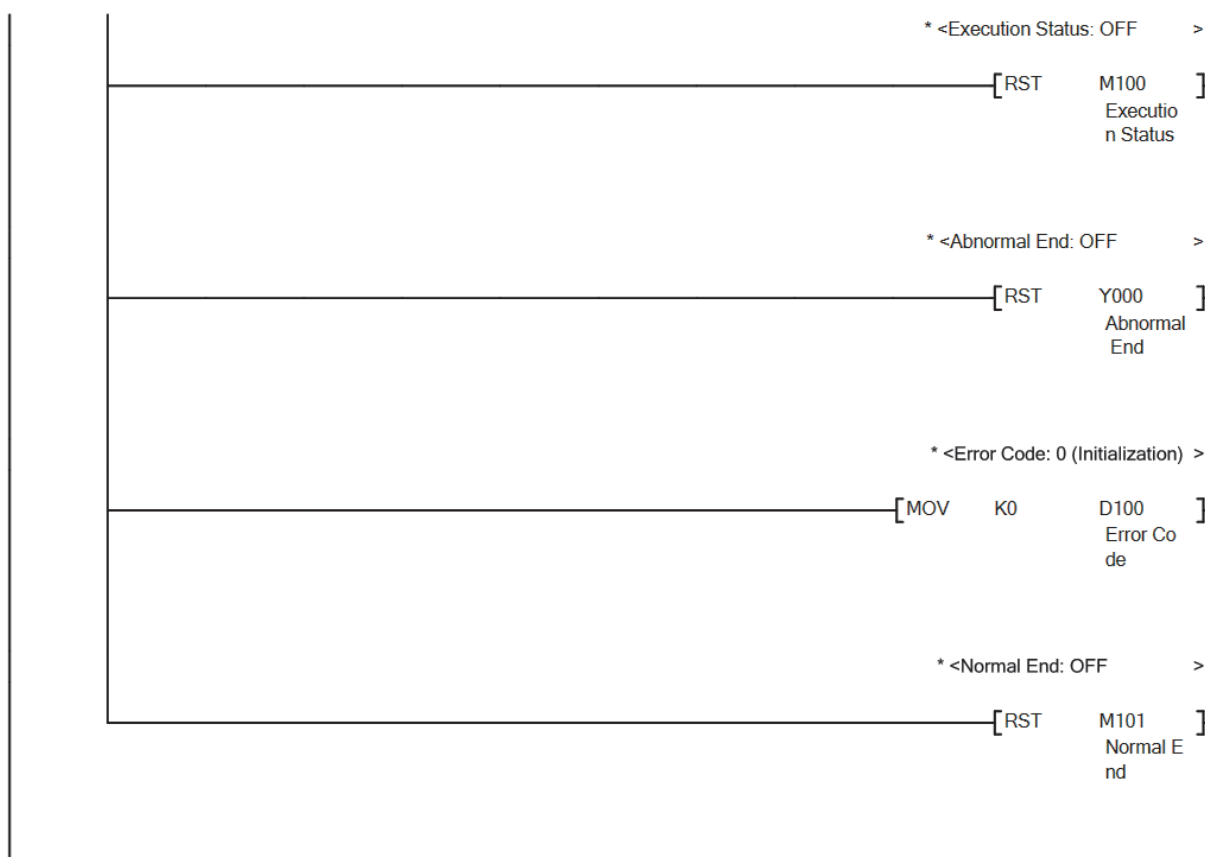
## Version upgrade history

Version	Date	Description
Ver. 1.00A	October, 2016	First Edition

Program

\* Sample Ladder Name: 01\_LD-FX3G\_CPU\_Clock\_V100A\_E  
\* Function: STOH Instruction Implementation  
\* Version: Ver.1.00A  
\*  
\* Process of Initializing Program  
\*



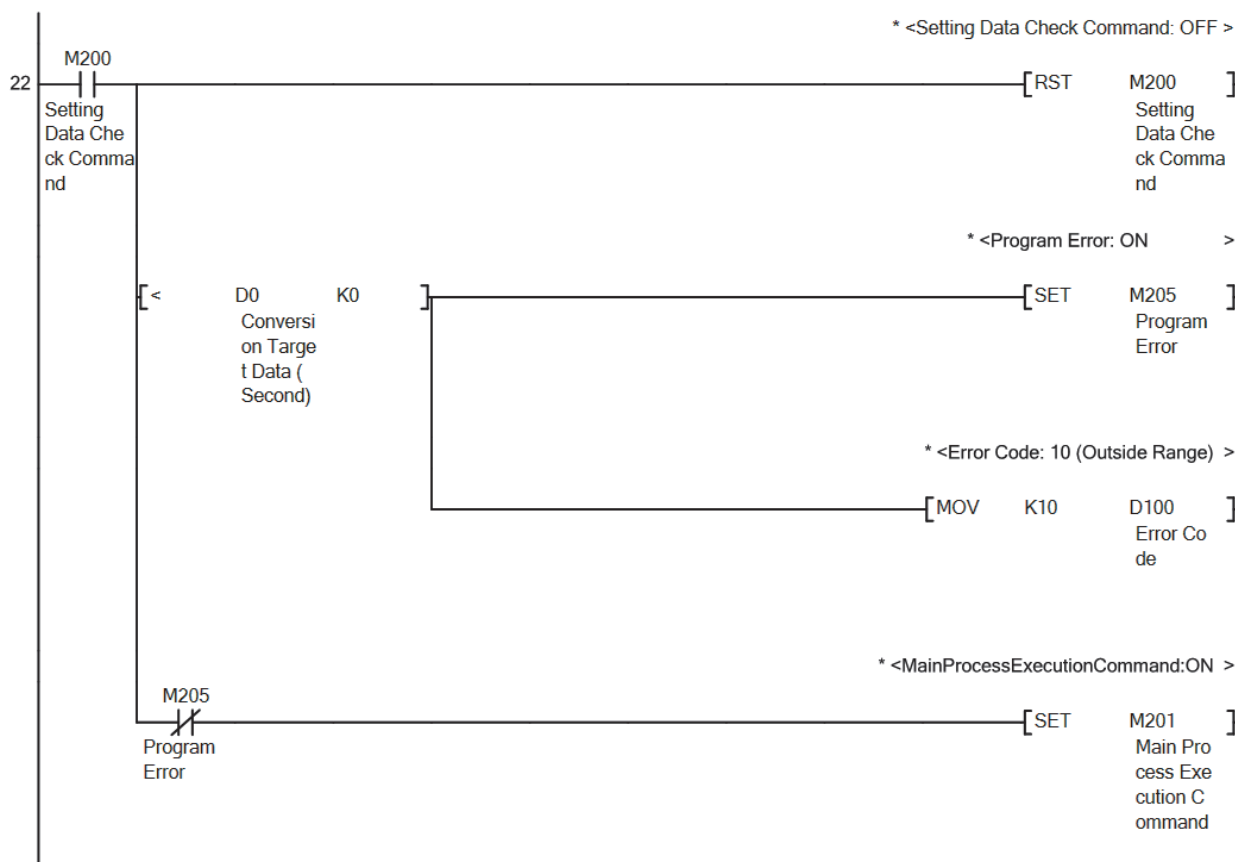


\*  
 \* Process of Executing Program  
 \*

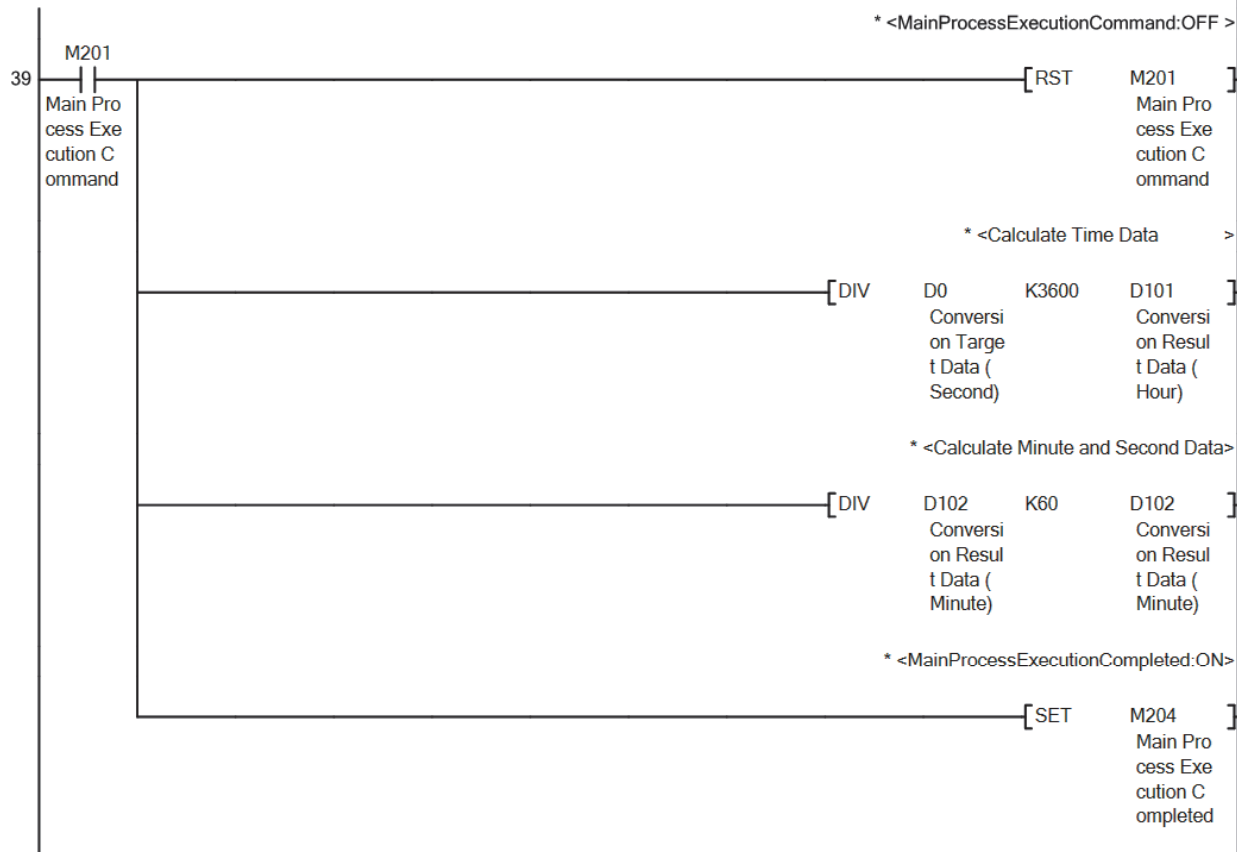




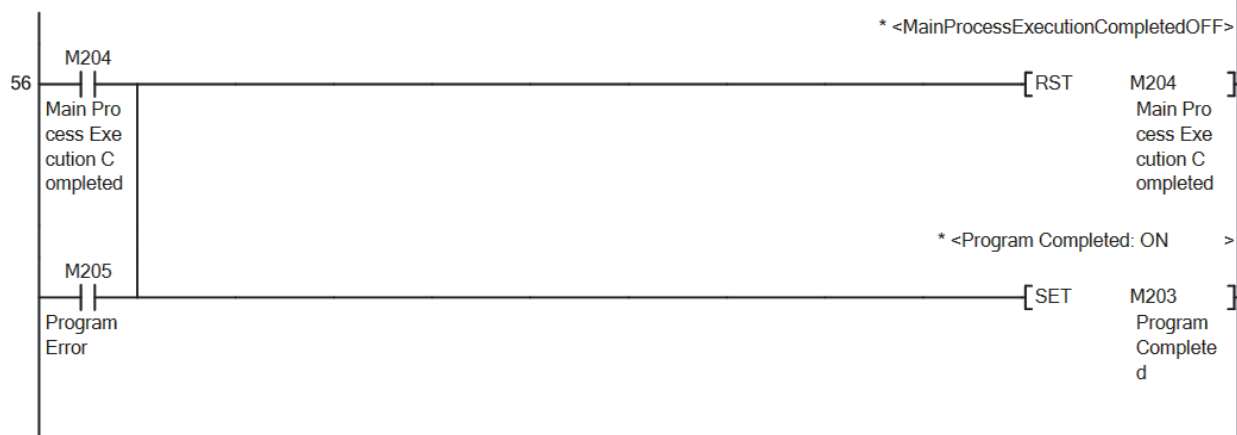
\*  
 \* Process of Checking Preset Data  
 \*  
 \* Confirm Range of Conversion Target Data  
 \*

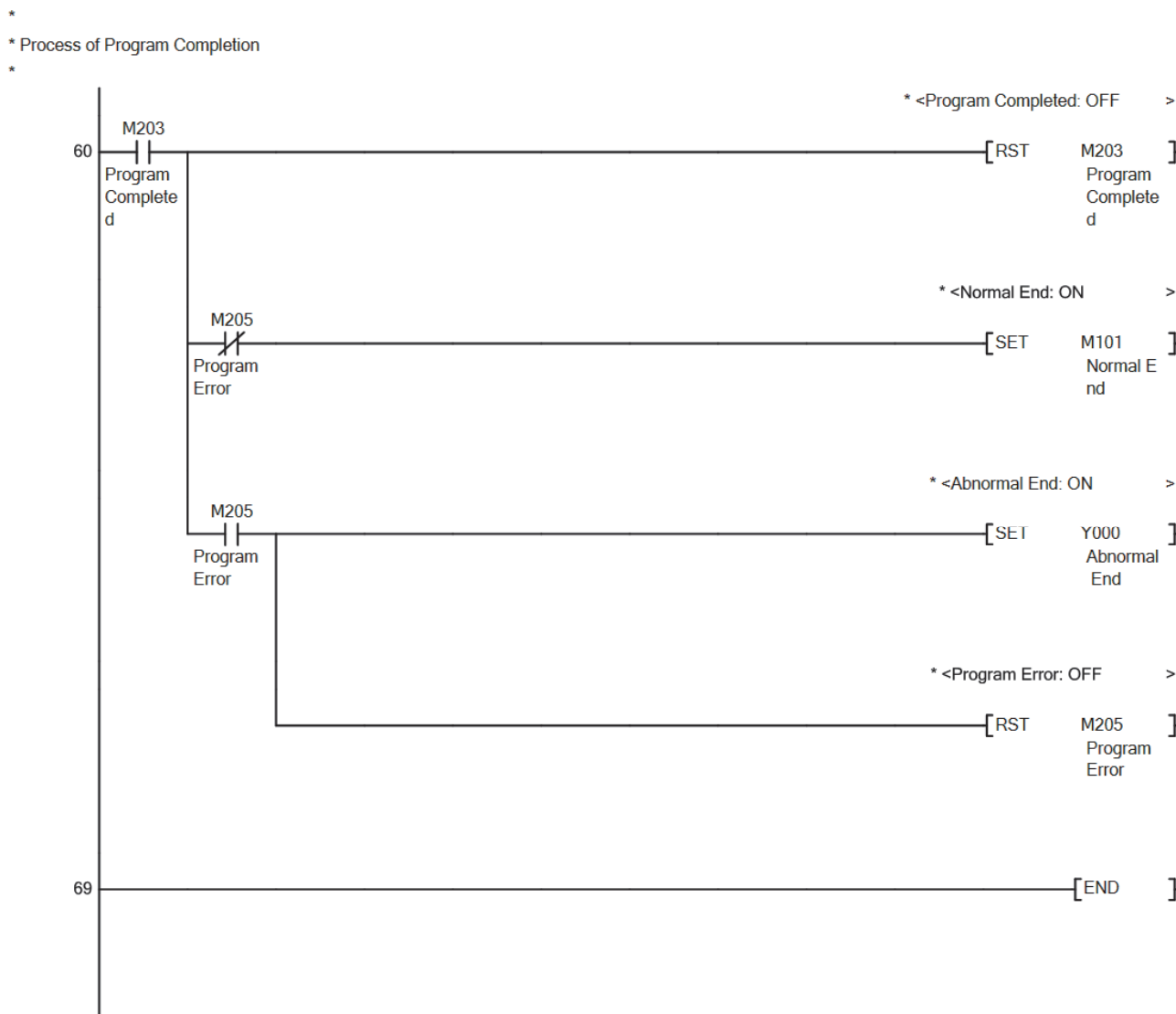


\*  
 \* Execute STO H Instruction Implementation  
 \*



\*  
 \* Confirm Program Completion  
 \*





## 2. 2. ON time control (02\_LD-FX3U\_CPU\_Clock\_V100A\_E)

### Outline of System

Two intervals are set for the year, and a random device is turned ON at the time zone specified for each interval. Two time zones can be set for each interval.

#### ■ Description of functions

When the execution command (M0) turns ON, the following process is continually executed.

- (1) Reads the clock data.
- (2) Turns the control contact output (Y001) ON/OFF according to the read clock data, and set interval and time.
  - When present time is included in start/end time: Control contact output (Y001) = ON
  - When present time is not included in start/end time: Control contact output (Y001) = OFF
- (3) The data in which the execution command (M0) changes from OFF to ON is used for the input data. The operation will not be affected even if the input data is changed while the execution command is ON.
- (4) The data must be set so that the start time ≤ end time is established.
  - \* Setting of just the start time or end time is not acceptable. Both times must always be set.
- (5) If the input value is incorrect, Abnormal Output (Y000) turns ON, and the process is halted.  
The error code is stored in error code (D100).  
For the error codes, refer to error code in devices used (D100).

\* Supplement: In this sample program, the index register backup and recovery process is executed, but this is not necessary if there is no need to hold the index register value other than in this sample process.

### Programs Used

This program is targeted for FX3S, FX3G, FX3GC, FX3U and FX3UC.

The projects used in this program are indicated below.

No.	Project name	Function name	Remark
1	02_LD-FX3U_CPU_Clock_V100A_E	ON time control	This product is created with FX3U/FX3UC. When using with a model other than the provided project, change the PLC type using the engineering tool.

### Devices used

The devices used in this program are indicated below.

#### Input device

No.	Device name	Data type	Kind	Device comment	Remark
1	M0	Bit	Input	Execution command	ON: The program starts. OFF: The program does not start.
2	D0	Word	Input	Start month of period 1	Sets the month to start interval 1. [Valid range (decimal)] 1 --- 12
3	D1	Word	Input	Start month of period 2	Sets the month to start interval 2. [Valid range (decimal)] 1 --- 12
4	D2 --- D4	Word	Input	Start time 1 of period 1	Sets the time to start the first ON time zone in interval 1. D2: Start time 1 of period 1: Hour D3: Start time 1 of period 1: Minute D4: Start time 1 of period 1: Second [Valid range (decimal)] Hour: 0 --- 23 Minute: 0 --- 59 Second: 0 --- 59

No.	Device name	Data type	Kind	Device comment	Remark
5	D5 --- D7	Word	Input	End time 1 of period 1	Sets the time to end the first ON time zone in interval 1. D5: End time 1 of period 1: Hour D6: End time 1 of period 1: Minute D7: End time 1 of period 1: Second [Valid range (decimal)] Hour: 0 --- 23 Minute: 0 --- 59 Second: 0 --- 59
6	D8 --- D10	Word	Input	Start time 2 of period 1	Sets the time to start the second ON time zone in interval 1. D8: Start time 2 of period 1: Hour D9: Start time 2 of period 1: Minute D10: Start time 2 of period 1: Second [Valid range (decimal)] Hour: 0 --- 23 Minute: 0 --- 59 Second: 0 --- 59
7	D11 --- D13	Word	Input	End time 2 of period 1	Sets the time to end the second ON time zone in interval 1. D11: End time 2 of period 1: Hour D12: End time 2 of period 1: Minute D13: End time 2 of period 1: Second [Valid range (decimal)] Hour: 0 --- 23 Minute: 0 --- 59 Second: 0 --- 59
8	D14 --- D16	Word	Input	Start time 1 of period 2	Sets the time to start the first ON time zone in interval 2. D14: Start time 1 of period 2: Hour D15: Start time 1 of period 2: Minute D16: Start time 1 of period 2: Second [Valid range (decimal)] Hour: 0 --- 23 Minute: 0 --- 59 Second: 0 --- 59
9	D17 --- D19	Word	Input	End time 1 of period 2	Sets the time to end the first ON time zone in interval 2. D17: End time 1 of period 2: Hour D18: End time 1 of period 2: Minute D19: End time 1 of period 2: Second [Valid range (decimal)] Hour: 0 --- 23 Minute: 0 --- 59 Second: 0 --- 59
10	D20 --- D22	Word	Input	Start time 2 of period 2	Sets the time to start the second ON time zone in interval 2. D20: Start time 2 of period 2: Hour D21: Start time 2 of period 2: Minute D22: Start time 2 of period 2: Second [Valid range (decimal)] Hour: 0 --- 23 Minute: 0 --- 59 Second: 0 --- 59

No.	Device name	Data type	Kind	Device comment	Remark
11	D23 --- D25	Word	Input	End time 2 of period 2	Sets the time to end the second ON time zone in interval 2. D23: End time 2 of period 2: Hour D24: End time 2 of period 2: Minute D25: End time 2 of period 2: Second [Valid range (decimal)] Hour: 0 --- 23 Minute: 0 --- 59 Second: 0 --- 59

#### Output device

No.	Device name	Data type	Kind	Device comment	Remark
1	Y000	Bit	Output	Abnormal end	When ON, it means an error has occurred in the program.
2	Y001	Bit	Output	Control contact output	Returns the results of output control.
3	M100	Bit	Output	Execution status	ON: The execution command is ON. OFF: The execution command is OFF.
4	M101	Bit	Output	Normal end	When ON, it means that the process has ended.
5	D100	Word	Output	Error code	Stores the error code that occurred in the program. [Error code (decimal)] 10: Start month of period 1 is out-of-range. 11: Start month of period 2 is out-of-range. 12: Start month of period 1 is later than start month of period 2. 13: Start time 1 of period 1 is out-of-range. 14: End time 1 of period 1 is out-of-range. 15: Start time 2 of period 1 is out-of-range. 16: End time 2 of period 1 is out-of-range. 17: Start time 1 of period 2 is out-of-range. 18: End time 1 of period 2 is out-of-range. 19: Start time 2 of period 2 is out-of-range. 20: End time 2 of period 2 is out-of-range. 21: Start time 1 of period 1 is later than end time 1 of period 1. 22: Start time 2 of period 1 is later than end time 2 of period 1. 23: Start time 1 of period 2 is later than end time 1 of period 2. 24: Start time 2 of period 2 is later than end time 2 of period 2.

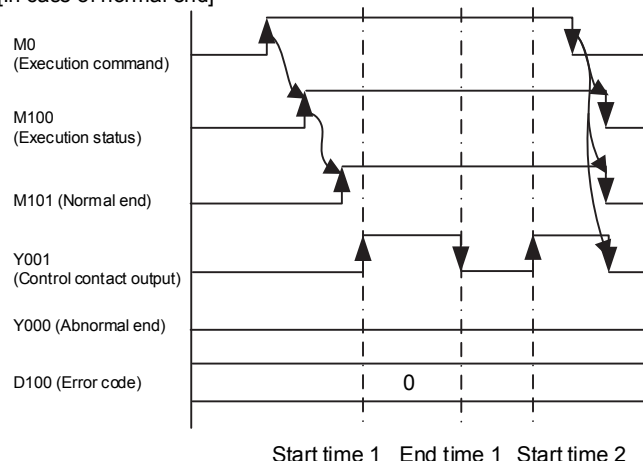
## Internal device

No.	Device name	Data type	Kind	Device comment	Remark
1	M200	Bit	Internal	Setting data check command	Holds the check command flag for the set data.
2	M201	Bit	Internal	Main process execution command	Holds the execution command flag for the main process.
3	M202	Bit	Internal	Exe command before start main process	Holds the execution command flag for the main process start pre-process.
4	M203	Bit	Internal	Program completed	Holds the program completed flag.
5	M205	Bit	Internal	Program error	Holds the program error flag.
6	M206	Bit	Internal	Pulsed execution command	Holds the pulse conversion flag for the execution command.
7	M210	Bit	Internal	RTC data zone result 1: Before	Holds the RTC data zone result 1 (before).
8	M211	Bit	Internal	RTC data zone result 1: In Range	Holds the RTC data zone result 1 (in range).
9	M212	Bit	Internal	RTC data zone result 1: After	Holds the RTC data zone result 1 (after).
10	M213	Bit	Internal	RTC data zone result 2: Before	Holds the RTC data zone result 2 (before).
11	M214	Bit	Internal	RTC data zone result 2: In Range	Holds the RTC data zone result 2 (in range).
12	M215	Bit	Internal	RTC data zone result 2: After	Holds the RTC data zone result 2 (after).
13	M8000	Bit	Internal	RUN monitor NO contact	Used for index register backup and recovery command.
14	D50	Word	Internal	For memorizing period 1 start month	Holds the interval 1 start month.
15	D51	Word	Internal	For memorizing period 2 start month	Holds the interval 2 start month.
16	D52 --- D54	Word	Internal	For memorize period 1 start time 1	Holds the interval 1 start time 1.
17	D55 --- D57	Word	Internal	For memorizing period 1 end time 1	Holds the interval 1 end time 1.
18	D58 --- D60	Word	Internal	For memorize period 1 start time 2	Holds the interval 1 start time 2.
19	D61 --- D63	Word	Internal	For memorizing period 1 end time 2	Holds the interval 1 end time 2.
20	D64 --- D66	Word	Internal	For memorize period 2 start time 1	Holds the interval 2 start time 1.
21	D67 --- D69	Word	Internal	For memorizing period 2 end time 1	Holds the interval 2 end time 1.
22	D70 --- D72	Word	Internal	For memorize period 2 start time 2	Holds the interval 2 start time 2.
23	D73 --- D75	Word	Internal	For memorizing period 2 end time 2	Holds the interval 2 end time 2.
24	D76 --- D82	Word	Internal	Present time	Stores the present time. D76: Present time: Year D77: Present time: Month D78: Present time: Day D79: Present time: Hour D80: Present time: Minute D81: Present time: Second D82: Present time: Day of week
25	D99	Word	Internal	Index register backup and recovery	Used to backup and restore the interval data (Z7) being used.
26	Z7	Word	Internal	Interval data used	Stores whether to use interval 1 or interval 2 for the time zone data.

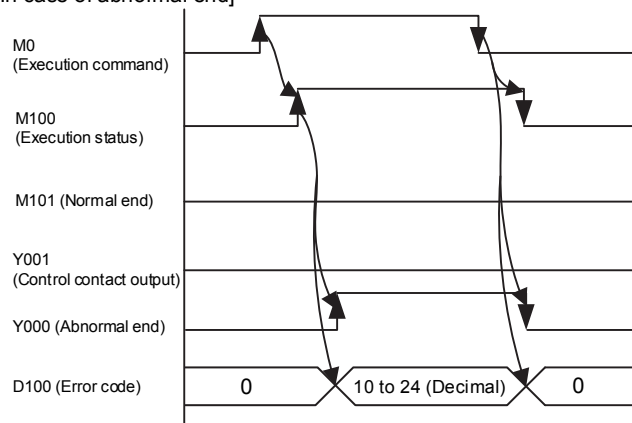
## Operation of I/O signals

■ The timing chart for this program is shown below.

[In case of normal end]



[In case of abnormal end]



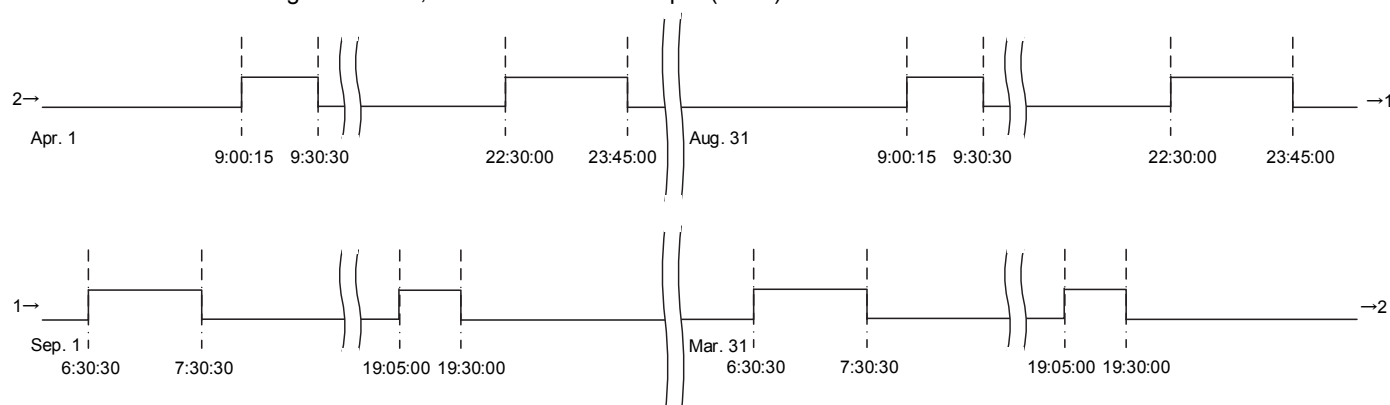
■ The processes of this program are given below.

- (1) The input data is checked when execution command (M0) changes from OFF -> ON. If there is an error, the results are output to error code (D100). When the data is normal, the input data is retrieved into the internal device.
- (2) Reads the clock data (TRD).
- (3) If start month of period 1  $\leq$  current month < start month of period 2 is established, the start/end time for interval 1 is used.  
If current month < Start month of period 1 or start month of period 2  $\leq$  current month, the start/end time for interval 2 is used.
- (4) The clock data band is compared (TZCP) to check whether the present time is included in interval 1/2 start/end time, and the control contact output (Y001) setting is decided.
  - When present time is included in start/end time: Control contact output (Y001) = ON
  - When present time is not included in start/end time: Control contact output (Y001) = OFF

Example of operation:

- Start month of period 1: 4  
Start time 1 of period 1 9:00:15, end time 1 of period 1 9:30:29  
Start time 2 of period 1 22:30:00, end time 2 of period 1 23:44:59
- Start month of period 2: 9  
Start time 1 of period 2 6:30:30, end time 1 of period 2 7:30:29  
Start time 2 of period 2 19:05:00, end time 2 of period 2 19:29:59

When the above settings are made, the control contact output (Y001) turns ON and OFF as shown below.



