CONTENTS

8. AUXILIARY AND APPLIED FUNCTIONS

This section describes the auxiliary and applied functions available for positioning control by the servo system CPU.

8. AUXILIARY AND APPLIED FUNCTIONS

8.1 Limit Switch Output Function

The limit switch output function allows the A1SY42 output module or AY42 output module to output ON/OFF signals corresponding to the positioning address set for each axis.

8.1.1 Limit switch output data

Item	Settings	Initial Value	Comments
ON/OFF point setting	• -2147483648 to 2147483647 ($\times 10^{-1}$ µm, $\times 10^{-5}$ inch, PLS) • 0 to 35999999 ($\times 10^{-5}$ degree) Units: $\times 10^{-1}$ µm, $\times 10^{-5}$ inch, $\times 10^{-5}$ degree, PLS	0	• Up to 10 points can be set for each axis.

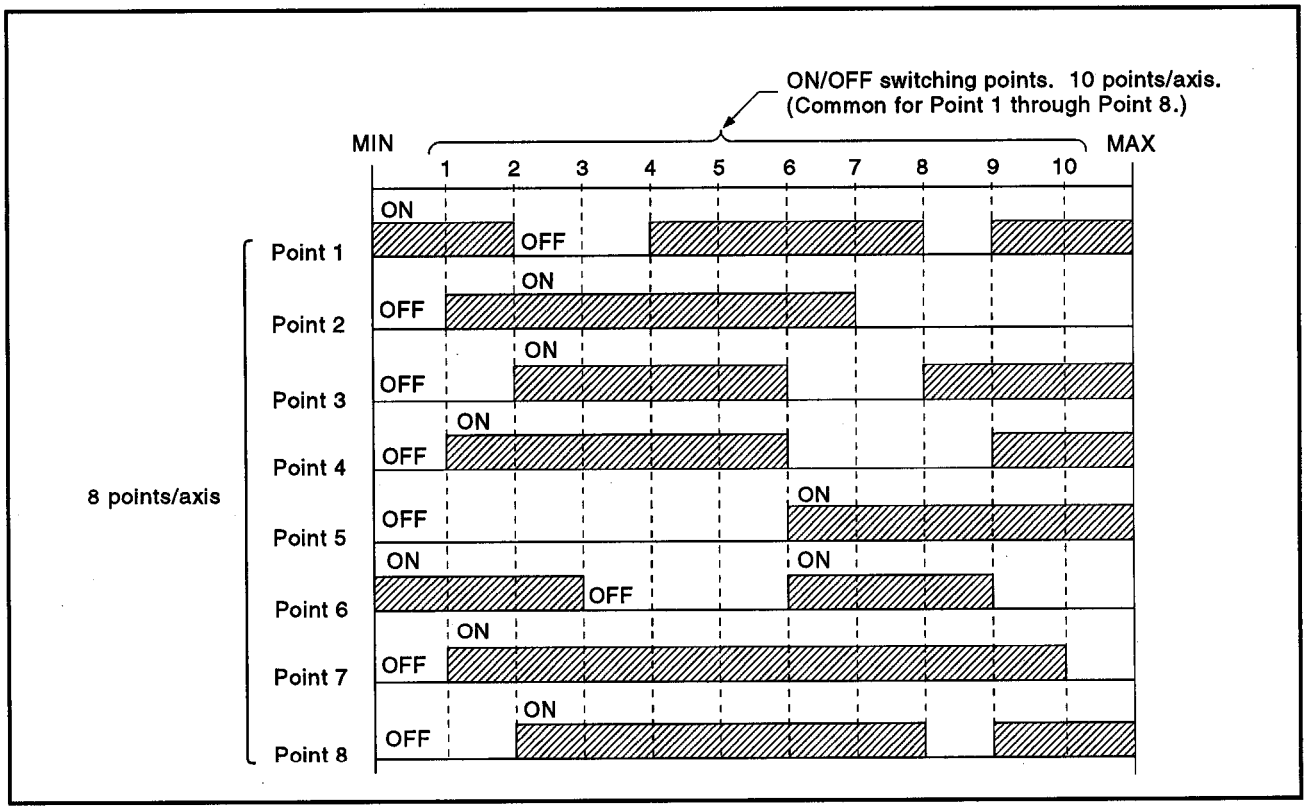
8.1.2 Limit switch output function

[Control Details]

(1) The limit switch function outputs the ON/OFF pattern from the A1SY42/AY42 at the set addresses.
Before running the limit switch output function, the ON/OFF point addresses and the ON/OFF pattern must be set from a peripheral device. (Settings cannot be made by the sequence program.)
The number of limit switch outputs per axis and the ON/OFF points are as follows:

(a) Number of limit switch output points:.....8 points/axis, total 64 points

(b) ON/OFF points .....10 points/axis
Set an address in the stroke limit range for each point.



(2) Limit Switch Enable/Disable Setting
The following devices can be used to enable or disable the limit switch output from each axis or each point.

Table 8.1 Limit Switch Enable/Disable Settings

Set Data/Device	Setting Unit	Processing	Set Data Valid Timing
Limit switch output used/not used setting in the fixed parameters.	Axis	Used Set ON/OFF pattern can be output for the appropriate axis. Not Used All outputs OFF for the appropriate axis.	(1) Leading edge of PC ready (M2000) (2) When test mode is started
Limit switch output enable signal (M1806+20n)	Axis	ON ON/OFF pattern is output for the appropriate axis based on the set ON/OFF pattern and the limit switch output disable setting registers (D1008 and D1009). OFF All outputs OFF for the appropriate axis.	Limit switch output used/not used setting in the fixed parameters is set to "used."
Limit switch output disable setting registers (D1008 and D1009)	Point	Disable bit (1) Outputs corresponding to disable bits set to "1" are OFF. Enable bit (0) Outputs corresponding to enable bits set to "0" output an ON/OFF pattern based on the set ON/OFF pattern.	While M1806+20n is ON.

REMARKS

The data in Table 8.1 is also valid during the test mode set by a peripheral device.

(3) Cautions
(a) The limit switch output is based on the "feed present value" for each axis after PC ready (M2000) turns ON and the PCPU ready flag (M9074) is ON.
All points turn OFF when the PCPU ready flag (M9074) turns OFF.

(b) While the PCPU ready flag (M9074) is ON and the feed present value is outside the set stroke limits, the limit switch output is based on M1806+20n.
Consequently, the user should apply an interlock to ensure that the sequence program turns M1806+20n ON inside the stroke limit range only.

8.2 M Code Output Function

An M code is a code number between 0 and 255 which can be set for each positioning control. During positioning control execution, these M codes are read by the sequence program to check the current servo program and to command auxiliary operations, such as clamping, drill rotation, and tool changing.

(1) Setting M codes
The M code can be set when a servo program is written or modified using a peripheral device. One M code can be set for each servo program.

(2) M code storage and read timing
(a) M codes are stored in the M code register for the designated axis on positioning start completion and at designated points (speed switching control, constant speed control).
During interpolation control, the M code is stored for all axes under interpolation control.

(b) To read an M code on positioning start completion, use the positioning start completion signal (M16m0) as the read command.

(c) To read an M code on positioning completion, use the positioning completion signal (M16m1) as the read command.

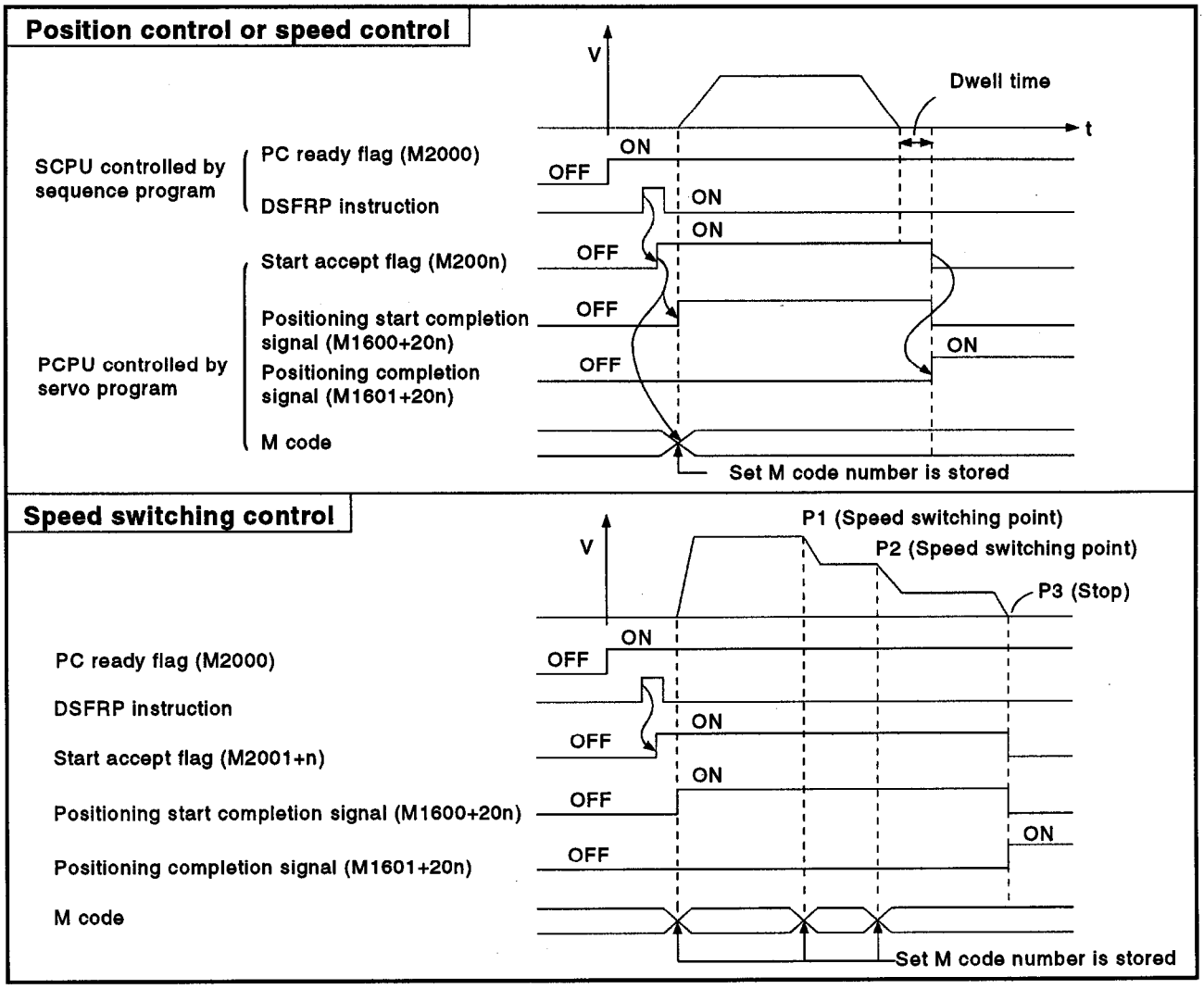


Figure 8.1 M Code Storage and Read Timing

(3) Resetting M codes

The M codes can be reset by clearing the M code output devices to zero. Use this method during positioning control to carry out operations unrelated to the servo program, such as when it has been difficult to output the M code during the previous positioning control.

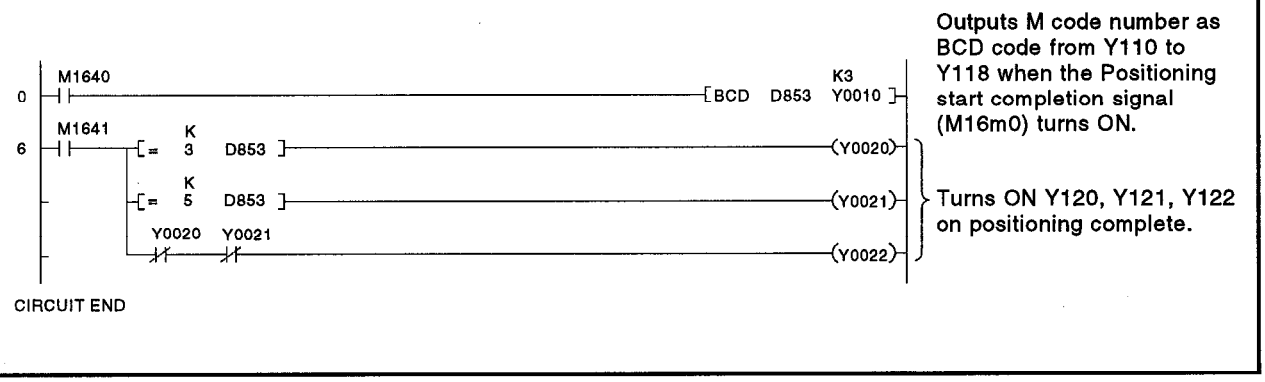
However, an M code output from the servo program takes priority over an M code set for an intermediate point under speed switching control or constant-speed control.

(4) Program example

(a) A sequence program to read M codes is shown below, using the following conditions.

1) Axis used..... Axis 3
2) Processing on positioning..... M code number output as BCD code start due to M code code from Y110 to Y118
3) Processing on positioning completion due to M code
   a) if M code = 3 ..... turn ON Y120
   b) if M code = 5 ..... turn ON Y121
   c) if M code is not 3 or 5 .....turn ON Y122

(b) The sequence program based on the above conditions is shown below.



8.3 Backlash Compensation Function

The backlash compensation function compensates for the backlash amount in the mechanical system. When the backlash compensation amount is set, extra pulses equivalent to the backlash compensation amount are output after a change in travel direction resulting from positioning control, JOG operation, or manual pulse generator operation.

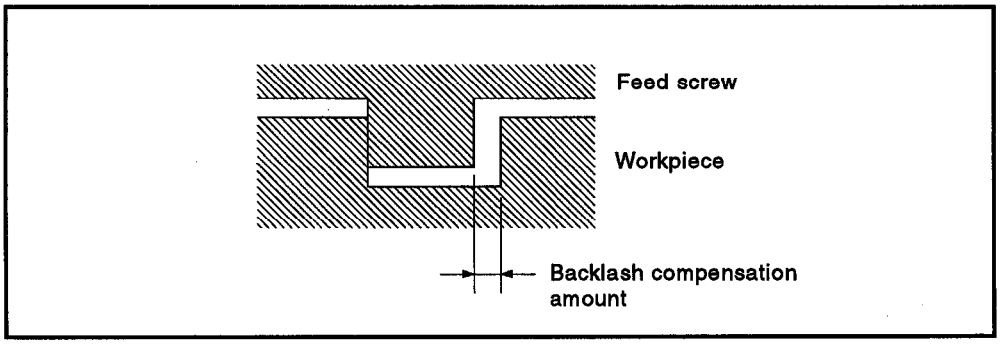


Figure 8.2 Backlash Compensation Amount

(1) Setting the backlash compensation amount
The backlash compensation amount is one of the fixed parameters, and is set for each axis using a peripheral device.
The setting range differs according to whether mm, inch, degree, or pulse units are used, as shown below.

(a) Millimeter units

- 0 to 6553.5
- $0 \leq \dfrac{\text{(Backlash compensation amount)}}{\text{(Travel value per pulse)}} \leq 65535$ (PLS)

(Decimal fraction rounded down.)

(b) Inch or Degree Units

- 0 to 0.65535
- $0 \leq \dfrac{\text{(Backlash compensation amount)}}{\text{(Travel value per pulse)}} \leq 65535$ (PLS)

(Decimal fraction rounded down.)

(c) Pulse Units

- 0 to 65535
- $0 \leq \dfrac{\text{(Backlash compensation amount)} \times \text{(Pulses per rotation)}}{\text{(Travel value per rotation)}} \leq 65535$ (PLS)

(Decimal fraction rounded down.)

(2) Backlash compensation processing
The details of backlash compensation processing are shown in the table below.

Table 8.2 Details of Backlash Compensation Processing

Condition	Processing
First motion after power on	• No backlash compensation if travel direction = home position return direction. • Backlash compensation if travel direction ≠ home position return direction.
JOG operation start	• Minimum backlash amount on first JOG operation after travel direction change.
Positioning start	• Backlash compensation if travel direction changed.
Manual pulse generator operation	• If travel direction changed.
Home position return start	• Backlash compensation amount is valid after home position return is started.
Absolute position system	• Status stored at power off and applied to absolute position system.

POINTS

(1) The feed pulses equivalent to the backlash compensation amount are not added to the feed present value.
(2) Home position return is required after the backlash compensation amount is changed.
The original backlash compensation amount is retained until home position return is carried out.

8.4 Torque Limit Function

The torque limit function controls the torque generated by the servomotor within the set range.
The torque is controlled to the set torque limit value if the torque required during positioning control exceeds the set limit value.

(1) Torque limit value set range
Set the torque limit value between 1% and 500% of the rated torque.

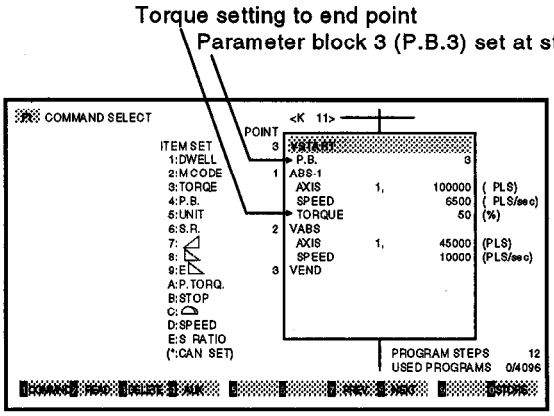
(2) How to set the torque limit value
Set the torque limit value using a peripheral device, as described below.
(a) Setting in the Parameter Block (See Section 4.4)
Set the Torque limit value parameter in the parameter block.
Using the servo program to designate which parameter block number is used allows the servomotor torque to be controlled to a torque limit value for any positioning control.

(b) Setting with a Servo Program
Designating the torque limit value with the servo program allows restriction of the servomotor torque to the designated torque limit value during execution of the servo program.

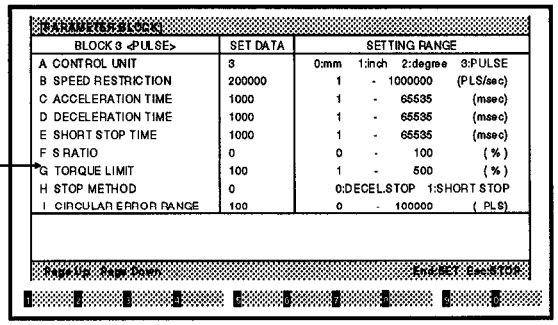
Examples

[Setting the torque limit value for speed switching control (VSTART)]

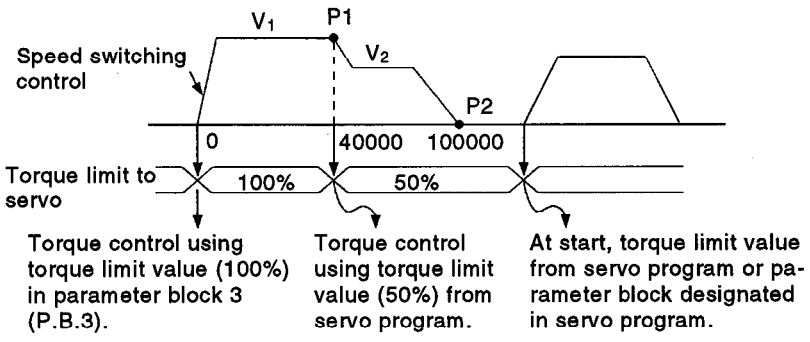
(1) Servo program



(2) Parameter block



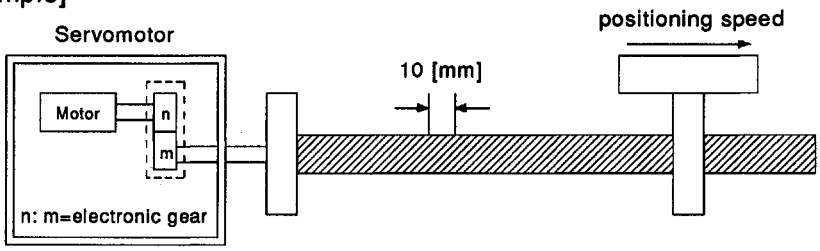
(3) General description of operation



8.5 Electronic Gear Function

The electronic gear function changes the travel value per pulse.
The electronic gear is set by setting the travel value per pulse (see Section 4.2.1).
Using the electronic gear function allows positioning control without the need to select the encoder to match the mechanical system.

[Example]



Pulses per motor revolution ..... 10000 [PLS]
Travel value per motor revolution ... 10 mm [mm]

(1) Electronic gear 1:1 (electronic gear setting = 1)

Travel value per pulse =

$$\frac{\text{Travel value per motor revolution}}{\text{Pulses per motor revolution}} = \frac{10\ [\text{mm}]}{10000\ [\text{PLS}]} = 0.001\ [\text{mm/PLS}]$$

Positioning control is executed at the commanded speed.

(2) Electronic gear 2:1 (electronic gear setting = 0.5)

Travel value per pulse =

$$\frac{\text{Travel value per motor revolution}}{\text{Pulses per motor revolution}} = \frac{5\ [\text{mm}]}{10000\ [\text{PLS}]} = 0.0005\ [\text{mm/PLS}]$$

Positioning control is executed faster than the commanded speed.

(3) Electronic gear 1: 2 (electronic gear setting = 2)

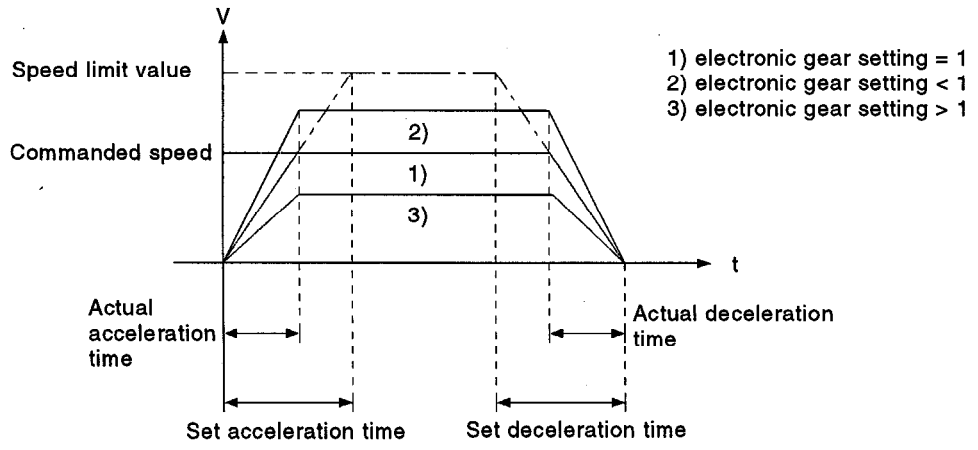
Travel value per pulse =

$$\frac{\text{Travel value per motor revolution}}{\text{Pulses per motor revolution}} = \frac{20\ [\text{mm}]}{10000\ [\text{PLS}]} = 0.002\ [\text{mm/PLS}]$$

Positioning control is executed slower than the commanded speed.

The relationship between the commanded speed (positioning speed set in the servo program) and actual speed (actual positioning speed) is shown below for different electronic gear settings.

- if electronic gear setting = 1, commanded speed = actual speed
- if electronic gear setting < 1, commanded speed < actual speed
- if electronic gear setting > 1, commanded speed > actual speed



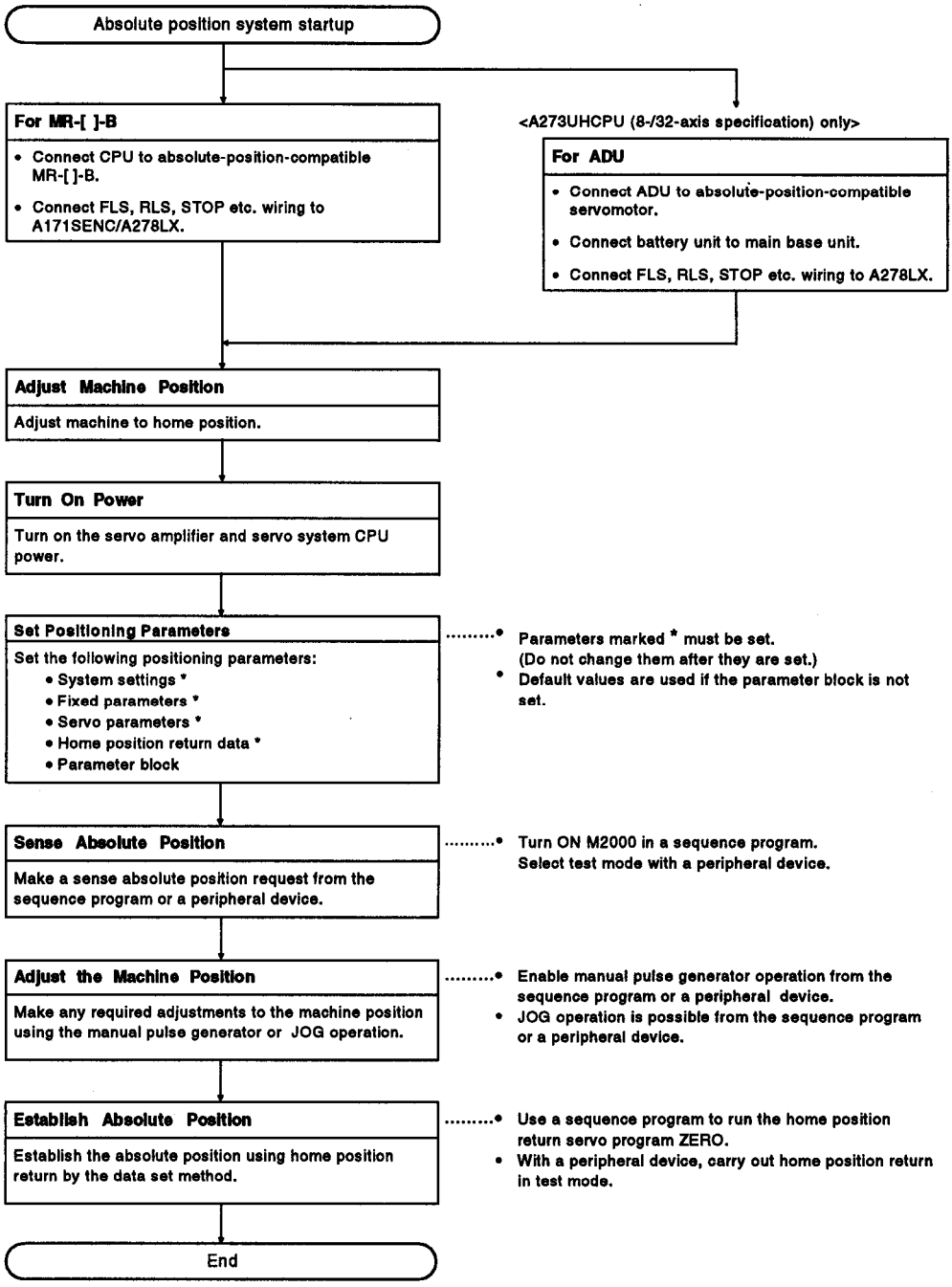
The speed limit value, acceleration time, and deceleration time are data from the designated parameter block.

Figure 8.3 Relationship Between Commanded Speed and Actual Speed

8.6 Absolute Positioning System

The absolute positioning system can be used for positioning control when using an absolute- position-compatible servomotor (A273UHCPU (8-/32-axis specification using ADU) and MR-[ ]-B.
Home position return is not necessary using the absolute positioning system because after the machine position is initially established at system startup, the absolute position is sensed each time the power is turned on.
The machine position is established using a home position return initiated from the sequence program or a peripheral device.

(1) Absolute position system startup procedure
The system startup procedure is shown below.



(2) In the absolute positioning system, the absolute position may be lost under the following conditions:
Re-establish the absolute position using home position return or by aligning the machine position and using present value change.
(a) After removing or replacing the battery unit.
(b) On occurrence of a servo battery error (detected at servo amplifier power on).
(c) After the mechanical system is disturbed by a shock.

(3) Power of Allowed Traveling Points can be monitored in the system setting mode of a peripheral device, and the present value history can be monitored in the monitor mode.
(For details on monitoring Power of Allowed Traveling Points and the present value history, refer to the operating manual for the peripheral device being used.)
(a) Present value history monitor
1) Month/day/hour/minute
The time when a home position return is completed or the servo amplifier power is turned ON or OFF is indicated.
In order to display the time correctly, it is necessary to first set the clock data at the programmable controller side, then switch ON M9028 (clock data read request) from the sequence program.
2) Encoder present value
When using MR-H-B (version BCD-B13W000-B2 or later) or MR-J2-B (version BCD-B20W200-A1 or later), the multiple revolution data and within-one-revolution data read from the encoder is displayed.
Note:For the encoder present value in the home position data area, the encoder present value when the motor is within the in-position range after completion of a home position return is displayed (not the encoder value at the home position).
3) Servo command value
The command value issued to the servo amplifier is displayed.
4) Monitor present value
The present value controlled within the servo system CPU is displayed.
Note:A value close to the feed present value is displayed, but, since the monitor present value and feed present value are different data, the display of different values does not indicate an error.
5) Alarms
When an error involving resetting of the present value occurs while the servo amplifier power is ON, an error code is displayed. For details of the error, refer to the error contents area (related error list) at the bottom of the screen.

⚠ CAUTION

⚠ After removing or replacing the battery unit, correctly install the new unit and establish the absolute position.

⚠ After a servo battery error occurs, eliminate the cause of the error and ensure operation is safe before establishing the absolute position.

⚠ After the mechanical system is disturbed by a shock, make the necessary checks and repairs, and ensure operation is safe before establishing the absolute position.

POINTS

(1) The address setting range for absolute position systems is -2147483648 to 2147483647.
It is not possible to restore position commands that exceed this limit, or present values, after a power interruption.
When performing an infinite feed operation, solve this problem by setting the units to degrees or by setting a rotary table (when using SV22).

(2) Even when the present value address is changed by a present value change instruction, the restored data for the present value after a power interruption is the value based on the status prior to execution of the present value change instruction.

(3) When home position return has not been completed, restoration of the present value after a power interruption is not possible.

8.7 Speed Change

Changes the speed for positioning control and JOG operation.
Speed change is possible with the sequence program DSFLP instruction (for A171SCPU/A273UHCPU (8-axis specification), the CHGV instruction, and in the test mode with a peripheral device.
(See the peripheral device operation manual for the method of changing the speed in the test mode with a peripheral device.)

[Control Details]

(1) Forcibly changes the speed of an axis during operation to the speed designated in the speed change register.

(2) Speed change is possible with the DSFLP instruction (for A171SCPU/ A273UHCPU (8-axis specification) and the CHGV instruction. See Section 5.3 for details about the DSFLP instruction and the CHGV instruction.

[Data Settings]

(1) The speed change registers for each axis when using the DSFLP instruction are listed in the table below.
<A171SCPU>

Axis No.	Speed Change Register	
	Most Significant	Least Significant
1	D963	D962
2	D969	D968
3	D975	D974
4	D981	D980

<A273UHCPU (8-axis specification)>

Axis No.	Speed Change Register	
	Most Significant	Least Significant
1	D963	D962
2	D969	D968
3	D975	D974
4	D981	D980
5	D987	D986
6	D993	D992
7	D999	D998
8	D1005	D1004

(2) The setting ranges for the speed change registers are shown below.

Unit	mm		inch		degree		PULSE	
Item	Set Range	Units	Set Range	Units	Set Range	Units	Set Range	Units
Speed change value	0 to 600000000	$\times 10^{-2}$ mm/min	0 to 600000000	$\times 10^{-3}$ inch/min	0 to 600000000	$\times 10^{-3}$ degree/min	0 to 1000000	PLS/sec

POINT

To set the speed using a sequence program, store a value in the speed change register which is 100 times the actual speed in units of millimeters or 1000 times the speed in units of inches or degrees.

Example
To set a speed of 10000.00 mm/min., store the value 1000000 in the speed change register.

[Cautions]

(1) To change the speed during 2- to 4-axis linear interpolation control, change the speed of one of the axes under interpolation control.

(2) The speed units are the control units set in the parameter block.

(3) The values in the speed change registers are ignored during test mode with a peripheral device.

(4) The speed does not change if any of the following errors occurs during the check on DSFLP/CHGV instruction execution.

Error Details		Error Processing	Error Code
Data setting error	An axis number was set outside the range 1-4 or 1-8.	• Error step saved in D9010, D9011. • M9010, M9011 turn ON. (M9010 does not turn ON for (A273UHCPU (8-/32-axis specification.)	—
	Axis number set by indirect designation using index qualification.		
	Present value change data not set to 0 or 1.		
	Present value change data set by indirect designation using index qualification.		
	Speed not set in range between 0 and speed limit value.	• Error detection flag (M1607+20n/Yn7/M2407+20n) turns ON. • Error code listed at right is stored in the minor error register for each axis.	305
Error at speed change	Home position return in progress for designated axis.	• Error detection flag (M16+20n07/Yn7/M2407+20n) turns ON. • Error code listed at right is stored in the minor error register for each axis.	301
	Circular interpolation in progress for designated axis.		302
	Automatic deceleration in progress under positioning control.		303
	Deceleration in progress after JOG operation signal turned OFF.		304

(5) The speed set by the speed change is ignored in the following cases, but no error occurs:
(a) During deceleration due to a stop command;

(b) When stopped;

(c) During manual pulse generator operation.

[Operation Timing]

The operation timing for speed change is shown in Figure 8.4.

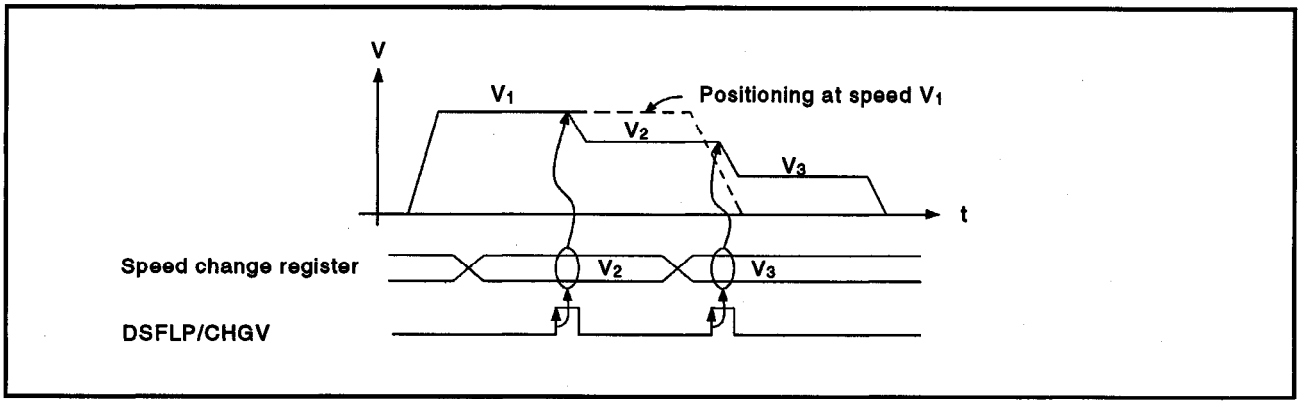


Figure 8.4 Operation Timing for Speed Change

[Program Example]

A program to change the speed is shown below, using the following conditions.

