



SIE-C815-13•14  
DESCRIPTIVE  
INFORMATION

PROGRAMMABLE CONTROLLER

**Memocon™-SC GL20/GL60S**

USER'S MANUAL

**POSITIONING MODULE**

TYPE JAMSC-B2813

PULSE TRAIN INPUT

## 1. INTRODUCTION

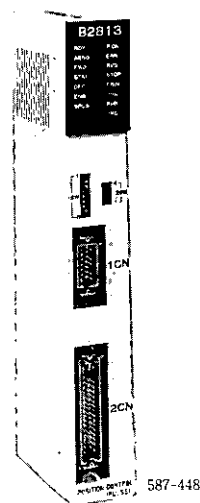
The Memocon-SC 2000 Series I/O Positioning Module JAMSC-B2813, or B2813 for short, is designed to comprise a positioning system in combination with the Programmable Controller Memocon-SC GL20 or GL60S, simply and conveniently.

This module has the following features:

- Pulse train output speed references, allowing direct connection to YASKAWA Servo Controller Servopack.
- Simple point-to-point positioning function with linear acceleration/deceleration.
- Simple on-line setting of travel distance, speed, and acceleration/deceleration time from GL20 or GL60S, for each positioning motion.
- Lag Preventive Function for a set deceleration time in positioning operation.

This manual describes the composition of a positioning system using the B2813. Following are additional reference manual.

- Memocon-SC GL20 User's Manual Design and Maintenance (SIE-C815-13.1)
- Memocon-SC GL60S User's Manual-No.1 Design and Maintenance (SIE-C815-14.1)
- AC Servo Drive M, F Series for Positioning Control (TSE-S800-2.3)
- AC Servo Drive M, F, S Series for Positioning Control (TSE-S800-2.4)



Positioning Module  
Type JAMSC-B2813

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## 2. CONFIGURATION

Fig. 2.1 shows a system configuration for positioning module, Type JAMSC-B2813.