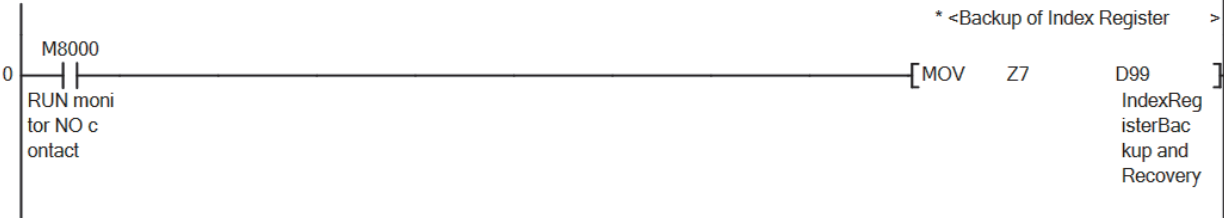


**Version upgrade history**

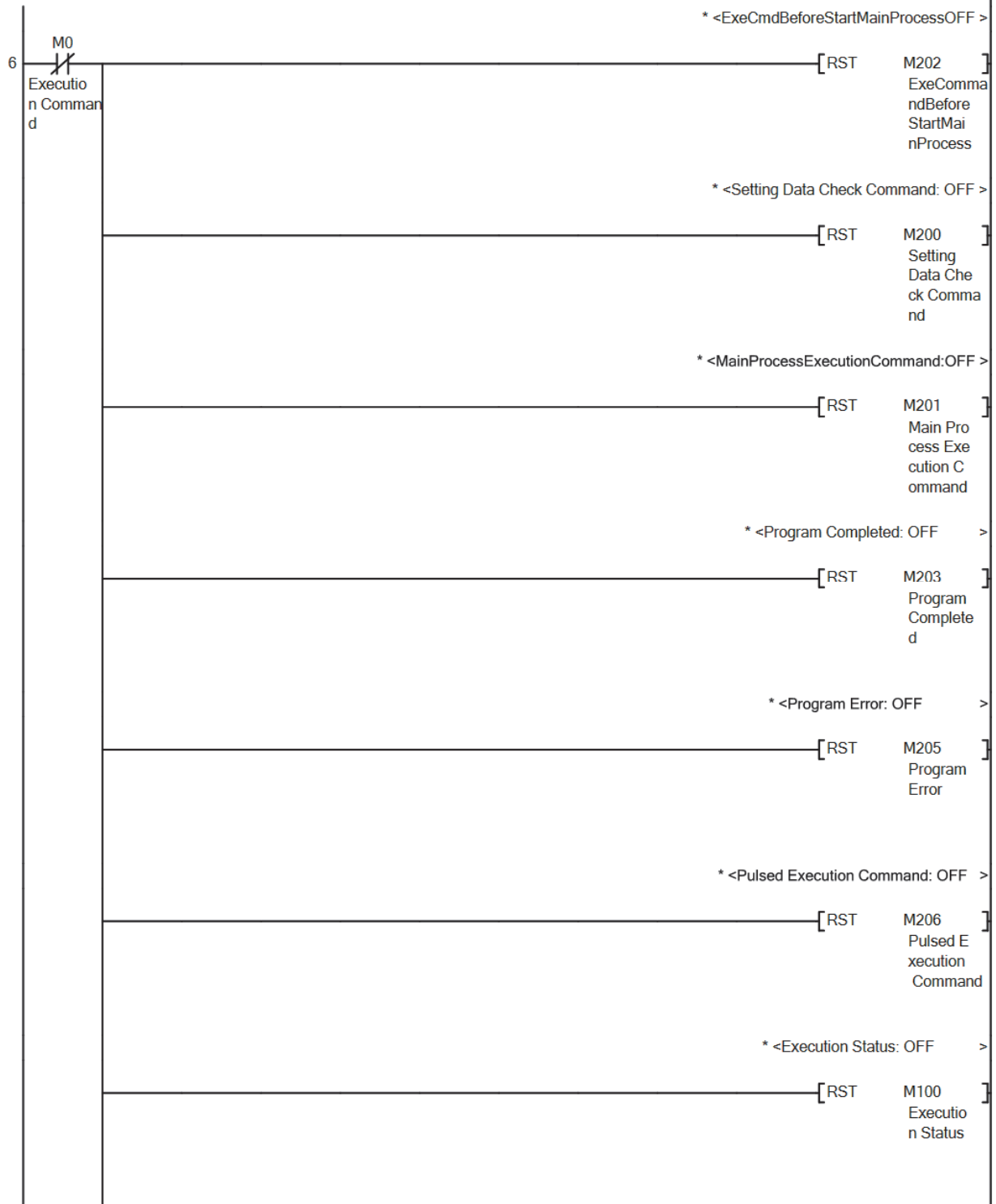
Version	Date	Description
Ver. 1.00A	October, 2016	First Edition

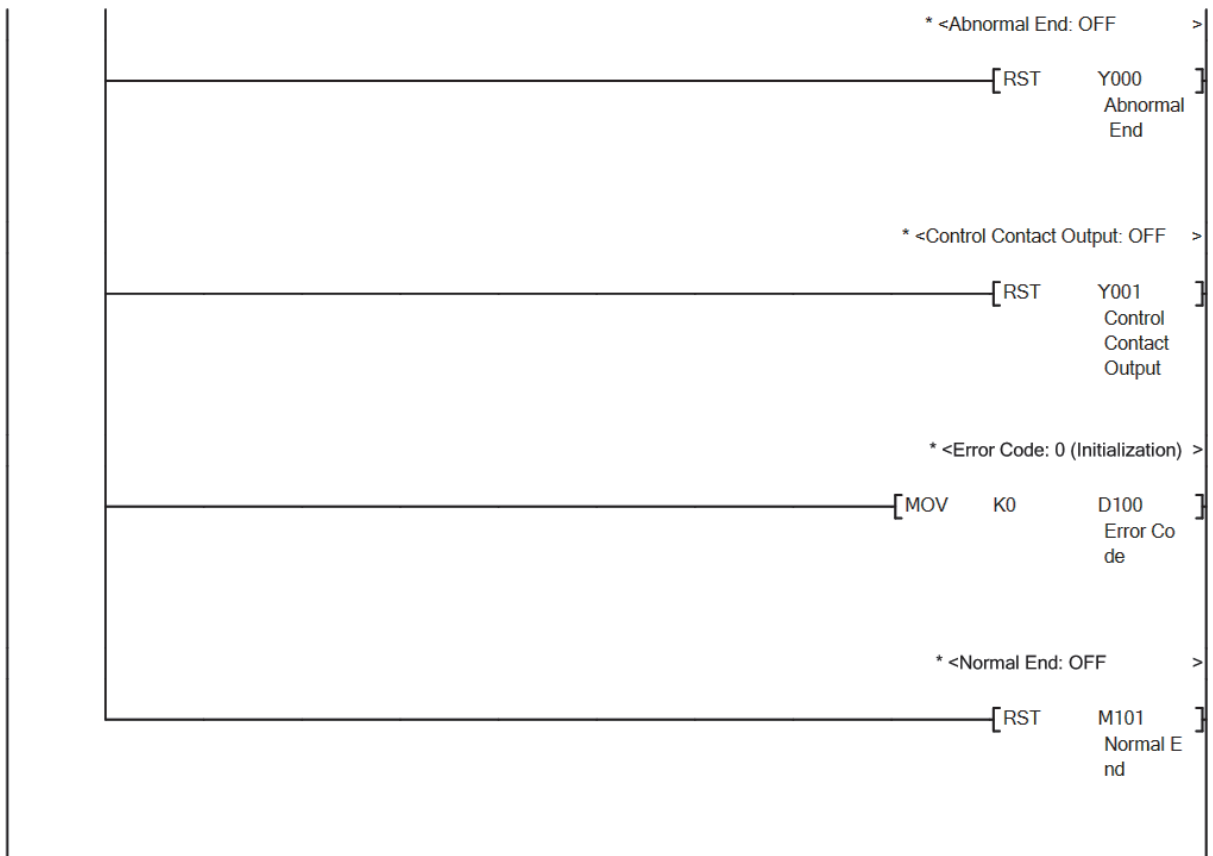
Program

\* Sample Ladder Name: 02\_LD-FX3U\_CPU\_Clock\_V100A\_E  
\* Function: ON Time Control  
\* Version: Ver.1.00A  
\*  
\* Backup Process of Index Register  
\*



\*  
\* Process of Initializing Program  
\*

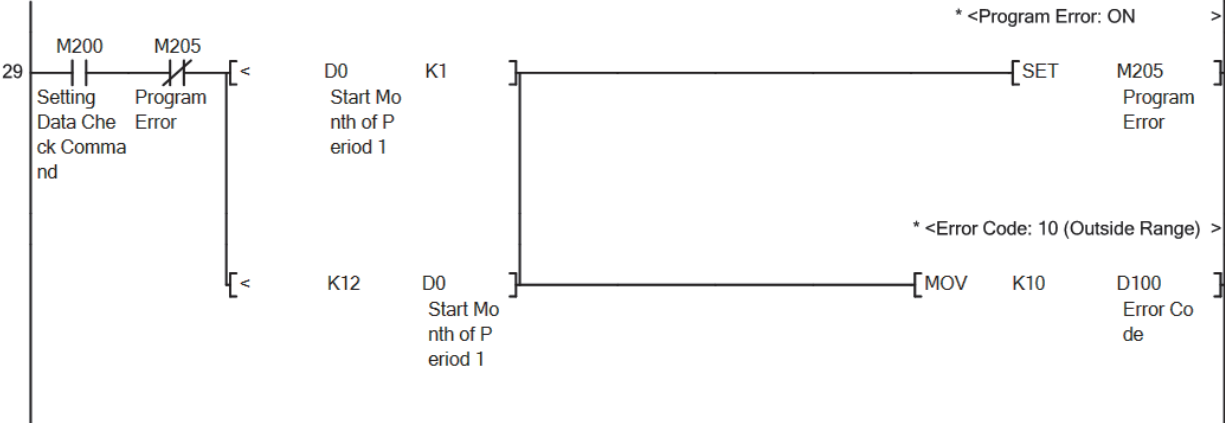




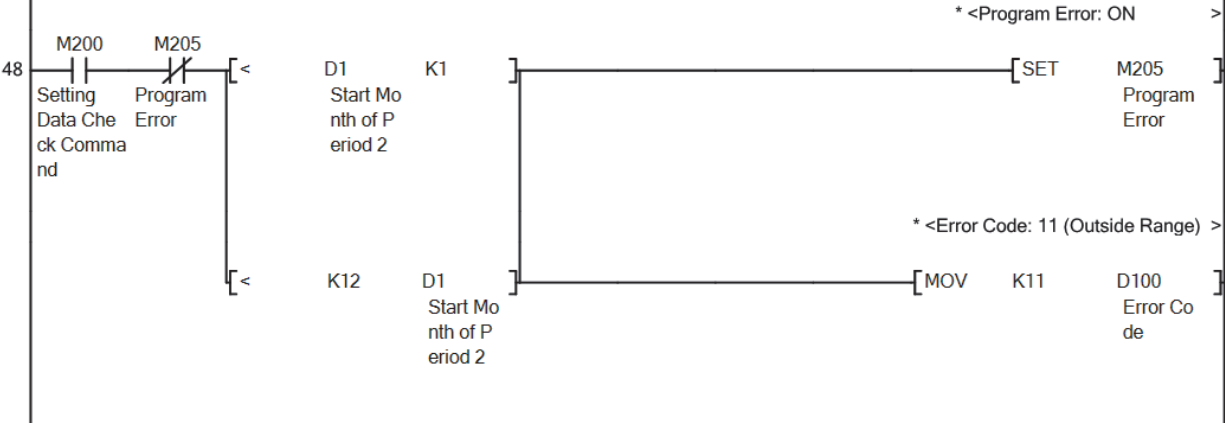
\*  
 \* Process of Executing Program  
 \*



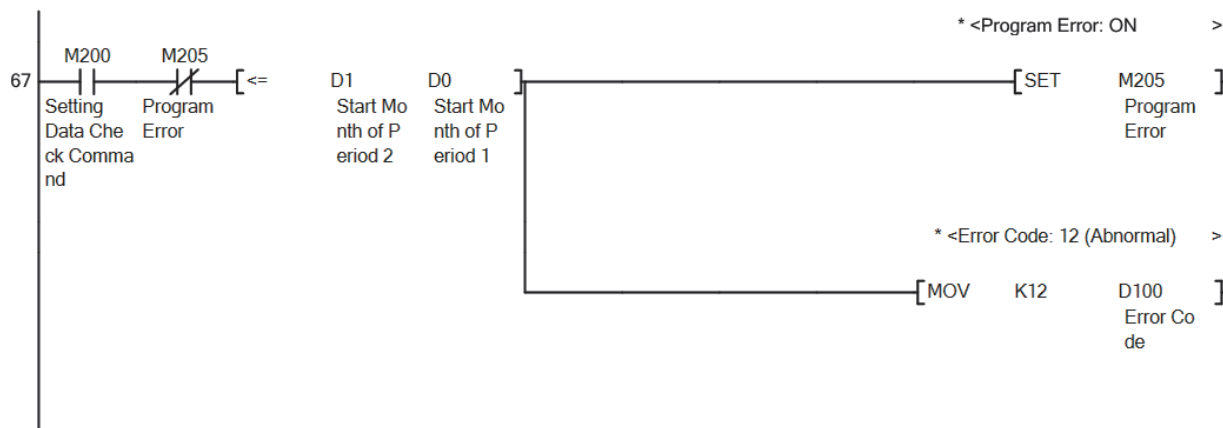
\*  
\* Process of Checking Preset Data  
\*  
\* Confirm Range of Start Month of Period 1  
\*



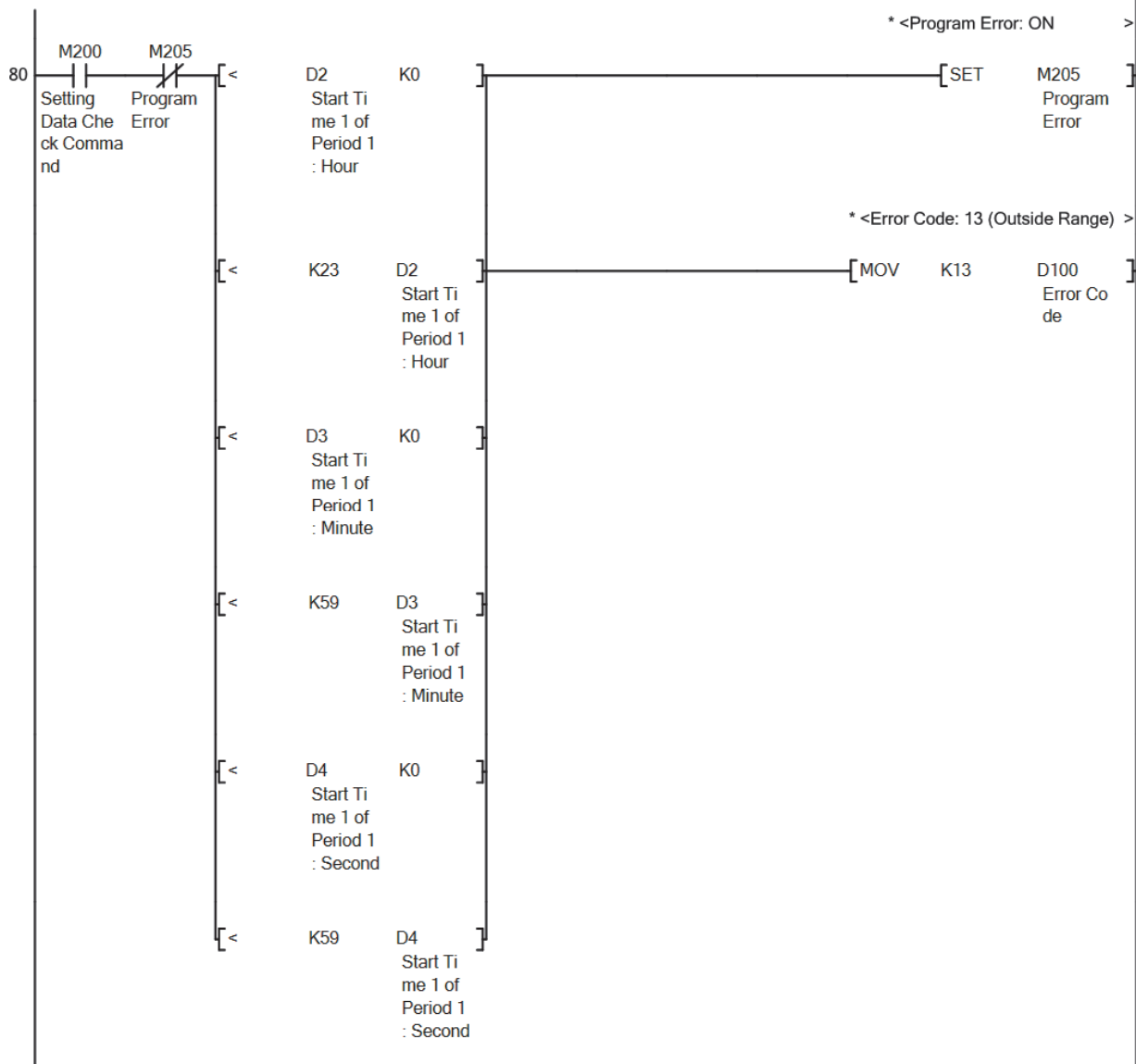
\*  
\* Confirm Range of Start Month of Period 2  
\*



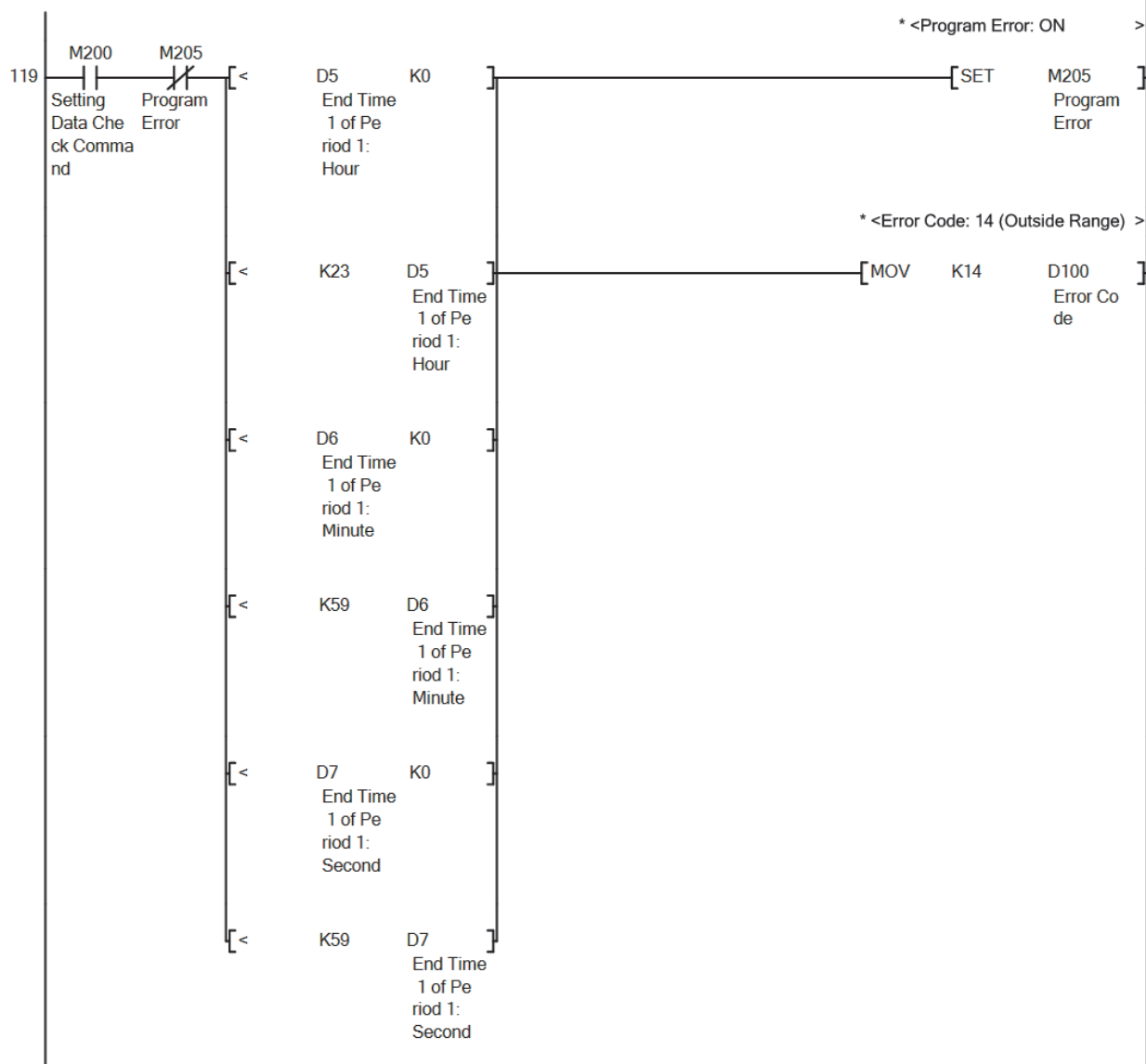
\*  
 \* Confirm Order of Period 1 Start Month/Period 2 Start Month  
 \*



\*  
 \* Confirm Range of Start Time 1 of Period 1  
 \*

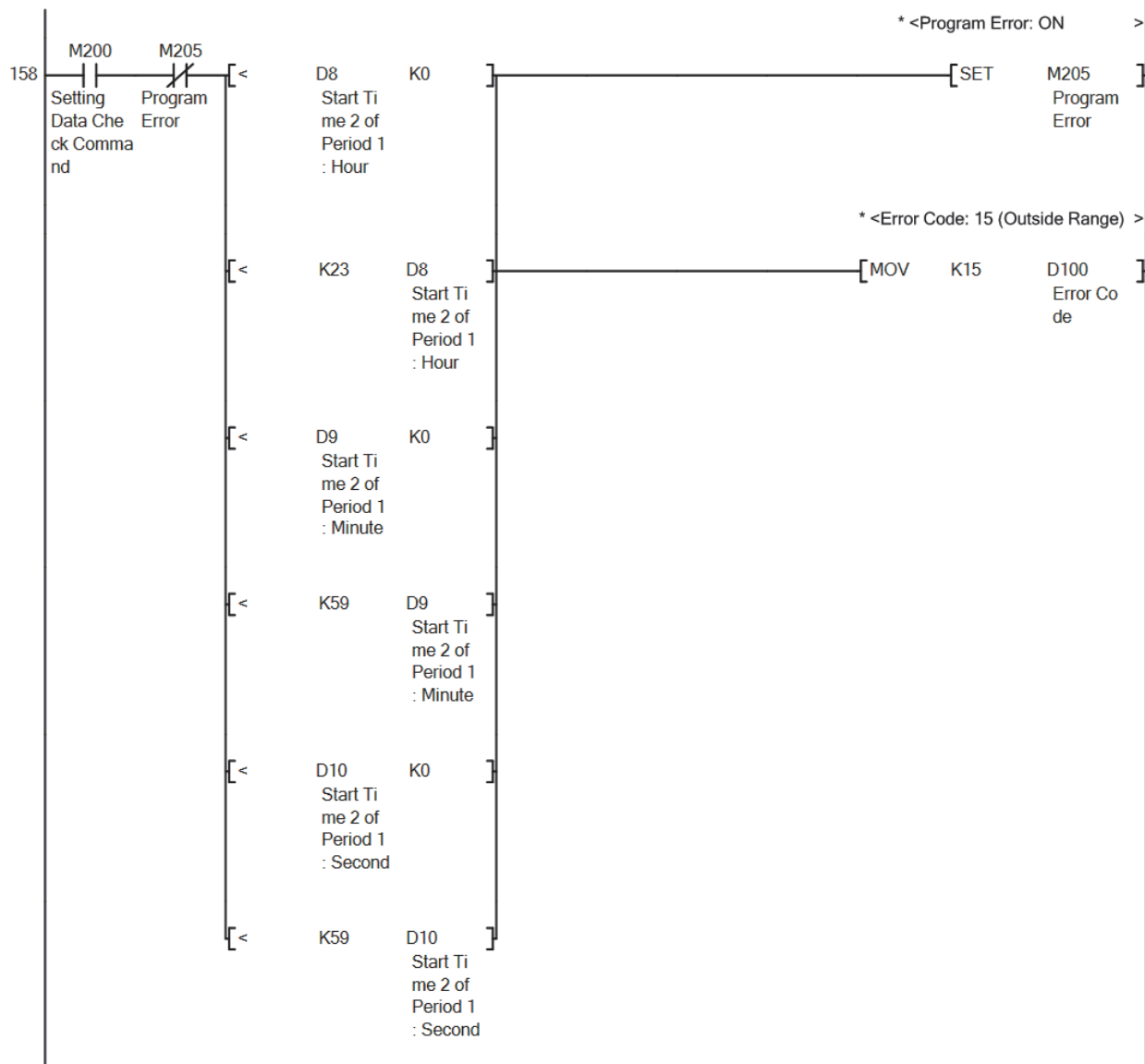


\*  
 \* Confirm Range of End Time 1 of Period 1  
 \*





\*  
 \* Confirm Range of Start Time 2 of Period 1  
 \*



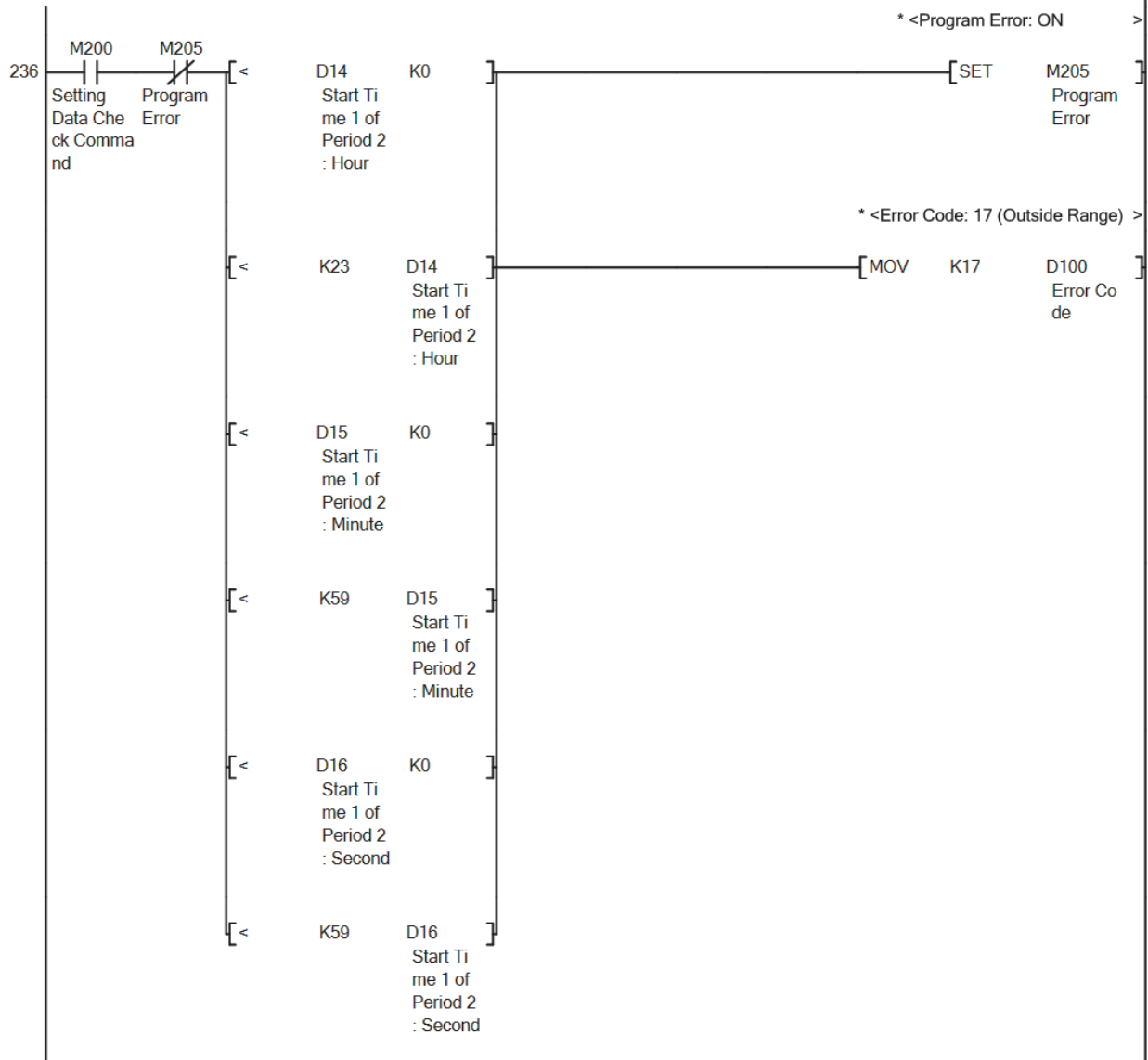
\* Confirm Range of End Time 2 of Period 2