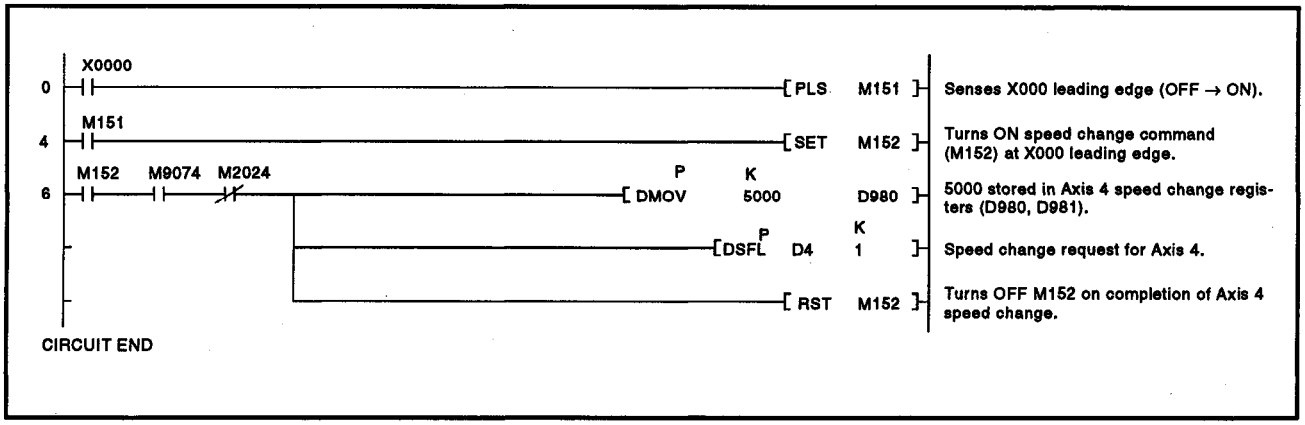
(1) Speed change conditions

(a) Axis for speed change..... Axis 4

(b) Speed after change 5000

(c) Speed change command..... X000

(2) Sequence program



8.8 Present Value Change

Feed present value of a stopped axis can be changed with the sequence program DSFLP instruction (for A171SCPU/A273UHCPU (8-axis specification), the CHGA instruction, and in the test mode with a peripheral device. (See the peripheral device operation manual for the method of changing the present value in the test mode with a peripheral device.)

[Control Details]

(1) Changes the present value to the value designated in the present value change register.
The actual present value is also changed when the feed present value is changed.

(2) Present value change is possible with the DSFLP instruction (for A171SCPU/A273UHCPU (8-axis specification) and the CHGA instruction. See Section 5.3 for details about the DSFLP instruction and the CHGA instruction.

(3) When a present value change is executed in an absolute position system, the machine position address is changed.

[Data Settings]

(1) The present value change registers for each axis when using the DSFLP instruction are listed in the table below.
<A171SCPU>

Axis No.	Present Value Change Register	
	Most Significant	Least Significant
1	D961	D960
2	D967	D966
3	D973	D972
4	D979	D978

<A273UHCPU (8-axis specification)>

Axis No.	Present Value Change Register	
	Most Significant	Least Significant
1	D961	D960
2	D967	D966
3	D973	D972
4	D979	D978
5	D985	D984
6	D991	D990
7	D997	D996
8	D1003	D1002

(2) The setting ranges for the present value change registers are shown below.

Item \ Unit	mm		inch		degree		pulse		Comments
	Set Range	Units	Set Range	Units	Set Range	Units	Set Range	Units	
Present value change value	-2147483648 to 2147483647	$\times 10^{-1}$ μm	-2147483648 to 2147483647	$\times 10^{-5}$ inch	-2147483648 to 2147483647	$\times 10^{-5}$ degree	-2147483648 to 2147483647	PLS	No error occurs if the set value is outside the stroke range.

POINT

To set the present value using a sequence program, store a value in the present value change register which is 10 times the actual present value in units of millimeters or 100000 times the present value in units of inches or degrees.

Example

To set a present value of 100000.00 mm/min., store the value 1000000 in the present value change register.

[Cautions]

(1) The present value cannot be changed for an axis when it is being operated.
If an attempt is made to change the present value for an axis which is being operated, a minor error occurs and the error detection flag (M16m7) turns ON.
The error code 300 is stored in the minor error register for the appropriate axis.

(2) The values in the present value change registers are ignored during test mode with a peripheral device.

(3) In the absolute position system, use present value change on system startup to establish the reference position at the machine position address.

(4) The present value does not change if any of the following errors occurs during the check on DSFLP/CHGA instruction execution.

Error Details		Error Processing
Data setting error	An axis number was set outside the range 1-4 or 1-8.	• Error step saved in D9010, D9011. • M9010, M9011 turn ON. (M9010 does not turn ON for (A273UHCPU (8-/32-axis specification)
	Axis number set by indirect designation using index qualification.	
	Present value change data not set to 0 or 1.	
	Present value change data set by indirect designation using index qualification.	
Error at present value change	Axis designated for present value change is in operation.	• Error detection flag (M1607+20n/Yn7/M2407+20n) turns ON. • Error code 300 is stored in the minor error register for each axis.
	Servo not commissioned for axis.	

(5) The start accept flag remains ON during present value change.

(6) Present value change is executed whether PC ready (M2000) is ON or OFF.

[Operation Timing]

The operation timing for present value change is shown in Figure 8.5.

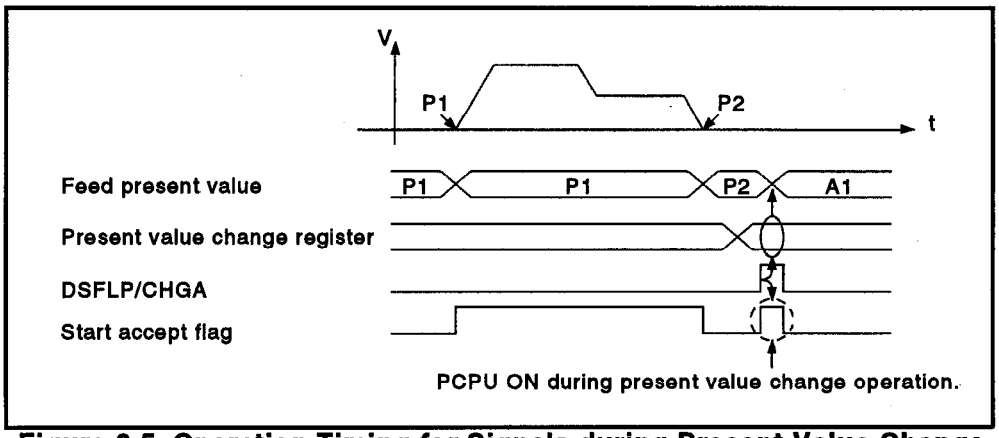


Figure 8.5 Operation Timing for Signals during Present Value Change

[Program Example]

A program to change the present value is shown below, using the following conditions.

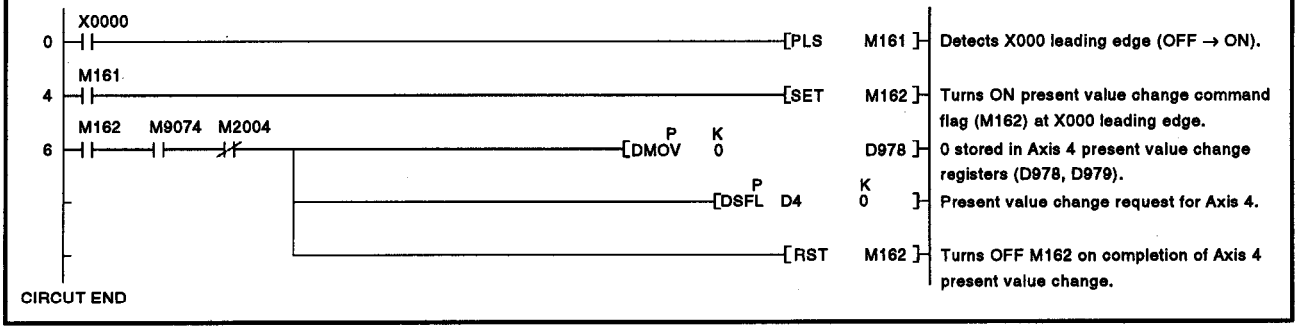
(1) Present value change conditions

(a) Axis for present value change ..... Axis 4

(b) Present value change command X000

(c) Present value after change 0

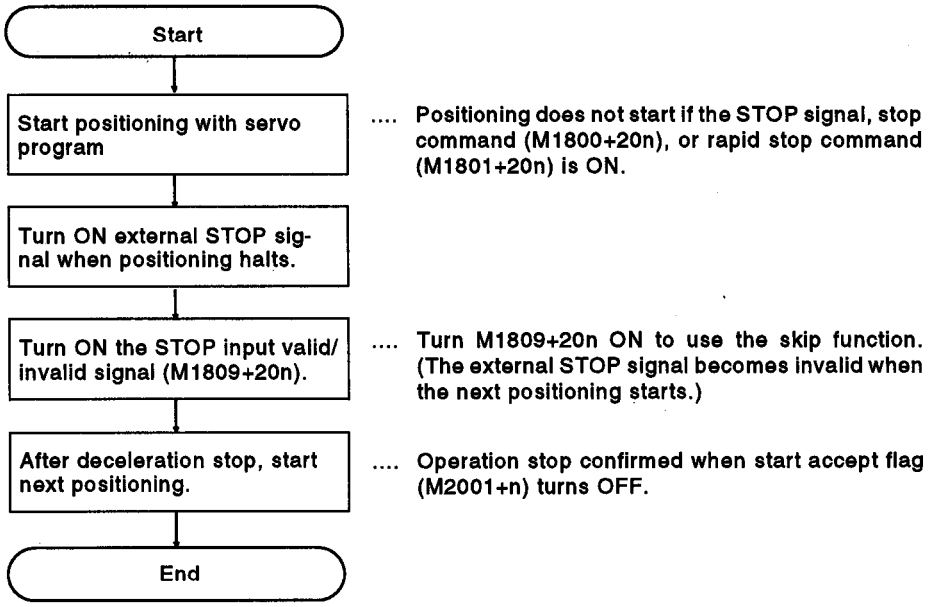
(2) Sequence program



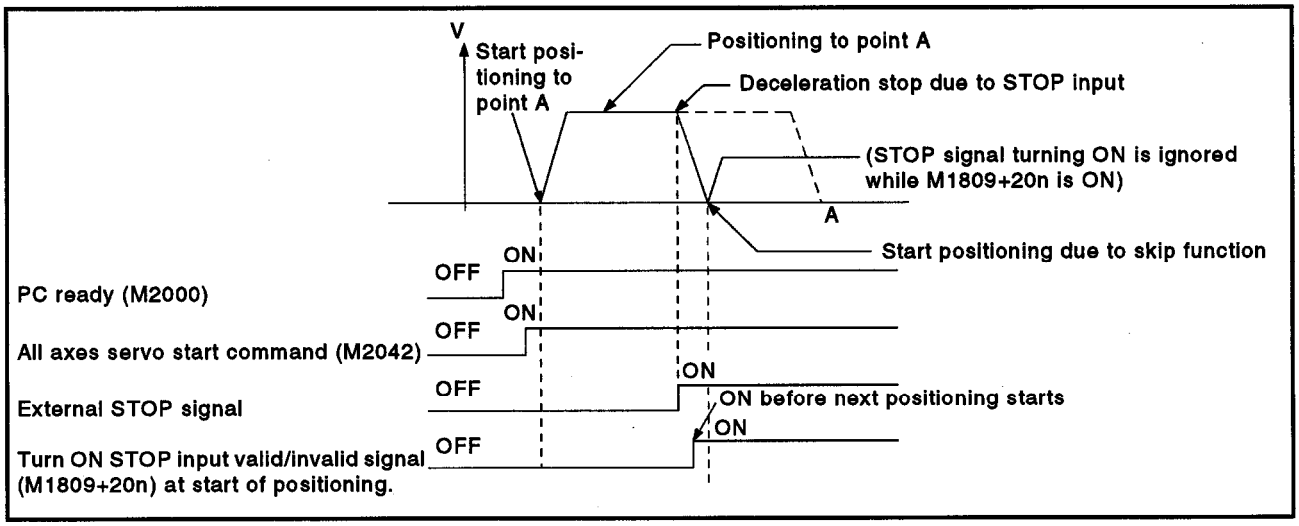
8.9 Skip Function

Based on an external input, the skip function halts the current positioning and executes the next positioning control.
The servo system CPU can run the skip function according to the external STOP signal and the sequence program.

(1) The procedure for using the skip function based on the external STOP signal and the sequence program is shown below.



(2) Operation timing
The operation timing of the skip function is shown in the diagram below.



8.10 Teaching Function

The teaching function allows the operator to teach the servo system CPU when the target position (address) is unknown or to align with an object.

(1) Teaching methods
Two teaching methods are available: "address teaching" and "program teaching."

(a) Address teaching
Writes the present value to the designated program address. The program must be created before the address teaching method can be used.

(b) Program teaching
Writes the present value to addresses while the program is being created.

(2) For details about teaching, see the A30TU Teaching Unit Operating Manual (IB-67277).

8.11 High-Speed Reading of Designated Data

This function stores the designated positioning data in the designated device (D, W) with the signal from an input module mounted on the motion base as the trigger.
It can be set in the system setting of a peripheral device software package.

(1) Positioning data that can be set

1. Feed present value
2. Present value
3. Deviation counter value
4. M codes
5. Torque limit value
6. Motor current
7. Motor rpm
8. Virtual servo motor feed present value
9. Synchronous encoder present value
10. Virtual servo M code
11. Present value after differential gear of main shaft
12. Present value in one rotation of main virtual axis
13. Present value in one rotation of auxiliary input axis
14. Present value in one rotation of cam axis
15. Executed cam No.
16. Executed stroke amount

} Only valid in SV22 virtual mode

(2) Modules and signals used

CPU	Input Module	Signal	Reading Timing	Number of Points Settable
When using A171SCPU	A171SENC	TREN	0.8 ms	1
	PC input module	X device		8
When using A273UHCPU (8/32-axis specification)	A273EX	TREN		3
	PC input module	X device		8

Note: Only one PC input module can be used.

8.12 Servo Program Cancel/Start Function

This is a function for stopping a servo program being executed by means of a deceleration stop caused turning the cancel signal ON. When used in combination with "start" (selectable item), this function also allows a designated servo program to be automatically started after a deceleration start.

[Control details]

(1) When the cancel signal is turned ON during execution of a program for which the cancel function has been designated, the positioning processing being executed is suspended, and a deceleration stop is executed.

(2) If "start" has been designated in conjunction with "cancel", after the stop has been executed as described above, the designated servo program is started.

[Data setting]

(1) Cancel signal device
The devices that can be used as cancel signal devices are indicated below.
X, Y, M, TC, TT, CC, CT, B, F

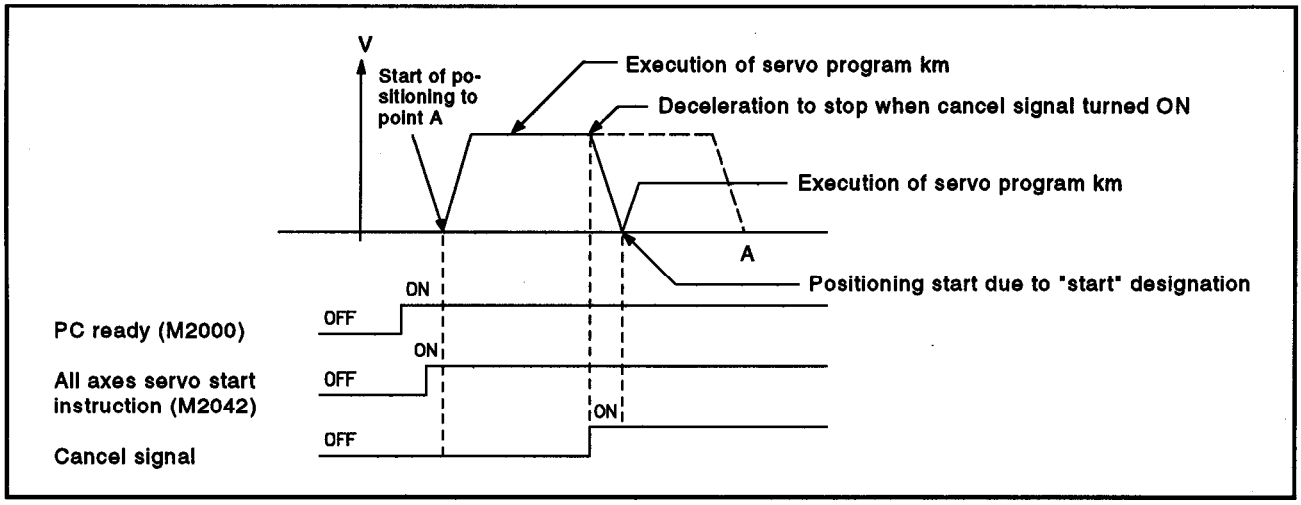
(2) Start (selectable item) setting method
Set by indirect designation (1 word) by using a constant (K) or D, W devices.

[Notes]

(1) Cannot be used with the home position return instruction (ZERO) or simultaneous start instruction (START).
For details on whether other instructions can be used or not, refer to the servo instruction list (6.2(2)).

(2) If the axes used with a servo program designated by "start" are already in operation and the program cannot be executed, the axes decelerate to a stop and minor error "101" occurs.

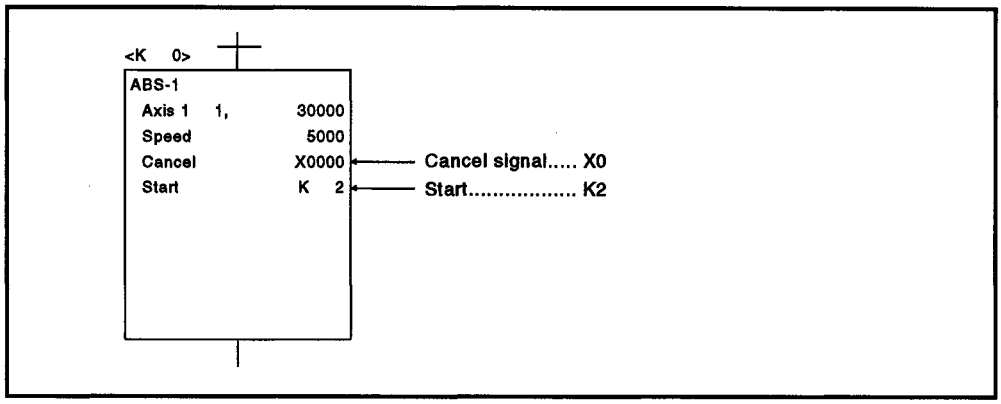
[Operation timing]



The operation timing is shown below.

[Program example]

A program example is shown below.



APPENDICES

APPENDIX 1 SCPU ERROR CODE LIST

If an error occurs when the PC is switched to the RUN status or is in the RUN status, the error indication and error code (including the step number) are stored in a special register by the self-diagnosis function. When an error occurs, refer to Table 1.1 for its cause and the corrective action to take. Eliminate the cause of the error by taking the appropriate corrective action. Error codes can be read at a peripheral device; for details on the relevant operation, see the Operating Manual for the peripheral device.

⚠ CAUTION

⚠ When an error occurs, check the points stated in this manual and reset the error.

1.1 SCPU Error Code List

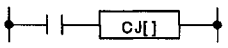
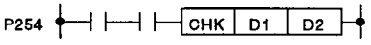
The list presented below gives the error numbers, and the error contents, causes, and corrective actions for each error message.

Table 1.1 Error Code List

Error Message (When an A273UHCPU (8/32 Axis Specification) Is Used)	Contents of Special Register D9008 (BIN Value)	CPU Status	Error Contents and Cause	Corrective Action
"INSTRCT.CODE ERR" (When an instruction is executed.)	10	Stopped	An instruction code that cannot be decoded has been included in the program. (1) A ROM which includes undecodable instruction codes has been installed. (2) The memory contents have changed for some reason and now include an undecodable instruction code.	(1) Read the error step with a peripheral device, and correct the program at that step. (2) If the ROM is the problem, either rewrite its contents or replace it with a ROM into which the correct contents have been written.
"PARAMETER ERROR" (On switching on the power or resetting. On switching from {STOP / PAUSE} to {RUN / STEP RUN})	11	Stopped	The parameter data in the CPU's memory has been changed due to noise or incorrect installation of the memory.	(1) Check the installation of the memory and install it correctly. (2) Read the parameter data of the CPU memory at a peripheral device, check the data, correct it, and write the corrected data back into the memory.
"MISSING END INS." (When M9056 or M9057 is ON. On switching from {STOP / PAUSE} to {RUN / STEP RUN})	12	Stopped	(1) There is no END (FEND) instruction in the program. (2) When a subprogram is set in the parameters, there is no END instruction in the subprogram.	(1) Write an END instruction at the end of the program.
"CAN'T EXECUTE (P)" (When a CJ/SCJ/JMP/CALL(P)/FOR-NEXT instruction is executed. On switching from {STOP / PAUSE} to {RUN / STEP RUN})	13	Stopped	(1) The jump destination designated with a CJ/SCJ/CALL/CALLP/JMP instruction does not exist, or more than one exists. (2) There is a CHG instruction but no subprogram is set. (3) Although there is no CALL instruction, there is a RET instruction in the program and is has been executed. (4) A CJ/SCJ/CALL/CALLP/JMP instruction whose jump destination is at or beyond the END instruction has been executed. (5) The number of FOR instructions does not match the number of NEXT instructions. (6) A JMP instruction has been included between a FOR and NEXT command, exiting the FOR - NEXT sequence. (7) The subroutine has been exited by execution of a JMP instruction before execution of a RET instruction. (8) Execution of a JMP instruction has caused a jump into a step in a FOR - NEXT range, or into a subroutine.	(1) Read the error step with a peripheral device, and correct the program at that step. (Correct, for example, by inserting a jump destination, or making sure there is only one jump destination.)

APP

Table 1.1 Error Code List (Continued)

Error Message (When an A273UHCPU (8/32 Axis Specification) is Used)	Contents of Special Register D9008 (BIN Value)	CPU Status	Error Contents and Cause	Corrective Action
"CHK FORMAT ERR." (On switching from {STOP / PAUSE} to {RUN / STEP RUN})	14	Stopped	(1) An instruction other than an LDX, LDIX, ANDX, or ANIX instruction (including NOP) has been included in the same ladder block as a CHK instruction. (2) More than one CHK instruction exists. (3) The number of contacts in a CHK instruction ladder block exceeds 150. (4) The device number of an X device in a CHK instruction ladder block exceeds X7FE when using an A373CPU or X1FFE when using an A373U/A273U. (5) The following ladder block  has not been inserted before the CHK instruction ladder block. (6) The D1 device (number) of a CHK D1 D2 instruction is not the same as the device (number) of the contact before the CJ[ ] instruction. (7) The pointer P254 is not appended at the head of a CHK instruction ladder block. 	(1) Check if any of items (1) to (6) in the column to the left apply to the program with the CHK instruction ladder block, correct any problem in the program with a peripheral device, then restart program operation. (2) This error code is only valid when the I/O control method used is the direct method.
"CAN'T EXECUTE (I)" (When an interruption occurs. On switching from {STOP / PAUSE} to {RUN / STEP RUN})	15	Stopped	(1) An interrupt module is used but there is no number for the corresponding interrupt pointer I in the program. Or, more than one exists. (2) There is no IRET instruction in the interrupt program. (3) There is an IRET instruction other than in the interrupt program.	(1) Check the whether or not an interrupt program corresponding to the interrupt module exists and either create an interrupt program or eliminate the duplicated I number. (2) Check if there is an IRET instruction in the interrupt program: if there is not, insert one. (3) Check if there is an IRET instruction other than in the interrupt program: if there is, delete it.
"CASSETTE ERROR" (On switching on the power or resetting.)	16	Stopped	No memory cassette is installed.	Install a memory cassette and reset.
"RAM ERROR" (On switching on the power or resetting. When M9084 is turned ON in the STOP status.)	20	Stopped	(1) On checking if data can be read from and written to the CPU data memory area normally, it is determined that one or both are not possible.	There is a hardware fault. Contact your nearest Mitsubishi service center, agent, or office, and explain the problem.
"OPE.CIRCUIT ERR." (On switching on the power or resetting.)	21	Stopped	(1) The operation circuit that executes sequence processing in the CPU does not operate normally.	
"WDT ERROR" (At any time)	22	Stopped	The scan time has exceeded the watchdog error monitor time. (1) The user program scan time has been exceeded due to the conditions. (2) A momentary power interruption has occurred during scanning, extending the scan time.	(1) Calculate and check the scan time for the user program and shorten the scan time, e.g. by using a CJ instruction. (2) Monitor the contents of special register D9005 with a peripheral device. If the contents are other than "0" the power supply voltage is unstable: in this case check the power supply and reduce voltage fluctuation.
"END NOT EXECUTE" (When END processing is executed.)	24	Stopped	(1) When the END instruction is executed it is read as another instruction code, e.g. due to noise. (2) The END instruction has been changed to another instruction code somehow.	(1) Reset and establish the RUN status again. If the same error is displayed again, the cause is a CPU hardware error. Contact your nearest Mitsubishi service center, agent, or office, and explain the problem.
"WDT ERROR" (At any time)	25	Stopped	A loop has been established for execution of the sequence program, due for example to a CJ instruction, and the END instruction cannot be executed.	Check if any program will be run in an endless loop: if there is such a program, modify the program.
"UNIT VERIFY ERR." (When an END instruction is executed. (However, no check is performed when M9084 or M9094 is ON.)	31	Stopped (RUN)	The I/O information does not match a loaded module when the power is switched ON. (1) An I/O module (this includes special function modules) is loose, or has become detached, during operation. Or, a completely different module has been loaded.	(1) The bit in special registers D9116 to D9123 that corresponds to the module for which the verification error occurred will be set to "1": check for the module whose bit is set to "1" by monitoring these registers with a peripheral device and replace that module. (2) If the current arrangement of loaded modules is acceptable, reset with the reset switch.

APP

Table 1.1 Error Code List (Continued)

Error Message (When an A273UHCPU (8/32 Axis Specification) is Used)	Contents of Special Register D9008 (BIN Value)	CPU Status	Error Contents and Cause	Corrective Action
"FUSE BREAK OFF" (When an END instruction is executed. However, no check is performed when M9084 or M9094 is ON.)	32	RUN (Stopped)	There is an output module with a blown fuse.	(1) Check the blown fuse indicator LEDs of the output modules and replace the fuse of the module whose indicator LED is lit. (2) Modules with blown fuses can also be detected by using a peripheral device. The bit in special registers D9100 to D9107 that corresponds a module whose fuse has blown will be set to "1": monitor these registers to check.
"CONTROL-BUS ERR." (When FROM, TO instructions are executed. On switching on the power or resetting. On switching from {STOP / PAUSE} to {RUN / STEP RUN})	40	Stopped	FROM, TO instructions cannot be executed. (1) Fault in the control bus to the special function module.	(1) There is a hardware fault of the special function module, CPU module, or base unit: replace each module/unit to find the defective one. Contact your nearest Mitsubishi service center, agent, or office, and explain the problem with the defective module/unit.
"SP.UNIT DOWN" (When FROM, TO instructions are executed. On switching on the power or resetting. On switching from {STOP / PAUSE} to {RUN / STEP RUN})	41	Stopped	On execution of a FROM, TO instruction, a special function module was accessed but no response was received. (1) The accessed special function module is faulty.	There is a hardware fault in the accessed special function module: contact your nearest Mitsubishi service center, agent, or office, and explain the problem.
"LINK UNIT ERROR" (On switching on the power or resetting. On switching from {STOP / PAUSE} to {RUN / STEP RUN})	42	Stopped	(1) A data link module for use with MELSECNET has been loaded at the master station.	(1) Remove the data link module for MELSECNET from the master station. After making this correction, reset and start operation from the initial status.
"I/O INT.ERROR" (When an interruption occurs.)	43	Stopped	An interruption has occurred although there is no interrupt module.	(1) There is a hardware fault in one of the modules: replace each module in turn to determine which one is defective. Contact your nearest Mitsubishi service center, agent, or office, and explain the problem with the defective module.
"SP.UNIT LAY.ERR." (On switching on the power or resetting. On switching from {STOP / PAUSE} to {RUN / STEP RUN})	44	Stopped	(1) Three or more computer link modules have been installed for one CPU module. (2) Two or more data link modules for MELSECNET have been installed. (3) Two or more interrupt modules have been installed. (4) In the parameter settings made at a peripheral device, an allocation for a special function module has been made where there is in fact an I/O module, or vice versa.	(1) Do not install more than two computer link modules. (2) Do not install more than one data link module for MELSECNET. (3) Install only one interrupt module (4) Re-set the I/O allocations in the parameter settings made at the peripheral device so that they agree with the loaded modules.
"SP.UNIT ERROR" (When a FROM, TO instruction is executed)	46	Stopped (RUN)	(1) A location where there is no special function module has been accessed (when the FROM, TO instruction was executed).	(1) Read the error step using a pe-ripheral device, check the contents of the FROM, TO instruction at that step, and correct it using the peripheral device.
"LINK PARA.ERROR" (On switching on the power or resetting. On switching from {STOP / PAUSE} to {RUN / STEP RUN})	47	RUN	(1) The data written to the link parameter area when link range settings are made by parameter setting at a peripheral device differ for some reason from the parameter data read by the CPU. (2) The setting for the total number of slave stations is "0".	(1) Write the parameters again and check. (2) If the error is displayed again, there is a hardware fault. Contact your nearest Mitsubishi service center, agent, or office, and explain the problem.
"OPERATION ERROR" (When a command is executed)	50	RUN (Stopped)	(1) The result of BCD conversion is outside the stipulated range (max. 9999 or 99999999). (2) A setting exceeding the stipulated device range has been made and operation is therefore impossible. (3) A file register has been used in the program without having made a file register capacity setting.	(1) Read the error step with a pe ripheral device, and correct the program at that step. (Check the device setting range, BCD conversion value, etc.)
"BATTERY ERROR" (At any time However, no check is performed when M9084 is ON.)	70	RUN	(1) The battery voltage has fallen below the stipulated value. (2) The battery's lead connecter has not been installed.	(1) Replace the battery. (2) If the battery is used to back up the RAM memory or to retain memory contents during momentary power interruptions, install a lead connector.

APPENDIX 2 ERROR CODES STORED BY THE PCPU

The errors that are detected at the PCPU are servo program setting errors and positioning errors.

(1) Servo program setting errors
Servo program setting errors are errors in the positioning data set in the servo program and are checked for when a servo program is started.
They are errors that occur when the positioning data is designated indirectly.
When a servo program setting error occurs, the following happens:
- The servo program setting error flag (M9079) comes ON.
- The program number of the program in which the error occurred is stored in the error program No. register (D9189).
- The error code is stored in the error item information register (D9190).

(2) Positioning error
(a) Positioning errors are errors that occur when positioning starts or during positioning: they are classified into minor errors, major errors, and servo errors.
1) Minor errors..... These are errors generated by sequence programs or servo programs; they are assigned error codes 1 to 999.
The cause of minor errors can be eliminated by checking the error code and correcting the sequence program or servo program.
2) Major error..... These are errors generated by external input signals or control commands from the SCPU; they are assigned error codes 1000 to 1999.
When a major error occurs, check the error code and eliminate the error cause in the external input signal status or sequence program.
3) Servo error..... These are errors detected by the servo amplifier; they are assigned error codes 2000 to 2999.
When a servo error occurs, check the error code and eliminate the error cause at the servo side.

(b) When an error occurs, the error detection signal for the relevant axis comes ON, and the error code is stored in the minor error code, major error code, or servo error code register.

Table 2.1 Error Code Registers, Error Detection Flags
<A171SCPU>

Device / Error Class	Error Code Register				Error Detection Signal
	Axis 1	Axis 2	Axis 3	Axis 4	
Minor error	D806	D826	D846	D866	M1607+20n
Major error	D807	D827	D847	D867	
Servo error	D808	D828	D848	D868	M1608+20n

<A273UHCPU (8 axis specification)>

Table 2.2 Error Code Registers, Error Flags

Device / Error Class	Error Code Register								Error Detec-tion Signal
	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	Axis 8	
Minor error	D806	D826	D846	D866	D886	D906	D926	D946	Xn7
Major error	D807	D827	D847	D867	D887	D907	D927	D947	
Servo error	D808	D828	D848	D868	D888	D908	D928	D948	Xn8

<A273UHCPU (32 axis specification)>

Table 2.3 Error Code Registers, Error Flags

Device / Error Class	Error Code Register																Error Detection Signal
	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	Axis 8	Axis 9	Axis 10	Axis 11	Axis 12	Axis 13	Axis 14	Axis 15	Axis 16	
Minor error	D6	D26	D46	D66	D86	D106	D126	D146	D166	D186	D206	D226	D246	D266	D286	D306	M2407+20n
Major error	D7	D27	D47	D67	D87	D107	D127	D147	D167	D187	D207	D227	D247	D267	D287	D307	
Servo error	D8	D28	D48	D68	D88	D108	D128	D148	D168	D188	D208	D228	D248	D268	D288	D308	M2408+20n

Device / Error Class	Error Code Register																Error Detection Signal
	Axis 17	Axis 18	Axis 19	Axis 20	Axis 21	Axis 22	Axis 23	Axis 24	Axis 25	Axis 26	Axis 27	Axis 28	Axis 29	Axis 30	Axis 31	Axis 32	
Minor error	D326	D346	D366	D386	D406	D426	D446	D466	D486	D506	D526	D546	D566	D586	D606	D626	M2407+20n
Major error	D327	D347	D367	D387	D407	D427	D447	D467	D487	D507	D527	D547	D567	D587	D607	D627	
Servo error	D328	D348	D368	D388	D408	D428	D448	D468	D488	D508	D528	D548	D568	D588	D608	D628	M2408+20n

(c) If another error occurs after an error code has been stored, the existing error code is overwritten, deleting it.
However, it is possible to check the history of error occurrence by using a peripheral device started up with the GSV13PE/GSV22PE software.

(d) Error detection flags and error codes are latched until the error code reset signal (M1807+20n/Yn7/M3207+20n) or servo error reset signal (M1808+20n/Yn8/M3208+20n) comes ON.

POINTS

(1) When some servo errors occur, the same error code will be stored again even if the servo error reset signal (M1806+20n/Xn8/M3208+20n: ON) is issued.
(2) When a servo error occurs, reset the servo error after first eliminating the error cause at the servo side.

2.1 Servo Program Setting Errors

The error codes, error contents, and corrective actions for servo program setting errors are shown in Table 2.4. The "*" in error codes marked with an asterisk indicates the axis number (1 to 4/1 to 8/1 to 32).