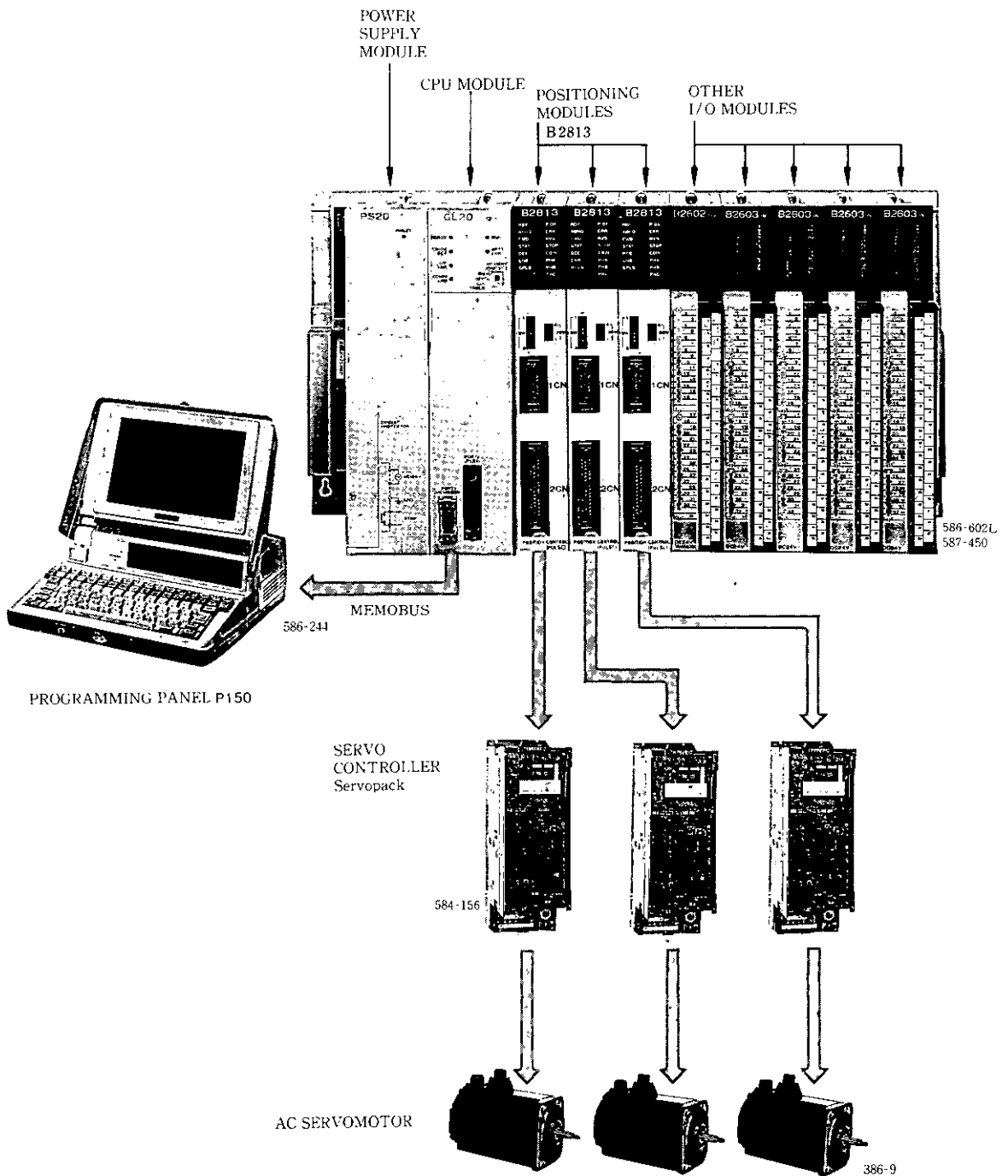


Fig. 2.1 B2813 System Configuration

### 3. SPECIFICATIONS

This section describes B2813 general specifications, performance and interface for external device connection.

#### 3.1 GENERAL SPECIFICATIONS

Table 3.1 General Specifications

Items	Specifications
Type	JAMSC-B2813
Ambient Temperature	0 to +55°C
Storage Temperature	-10 to +75°C
Humidity	10% to 90% RH (non-condensing)
Vibration Resistance	In compliance with JIS* C0911. (Range : 10 to 55 Hz, amplitude : 0.075 mm, No. of liftings : 10 times)
Shock Resistance	10G max in compliance with JIS* C0912.
Environmental Condition	Free from explosive, inflammable and corrosive gases.
Dimensions in mm (inch)	37 (1.46) W × 250 (9.84) H × 79 (3.11) D ; 1 span
Internal Consumed Current (Vcc)	0.25A 5VDC±3%
Approx Weight	0.6 kg (1.3 lb)

\* Japanese Industrial Standard

#### 3.2 PERFORMANCE

Table 3.2 Performance

Items	Specifications	Remarks	
Function	Point-to-point automatic positioning	With liner accel/decel speed	
Number of Control Axis	1 Axis	—	
Applicable Mainframe	CPU module	Selectable by switch	
Number of I/O Allocation Points and Registers	<ul style="list-style-type: none"> <li>• Input relay : 16 points</li> <li>• Output coil : 24 points (16 points available)</li> <li>• Input register : 4 registers</li> <li>• Output register : 4 registers</li> </ul>	Number of I/O allocation in CPU module I/O registers specified by binary	
Positioning Function	Motion Distance	—	
	Reference Speed	(1 to 9,999) × 10 pps (in 10 pps) (1 to 9,999) × 20 pps (in 20 pps)	Selectable by switch (10 pps/20 pps)
	Reference Accel/Decel Speed Time	(1 to 99) × 10 ms (in 10 ms) (1 to 99) × 0.1 s (in 0.1 s)	Selectable by initial setting (10 ms/0.1 s)
Positioning Mode	Absolute mode, incremental mode	Selectable by initial setting	
Setting Data	Data for next one position	During operation, next setting possible.	
Zero Return	Provided (2 modes)	Selectable by initial setting	



### 3.3 INTERFACE OF CPU MODULE AND EXTERNAL DEVICES

Fig. 3.1 shows the relationship between B2813 interfaces, CPU module (GL20, GL60S) and external devices.