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JY997D70601A

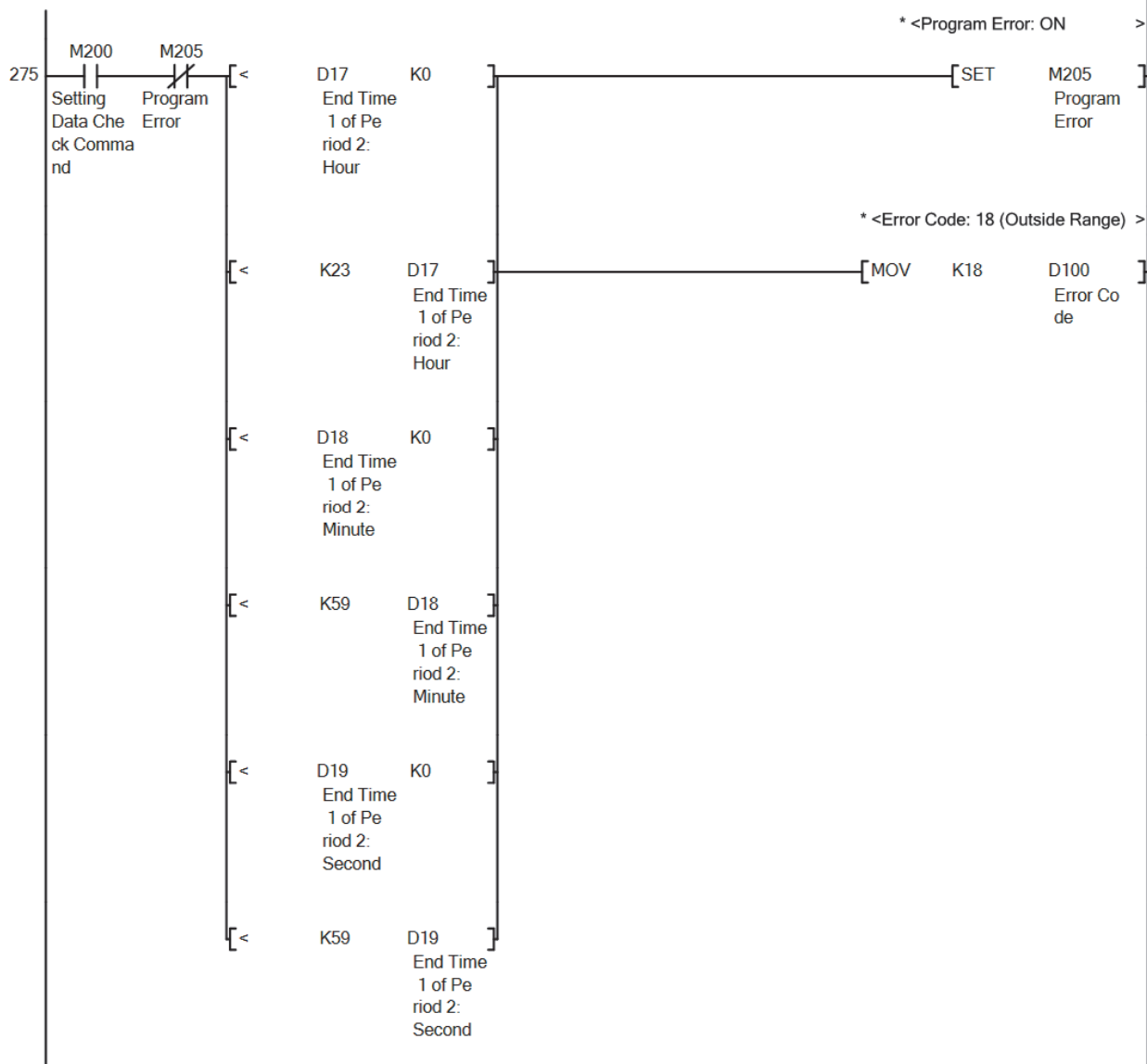
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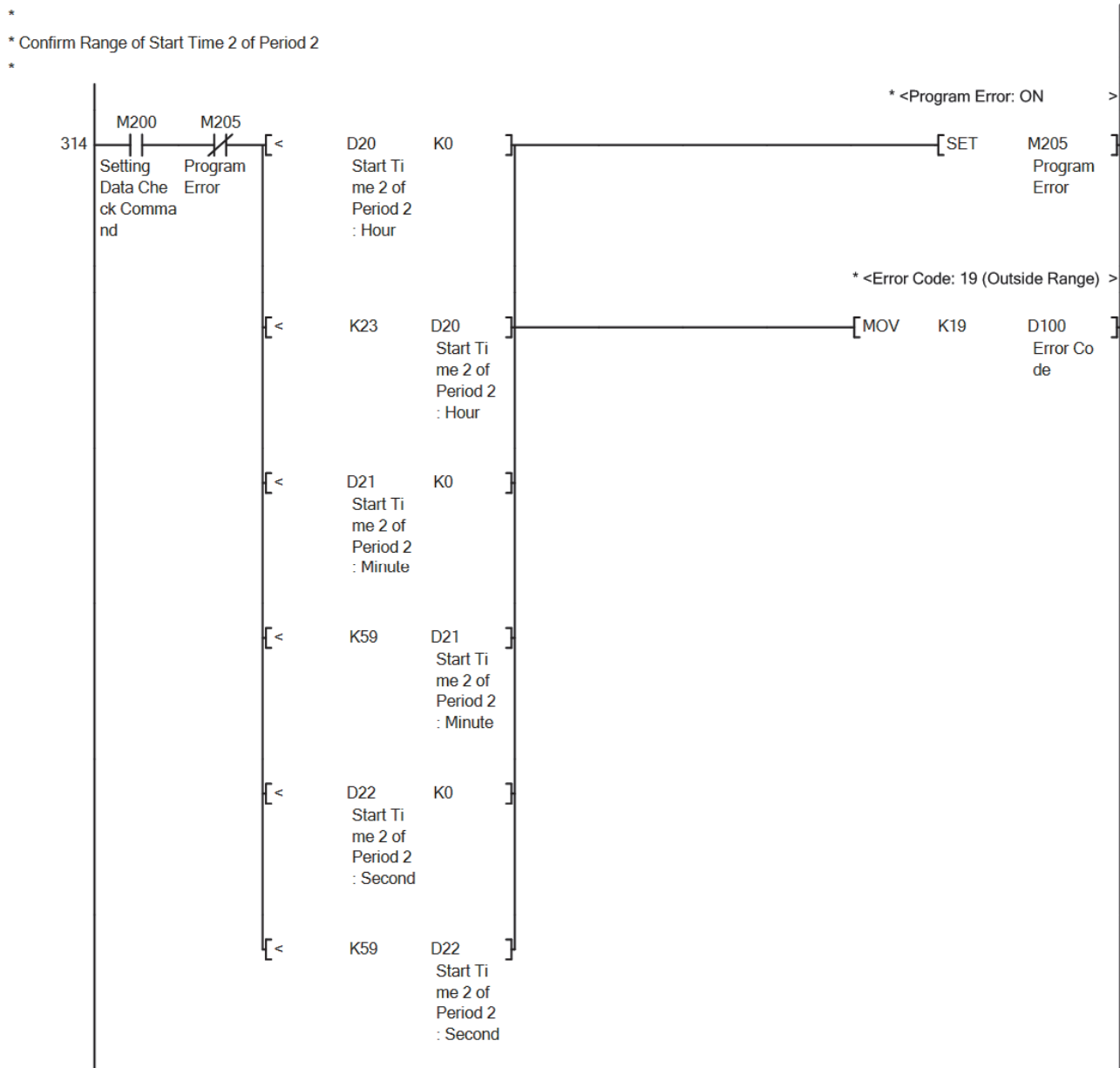
\* Confirm Range of Start Time 1 of Period 2

\*

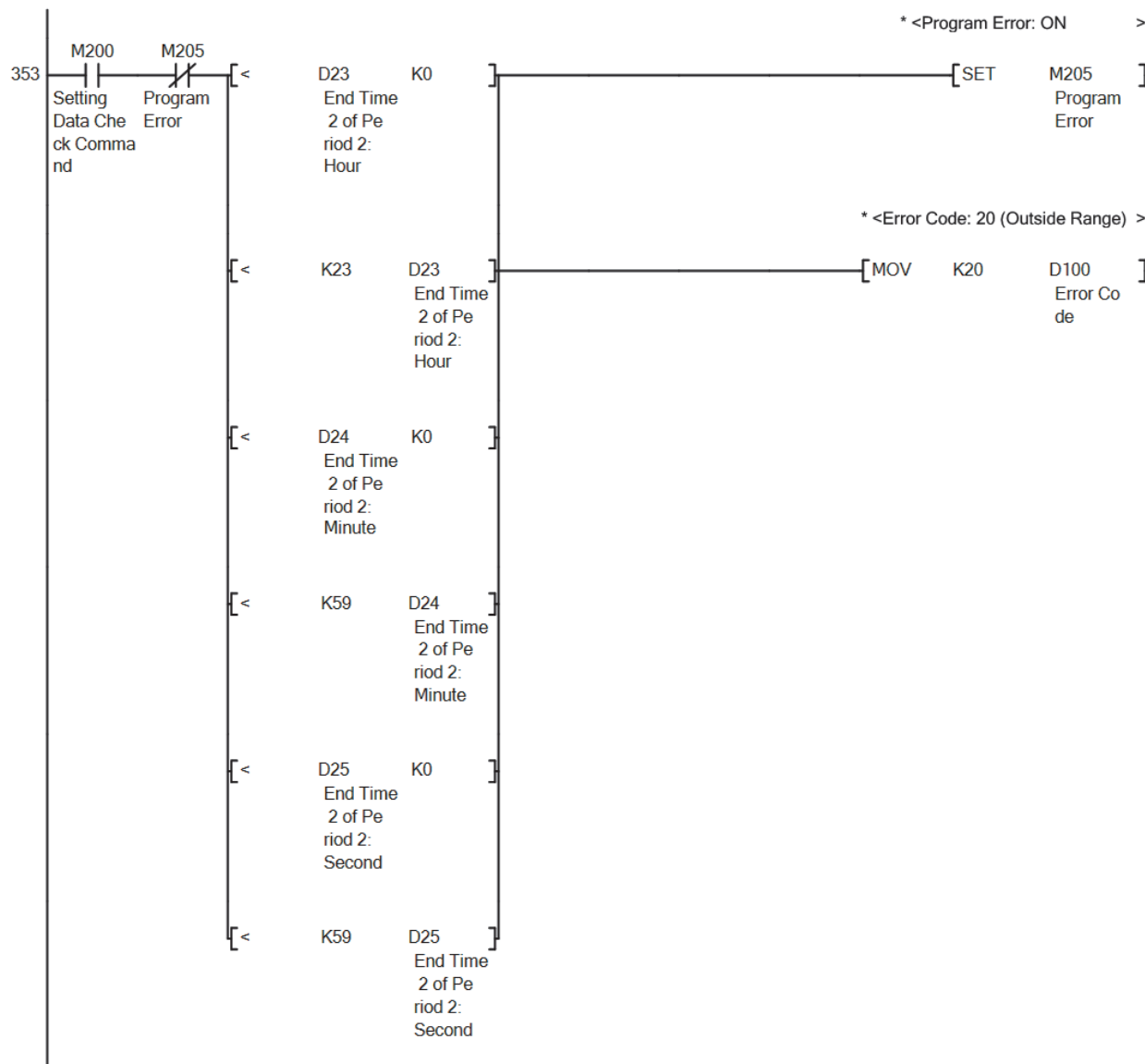


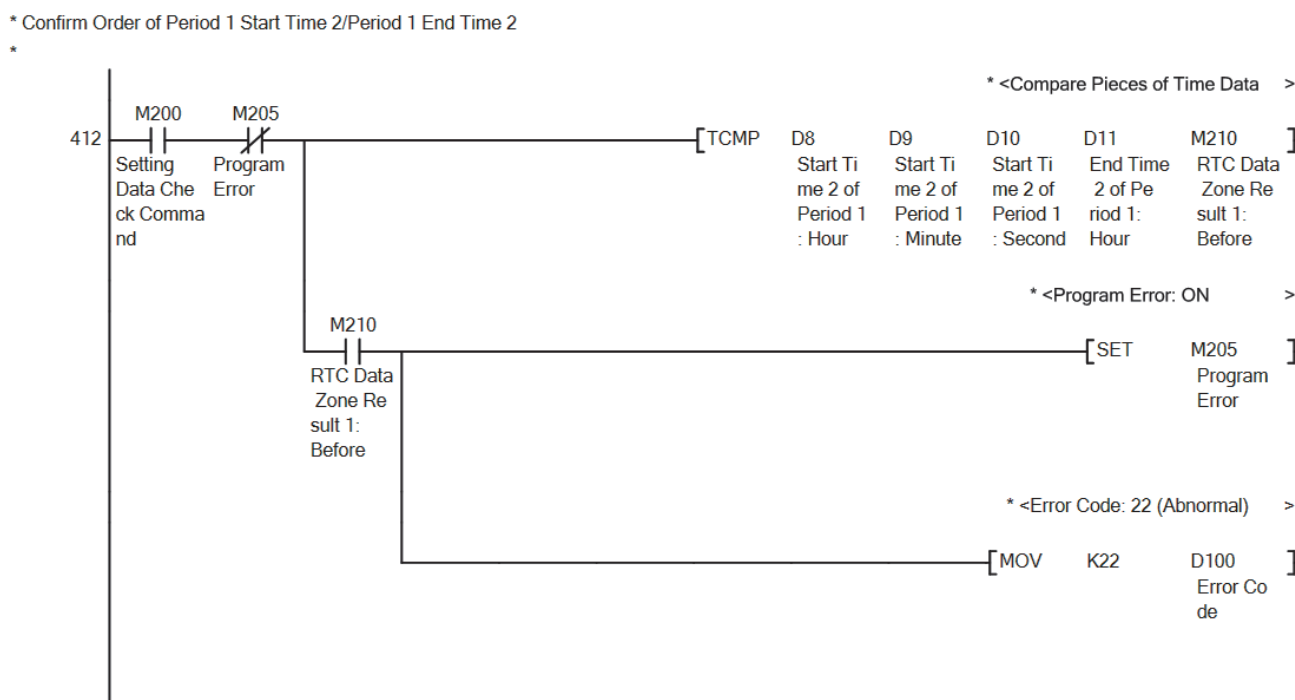
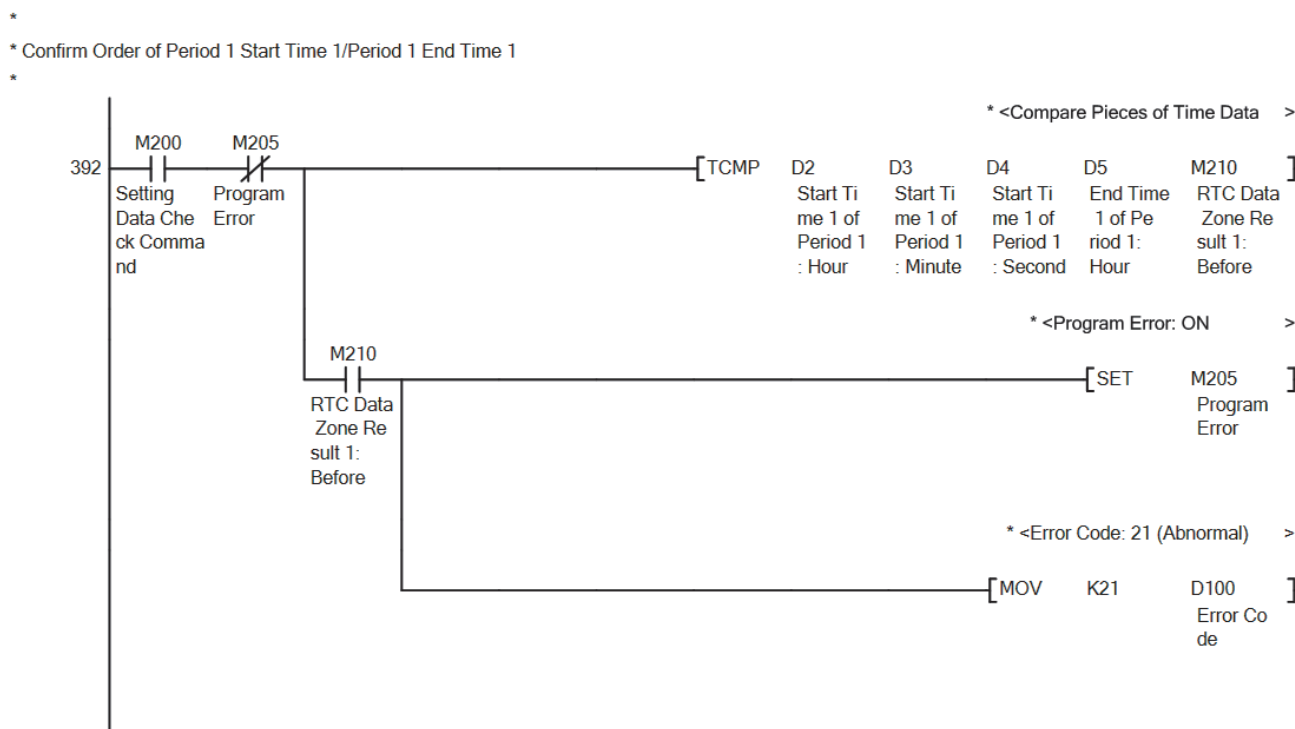
\*  
 \* Confirm Range of End Time 1 of Period 2  
 \*

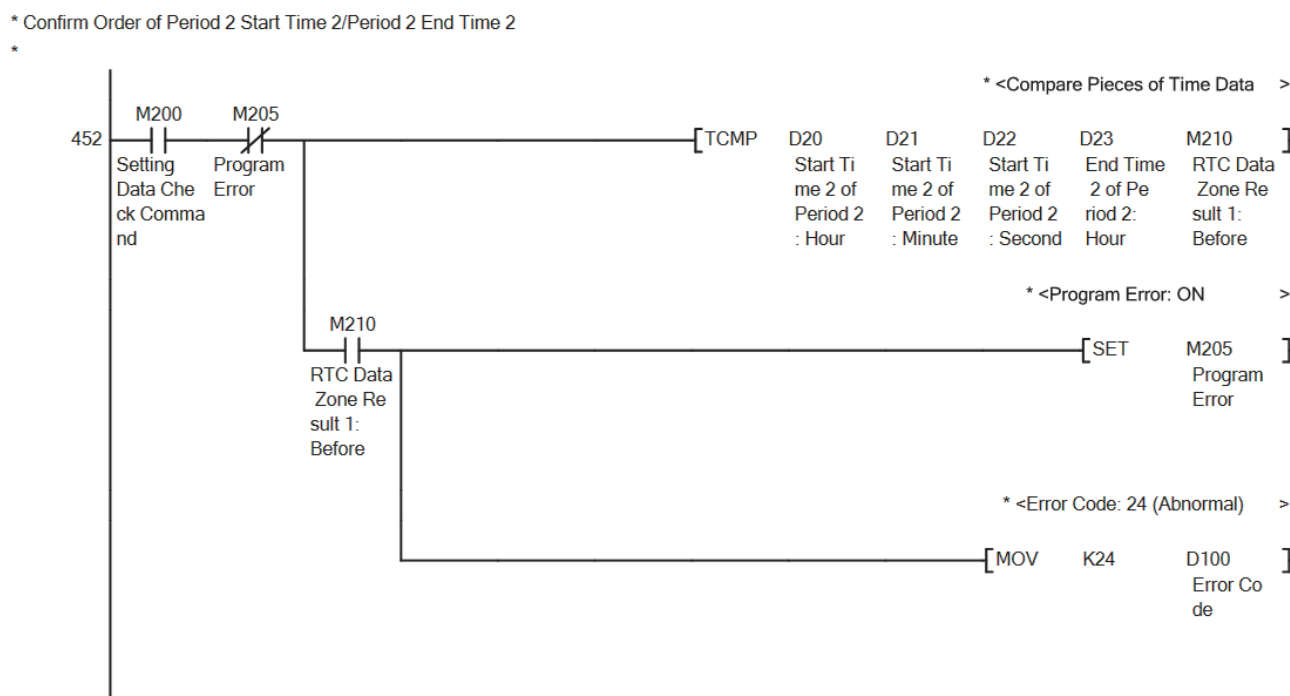
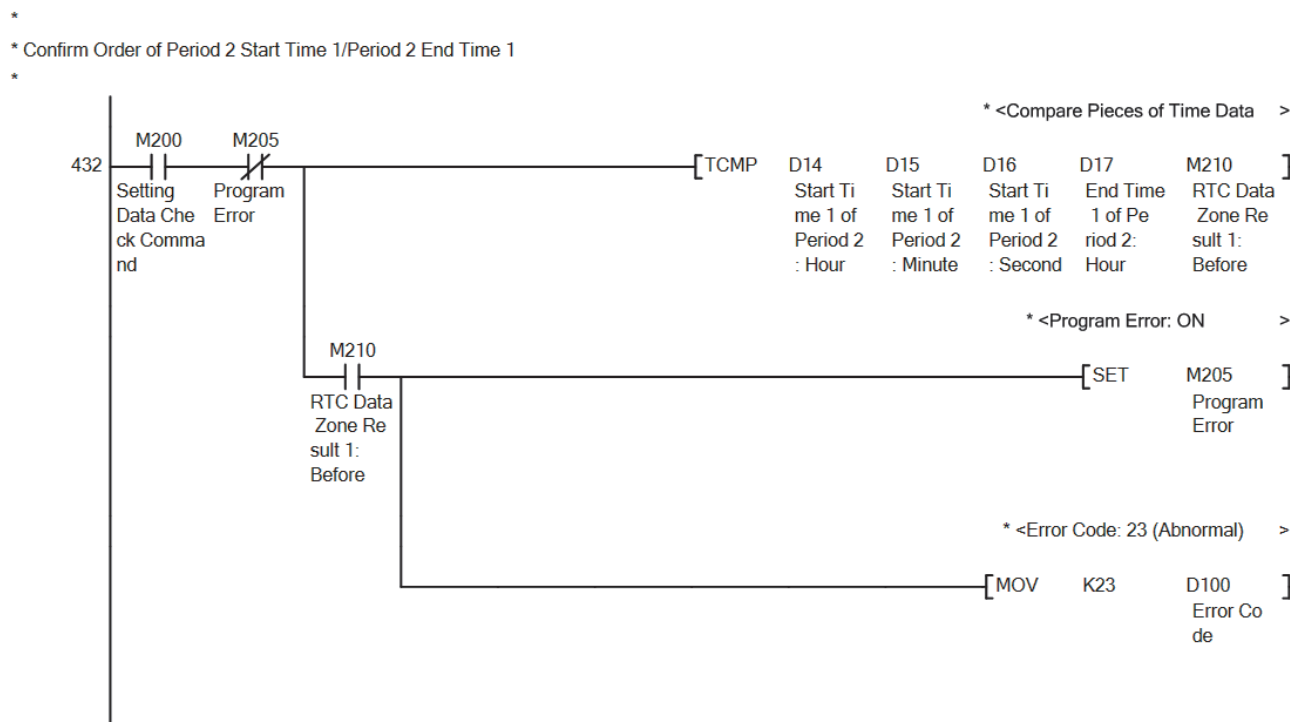




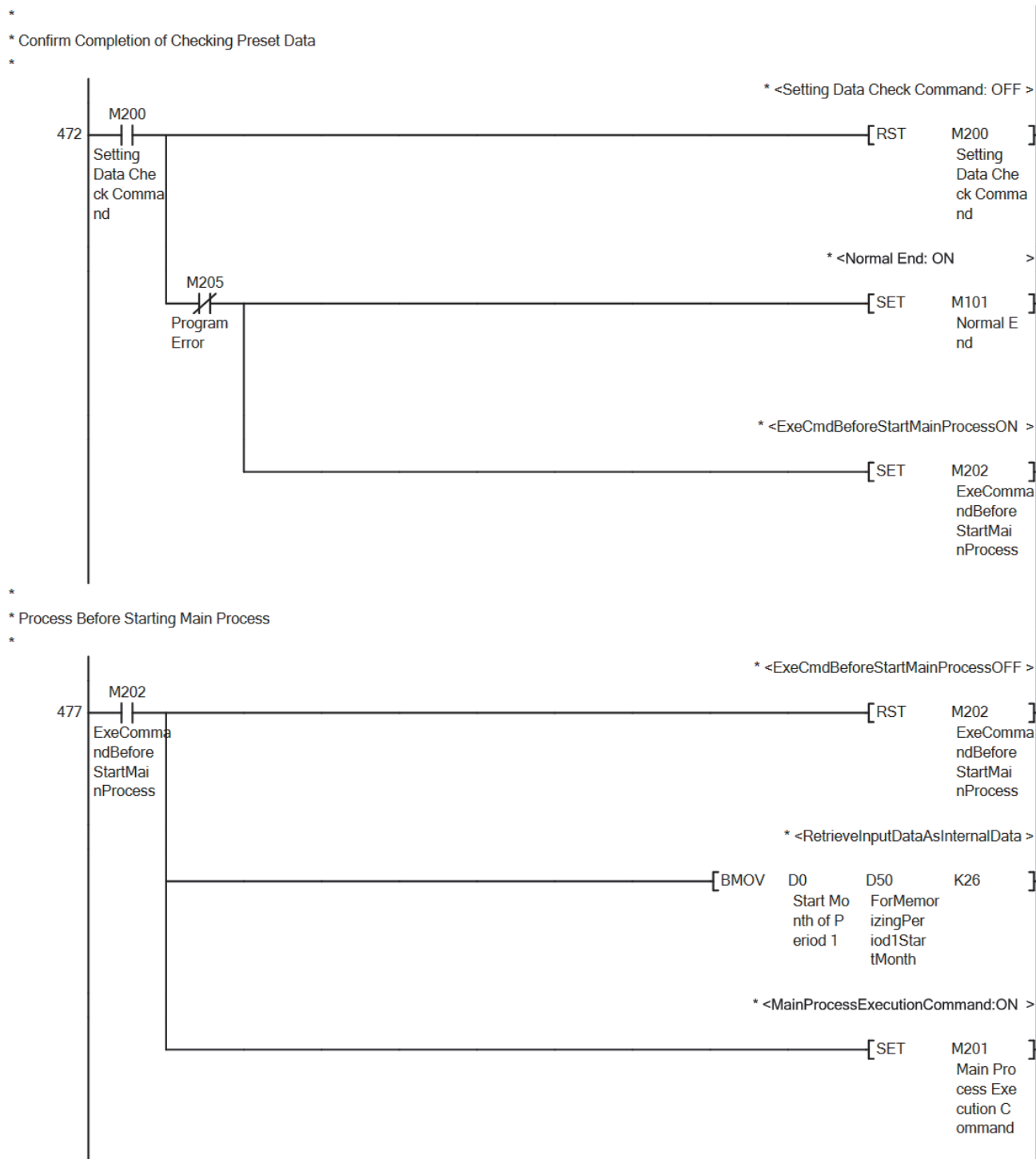
\*  
 \* Confirm Range of End Time 2 of Period 2  
 \*