Table 2.4 Servo Program Setting Error List

Error Code Stored in D9190	Error Name	Error Contents	Error Processing	Corrective Action
1	Parameter Block number Setting error	The designated parameter block number is outside the range 1 to 16 (A273UH 32-axis specification : 1 to 64).	The servo program is executed with the parameter block number set to the default value of "1".	Designate the parameter block number in the range 1 to 16 (1 to 64).
n03*	Address/travel value setting error (Exculuding speed control and speed/ position switching control)	(1) An address outside the designated range is set when executing absolute positioning control. Units: degree; Address Setting Range: 0 to 35999999; × 10^{-5}degree	(1) Axis motion does not start. (When executing interpolation control, none of the interpolation control axes start.) (2) If the error is detected during speed switching control or constant speed control, a deceleration stop is executed. (3) When multiple servo programs are to be executed simultaneously, if an error occurs in one servo program none of the programs are executed.	(1) If the control unit is degrees, set the address in the range 0 to 35999999.
		(2) The travel value is set to –2147483648 (H80000000) when executing incremental positioning control.		(2) Set the travel value in the range 0 to $\pm(2^{31}-1)$.
4	Commanded speed error	(1) The commanded speed is set outside the range of 1 to the speed limit value. (2) The designation for the commanded speed is outside the applicable range. mm: 1 to 600000000; × 10^{-2}mm/min inch: 1 to 600000000; × 10^{-5}inch/min degree: 1 to 600000000; × 10^{-5}degree/min PULSE: 1 to 1000000; PLS/sec	(1) The axis does not start if the commanded speed is set at "0" or less. (2) If the set commanded speed exceeds the speed limit value, control is executed at the speed limit value.	(1) Set the commanded speed in the range from 1 to the speed limit value.
5	Dwell time setting error	The dwell time is set outside the range 0 to 5000.	Control is executed using the default value of "0".	Set the dwell time in the range from 0 to 5000.
6	M code setting error	The M code is set outside the range 0 to 255.	Control is executed using the default value of "0".	Set the M code in the range from 0 to 255.
7	Torque limit value setting error	The torque limit value is set outside the range 1 to 500.	Control is executed using the torque limit value set in the designated parameter block.	Set the torque limit value in the range from 1 to 500.
n08*	Auxiliary point setting error (when executing circular interpolation by designating an auxiliary point).	(1) An address outside the designated range is set when executing absolute positioning control. Units: degree; Address Setting Range: 0 to 35999999; × 10^{-5}degree	Positioning control does not start.	(1) If the control unit is degrees, set the address in the range 0 to 35999999.
		(2) The travel value is set to –2147483648 (H80000000) when executing incremental positioning control.		(2) Set the travel value in the range 0 to ±2147483647.
		(3) The start point is also the auxiliary point, or the auxiliary point is also the end point.		(3) Set the start, auxiliary, and end points so that they are not equal to one another.
		(4) The auxiliary point is located on a straight line between the start and end points.		(4) Set the auxiliary point at a location not on the straight line between the start and end points.
n09*	Radius setting error (when executing circular interpolation by designating a radius)	(1) An address outside the applicable range is set when executing absolute positioning control. Units: degree; Address Setting Range: 0 to 35999999; × 10^{-5}degree	Positioning control does not start.	(1) If the control unit is degrees, set the address in the range 0 to 35999999.
		(2) The travel value is set to –2147483648 (H80000000) when executing incremental positioning control.		(2) Set the travel value in the range 0 to ±2147483647.
		(3) The start point is also the end point.		(3) Set the start and end points so that they are not equal to each another.
		(4) The distance between the start and end points is greater than the radius.		(4) Change the relationship between the start-to-end point distance (L) and the radius (R) so that it conforms with the following equation: $\frac{L}{2R} \leq 1$

Table 2.4 Servo Program Setting Error List (Continued)

<table>
<tr><th>Error Code Stored in D9190</th><th>Error Name</th><th>Error Contents</th><th>Error Processing</th><th>Corrective Action</th></tr>
<tr><td rowspan="2">n10*</td><td rowspan="2">Center point setting error (when executing circular interpolation by designating a center point)</td><td>(1) An address outside the applicable range is set when executing absolute positioning control.
<table><tr><th>Units</th><th colspan="2">Address Setting Range</th></tr><tr><td>degree</td><td>0 to 35999999</td><td>x 10^{-5}degree</td></tr></table></td><td rowspan="2">Positioning control does not start.</td><td>(1) If the control unit is degrees, set the address in the range 0 to 35999999.</td></tr>
<tr><td>(2) The travel value is set to –2147483648 (H80000000) when executing incremental positioning control.</td><td>(2) Set the travel value in the range 0 to ±2147483647.</td></tr>
<tr><td>11</td><td>Interpolation control unit setting error</td><td>The interpolation control unit is set outside the range 0 to 3.</td><td>Control is executed at the default value of "3".</td><td>Set the interpolation control unit in the range 0 to 3.</td></tr>
<tr><td>12</td><td>Speed limit value setting error</td><td>The speed limit value is set outside the applicable range.</td><td>Control is executed at the default value of 200000 PLS/sec.</td><td>Set the speed limit value in the specified range.</td></tr>
<tr><td>13</td><td>Acceleration time setting error</td><td>The acceleration time is set to "0".</td><td rowspan="3">Control is executed at the default value of 1000.</td><td>Set the acceleration time in the range 1 to 65535.</td></tr>
<tr><td>14</td><td>Deceleration time setting error</td><td>The deceleration time is set to "0".</td><td>Set the deceleration time in the range 1 to 65535.</td></tr>
<tr><td>15</td><td>Rapid stop deceleration time setting error</td><td>The rapid stop deceleration time is set to "0".</td><td>Set the rapid stop deceleration time in the range 1 to 65535.</td></tr>
<tr><td>16</td><td>Torque limit value setting error</td><td>The torque limit value is set outside the range 1 to 500.</td><td>Control is executed at the default value of 300%.</td><td>Set the torque limit value in the range 1 to 500.</td></tr>
<tr><td>17</td><td>Allowable error range for circular interpolation setting error</td><td>The allowable error range for circular interpolation is set outside the applicable range.
<table><tr><th>Units</th><th colspan="2">Address Setting Range</th></tr><tr><td>mm</td><td rowspan="4">1 to 100000</td><td>x 10^{-1}µm</td></tr><tr><td>inch</td><td>x 10^{-5}inch</td></tr><tr><td>degree</td><td>x 10^{-5}degree</td></tr><tr><td>PULSE</td><td>PLS</td></tr></table></td><td>Control is executed at the default value (100PLS).</td><td>Set the allowable error range for circular interpolation in the applicable range.</td></tr>
<tr><td>18</td><td>Repeat count error</td><td>The repeat count is set outside the range 1 to 32767.</td><td>Control is executed with the repeat count set to "1".</td><td>Set the repeat count in the range 1 to 32767.</td></tr>
<tr><td rowspan="3">19</td><td rowspan="3">START instruction setting error</td><td>(1) The servo program designated by the START instruction does not exist.</td><td rowspan="3">Positioning control does not start.</td><td>(1) Create a servo program designated by the START instruction.</td></tr>
<tr><td>(2) There is a START instruction in the designated servo program.</td><td>(2) Delete the servo program containing the START instruction.</td></tr>
<tr><td>(3) More than one axis has been designated for the started servo program.</td><td>(3) Do not designate more than one axis.</td></tr>
<tr><td>20</td><td>Point setting error</td><td>No point has been designated in the instruction for constant speed control.</td><td>Positioning control does not start.</td><td>Designate a point between CPSTART and CPEND.</td></tr>
<tr><td>21</td><td>Reference axis speed setting error</td><td>In linear interpolation using the reference axis speed designation method, an axis not involved in the interpolation has been designated as the reference axis.</td><td>Positioning control does not start.</td><td>Set one of the axes involved in the interpolation as the reference axis.</td></tr>
<tr><td>22</td><td>S-curve ratio setting error</td><td>The S-curve ratio when designating S-curve acceleration/deceleration is outside the range 0 to 100%.</td><td>Control is executed with an S-curve ratio of 100%.</td><td>Set the S-curve ratio within the range 0 to 100%.</td></tr>
<tr><td>23</td><td>VSTART setting error</td><td>Not even one speed switching point has been set between a VSTART and VEND instruction, or between a FOR and NEXT instruction. (Applies with A273UHCPU (8/32 axis specification) only.)</td><td>Positioning control does not start.</td><td>Set a speed switching point between the VSTART and VEND instructions or the FOR and NEXT instructions.</td></tr>
<tr><td>24</td><td>Cancel function start program No. error</td><td>The start program No. for the cancel function has been set outside the range 0 to 4095.</td><td>Positioning control does not start.</td><td>Set the start program No. within the range 0 to 4095 and then start.</td></tr>
<tr><td>25</td><td>High-speed oscillation command amplitude error</td><td>Operation cannot be started because the amplitude commanded for the high-speed oscillation function is outside the range 1 to 2147483647.</td><td>Positioning control does not start.</td><td>Set the commanded amplitude within the range 1 to 2147483647 and then start.</td></tr>
<tr><td>26</td><td>High-speed oscillation starting angle error</td><td>Operation cannot be started because the commanded starting angle for the high-speed oscillation function is outside the range 0 to 3599 (x 0.1 degrees).</td><td>Positioning control does not start.</td><td>Set the starting angle within the range 0 to 3599 (x 0.1 degrees) and then start.</td></tr>
<tr><td>27</td><td>High-speed oscillation frequency error</td><td>Operation cannot be started because the commanded frequency for the high-speed oscillation function is outside the range 1 to 5000 (CPM).</td><td>Positioning control does not start.</td><td>Set the frequency within the range 1 to 5000 (CPM) and then start.</td></tr>
</table>

Table 2.4 Servo Program Setting Error List (Continued)

Error Code Stored in D9190	Error Name	Error Contents	Error Processing	Corrective Action
900	START instruction setting error	The servo program designated by the DSFRP/SVST program does not exist.	Positioning control does not start.	Set the correct servo program number.
901	START instruction setting error	(1) The axis number set for the DSFRP/SVST instruction is different from the axis number set for the servo program.	Positioning control does not start.	(1) Set the correct axis number.
		(2) A DSFRP instruction has been used when executing 4-axis linear interpolation.		(2) Use the SVST instruction for 4-axis linear interpolation.
902	Servo program instruction code error	The instruction code cannot be decoded (a non-existent instruction code has been designated).	Positioning control does not start.	Set the correct instruction code.
903	Start error	A virtual mode program was started in the real mode.	Positioning control does not start.	Check the mode allocation for the program.
904	Start error	A real mode program was started in the virtual mode.	Positioning control does not start.	Check the mode allocation for the program.
905	Start error	An instruction that cannot be used in the virtual mode (VPF, VPR, VPSTART, ZERO, VVF, VVR, OSC) was issued.	Positioning control does not start.	Correct the servo program.
906	Axis No. setting error	An axis not used in the system settings has been set for the servo program set in a DSFRP/SVST instruction.	Positioning control does not start.	Set an axis number that is setted in the system settings.
907	Start error	Start attempted during processing for switching from real mode to virtual mode.	Positioning control does not start.	Use M2034 (real/virtual mode switching request), M2044 (real/virtual mode status) as interlocks for starting.
908	Start error	Start attempted during processing for switching from virtual mode to real mode.		

2.2 Minor Errors

Minor errors are those that occur in the sequence program or servo program. The error codes for these errors are from 1 to 999.
Minor errors include set data errors, positioning control start-up errors, positioning control errors, and control change errors.

(1) Set data errors (1 to 99, 900)
These errors occur when the data set in the parameters for positioning control is not correct.
The error codes, causes, processing, and corrective actions are shown in Table 2.5 below.

Table 2.5 Set Data Error List (1 to 99, 900)

Error Code	Data Where Error Occurred	Check Timing	Error Cause	Error Processing	Corrective Action
21	Home position return data	When count type, near-zero-point dog type, or data set type home position return is started.	The home position address of a degree axis is outside the range 0 to 35999999 (x 10^{-5} degrees).	Home position return is not started.	Set the home position address within the permissible range with a peripheral device.
22		When a count type or near-zero-point dog type home position return is started.	The home position return speed is set outside the range of 1 to the speed limit value.		Set the home position return speed at or below the speed limit value by using a peripheral device.
23			The creep speed is set outside the range of 1 to the home position return speed.		Set the creep speed at or below the home position return speed by using a peripheral device.
24		When a count type home position return is started.	The travel value after the near-zero-point dog comes ON is outside the range ON2^{31}-1 (x unit).		Set the travel value after the near-zero-point dog to within the permissible range with a peripheral device.
25		When a count type or near-zero-point dog type home position return is started.	The parameter block No. is outside the range of 1 to the maximum No.*		Set the parameter block No. within the permissible range with a peripheral device.
40	Parameter block	When interpolation control is started	The unit for interpolation control designated in the parameter block is different from the control unit designated in the fixed parameters.	Control is executed using the control unit designated in the fixed parameters.	Designate the same control unit in the fixed parameters and servo parameters.

POINT

Sometimes, if the interpolation control unit designated in the parameter block and the control unit designated in the fixed parameters are different, no error code is stored; this depends on the combination of units designated.
For details, see Section 7.1.4.

(2) Positioning control start-up errors (100 to 199)
The errors shown in this section are those detected when positioning control is started.
Error codes, causes, processing, and corrective actions are shown in Table 2.6 below.
*: When interpolation control is being executed, the error codes are stored in the error code storage areas of all the axes involved in the interpolation.

Table 2.6 Positioning Control Start-Up Error List (100 to 199)

Error Code	Control Mode												Error Cause	Error Processing	Corrective Action
	Positioning	Fixed-Pitch Feed	Speed	Speed/Position Switching	Speed Switching	Constant Speed	JOG	Manual Pulse Generator	Home Position Return	Position Follow-Up Control	OSC				
100	o	o	o	o	o	o	o	o	o	o	o		• The PC ready flag (M2000) or PCPU ready flag (M9074) is OFF.	Positioning control does not start.	• Set the servo system CPU to RUN. • Turn the PC ready flag (M2000) ON.
101	o	o	o	o	o	o	o	o	o	o	o		• The start accept flag (M2001 to M2004/M2001 to M2008/M2001 to M2032) of the relevant axis has been turned ON.		• Provide an interlock in the program to prevent the axis from being started while in motion (use the turning OFF of the start accept signal for the axis as the interlock condition).
103	o	o	o	o	o	o	o	o	o	o	o		• The stop command (M1800+20n/Yn0/M3200+20n) of the relevant axis has been turned ON.		• Turn the stop command (M1800+20n/Yn0/M3200+20n) OFF and start positioning.
104	o	o	o	o	o	o	o	o	o	o	o		• The rapid stop command (M1801+20n/Yn1/M3201+20n) of the relevant axis has been turned ON.		• Turn the rapid stop command (M1801+20n/Yn1/M3201+20n) OFF and start positioning.
105	o				o	o				o			• On starting, the feed present value is outside the stroke limit range.		• Move back inside the stroke range using JOG operation. • Enter inside the stroke range by executing a home position return or present value change.
106*	o	o			o	o				o	o		• Positioning outside the stroke limit has been designated.		• Positioning end point must be within the specified stroke limit.
107	o					o							• An address that does not generate an arc was designated in circular interpolation for which an auxiliary point is designated. (Error in relationship between the start point, auxiliary point, and end point)		• Designate correct addresses in the servo program.
108*	o					o							• An address that does not make an arc was designated in circular interpolation for which a radius is designated. (Error in relationship between the start point, auxiliary point, and end point)		
109	o					o							• An address that does not generate an arc was designated in circular interpolation for which a center point is designated. (Error in relationship between the start point, auxiliary point, and end point)		
110*	o					o							• In circular interpolation, the difference between the end point address and the ideal end point exceeded the allowable error range for circular interpolation.		
111				o									• An attempt was been made to restart speed/position switching control although it had not stopped.		• Do not attempt restart when speed/position switching control has not stopped.
115									o				• The home position return completed signal (M1610+20n/XnA/M2410+20n) has been turned ON during a near-zero point dog type home position return operation.		• Resumptive starts are not possible for home position return operations. Use JOG operation or positioning operation to return the axis to a point before the near-zero point dog signal was output, then retry the home position return operation.

Table 2.6 Positioning Control Start-Up Error List (100 to 199) (Continued)

Error Code	Control Mode												Error Cause	Error Processing	Corrective Action
	Positioning	Fixed-Pitch Feed	Speed	Speed/Position Switching	Speed Switching	Constant Speed	JOG	Manual Pulse Generator	Home Position Return	Position Follow-Up Control	OSC				
116							o						• The set JOG speed is 0.	Positioning control does not start.	• Set a correct speed (within the specified range).
													• The set JOG speed exceeds the JOG speed limit value.	Control is executed at the JOG speed limit value.	
117								o					• Both forward and reverse motion were designated when simultaneously starting JOG operation programs.	Only the axis set to move in the forward direction starts.	• Set correct data.
118					o								• The speed change point is beyond the final address.	Positioning control does not start.	• Set a speed change point that is before the final address.
													• An address that causes positioning in the reverse direction is set.		• Set an address for positioning in the forward direction.
120										o			ZCT not set During second travel in dog type or count type home position return, or when data set type home position return is started, the zero pass signal (M1606+20n/Xn6/M2406+20n) is OFF.	Home position return is not completed correctly.	• Carry out the home position return after the home position has been passed.
136			o										• A VVF/VVR instruction has been used for an MR-[ ]-B axis.	Positioning control does not start.	• MR-J-B axes cannot be started with VVF/VVR instructions: use VF/VR instructions instead.
140	o												• In linear interpolation for which a reference axis is designated, the travel value of the reference axis is set at "0".		• Do not set an axis whose travel value is 0 as the reference axis.
141											o		• An odd number has been set for the position command device for position follow-up control.		• Set an even number for the position command device for position follow-up control.
142				o						o			• An external input signal has come ON although external input signal setting has not been performed for that signal in the system settings.		• Perform external input signal setting in system setting.

(3) Positioning control errors (200 to 299)
The errors shown in this section are those detected during positioning control.
Error codes, causes and corrective actions are shown in Table 2.7.

Table 2.7 Positioning Control Error List (200 to 299)

Error Code	Control Mode												Error Cause	Error Processing	Corrective Action
	Positioning	Fixed-Pitch Feed	Speed	Speed/Position Switching	Speed Switching	Constant Speed	JOG	Manual Pulse Generator	Home Position Return	Position Follow-Up Control	OSC				
200	o	o	o	o	o	o	o	o		o	o		• The PC ready flag (M2000) was turned OFF while positioning was being started in response to a start request issued by a sequence program.	Axis motion decelerates to a stop.	• Turn the PC ready flag (M2000) ON after all axes have stopped.
201									o				• The PC ready flag (M2000) was turned OFF during a home position return operation.		• After turning the PC ready flag (M2000) ON or turning the stop command (M1800+20n/Yn0/M3200+20n) or rapid stop command (M1801+20n/Yn1/M3201+20n) OFF, re-attempt home position return. (In the case of a near-zero point dog type home position return, use JOG operation or positioning operation to return the axis to the point before the near-zero point dog signal was output, and re-attempt home position return.)
202									o				• The stop command (M1800+20n/Yn0/M3200+20n) has been turned ON during a home position return operation.		
203									o				• The rapid stop command (M1801+20n/Yn1/M3201+20n) has been turned ON during a home position return operation.	Axis motion stops immediately.	
204	o	o	o	o	o	o	o	o	o	o	o		• The PC ready flag (M2000) was turned back ON during deceleration initiated by turning OFF the PC ready flag (M2000).	No processing	• Turn the PC ready flag (M2000) ON after all axes have stopped. (Turing ON of the PC ready flag (M2000) during deceleration is ignored.)
206									o				• While a home position return operation was in progress, an emergency stop was executed in the test mode at a peripheral device by pressing the [Back Space] key.	Axis motion stops immediately.	• In the case of a near-zero point dog type home position return, use JOG operation or positioning operation to return the axis to the point before the near-zero point dog signal was output, and re-attempt home position return. • If the near-zero point dog signal is turned OFF when executing a count type home position return, use JOG operation or positioning operation to return the axis to the point before the near-zero point dog signal was output, and re-attempt home position return. (If the near-zero point dog signal is turned ON when executing count type home position return, re-attempt the home position return.)
207	o				o	o	o			o			• The feed present value exceeded the stroke limit during positioning. In the case of circular interpolation, an error code is stored only for axes whose feed present value exceeded the stroke limit. In the case of linear interpolation, error codes are stored for all axes involved in the interpolation.	Axis motion decelerates to a stop.	• Correct the stroke limit or travel value setting so that positioning is executed within the stroke limit.
208	o				o	o		o					• During circular interpolation or during simultaneous operation of multiple manual pulse generators, the feed present value of another axis exceeded the stroke limit value. (For detection of other axis errors).		
209				o					o				• An overrun has occurred because the set travel value exceeds the deceleration distance when a speed/position change (CHANGE) signal is input during speed/position switching control, or when the near-zero-point dog signal is input during count type home position return.		• Correct the speed setting so that overrun does not occur. • Set a travel value which will not cause an overrun.
210				o									• During speed/position switching control, the set travel value exceeds the stroke limit when a speed/position switching (CHANGE) signal is input.		• Correct the stroke limit or travel value setting so that positioning is executed within the stroke limit.

Table 2.7 Positioning Control Error List (200 to 299) (Continued)

Error Code	Control Mode												Error Cause	Error Processing	Corrective Action
	Positioning	Fixed-Pitch Feed	Speed	Speed/Position Switching	Speed Switching	Constant Speed	JOG	Manual Pulse Generator	Home Position Return	Position Follow-Up Control	OSC				
211						O							• During positioning, an overrun occurs because the deceleration distance for the output speed is not attained at the point where the final positioning address is detected.	Axis motion decelerates to a stop.	• Set a speed at which overrun does not occur. • Set a travel value which will not cause an overrun.
214								O					• An attempt was made to control an axis already being moved by the manual pulse generator by setting the manual pulse generator operation enable flag for that axis.	The manual pulse generator input is ignored until the axis stops.	• Perform the manual pulse generator operation after the axis has stopped.
215					O								• The speed switching point address is greater than the end point address.	A rapid stop is executed.	• Set the speed switching point within the range from the previous speed switching point address to the end point address.
													• An address to control positioning in the opposite direction was set during speed switching control.		
													• The same servo program was been executed a second time.		• Modify the sequence program.
220										O			• In position follow-up control, when the control unit is "degrees", a command address outside the 0 to 35999999 has been set.	Axis motion decelerates to a stop. (M2001+20n OFF)	• When the control unit is "degrees", set a command address within the range 0 to 35999999.
													• The command address has exceeded the stroke limit range in position follow-up control.		• Set an address within the stroke limit range.
225										O			• In constant speed control, the speed at the pass point exceeds the speed limit value.	The speed is kept at the speed limit value.	• Set a speed command value between 1 and the velocity limit value.

(4) Errors occurring at present value changes and speed changes (300 to 399)
The errors shown in this section are those that occur on execution of present value changes and speed changes.
Error codes, causes, processing, and corrective actions are shown in table 2.8.

Table 2.8 List of Errors that Occur at Present Value/Speed Changes

Error Code	Control Mode												Error Cause	Error Processing	Corrective Action
	Positioning	Fixed-Pitch Feed	Speed	Speed/Position Switching	Speed Switching	Constant Speed	JOG	Manual Pulse Generator	Home Position Return	Position Follow-Up Control	OSC				
300	o	o	o	o	o	o	o	o	o	o	o		• An attempt was made to change the present value data of an axis in motion. • An attempt was made to change the present value data of an axis that had not been started up. • An attempt was made to change the present value data of an axis whose status was "servo OFF".	The present value data is not changed.	• Use the following states of the following devices as interlocks to ensure that the present value of an axis in motion cannot be changed. (1) OFF state of the start accept flag (M2001 to M2004/M2001 to M2008/M2001 to M2032) for the relevant axis (2) ON state of the servo READY flag XnF
301									o				• An attempt was made to change the speed of an axis executing a home position return.	The speed is not changed.	• The speed of an axis executing a home position return cannot be changed.
302	o					o							• An attempt was made to change the speed of an axis executing circular interpolation.		• The speed of an axis executing circular interpolation cannot be changed.
303	o	o		o	o	o				o			• An attempt was made to change the speed of an axis after automatic deceleration had started in positioning.		• The speed of an axis cannot be changed after automatic deceleration has started.
304							o						• An attempt was made to change the speed of an axis during deceleration initiated by turning OFF the JOG operation start signal (M1802+20n, M1803+20n/Yn2, Yn3/M3202+20n, M3203+20n).		• Do not attempt a speed change during deceleration initiated by turning OFF the JOG operation start signal (M1802+20n, M1803+20n/Yn2, Yn3/M3202+20n, M3203+20n).
305	o	o	o	o	o	o	o			o			• The speed to be changed to in a speed change was set outside the range of 0 to the speed limit value.	The speed is kept at the speed limit value.	• Set the speed within the range from 0 to the speed limit value.
309													• A present value change command outside the range of 0 to 35999999 ($\times 10^{-5}$ degrees) has been issued for an axis whose control units are degrees.	The present value data is not changed.	• Make a setting in the range of 0 to 35999999 ($\times 10^{-5}$ degrees).
310											o		• A speed change was attempted during high-speed oscillation. • A speed change to "0" request was issued during high-speed oscillation.	The speed is not changed.	• Do not perform speed changes during high-speed oscillation.

(5) System errors (900 to 999)

Table 2.9 System Error List (900 to 999)

Error Code	Control Mode												Error Cause	Error Processing	Corrective Action
	Positioning	Fixed-Pitch Feed	Speed	Speed/Position Switching	Speed Switching	Constant Speed	JOG	Manual Pulse Generator	Home Position Return	Position Follow-Up Control	OSC				
900													• When the servo amplifier power is switched ON, the motor type set in the "system settings" differs from the motor type actually installed. (Checked only when using MR-J2-B)	Further operation is impossible.	• Correct the motor type setting in the system settings.
901													• When the servo amplifier power is switched ON, the motor travel value while the power was OFF is found to have exceeded the "Power of Allowed Traveling Points" setting made in the system settings.		• Check the position. Check the encoder battery.

2.3 Major Errors

Major errors are caused by external input signals or by control commands from the SCPU. The error codes for major errors are 1000 to 1999.
Major errors consist of control start-up errors, positioning errors, absolute system errors, and system errors.

(1) Positioning control start-up errors (1000 to 1099)
The errors shown in this section are those detected when positioning control is started.
Error codes, error causes, error processing and corrective actions are shown in Table 2.10.

Table 2.10 Positioning Control Start-Up Error List (1000 to 1099)

Error Code	Control Mode												Error Cause	Error Processing	Corrective Action
	Positioning	Fixed-Pitch Feed	Speed	Speed/Position Switching	Speed Switching	Constant Speed	JOG	Manual Pulse Generator	Home Position Return	Position Follow-Up Control	OSC				
1000	o	o	o	o	o	o	o	o	o	o	o		• The external stop signal of the corresponding axis was turned ON.	Positioning control does not start.	• Turn OFF the STOP signal.
1001	o	o	o	o	o	o	o	o	o	o	o		• When positioning was started in the forward direction (addresses increasing), the external FLS (upper limit LS) signal was turned OFF.		• Move the axis in the reverse direction in the JOG mode until it enters the external limit range.
1002	o	o	o	o	o	o	o	o	o	o	o		• When positioning was started in the reverse direction (addresses decreasing), the external RLS (lower limit LS) signal was turned OFF.		• Move the axis in the forward direction in the JOG mode until it enters the external limit range.
1003									o				• When near-zero point type home position return was started, the external DOG (near-zero point dog) signal was turned ON.		• Move the axis to a point before the near-zero point dog in the JOG mode and then execute a home position return.
1004	o	o	o	o	o	o	o	o	o	o	o		• The servo state of the corresponding axis is not servo READY. (M1615+20n/XnF/M2415+20n : OFF). (1) The power supply to the servo amplifier is OFF. (2) Initial processing is in progress after turning on the servo amplifier. (3) The servo amplifier has not been installed. (4) A servo error has occurred. (5) Cable fault.		• Wait until the servo status is READY (M1615+20n/XnF/M2415+20n : OFF).
1005	o	o	o	o	o	o	o	o	o	o	o		• The servo error detection signal of the corresponding axis (M1608+20n/Xn8/M2408+20n) was turned ON.		• Eliminate the error at the servo side, reset the servo error detection signal (M1608+20n/Xn8/M2408+20n) by using the servo error reset command (M1808+20n/Yn8/M3208+20n), then start operation.

(2) Positioning control errors (1100 to 1199)
The errors shown in this section are those detected during positioning. Error codes, error causes, error processing, and corrective actions are shown in Table 2.11.

Table 2.11 Positioning Control Error List (1100 to 1199)

Error Code	Control Mode												Error Cause	Error Processing	Corrective Action
	Positioning	Fixed-Pitch Feed	Speed	Speed/Position Switching	Speed Switching	Constant Speed	JOG	Manual Pulse Generator	Home Position Return	Position Follow-Up Control	OSC				
1101	o	o	o	o	o	o	o	o	o	o	o		• When positioning was started in the forward direction (addresses increasing), the external FLS (upper limit LS) signal was turned OFF.	Axis motion decelerates to a stop in accordance with the "deceleration processing on STOP input" setting in the parameter block.	• Move axis in the reverse direction in the JOG mode until it enters the external limit range.
1102	o	o	o	o	o	o	o	o	o	o	o		• When positioning was started in the reverse direction (addresses decreasing), the external RLS (lower limit LS) signal was turned OFF.		• Move the axis in the forward direction in the JOG mode until it enters the external limit range.
1103									o				• The external STOP signal (stop signal) was turned ON while the axis was moving.		• When executing a near-zero point dog type home position return, move the axis to a point before the near-zero point dog in the JOG mode and then execute a home position return.
1104	o	o	o	o	o	o	o	o	o	o	o		• The servo error detection signal (Xn8) was turned ON while an axis was in motion.	The axis stops immediately without decelerating.	• After taking the appropriate corrective action for the servo error, the axis can be restarted.
1105	o	o	o	o	o	o	o	o	o	o	o		• The power supply to the servo amplifier was turned OFF while an axis was in motion. (Servo not installed status detected, cable fault, etc.)	M1615+20n/ XnF/M2415 +20n turned OFF.	• Turn ON the power supply to the servo amplifier. • Check the cable to servo amplifier connecting cable.

(3) Absolute System Errors (1200 to 1299)

The errors shown in this section are those detected in an absolute system.

Error codes, error causes, error processing, and corrective actions are shown in Table 2.12.

Table 2.12 Absolute Sysyem Error List (1200 to 1299)

Error Code	Control Mode												Error Cause	Error Processing	Corrective Action
	Positioning	Fixed-Pitch Feed	Speed	Speed/Position Switching	Speed Switching	Constant Speed	JOG	Manual Pulse Generator	Home Position Return	Position Follow-Up Control	OSC				
1201													• When the servo amplifier power was switched ON, a sum check error occurred with the backup data in the controller. Home position return has not been performed. CPU module battery error.	Home position return request (X0n9) ON	• Check the battery of the CPU module and execute a home position return.
1202*													• When the servo amplifier power is turned ON, a communication error in communication between the servo amplifier and encoder occurs.	Home position return request (X0n9) ON, servo error 2016 set.	• Check the motor and encoder cables and perform home position return again.
1203*													• During operation, the amount of change in the encoder present value complies with the following expression : "Amount of change in encoder present value/3.5 ms 180° of motor revolution" After the servo amplifier power has been turned ON, a continual check is performed (in both servo ON and OFF states).	No processing	• Check the motor and encoder cables.
1204*													• During operation, the following expression holds : "Encoder present value (PLS) ≠ feedback present value (PLS) (encoder effective bit number)". After the servo amplifier power has been turned ON, a continual check is performed (in both servo ON and OFF states).		

* : These errors occur only when using MR-H-B and MR-J2-B servo amplifiers.

(4) System error (1300 to 1399, 1500 to 1599)
This is an error that is detected when the power is turned on.
Error codes, error causes, error processing, and corrective actions are shown in Table 2.13.

Table 2.13 Main Base Unit Error List (1300 to 1399, 1500 to 1599)

Error Code	Control Mode												Error Cause	Error Processing	Corrective Action
	Positioning	Fixed-Pitch Feed	Speed	Speed/Position Switching	Speed Switching	Constant Speed	JOG	Manual Pulse Generator	Home Position Return	Position Follow-Up Control	OCR				
1300													• System setting differs from actual ADU installation status. • ADU defective.	Positioning control does not start.	• Review the parameter settings. • Replace the ADU.
1310													• Initial communication with servo system CPU not completed correctly. • Servo system CPU defective, or ADU defective.		• Replace the servo system CPU or ADU.
1500													• The servo power supply (A230P) is not on, or the all axes servo ON command (M2042 ON) was given during a fault status.		• Issue the all axes servo ON command after turning on the servo power supply. • Replace the servo power supply module.
1501													• When use of A278LX brake output is set, 24 VDC is not supplied correctly.		• Supply a 24 VDC power supply to the A278LX.

2.4 Servo Errors

Servo errors include servo amplifier errors and servo power supply module errors (only when using an A273UHCPU (8/32 axis specification)).
[When using A273UHCPU (32-axis specification)]
When using A273UHCPU (32-axis specification), the processing when a servo error is detected can be set separately for each system.
(However, this applies only to servo errors detected at the ADU.)
The processing and systems are set in the system settings at a peripheral device.

	Setting	Control Details
1	System servo OFF (default)	• If even one ADU axis is subject to a servo error, servo OFF is established for all the axes in that system. (Same control as when all axes servo OFF is performed.)
2	Servo OFF of affected axis only	• Only the ADU axis subject to the servo error goes into the servo OFF status and other axes are unaffected. • However: (1) Where there are two axes per module, if one of the axes is subject to a servo error then both axes go into the servo OFF status. (2) When the following servo errors occur, servo OFF for individual systems becomes effective. Overcurrent (2032) Insufficient voltage (2810) Excessive regeneration (2830) Overvoltage (2833) Amplifier power supply overheated (2847)

(1) Servo amplifier errors (2000 to 2799)
The servo amplifier errors are errors detected by the servo amplifier and are assigned error codes 2000 to 2799.
Servo errors include errors at an ADU (only when using an A273UHCPU (8/32 axis specification)) and errors at an MR-[ ]-B.
In the following tables, the types of servo amplifier are indicated by symbols: (A) for "ADU", and (M) for MR-[ ]-B.
The servo error detection signal (M1608+20n/Xn8/M2408+20n) comes ON when a servo error occurs. Eliminate the cause of the error, reset the error by turning ON the servo error reset signal (M1808+20n/Yn8/M3208+20n), and reset operation. (Note that the servo error detection signal will not come ON in response to error codes in the range 2100 to 2499 because these codes are for warnings.)

Note: 1. When an excessive regeneration error (code 2030), or overload 1 or 2 error (codes 2050, 2051) occurs, the state that applied when the error occurred is stored in the servo amplifier even after the protection circuit has operated. The memory contents are cleared if the external power supply is turned OFF, but are not cleared by the reset signal.
2. Repeated resetting by turning OFF the external power supply after occurrence of error code 2030, 2050, or 2051, may cause devices to be destroyed by overheating. Only restart operation after eliminating the cause of the error.