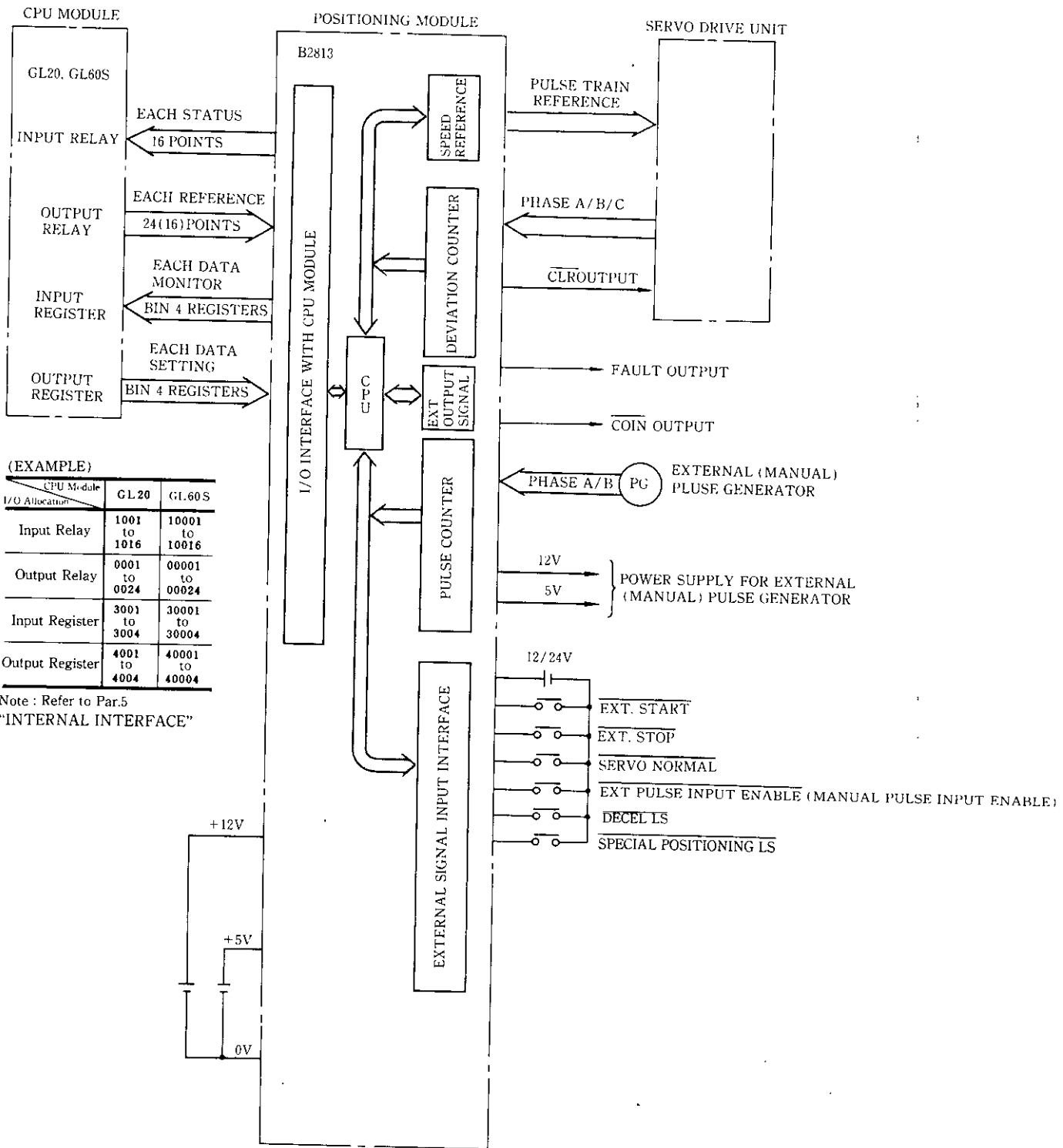


Fig 3.1 Interface of CPU Module and External Devices

### 3.4 B2813 OPERATION FLOW

Fig. 3.2 shows B2813 operation outline.  
(The reference numbers here are given as an example.)