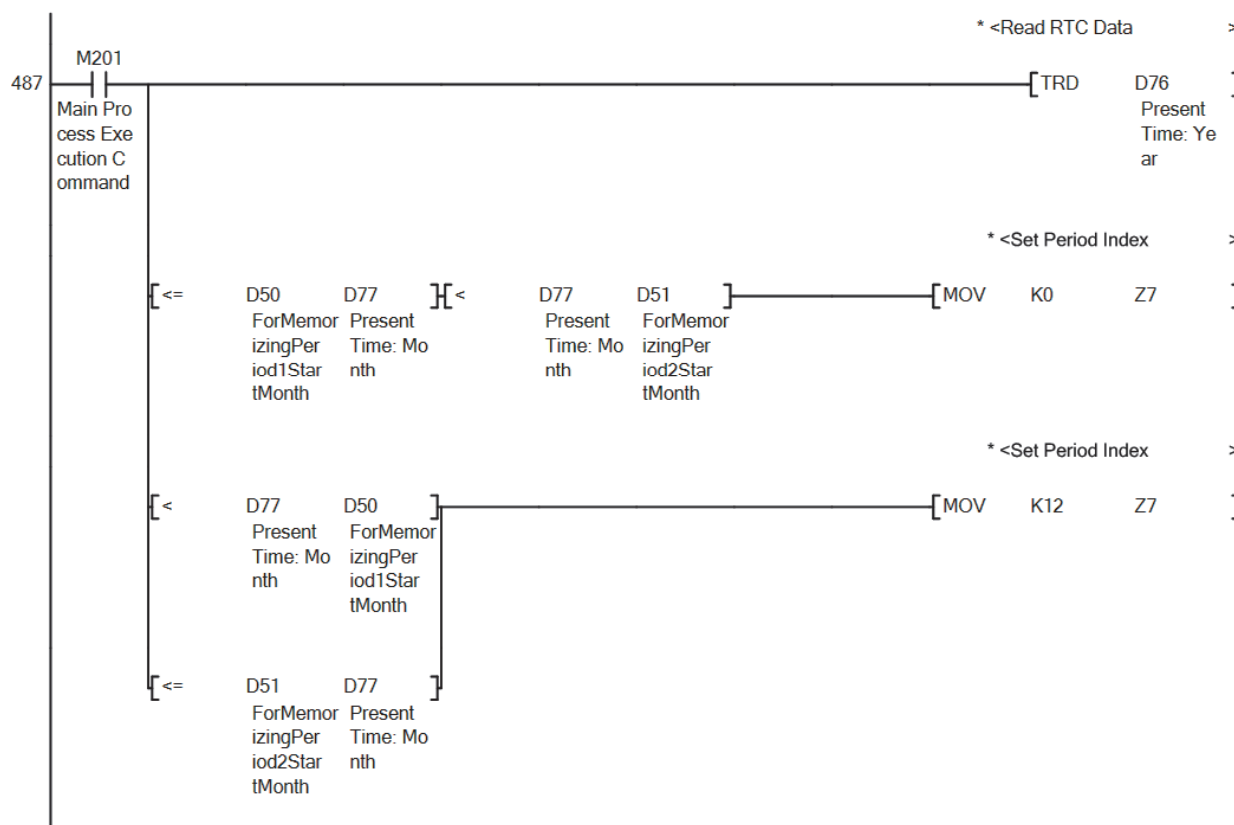


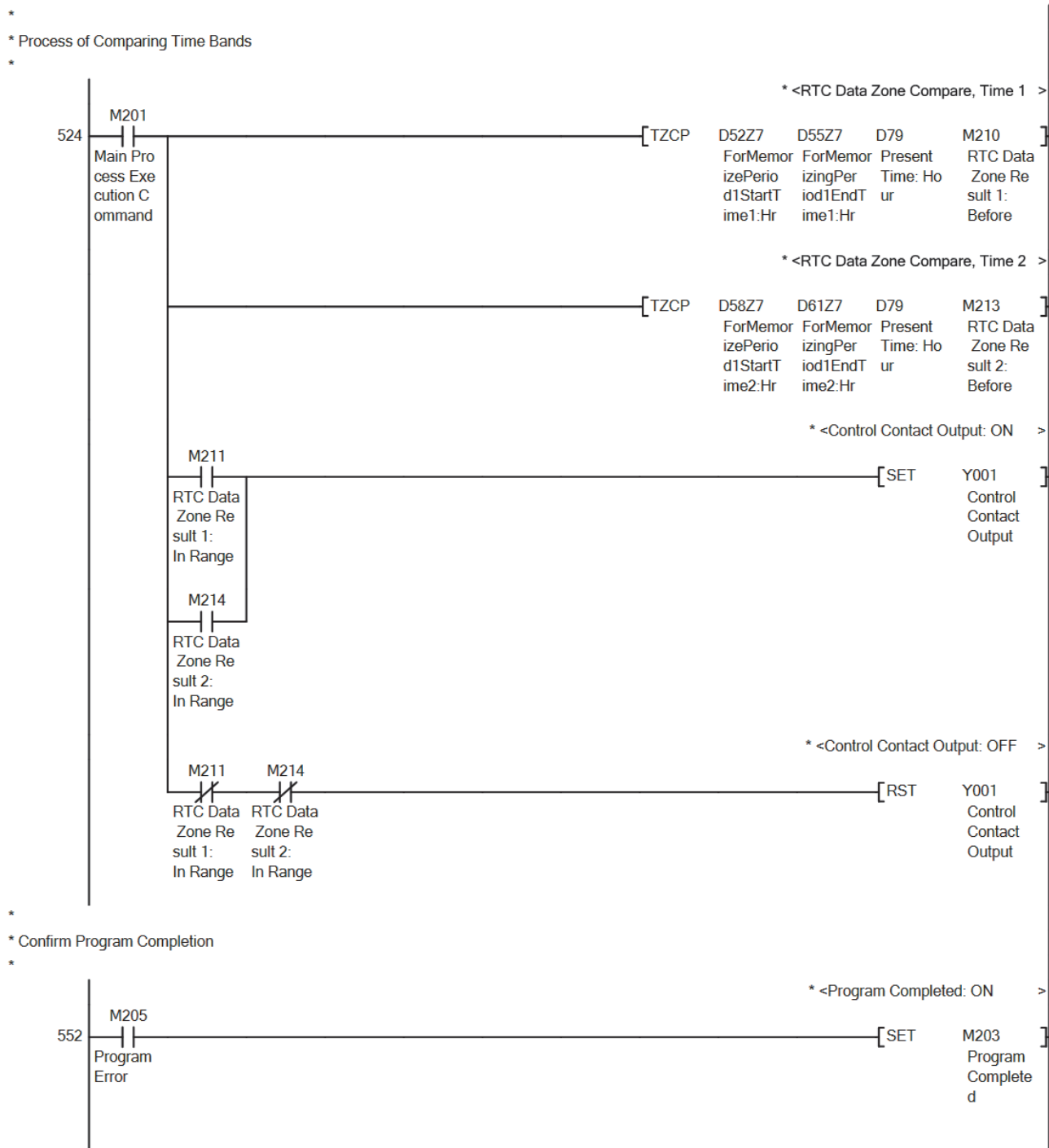


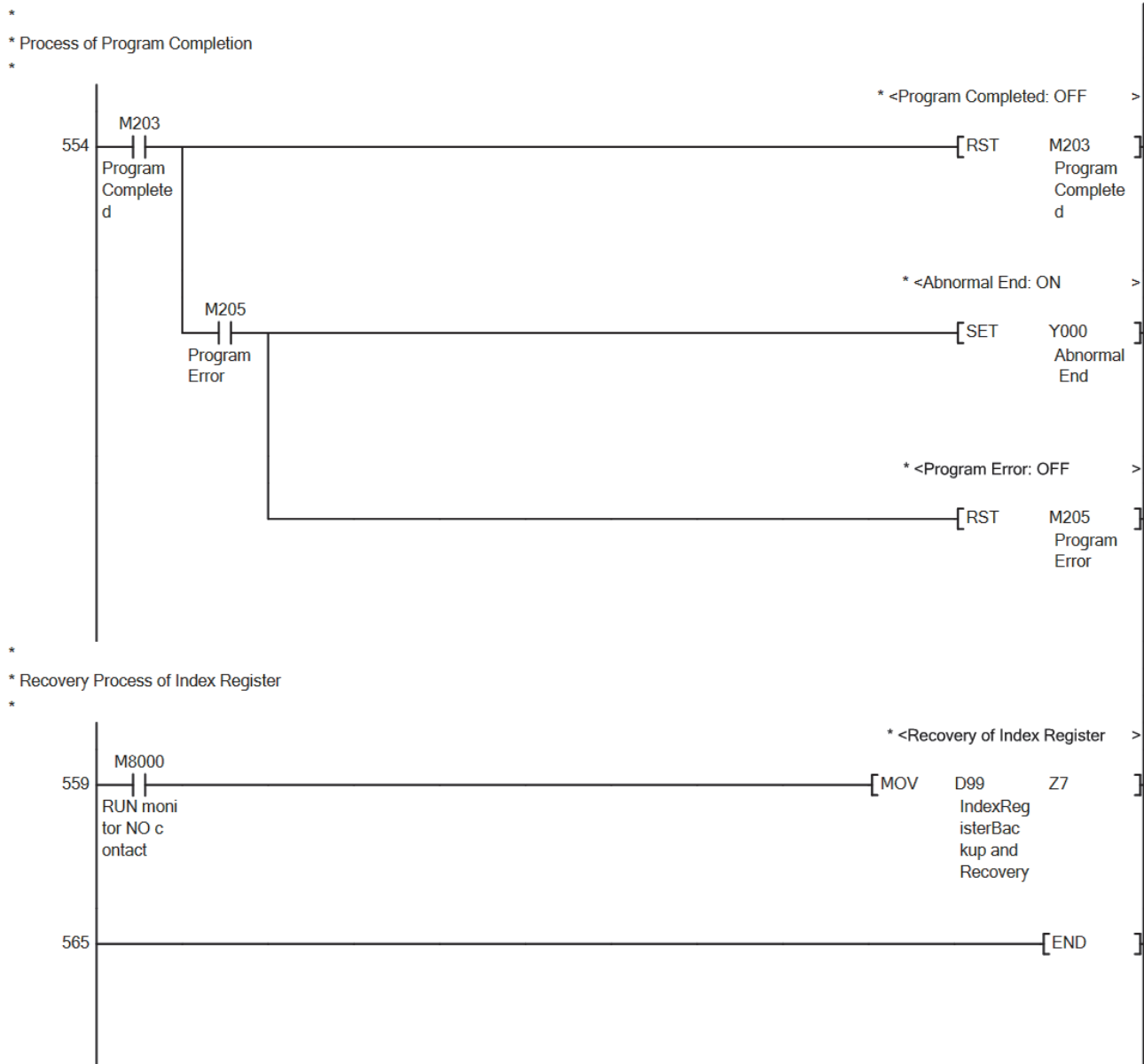




- \* Execute ON Time Control Process
- \* Process of Determining Period of Time Used







## 2. 3. STMR instruction implementation (03\_LD-FX3G\_CPU\_Clock\_V100A\_E)

### Outline of System

An operation equivalent to the STMR instruction is realized with ladder.

#### ■ Description of functions

- (1) When the execution command (M0) turns ON, an operation equivalent to the STMR Instruction is carried out so the off-delay timer, one-shot timer, and flicker timer can be created easily.
- (2) If the input value is incorrect, Abnormal End (Y000) turns ON, and the process is halted. The error code is stored in error code (D100). For the error codes, refer to error code in devices used (D100).

### Programs Used

This program is targeted for FX3S, FX3G and FX3GC. Use the STMR instruction with the FX3U and FX3UC.

The projects used in this program are indicated below.

No.	Project name	Function name	Remark
1	03_LD-FX3G_CPU_Clock_V100A_E	STMR instruction implementation	This product is created with FX3G/FX3GC. When using with a model other than the provided project, change the PLC type using the engineering tool.

### Devices used

The devices used in this program are indicated below.

#### Input device

No.	Device name	Data type	Kind	Device comment	Remark
1	M0	Bit	Input	Execution command	ON: The program starts. OFF: The program does not start.
2	D0	Word	Input	Set value of the timer	Sets the timer with a 0.1 second unit. [Valid range (decimal)] 1 --- 32767

#### Output device

No.	Device name	Data type	Kind	Device comment	Remark
1	Y000	Bit	Output	Abnormal end	When ON, it means an error has occurred in the program.
2	M100	Bit	Output	Execution status	ON: The execution command n is ON. OFF: The execution command is OFF.
3	M101	Bit	Output	Normal end	When ON, it means that the process has ended.
4	M110 --- M113	Bit	Output	Timer output	Stores the timer output results. M110: Correspond [D·] of STMR command M111: Correspond [D·+1] of STMR command M112: Correspond [D·+2] of STMR command M113: Correspond [D·+3] of STMR command
5	D100	Word	Output	Error code	Stores the error code that occurred in the program. [Error code (decimal)] 10: Set value of the timer is out-of-range.

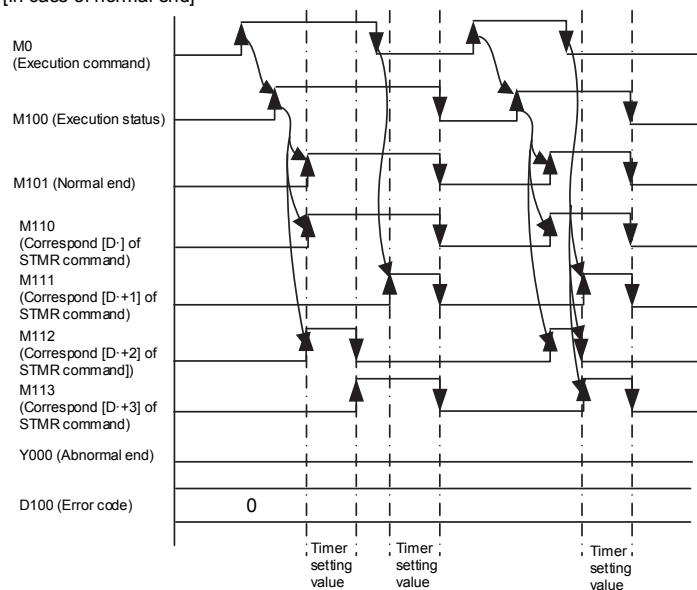
## Internal device

No.	Device name	Data type	Kind	Device comment	Remark
1	M200	Bit	Internal	Setting data check command	Holds the check command flag for the set data.
2	M201	Bit	Internal	Main process execution command	Holds the execution command flag for the main process.
3	M202	Bit	Internal	Exe command before start main process	Holds the execution command flag for the main process start pre-process.
4	M203	Bit	Internal	Program completed	Holds the program completed flag.
5	M204	Bit	Internal	Main process execution completed	Holds the execution completed flag for the main process.
6	M205	Bit	Internal	Program error	Holds the program error flag.
7	M206	Bit	Internal	Pulsed execution command	Holds the pulse conversion flag for the execution command.
8	D50	Word	Internal	For memorizing set value of timer	Holds the set value of the timer.
9	T0	Timer	Internal	For measure set time at exe command ON	This is used to measure the set time when the execution command is ON.
10	T1	Timer	Internal	For measure set time at exe command OFF	This is used to measure the set time when the execution command is OFF.

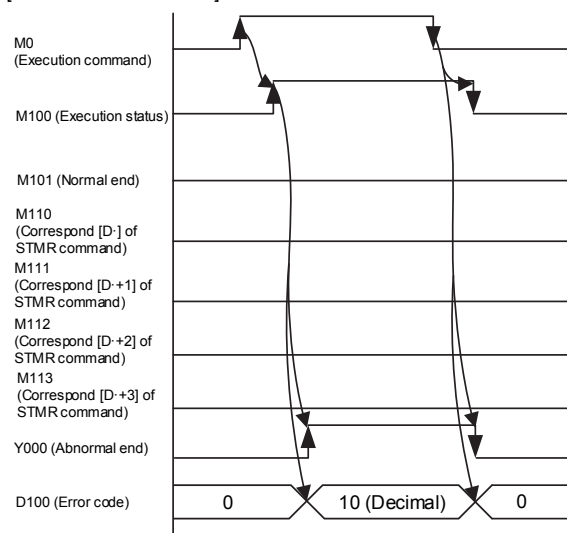
## Operation of I/O signals

■ The timing chart for this program is shown below.

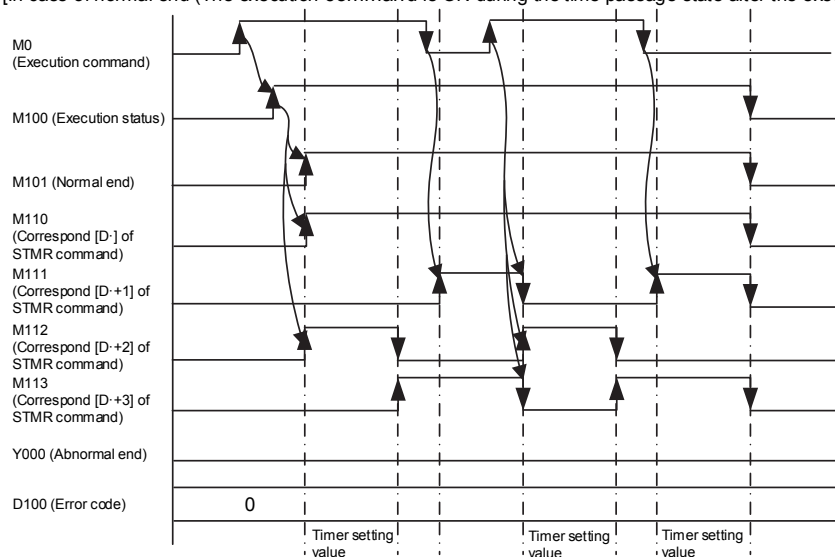
[In case of normal end]



[In case of abnormal end]



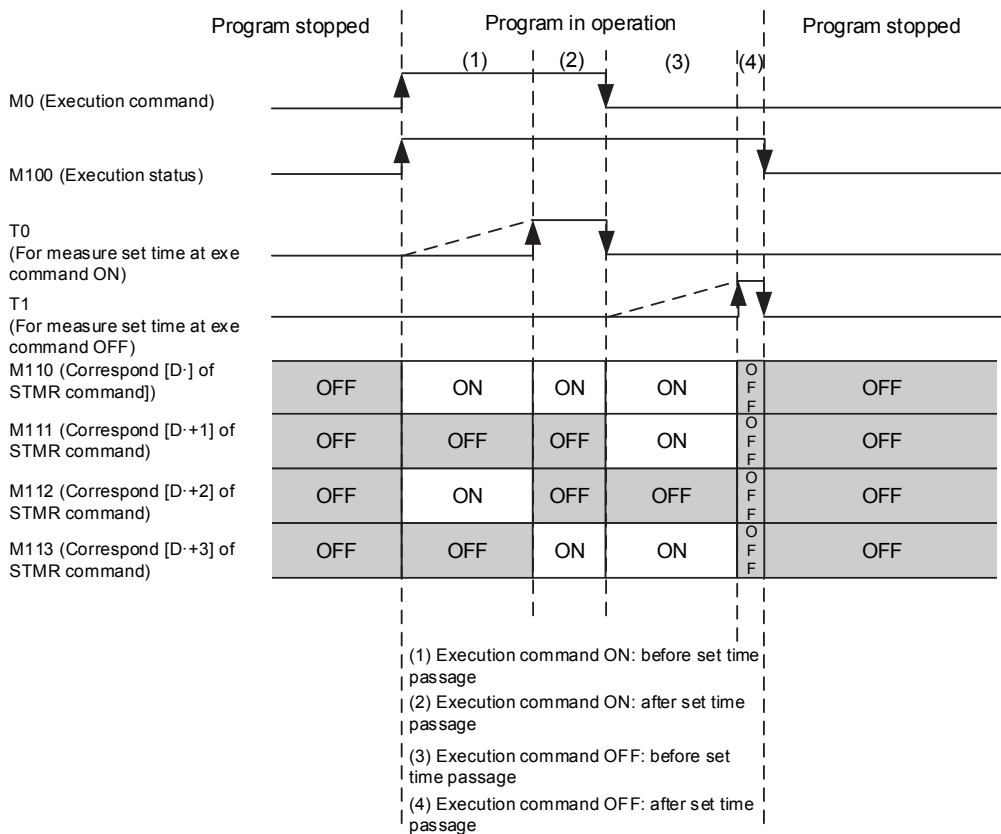
[In case of normal end (The execution command is ON during the time passage state after the execution command OFF)]



■ The processes of this program are given below.

- (1) The input data is checked when execution command (M0) changes from OFF -> ON. If there is an error, the results are output to error code (D100). When the data is normal, the input data is retrieved into the internal device.
- (2) Measures the set time. The timer used switches as shown below when the execution command turns ON and OFF.
  - When the execution command is ON, the timer (T0) for measuring the set time during the execution command ON counts up.
  - When the execution command is OFF, the timer (T1) for measuring the set time during the execution command OFF counts up.
- (3) To realize an operation equivalent to the STMR instruction's [D · ], the M110 ON/OFF state is shown below according to the execution command ON/OFF state and the before/after set time passage state.
  - Execution command ON, before set time passage: ON
  - Execution command ON, after set time passage: ON
  - Execution command OFF, before set time passage: ON
  - Execution command OFF, after set time passage: OFF
- (4) To realize an operation equivalent to the STMR instruction's [D · +1], the M111 ON/OFF state is shown below according to the execution command ON/OFF state and the before/after set time passage state.
  - Execution command ON, before set time passage: OFF
  - Execution command ON, after set time passage: OFF
  - Execution command OFF, before set time passage: ON
  - Execution command OFF, after set time passage: OFF
- (5) To realize an operation equivalent to the STMR instruction's [D · +2], the M112 ON/OFF state is shown below according to the execution command ON/OFF state and the before/after set time passage state.
  - Execution command ON, before set time passage: ON
  - Execution command ON, after set time passage: OFF
  - Execution command OFF, before set time passage: OFF
  - Execution command OFF, after set time passage: OFF
- (6) To realize an operation equivalent to the STMR instruction's [D · +3], the M113 ON/OFF state is shown below according to the execution command ON/OFF state and the before/after set time passage state.
  - Execution command ON, before set time passage: OFF
  - Execution command ON, after set time passage: ON
  - Execution command OFF, before set time passage: ON
  - Execution command OFF, after set time passage: OFF

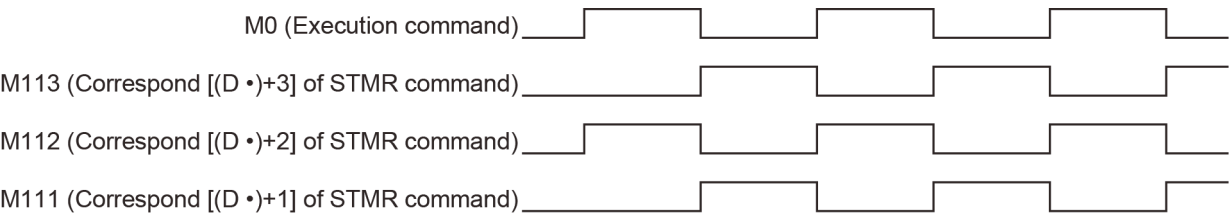
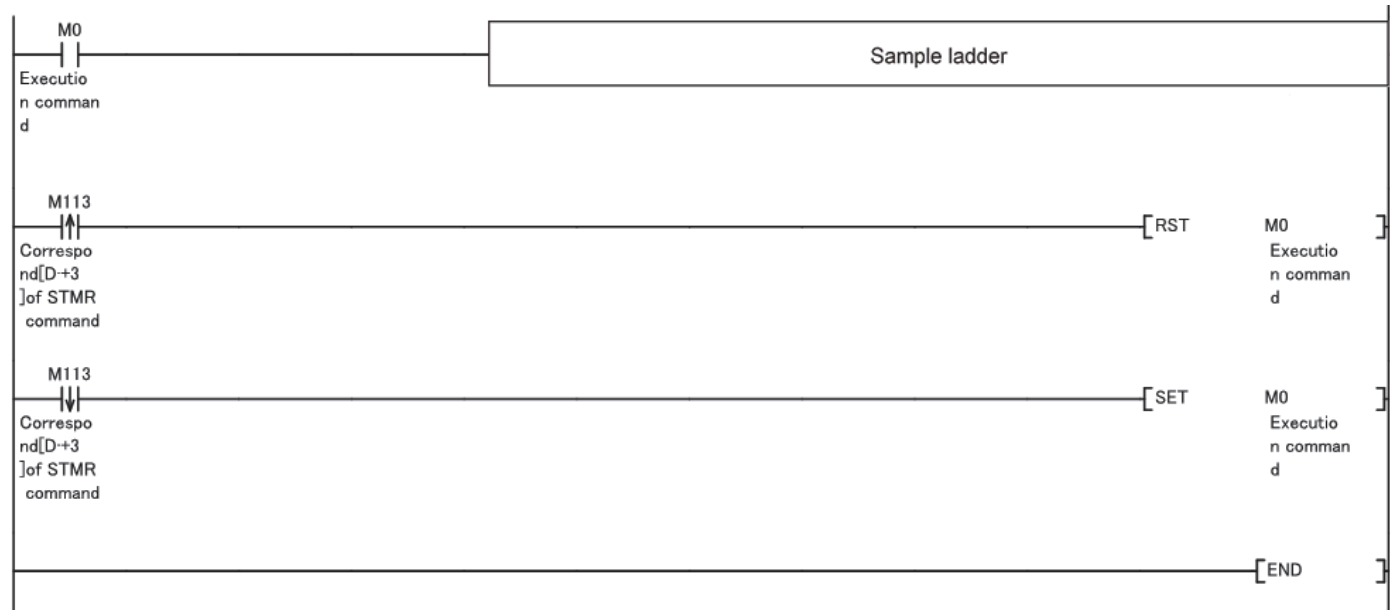
The operation of this program is shown below.





The (M113) equivalent to the STMR instruction's [D • +3] in the output device's timer output is used for the flicker. As shown in the following program, when the execution command (M0) turns ON and OFF, (M111) equivalent to the STMR instruction [(D • )+1] and (M112) equivalent to the STMR instruction [D • +2] is output.

- Rising edge equivalent to STMR instruction [D • +3]: Execution command OFF
- Falling edge equivalent to STMR instruction [D • +3]: Execution command ON