Details of servo errors are given in Table 2.14.

⚠ CAUTION

⚠ If a controller or servo amplifier self-diagnosis error occurs, check the points stated in this manual and clear the error.

Table 2.14 Servo Amplifier Error List (2000 to 2799)

Error Code	Amplifier Type	Error Cause		When Error Checked	Error Processing	Corrective Action
		Name	Description			
2010	(A)	P-N not connected.	• P-N of the ADU are not connected to P-N of the servo power supply module.	At any time during operation.	Immediate stop.	• Review the wiring.
	(M)	Low voltage	• The power supply voltage is less than 160 VAC. • A momentary power interruption of 15 ms or longer has occurred. • The power supply voltage dropped, for example when motion control started, due to insufficient power capacity.			• Measure the input voltage (R, S, T) with a voltmeter. • Monitor with an oscilloscope to check whether a momentary power interruption has occurred. • Review the power capacity.
2012	(A)	Internal memory error	• ADU SRAM fault	• When the servo amplifier power is turned ON.		• Replace the ADU.
	(M)	Memory error 1	• Servo amplifier SRAM is faulty. • Servo amplifier EPROM check sum error.	• When the servo amplifier power is turned ON • At the leading edge of the PC READY flag (M2000) • When a servo error is reset • When the power to the servo system CPU is turned ON		• Replace the servo amplifier.
2013	(M)	Clock error	• Servo amplifier clock fault.	At any time during operation		• Replace the servo amplifier.
2014	(A)	Watchdog	• Fault in servo control system • ADU failure			• Reset the servo system CPU and check again. • Replace the ADU.
	(M)		• Servo amplifier hardware fault • Servo system CPU hardware fault			• Replace the servo amplifier. • Replace the servo system CPU.
2015	(A)	2-port memory error	• Faulty 2-port memory in ADU	• When the servo amplifier power is turned ON • When a servo error is reset		• Reset the servo system CPU and check again. • Replace the ADU.
	(M)	Memory error 2	• Servo amplifier EEPROM fault	• When the servo amplifier power is turned ON • At the leading edge of the PC READY flag (M2000) • When a servo error is reset • When the power to the servo system CPU is turned ON		• Replace the servo amplifier.
2016	(A)	Position sensor error 1	• Communication with the encoder is not normal at initialization. • The encoder type set in the system settings (ABS/INC) does not match the encoder actually connected.	• When the servo amplifier power is turned ON • When a servo error is reset		• Reset the servo system CPU and check again. • Replace the servomotor (encoder). • Review the system settings.
	(M)		• Fault in communication with the encoder	• When the servo amplifier power is turned ON • At the leading edge of the PC READY flag (M2000) • When a servo error is reset • When the power to the servo system CPU is turned ON		• Check if the connector of the encoder cable is loose. • Replace the servomotor. • Replace the encoder cable.
2017	(A)	PCB error	• ADU A/D onverter faulty	• When the servo amplifier power is turned ON • When a servo error is reset		• Reset the servo system CPU and check again. • Replace the ADU.
	(M)		• Faulty device in the servo amplifier PCB.	• When the servo amplifier power is turned ON • At the leading edge of the PC READY flag (M2000) • When a servo error is reset • When the power to the servo system CPU is turned ON		• Replace the servo amplifier.
2019	(M)	Memory error 3	• Servo amplifier flash ROM check sum error	• When the servo amplifier power is turned ON • At the leading edge of the PC READY flag (M2000) • When a servo error is reset • When the power to the servo system CPU is turned ON		• Replace the servo amplifier.

Table 2.14 Servo Amplifier Error List (2000 to 2799) (Continued)

Error Code	Amplifier Type	Error Cause		When Error Checked	Error Processing	Corrective Action
		Name	Description			
2020	(A)	Position sensor error 2	• Communication with the encoder was not performed normally during operation.	At any time during operation	Immediate stop	• Check the connection between the encoder and ADU. • Replace the servomotor (encoder).
	(M)		• Fault in communication with the encoder			• Check if the connector of the encoder cable is loose. • Replace the servomotor. • Replace the encoder cable.
2024	(M)	Output ground fault	• U, V, or W of the servo amplifier output grounded			• Use a multimeter to check between the U, V, and W terminals and the case. • Use a multimeter and megger tocheck between the U, V, and W terminals of the motor and the core.
2025	(A)	Absolute position lost	• The voltage of the supercapacitor inside the absolute encoder has dropped below 2.5 ±0.2 V. • The absolute encoder rotated at greater than 500 rpm during a momentary power interruption.	• When the servo amplifier power is turned ON • When a servo error is reset		• Replace the battery (MR-JBAT-[ ]). • Check the connection between the encoder and ADU.
	(M)	Battery alarm	• The voltage of the supercapacitor inside the absolute position sensor has dropped.	• When the servo amplifier power is turned ON • At the leading edge of the PC READY flag (M2000) • When a servo error is reset • When the power to the servo system CPU is turned ON		• Turn the power ON for 2 to 3 minutes to charge the supercapacitor, switch the power OFF then ON again, and execute a home position return.
			• The battery voltage is low.			• Turn the servo amplifier power OFF, then measure the battery voltage.
			• Failure of battery cable or battery. (Home position return must be re-executed after clearing the error.)			• Replace the servo amplifier battery.
2026	(A)	Unit mismatch	• There is a discrepancy between the servo parameters (system settings) and the actually installed servo amplifier.	• When the servo amplifier power is turned ON • When a servo error is reset		• Review the system settings.
2030	(M)	Excessive regeneration	• The frequency of ON/OFF switching of the power transistor for regeneration is too high. (Caution is required since the regenerative resistor could overheat.)	At any time during operation		• Reduce the frequency of acceleration and deceleration or feed speed while checking the servo monitor regeneration level (%). • Reduce the load. • Increase the servomotor capacity.
			• Servo parameter (system settings) setting error			• Check the servo parameters (regenerative resistor and motor type settings in the system settings).
			• Incorrect wiring of regenerative resistor			• Connect the regenerative resistor correctly.
			• Failure of regenerative resistor			• Replace the regenerative resistor.
			• Power transistor for regeneration damaged by short circuit			• Replace the servo amplifier.
2031	(A)	Overspeed	• The commanded speed is too high.			• Review the commanded speed.
			• An overshoot occurred during acceleration.			• Review the servo parameters.
			• Encoder failure			• Replace the encoder.
			• Failure or incorrect wiring of encoder cable			• Check the connection between the encoder and ADU.

Table 2.14 Servo Amplifier Error List (2000 to 2799) (Continued)

Error Code	Amplifier Type	Error Cause		When Error Checked	Error Processing	Corrective Action
		Name	Description			
2031	(M)	Overspeed	• The motor rpm has exceeded 115% of the rated rpm.	At any time during operation	Immediate stop	• Check the motor rpm in the servo parameters. • Check if the number of pulses per revolution and travel value per revolution in the fixed parameters match the machine specifications.
			• An overshoot has occurred because the acceleration time constant is too small.			• If an overshoot occurs during acceleration, check the acceleration time and deceleration time in the fixed parameters.
			• An overshoot has occurred because the servo system is unstable.			• If overshoot occurs, increase the speed integral compensation by adjusting the position loop gain / position control gain 1, 2, speed loop gain / speed control gain 1, 2 in the servo parameters.
			• Position sensor fault.			• Check if the encoder cable is disconnected. • Replace the servomotor.
2032	(A)	Overcurrent	• A servomotor that does not match the setting has been connected.	• When the servo amplifier power is turned ON • When a servo error is reset		• Review the system settings.
			• The U, V, W phases in the ADU outputs have shorted with each other or to ground.			• Check the servomotor cable.
			• Incorrect wiring of U, V, W phases in the ADU outputs			• Correct the servomotor wiring.
			• The transistor module of the ADU is damaged. • ADU failure			• Replace the ADU.
			• Failure of coupling between the servomotor and encoder			• Replace the servomotor.
			• The servomotor oscillated.			• Review the servo parameters.
	(M)		• U, V, W in the servo amplifier outputs have short circuited with each other.	At any time during operation		• Check if there is a short circuit between U, V, W of the servo amplifier outputs.
			• U, V, W in the servo amplifier outputs have shorted to ground.			• Check if U, V, W of the servo amplifier outputs have been grounded to the ground terminal. Check if U, V, W of the servomotor are grounded to the core. If grounding is found, replace the servo amplifier and/or motor.
			• Incorrect wiring of U, V, W phases in the servo amplifier outputs.			• Correct the wiring.
			• The servo amplifier transistor is damaged.			• Replace the servo amplifier.
			• Failure of coupling between servomotor and encoder			• Replace the servomotor.
			• Encoder cable failure			• Replace the encoder cable.
			• A servomotor that does not match the setting has been connected.			• Check the connected motor set in the system settings.
			• The servomotor oscillated.			• Check and adjust the gain value set in the servo parameters.
			• Noise entered the overcurrent detection circuit.			• Check if any relays or valves are operating in the vicinity.
2033	(M)	Overvoltage	• The converter bus voltage has reached 400 V or more. • The frequency of acceleration and deceleration was too high for the regenerative ability. • The regenerative resistor has been connected incorrectly.			• Increase the acceleration time and deceleration time in the fixed parameters. • Check the connection between C and P of the terminal block for the terminal block for regenerative resistance.
			• The regenerative resistor in the servo amplifier is destroyed.			• Measure between C and P of the terminal block for regenerative resistance with a multimeter; if abnormal, replace the servo amplifier. (Measure about 3 minutes after the charge lamp has gone out.)
			• The power transistor for regeneration is damaged.			• Replace the servo amplifier.
			• The power supply voltage is too high.			• Measure the input voltage (R, S, T) with a voltmeter.

Table 2.14 Servo Amplifier Error List (2000 to 2799) (Continued)

Error Code	Amplifier Type	Error Cause		When Error Checked	Error Processing	Corrective Action
		Name	Description			
2034	(M)	Communications error	• Error in data received from the servo system CPU	At any time during operation	Immediate stop	• Check the connection of the motion bus cable. • Check if there is a disconnection in the motion us cable. • Check if the motion bus cable is clamped correctly.
2035	(A)	Data error	• The commanded speed is too high.			• Review the commanded speed.
			• Servo system CPU failure			• Replace the servo system CPU.
	(M)		• There is excessive variation in the position commands from the servo system CPU; commanded speed is too high.			• Check the commanded speed, and the number of pulses per revolution and travel value per revolution in the fixed parameters.
			• Noise has entered the commands from the servo system CPU.			• Check the connection of the motion bus cable connector. • Check if the motion bus cable is clamped correctly. • Check if the motion bus cable is clamped correctly. • Check if any relays or valves are operating in the vicinity.
2036	(A)	Transmission error	• Servo system CPU failure			• Replace the servo system CPU.
	(M)		• Fault in communication with the servo system CPU			• Check the connection of the motion bus cable connector. • Check if there is a disconnection in the motion bus cable. • Check if the motion bus cable is clamped correctly.
2042	(M)	Feedback error	• Encoder signal fault			• Replace the servomotor.
2045	(A)	Amplifier fin overheating	• The fan of the ADU has stopped.			• Replace the fan of the ADU.
			• The continuous output current rating of the ADU was exceeded.			• Reduce the load.
			• Failure of ADU thermal sensor			• Replace the ADU.
	(M)	Fin overheating	• The heat sink in the servo amplifier is overheated. • Amplifier error (rated output exceeded) • Power repeatedly switched ON/OFF during overload. • Cooling fault			• If the effective torque of the servomotor is high, reduce the load. • Reduce the frequency of acceleration and deceleration. • Check if the amplifier's fan has stopped. (MR-H150B or higher) • Check if the passage of cooling air is obstructed. • Check if the temperature inside the panel is too high (range: 0 to +55°C). • Check if the electromagnetic brake was actuated from an external device during operation. • Replace the servo amplifier.
2046	(A)	Motor overheating	• The thermal protector incorporated in the servomotor operated.			• Replace the servomotor.
			• The continuous output rating of the motor has been exceeded.			• Reduce the load.
	(M)		• The servomotor is overloaded.			• If the effective torque of the servomotor is high, reduce the load.
			• The servomotor and regenerative option are overheated.			• Check the ambient temperature of the servomotor (range: 0 to +40°C).
			• The thermal protector incorporated in the encoder is faulty.			• Replace the servomotor.

Table 2.14 Servo Amplifier Error List (2000 to 2799) (Continued)

Error Code	Amplifier Type	Error Cause		When Error Checked	Error Processing	Corrective Action
		Name	Description			
2050	(A)	Overload	• The rated current of the motor has been exceeded. • The load inertia or friction is too great.	At any time during operation	Immediate stop	• Reduce the load.
			• Hunting occurred due to parameter setting error.			• Review the servo parameters.
	(M)	Overload 1	• An overload current of about 200% has been continuously supplied to the servo amplifier and servomotor.			• Check if there has been a collision at the machine. • If the load inertia is very large, either increase the time constant for acceleration and deceleration or reduce the load. • If hunting occurs, adjust the position loop gain in the ervo parameters. • Check the connection of U, V, W of the servo amplifier and servomotor. • Check for disconnection of the encoder cable. • Replace the servomotor.
2051	(M)	Overload 2	• The servo amplifier and servomotor were overloaded at a torque close to the maximum torque (95% or more of the current control value).			• Check if there has been a collision at the machine. • If the load inertia is very large, either increase the time constant for acceleration and deceleration or reduce the load. • If hunting occurs, adjust the position loop gain / position control gain 1, 2, speed loop gain/ speed control gain 1, 2 in the servo parameters. • Check the connection of U, V, W of the servo amplifier and servomotor. • Check for disconnection of the encoder cable. • Replace the servomotor. • If the voltage of the bus in the servo amplifier has dropped (charge lamp has gone out), replace the servo amplifier.
2052	(A)	Excessive error	•The deviation counter value has exceeded the stipulated value. • Adequate acceleration is not possible because the inertia is too great.			• Review the servo parameters.
			• Encoder or cable failure.			• Replace the encoder, cable.
	(M)		• The difference between the servo amplifier command pulses and feedback pulses has exceeded 80000 pulses.			• Check if there has been a collision at the machine. • Increase the time constant for acceleration and deceleration. • Increase the position loop gain / position control gain 1, 2, in the servo parameters. • Check for disconnection of the encoder cable. • Replace the servomotor. • If the voltage of the bus in the servo amplifier has dropped (charge lamp has gone out), replace the servo amplifier.
2057	(A)	Hardware fault	• Hardware fault in an ADU			• Replace the ADU
2086	(M)	RS232 communication error	• Parameter unit communication error		Operation continues	• Check for disconnection of the parameter unit cable. • Replace the parameter unit.
2102	(A)	Battery warning	• The voltage of the backup battery for the absolute encoder has become low.			• Replace the battery (MR-JBAT-[ ]).
	(M)		• The voltage of the battery installed in the servo amplifier has become low.			• Replace the battery.
2103	(M)	Battery disconnection warning	• The power supply voltage to the absolute position sensor has become low.			• Replace the battery. • Check for disconnection of the encoder cable. • Replace the servomotor. • Replace the servo amplifier.

Table 2.14 Servo Amplifier Error List (2000 to 2799) (Continued)

Error Code	Amplifier Type	Error Cause		When Error Checked	Error Processing	Corrective Action
		Name	Description			
2140	(M)	Excessive regeneration warning	• An excessive regeneration error (2030) is likely to occur (regeneration of 85% of the maximum load capacity for the regenerative resistor has been detected).	At any time during operation	Operation continues	• Refer to the details on the excessive regeneration error (2030).
2141	(A)	Overload warning	• A load of 80% of the level that will cause an overload error (2050) has been detected.			• Refer to the details on the overload error (2050).
	(M)		• An overload error (2050, 2051) is likely to occur (85% of overload level detected).			• Refer to the details on the overload errors (2050, 2051).
2143	(A)	Absolute position counter warning	• Encoder failure			• Replace the encoder.
2146	(M)	Servo emergency stop	• The connection between 1A and 1B (emergency stop input) of CN6 of the servo amplifier encoder has been broken.			• Establish a short circuit between 1A and 1B of CN6 of the servo amplifier encoder.
2147	(A)	Emergency stop	• An emergency stop has been executed.		Immediate stop	• Release the emergency stop.
	(M)		• An emergency stop (EMG) signal has been input from the servo system CPU.			
2149	(M)	Main circuit OFF warning	• The servo ON (SON) signal was turned ON while the contactor was OFF. • The main circuit bus voltage fell to 215 V or lower at 50 rpm or lower.		Operation continues	• Turn the main circuit contactor or circuit power supply ON.
2196	(M)	Home position setting error warning	• After a home position set command, the droop pulses did not come within the in-position range.			• Re-attempt home position return.
2201 to 2224	(A)	Parameter warning	• An incorrect parameter setting has been made.			• Review the system settings and servo parameters.

2201	Amplifier setting
2202	Motor type
2203	Motor capacity
2204	Number of feedback pulese
2205	In-position range
2206	Position control gain 2 (Actual position gain)
2207	Speed control gain 2 (Actual speed gain)
2208	Speed integral compensation
2209	Torque limit (forward)
2210	Torque limit (reverse)
2211	Emergency stop time delay
2212	Position control gain 1 (Model position gain)
2213	Speed control gain 1 (Model speed gain)
2214	Load inertia ratio
2215	Excessive error alarm level
2216	Special compensation processing
2217	Special servo processing
2218	Td dead band compensation
2219	Feed forward gain
2220	Torque imbalance compensation
2221	Dither control
2222	Gain operation time
2223	Servo responsibility
2224	—

Table 2.14 Servo Amplifier Error List (2000 to 2799) (Continued)

<table>
<tr><th rowspan="2">Error Code</th><th rowspan="2">Amplifier Type</th><th colspan="2">Error Cause</th><th rowspan="2">When Error Checked</th><th rowspan="2">Error Processing</th><th rowspan="2">Corrective Action</th></tr>
<tr><th>Name</th><th>Description</th></tr>
<tr><td rowspan="2">2301
to
2336</td><td rowspan="2">(M)</td><td rowspan="2">Parameter error</td><td>• Out-of-range parameter setting has been designated. Incorrect parameter values are ignored and the values before setting are retained.
<table><tr><td>2301</td><td>Amplifier setting</td></tr><tr><td>2302</td><td>Regenerative resistance</td></tr><tr><td>2303</td><td>Motor type</td></tr><tr><td>2304</td><td>Motor capacity</td></tr><tr><td>2305</td><td>Motor rpm</td></tr><tr><td>2306</td><td>Number of feedback pulses</td></tr><tr><td>2307</td><td>Rotating direction setting</td></tr><tr><td>2308</td><td>Automatic tuning setting</td></tr><tr><td>2309</td><td>Servo responsibility</td></tr><tr><td>2310</td><td>Torque limit (forward)</td></tr><tr><td>2311</td><td>Torque limit (reverse)</td></tr><tr><td>2312</td><td>Load inertia ratio</td></tr><tr><td>2313</td><td>Position control gain 1</td></tr><tr><td>2314</td><td>Speed control gain 1</td></tr><tr><td>2315</td><td>Position control gain 2</td></tr><tr><td>2316</td><td>Speed control gain 2</td></tr><tr><td>2317</td><td>Speed integral compensation</td></tr><tr><td>2318</td><td>Notch filter</td></tr><tr><td>2319</td><td>Feed forward coefficient</td></tr><tr><td>2320</td><td>In-position range</td></tr><tr><td>2321</td><td>Electromagnetic brake sequence output</td></tr><tr><td>2322</td><td>Monitor output mode selection</td></tr><tr><td>2323</td><td>Optional function 1</td></tr><tr><td>2324</td><td>Optional function 2</td></tr><tr><td>2325</td><td>Optional function 3</td></tr><tr><td>2326</td><td>Optional function 4</td></tr><tr><td>2327</td><td>Monitor output 1 offset</td></tr><tr><td>2328</td><td>Monitor output 2 offset</td></tr><tr><td>2329</td><td>Pre-alarm data selection</td></tr><tr><td>2330</td><td>Zero speed</td></tr><tr><td>2331</td><td>Excessive error alarm level</td></tr><tr><td>2332</td><td>Optional function 5</td></tr><tr><td>2333</td><td>Optional function 6</td></tr><tr><td>2334</td><td>PI-PID switching position droop</td></tr><tr><td>2335</td><td>Torque limit compensation factor</td></tr><tr><td>2336</td><td>Speed integral compensation (actual speed differential compensation)</td></tr></table></td><td>At any time during operation</td><td>Operation continues</td><td>• Check the servo parameter setting range.</td></tr>
</table>

Table 2.14 Servo Amplifier Error List (2000 to 2799) (Continued)

<table>
<tr><th rowspan="2">Error Code</th><th rowspan="2">Amplifier Type</th><th colspan="2">Error Cause</th><th rowspan="2">When Error Checked</th><th rowspan="2">Error Processing</th><th rowspan="2">Corrective Action</th></tr>
<tr><th>Name</th><th>Description</th></tr>
<tr><td>2301 to 2324</td><td>(A)</td><td>Parameter error</td><td>• Out-of-range parameter setting has been designated. Incorrect parameter values are ignored and the values before setting are retained.
<table><tr><td>2301</td><td>Amplifier setting</td></tr><tr><td>2302</td><td>Motor type</td></tr><tr><td>2303</td><td>Motor capacity</td></tr><tr><td>2304</td><td>Number of feedback pulese</td></tr><tr><td>2305</td><td>In-position range</td></tr><tr><td>2306</td><td>Position control gain 2 (Actual position gain)</td></tr><tr><td>2307</td><td>Speed control gain 2 (Actual speed gain)</td></tr><tr><td>2308</td><td>Speed integral compensation</td></tr><tr><td>2309</td><td>Torque limit (forward)</td></tr><tr><td>2310</td><td>Torque limit (reverse)</td></tr><tr><td>2311</td><td>Emergency stop time delay</td></tr><tr><td>2312</td><td>Position control gain 1 (Model position gain)</td></tr><tr><td>2313</td><td>Speed control gain 1 (Model speed gain)</td></tr><tr><td>2314</td><td>Load inertia ratio</td></tr><tr><td>2315</td><td>Excessive error alarm level</td></tr><tr><td>2316</td><td>Special compensation processing</td></tr><tr><td>2317</td><td>Special servo processing</td></tr><tr><td>2318</td><td>Td dead band compensation</td></tr><tr><td>2319</td><td>Feed forward gain</td></tr><tr><td>2320</td><td>Torque imbalance compensation</td></tr><tr><td>2321</td><td>Dither control</td></tr><tr><td>2322</td><td>Gain operation time</td></tr><tr><td>2323</td><td>Servo responsibility</td></tr><tr><td>2324</td><td>—</td></tr></table></td><td>At any time during operation</td><td rowspan="2">Operation continues</td><td>• Check the servo parameter setting range.</td></tr>
<tr><td>2500</td><td>(A)</td><td>Parameter error</td><td>• The following servo parameters were set incorrectly.
• Amplifier/external regenerative resistance setting
• Motor type
• Motor capacity</td><td>• When the servo amplifier power is turned ON
• When a servo error is reset</td><td>• Review the system settings and the servo parameters.</td></tr>
</table>

Table 2.14 Servo Amplifier Error List (2000 to 2799) (Continued)

<table>
<tr><th rowspan="2">Error Code</th><th rowspan="2">Amplifier Type</th><th colspan="2">Error Cause</th><th rowspan="2">When Error Checked</th><th rowspan="2">Error Processing</th><th rowspan="2">Corrective Action</th></tr>
<tr><th>Name</th><th>Description</th></tr>
<tr><td>2501 to 2524</td><td>(A)</td><td>Parameter error</td><td>• Incorrect parameter settings have been made.
<table><tr><td>2501</td><td>Amplifier setting</td></tr><tr><td>2502</td><td>Motor type</td></tr><tr><td>2503</td><td>Motor capacity</td></tr><tr><td>2504</td><td>Number of feedback pulese</td></tr><tr><td>2505</td><td>In-position range</td></tr><tr><td>2506</td><td>Position control gain 2 (Actual position gain)</td></tr><tr><td>2507</td><td>Speed control gain 2 (Actual speed gain)</td></tr><tr><td>2508</td><td>Speed integral compensation</td></tr><tr><td>2509</td><td>Torque limit (forward)</td></tr><tr><td>2510</td><td>Torque limit (reverse)</td></tr><tr><td>2511</td><td>Emergency stop time delay</td></tr><tr><td>2512</td><td>Position control gain 1 (Model position gain)</td></tr><tr><td>2513</td><td>Speed control gain 1 (Model speed gain)</td></tr><tr><td>2514</td><td>Load inertia ratio</td></tr><tr><td>2515</td><td>Excessive error alarm level</td></tr><tr><td>2516</td><td>Special compensation processing</td></tr><tr><td>2517</td><td>Special servo processing</td></tr><tr><td>2518</td><td>Td dead band compensation</td></tr><tr><td>2519</td><td>Feed forward gain</td></tr><tr><td>2520</td><td>Torque imbalance compensation</td></tr><tr><td>2521</td><td>Dither control</td></tr><tr><td>2522</td><td>Gain operation time</td></tr><tr><td>2523</td><td>Servo responsibility</td></tr><tr><td>2524</td><td>—</td></tr></table></td><td>• When the servo amplifier power is turned ON
• At the leading edge of the PC READY flag (M2000)
• When a servo error is reset</td><td>Operation continues</td><td>• Review the system settings and the servo parameters.</td></tr>
</table>

Table 2.14 Servo Amplifier Error List (2000 to 2799) (Continued)

Error Code	Amplifier Type	Error Cause		When Error Checked	Error Processing	Corrective Action
		Name	Description			
2601 to 2636	(M)	Initial parameter error	• The set parameter values are incorrect. • The parameter data has been destroyed. 2601 Amplifier setting 2602 Regenerative resistance 2603 Motor type 2604 Motor capacity 2605 Motor rpm 2606 Number of feedback pulses 2607 Rotating direction setting 2608 Automatic tuning setting 2609 Servo responsibility 2610 Torque limit (forward) 2611 Torque limit (reverse) 2612 Load inertia ratio 2613 Position control gain 1 2614 Speed control gain 1 2615 Position control gain 2 2616 Speed control gain 2 2617 Speed integral compensation 2618 Notch filter 2619 Feed forward coefficient 2620 In-position range 2621 Electromagnetic brake sequence output 2622 Monitor output mode selection 2623 Optional function 1 2624 Optional function 2 2625 Optional function 3 2626 Optional function 4 2627 Monitor output 1 offset 2628 Monitor output 2 offset 2629 Pre-alarm data selection 2630 Zero speed 2631 Excessive error alarm level 2632 Optional function 5 2633 Optional function 6 2634 PI-PID switching position droop 2635 Torque limit compensation factor 2636 Speed integral compensation (actual speed differential compensation)	• When the servo amplifier power supply is turned ON • At the leading edge of the PC READY flag (M2000) • When a servo error is reset • When the power to the servo system CPU is turned ON	Immediate stop	• Check and change the set parameter values, then switch the power to the servo system CPU OFF then ON again, press the reset key, or turn the PC READY flag (M2000) OFF then ON again.

(2) Servo power supply module errors (2800 to 2999: only applicable when using 273UHCPU (8/32 axis specification))
Servo power supply module errors are detected by the servo amplifier, and their codes are 2800 to 2999.
The servo error detection signal (M1608+20n/Xn8/M2408+20n) comes ON when a servo error occurs. Eliminate the cause of the error, reset the error by turning ON the servo error reset signal (M1808+20n/Yn8/M3208+20n), and reset operation. (Note that the servo error detection signal will not come ON in response to error codes in the range 2900 to 2999 because these codes are for warnings.)

Note: 1. Regarding the excessive regeneration error (error code 2830), the state at the time the error occurred remains stored in the servo amplifier even after the protection circuit has operated. The memory contents are cleared when the external power supply is turned OFF, but are not cleared by the RESET signal.
2. If error code 2830 is repeatedly reset by turning OFF the external power supply, devices may be destroyed due to overheating: only restart operation after the cause of the error has been completely eliminated.

The servo power supply module errors are shown in Table 2.15.

Table 2.15 Servo Power Supply Module Error List (2800 to 2999)

Error Code	Error Cause		When Error Checked	Error Processing	Corrective Action
	Name	Description			
2810	Low voltage	• The voltage to the power supply module fell below 170 VAC. • A momentary power interruption occurred.	At any time during operation	Immediate stop	• Review the power supply equipment.
		• The load is too great.			• Review the power capacity.
2830	Excessive regeneration	• The maximum load capacity of the regenerative resistor has been exceeded due to frequent operation or continuous regenerative operation.			• Review the operation pattern, either by reducing the frequency of acceleration and deceleration or reducing the speed.
		• The power transistor for regeneration has been damaged.			• Replace the servo power supply module.
		• The regenerative resistor setting in the system settings is incorrect.			• Review the system settings.
		• The regenerative resistor is wired incorrectly.			• Connect the wiring correctly.
2833	Overvoltage	• The regenerative resistor is connected incorrectly.			• Correct the wiring.
		• The power transistor for regeneration has been damaged.			• Replace the servo power supply module.
		• The regenerative resistor is destroyed.			• Replace the regenerative resistor.
		• The power supply voltage is too high.			• Review the power supply equipment.
2847	Amplifier power supply overheating	• The servo power supply module fan is stopped.			• Replace the fan.
		• The continuous output current of the power supply module has been exceeded.			• Reduce the load.
		• Thermal sensor fault.			• Replace the servo power supply module.
2940	Excessive regeneration warning	• 80% of the level that would cause an excessive regeneration error (2830) was detected.		Operation continues.	• Refer to the details on the excessive regeneration error (2830).

2.5 LED Indications when Errors Occur at the PCPU

When the errors listed below occur, they are indicated by the "ERROR" LED on the front panel of the A171SCPU, and the LED on the front panel of the A273UHCPU. The error message can be read on the error list monitor screen of the peripheral device.
For details on the operating procedure, refer to the operating manual for the peripheral device.

Table 2.16 LED Indications When Errors Occur at PCPU

A171SCPU "ERROR" LED ● : Lit ○ : Not lit	LED Display on Front Panel of A273UHCPU	Error Cause	Error Check Timing	Operation when Error Occurs	Error Set Device	Corrective Action
●	L.A.Y. .E.R.R.O.R. .(S.L.■■.) (*1) Base No. + slot No.	• The slot set in the "system settings" has nothing mounted in it, or has a different module mounted in it.	When power switched ON On resetting with the RESET key switch	• Start is disabled.	• System setting error flag (M2041) ON	• Set the "system settings" correctly in accordance with the modules actually mounted, then reset with the RESET key switch.
●	A.X.I.S. .N.O. .M.U.L.T.I.D.E.F.	• Axis number settings are duplicated in the "system settings".				
●	A.M.P. .N.O. .S.E.T.T.I.N.G. .	• Not even one axis No. has been set in the "system settings".				
—	P.W. .N.O. .S.E.T.T.I.N.G. . .	• When an ADU axis has been set in the system settings, no servo power supply module (A230P) has been set.				
●	S.Y.S. .S.E.T. .D.A.T.A. .E.R.R.	• No system setting data has been written. • The system setting data has been written without performing a relative check. Or it has been written although an error occurred in the relative check. • There is no battery in the memory cassette.				
●	A.X.I.S. .N.O. . .E.R.R.O.R. .	• An axis No. that exceeds the "number of controlled axes" setting in the "system settings" has been set.				
●	I./.O. .P.O.I.N.T.S. .O.V.E.R.	• The total number of I/O points of the PC I/O modules set in motion slots in the "system settings" exceeds 256.				
●	A.M.P. .T.Y.P.E. .E.R.R.O.R.■■ Axis No. (01 to 32)	• The amplifier type set in the "system settings" (MR-H-B/MR-J-B/MR-J2-B) disagrees with the amplifier type actually installed.	When the servo amplifier power is turned ON	• Servo operation does not start for the relevant axis only. Starting of this axis is disabled.		

Note : "—" in the A171SCPU "ERROR" LED area indicates errors that do not occur with A171SCPU.

Table 2.16 LED Indications When Errors Occur at PCPU (Continued)

A171SCPU "ERROR" LED ● : Lit ○ : Not lit	LED Display on Front Panel of A273UHCPU	Error Cause	Error Check Timing	Operation when Error Occurs	Error Set Device	Corrective Action
●	A.D.U. .E.R.R.O.R. .(S.L.■■.) (*1) Base No. + slot No.	•ADU hardware error	When the power is switched ON (or on resetting with the RESET key switch)	The servo ON status cannot be established for the relevant ADU axis.		•Try replacing the ADU.
For servo error ● / For warning ○	S.V. .E.R.R.O.R.■■.■■.■■.(.■■.) Servo error code Axis No. (01to 32) • "(**)" if applicable to all axes.	•Occurrence of a servo error or servo warning •When using A171SCPU, the LED does not light for a warning. (SV13, SV22, Ver.U or later)	At all times	•In the case of MR-H-B, MR-J-B, and MR-J2-B axes, only the relevant axis enters the servo OFF status. •In the case of ADU axes, the operation follows the ADU servo error processing.	•Servo error detection flag (M1608+20n/ Xn8/M2408+ 20n) ON •Servo error code device (D808+20n/ D808+20n/D08 +20n) set	•Eliminate the error cause and perform a servo error reset. After servo error reset, if the servo status is normal at all axes, the LED display is cleared.
—	S.V. .E.R.R.O.R.■■.■■.■■.(.P.■.) Servo error code Indicates "n" for the "nth" servo power supply	•Occurrence of servo error detected at a servo power supply module (A230P)				
—	S.Y.S. .E.R.R.. ■■.■■.■■.(.P.■.) System error code (major error) detected at a servo power supply Indicates "n" for the "nth" servo power supply module. When using A273UHCPU (32-axis specification), indicates a system error that is unconnected with the servo power supply module system.	•Occurrence of a system error (major error) detected at a servo power supply module.		•All axes in the affected system assume the servo OFF status.	•Major error detection flag (M1607+20N/Xn 7/M2407+20n) ON. •Major error code device (D807+20n/ D807+20n/D07 +20n) set.	•Eliminate the error cause and issue the all axes servo ON command. If all axes enter the servo ON status normally, the LED display is cleared.
●	S.L.■■. .U.N.I.T. .E.R.R.O.R. (*1) Base No. + slot No.	•Detection of motion slot module abnormality (module comes out, or is loose, during operation)			•Motion slot module error detection flag (M2047) ON	•Switch off the power and mount the module correctly.
●	P.C.P.U. .W.D.T. .E.R.R.. ■■.■■ PCPU WDT error code	•Occurrence of a PCPU WDT error		Immediate stop of all axes	•PCPU WDT error flag •(M9073) ON PCPU WDT error cause (D9184) set	•See Section 3.5.2.

(*1) Indicates the base No., slot No., and the slot information where the error occurred.

(SL□□)

└── Slot No. at which the error occurred
- 0 : I/O slot 0
- to to
- 7 : I/O slot 7

└── Extension stage of the base unit where the error occurred
- 0 : Main base unit
- 1 : First motion extension base unit
- 2 : Second motion extension base unit
- 3 : Third motion extension base unit
- 4 : Fourth motion extension base unit

REMARK

Numerical values corresponding to axis numbers are entered for "m" and "n" in Table 2.16 (error set device).