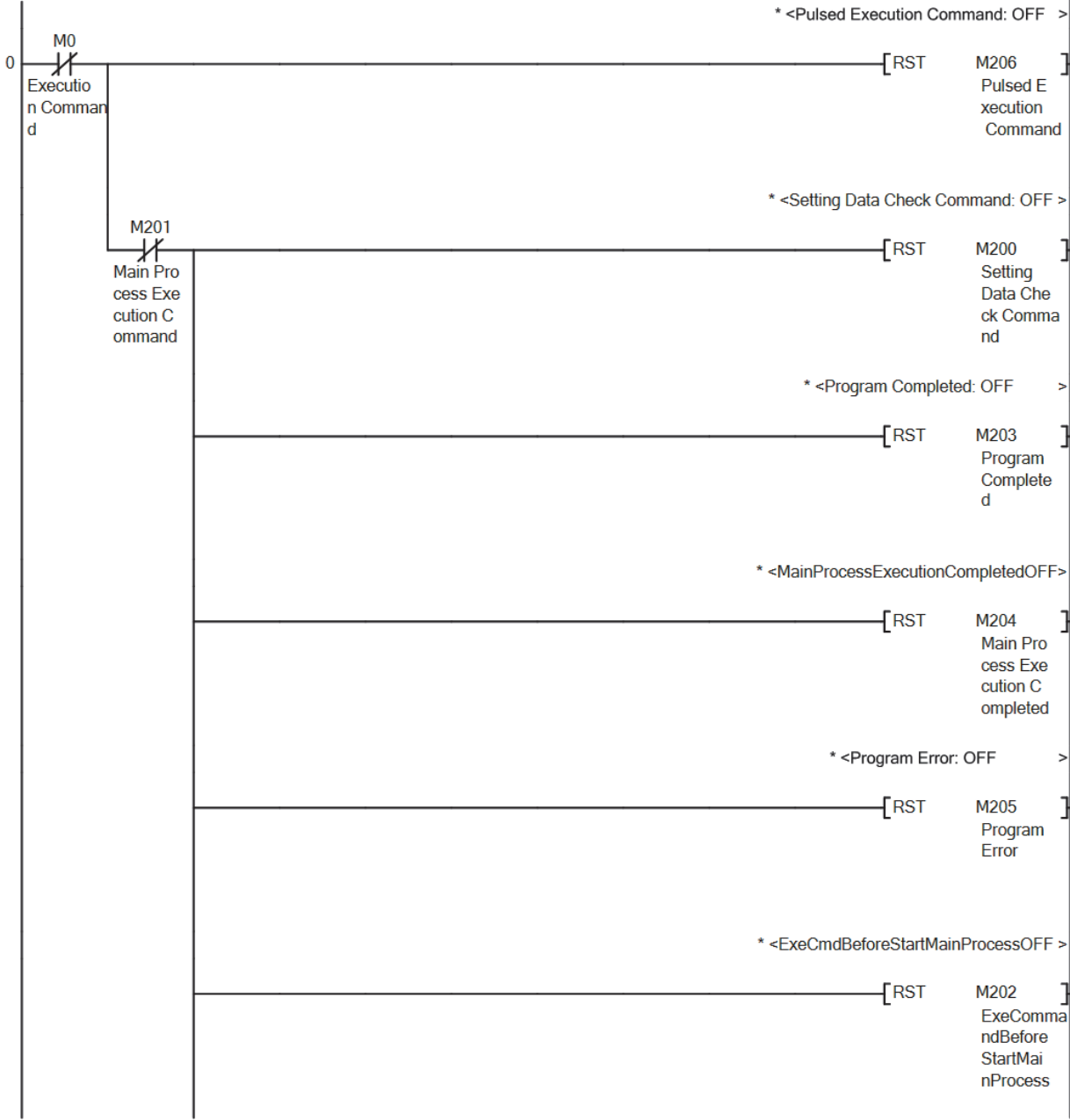


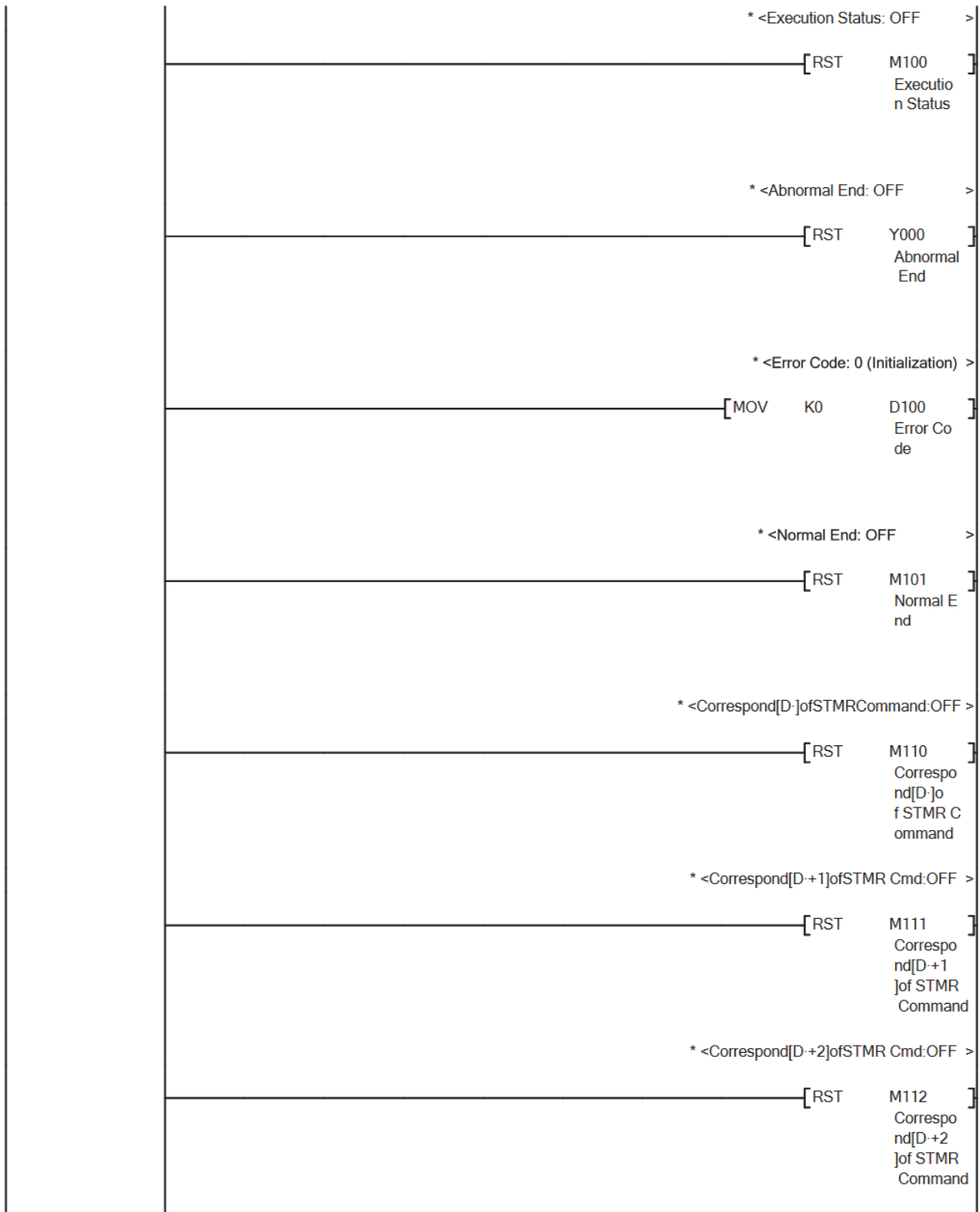
Version upgrade history

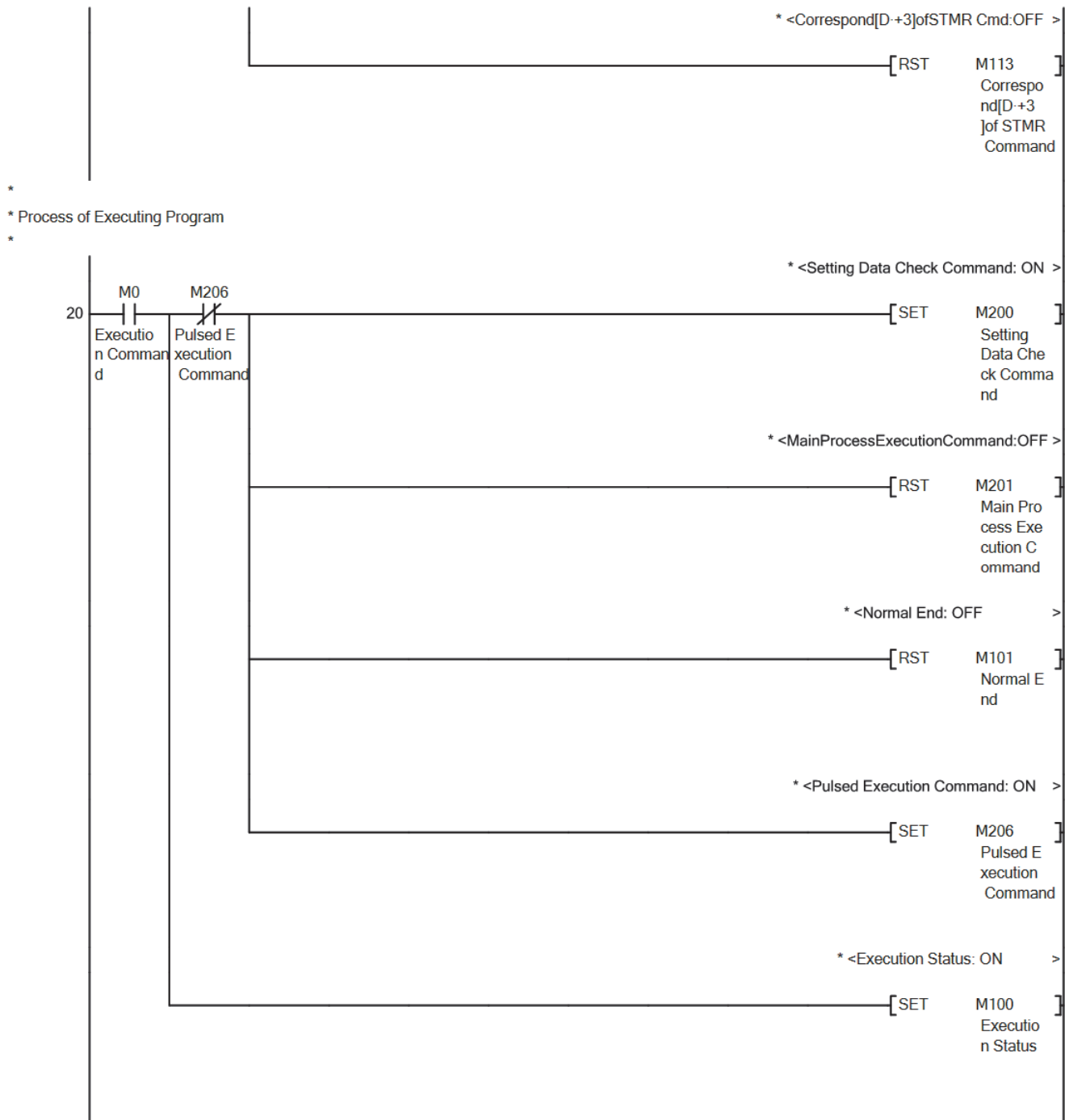
Version	Date	Description
Ver. 1.00A	October, 2016	First Edition

# Program

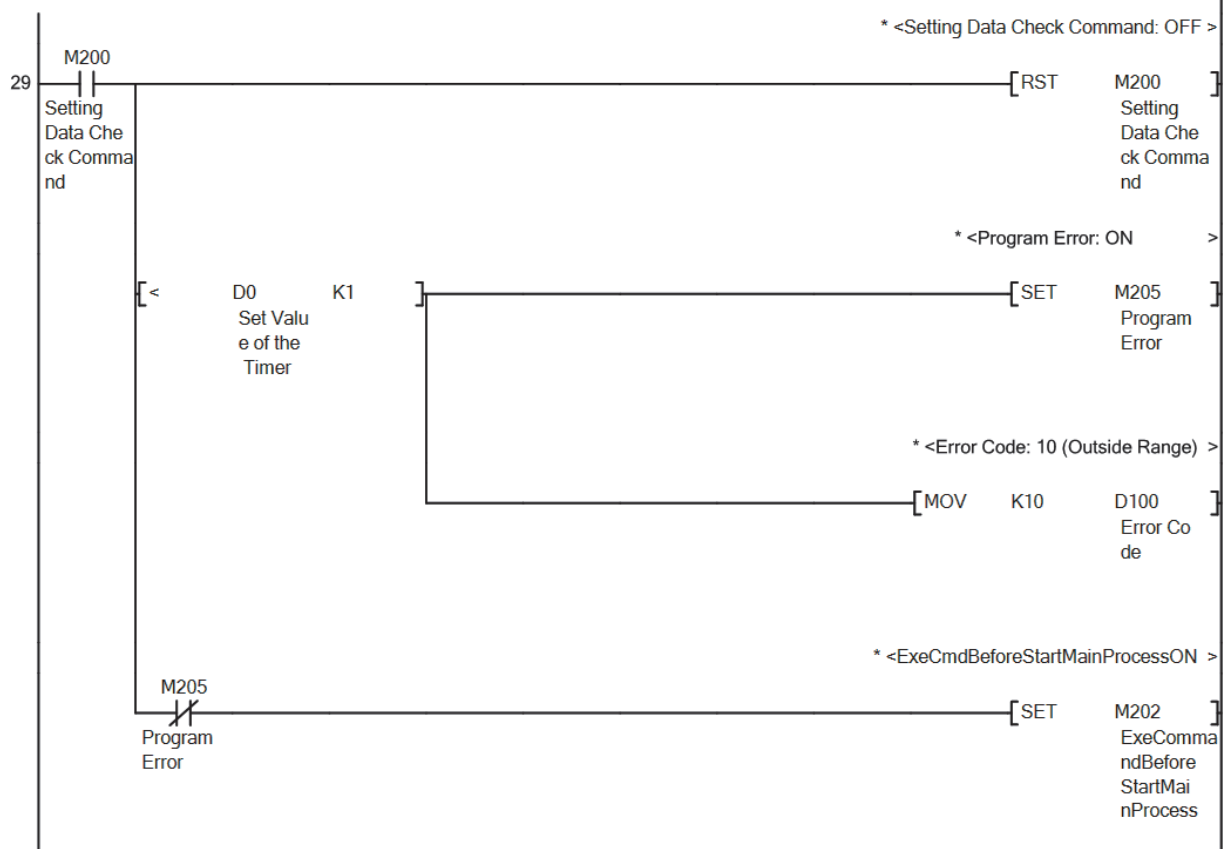
\* Sample Ladder Name: 03\_LD-FX3G\_CPU\_Clock\_V100A\_E  
\* Function: STMR Instruction Implementation  
\* Version: Ver.1.00A  
\*  
\* Process of Initializing Program  
\*

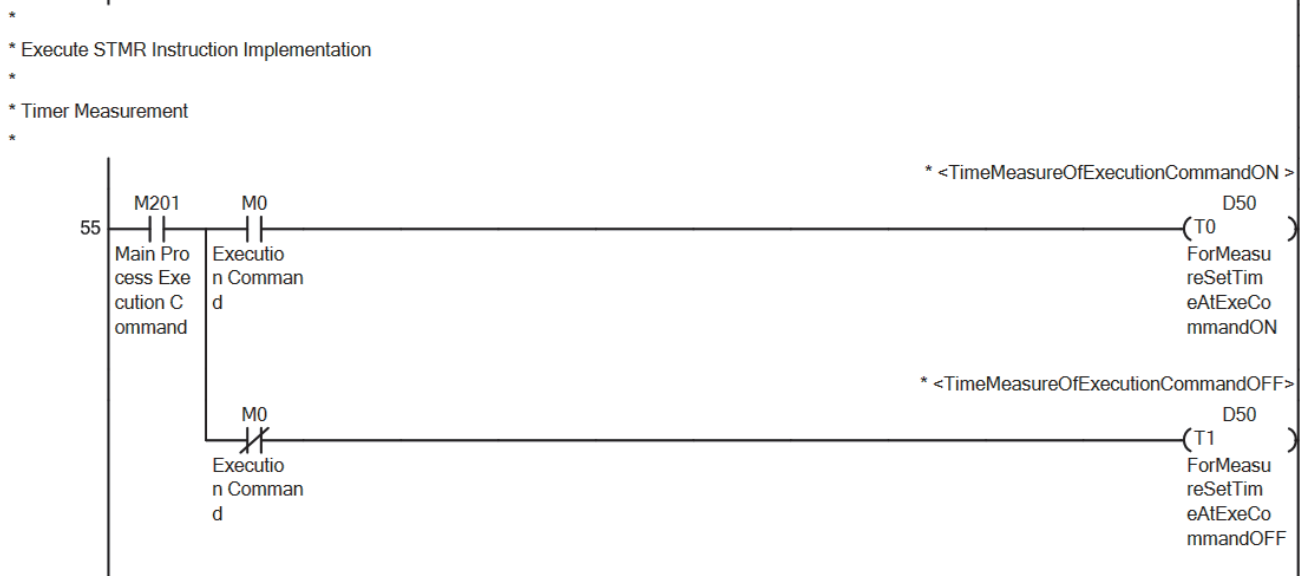
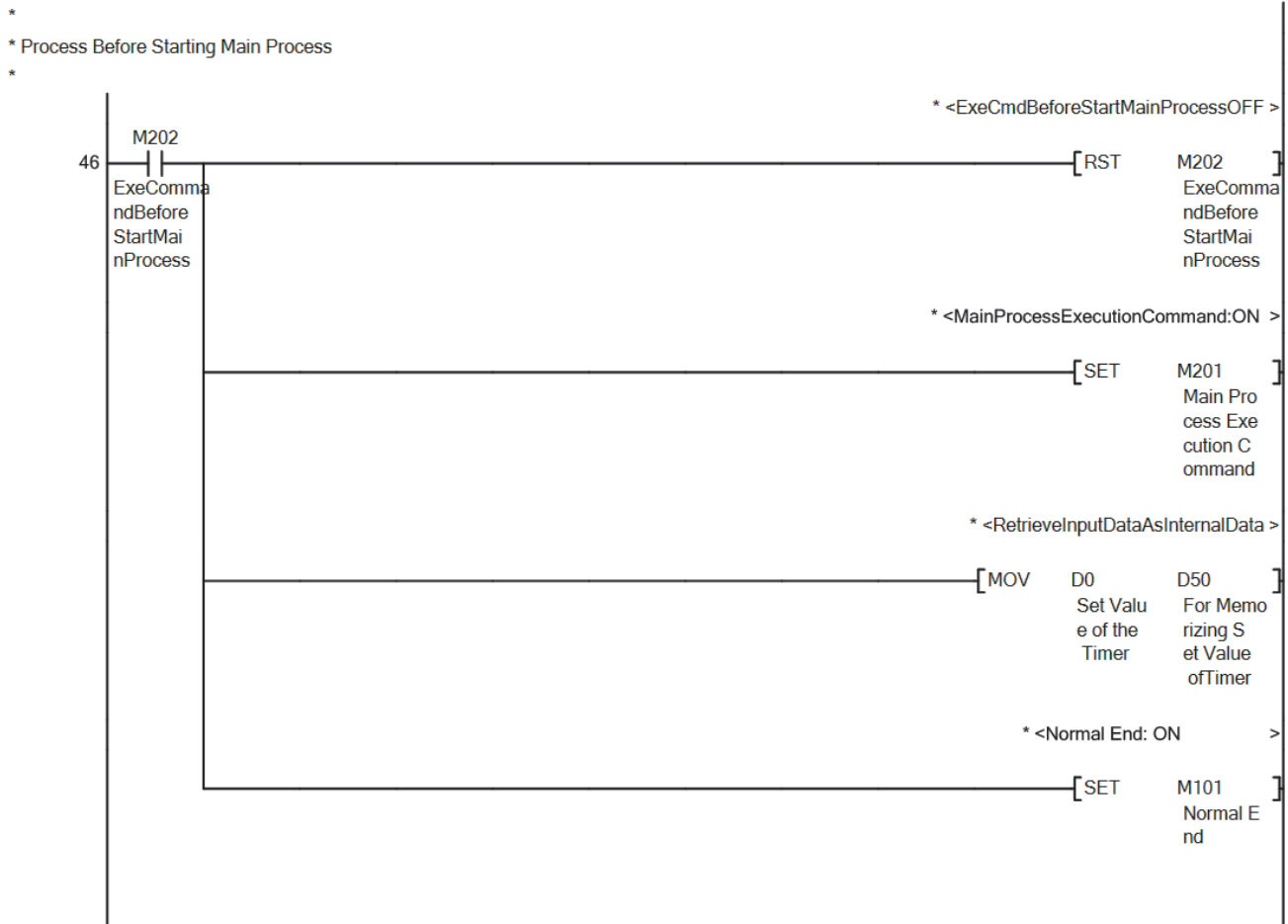






\*  
 \* Process of Checking Preset Data  
 \*  
 \* Confirm Range of Values Preset in Timer  
 \*

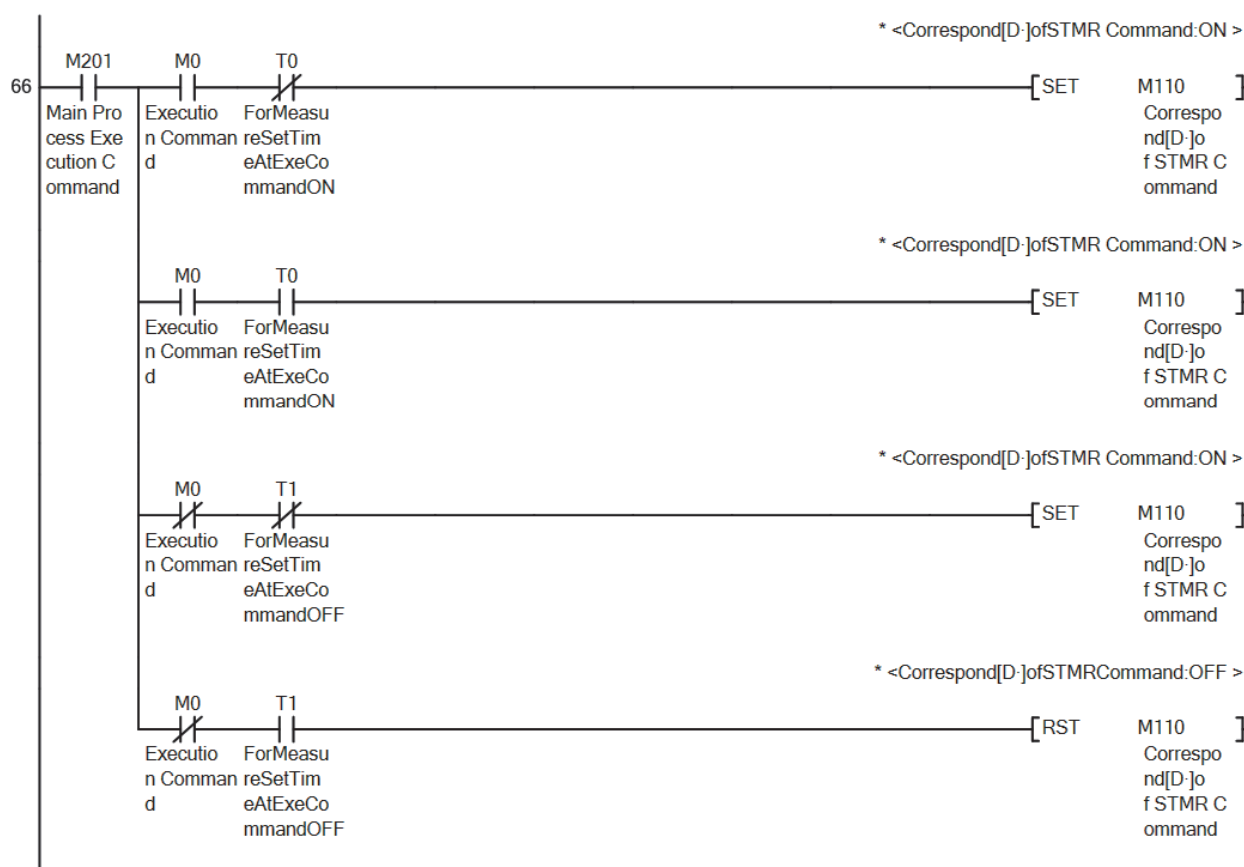




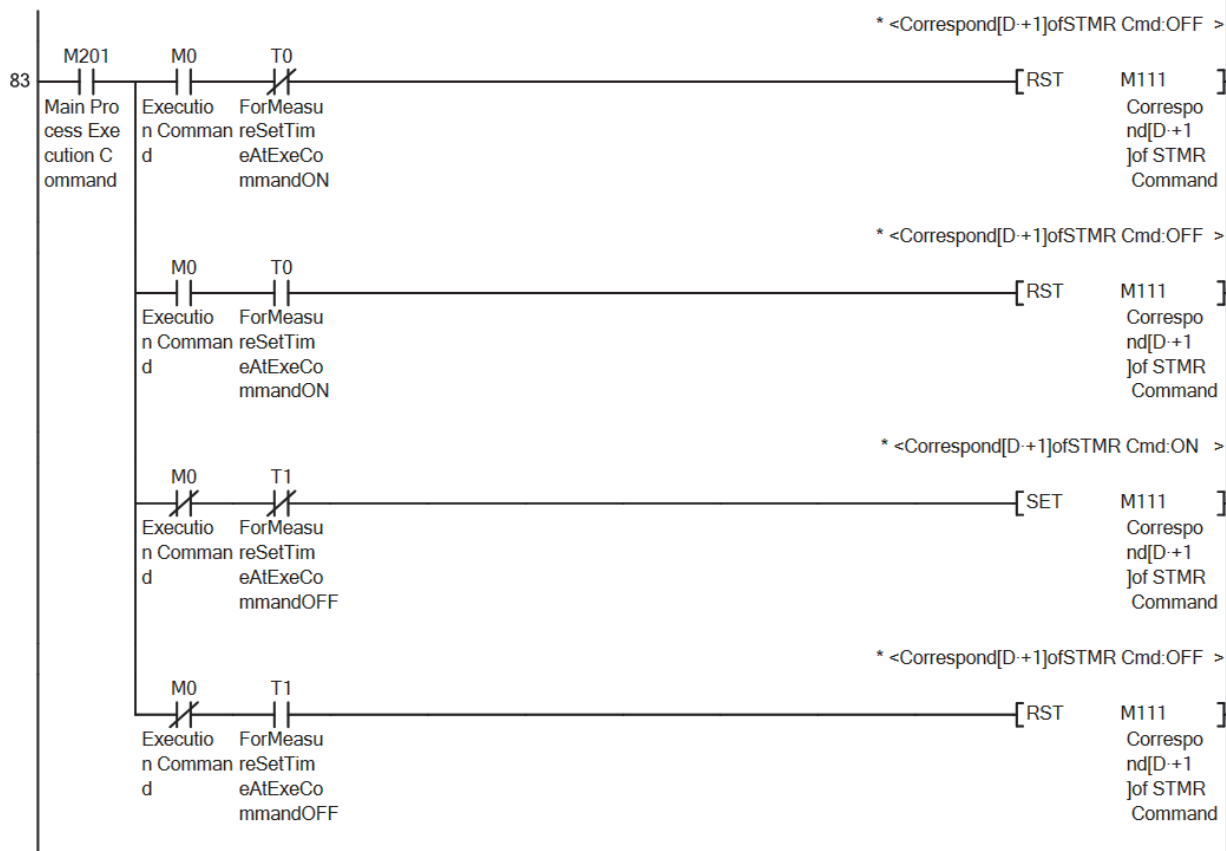
\* TurnOffDueToTimerPresetTimeDelayAfterTurningOffCommandContact

\* Correspond[D]of STMR Command

\*

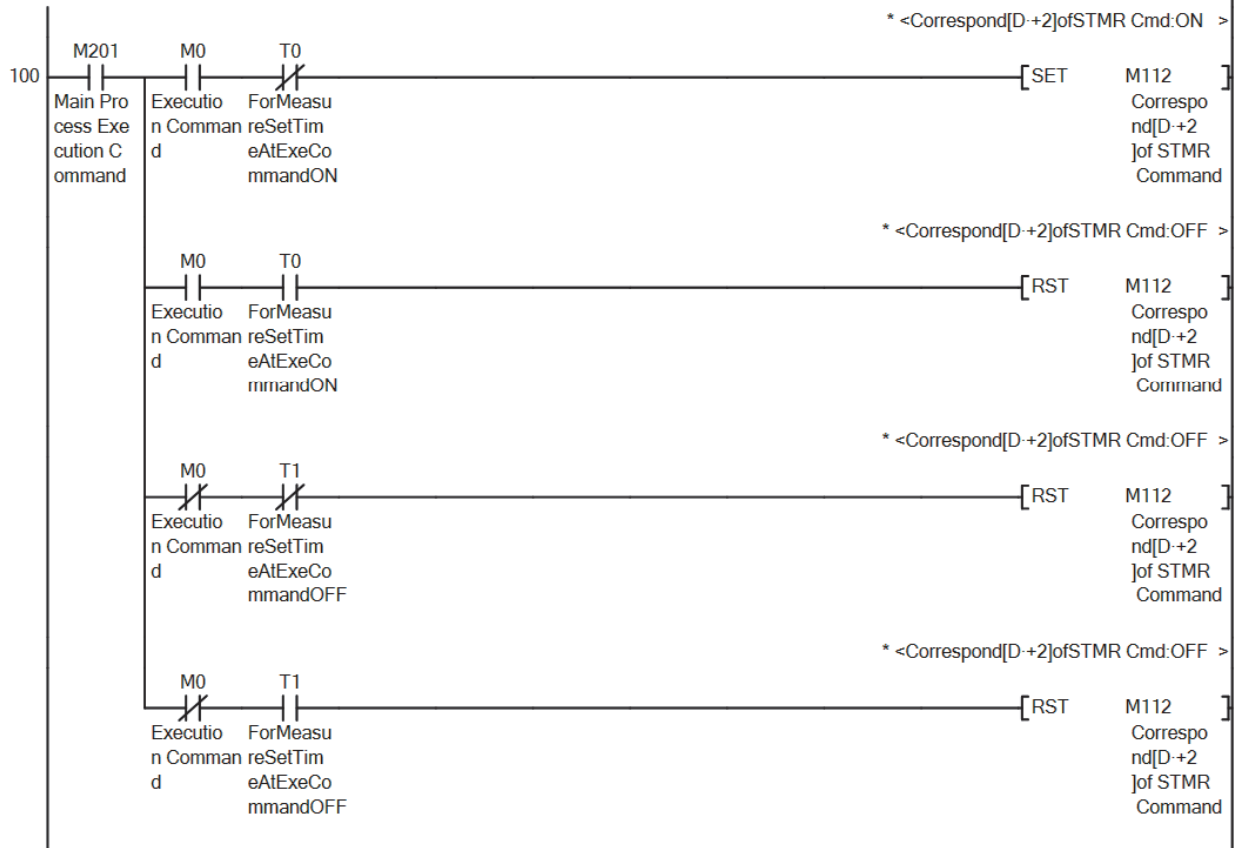


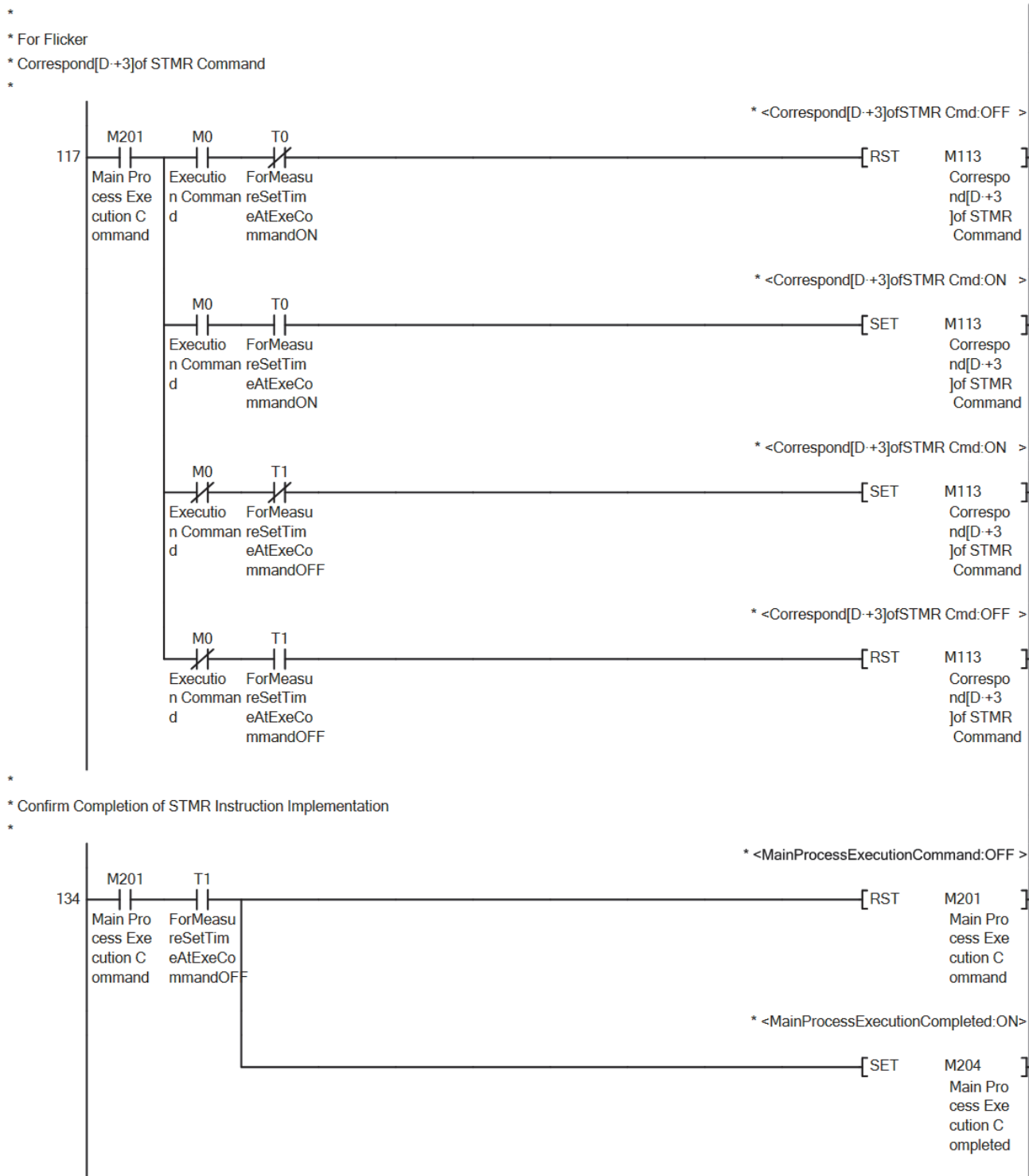
\*  
 \* TurnOnAfterCommandContactOnToOffAndTurnOffAfterTimerPresetTime  
 \* Correspond[D+1]of STMR Command  
 \*