<A171SCPU>

Axis No.	n
1	0
2	1
3	2
4	3

<A273UHCPU (8-axis specification)>

Axis No.	n
1	0
2	1
3	2
4	3
5	4
6	5
7	6
8	7

<A273UHCPU (32 axis specification)>

Axis No.	n	Axis No.	n	Axis No.	n	Axis No.	n
1	0	9	8	17	16	25	24
2	1	10	9	18	17	26	25
3	2	11	10	19	18	27	26
4	3	12	11	20	19	28	27
5	4	13	12	21	20	29	28
6	5	14	13	22	21	30	29
7	6	15	14	23	22	31	30
8	7	16	15	24	23	32	31

* Calculate "n" when using A273UHCPU (8-axis specification), and the device No. corresponding to each axis when using A273UHCPU (32-axis specification), as shown below.
  Example : For 32 axes...
  M2408+20n (servo error detection flag) = M2408+20×31 = M3028
  D07+20n (major error code device) = D07+20×31 = D627

APPENDIX 3 SPECIAL RELAYS AND SPECIAL REGISTERS

3.1 Special Relays (SP, M)

The special relays are internal relays with fixed applications in the programmable controller. Accordingly, they must not be turned ON and OFF in sequence programs (those marked *1 and *2 in the table are exceptions).

Table 3.1 Special Relay List

Number	Name	Stored Data	Explanation	Applicability	
				A273UH	A171S
M9000*1	Fuse blown	OFF Normal ON There is a module with a blown fuse.	• Comes ON even if there is only one output module with a blown fuse, and remains ON even after return to normal.	●	●
M9002*1	I/O unit verify error	OFF Normal ON Error	• Comes ON if there is a discrepancy between the actual I/O modules and the registered information when the power is turned on.	●	●
M9004*1	MINI link error	OFF Normal ON Error	• Come ON when a module detects an error at the master station of the MINI link. Remains ON even after return to normal.	●	●
M9005*1	AC DOWN detection	OFF AC DOWN detected ON AC DOWN not detected	• Comes ON when there is a momentary power interruption not exceeding 20 ms; reset by turning the power OFF then ON again.	●	●
M9006	Battery low	OFF Normal ON Low battery voltage	• Comes ON when the battery voltage falls below the stipulated value; goes OFF when normal battery voltage is re-established.	●	●
M9007*1	Battery low latch	OFF Normal ON Low battery voltage	• Comes ON when the battery voltage falls below the stipulated value; remains ON even after normal battery voltage is re-established.	●	●
M9008*1	Self-diagnostic error	OFF No error ON Error	• Comes ON when an error occurs as a result of self-diagnosis.	●	●
M9009	Annunciator detection	OFF No F number detected ON F number detected	• Comes ON when OUT F, SET F instructions are executed. Goes OFF when 0 is stored in D9124.	●	●
M9010	Operation error flag	OFF No error ON Error	• Comes on when an operation error occurs during execution of an application instruction; goes OFF when the error is cleared. Cannot be used with A273UHCPU (8/32 axis specification).	—	●
M9011*1	Operation error flag	OFF No error ON Error	• Comes on when an operation error occurs during execution of an application instruction; remains ON even after the error is cleared.	●	●
M9012	Carry flag	OFF Carry OFF ON Carry ON	• Carry flag used in an application instruction.	●	●
M9016*2	Data memory clear flag	OFF No processing ON Output cleared	• When M9016 is ON, all data memory contents, including those in the latch range but with the exception of special relays/registers, are cleared on reception of remote RUN from a computer or other device.	●	●
M9017*2	Data memory clear flag	OFF No processing ON Output cleared	• When M9017 is ON, all data memory contents that are not latched, with the exception of special relays/registers, are cleared on reception of remote RUN from a computer or other device.	●	●

Table 3.1 Special Relay List (Continued)

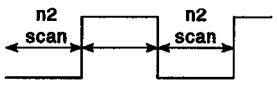
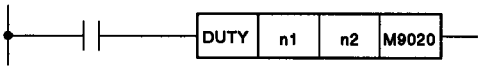
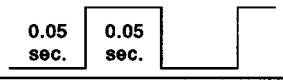
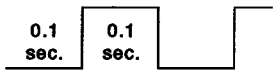
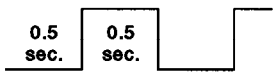
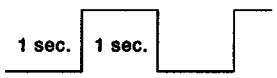
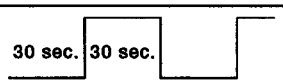
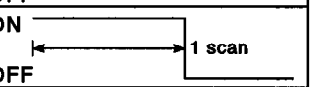
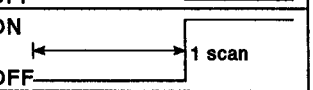
Number	Name	Stored Data	Explanation	Applicability	
				A273UH	A171S
M9020	User timing clock No.0		• Relay repeats ON/OFF switching at fixed scan intervals. • Starts from the OFF status when the power is turned ON or on resetting. • The ON/OFF intervals are set with the DUTY instruction. 	●	●
M9021	User timing clock No.1				
M9022	User timing clock No.2				
M9023	User timing clock No.3				
M9024	User timing clock No.4				
M9025*2	Clock data set request	OFF No processing ON Data set request	• Writes the clock data stored in D9025 to D9028 to the clock devices after execution of the END instruction in the scan in which M9025 is switched ON.	●	●
M9026	Clock data error	OFF No error ON Error	• Comes ON when there is an error in the clock data (D9025 to D9028) values. OFF when there is no error.	●	●
M9027	Clock data display	OFF No processing ON Display	• Displays the clock data (D9025 to D9028) on the LED display on the front panel of the CPU module, as the month, day, hour, minute, and second.	●	—
M9028*2	Clock data read request	OFF No processing ON Read request	• When M9028 is ON, the clock data is read to D9025 to D9028 as BCD data.	●	●
M9029*2	Data communication request batch processing	OFF Batch processing not performed ON Batch processing performed	• By turning M9029 ON in the sequence program, all of the data communication requests received during one scan are processed at the END processing of that scan. • Data communication request processing can be switched between ON and OFF during the RUN status. • The default is OFF (one request at a time is processed at END processing, in the order in which the data communication requests were received).	●	—
M9030	0.1 second clock		• These relays generate the 0.1 second, 0.2 second, 1 second, 2 second, and 1 minute clocks. • These relays do not go ON/OFF with each scan but when their respective fixed intervals have elapsed, even during a scan. • These relays start from the OFF status when the power is turned on or resetting.	●	●
M9031	0.2 second clock				
M9032	1 second clock				
M9033	2 second clock				
M9034	1 minute clock				
M9036	Always ON		• Relay used for initialization during a sequence program or as a dummy contact for an application instruction. • M9036 and M9037 retain their ON or OFF status regardless of the settings of the key switch on the front of the CPU, but M9038 and M9039 change in accordance with the key switch status. They go OFF when the key switch is set to the STOP position. When the key switch is at a position other than STOP, M9038 comes ON for one scan only, and M9039 goes OFF for one scan only.	●	●
M9037	Always OFF			●	●
M9038	ON for 1 scan only after RUN			●	●
M9039	RUN flag (OFF for 1 scan only after RUN)			●	●

Table 3.1 Special Relay List (Continued)

Number	Name	Stored Data	Explanation	Applicability	
				A273UH	A171S
M9040	PAUSE enable coil	OFF PAUSE disable ON PAUSE enabled	• When the RUN/STOP key switch is set to PAUSE or the remote PAUSE contact is turned on, provided M9040 is ON, the PAUSE status is established and M9041 comes ON.	●	●
M9041	PAUSE status contact	OFF PAUSE not in effect ON PAUSE in effect			
M9042	STOP status contact	OFF STOP not in effect ON STOP in effect	• ON when the RUN/STOP key switch is set to STOP.	●	●
M9043	Sampling trace completed	OFF Sampling trace in progress ON Sampling trace completed	• Comes ON on completion of the number of sampling traces set in the parameters are completed after execution of the STRA instruction. After that, it is reset by execution of the STRAR instruction.	●	●
M9044	Sampling trace	0→1 Same as executing [STRA] 1→0 Same as executing [STRAR]	• By switching M9044 ON/OFF the [STRA]/[STRAR] instruction can be executed. (M9044 is turned ON/OFF by executing forced ON/OFF at a peripheral device.) M9044 OFF → ON : [STRA] instruction M9044 ON → OFF : [STRAR] instruction } The sampling trace condition depends on D9044.	●	—
M9045	Watchdog timer (WDT) reset	OFF WDT is not reset ON WDT is reset	• By turning M9045 ON, WDT can be reset when a ZCOM instruction is executed or when data communication request batch processing is executed. (Used when the scan time exceeds 200 ms.)	●	—
M9046	Sampling trace	OFF Trace not in progress ON Trace in progress	• ON during execution of a sampling trace	●	●
M9047	Sampling trace preparation	OFF Sampling trace stop ON Sampling trace start	• A sampling trace cannot be executed unless M9047 has been turned ON. When M9047 is turned OFF, the sampling trace is stopped.	●	●
M9049	Number of output characters selection	OFF Output until NULL code ON 16 characters output	• When M9049 is OFF, output continues until the NULL (00H) code. • When M9049 is ON, ASCII code for 16 characters is output.	●	●
M9051	CHG instruction execution disable	OFF Enabled ON Disabled	• Turned ON to disable execution of the CHG instruction. • Turn ON when issuing a program transfer request; automatically turned OFF on completion of transfer.	●	—
M9052*2	SEG instruction switch	OFF 7-segment display ON I/O part refresh	• When M9052 is ON it is executed as the I/O partial refresh instruction. When M9052 is ON, it is executed as the 7-segment display instruction.	●	●
M9053*2	EI/DI instruction switch	OFF Sequence interrupt control ON Link interrupt control	• Turn ON when a link refresh enable/disable (EI, DI) instruction is executed.	—	●
M9054	STEP RUN flag	OFF STEP RUN not in effect ON STEP RUN in effect	• ON when the RUN/STOP key switch is set to the RUN position.	●	●
M9055	Status latch completion flag	OFF Not completed ON Completed	• Comes ON when status latch is completed. Goes OFF on execution of a reset instruction.	●	●
M9056	Main side P, I set request	ON P, I set being requested OFF Other than when P, I set being requested	• These relays switch ON the P, I set request on completion of program transfer while another program is being run (for example a subprogram during execution of a main program). Automatically turned OFF on completion of P, I setting.	●	—
M9057	Sub side P, I set request	ON P, I set being requested OFF Other than when P, I set being requested		●	—

Table 3.1 Special Relay List (Continued)

Number	Name	Stored Data	Explanation	Applicability	
				A273UH	A171S
M9058	Main program P, I set complete	Momentarily ON on completion of P, I setting	• Comes ON momentarily on completion of P, I setting, then goes OFF immediately.	●	—
M9059	Subprogram P, I set complete	Momentarily ON on completion of P, I setting		●	—
M9065	Partial processing execution detection	OFF Partial processing not in progress ON Partial processing in progress	• ON during partial processing of an instruction given with respect to AD57(S1) or AD58; goes OFF on completion of this execution (when partial processing is not being performed).	●	—
M9066*2	Partial processing request flag	OFF Batch processing ON Partial processing	• When an instruction with a long processing time is executed with respect to AD57(S1) or AD58 and the scan time is lengthened, this instruction can be dealt with by partial processing by turning M9066 ON.	●	—
M9070*2	A8UPU/A8PUJ search time	OFF No reduction of reading time ON Reading time reduced	• By turning this relay ON, the time required for a search at an A8UPU/A8PUJ can be shortened. (In this case the scan time is increased by 10%.)	●	—
M9081	Communication request entry areas busy signal	OFF Communication request entry areas available ON Communication request entry areas not available	• 32 entry areas are provided for FROM/TO instructions waiting for execution at MNET/MINI(-S3); this relay comes ON when there are no more empty areas.	●	—
M9084*2	Error check	OFF Error check executed ON No error check	• Set whether or not the error check shown below is executed on END instruction processing. (Used to shorten END instruction processing time.) (1) Blown fuse check (2) I/O module verification check (3) Battery check	●	●
M9091*1	Instruction error flag	OFF No error ON Error	• Comes ON when an instruction related error occurs. Remains ON even after return to normal.	●	—
M9094*2 *3	I/O change flag	OFF No replacement ON Replacement	• When M9094 is turned ON after the head I/O number of the I/O module to be replaced has been set in it, it is possible to replace the I/O module in the online status. (It is only possible to replace one I/O module per setting.) • To replace an I/O module in the RUN mode, use the program or a peripheral device to turn this relay ON; to replace an I/O module in the STOP mode, use the test mode of a peripheral device to turn this relay ON. • Do not switch between RUN and STOP modes until I/O module replacement is completed.	●	—
M9100	Existence of SFC program	OFF No SFC program ON SFC program exists	• ON when an SFC program is registered and a work area for SFC has been secured. • OFF when no SFC program is registered, or the work area for SFC could not be secured.	●	—
M9101*2	SFC program start/stop	OFF SFC program stop ON SFC program start	• Turned ON by the user in order to start an SFC program. When turned OFF, the operation output of the step being executed is turned OFF and the SFC program is stopped.	●	—

Table 3.1 Special Relay List (Continued)

Number	Name	Stored Data	Explanation	Applicability	
				A273UH	A171S
M9102*2	SFC program start status	OFF Initial start ON Continued start	• Selects the start step when an SFC program is restarted using M9101. When OFF : All execution statuses that applied when the SFC program was stopped are cleared and the program is started from the initial step of block 0. When ON : The SFC program is started from the block and step that were being executed when it was stopped. • Once this relay has been turned ON, it is latched (memory back up) by the system.	●	—
M9103*2	Continuous transition setting	OFF Continuous transition ineffective ON Continuous transition effective	• Selects whether or not to execute all the steps whose transition conditions have been satisfied in one scan in cases where all the transition conditions of consecutive steps have been satisfied. When ON : Steps are executed continuously (continuous transition effective). When OFF : One step at a time is executed within the scan (continuous transition ineffective).	●	—
M9104	Continuous transition prevention flag	OFF At completion of transition ON Before transition	• When continuous transition is effective, ON when continuous transition is not being performed and goes OFF when the transition of one step is completed. By writing M9104 with an AND condition as the transition condition, continuous transition of the relevant step can be prevented.	●	—
M9108*2	Step transition monitor timer start (corresponds to D9108)	OFF Monitor timer reset ON Monitor timer reset start	• Turned ON to start timing by the step transition monitor timer. When turned OFF, the monitor timer is reset.	●	—
M9109*2	Step transition monitor timer start (corresponds to D9109)				
M9110*2	Step transition monitor timer start (corresponds to D9110)				
M9111*2	Step transition monitor timer start (corresponds to D9111)				
M9112*2	Step transition monitor timer start (corresponds to D9112)				
M9113*2	Step transition monitor timer start (corresponds to D9113)				
M9114*2	Step transition monitor timer start (corresponds to D9114)				
M9180	Active step sampling trace completed flag	OFF Trace start ON Trace complete	• Comes ON on completion of sampling trace for all designated blocks, and goes OFF at the start of sampling trace.	●	—
M9181	Active step sampling trace execution flag	OFF Trace not executed yet ON Trace being executed	• ON during sampling trace execution, goes OFF on completion or suspension of sampling trace.	●	—

Table 3.1 Special Relay List (Continued)

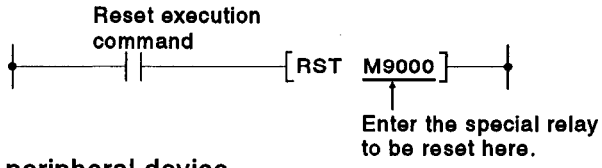
Number	Name	Stored Data	Explanation	Applicability	
				A273UH	A171S
M9182*2	Active step sampling trace enabled	OFF Trace disabled/ suspended ON Trace enabled	• Selects whether to enable or disable sampling trace. When ON : Execution of sampling trace is enabled. When OFF : Execution of sampling trace is disabled. When this relay is turned OFF during execution of sampling trace, the trace is suspended.	●	—
M9196*2	Operation output at block stop	OFF Coil output OFF ON Coil output ON	• Selects the operation output when a block stop is executed. When ON : The coil ON/OFF status used for the operation output of the step that was being executed when the block was stopped is retained. When OFF : All coil outputs are turned OFF. (Operation output by a SET instruction is retained regardless of the ON/OFF status of M9196.)	●	—
M9197 · M9198	Fuse blown / I/O verify error display switching	The display is selected by the combination of the M9197 ON/OFF and M9198 ON/OFF statuses.	M9197 / M9198 / Display Range OFF / OFF / Statuses X/Y0 to 7F0 ON / OFF / Statuses X/Y800 to FF0 OFF / ON / Statuses X/Y1000 to 17F0 ON / ON / Statuses X/Y1800 to 1FF0 • Selects the I/O module numbers for fuse blown module display (D9100 to D9107) and I/O module verify error display (D9116 to D9123). • The display selection is executed at END processing.	●	—
M9199	Online sampling trace status latch data restore	OFF Data not restored ON Data restored	• Restores the set data stored in the CPU and enables restarting of operation after sampling trace/status latch has been executed. • For re-execution, turn M9199 ON. (It is not necessary to write the data from a peripheral device again.)	●	—

POINTS

(1) All special relays, M, are turned OFF by turning the power OFF, performing latch clear, or resetting with the RESET key switch. When the RUN key switch is set to "STOP", the special relay settings are retained.

(2) The special relays marked "*1" in the table above remain "ON" even after a return to normal. They must therefore be turned OFF by using one of the following methods.

(a) Method using the user program
Insert the ladder block at right into the program and turn the reset execution command contact ON to clear the special relay.



(b) Method using a peripheral device
Perform a forced reset using the test function of the peripheral device.
For details on this operation, refer to the manual for the peripheral device.

(c) Turn the special relay OFF by setting the RESET key switch on the front panel of the CPU module to "RESET".

(3) The ON/OFF status of special relays marked "*2" in the table above is controlled by the sequence program.

(4) The ON/OFF status of special relays marked "*3" in the table above is controlled in the test mode of a peripheral device.

(5) The status of special relays marked "*4" in the table above is only reset on switching the power ON.

3.2 Special Registers (SP.D)

The special registers are data registers used for specific purposes in the programmable controller. Therefore, do not write data to the special registers in the program (with the exception of those whose numbers are marked *2 in the table).
Of the special relays, those from D9180 to D9199 are used for positioning control.

Table 3.2 Special Register List

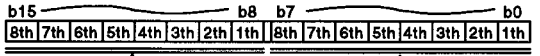
Number	Name	Stored Data	Explanation	Applicability	
				A273UH	A171S
D9000	Fuse blown	Number of module with blown fuse	• When modules with blown fuses are detected, the lowest module number among the detected modules is stored in hexadecimal. (Example: when the fuses of output modules Y50 to 6F have blown, "50" is stored in hexadecimal.) When monitoring with a peripheral device, use a hexadecimal display monitoring operation. (Cleared when all contents of D9100 to D9107 are reset to zero.)	●	—
			• When modules with a blown fuse are detected, the lowest I/O number of the detected modules is stored in hexadecimal in this special relay. (Exampl:: Blown fuse at the output module Y50 to 6F ... "50" is stored in hexadecimal) For monitoring at a peripheral device, use hexadecimal display monitor operations. (Cleared when the contents of D9100 are all "0".)	—	●
D9002	I/O unit verify error	I/O module verification error module number	• If I/O modules that do not match the registered data are detected when the power is turned on, the first I/O number of the lowest module number among the detected modules is stored in hexadecimal (the storage method is the same as for D9000). When monitoring with a peripheral device, use a hexadecimal display monitoring operation. (Cleared when all contents of D9116 to D9123 are reset to zero.)	●	●
D9004*1	MINI link error	Indicates the status for the number of master modules set in the parameters (1 to 8)	• Stores the MINI(S3) link error detected status for the master modules installed.  Bits corresponding to master modules which cannot communicate with the PC CPU. By turning ON the master module signals indicated below, the relevant bit is turned ON. • Hardware error (X0/X20) • MINI(S3) link error detected (X6/X26) • MINI(S3) link communication error (X7/X27)	●	—
D9005*1	AC DOWN counter	AC DOWN occurrence count	• 1 is added to the stored value each time the input voltage becomes 80% or less of the rating while the CPU module is performing an operation, and the value is stored in BIN code.		
D9008*1	Self-diagnostic error	Self-diagnostic error number	• 1 is added to the stored value when an error is found as a result of self-diagnosis, the error number, and the value is stored in BIN code.		

Table 3.2 Special Register List (Continued)

Number	Name	Stored Data	Explanation	Applicability	
				A273UH	A171S
D9009	Annunciator detection	F number at which external failure has occurred	• When one of F0 to F255 is turned on by OUT F or SET F, the F number detected earliest among the F numbers which have been turned on is stored in BIN code. • D9009 can be cleared by executing a RST F or LEDR instruction. If another F number has been detected, the clearing of D9009 causes the next number to be stored in D9009.	—	●
			• When one of F0 to F255 is turned on by OUT F or SET F, the F number detected earliest among the F numbers which have been turned on is stored in BIN code. • D9009 can be cleared by executing a RST F or LEDR instruction, or by setting the INDICATOR RESET switch on the front of the CPU to ON. If another F number has been detected, the clearing of D9009 causes the next number to be stored in D9009.	●	—
D9010	Error step	Step number at which operation error has occurred	• When it has not been possible to access a module for which a special function module setting has been made at STOP → RUN, the module No. of the special function module is stored in this special register. • When an operation error occurs during execution of an application instruction, the step No. where the error occurred is stored in BIN code, and thereafter every time an operation error occurs the contents of D9010 are updataed.	●	—
			• When an operation error occurs during execution of an application instruction, the step No. where the error occurred is stored in BIN code, and thereafter every time an operation error occurs the contents of D9010 are updated.	—	●
D9011	Error step	Step number at which operation error has occurred.	• When an operation error occurs during execution of an application instruction, the step number at which the error occurs is stored in this register in BIN code. Since storage is executed when M9011 changes from OFF to ON, the contents of D9011 cannot be updated unless it is cleared by the user program.	—	●
D9014	I/O control mode	I/O control mode number	• The set I/O control method is represented as follows: 3: Refresh method for both input and output	●	—
			• The set control mode is represented as follows: 0: I/O in direct mode 3: I/O in refresh mode	—	●

Table 3.2 Special Register List (Continued)

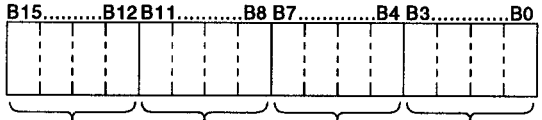
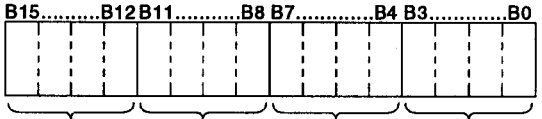
<table>
<tr><th rowspan="2">Number</th><th rowspan="2">Name</th><th rowspan="2">Stored Data</th><th rowspan="2">Explanation</th><th colspan="2">Applicability</th></tr>
<tr><th>A273UH</th><th>A171S</th></tr>
<tr><td rowspan="2">D9015</td><td rowspan="2">CPU operating states</td><td rowspan="2">Operating states of CPU</td><td>• The operating states of the CPU are stored in D9015 as shown below.
B15.....B12 B11.....B8 B7.....B4 B3.....B0
 
CPU RUN/STOP key switch (Remains unchanged in remote run/stop mode)
0 RUN
1 STOP
2 PAUSE*
3 STEP RUN
Remote RUN/STOP by parameter setting
0 RUN
1 STOP
2 PAUSE*
Status in program
0 Other than below
1 STOP instruction execution
Remote RUN/STOP by computer
0 RUN
1 STOP
2 PAUSE*
*: When the CPU is in the RUN mode and M9040 is off, the RUN mode remains in effect even if an attempt is made to change to the PAUSE mode.</td><td>●</td><td>—</td></tr>
<tr><td>• The CPU operating states indicated in the figure below are stored in D9015.
B15.....B12 B11.....B8 B7.....B4 B3.....B0
 
CPU key switch (Remains unchanged in remote run/stop mode.)
0 RUN
1 STOP
Remote RUN/STOP by parameter setting
0 RUN
1 STOP
2 PAUSE*
Status in program
0 Other than below
1 STOP instruction execution
Remote RUN/STOP by computer
0 RUN
1 STOP
2 PAUSE*
*: When the CPU is in the RUN status and M9040 is OFF, the CPU remains in RUN mode even if set to PAUSE.</td><td>—</td><td>●</td></tr>
</table>

Table 3.2 Special Register List (Continued)

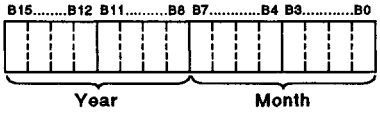
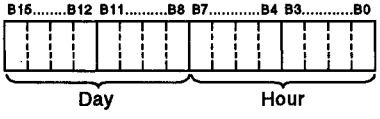
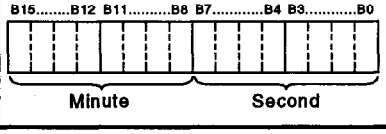
Number	Name	Stored Data	Explanation	Applicability A273UH	Applicability A171S
D9016	Program No.	The type of sequence program being executed is stored as a BIN value.	• The type of sequence program currently being executed is stored under one of the following code numbers. 0: ROM main 4: RAM sub 3 8: EEP-ROM main 1: RAM main 5: ROM sub 1 9: EEP-ROM sub 1 2: RAM sub 1 6: ROM sub 2 A: EEP-ROM sub 2 3: RAM sub 2 7: ROM sub 3 B: EEP-ROM sub 3	●	—
	ROM/RAM setting	0 : ROM 1 : RAM 2 : E^2ROM	• Indicates the setting for the memory selection chip; one of the values 0 to 2 is set in BIN code.	—	●
D9017	Scan time	Minimum scan time (10 ms units)	• At each END instruction, if the scan time is shorter than the contents of D9017, the new value is stored in this register. In other words, the minimum value for scan time is stored in D9017, in BIN code.	●	●
D9018	Scan time	Scan time (10 ms units)	• The scan time is stored in BIN code at each END instruction and is always rewritten.	●	●
D9019	Scan time	Maximum scan time (10 ms units)	• At each END instruction, if the scan time is longer than the contents of D9019, the new value is stored in this register. In other words, the maximum value for scan time is stored in D9019, in BIN code.	●	●
D9020*2	Constant scan	Constant scan time (user-specified in 10 ms units)	• When a user program is executed at fixed intervals, set the interval in 10 ms units. 0 : Constant scan function not used 1 to 20 : Constant scan function used Execution at (set value)×10 ms inter vals	—	●
			• When user programs are executed at fixed intervals, used to set the execution intervals, in 10 ms units. 0 : Constant scan function not used 1 to 200 : Constant scan function used; program executed at intervals of (set value)×10 ms.	●	—
D9021	Scan time	Scan time (1 ms units)	• The scan time is stored in BIN code at each END processing, overwriting the existing value.	●	—
D9022	Time	Time	• Counts up +1 for each second.	●	—
D9025*2	Clock data	Clock data (year, month)	• The year (last two digits) and month are stored in BCD code in D9025 as shown below.  Example : July 1993 H9307	●	●
D9026*2	Clock data	Clock data (day, hour)	• The day and hour are stored in BCD code in D9026 as shown below.  Example : 31st, 10th hour H3110	●	●
D9027*2	Clock data	Clock data (minute, second)	• The minute and second are stored in BCD code in D9027 as shown below.  Example : 35 ms, 48 s H3548	●	●

Table 3.2 Special Register List (Continued)

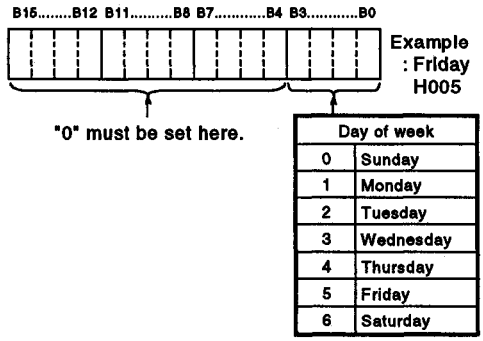
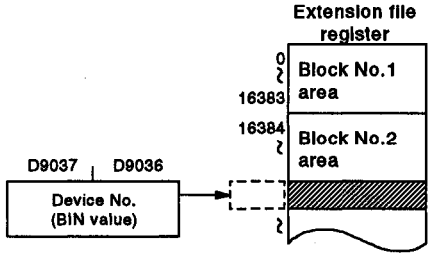
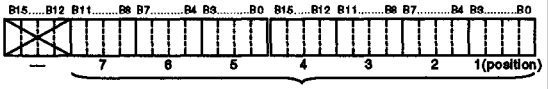
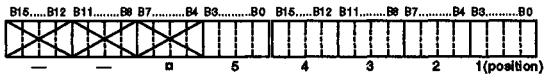
Number	Name	Stored Data	Explanation	Applicability	
				A273UH	A171S
D9028*2	Clock data	Clock data (, day of week)	• The day of the week is stored in BCD code in D9028 as shown below. 	●	●
D9035	Extension file register	Used block No.	• The block No. of the currently used extension file register is stored in BIN code.	●	—
D9036 D9037	For extension file register device No. designation	Device No. when directly accessing individual devices of the file register	• Designate the device numbers in the file register that are to be directly read or written to as a BIN value in the 2 words D9036 and D9037. Device numbers are designated as consecutive numbers beginning with R0 of block No.1, regardless of block numbers. 	●	—

Table 3.2 Special Register List (Continued)

<table>
<tr><th rowspan="2">Number</th><th rowspan="2">Name</th><th rowspan="2">Stored Data</th><th rowspan="2">Explanation</th><th colspan="2">Applicability</th></tr>
<tr><th>A273UH</th><th>A171S</th></tr>
<tr><td>D9038*2

D9039*2</td><td rowspan="2">LED display priority</td><td>Priorities 1 to 4

Priorities 5 to 7</td><td>• The element numbers for display priorities 1 to 4 (D9038) and 5 to 7 (D9039) of the LED display of the CPU module are set and changed.
 

Priority
Even if "0" is set, errors which cause CPU operation to stop (including parameter settings) are unconditionally displayed on the LED display.
Default values :
H9038=H4321
H9039=H0765
<table><tr><th>Element No.</th><th>Content</th></tr><tr><td>0.</td><td>Not displayed</td></tr><tr><td>1.</td><td>I/O verify, fuse blown</td></tr><tr><td>2.</td><td>Special function module, link parameters, operation error</td></tr><tr><td>3.</td><td>CHK instruction error</td></tr><tr><td>4.</td><td>Annunciator</td></tr><tr><td>5.</td><td>LED instruction related</td></tr><tr><td>6.</td><td>Parity error</td></tr><tr><td>7.</td><td>Clock data</td></tr></table></td><td>●</td><td>—</td></tr>
<tr><td>• The element numbers for priorities 1 to 4 (D9038) and 5 to 7 (D9039) for the lighting (or flashing) of the ERROR LED when an error occurs, are set and changed.
 

Priority
Even if "0" is set, errors which cause CPU operation to stop (including parameter settings) are unconditionally displayed on the LED display.
Default values :
D9038=H4321
D9039=H0006
<table><tr><th>Element No.</th><th>Content</th></tr><tr><td>0.</td><td>Not displayed</td></tr><tr><td>1.</td><td>I/O verify, fuse blown</td></tr><tr><td>2.</td><td>Special function module, link parameters, SFC parameters, SFC operation</td></tr><tr><td>3.</td><td>CHK instruction error</td></tr><tr><td>4.</td><td>Annunciator (F)</td></tr><tr><td>5.</td><td>LED instruction related</td></tr><tr><td>6.</td><td>Parity error</td></tr></table></td><td>—</td><td>●</td></tr>
<tr><td>D9044</td><td>For sampling trace</td><td>Step or time for sampling trace</td><td>• The value that D9044 contains is used as a sampling trace condition when the sampling trace instruction [STRA], [STRAR] is executed by switching ON/OFF M9044 from the peripheral device.
For scan —— Set "0".
For time —— Set the time in 10 ms units.
] The value is stored in BIN.</td><td>●</td><td>—</td></tr>
<tr><td>D9049</td><td>SFC work area</td><td>Extension file register block number</td><td>• The extension file register block number used as the SFC work area is stored.
Higher 8 bits .... Block number is stored.
Lower 8 bits ..... Step number is stored.</td><td>●</td><td>—</td></tr>
<tr><td>D9050</td><td>SFC program error code</td><td>Error code generated during SFC program execution</td><td>• Error codes generated during SFC program execution are stored in BIN code.
0 : No error
80 : SFC program parameter error
81 : Number of simultaneous execution steps exceeded
82 : Block start error
83 : SFC program operation error</td><td>●</td><td>—</td></tr>
</table>

Table 3.2 Special Register List (Continued)

Number	Name	Stored Data	Explanation	Applicability	
				A273UH	A171S
D9051	Error block	Block number in which an error occurred	• Block numbers at which errors occurred during SFC program execution are stored in BIN code. In the case of error code 82, the start block step number is stored.	●	—
D9052	Error step	Step number at which an error occurred	• The step number at which error 83 occurred during SFC program execution is stored in BIN code. In the case of error code 80 or 81, "0" is stored. In the case of error code 82, the block start step number is stored.	●	—
D9053	Error transition	Transition condition number at which an error occurred	• The transition condition number at which error 83 occurred during SFC program execution is stored in BIN code. In the case of error code 80, 81, or 82, "0" is stored.	●	—
D9054	Error sequence step	Sequence step number at which an error occurred	• The sequence step number of the transition condition and operation output when error 83 occurred during SFC program execution is stored in BIN code.	●	—
D9055	Status latch	Status latch step	• The step number executed when the status is latched is stored in BIN code.	●	—
D9072	PC communication check	Computer link data check	• Used at self-loopback check	●	—
D9081	Empty communication request entry areas	Empty communication request entry areas	• The number of empty communication request entry areas in which communication requests to MNET/MINI(S3) can be entered is stored (Max. 32).	●	—
D9085	Time check value setting register	Default value 10 s	• The time check value at execution of a MELSECNET/10 link instruction (ZNRD, ZNWR) is stored. • Setting range : 1 to 65535 sec • Setting unit : 1 sec • If the set value is "0", the default of "10 sec" is used for operation.	●	—
D9090*1	Excessive special function modules	Too many special function modules	• When the number of special function modules mounted is excessive, the value "(head I/O number of the last special function module entered) / 16" is stored as a BIN value.	●	—
D9091*1	Detailed error numbers	Self-diagnostic detailed error numbers	• The detailed error number when a self-diagnostic error occurs is stored.	●	—
D9094*2	Replacement I/O first I/O number	Replacement I/O first I/O number	• Stores the upper two digits of the first I/O number of an I/O module that is removed/replaced in the online status. Example: Input module X2F0 → H2F	●	—

Table 3.2 Special Register List (Continued)

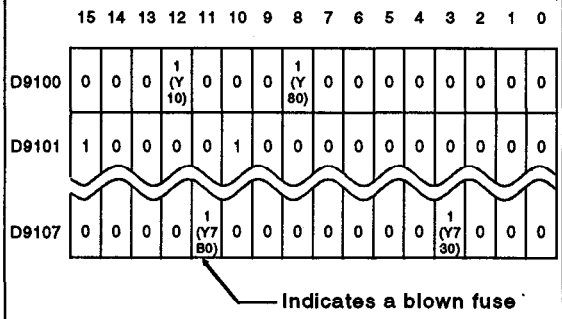
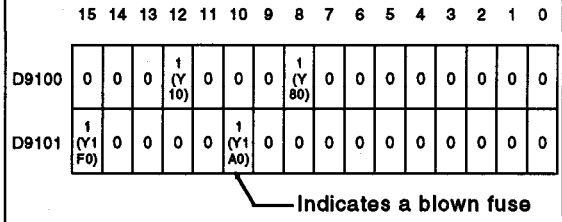
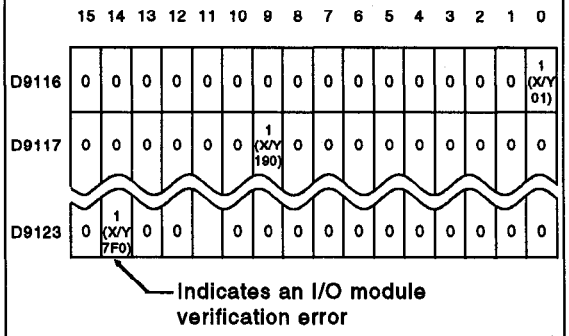
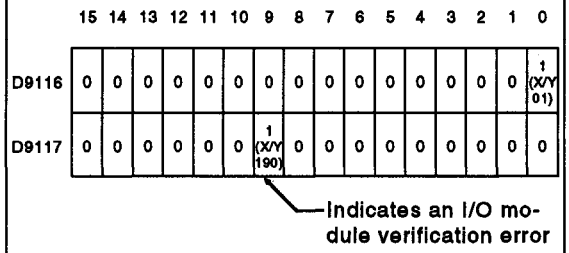
Number	Name	Stored Data	Explanation	Applicability	
				A273UH	A171S
D9100 to D9107	Fuse blown module	Bit pattern in units of 16 points, indicating the modules whose fuses have blown	• The numbers of output modules whose fuses have blown are input as a bit pattern (in units of 16 points). (If the module numbers are set by parameter, the parameter-set numbers are stored.) • The blown fuse statuses of the output modules of remote stations are also detected.  • By switching M9197 and M9198 ON and OFF, the I/O module number display range is switched. • To clear the data of a module whose fuse is blown, turn OFF M9000 (fuse blown).	●	—
D9100*1 D9101*1			• Output module numbers of the (in units of 16 points) of output modules whose fuses have blown or whose external power supply has been switched OFF are entered in a bit pattern. (Preset output number when parameter setting has been performed.)  (Since the error is not cleared even after returning to normal, it must be cleared with a program.)	●	—

Table 3.2 Special Register List (Continued)

<table>
<tr><th rowspan="2">Number</th><th rowspan="2">Name</th><th rowspan="2">Stored Data</th><th rowspan="2">Explanation</th><th colspan="2">Applicability</th></tr>
<tr><th>A273UH</th><th>A171S</th></tr>
<tr><td rowspan="2">D9116
to
D9123</td><td rowspan="2">Input/Output module verification error</td><td rowspan="2">Bit pattern, in units of 16 points, indicating the modules with verification errors.</td><td>• When the power is turned on, the module numbers of the I/O modules whose information differs from the registered I/O module information are set in this register (in units of 16 points).
(If the I/O numbers are set by parameter, the parameter-set numbers are stored.)
• The I/O module information of remote stations can be detected.
 

• By switching M9197 and M9198 ON and OFF, the I/O module number display range is switched.
• To clear the verify error, turn OFF M9002 (verify error).</td><td>●</td><td>—</td></tr>
<tr><td>D9116*1
D9117*1</td><td>• When an I/O modules whose data is different from that entered are detected, the I/O module numbers (in units of 16 points) are entered in a bit pattern.
(Preset I/O module numbers when parameter setting has been performed.)
 

(Since the error is not cleared even after returning to normal, it must be cleared with a program.)</td><td>—</td><td>●</td></tr>
<tr><td rowspan="2">D9124</td><td rowspan="2">Annunciator detection quantity</td><td rowspan="2">Number of detected annunciators</td><td>• When one of F0 to 2047 is turned ON by OUT F or SET F, 1 is added to the contents of D9124. When an RST F or LED R instruction is executed, 1 is subtracted from the contents of D9124.
(This can also be achieved with the INDICATOR RESET switch on the front panel of the CPU module.)
The maximum number of annunciators switched ON by OUT F or SET F that can be stored in D9124 is 8.</td><td>●</td><td>—</td></tr>
<tr><td>• When one of F0 to 255 is turned on by an OUT F or SET F, 1 is added to the contents of D9124. When the RST F or LED R instruction is executed, 1 is subtracted from the contents of D9124.
The number of annunciators that has been turned on by OUT F or SET F is stored in D9124: the maximum stored value is 8.</td><td>—</td><td>●</td></tr>
</table>

Table 3.2 Special Register List (Continued)

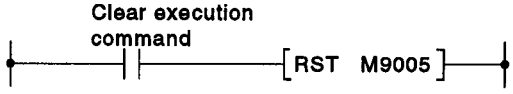
<table>
<tr><th rowspan="2">Number</th><th rowspan="2">Name</th><th rowspan="2">Stored Data</th><th rowspan="2">Explanation</th><th colspan="2">Applicability</th></tr>
<tr><th>A273UH</th><th>A171S</th></tr>
<tr><td rowspan="2">D9125
to
D9132</td><td rowspan="2">Annunciator detection number</td><td rowspan="2">Annunciator detection number</td><td>• When one of F0 to 2047 is turned ON by [OUT F] or [SET F], the F number which has been turned ON is entered in D9125 to D9132, in due order, in BIN code.
An F number which has been turned OFF by [RST F] is erased from D9125 to D9132 and the contents of data registers succeeding the data register from which the F number was erased are shifted to the preceding data registers. By executing the [LED R] instruction, the contents of D9125 to D9132 are shifted upward by one. (This can also be done with the INDICATOR RESET switch on the front of the CPU module.) When there are 8 annunciator detections, a 9th will not be stored in D9125 to D9132 even if detected.
<table>
<tr><th></th><th>SET F50</th><th>SET F25</th><th>SET F19</th><th>SET F25</th><th>SET F15</th><th>SET F70</th><th>SET F65</th><th>SET F38</th><th>SET F110</th><th>SET F151</th><th>SET F210</th><th>LEDR</th><th></th></tr>
<tr><td>D9009</td><td>0</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>99</td><td>← Detection number</td></tr>
<tr><td>D9124</td><td>0</td><td>1</td><td>2</td><td>3</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>8</td><td>← Detection quantity</td></tr>
<tr><td>D9125</td><td>0</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>99</td><td rowspan="9">Detection number</td></tr>
<tr><td>D9126</td><td>0</td><td>0</td><td>25</td><td>25</td><td>99</td><td>99</td><td>99</td><td>99</td><td>99</td><td>99</td><td>99</td><td>15</td></tr>
<tr><td>D9127</td><td>0</td><td>0</td><td>0</td><td>99</td><td>0</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>70</td></tr>
<tr><td>D9128</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>70</td><td>70</td><td>70</td><td>70</td><td>70</td><td>65</td></tr>
<tr><td>D9129</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>65</td><td>65</td><td>65</td><td>65</td><td>65</td><td>38</td></tr>
<tr><td>D9130</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>38</td><td>38</td><td>38</td><td>38</td><td>110</td></tr>
<tr><td>D9131</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td><td>110</td><td>110</td><td>110</td><td>151</td></tr>
<tr><td>D9132</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td><td>151</td><td>151</td><td>210</td></tr>
</table>
</td><td>●</td><td>—</td></tr>
<tr><td>• When F numbers in the range F0 to 255 are turned on by [OUT F] or [SET F], they are entered in D9125 to D9132 in ascending order of register numbers.
An F number which is turned off by [RST F] is erased from D9125 to D9132, and the contents of the data registers following the one where the erased F number was stored are each shifted to the preceding data register. When the [LEDR] instruction is executed, the contents of D9125 to D9132 are shifted upward by one. When there are 8 annunciator detections, a 9th one is not stored in D9125 to D9132 even if detected.
<table>
<tr><th></th><th>SET F50</th><th>SET F25</th><th>SET F19</th><th>SET F25</th><th>SET F15</th><th>SET F70</th><th>SET F65</th><th>SET F38</th><th>SET F110</th><th>SET F151</th><th>SET F210</th><th>LEDR</th></tr>
<tr><td>D9009</td><td>0</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>99</td></tr>
<tr><td>D9124</td><td>0</td><td>1</td><td>2</td><td>3</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>8</td></tr>
<tr><td>D9125</td><td>0</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td><td>99</td></tr>
<tr><td>D9126</td><td>0</td><td>0</td><td>25</td><td>25</td><td>99</td><td>99</td><td>99</td><td>99</td><td>99</td><td>99</td><td>99</td><td>15</td></tr>
<tr><td>D9127</td><td>0</td><td>0</td><td>0</td><td>99</td><td>0</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>70</td></tr>
<tr><td>D9128</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>70</td><td>70</td><td>70</td><td>70</td><td>70</td><td>65</td></tr>
<tr><td>D9129</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>65</td><td>65</td><td>65</td><td>65</td><td>65</td><td>38</td></tr>
<tr><td>D9130</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>38</td><td>38</td><td>38</td><td>38</td><td>110</td></tr>
<tr><td>D9131</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td><td>110</td><td>110</td><td>110</td><td>151</td></tr>
<tr><td>D9132</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td><td>151</td><td>151</td><td>210</td></tr>
</table>
</td><td>—</td><td>●</td></tr>
</table>

POINTS

(1) All special register data is cleared by the power-off, latch clear, and reset operations. The data is retained when the RUN/STOP key switch is set to STOP.

(2) The contents of the special relays marked *1 in the table above are not cleared even after the normal status is restored. To clear the contents, use one of the following methods:

(a) Using a user program
Insert the ladder block shown at right into the program and turn on the clear execution command contact to clear the contents of the register.



(b) Using a peripheral device
Using the test function of a peripheral device, set the register to "0" by using present value change or forced reset.
For details on the operation involved, refer to the manual for the relevant peripheral device.

(c) Set the special register to "0" by setting the RESET key switch on the front of the CPU to the RESET position.

(3) For special registers marked "*2", data is written in the sequence program.

(4) For special registers marked "*3", data is written in the test mode of a peripheral device.

(5) For special registers marked "*4", data is cleared only when the power is turned ON.

(1) A171SCPU/A273UHCPU (8-axis specifications)

Table 3.3 Special Register List

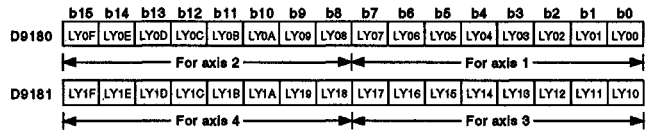
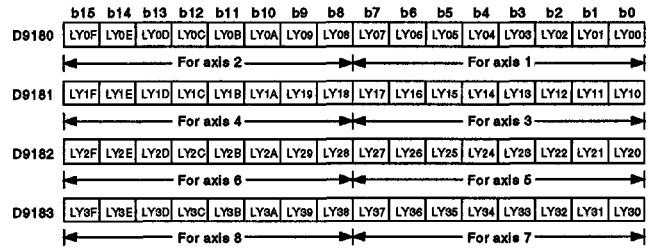
Number	Name	Stored Data	Explanation
D9180 to D9183	Limit switch output storage area	Limit switch output storage area 1: ON 0: OFF	• The status of output (ON/OFF) to limit switch output AY42 set with a peripheral device is stored as "1" or "0". 1: ON 0: OFF • These registers can be used to output limit switch output data to an external device using the sequence program. (1) A171SCPU  * "1" or "0" is stored for each of the bits in D9180 and D9181. 1) 1.....ON 2) 0.....OFF D9182 to D9183 are not used (cannot be used by the user). (2) A273UHCPU (8 axis specification)  * "1" or "0" is stored for each of the bits in D9180 through D9183. 1) 1.....ON 2) 0.....OFF

Table 3.3 Special Register List (Continued)

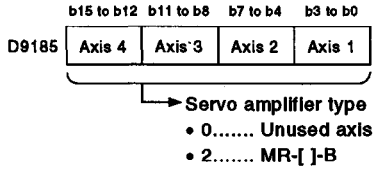
<table>
<tr><th>Number</th><th>Name</th><th>Stored Data</th><th>Explanation</th></tr>
<tr><td>D9184</td><td>Cause of PCPU error</td><td>PCPU WDT error number</td><td>
• The PCPU WDT errors tabled below are stored in D9184.
(1) When using an A171SCPU
<table>
<tr><th>Error Code</th><th>Error Cause</th></tr>
<tr><td>2</td><td>• PCPU excessive operation frequency</td></tr>
<tr><td>3</td><td>• SCPU software fault 2</td></tr>
<tr><td>300</td><td>• SCPU software fault 3</td></tr>
</table>
(2) When using an A273UHCPU (8-axis specification)
<table>
<tr><th>Error Code</th><th>Error Cause</th></tr>
<tr><td>1</td><td>• PCPU software fault 1</td></tr>
<tr><td>2</td><td>• PCPU excessive operation frequency</td></tr>
<tr><td>3</td><td>• PCPU software fault 2</td></tr>
<tr><td>30</td><td>• Hardware fault between PCPU and SCPU</td></tr>
<tr><td>100
to
107

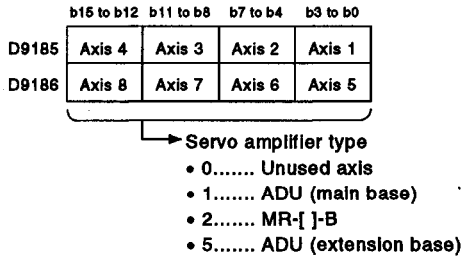
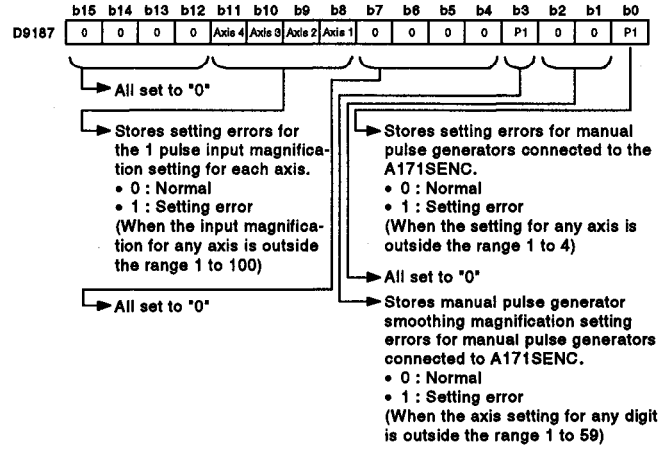
110
to
117</td><td>AC motor drive module CPU error
1 0 0
• Indicates the slot No. (0 to 7) where the AC motor drive module with the error is loaded.
• Indicates the stage number of the base on which the AC motor drive module with the error is loaded. (0: main base, 1: extension base)</td></tr>
<tr><td>200
to
207

210
to
217</td><td>Hardware fault of module loaded in main base unit or motion extension base unit.
2 0 0
• Indicates the slot No. (0 to 7) where the module with the error is loaded.
• Indicates the stage number of the base on which the module with the error is loaded. (0: main base, 1: extension base)</td></tr>
<tr><td>250
to
251</td><td>Separate servo amplifier (MR-[ ]-B) interface hardware fault
2 5 0
Fault SSCNET No.
0: SSCNET 1</td></tr>
<tr><td>300</td><td>PCPU software fault 3</td></tr>
<tr><td>301</td><td>CPSTART instructions for 8 or more points simultaneously started for 21 or more programs.
CPSTART instructions for 8 or more points can only be started simultaneously for up to 20 programs.</td></tr>
</table>
</td></tr>
</table>

Table 3.3 Special Register List (Continued)

<table>
<tr><th>Number</th><th>Name</th><th>Stored Data</th><th>Explanation</th></tr>
<tr><td>D9185

D9186</td><td>Servo amplifier type</td><td>Servo amplifier type</td><td>• On switching the power ON or resetting, the servo amplifier type set in the system settings is set in these devices.
(1) When an A171SCPU is used
 

(2) When an A273UHCPU (8 axis specification) is used
 
</td></tr>
<tr><td>D9187</td><td>Manual pulse generator axis setting error</td><td>Manual pulse generator axis setting error</td><td>• Stores the contents of the manual pulse generator axis setting error when the manual pulse generator axis setting flag (M9077) comes ON.
(1) When an A171SCPU is used
 

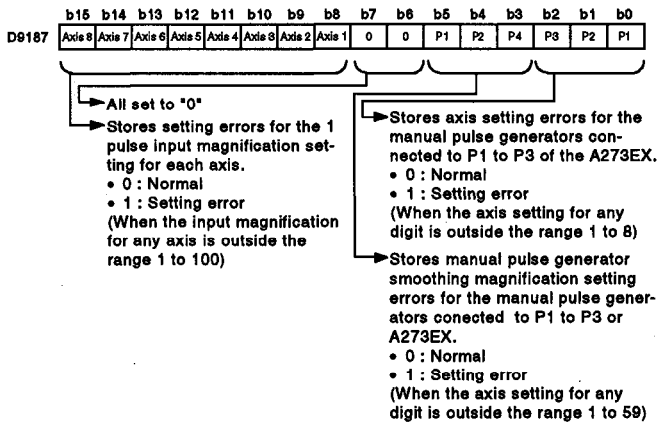
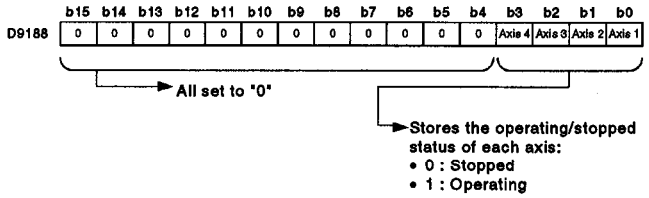
(2) When an A273UHCPU (8 axis specification) is used
 
</td></tr>
</table>

Table 3.3 Special Register List (Continued)

<table>
<tr><th>Number</th><th>Name</th><th>Stored Data</th><th>Explanation</th></tr>
<tr><td>D9188</td><td>Test mode request error</td><td>Test mode request error</td><td>• Stores the data of axes being operated when the test mode request error flag (M9078) comes ON.
(1) When an A171SCPU is used
 

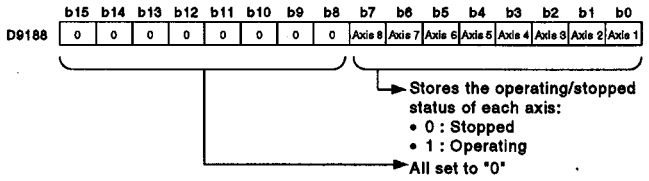
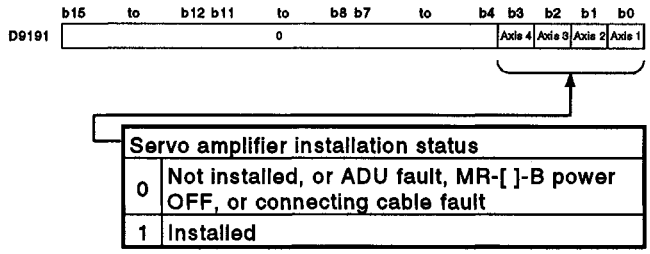
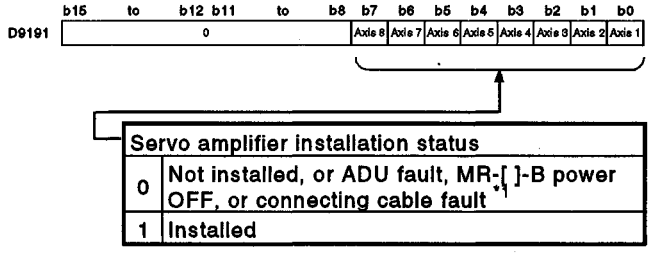
(2) When A273UHCPU (8 axis specification) is used
 
</td></tr>
<tr><td>D9189</td><td>Error program No.</td><td>Error program number</td><td>• Stores the subprogram number (range: 0 to 4095) affected by the error when the subprogram setting error flag (M9079) comes ON.
• If, once an error program number has been stored, an error occurs in another servo program, the program number of the program with the new error is stored.</td></tr>
<tr><td>D9190</td><td>Error item information</td><td>Servo program setting error number</td><td>• When the servo program setting error flag (M9079) comes ON, the error code that corresponds to the relevant setting item is stored in this device.
<table>
<tr><th>Error Code</th><th>Error Contents</th></tr>
<tr><td>900</td><td>The servo program set for the DSFRP/SVST instruction does not exist.</td></tr>
<tr><td>901</td><td>The axis number set for the DSFRP/SVST instruction is different from the axis number set in the servo program.</td></tr>
<tr><td>902</td><td>The instruction code cannot be decoded (there is a questionable instruction code).</td></tr>
<tr><td>906</td><td>An axis designated as unused in the system settings is set in the subprogram set for the DSFRP/SVST instruction.</td></tr>
<tr><td>Error item data</td><td>There is an error in the settings of the servo program set for the DSFRP/SVST instruction. The error item in 6.3 is stored.</td></tr>
</table></td></tr>
</table>

Table 3.3 Special Register List (Continued)

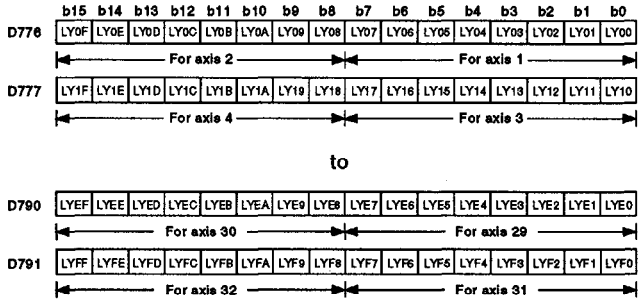
<table>
<tr><th>Number</th><th>Name</th><th>Stored Data</th><th>Explanation</th></tr>
<tr><td>D9191</td><td>Servo amplifier installation information</td><td>Servo amplifier installation information</td><td>• When the power is turned ON, or on resetting, the servo amplifier and option slot installation statuses are checked and the results stored in this device.
(1) When an A171SCPU is used
 

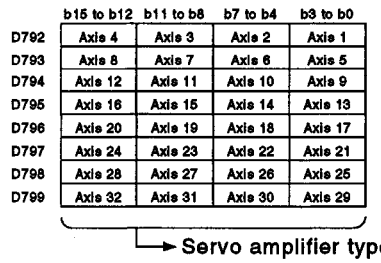
(2) When an A273UHCPU (8 axis specification) is used
 

*1: In the case of an ADU, if the module is not installed although an axis number has been set in the system settings, a major error is displayed.</td></tr>
<tr><td>D9192</td><td>Area for setting the smoothing magnification for manual pulse generator 1 (P1)</td><td rowspan="3">Areas for setting manual pulse generator smoothing magnifications</td><td rowspan="3">• Stores the manual pulse generator smoothing time constant.
• The smoothing time constant is calculated using the following formula:
$\text{Smoothing time constant (t)} = \left(\text{Smoothing magnification} + 1\right) \times 56.8[\text{ms}]$
The setting range for smoothing magnification is 0 to 59.</td></tr>
<tr><td>D9193</td><td>Area for setting the smoothing magnification for manual pulse generator 2 (P2) (A273UH only)</td></tr>
<tr><td>D9194</td><td>Area for setting the smoothing magnification for manual pulse generator 3 (P3) (A273UH only)</td></tr>
</table>

(2) A273UHCPU (32 specification)

Table 3.4 Special Register List

<table>
<tr><th>Number</th><th>Name</th><th>Stored Data</th><th>Explanation</th></tr>
<tr><td>D752*</td><td>Area for setting the smoothing magnification for manual pulse generator 1 (P1)</td><td rowspan="3">Areas for setting manual pulse generator smoothing magnifications</td><td rowspan="3">• Stores the manual pulse generator smoothing time constant.
• The smoothing time constant is calculated using the following formula:
Smoothing time constant (t) = (Smoothing magnification + 1) × 56.8[ms]
The setting range for smoothing magnification is 0 to 59.</td></tr>
<tr><td>D753*</td><td>Area for setting the smoothing magnification for manual pulse generator 2 (P2)</td></tr>
<tr><td>D754*</td><td>Area for setting the smoothing magnification for manual pulse generator 3 (P3)</td></tr>
<tr><td>D776 to * D791</td><td>Storage area for axis 1 to axis 32 limit switch output statuses</td><td>Limit switch output storage area
1: ON
0: OFF</td><td>• The status of output (ON/OFF) to limit switch output AY42 set with a peripheral device is stored as "1" or "0".
1: ON
0: OFF
• These registers can be used to output limit switch output data to an external device using the sequence program.
 

* "1" or "0" is stored for each of the bits in D776 to D791.
1) 1.....ON
2) 0.....OFF</td></tr>
<tr><td>D792 to * D799</td><td>Servo amplifier type</td><td>Servo amplifier type</td><td>• On switching the power ON or resetting, the servo amplifier type set in the system settings is set in these devices.
 

Servo amplifier type1)
• 0.....Unused axis
• 1.....ADU (main base)
• 2.....MR-[ ]-B
• 5.....ADU (extension base)</td></tr>
</table>

*: Data registers are used (see Section 3.5).

Table 3.4 Special Register List (Continued)

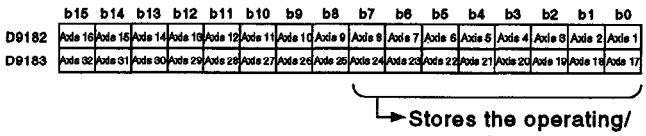
<table>
<tr><th>Number</th><th>Name</th><th>Stored Data</th><th>Explanation</th></tr>
<tr><td>D9182
to
D9183</td><td>Test mode request error</td><td>Test mode request error</td><td>• Stores the data of axes being operated when the test mode request error flag (M9078) comes ON.
 
</td></tr>
<tr><td>D9184</td><td>Cause of PCPU error</td><td>PCPU WDT error number</td><td>• The PCPU WDT errors tabled below are stored in D9184.
<table>
<tr><th>Error Code</th><th>Error Cause</th></tr>
<tr><td>1</td><td>• PCPU software fault 1</td></tr>
<tr><td>2</td><td>• PCPU excessive operation frequency</td></tr>
<tr><td>3</td><td>• PCPU software fault 2</td></tr>
<tr><td>30</td><td>• Hardware fault between PCPU and SCPU</td></tr>
<tr><td>100 to 107
110 to 117
120 to 127
130 to 137
140 to 147</td><td>AC motor drive module CPU error
1 0 0
• Indicates the slot No. (0 to 7) where the AC motor drive module with the error is loaded.
• Indicates the stage number of the base on which the AC motor drive module with the error is loaded. (0: main base, 1: extension base, 2: extension base, 3: extension base, 4: extension base)</td></tr>
<tr><td>200 to 207
210 to 217
220 to 227
230 to 237
240 to 247</td><td>Hardware fault of module loaded in main base unit or motion extension base unit.
2 0 0
• Indicates the slot No. (0 to 7) where the module with the error is loaded.
• Indicates the stage number of the base on which the module with the error is loaded. (0: main base, 1: extension base, 2: extension base, 3: extension base, 4: extension base)</td></tr>
<tr><td>250
to
253</td><td>Separate servo amplifier (MR-[ ]-B) interface hardware fault
2 5 0
Fault SSCNET No.
0: SSCNET 1
1: SSCNET 2
2: SSCNET 3
3: SSCNET 4</td></tr>
<tr><td>300</td><td>PCPU software fault 3</td></tr>
<tr><td>301</td><td>CPSTART instructions for 8 or more points simultaneously started for 21 or more programs.
CPSTART instructions for 8 or more points can only be started simultaneously for up to 20 programs.</td></tr>
</table></td></tr>
</table>

Table 3.4 Special Register List (Continued)

<table>
<tr><th>Number</th><th>Name</th><th>Stored Data</th><th>Explanation</th></tr>
<tr><td>D9185
to
D9187

D9180
to
D9183</td><td>Manual pulse generator axis setting error

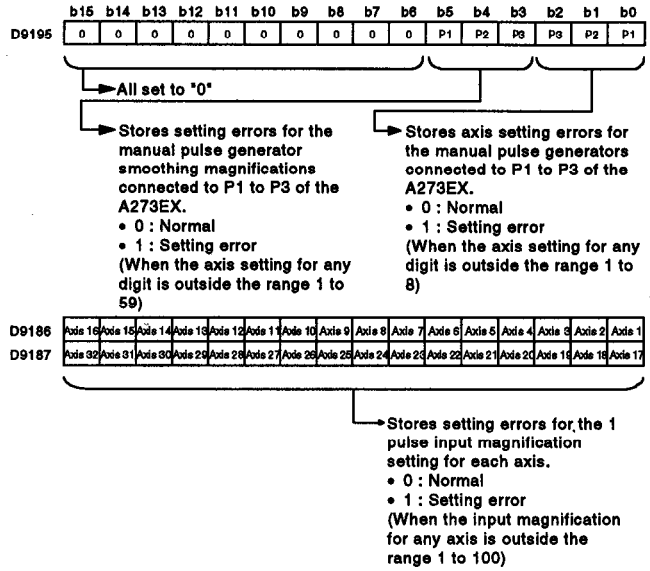
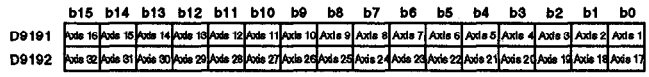
Limit switch output storage area</td><td>Manual pulse generator axis setting error</td><td>• Stores the contents of the manual pulse generator axis setting error when the manual pulse generator axis setting flag (M9077) comes ON.
 
</td></tr>
<tr><td>D9189</td><td>Error program No.</td><td>Error program number</td><td>• Stores the subprogram number (range: 0 to 4095) affected by the error when the subprogram setting error flag (M9079) comes ON.
• If, once an error program number has been stored, an error occurs in another servo program, the program number of the program with the new error is stored.</td></tr>
<tr><td>D9190</td><td>Error item information</td><td>Servo program setting error number</td><td>• When the servo program setting error flag (M9079) comes ON, the error code that corresponds to the relevant setting item is stored in this device.
<table>
<tr><th>Error Code</th><th>Error Contents</th></tr>
<tr><td>900</td><td>The servo program set for the DSFRP/SVST instruction does not exist.</td></tr>
<tr><td>901</td><td>The axis number set for the DSFRP/SVST instruction is different from the axis number set in the servo program.</td></tr>
<tr><td>902</td><td>The instruction code cannot be decoded (there is a questionable instruction code).</td></tr>
<tr><td>906</td><td>An axis designated as unused in the system settings is set in the subprogram set for the DSFRP/SVST instruction.</td></tr>
<tr><td>Error item data</td><td>There is an error in the settings of the servo program set for the DSFRP/SVST instruction. The error item in 6.3 is stored.</td></tr>
</table></td></tr>
</table>

Table 3.4 Special Register List (Continued)

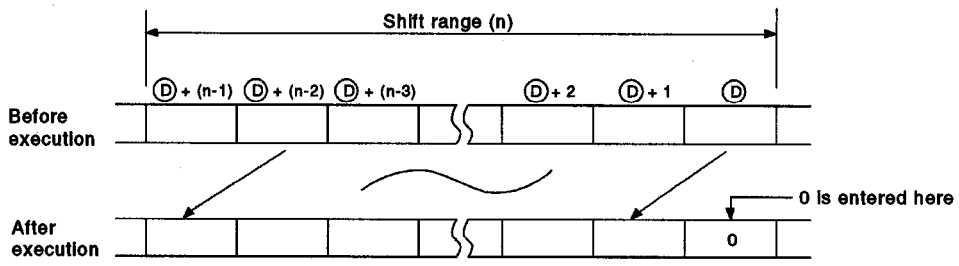
<table>
<tr><th>Number</th><th>Name</th><th>Stored Data</th><th>Explanation</th></tr>
<tr><td>D9191
to
D9192</td><td>Servo amplifier installation information</td><td>Servo amplifier installation information</td><td>• When the power is turned ON, or on resetting, the servo amplifier and option slot installation statuses are checked and the results stored in this device.
 
<table><tr><th colspan="2">Servo amplifier installation status</th></tr><tr><td>0</td><td>Not installed, or ADU fault, MR-[ ]-B power OFF, or connecting cable fault *1</td></tr><tr><td>1</td><td>Installed</td></tr></table>*1: In the case of an ADU, if the module is not installed although an axis number has been set in the system settings, a major error is displayed.</td></tr>
</table>

*: Data registers are used (see Section 3.5).

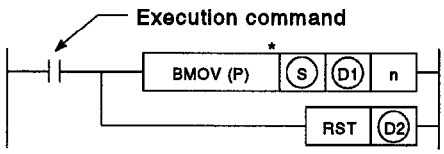
APPENDIX 4 EXAMPLE PROGRAMS

4.1 Word Data 1 Word Shift to Left

(1) A program for shifting to the left a range of devices that comprises n points and starts with a designated word device is shown here.



(2) Word data can be shifted one word to the left by using the BMOV (P) instruction and RST instruction.
The format for a program for shifting data one word to the left by using the BMOV (P) instruction and RST instruction is shown in Figure 4.1.



(1) S, D1, D2, and n are explained below.
S, D2: Head number of the devices to be shifted to the left
D1 : Number of (word device designated by S + 1) device
n : Number of shifted devices

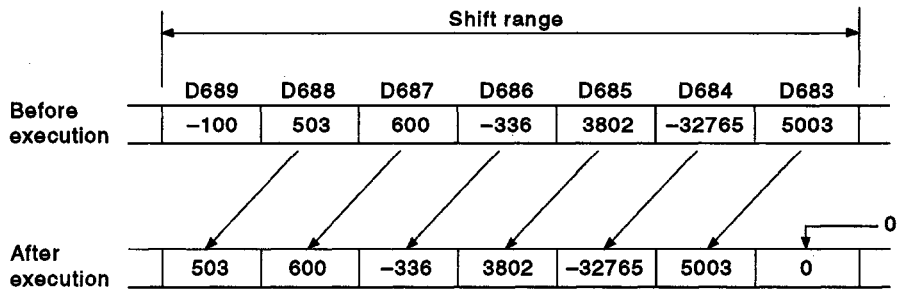
(2) *: BMOV(P) indicates the BMOV instruction and the BMOVP instruction.