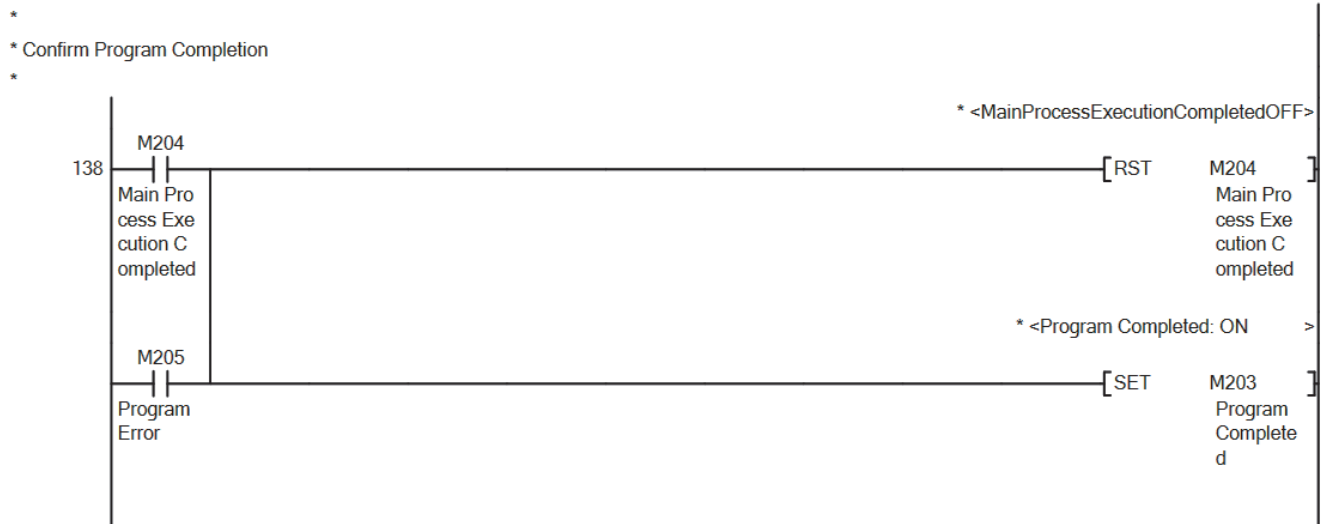




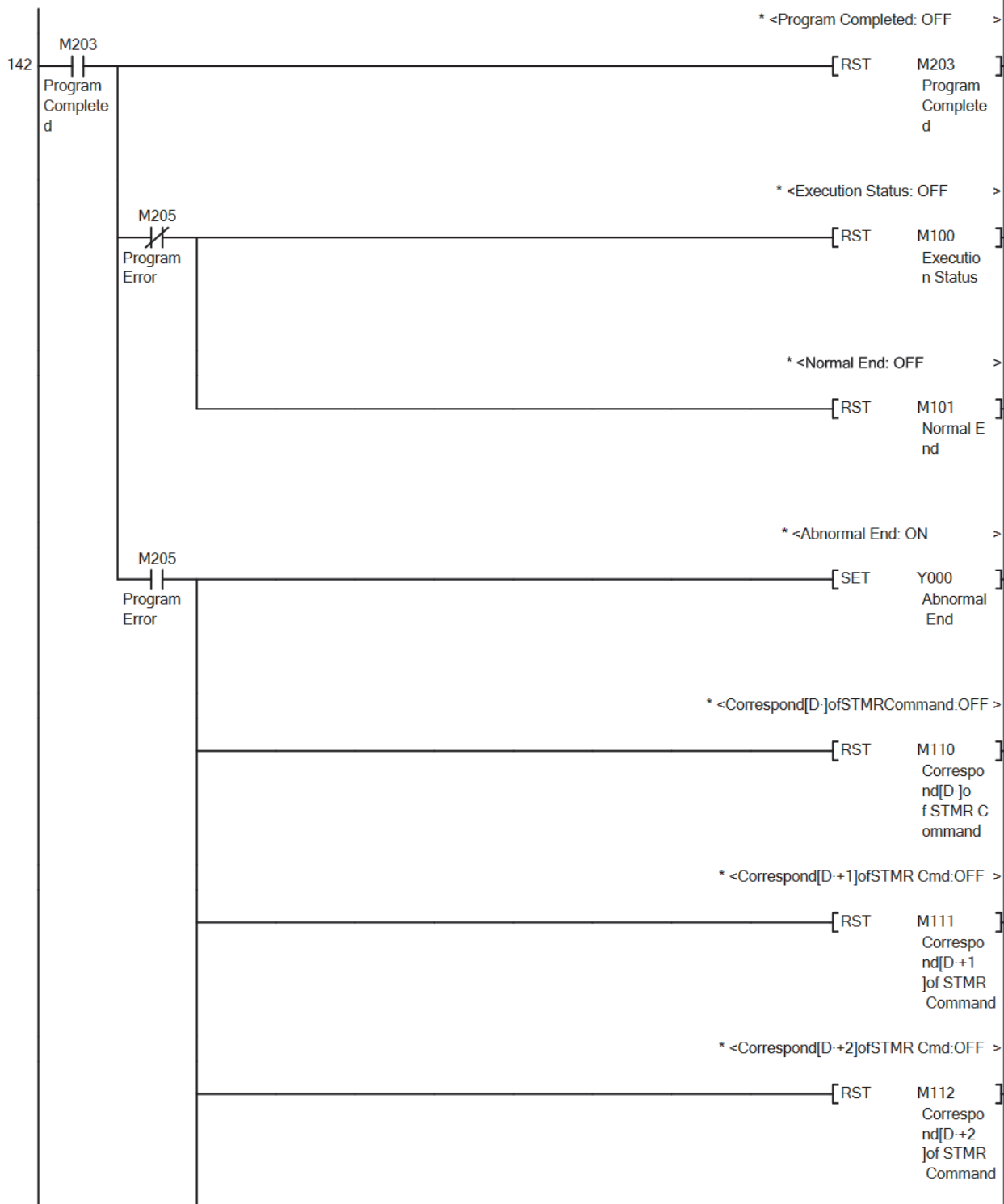
\*  
 \* For Flicker  
 \* Correspond[D+2]of STMR Command  
 \*

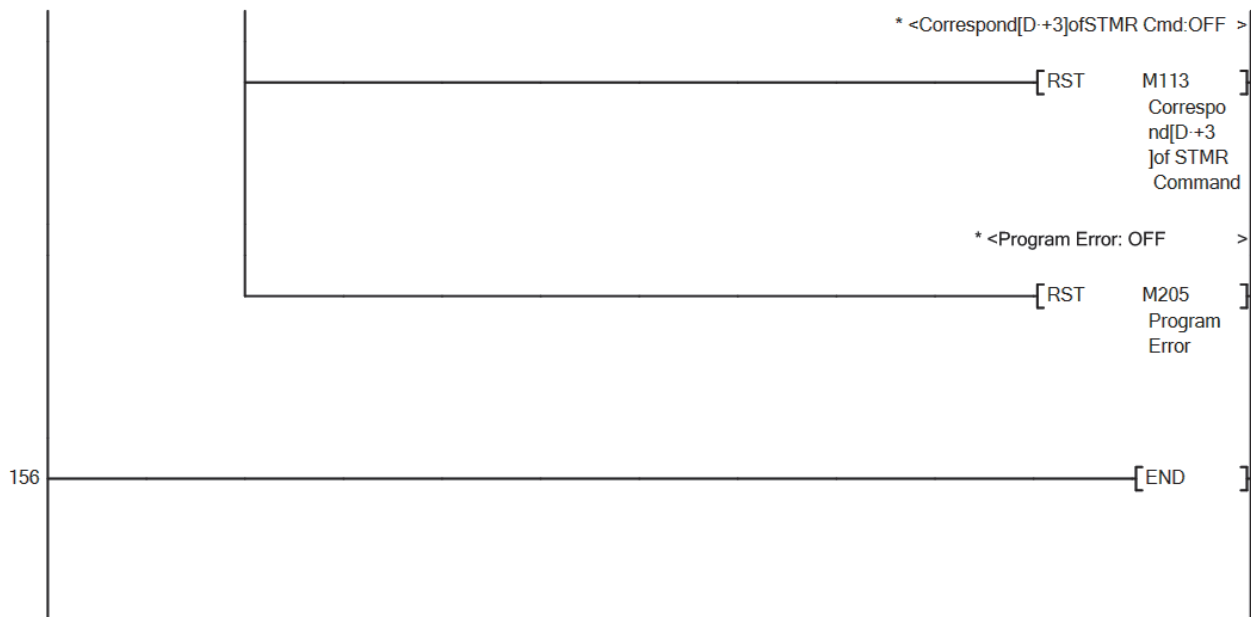






\*  
 \* Process of Program Completion  
 \*





## 2. 4. Calculating date (04\_LD-FX3U\_CPU\_Clock\_V100A\_E)

### Outline of System

Calculates the date after the specified number of days.

#### ■ Description of functions

- (1) When the execution command (M0) turns ON, the date that is the specified number of days after the programmable controller date is calculated.
- (2) If the calculated year is after 2080, abnormal end (Y000) turns ON. The error code is stored in error code (D100). For the error codes, refer to error code in devices used (D100).
- (3) Use this sample ladder under the following condition:  
Year data (D8018) of the PLC is in the range of 2000 to 2079 in the 2-digit year mode.

### Programs Used

This program is targeted for FX3S, FX3G, FX3GC, FX3U and FX3UC.

The projects used in this program are indicated below.

No.	Project name	Function name	Remark
1	04_LD-FX3U_CPU_Clock_V100A_E	Calculating date	This product is created with FX3U/FX3UC. When using with a model other than the provided project, change the PLC type using the engineering tool.

### Devices used

The devices used in this program are indicated below.

#### Input device

No.	Device name	Data type	Kind	Device comment	Remark
1	M0	Bit	Input	Execution command	ON: The program starts. OFF: The program does not start.
2	D0	Word	Input	Specified no. of days	Sets the specified number of days. [Valid range (decimal)] 0 --- 32000

#### Output device

No.	Device name	Data type	Kind	Device comment	Remark
1	Y000	Bit	Output	Abnormal end	When ON, it means an error has occurred in the program.
2	M100	Bit	Output	Execution status	ON: The execution command is ON. OFF: The execution command is OFF.
3	M101	Bit	Output	Normal end	When ON, it means that the process has ended.
4	D100	Word	Output	Error code	Stores the error code that occurred in the program. [Error code (decimal)] 10: Specified number of days is out-of-range. 11: Calculated year is after 2080.
5	D200 --- D202	Word	Output	Date after specify no. of days	Stores the date after the specified number of days. D200 : Date after specify no. of days: Year D201 : Date after specify no. of days: Month D202 : Date after specify no. of days: Day

#### Internal device

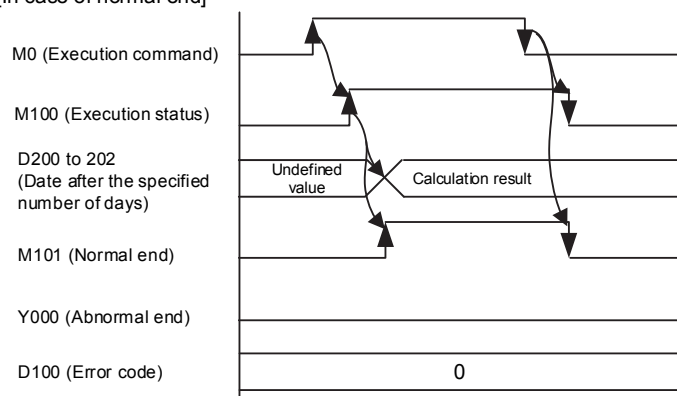
No.	Device name	Data type	Kind	Device comment	Remark
1	M200	Bit	Internal	Setting data check command	Holds the check command flag for the set data.
2	M201	Bit	Internal	Main process execution command	Holds the execution command flag for the main process.

No.	Device name	Data type	Kind	Device comment	Remark
3	M202	Bit	Internal	Exe command before start main process	Holds the execution command flag for the main process start pre-process.
4	M203	Bit	Internal	Program completed	Holds the program completed flag.
5	M204	Bit	Internal	Main process execution completed	Holds the execution completed flag for the main process.
6	M205	Bit	Internal	Program error	Holds the program error flag.
7	M206	Bit	Internal	Pulsed execution command	Holds the pulse conversion flag for the execution command.
8	M210 --- M221	Bit	Internal	Data for confirm end month	Stores the month data used to end the calculation of the date after the specified number of days. M210: Data for confirm end month: Jan M211: Data for confirm end month: Feb M212: Data for confirm end month: Mar M213: Data for confirm end month: Apr M214: Data for confirm end month: May M215: Data for confirm end month: Jun M216: Data for confirm end month: Jul M217: Data for confirm end month: Aug M218: Data for confirm end month: Sep M219: Data for confirm end month: Oct M220: Data for confirm end month: Nov M221: Data for confirm end month: Dec
9	D50 --- D52	Word	Internal	Data for calculating date	Stores the data being used while calculating the date after the specified number of days. D50: Data for calculating date: Year D51: Data for calculating date: Month D52: Data for calculating date: Day
10	D53	Word	Internal	No. of days in Feb (28 or 29)	Stores the number of days in February.
11	D54 --- D55	Word	Internal	Data for leap year	Stores the results of the leap year judgment operation. D54: Data for leap year: Quotient of year/4 D55: Data for leap year: Remnant of year/4
12	D8016	Word	Internal	Day data	Used to retrieve the day information for the real-time clock.
13	D8017	Word	Internal	Month data	Used to retrieve the month information for the real-time clock.
14	D8018	Word	Internal	Year data	Used to retrieve the year information for the real-time clock.

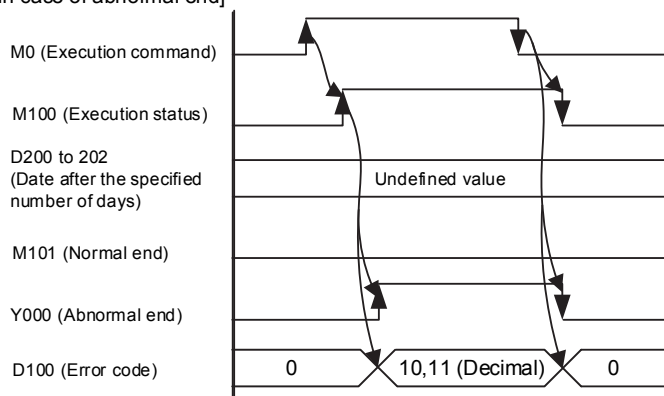
## Operation of I/O signals

■ The timing chart for this program is shown below.

[In case of normal end]



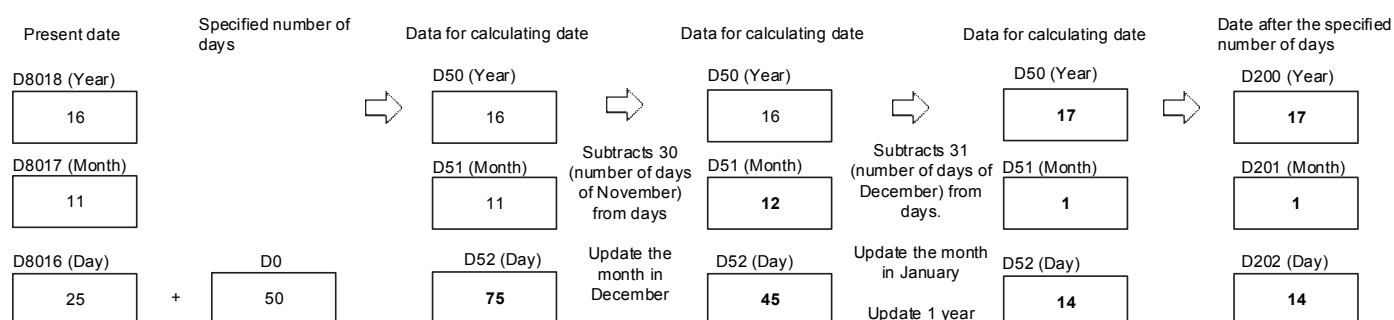
[In case of abnormal end]



■ The processes of this program are given below.

- (1) The input data is checked when execution command (M0) changes from OFF -> ON. If there is an error, the results are output to error code (D100). When the data is normal, the input data is retrieved into the internal device.
- (2) Determines the initial value of the end confirmation month data from the programmable controller's month.
- (3) Stores the programmable controller's date in the data for calculating date.
- (4) Adds the specified number of days in the data for calculating date: day.
- (5) If the results calculated in step (4) exceed the number of days in the month indicated in the end confirmation month data, the following process is executed.
  1. Subtracts the number of days in the month indicated for the end confirmation month data from the data for calculating date: day.
  2. Sets the next month in the end confirmation month data.
  3. Sets the month indicated in the end confirmation month data to data for calculating date: month.
  4. When the end confirmation month data is updated from December to January in step 2, the data for calculating date: year is incremented by 1.
- (6) The data for calculating date for the year at the point when step (5) is finished is stored in the keep area as the date after the specified number of days.

An example for designating this program on November 25, 2016, setting the specified number of days to 50, and running the program is shown below.



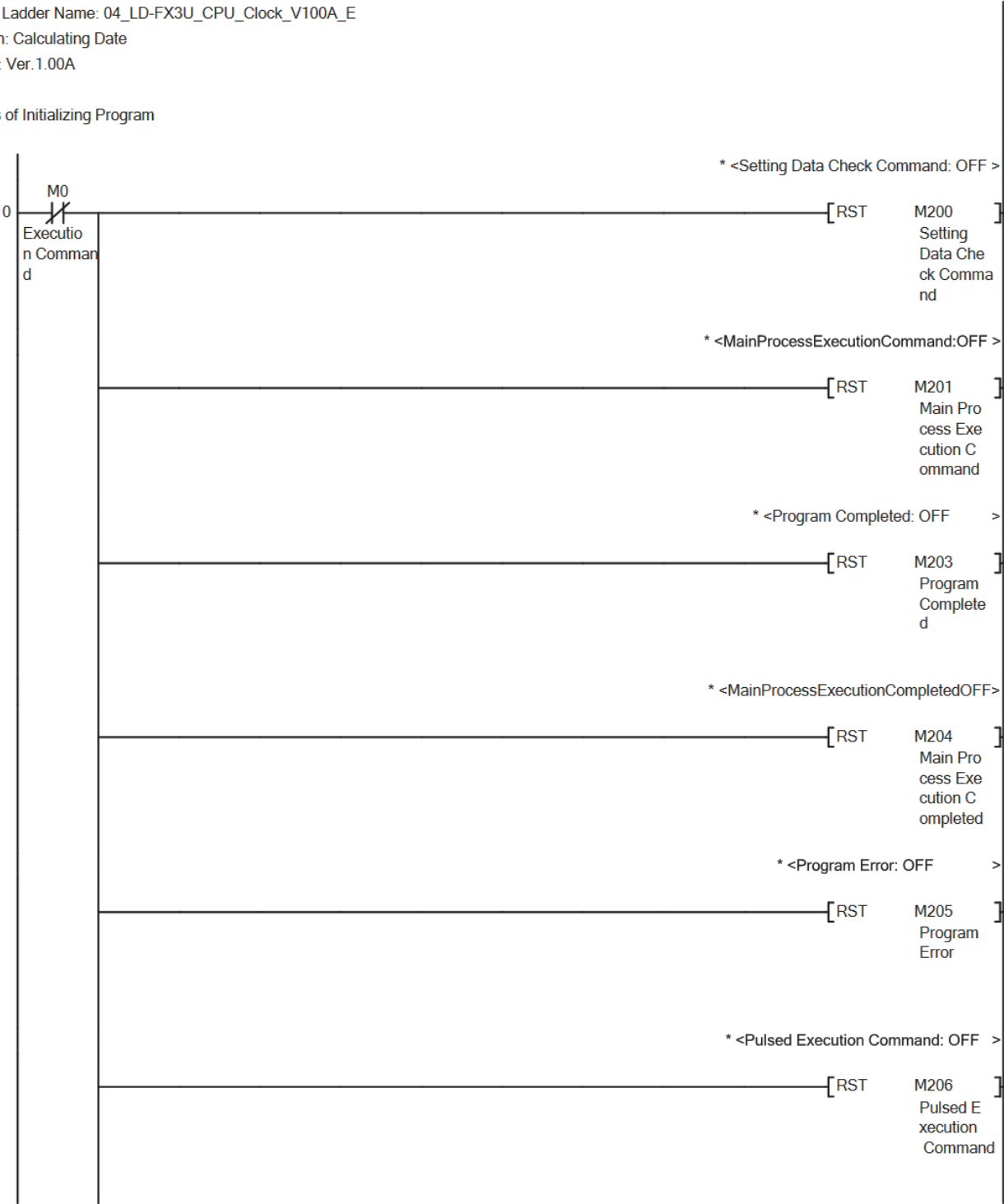
## Version upgrade history

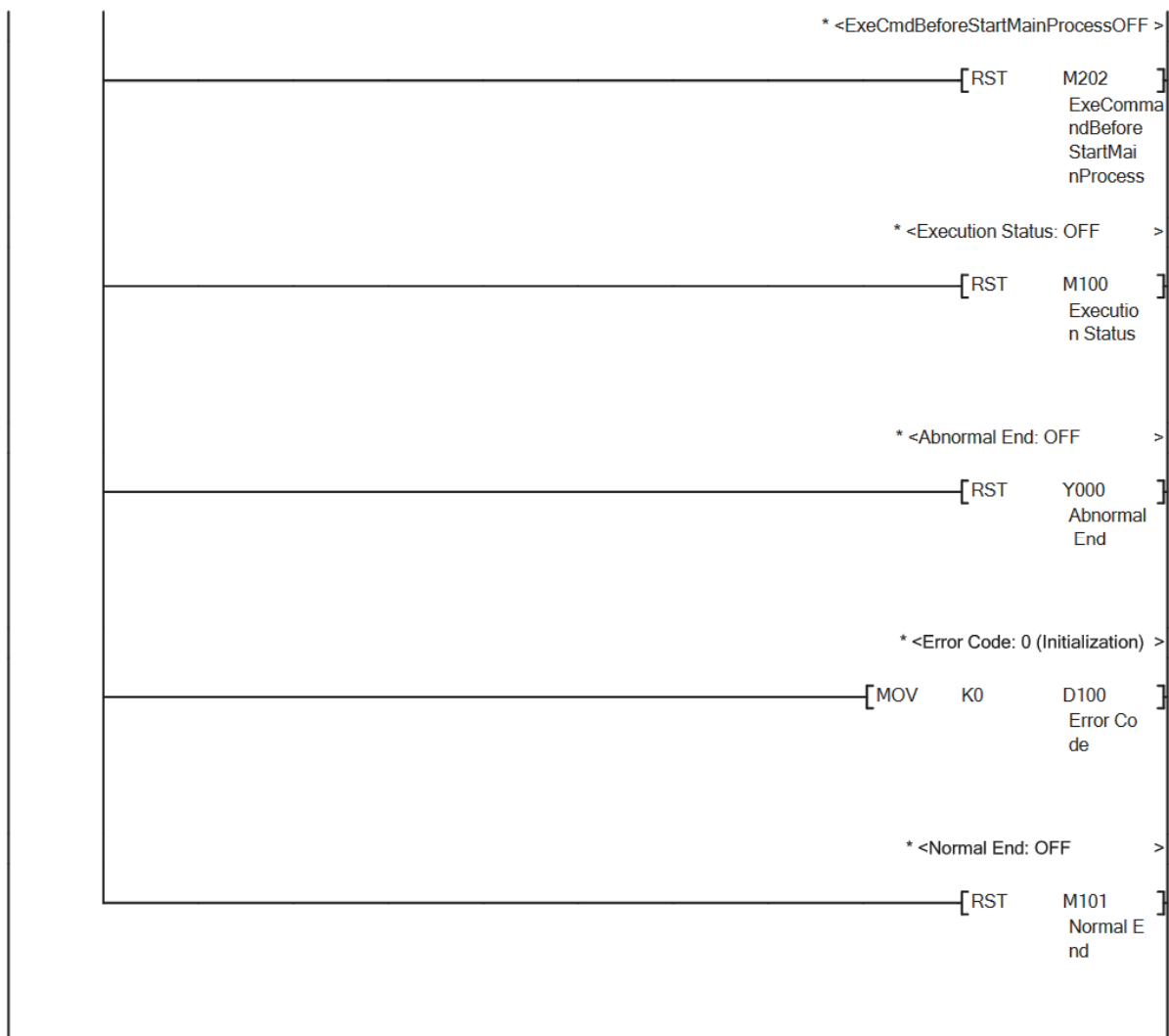
Version	Date	Description
Ver. 1.00A	October, 2016	First Edition

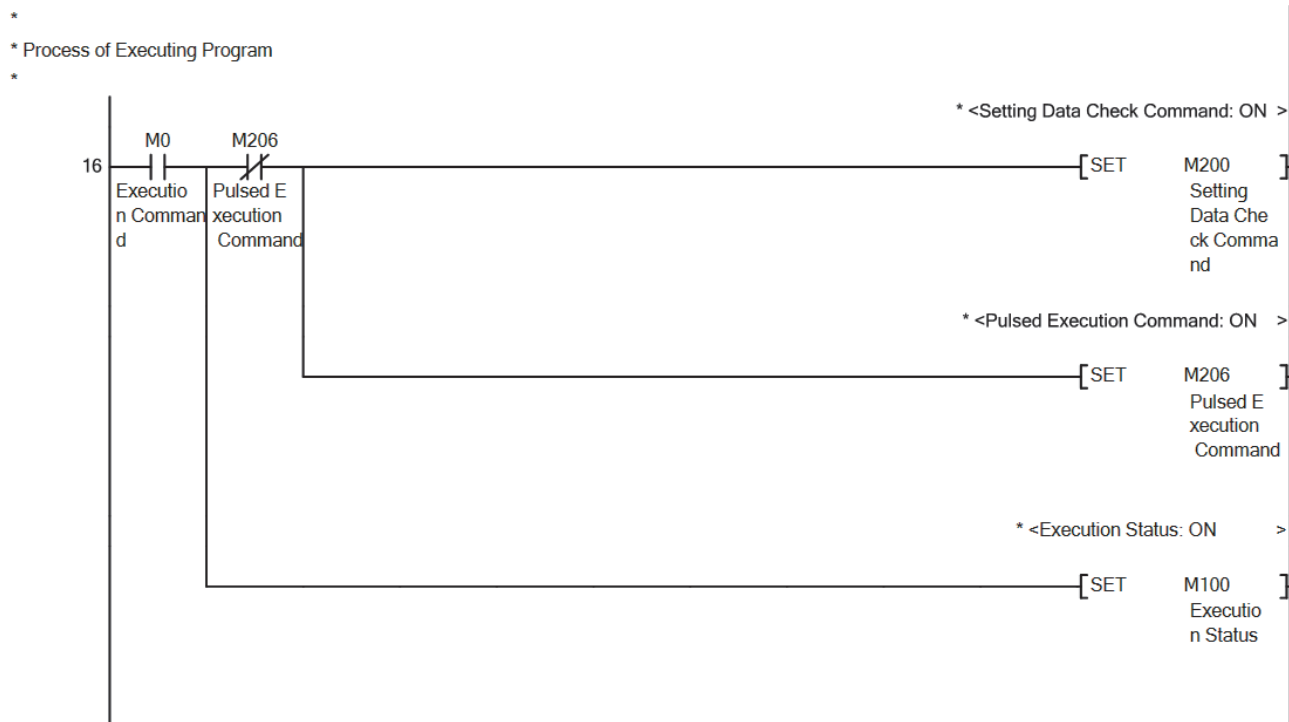


Program

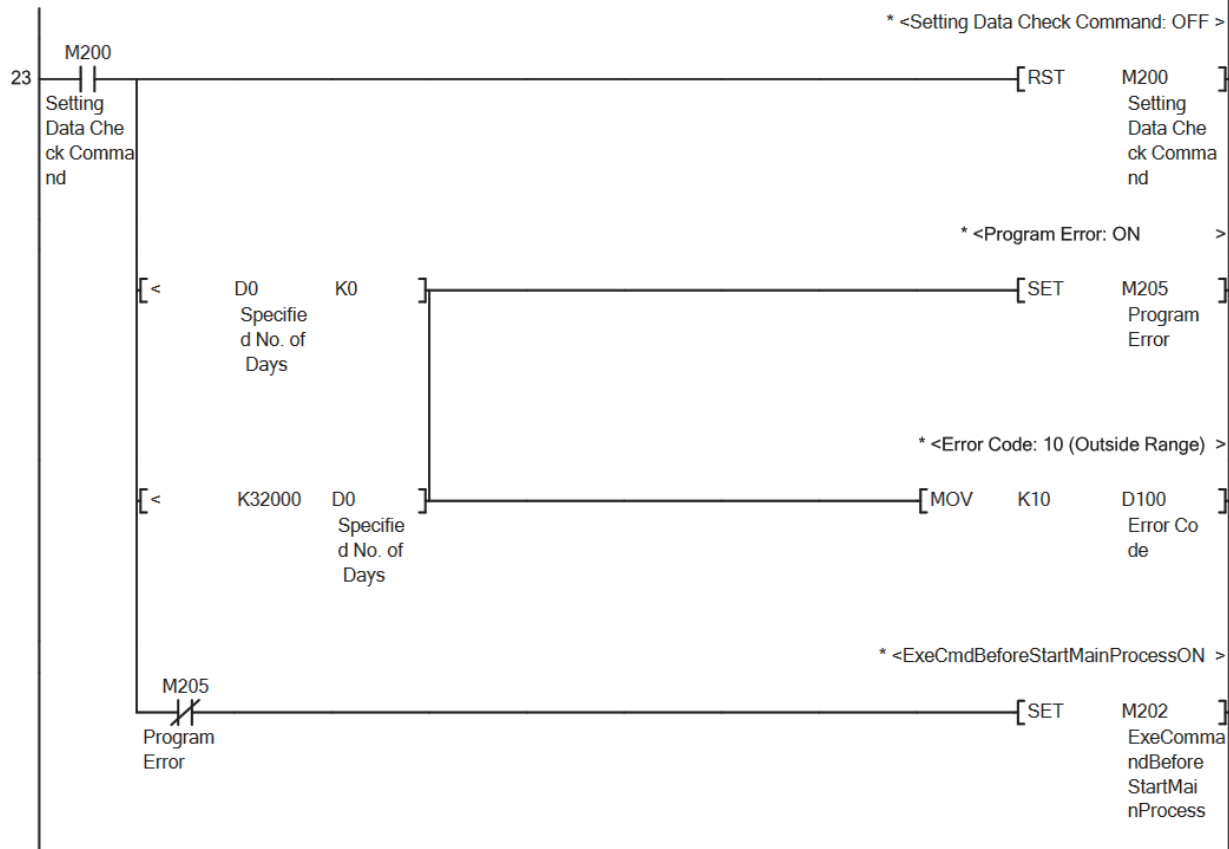
\* Sample Ladder Name: 04\_LD-FX3U\_CPU\_Clock\_V100A\_E  
\* Function: Calculating Date  
\* Version: Ver.1.00A  
\*  
\* Process of Initializing Program  
\*

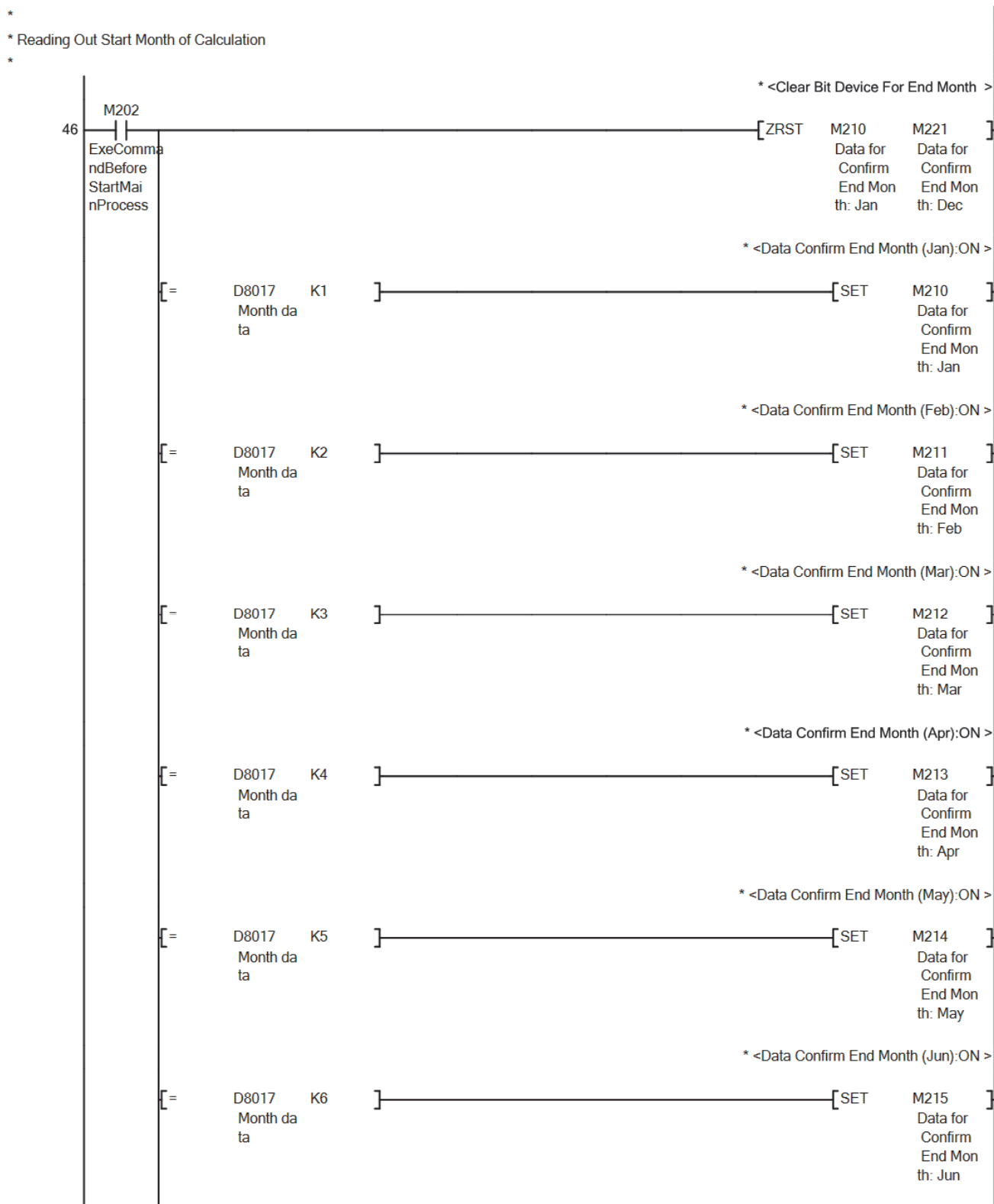


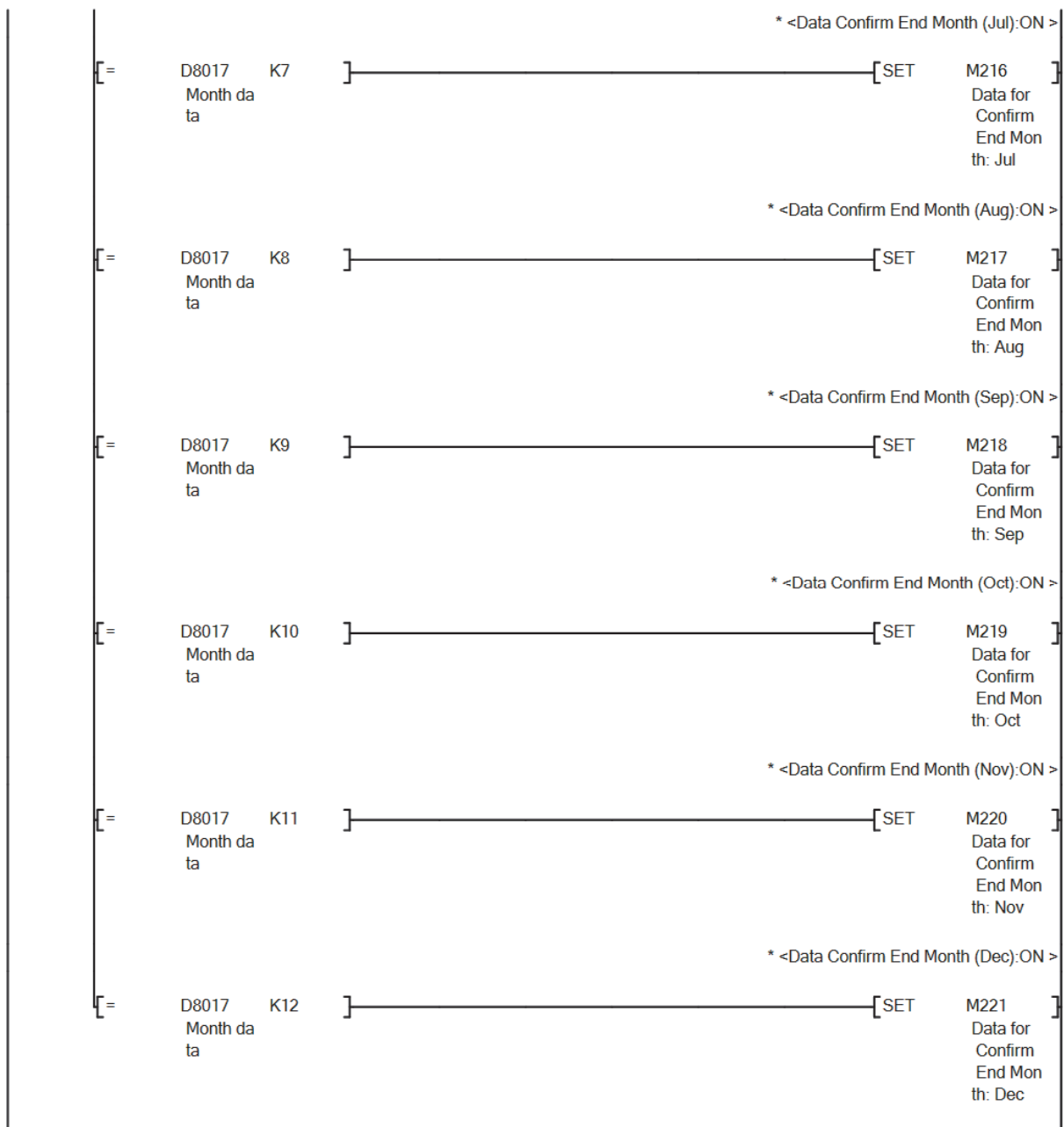




\*  
 \* Process of Checking Preset Data  
 \*  
 \* Confirm Range of Specified No. of Days  
 \*



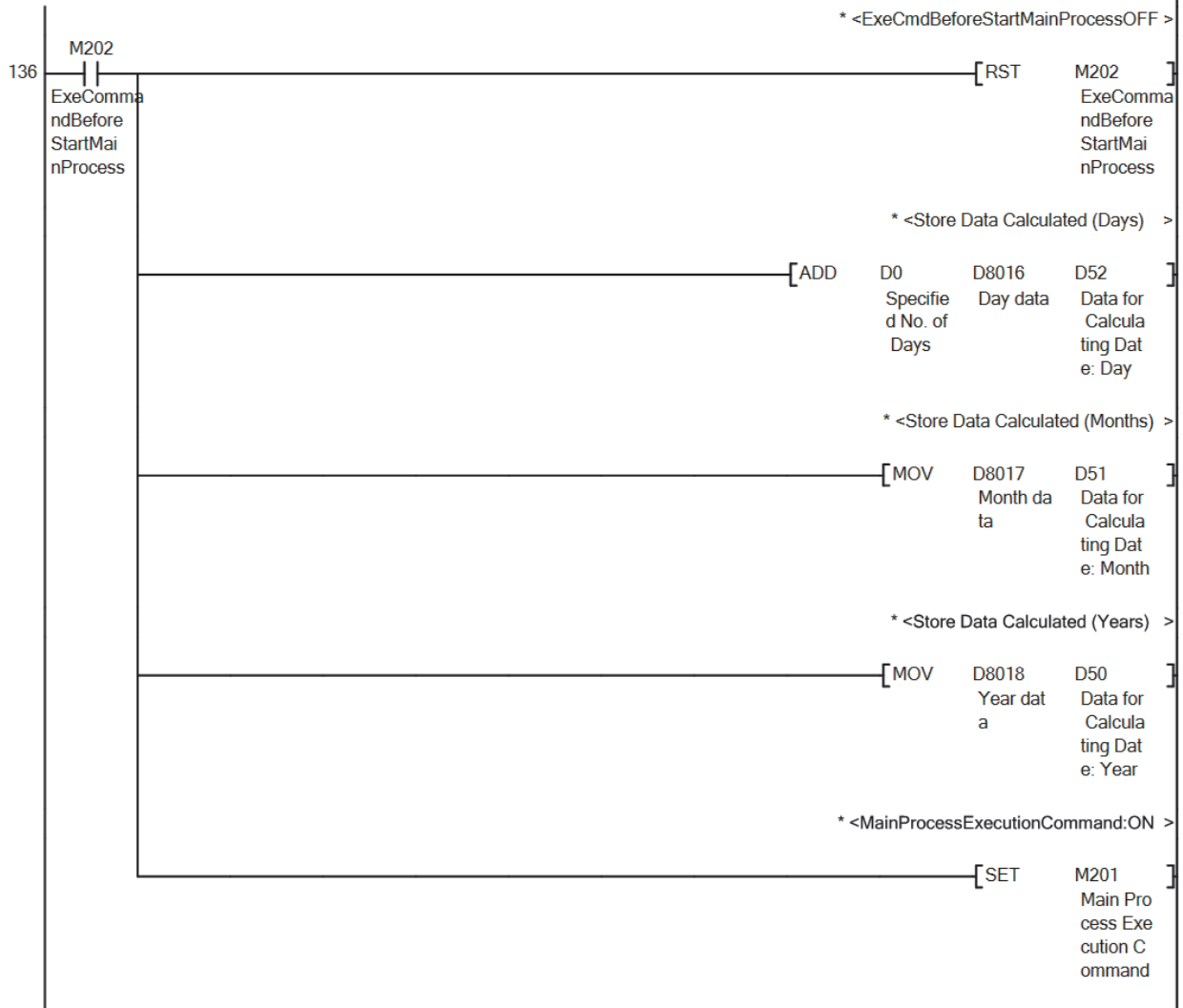


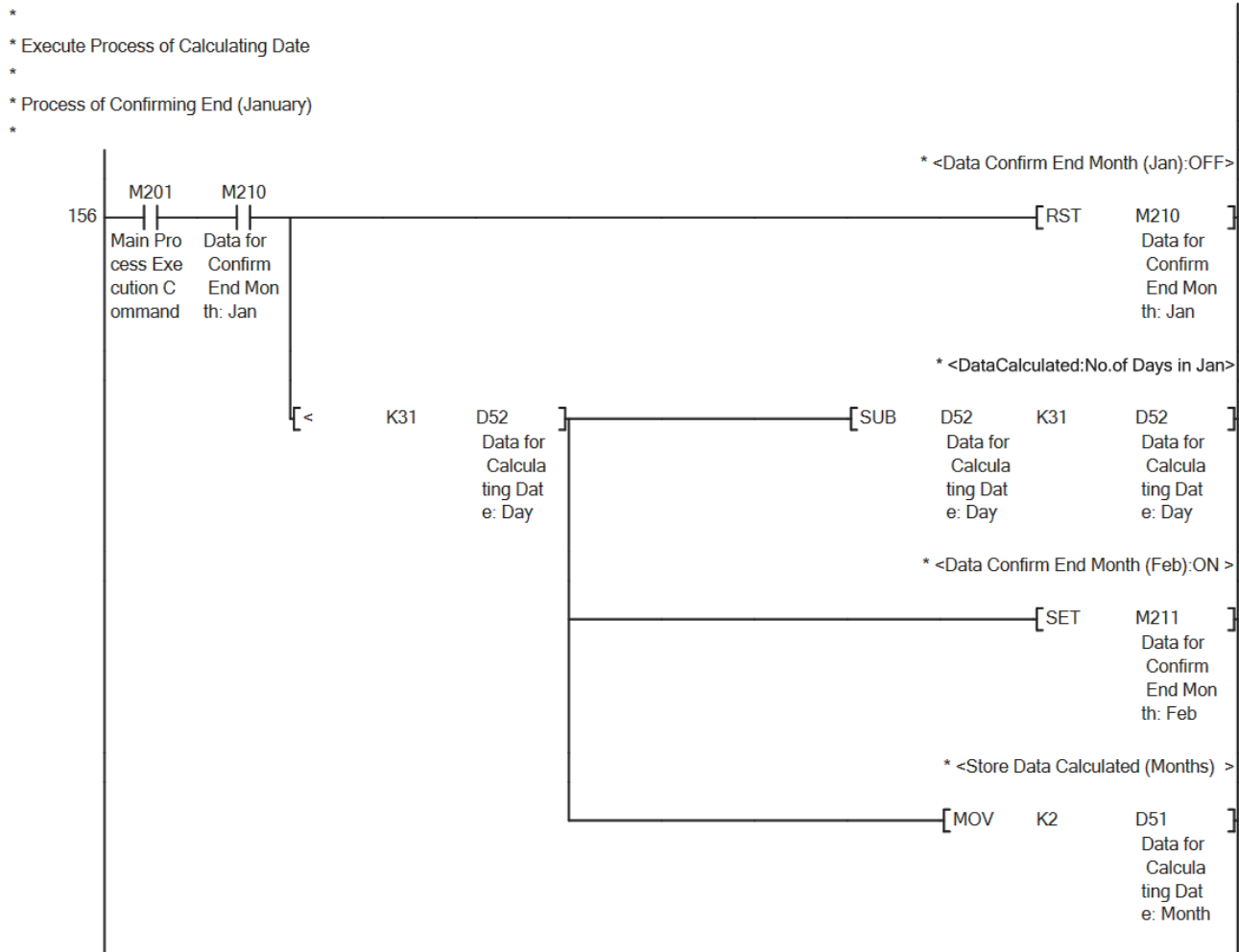


\*

\* Reading Out Present Date - Preparing for Starting Calculation

\*

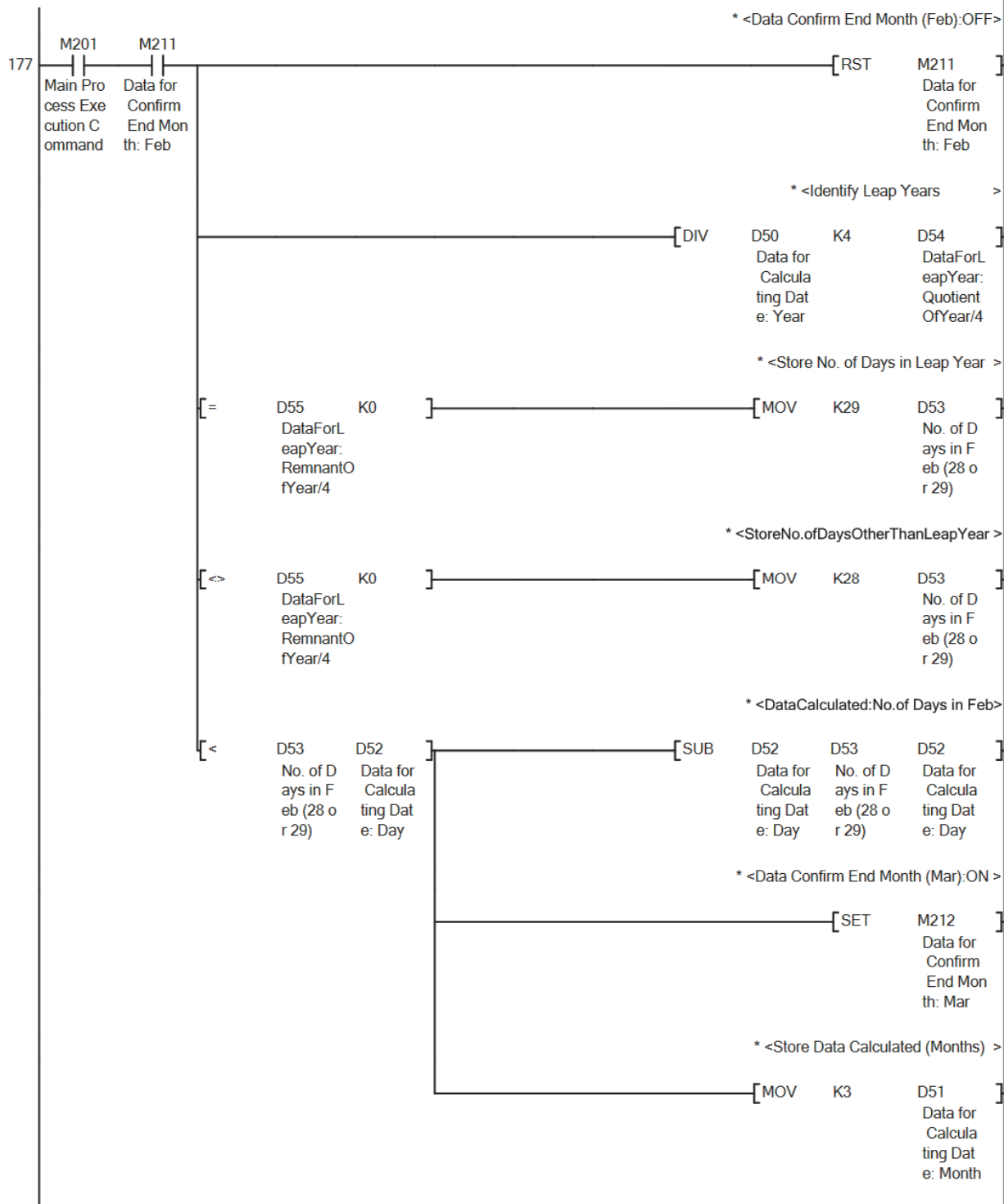


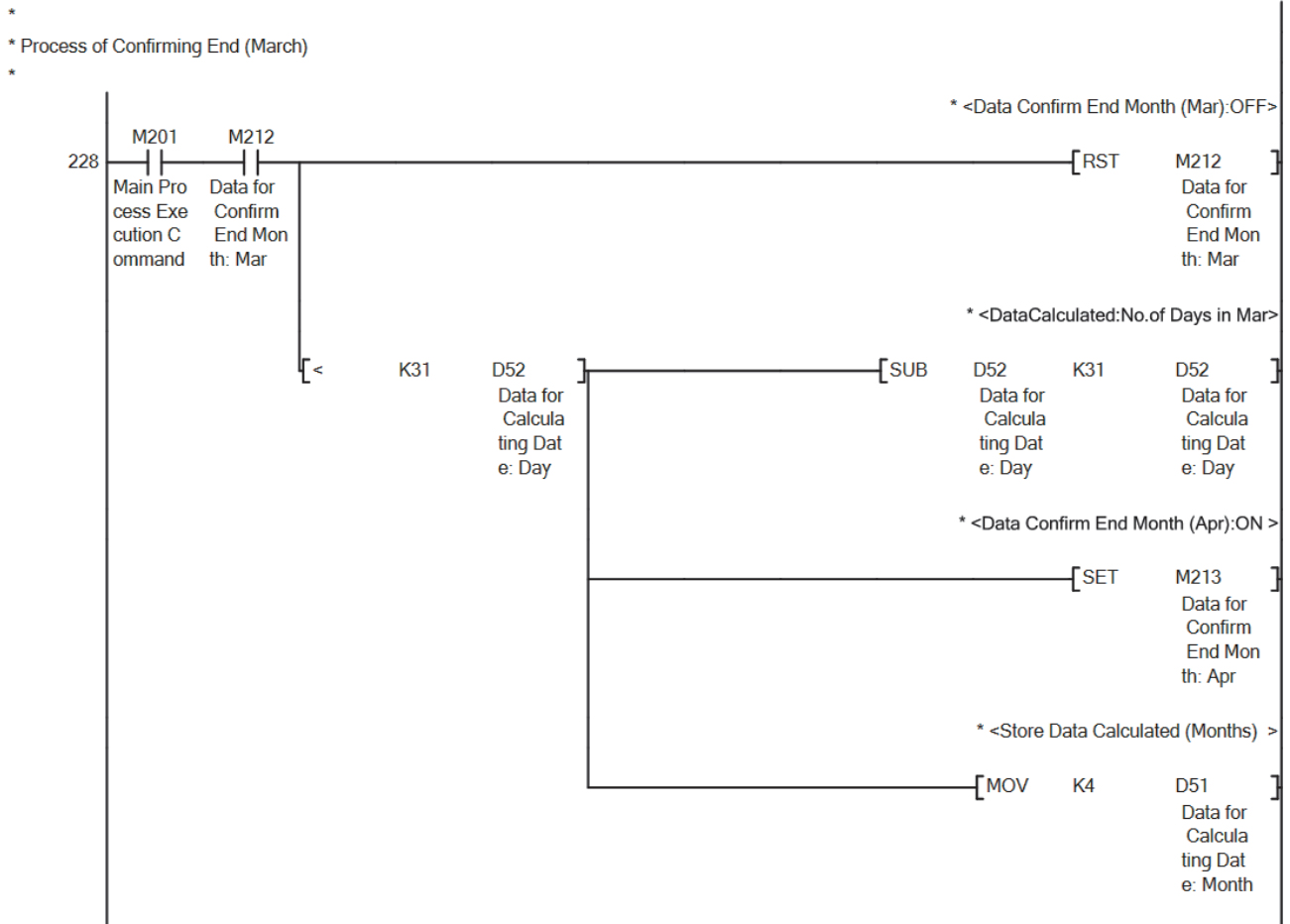




\*  
\*  
\*

\* Process of Confirming End (February)

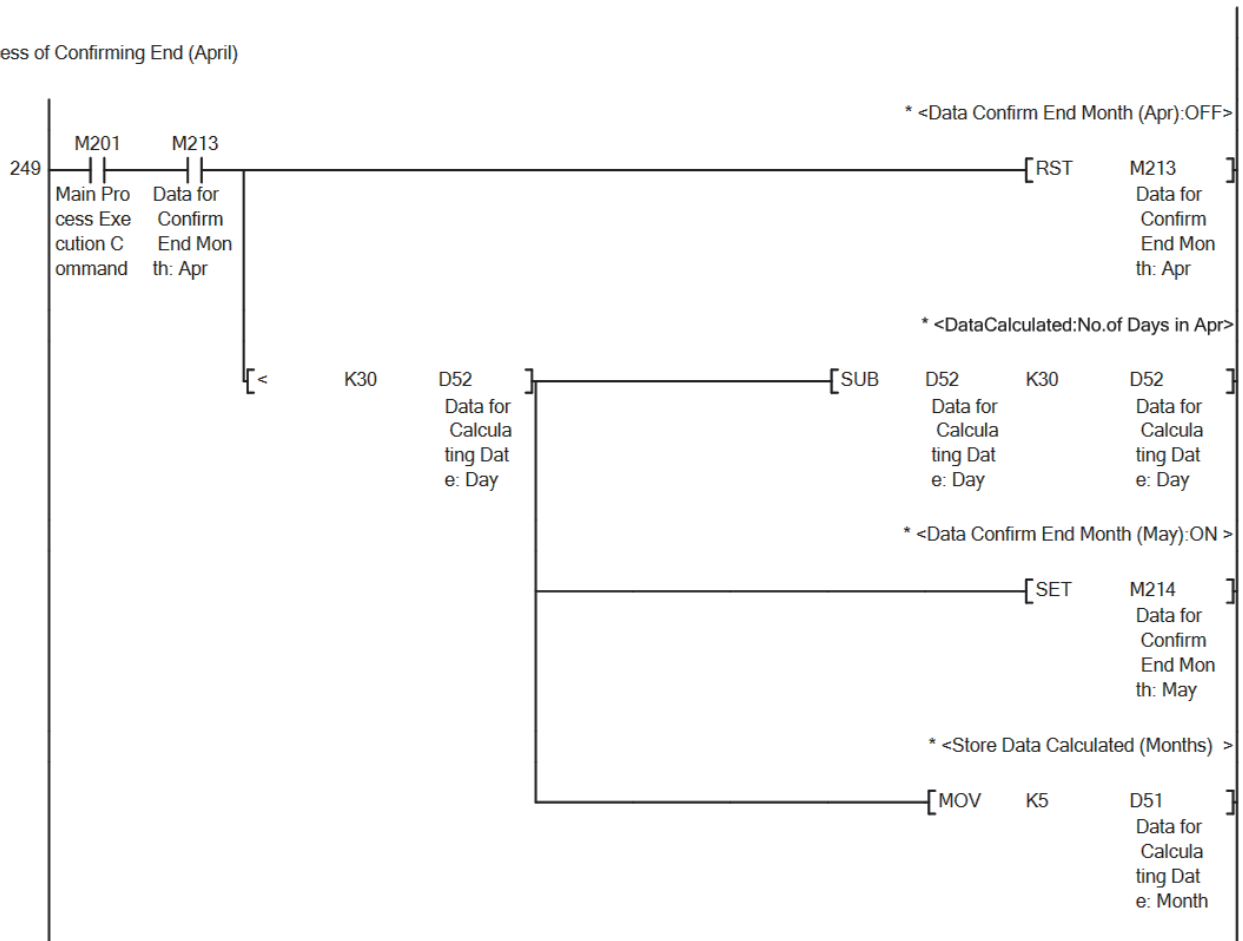


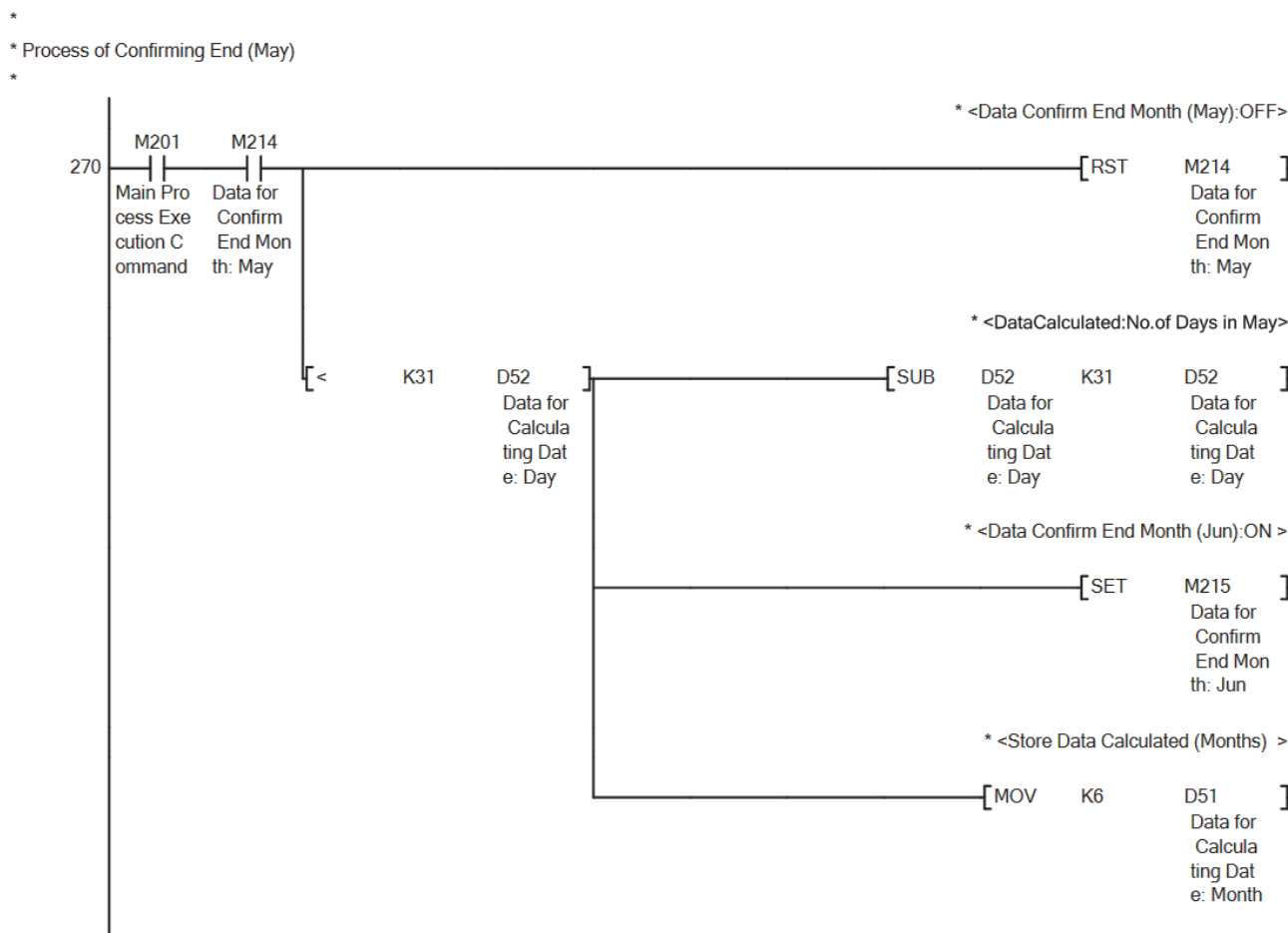


\*

\* Process of Confirming End (April)