Fig. 4.1 Format for Left Shift Using BMOV(P) Instruction and RST Instruction

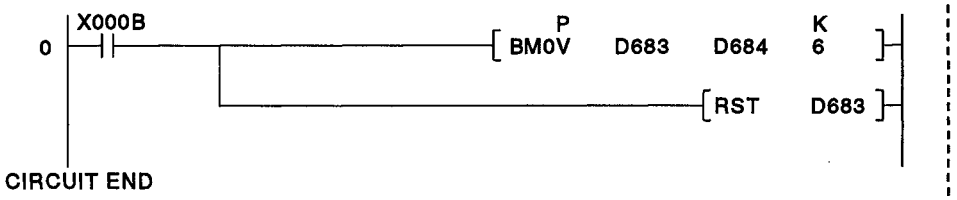
Example

(1) A program that shifts the contents of D683 to D689 one word to the left at the leading edge (OFF → ON) of XB is shown here.

[Operation]

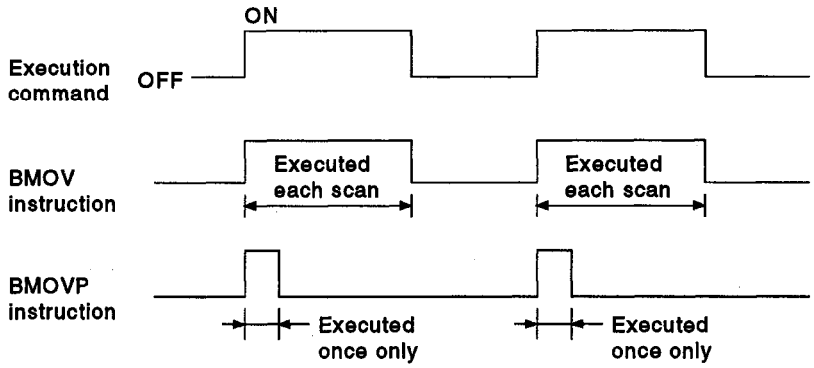


[Program Example]



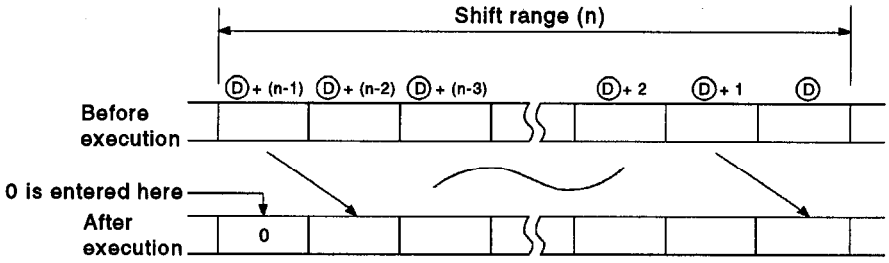
(3) Execution condition

The execution condition when the BMOV instruction and BMOVP instruction are used is as follows.

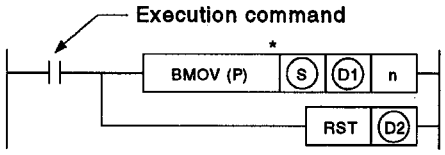


4.2 Word Data 1 Word Shift to Right

(1) A program for shifting to the right a range of devices that comprises n points and starts with a designated word device is shown here.



(2) Word data can be shifted one word to the right by using the BMOV (P) instruction and RST instruction.
The format for a program for shifting data one word to the right by using the BMOV (P) instruction and RST instruction is shown in Figure 4.2.



(1) S, D1, D2, and n are explained below.
- S : Head number of the devices to be shifted to the right
- D1 : Number of (word device designated by S + 1) device
- D2 : Final device number of word devices to be shifted to right
- n : Number of shifted devices

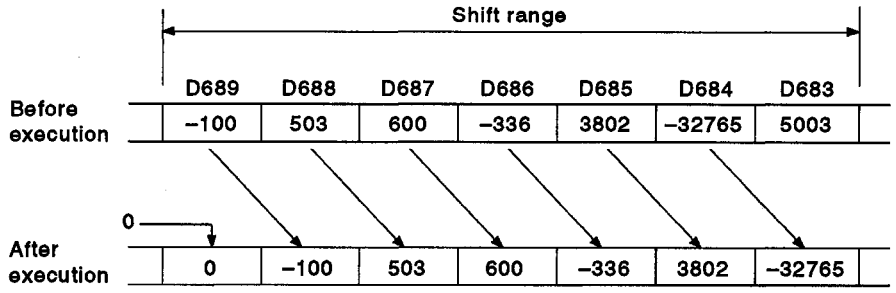
(2) *: BMOV(P) indicates the BMOV instruction and the BMOVP instruction.

Fig. 4.2 Format for Right Shift Using BMOV(P) Instruction and RST Instruction

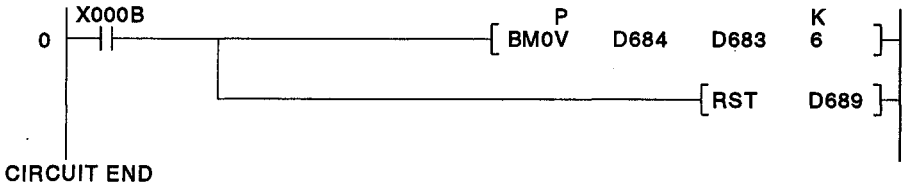
Example

(1) A program that shifts the contents of D683 to D689 one word to the right at the leading edge (OFF → ON) of XB is shown here.

[Operation]

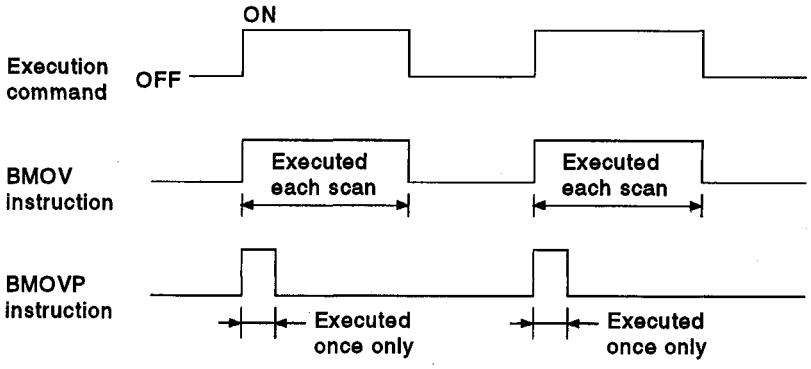


[Program Example]



(3) Execution condition

The execution condition when the BMOV instruction and BMOVP instruction are used is as follows.



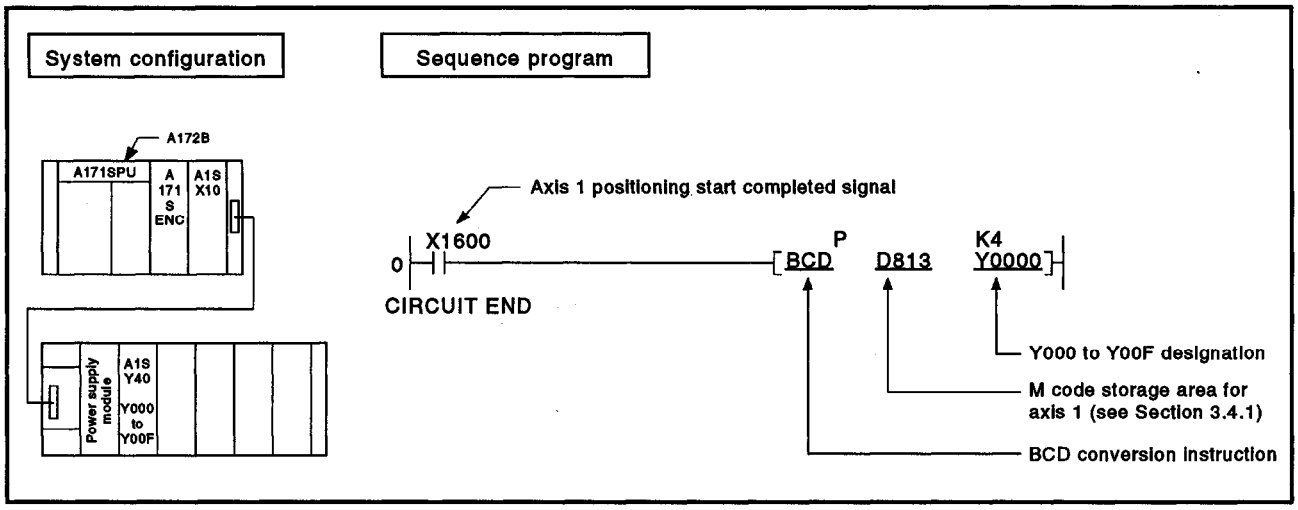
4.3 Reading M Codes

An example of a program for reading an M code on completion of positioning start or on completion of positioning is shown here.
The distinction between positioning start completion and positioning completion is made with the following signals.

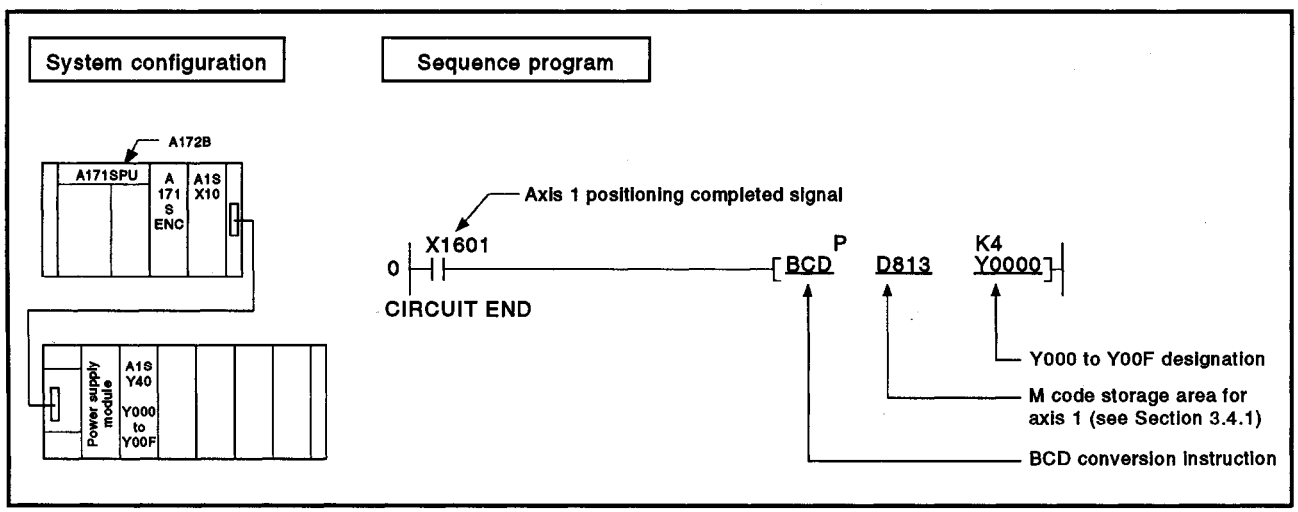
- Positioning start completed ... M1600+20n (positioning start completed signal)
- Positioning completed .....M1601+20n (positioning completed signal)

[Program Example]

(1) A program that outputs the M code for axis 1 from Y000 to Y00F to an external destination on completion of positioning start and after conversion to BCD code, is shown here.



(2) A program that outputs the M code for axis 1 from Y000 to Y00F to an external destination on completion of positioning and after conversion to BCD code, is shown here.



4.4 Error Code Reading

A program that reads the error code when an error occurs is shown here. The following signals are used to determine whether or not an error has occurred:

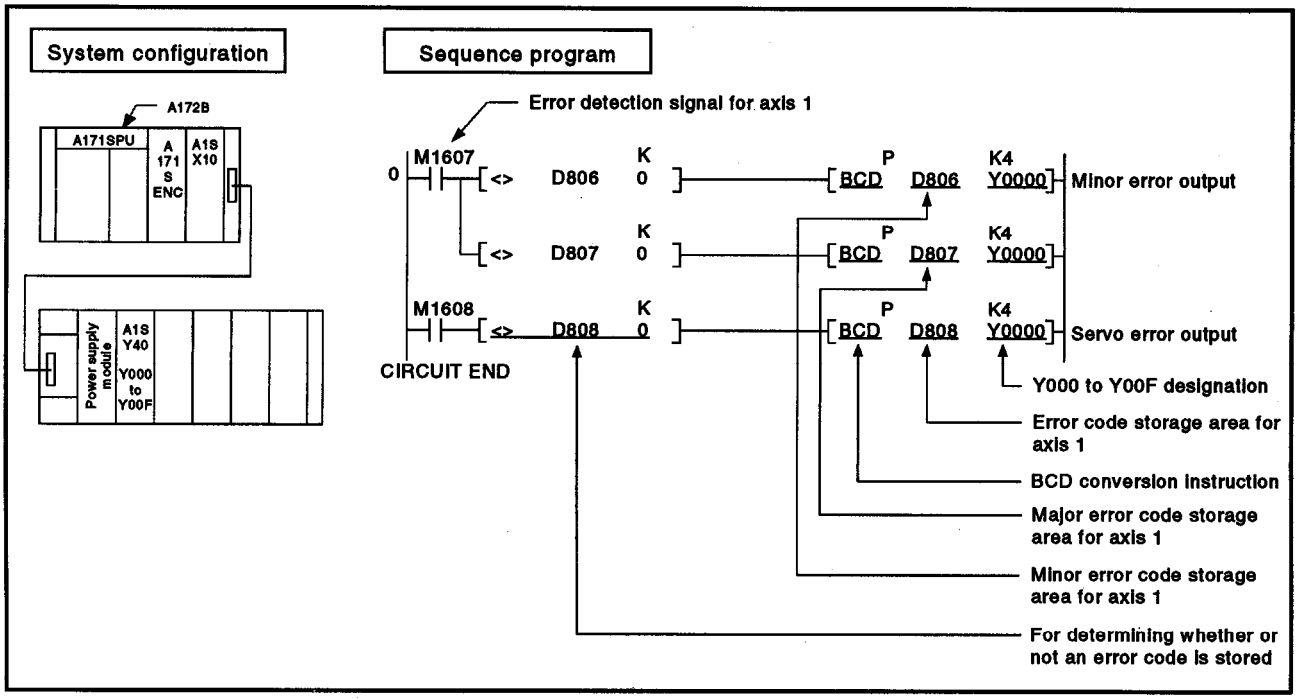
- Minor errors, major errors .....Error detection signal (M1607+20n)
- Servo errors .....Servo error detection signal (M1608+20n)

POINT

(1) The following delay occurs between the leading edge (OFF → ON) of M1607+20n/M1608+20n and storage of the error code.
   (a) If the sequence program scan time is less than 80 ms, there will be a delay of up to 80 ms.
   (b) If the sequence program scan time is longer than 80 ms, there will be a delay of up to one scan time.
   Program so that error code reading is executed after sufficient time has elapsed for error codes to be written in the various error code storage areas after M1607+20n/M1608+20n comes ON.

[Program Example]

(1) A program that converts the error code to BCD and outputs it to Y000 to Y00F when an axis 1 error occurs (minor error, major error) is shown here.



APPENDIX 5 RATED MOTOR SPEED AND NUMBER OF FEEDBACK PULSES FOR EACH SERVOMOTOR TYPE

The rated motor speed and number of feedback pulses for each servomotor type is shown in Table 5.1.

Table 5.1 Rated Motor Speed and Number of Feedback Pulses for Each Servomotor Type

Motor Model Name	Rated Motor Speed [rpm]	Number of Feedback Pulses [PLS]
HA-MH053	3000	8192
HA-MH13		
HA-MH23		
HA-MH43		
HA-MH73		
HA-FH053		
HA-FH13		
HA-FH23		
HA-FH33		
HA-FH43		
HA-FH63		
HA-SH81	1000	16384
HA-SH121		
HA-SH201		
HA-SH301		
HA-SH52	2000	
HA-SH102		
HA-SH152		
HA-SH202		
HA-SH352		
HA-SH502		
HA-SH702		
HA-SH53	3000	
HA-SH103		
HA-SH153		
HA-SH203		
HA-SH353		
HA-RH103		
HA-RH153		
HA-RH223		
HA-LH52	2000	
HA-LH102		
HA-LH152		
HA-LH202		
HA-LH302		
HA-LH502	2000	16384
HA-LH102		
HA-LH152		
HA-LH202		
HA-LH302		
HA-LH502		
HA-LH702		
HA-LH11K2	2000	
HA-LH15K2		
HA-LH22K2		
HA-UH32	2000	
HA-UH52		
HA-UH102		
HA-UH152		
HA-UH222		
HA-UH352		
HA-UH452		
HA-FF053	3000	8192
HA-FF13		
HA-FF23		
HA-FF33		
HA-FF43		
HA-FF63		
HC-MF053		
HC-MF13		
HC-MF23		
HC-MF43		
HC-MF73		
HC-SF52	2000	16384
HC-SF102		

APPENDIX 6 SIGNALS FOR POSITIONING

6.1 Internal Relays

<A171SCPU> **Table 6.1 Axis I/O Signal List**

Signal Name		Device No.				Signal Direction
		Axis 1	Axis 2	Axis 3	Axis 4	
Positioning start completed		M1600	M1620	M1640	M1660	PCPU → SCPU
Positioning completed		M1601	M1621	M1641	M1661	
In-position		M1602	M1622	M1642	M1662	
Command in-position		M1603	M1623	M1643	M1663	
Speed control in progress		M1604	M1624	M1644	M1664	
Speed/position switching latch		M1605	M1625	M1645	M1665	
Zero pass		M1606	M1626	M1646	M1666	
Error detection		M1607	M1627	M1647	M1667	
Servo error detection		M1608	M1628	M1648	M1668	
Home position return request		M1609	M1629	M1649	M1669	
Home position return completed		M1610	M1630	M1650	M1670	
External signals	FLS	M1611	M1631	M1651	M1671	
	RLS	M1612	M1632	M1652	M1672	
	STOP	M1613	M1633	M1653	M1673	
	DOG/CHANGE	M1614	M1634	M1654	M1674	
Servo READY		M1615	M1635	M1655	M1675	
Torque control in progress		M1616	M1636	M1656	M1676	
Unusable		M1617	M1637	M1657	M1677	
		M1618	M1638	M1658	M1678	
M code output in progress signal		M1619	M1639	M1659	M1679	
Stop command		M1800	M1820	M1840	M1860	SCPU → PCPU
Rapid stop command		M1801	M1821	M1841	M1861	
Forward JOG start		M1802	M1822	M1842	M1862	
Reverse JOG start		M1803	M1823	M1843	M1863	
End signal OFF command		M1804	M1824	M1844	M1864	
Speed/position switching enabled		M1805	M1825	M1845	M1865	
Limit switch output enable		M1806	M1826	M1846	M1866	
Error reset		M1807	M1827	M1847	M1867	
Servo error reset		M1808	M1828	M1848	M1868	
External STOP input valid/invalid when starting		M1809	M1829	M1849	M1869	
Unusable		M1810	M1830	M1850	M1870	
		M1811	M1831	M1851	M1871	
Feed present value update request command		M1812	M1832	M1852	M1872	
Unusable		M1813	M1833	M1853	M1873	
		M1814	M1834	M1854	M1874	
Servo OFF		M1815	M1835	M1855	M1875	
Unusable		M1816	M1836	M1856	M1876	
		M1817	M1837	M1857	M1877	
		M1818	M1838	M1858	M1878	
FIN signal		M1819	M1839	M1859	M1879	

<A273UHCPU (8 axis specification)> **Table 6.2 Axis I/O Signal List**

Signal Name		Device No.								Signal Direction
		Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	Axis 8	
Positioning start completed		X00	X10	X20	X30	X40	X50	X60	X70	PCPU → SCPU
Positioning completed		X01	X11	X21	X31	X41	X51	X61	X71	
In-position		X02	X12	X22	X32	X42	X52	X62	X72	
Command in-position		X03	X13	X23	X33	X43	X53	X63	X73	
Speed control in progress		X04	X14	X24	X34	X44	X54	X64	X74	
Speed/position switching latch		X05	X15	X25	X35	X45	X55	X65	X75	
Zero pass		X06	X16	X26	X36	X46	X56	X66	X76	
Error detection		X07	X17	X27	X37	X47	X57	X67	X77	
Servo error detection		X08	X18	X28	X38	X48	X58	X68	X78	
Home position return request		X09	X19	X29	X39	X49	X59	X69	X79	
Home position return completed		X0A	X1A	X2A	X3A	X4A	X5A	X6A	X7A	
External signals	FLS	X0B	X1B	X2B	X3B	X4B	X5B	X6B	X7B	
	RLS	X0C	X1C	X2C	X3C	X4C	X5C	X6C	X7C	
	STOP	X0D	X1D	X2D	X3D	X4D	X5D	X6D	X7D	
	DOG	X0E	X1E	X2E	X3E	X4E	X5E	X6E	X7E	
Servo READY		X0F	X1F	X2F	X3F	X4F	X5F	X6F	X7F	
M code output in progress signal		XC0	XC1	XC2	XC3	XC4	XC5	XC6	XC7	
Torque control in progress		XD0	XD1	XD1	XD3	XD4	XD5	XD6	XD7	
CHANGE signal		XD8	XD9	XDA	XDB	XDC	XDD	XDE	XDF	
Stop command		Y00	Y10	Y20	Y30	Y40	Y50	Y60	Y70	SCPU → PCPU
Rapid stop command		Y01	Y11	Y21	Y31	Y41	Y51	Y61	Y71	
Forward JOG start		Y02	Y12	Y22	Y32	Y42	Y52	Y62	Y72	
Reverse JOG start		Y03	Y13	Y23	Y33	Y43	Y53	Y63	Y73	
End signal OFF command		Y04	Y14	Y24	Y34	Y44	Y54	Y64	Y74	
Speed/position switching enabled		Y05	Y15	Y25	Y35	Y45	Y55	Y65	Y75	
Limit switch output enable		Y06	Y16	Y26	Y36	Y46	Y56	Y66	Y76	
Error reset		Y07	Y17	Y27	Y37	Y47	Y57	Y67	Y77	
Servo error reset		Y08	Y18	Y28	Y38	Y48	Y58	Y68	Y78	
External STOP input valid/invalid when starting		Y09	Y19	Y29	Y39	Y49	Y59	Y69	Y79	
Unusable		Y0A	Y1A	Y2A	Y3A	Y4A	Y5A	Y6A	Y7A	
		Y0B	Y1B	Y2B	Y3B	Y4B	Y5B	Y6B	Y7B	
Feed present value update request command		Y0C	Y1C	Y2C	Y3C	Y4C	Y5C	Y6C	Y7C	
Unusable		Y0D	Y1D	Y2D	Y3D	Y4D	Y5D	Y6D	Y7D	
		Y0E	Y1E	Y2E	Y3E	Y4E	Y5E	Y6E	Y7E	
Servo OFF		Y0F	Y1F	Y2F	Y3F	Y4F	Y5F	Y6F	Y7F	
FIN signal		YC0	YC1	YC2	YC3	YC4	YC5	YC6	YC7	

MEMO

<A273UHCPU (32 axis specification)>

Table 6.3 Axis I/O Signal List

Signal Name		Device No.						
		Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7
Positioning start completed		M2400	M2420	M2440	M2460	M2480	M2500	M2520
Positioning completed		M2401	M2421	M2441	M2461	M2481	M2501	M2521
In-position		M2402	M2422	M2442	M2462	M2482	M2502	M2522
Command in-position		M2403	M2423	M2443	M2463	M2483	M2503	M2523
Speed control in progress		M2404	M2424	M2444	M2464	M2484	M2504	M2524
Speed/position switching latch		M2405	M2425	M2445	M2465	M2485	M2505	M2525
Zero pass		M2406	M2426	M2446	M2466	M2486	M2506	M2526
Error detection		M2407	M2427	M2447	M2467	M2487	M2507	M2527
Servo error detection		M2408	M2428	M2448	M2468	M2488	M2508	M2528
Home position return request		M2409	M2429	M2449	M2469	M2489	M2509	M2529
Home position return completed		M2410	M2430	M2450	M2470	M2490	M2510	M2530
External signals	FLS	M2411	M2431	M2451	M2471	M2491	M2511	M2531
	RLS	M2412	M2432	M2452	M2472	M2492	M2512	M2532
	STOP	M2413	M2433	M2453	M2473	M2493	M2513	M2533
	DOG	M2414	M2434	M2454	M2474	M2494	M2514	M2534
Servo READY		M2415	M2435	M2455	M2475	M2495	M2515	M2535
Torque control in progress		M2416	M2436	M2456	M2476	M2496	M2516	M2536
CHANGE signal		M2417	M2437	M2457	M2477	M2497	M2517	M2537
Unusable		M2418	M2438	M2458	M2478	M2498	M2518	M2538
M code output in progress signal		M2419	M2439	M2459	M2479	M2499	M2519	M2539
Stop command		M3200	M3220	M3240	M3260	M3280	M3300	M3320
Rapid stop command		M3201	M3221	M3241	M3261	M3281	M3301	M3321
Forward JOG start		M3202	M3222	M3242	M3262	M3282	M3302	M3322
Reverse JOG start		M3203	M3223	M3243	M3263	M3283	M3303	M3323
End signal OFF command		M3204	M3224	M3244	M3264	M3284	M3304	M3324
Speed/position switching enabled		M3205	M3225	M3245	M3265	M3285	M3305	M3325
Limit switch output enable		M3206	M3226	M3246	M3266	M3286	M3306	M3326
Error reset		M3207	M3227	M3247	M3267	M3287	M3307	M3327
Servo error reset		M3208	M3228	M3248	M3268	M3288	M3308	M3328
External STOP input valid/invalid when starting		M3209	M3229	M3249	M3269	M3289	M3309	M3329
Unusable		M3210	M3230	M3250	M3270	M3290	M3310	M3330
		M3211	M3231	M3251	M3271	M3291	M3311	M3331
Feed present value update request command		M3212	M3232	M3252	M3272	M3292	M3312	M3332
Unusable		M3213	M3233	M3253	M3273	M3293	M3313	M3333
		M3214	M3234	M3254	M3274	M3294	M3314	M3334
Servo OFF		M3215	M3235	M3255	M3275	M3295	M3315	M3335
Unusable		M3216	M3236	M3256	M3276	M3296	M3316	M3336
		M3217	M3237	M3257	M3277	M3297	M3317	M3337
		M3218	M3238	M3258	M3278	M3298	M3318	M3338
FIN signal		M3219	M3239	M3259	M3279	M3299	M3319	M3339

Axis 8	Axis 9	Axis 10	Axis 11	Axis 12	Axis 13	Axis 14	Axis 15	Axis 16	Signal Direction
M2540	M2560	M2580	M2600	M2620	M2640	M2660	M2680	M2700	PCPU → SCPU
M2541	M2561	M2581	M2601	M2621	M2641	M2661	M2681	M2701	
M2542	M2562	M2582	M2602	M2622	M2642	M2662	M2682	M2702	
M2543	M2563	M2583	M2603	M2623	M2643	M2663	M2683	M2703	
M2544	M2564	M2584	M2604	M2624	M2644	M2664	M2684	M2704	
M2545	M2565	M2585	M2605	M2625	M2645	M2665	M2685	M2705	
M2546	M2566	M2586	M2606	M2626	M2646	M2666	M2686	M2706	
M2547	M2567	M2587	M2607	M2627	M2647	M2667	M2687	M2707	
M2548	M2568	M2588	M2608	M2628	M2648	M2668	M2688	M2708	
M2549	M2569	M2589	M2609	M2629	M2649	M2669	M2689	M2709	
M2550	M2570	M2590	M2610	M2630	M2650	M2670	M2690	M2710	
M2551	M2571	M2591	M2611	M2631	M2651	M2671	M2691	M2711	
M2552	M2572	M2592	M2612	M2632	M2652	M2672	M2692	M2712	
M2553	M2573	M2593	M2613	M2633	M2653	M2673	M2693	M2713	
M2554	M2574	M2594	M2614	M2634	M2654	M2674	M2694	M2714	
M2555	M2575	M2595	M2615	M2635	M2655	M2675	M2695	M2715	
M2556	M2576	M2596	M2616	M2636	M2656	M2676	M2696	M2716	
M2557	M2577	M2597	M2617	M2637	M2657	M2677	M2697	M2717	
M2558	M2578	M2598	M2618	M2638	M2658	M2678	M2698	M2718	
M2559	M2579	M2599	M2619	M2639	M2659	M2679	M2699	M2719	
M3340	M3360	M3380	M3400	M3420	M3440	M3460	M3480	M3500	SCPU → PCPU
M3341	M3361	M3381	M3401	M3421	M3441	M3461	M3481	M3501	
M3342	M3362	M3382	M3402	M3422	M3442	M3462	M3482	M3502	
M3343	M3363	M3383	M3403	M3423	M3443	M3463	M3483	M3503	
M3344	M3364	M3384	M3404	M3424	M3444	M3464	M3484	M3504	
M3345	M3365	M3385	M3405	M3425	M3445	M3465	M3485	M3505	
M3346	M3366	M3386	M3406	M3426	M3446	M3466	M3486	M3506	
M3347	M3367	M3387	M3407	M3427	M3447	M3467	M3487	M3507	
M3348	M3368	M3388	M3408	M3428	M3448	M3468	M3488	M3508	
M3349	M3369	M3389	M3409	M3429	M3449	M3469	M3489	M3509	
M3350	M3370	M3390	M3410	M3430	M3450	M3470	M3490	M3510	
M3351	M3371	M3391	M3411	M3431	M3451	M3471	M3491	M3511	
M3352	M3372	M3392	M3412	M3432	M3452	M3472	M3492	M3512	
M3353	M3373	M3393	M3413	M3433	M3453	M3473	M3493	M3513	
M3354	M3374	M3394	M3414	M3434	M3454	M3474	M3494	M3514	
M3355	M3375	M3395	M3415	M3435	M3455	M3475	M3495	M3515	
M3356	M3376	M3396	M3416	M3436	M3456	M3476	M3496	M3516	
M3357	M3377	M3397	M3417	M3437	M3457	M3477	M3497	M3517	
M3358	M3378	M3398	M3418	M3438	M3458	M3478	M3498	M3518	
M3359	M3379	M3399	M3419	M3439	M3459	M3479	M3499	M3519	

Table 6.3 Axis I/O Signal List (Continued)

Signal Name		Device No.						
		Axis 17	Axis 18	Axis 19	Axis 20	Axis 21	Axis 22	Axis 23
Positioning start completed		M2720	M2740	M2760	M2780	M2800	M2820	M2840
Positioning completed		M2721	M2741	M2761	M2781	M2801	M2821	M2841
In-position		M2722	M2742	M2762	M2782	M2802	M2822	M2842
Command in-position		M2723	M2743	M2763	M2783	M2803	M2823	M2843
Speed control in progress		M2724	M2744	M2764	M2784	M2804	M2824	M2844
Speed/position switching latch		M2725	M2745	M2765	M2785	M2805	M2825	M2845
Zero pass		M2726	M2746	M2766	M2786	M2806	M2826	M2846
Error detection		M2727	M2747	M2767	M2787	M2807	M2827	M2847
Servo error detection		M2728	M2748	M2768	M2788	M2808	M2828	M2848
Home position return request		M2729	M2749	M2769	M2789	M2809	M2829	M2849
Home position return completed		M2730	M2750	M2770	M2790	M2810	M2830	M2850
External signals	FLS	M2731	M2751	M2771	M2791	M2811	M2831	M2851
	RLS	M2732	M2752	M2772	M2792	M2812	M2832	M2852
	STOP	M2733	M2753	M2773	M2793	M2813	M2833	M2853
	DOG	M2734	M2754	M2774	M2794	M2814	M2834	M2854
Servo READY		M2735	M2755	M2775	M2795	M2815	M2835	M2855
Torque control in progress		M2736	M2756	M2776	M2796	M2816	M2836	M2856
CHANGE signal		M2737	M2757	M2777	M2797	M2817	M2837	M2857
Unusable		M2738	M2758	M2778	M2798	M2818	M2838	M2858
M code output in progress signal		M2739	M2759	M2779	M2799	M2819	M2839	M2859
Stop command		M3520	M3540	M3560	M3580	M3600	M3620	M3640
Rapid stop command		M3521	M3541	M3561	M3581	M3601	M3621	M3641
Forward JOG start		M3522	M3542	M3562	M3582	M3602	M3622	M3642
Reverse JOG start		M3523	M3543	M3563	M3583	M3603	M3623	M3643
End signal OFF command		M3524	M3544	M3564	M3584	M3604	M3624	M3644
Speed/position switching enabled		M3525	M3545	M3565	M3585	M3605	M3625	M3645
Limit switch output enable		M3526	M3546	M3566	M3586	M3606	M3626	M3646
Error reset		M3527	M3547	M3567	M3587	M3607	M3627	M3647
Servo error reset		M3528	M3548	M3568	M3588	M3608	M3628	M3648
External STOP input valid/invalid when starting		M3529	M3549	M3569	M3589	M3609	M3629	M3649
Unusable		M3530	M3550	M3570	M3590	M3610	M3630	M3650
		M3531	M3551	M3571	M3591	M3611	M3631	M3651
Feed present value update request command		M3532	M3552	M3572	M3592	M3612	M3632	M3652
Unusable		M3533	M3553	M3573	M3593	M3613	M3633	M3653
		M3534	M3554	M3574	M3594	M3614	M3634	M3654
Servo OFF		M3535	M3555	M3575	M3595	M3615	M3635	M3655
Unusable		M3536	M3556	M3576	M3596	M3616	M3636	M3656
		M3537	M3557	M3577	M3597	M3617	M3637	M3657
		M3538	M3558	M3578	M3598	M3618	M3638	M3658
FIN signal		M3539	M3559	M3579	M3599	M3619	M3639	M3659