\*

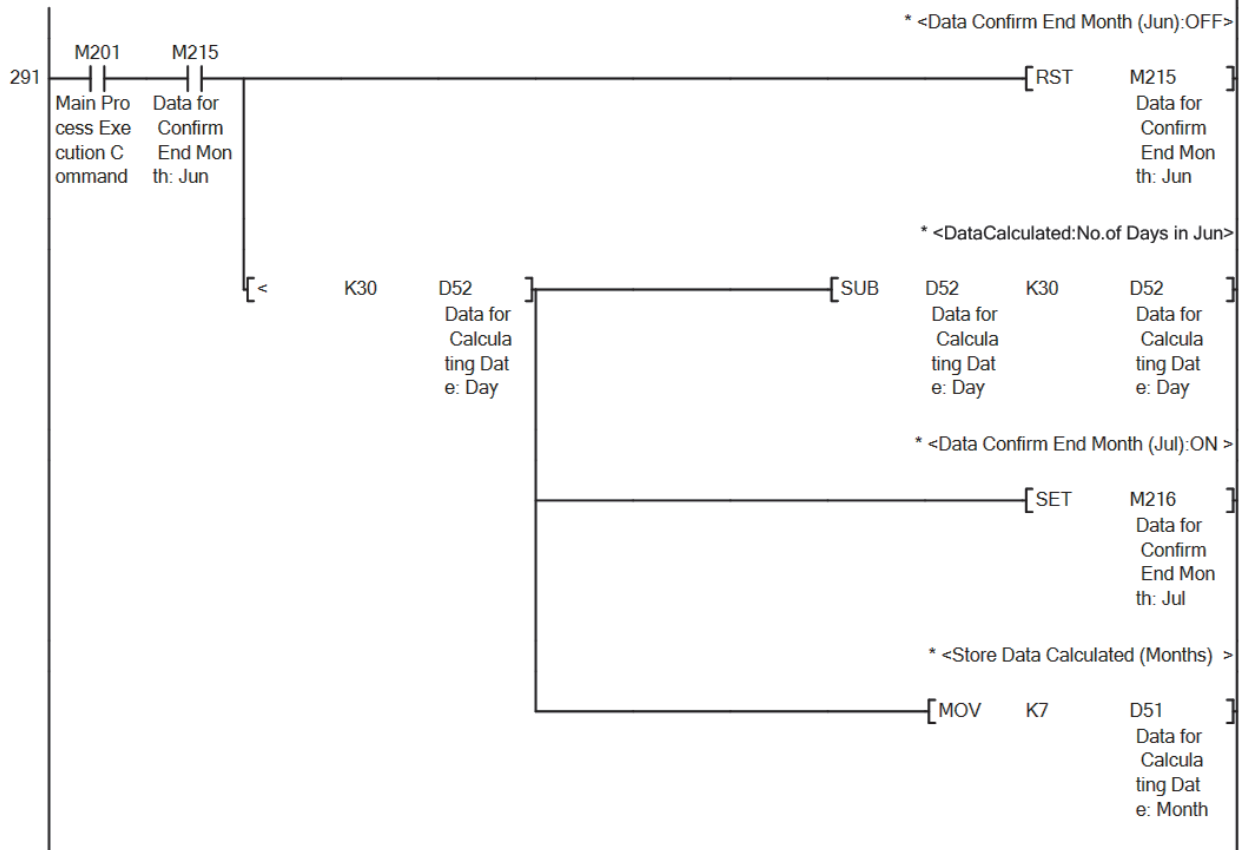




\*

\* Process of Confirming End (June)

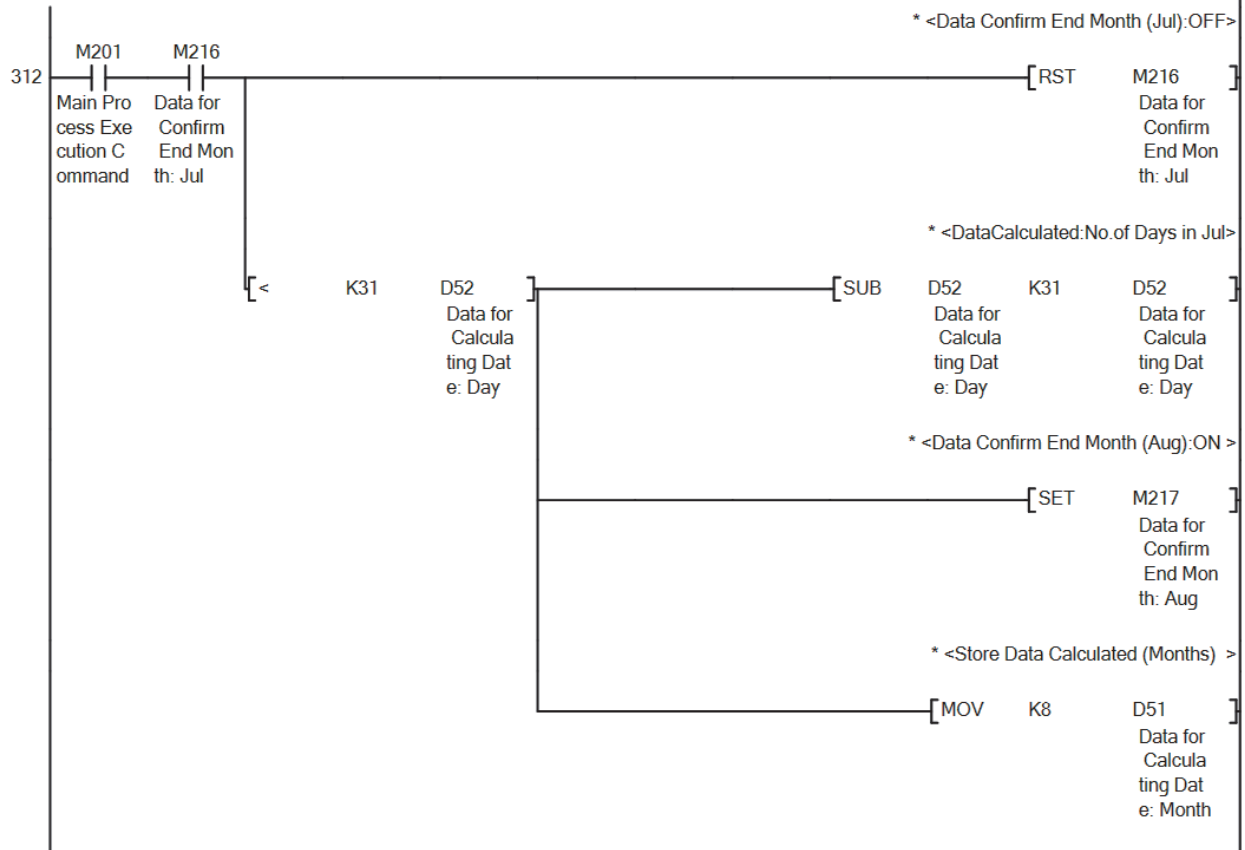
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\*

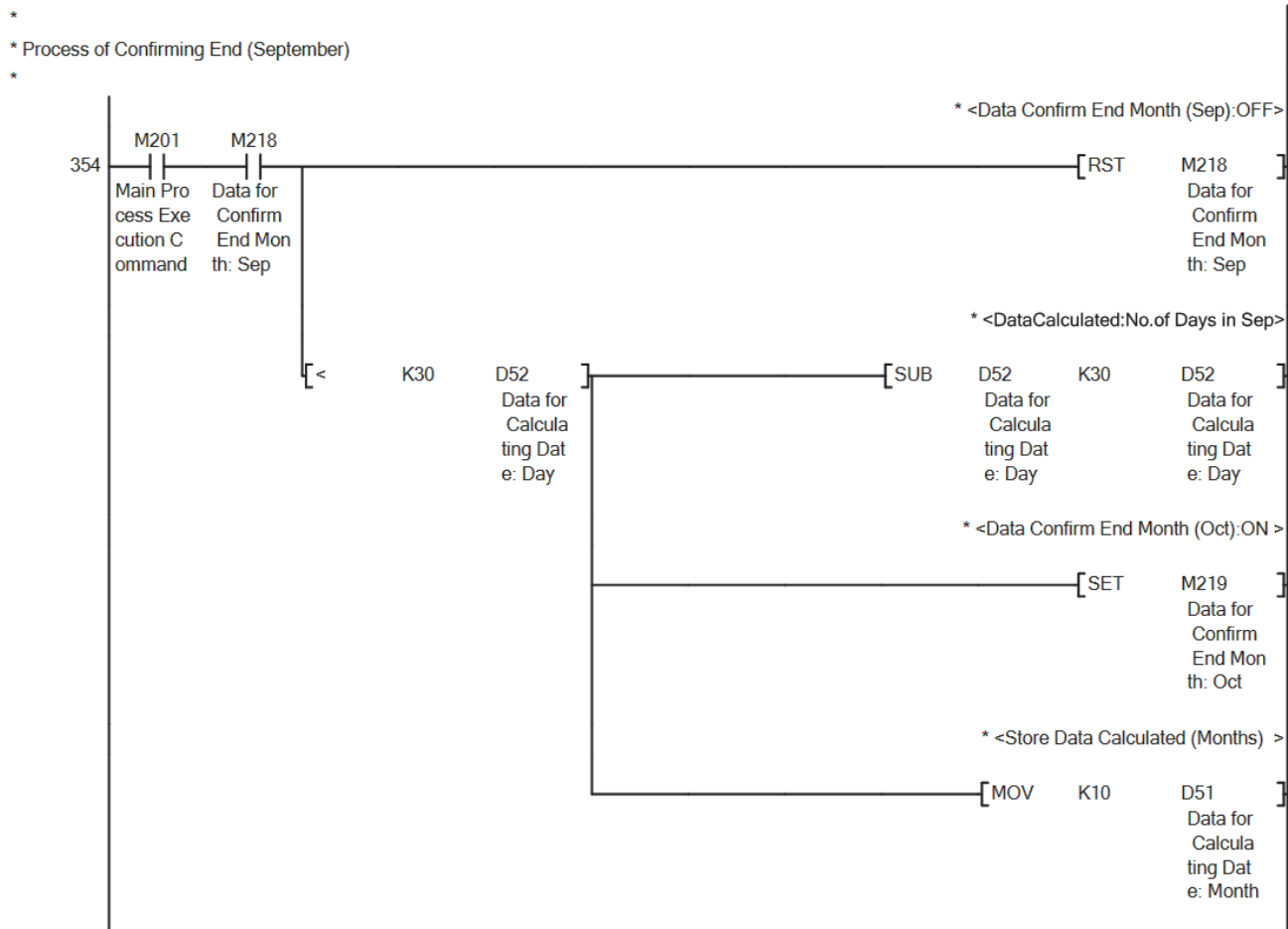
\* Process of Confirming End (July)

\*

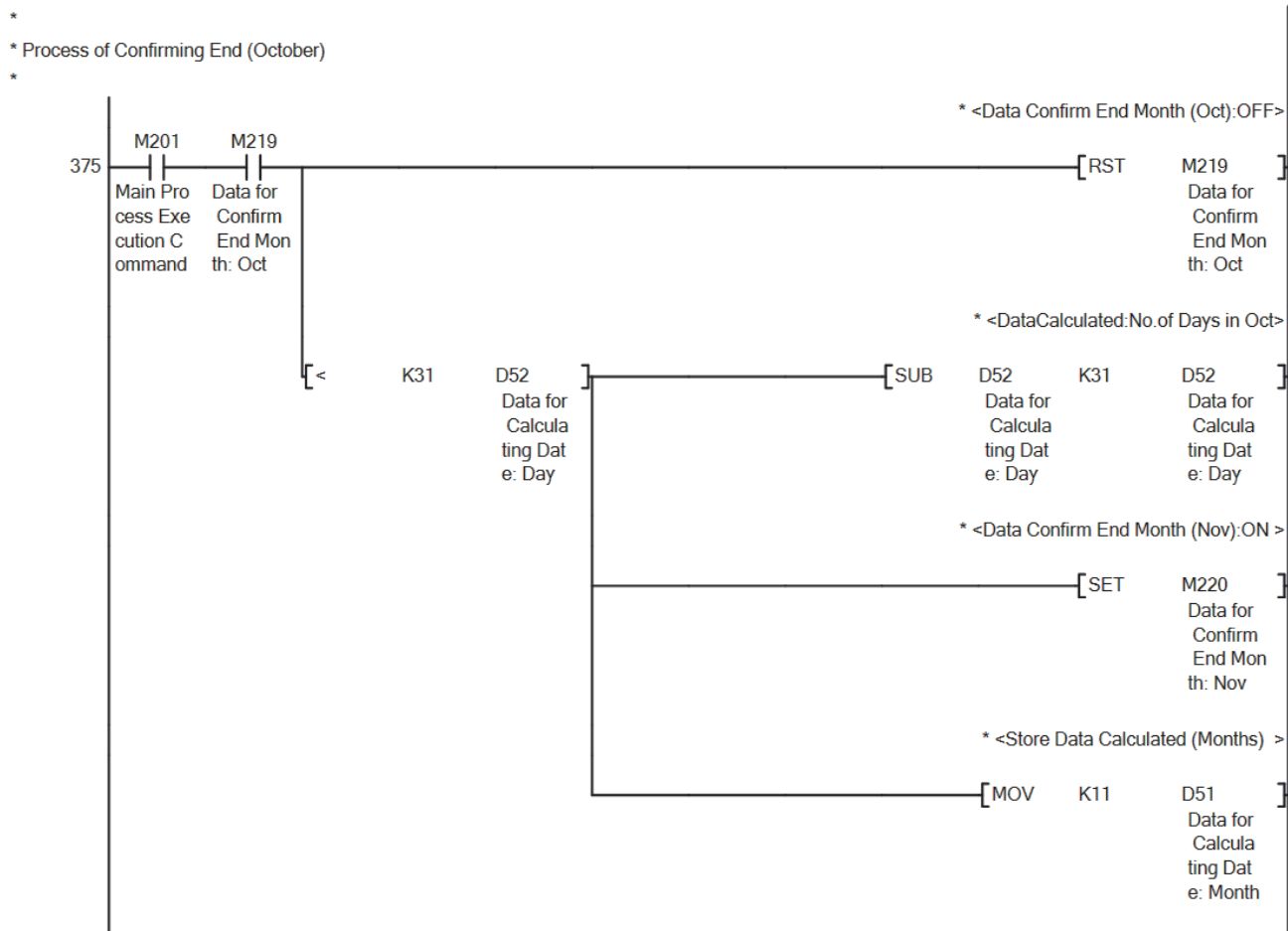


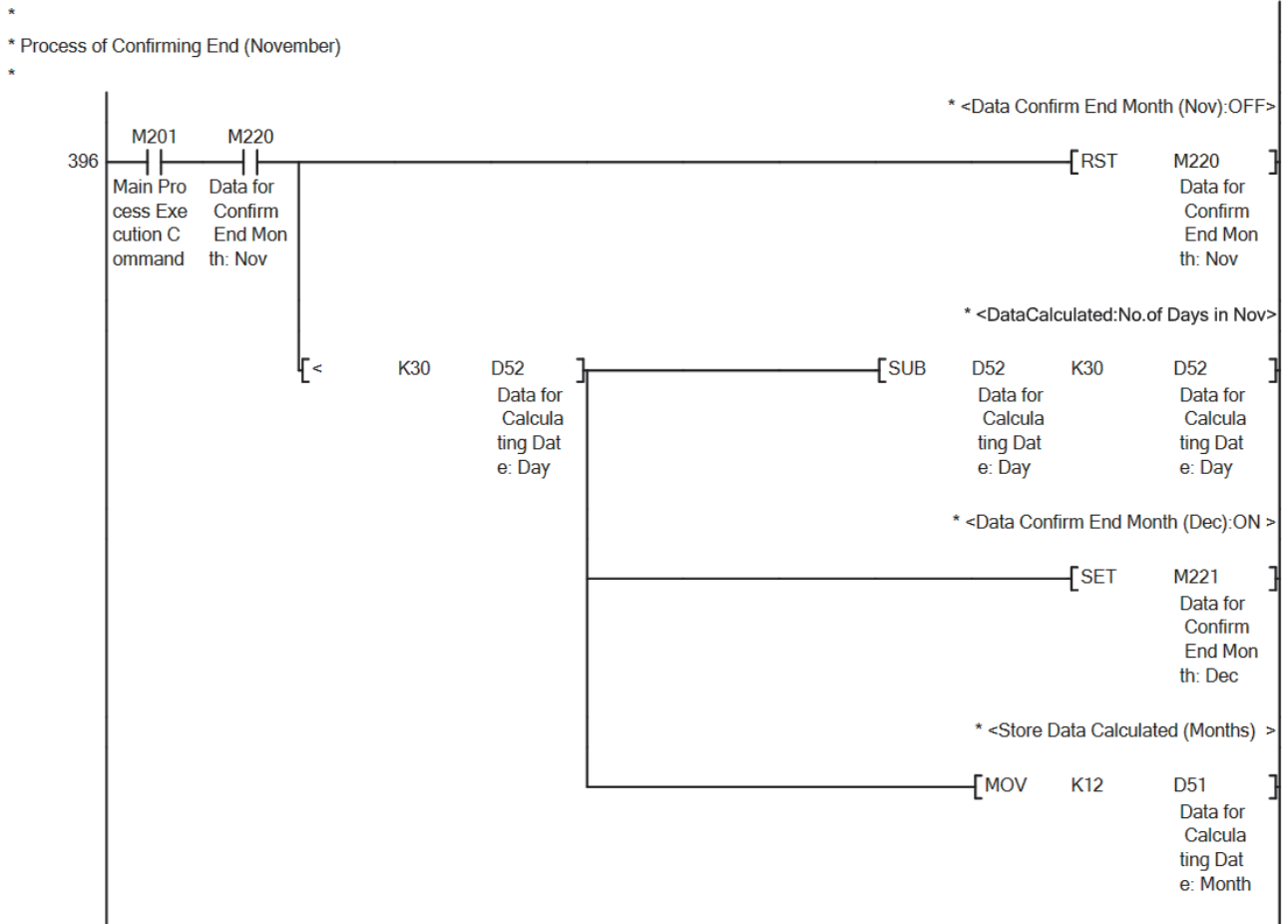
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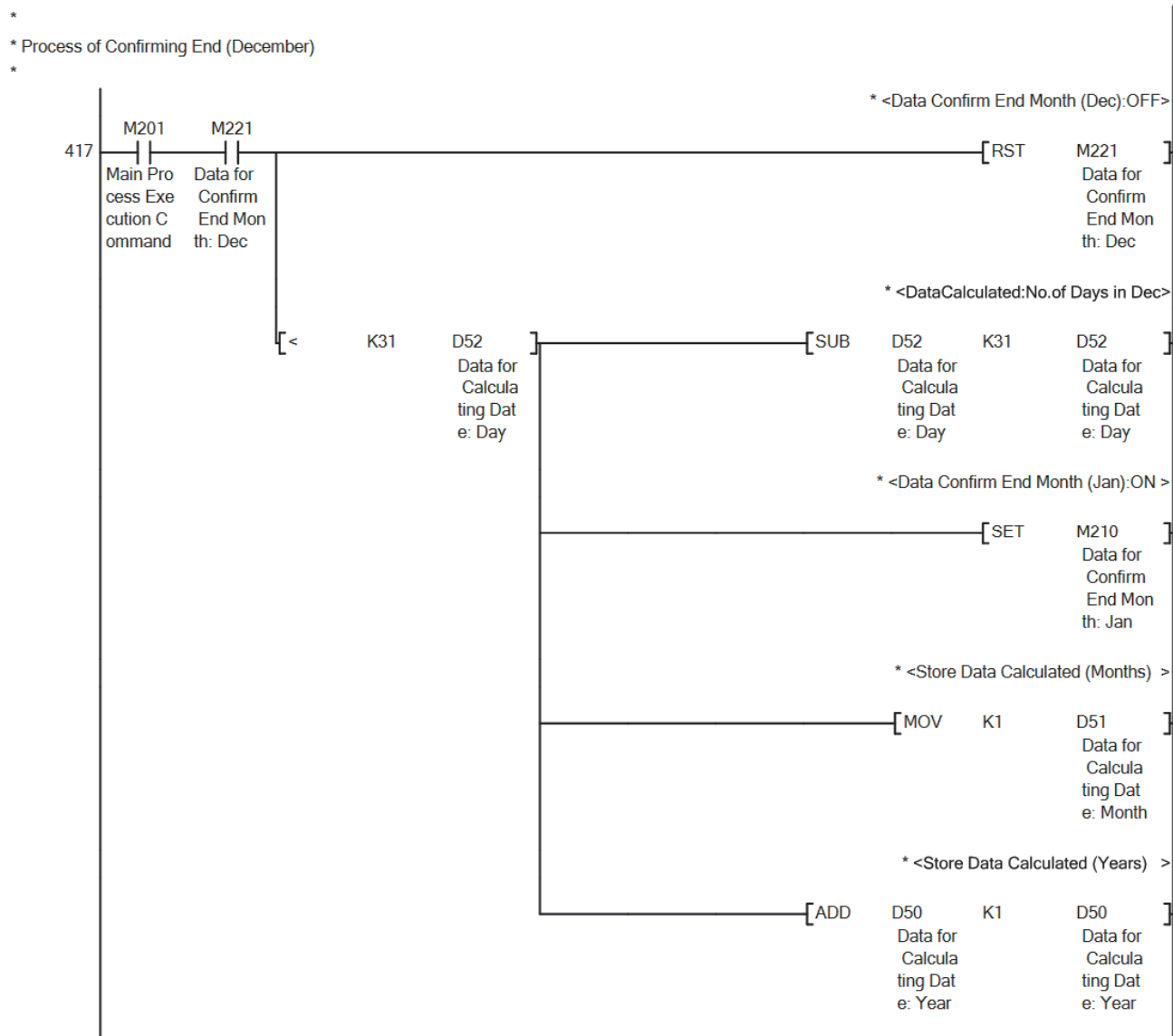


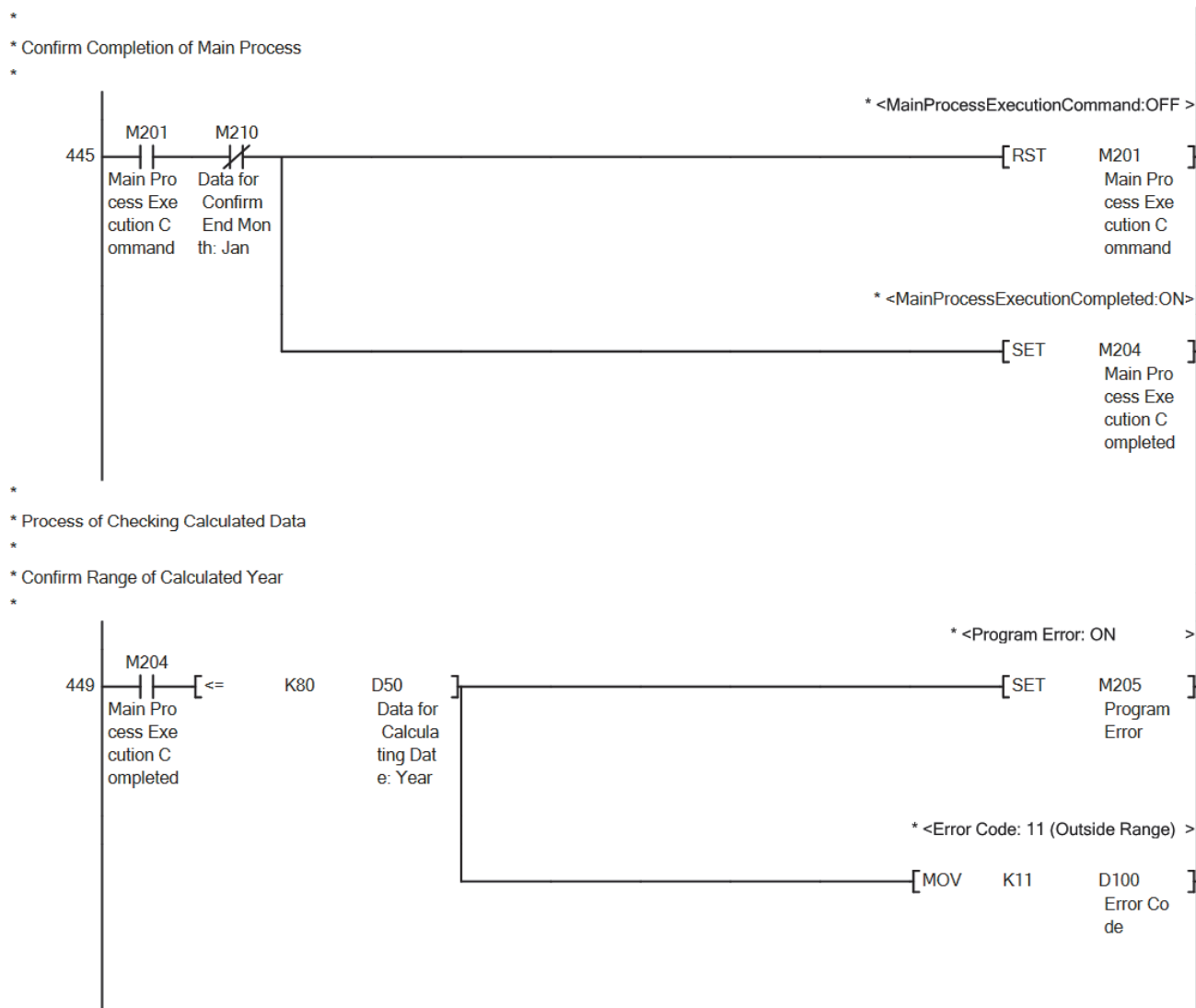


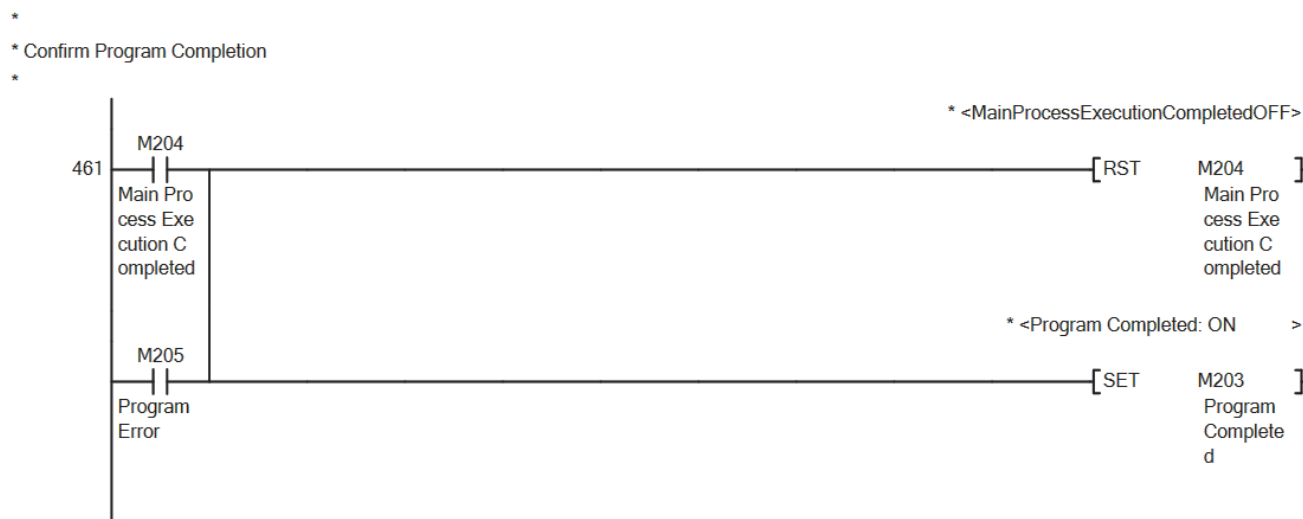












\*

\* Process of Program Completion

\*