Axis 24	Axis 25	Axis 26	Axis 27	Axis 28	Axis 29	Axis 30	Axis 31	Axis 32	Signal Direction
M2860	M2880	M2900	M2920	M2940	M2960	M2980	M3000	M3020	
M2861	M2881	M2901	M2921	M2941	M2961	M2981	M3001	M3021	
M2862	M2882	M2902	M2922	M2942	M2962	M2982	M3002	M3022	
M2863	M2883	M2903	M2923	M2943	M2963	M2983	M3003	M3023	
M2864	M2884	M2904	M2924	M2944	M2964	M2984	M3004	M3024	
M2865	M2885	M2905	M2925	M2945	M2965	M2985	M3005	M3025	
M2866	M2886	M2906	M2926	M2946	M2966	M2986	M3006	M3026	
M2867	M2887	M2907	M2927	M2947	M2967	M2987	M3007	M3027	PCPU → SCPU
M2868	M2888	M2908	M2928	M2948	M2968	M2988	M3008	M3028	
M2869	M2889	M2909	M2929	M2949	M2969	M2989	M3009	M3029	
M2870	M2890	M2910	M2930	M2950	M2970	M2990	M3010	M3030	
M2871	M2891	M2911	M2931	M2951	M2971	M2991	M3011	M3031	
M2872	M2892	M2912	M2932	M2952	M2972	M2992	M3012	M3032	
M2873	M2893	M2913	M2933	M2953	M2973	M2993	M3013	M3033	
M2874	M2894	M2914	M2934	M2954	M2974	M2994	M3014	M3034	
M2875	M2895	M2915	M2935	M2955	M2975	M2995	M3015	M3035	
M2876	M2896	M2916	M2936	M2956	M2976	M2996	M3016	M3036	
M2877	M2897	M2917	M2937	M2957	M2977	M2997	M3017	M3037	
M2878	M2898	M2918	M2938	M2958	M2978	M2998	M3018	M3038	
M2879	M2899	M2919	M2939	M2959	M2979	M2999	M3019	M3039	
M3660	M3680	M3700	M3720	M3740	M3760	M3780	M3800	M3820	
M3661	M3681	M3701	M3721	M3741	M3761	M3781	M3801	M3821	
M3662	M3682	M3702	M3722	M3742	M3762	M3782	M3802	M3822	
M3663	M3683	M3703	M3723	M3743	M3763	M3783	M3803	M3823	
M3664	M3684	M3704	M3724	M3744	M3764	M3784	M3804	M3824	
M3665	M3685	M3705	M3725	M3745	M3765	M3785	M3805	M3825	
M3666	M3686	M3706	M3726	M3746	M3766	M3786	M3806	M3826	
M3667	M3687	M3707	M3727	M3747	M3767	M3787	M3807	M3827	
M3668	M3688	M3708	M3728	M3748	M3768	M3788	M3808	M3828	SCPU → PCPU
M3669	M3689	M3709	M3729	M3749	M3769	M3789	M3809	M3829	
M3670	M3690	M3710	M3730	M3750	M3770	M3790	M3810	M3830	
M3671	M3691	M3711	M3731	M3751	M3771	M3791	M3811	M3831	
M3672	M3692	M3712	M3732	M3752	M3772	M3792	M3812	M3832	
M3673	M3693	M3713	M3733	M3753	M3773	M3793	M3813	M3833	
M3674	M3694	M3714	M3734	M3754	M3774	M3794	M3814	M3834	
M3675	M3695	M3715	M3735	M3755	M3775	M3795	M3815	M3835	
M3676	M3696	M3716	M3736	M3756	M3776	M3796	M3816	M3836	
M3677	M3697	M3717	M3737	M3757	M3777	M3797	M3817	M3837	
M3678	M3698	M3718	M3738	M3758	M3778	M3798	M3818	M3838	
M3679	M3699	M3719	M3739	M3759	M3779	M3799	M3819	M3839	

<A171SCPU> **Table 6.4 Internal Relay List**

Device Number	Signal Name	Signal Direction
M2000	PC READY flag	SCPU → PCPU
M2001	Axis 1 start accept flag	PCPU → SCPU
M2002	Axis 2 start accept flag	
M2003	Axis 3 start accept flag	
M2004	Axis 4 start accept flag	
M2005 to M2008	Unusable	—
M2009	All-axis servo start accept flag	PCPU → SCPU
M2010 to M2011	Unusable	—
M2012	Manual pulse generator enable flag	SCPU → PCPU
M2013	Unusable	—
M2014		
M2015	JOG simultaneous start command	SCPU → PCPU
M2016	When using SV13: Speed switching point designation flag	
	When using SV22: Unusable	—
M2017 to M2019	Unusable	
M2020	Start buffer full	PCPU → SCPU
M2021	Axis 1 speed change flag	
M2022	Axis 2 speed change flag	
M2023	Axis 3 speed change flag	
M2024	Axis 4 speed change flag	
M2025 to M2039	Unusable	—
M2040	When using SV13: Unusable	
	When using SV22: Speed switching point designation flag	SCPU → PCPU
M2041	System setting error flag	PCPU → SCPU
M2042	All axes servo start command	SCPU → PCPU
M2043 to M2046	Unusable	—
M2047	Optional slot module error detection flag	PCPU → SCPU

<A273UHCPU
(8-axis specification)> **Table 6.5 Internal Relay List**

Device Number	Signal Name	Signal Direction
M2000	PC READY flag	SCPU → PCPU
M2001	Axis 1 start accept flag	PCPU → SCPU
M2002	Axis 2 start accept flag	
M2003	Axis 3 start accept flag	
M2004	Axis 4 start accept flag	
M2005	Axis 5 start accept flag	
M2006	Axis 6 start accept flag	
M2007	Axis 7 start accept flag	
M2008	Axis 8 start accept flag	
M2009	All-axis servo start accept flag	
M2010 to M2011	Unusable	—
M2012	Manual pulse generator 1 enable flag	SCPU → PCPU
M2013	Manual pulse generator 2 enable flag	
M2014	Manual pulse generator 3 enable flag	
M2015	JOG simultaneous start command	
M2016	When using SV13: Speed switching point designation flag	
	When using SV22: Unusable	—
M2017 to M2019	Unusable	
M2020	Start buffer full	PCPU → SCPU
M2021	Axis 1 speed change flag	
M2022	Axis 2 speed change flag	
M2023	Axis 3 speed change flag	
M2024	Axis 4 speed change flag	
M2025	Axis 5 speed change flag	
M2026	Axis 6 speed change flag	
M2027	Axis 7 speed change flag	
M2028	Axis 8 speed change flag	
M2029 to M2039	Unusable	—
M2040	When using SV13: Unusable	
	When using SV22: Speed switching point designation flag	SCPU → PCPU
M2041	System setting error flag	PCPU → SCPU
M2042	All axes servo start command	SCPU → PCPU
M2043 to M2046	Unusable	—
M2047	Motion slot module error detection flag	PCPU → SCPU

<A273UHCPU
(32-axis specification)>

Table 6.6 Internal Relay List

Device No.	Signal Name	Signal Direction	Device No.	Signal Name	Signal Direction
M2000	PC READY flag	PCPU → SCPU	M2061	Axis 1 speed change flag	PCPU → SCPU
M2001	Axis 1 start accept flag		M2062	Axis 2 speed change flag	
M2002	Axis 2 start accept flag		M2063	Axis 3 speed change flag	
M2003	Axis 3 start accept flag		M2064	Axis 4 speed change flag	
M2004	Axis 4 start accept flag		M2065	Axis 5 speed change flag	
M2005	Axis 5 start accept flag		M2066	Axis 6 speed change flag	
M2006	Axis 6 start accept flag		M2067	Axis 7 speed change flag	
M2007	Axis 7 start accept flag		M2068	Axis 8 speed change flag	
M2008	Axis 8 start accept flag		M2069	Axis 9 speed change flag	
M2009	Axis 9 start accept flag		M2070	Axis 10 speed change flag	
M2010	Axis 10 start accept flag		M2071	Axis 11 speed change flag	
M2011	Axis 11 start accept flag		M2072	Axis 12 speed change flag	
M2012	Axis 12 start accept flag		M2073	Axis 13 speed change flag	
M2013	Axis 13 start accept flag		M2074	Axis 14 speed change flag	
M2014	Axis 14 start accept flag		M2075	Axis 15 speed change flag	
M2015	Axis 15 start accept flag		M2076	Axis 16 speed change flag	
M2016	Axis 16 start accept flag		M2077	Axis 17 speed change flag	
M2017	Axis 17 start accept flag		M2078	Axis 18 speed change flag	
M2018	Axis 18 start accept flag		M2079	Axis 19 speed change flag	
M2019	Axis 19 start accept flag		M2080	Axis 20 speed change flag	
M2020	Axis 20 start accept flag		M2081	Axis 21 speed change flag	
M2021	Axis 21 start accept flag		M2082	Axis 22 speed change flag	
M2022	Axis 22 start accept flag		M2083	Axis 23 speed change flag	
M2023	Axis 23 start accept flag		M2084	Axis 24 speed change flag	
M2024	Axis 24 start accept flag		M2085	Axis 25 speed change flag	
M2025	Axis 25 start accept flag		M2086	Axis 26 speed change flag	
M2026	Axis 26 start accept flag		M2087	Axis 27 speed change flag	
M2027	Axis 27 start accept flag		M2088	Axis 28 speed change flag	
M2028	Axis 28 start accept flag		M2089	Axis 29 speed change flag	
M2029	Axis 29 start accept flag		M2090	Axis 30 speed change flag	
M2030	Axis 30 start accept flag		M2091	Axis 31 speed change flag	
M2031	Axis 31 start accept flag		M2092	Axis 32 speed change flag	
M2032	Axis 32 start accept flag		M2093 to M2127	Unusable	—
M2033 to M2039	Unusable	—	M2128	Axis 1 automatic deceleration flag	PCPU → SCPU
M2040	Speed switching point designation flag	SCPU → PCPU	M2129	Axis 2 automatic deceleration flag	
			M2130	Axis 3 automatic deceleration flag	
M2041	System setting error flag	PCPU → SCPU	M2131	Axis 4 automatic deceleration flag	
M2042	All axes servo start flag	SCPU → PCPU	M2132	Axis 5 automatic deceleration flag	
M2043 to M2046	Unusable	—	M2133	Axis 6 automatic deceleration flag	
			M2134	Axis 7 automatic deceleration flag	
			M2135	Axis 8 automatic deceleration flag	
M2047	Motion slot module error detection flag	PCPU → SCPU	M2136	Axis 9 automatic deceleration flag	
			M2137	Axis 10 automatic deceleration flag	
M2048	JOG simultaneous start command	SCPU → PCPU	M2138	Axis 11 automatic deceleration flag	
M2049	All axis servo start accept flag	PCPU → SCPU	M2139	Axis 12 automatic deceleration flag	
M2050	Start buffer full		M2140	Axis 13 automatic deceleration flag	
M2051	Manual pulse generator 1 enable flag	SCPU → PCPU	M2141	Axis 14 automatic deceleration flag	
			M2142	Axis 15 automatic deceleration flag	
M2052	Manual pulse generator 2 enable flag		M2143	Axis 16 automatic deceleration flag	
			M2144	Axis 17 automatic deceleration flag	
M2053	Manual pulse generator 3 enable flag		M2145	Axis 18 automatic deceleration flag	
			M2146	Axis 19 automatic deceleration flag	
M2054 to M2060	Unusable	—	M2147	Axis 20 automatic deceleration flag	
			M2148	Axis 21 automatic deceleration flag	
			M2149	Axis 22 automatic deceleration flag	

Table 6.6 Internal Relay List (Continued)

Device No.	Signal Name	Signal Direction
M2150	Axis 23 automatic deceleration flag	PCPU → SCPU
M2151	Axis 24 automatic deceleration flag	
M2152	Axis 25 automatic deceleration flag	
M2153	Axis 26 automatic deceleration flag	
M2154	Axis 27 automatic deceleration flag	
M2155	Axis 28 automatic deceleration flag	
M2156	Axis 29 automatic deceleration flag	
M2157	Axis 30 automatic deceleration flag	
M2158	Axis 31 automatic deceleration flag	
M2159	Axis 32 automatic deceleration flag	
M2160 to M2239	Unusable	—
M2240	Axis 1 speed change "0" accept flag	PCPU → SCPU
M2241	Axis 2 speed change "0" accept flag	
M2242	Axis 3 speed change "0" accept flag	
M2243	Axis 4 speed change "0" accept flag	
M2244	Axis 5 speed change "0" accept flag	
M2245	Axis 6 speed change "0" accept flag	
M2246	Axis 7 speed change "0" accept flag	
M2247	Axis 8 speed change "0" accept flag	
M2248	Axis 9 speed change "0" accept flag	
M2249	Axis 10 speed change "0" accept flag	
M2250	Axis 11 speed change "0" accept flag	
M2251	Axis 12 speed change "0" accept flag	
M2252	Axis 13 speed change "0" accept flag	
M2253	Axis 14 speed change "0" accept flag	
M2254	Axis 15 speed change "0" accept flag	PCPU → SCPU
M2255	Axis 16 speed change "0" accept flag	
M2256	Axis 17 speed change "0" accept flag	
M2257	Axis 18 speed change "0" accept flag	
M2258	Axis 19 speed change "0" accept flag	
M2259	Axis 20 speed change "0" accept flag	
M2260	Axis 21 speed change "0" accept flag	
M2261	Axis 22 speed change "0" accept flag	
M2262	Axis 23 speed change "0" accept flag	
M2263	Axis 24 speed change "0" accept flag	
M2264	Axis 25 speed change "0" accept flag	
M2265	Axis 26 speed change "0" accept flag	
M2266	Axis 27 speed change "0" accept flag	
M2267	Axis 28 speed change "0" accept flag	
M2268	Axis 29 speed change "0" accept flag	
M2269	Axis 30 speed change "0" accept flag	
M2270	Axis 31 speed change "0" accept flag	
M2271	Axis 32 speed change "0" accept flag	
M2272 to M2319	Unusable	—

<A171SCPU/A273UHCPU (8/32-axis specification)>

Table 6.7 Special Relay List

Device No.	Signal Name	Signal Direction
M9073	WDT error flag	PCPU → SCPU
M9074	PCPU READY-completed flag	
M9075	In-test-mode flag	
M9076	External emergency stop input flag	
M9077	Manual pulse generator axis setting error flag	
M9078	Test mode request error flag	
M9079	Servo program setting error flag	

6.2 Data Registers (D)

<A171SCPU>

Table 6.8 Data Register List

Device No.	Signal Name	Device No.	Signal Name
D800 to D819	Axis 1 monitoring data First data register number 0 Feed present value (L) 1 (H) 2 Actual present value (L) 3 (H) 4 Deviation counter value (L) 5 (H) 6 Minor error code 7 Major error code 8 Servo error code 9 Travel value when the near-zero point dog is ON (L) 10 (H) 11 Home position return second travel value 12 Executed program number 13 M code 14 Torque limit value 15 Travel value change register (L) 16 (H) 17 Actual present value when STOP is input (L) 18 (H) 19 For constant speed control	D1012	Setting register for axis number controlled with manual pulse generator
D820 to D839	Axis 2 monitoring data	D1013 to D1014	Unusable
D840 to D859	Axis 3 monitoring data	D1015	JOG operation simultaneous start axis setting register
D860 to D879	Axis 4 monitoring data	D1016	1 pulse input magnification setting register of manual pulse generator for axis 1
D880 to D959	Unusable	D1017	1 pulse input magnification setting register of manual pulse generator for axis 2
D960 to D965	Axis 1 control change data storage area First data register number 0 Present value change register (L) 1 (H) 2 Speed change register (L) 3 (H) 4 JOG speed setting register (L) 5 (H)	D1018	1 pulse input magnification setting register of manual pulse generator for axis 3
D966 to D971	Axis 2 control change data storage area	D1019	1 pulse input magnification setting register of manual pulse generator for axis 4
D972 to D977	Axis 3 control change data storage area	D1020 to D1023	Unusable
D978 to D983	Axis 4 control change data storage area		
D984 to D1007	Unusable		
D1008 to D1009	Limit switch output disable setting		
D1010 to D1011	Unusable		

<A273UHCPU
(8-axis specification)>

Table 6.9 Data Register List

Device No.	Signal Name	Device No.	Signal Name
D800 to D819	Axis 1 monitoring data	D1012	Setting register for axis number controlled with manual pulse generator 1
D820 to D839	Axis 2 monitoring data	D1013	Setting register for axis number controlled with manual pulse generator 2
D840 to D859	Axis 3 monitoring data	D1014	Setting register for axis number controlled with manual pulse generator 3
D860 to D879	Axis 4 monitoring data	D1015	JOG operation simultaneous start axis setting register
D880 to D899	Axis 5 monitoring data	D1016	1 pulse input magnification setting register of manual pulse generator for axis 1
D900 to D919	Axis 6 monitoring data	D1017	1 pulse input magnification setting register of manual pulse generator for axis 2
D920 to D939	Axis 7 monitoring data	D1018	1 pulse input magnification setting register of manual pulse generator for axis 3
D940 to D959	Axis 8 monitoring data	D1019	1 pulse input magnification setting register of manual pulse generator for axis 4
D960 to D965	Axis 1 control change data storage area	D1020	1 pulse input magnification setting register of manual pulse generator for axis 5
D966 to D971	Axis 2 control change data storage area	D1021	1 pulse input magnification setting register of manual pulse generator for axis 6
D972 to D977	Axis 3 control change data storage area	D1022	1 pulse input magnification setting register of manual pulse generator for axis 7
D978 to D983	Axis 4 control change data storage area	D1023	1 pulse input magnification setting register of manual pulse generator for axis 8
D984 to D989	Axis 5 control change data storage area		
D990 to D995	Axis 6 control change data storage area		
D996 to D1001	Axis 7 control change data storage area		
D1002 to D1007	Axis 8 control change data storage area		
D1008 to D1011	Limit switch output disable setting		

First data register number

0	Feed present value	L
1		H
2	Actual present value	L
3		H
4	Deviation counter value	L
5		H
6	Minor error code	
7	Major error code	
8	Servo error code	
9	Travel value when the near-zero point dog is ON	L
10		H
11	Home position return second travel value	
12	Executed program number	
13	M code	
14	Torque limit value	
15	Travel value change register	L
16		H
17	Actual present value when STOP is input	L
18		H
19	For constant speed control	

First data register number

0	Present value change register	L
1		H
2	Speed change register	L
3		H
4	JOG speed setting register	L
5		H

<A273UHCPU
(32-axis specification)> **Table 6.10 Data Register List**

Device No.	Signal Name	Device No.	Signal Name	Data Register Names
D0 to D19	Axis 1 monitoring data	D320 to D339	Axis 17 monitoring data	
D20 to D39	Axis 2 monitoring data	D340 to D359	Axis 18 monitoring data	
D40 to D59	Axis 3 monitoring data	D360 to D379	Axis 19 monitoring data	
D60 to D79	Axis 4 monitoring data	D380 to D399	Axis 20 monitoring data	
D80 to D99	Axis 5 monitoring data	D400 to D419	Axis 21 monitoring data	
D100 to D119	Axis 6 monitoring data	D420 to D439	Axis 22 monitoring data	
D120 to D139	Axis 7 monitoring data	D440 to D459	Axis 23 monitoring data	First data register number 0 Feed present value L 1 H 2 Actual present value L 3 H 4 Deviation counter value L 5 H 6 Minor error code 7 Major error code 8 Servo error code 9 Home position return second travel value 10 Travel value when the near-zero point dog is ON L 11 H 12 Executed program number 13 M code 14 Torque limit value 15 For constant speed control 16 Travel value change register L 17 H 18 Actual present value when STOP is input L 19 H
D140 to D159	Axis 8 monitoring data	D460 to D479	Axis 24 monitoring data	
D160 to D179	Axis 9 monitoring data	D480 to D499	Axis 25 monitoring data	
D180 to D199	Axis 10 monitoring data	D500 to D519	Axis 26 monitoring data	
D200 to D219	Axis 11 monitoring data	D520 to D539	Axis 27 monitoring data	
D220 to D239	Axis 12 monitoring data	D540 to D559	Axis 28 monitoring data	
D240 to D259	Axis 13 monitoring data	D560 to D579	Axis 29 monitoring data	
D260 to D279	Axis 14 monitoring data	D580 to D599	Axis 30 monitoring data	
D280 to D299	Axis 15 monitoring data	D600 to D619	Axis 31 monitoring data	
D300 to D319	Axis 16 monitoring data	D620 to D639	Axis 32 monitoring data	

<A273UHCPU
(32-axis specification)> **Table 6.10 Data Register List (Continued)**

Device No.	Signal Name	Device No.	Signal Name	Data Register Names
D640 D641	Axis 1 JOG speed data storage area	D672 D673	Axis 17 JOG speed data storage area	
D642 D643	Axis 2 JOG speed data storage area	D674 D675	Axis 18 JOG speed data storage area	
D644 D645	Axis 3 JOG speed data storage area	D676 D677	Axis 19 JOG speed data storage area	
D646 D647	Axis 4 JOG speed data storage area	D678 D679	Axis 20 JOG speed data storage area	
D648 D649	Axis 5 JOG speed data storage area	D680 D681	Axis 21 JOG speed data storage area	
D650 D651	Axis 6 JOG speed data storage area	D682 D683	Axis 22 JOG speed data storage area	
D652 D653	Axis 7 JOG speed data storage area	D684 D685	Axis 23 JOG speed data storage area	First data register number 0 — JOG speed setting register L 1 — H
D654 D655	Axis 8 JOG speed data storage area	D686 D687	Axis 24 JOG speed data storage area	
D656 D657	Axis 9 JOG speed data storage area	D688 D689	Axis 25 JOG speed data storage area	
D658 D659	Axis 10 JOG speed data storage area	D690 D691	Axis 26 JOG speed data storage area	
D660 D661	Axis 11 JOG speed data storage area	D692 D693	Axis 27 JOG speed data storage area	
D662 D663	Axis 12 JOG speed data storage area	D694 D695	Axis 28 JOG speed data storage area	
D664 D665	Axis 13 JOG speed data storage area	D696 D697	Axis 29 JOG speed data storage area	
D666 D667	Axis 14 JOG speed data storage area	D698 D699	Axis 30 JOG speed data storage area	
D668 D669	Axis 15 JOG speed data storage area	D700 D701	Axis 31 JOG speed data storage area	
D670 D671	Axis 16 JOG speed data storage area	D702 D703	Axis 32 JOG speed data storage area	

<A273UHCPU
(32-axis specification)> **Table 6.10 Data Register List (Continued)**

Device No.	Signal Name	Device No.	Signal Name
D704 to D709	Unusable	D737	1 pulse input magnification setting register of manual pulse generator for axis 18
D710 to D713	JOG operation simultaneous start axis setting register	D738	1 pulse input magnification setting register of manual pulse generator for axis 19
D714 D715	Setting register for axis number controlled with manual pulse generator 1	D739	1 pulse input magnification setting register of manual pulse generator for axis 20
D716 D717	Setting register for axis number controlled with manual pulse generator 2	D740	1 pulse input magnification setting register of manual pulse generator for axis 21
D718 D719	Setting register for axis number controlled with manual pulse generator 3	D741	1 pulse input magnification setting register of manual pulse generator for axis 22
D720	1 pulse input magnification setting register of manual pulse generator for axis 1	D742	1 pulse input magnification setting register of manual pulse generator for axis 23
D721	1 pulse input magnification setting register of manual pulse generator for axis 2	D743	1 pulse input magnification setting register of manual pulse generator for axis 24
D722	1 pulse input magnification setting register of manual pulse generator for axis 3	D744	1 pulse input magnification setting register of manual pulse generator for axis 25
D723	1 pulse input magnification setting register of manual pulse generator for axis 4	D745	1 pulse input magnification setting register of manual pulse generator for axis 26
D724	1 pulse input magnification setting register of manual pulse generator for axis 5	D746	1 pulse input magnification setting register of manual pulse generator for axis 27
D725	1 pulse input magnification setting register of manual pulse generator for axis 6	D747	1 pulse input magnification setting register of manual pulse generator for axis 28
D726	1 pulse input magnification setting register of manual pulse generator for axis 7	D748	1 pulse input magnification setting register of manual pulse generator for axis 29
D727	1 pulse input magnification setting register of manual pulse generator for axis 8	D749	1 pulse input magnification setting register of manual pulse generator for axis 30
D728	1 pulse input magnification setting register of manual pulse generator for axis 9	D750	1 pulse input magnification setting register of manual pulse generator for axis 31
D729	1 pulse input magnification setting register of manual pulse generator for axis 10	D751	1 pulse input magnification setting register of manual pulse generator for axis 32
D730	1 pulse input magnification setting register of manual pulse generator for axis 11	D752*	Manual pulse generator 1 (P1) smoothing magnification setting area
D731	1 pulse input magnification setting register of manual pulse generator for axis 12	D753*	Manual pulse generator 2 (P2) smoothing magnification setting area
D732	1 pulse input magnification setting register of manual pulse generator for axis 13	D754*	Manual pulse generator 3 (P3) smoothing magnification setting area
D733	1 pulse input magnification setting register of manual pulse generator for axis 14	D756 to D759	Unusable
D734	1 pulse input magnification setting register of manual pulse generator for axis 15	D760 to D775	Limit switch output disable setting
D735	1 pulse input magnification setting register of manual pulse generator for axis 16	D776 to D791	Limit switch output status storage area
D736	1 pulse input magnification setting register of manual pulse generator for axis 17	D792 to D799	Servo amplifier type

*: Treated as a special register. For details, see Section 3.5.

<A171SCPU> **Table 6.11 Special Register List**

Device Number	Signal Name
D9180	Limit switch output status storage area for axis 1 and axis 2
D9181	Limit switch output status storage area for axis 3 and axis 4
D9182	Unusable
D9183	
D9184	PCPU error cause
D9185	Servo amplifier type
D9186	
D9187	Manual pulse generator axis setting error
D9188	Test mode request error
D9189	Error program number
D9190	Error item information
D9191	Servo amplifier loading information
D9192	Area for setting the manual pulse generator smoothing magnification
D9193	Unusable
D9194	
D9195 to D9199	Unusable

<A273UHCPU (8-axis specification)> **Table 6.12 Special Register List**

Device Number	Signal Name
D9180	Limit switch output status storage area for axis 1 and axis 2
D9181	Limit switch output status storage area for axis 3 and axis 4
D9182	Limit switch output status storage area for axis 5 and axis 6
D9183	Limit switch output status storage area for axis 7 and axis 8
D9184	PCPU error cause
D9185	Servo amplifier type
D9186	
D9187	Manual pulse generator axis setting error
D9188	Test mode request error
D9189	Error program number
D9190	Error item information
D9191	Servo amplifier loading information
D9192	Area for setting the manual pulse generator (P1) smoothing magnification
D9193	Area for setting the manual pulse generator (P2) smoothing magnification
D9194	Area for setting the manual pulse generator (P3) smoothing magnification
D9195 to D9199	Unusable

<A273UHCPU
(32-axis specification)> **Table 6.13 Special Register List**

Device Number	Signal Name
D752*	Area for setting the manual pulse generator (P1) smoothing magnification
D753*	Area for setting the manual pulse generator (P2) smoothing magnification
D754*	Area for setting the manual pulse generator (P3) smoothing magnification
D776 to D791	Limit switch output status storage area
D792 to D799	Servo amplifier type
D9180 to D9181	Unusable
D9182 to D9183	Test mode request error
D9184	PCPU error cause
D9185 to D9187	Manual pulse generator setting error
D9188	Unusable
D9189	Error program number
D9190	Error item information
D9191 to D9192	Servo amplifier loading information
D9193 to D9199	Unusable

*: Data registers used (See Section 3.5)

APPENDIX 7 PROCESSING TIMES

The processing times for each signal and each instruction when performing positioning control with a servo system CPU are indicated here.

(1) Operation cycle for each servo system CPU
The processing times for performing positioning control operation with each servo system CPU are indicated below.

	A171SCPU		A273UHCPU		
Set number of axes	1 to 3	4	1 to 12	13 to 24	25 to 32
Operation cycle	3.5 ms	7.1 ms	3.5 ms	7.1 ms	14.2 ms

(2) PCPU processing cycle
The processing time at the PCPU after detection of the start request signal and PC ready (M2000) signal ON is indicated below.

	A171SCPU	A273UHCPU (8-axis specification)		A273UHCPU			
Number of axes used	4 axes	4 axes	8 axes	4 axes	8 axes	16 axes	32 axes
Servo program processing time	7 to 14 ms*1	4 to 11 ms		4 to 11 ms		10 to 18 ms	14 to 21 ms
Speed change response time	7 to 14 ms	0 to 4 ms		0 to 4 ms		0 to 8 ms	0 to 14 ms
PC ready (M2000) ON→ PCPU ready completed flag (M9074) ON	100 to 300 ms	80 to 100 ms		8 to 100 ms		90 to 400 ms	100 to 800 ms
Simultaneous start processing time	7 to 17 ms*2	7 to 17 ms		7 to 17 ms		10 to 24 ms	14 to 28 ms

*1 : For FEED, VPF, and VPR, this differs greatly according to the conditions. If the other axes are stopped it is 14 to 28 ms.
*2 : The range of 7 to 17 ms should be regarded as a guide only.

(3) Common devices

The processing times for the common devices for each axis in positioning control are indicated below. For each signal whose direction of transmission is "PCPU → SCPU", the cycle for notification from the PCPU to the SCPU is indicated. For signals whose direction of transmission is "SCPU → PCPU", the cycle for notification from the SCPU to the PCPU, or the cycle for detection at the PCPU, is indicated.

Signal Name	Device No.			Signal Direction	A171SCPU		A273UHCPU			
							8-axis Specification	32-axis Specification		
	A171SCPU	A273UHCPU (8-axis specification)	A273UHCPU (32-axis specification)		Set Number of Axes		Set Number of Axes	Set Number of Axes		
					1 to 3	4	1 to 8	1 to 12	13 to 24	25 to 32
Axis start accept flags	M2001 to M2004	M2001 to M2008	M2001 to M2032	PCPU→ SCPU	10 ms	10 ms	10 ms	10 ms	10 ms	10 ms
All-axis servo start accept flag	M2009	M2009	M2049		10 ms	10 ms	10 ms	END *1	END *1	END *1
Axis speed change flags	M2021 to M2024	M2021 to M2028	M2061to M2092		END *1	END *1	END *1	END *1	END *1	END *1
System setting error flag	M2041	M2041	M2041		END *1	END *1	END *1	END *1	END *1	END *1
Optional slot module error detection flag	M2047	M2047	M2047		END *1	END *1	END *1	END *1	END *1	END *1
Automatic deceleration flags	—	—	M2128 to M2159		—	—	—	3.5 ms	7.1 ms	14.2 ms
Speed change "0" accept flags	—	—	M2240 to M2271		—	—	—	3.5 ms	7.1 ms	14.2 ms
Limit switch output status storage areas	D9180 to D9181	D9180 to D9183	D776 to D791		3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Areas for setting the manual pulse generator smoothing magnifications	D9192	D9192 to D9194	D752 to D754	SCPU→ PCPU	At leading edge of manual pulse generator enable signal	At leading edge of manual pulse generator enable signal	At leading edge of manual pulse generator enable signal	At leading edge of manual pulse generator enable signal	At leading edge of manual pulse generator enable signal	At leading edge of manual pulse generator enable signal
Limit switch output enable/ disable setting	D1008 to D1009	D1008 to D1011	D760 to D775		3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Manual pulse generator axis setting	D1012	D1012 to D1014	D714 to D719		At leading edge of manual pulse generator enable signal	At leading edge of manual pulse generator enable signal	At leading edge of manual pulse generator enable signal	At leading edge of manual pulse generator enable signal	At leading edge of manual pulse generator enable signal	At leading edge of manual pulse generator enable signal
JOG operation simultaneous start axis setting	D1015	D1015	D710 to D713		At start	At start	At start	At start	At start	At start
Manual pulse generator 1 pulse input magnification	D1016 to D1019	D1016 to D1023	D720 to D751		At leading edge of manual pulse generator enable signal	At leading edge of manual pulse generator enable signal	At leading edge of manual pulse generator enable signal	At leading edge of manual pulse generator enable signal	At leading edge of manual pulse generator enable signal	At leading edge of manual pulse generator enable signal
Present value change register	D960 to D1007	D960 to D1007	—		When DSFLP instruction is executed	When DSFLP instruction is executed	When DSFLP instruction is executed	—	—	—
Speed change register			—		When DSFLP instruction is executed	When DSFLP instruction is executed	When DSFLP instruction is executed	—	—	—
JOG speed setting register			D640 to D703		At start	At start	At start	At start	At start	At start

END *1 : With A171SCPU : "80 ms" or "PC program scan time", whichever is longer
With A273UHCPU : "50 ms" or PC program scan time, whichever is longer

(4) Devices specific to each axis

The processing times for the devices for each axis in positioning control are indicated below. For each signal whose direction of transmission is "PCPU → SCPU", the cycle for notification from the PCPU to the SCPU is indicated. For signals whose direction of transmission is "SCPU → PCPU", the cycle for notification from the SCPU to the PCPU, or the cycle for detection at the PCPU, is indicated.

Signal Name	Device No.			Signal Direction	A171SCPU		A273UHCPU			
							8-axis Specification	32-axis Specification		
	A171SCPU	A273UHCPU (8-axis specification)	A273UHCPU (32-axis specification)		Set Number of Axes		Set Number of Axes	Set Number of Axes		
					1 to 3	4	1 to 8	1 to 12	13 to 24	25 to 32
Positioning start completed	M1600 to M1759	X000 to X0FF	M2400 to M3039	PCPU→ SCPU	3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Positioning completed					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
In-position					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Command in-position					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Speed control in progress					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Speed/position switching latch					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Zero pass					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Error detection					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Servo error detection					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Home position return request					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Home position return completed					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Servo ON/OFF status					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Torque control in progress					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Stop command	M1400 to M1559	Y000 to Y070	M3200 to M3839	SCPU→ PCPU	3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Rapid stop command					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Speed/position switching enabled					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Limit switch output enable					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
External STOP input/invalid at start					At start	At start	At start	At start	At start	At start
Feed present value update request command					At start	At start	At start	At start	At start	At start
Servo OFF					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Feed present value	D800 to D959	D800 to D959	D0 to D639	PCPU→ SCPU	END*1	END*1	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Actual present value					END*1	END*1	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Deviation counter value					END*1	END*1	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Home position return second travel value					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Travel value after near-zero-point dog ON					END*1	END*1	END*1	END*1	END*1	END*1
Executed program No.					At start	At start	At start	At start	At start	At start
M code					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Torque limit value					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Travel value change register					3.5 ms	7.1 ms	3.5 ms	3.5 ms	7.1 ms	14.2 ms
Actual present value when STOP is input					END*1	END*1	END*1	END*1	END*1	END*1

END *1 : With A171SCPU : "80 ms" or "PC program scan time", whichever is longer
With A273UHCPU : "50 ms" or PC program scan time, whichever is longer

(5) Processing time for DSFRP/SVST instructions, DSFLP instruction, END instruction

The processing times for each instruction used in sequence programs used for e.g. positioning control start are indicated below. For the processing times of sequence program instructions other than the ones indicated below, refer to the ACPU Programming Manual (Common Instructions) IB-66250.

A171SCPU ..... Same as the processing time for A1SCPU
A273UHCPU ..... Same as the processing time for A3UCPU

			A171SCPU	A273UHCPU (8-axis specification)		A273UHCPU (32-axis specification)			
		Number of axes used	4 axes	4 axes	8 axes	4 axes	8 axes	16 axes	32 axes
DSFRP	1-axis start		180 μs	25 μs		—			
	2-axis. 3-axis start		200 μs	25 μs		—			
	Error occurrence		850 μs	120 μs		—			
DSFLP	Present value change	When normal	120 μs	10 μs		—			
		Error	770 μs	25 μs		—			
	Speed control	When normal	80 μs	15 μs		—			
		Error	700 μs	30 μs		—			
SVST	1-axis start		190 μs	35 μs		35 μs			
	2 to 4 axis start		700 μs	70 μs		70 μs			
	Error		900 μs	150 μs		150 μs			
END			7600 μs	5000 μs		5000 μs			

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : 1-8-12, OFFICE TOWER Z 14F HARUMI CHUO-KU 104-6212,JAPAN
NAGOYA WORKS : 1-14 , YADA-MINAMI 5 , HIGASHI-KU, NAGOYA , JAPAN

IB(NA)-67265-D(9702)MEE Printed in Japan