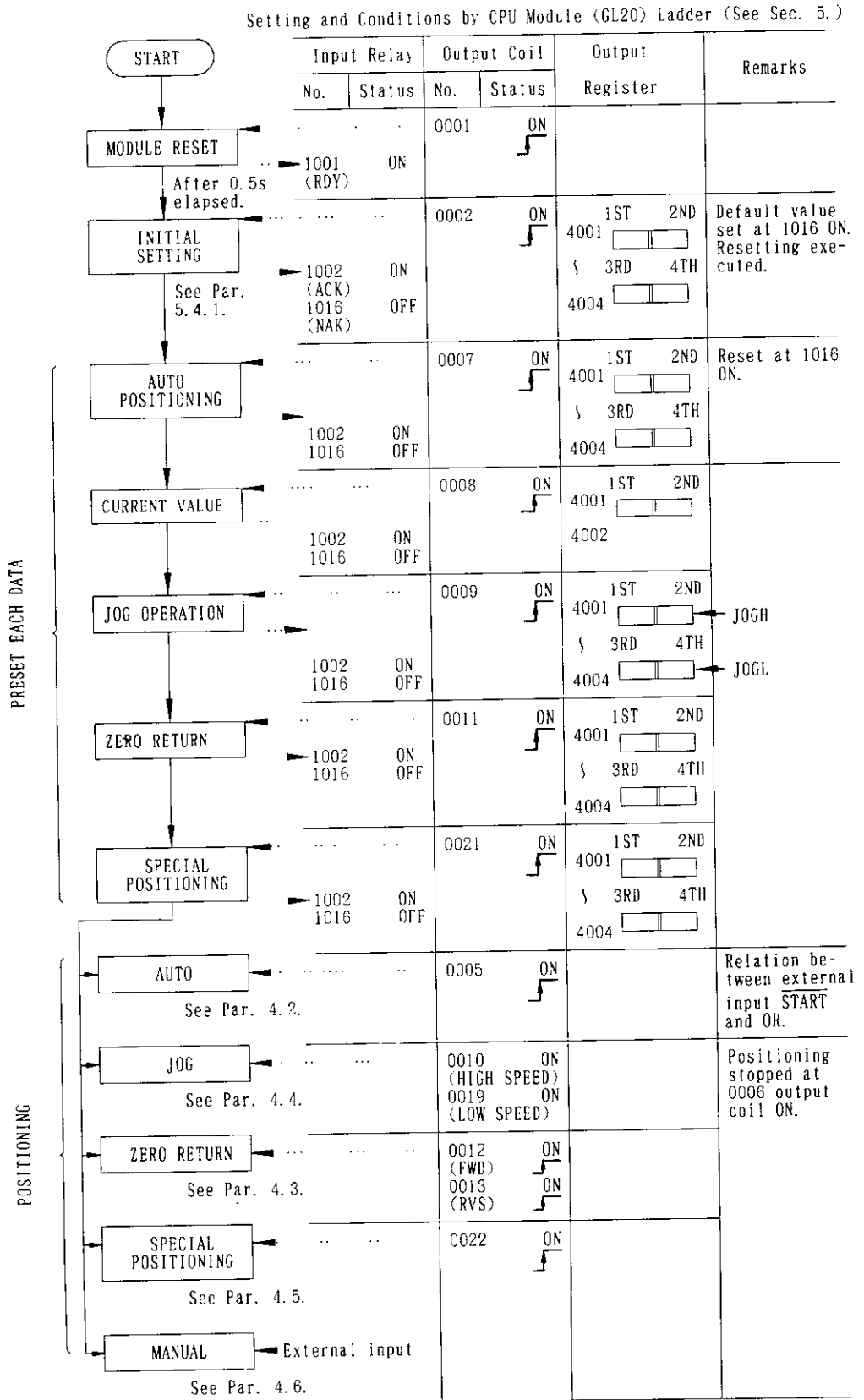


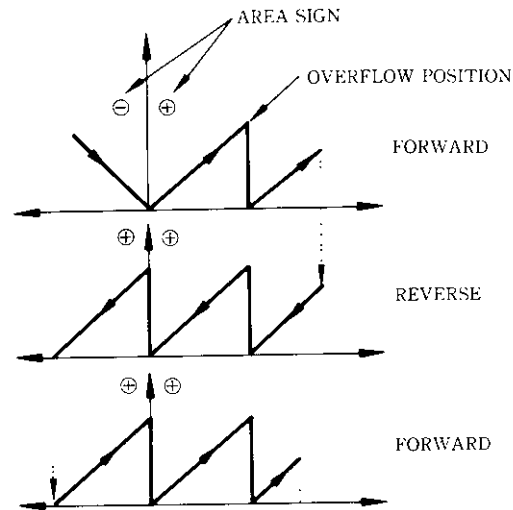
Fig 3.2 B2813 Operation FLOW



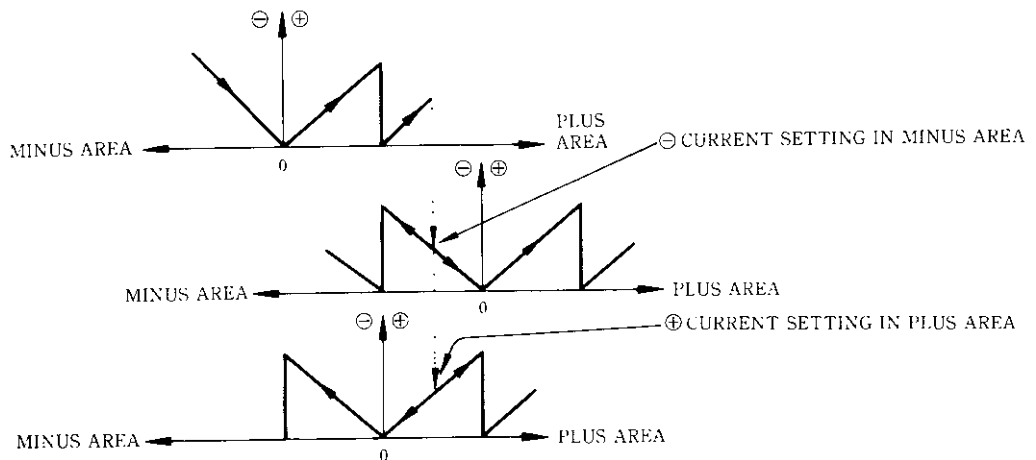


#### 4.1.1 Incremental Mode (Cont'd)

(a) When the current value counter has exceeded the initial count range, an area sign is fixed.



(b) The current value counter is activated in the initial count range when a current value resetting, a current value 0 setting, or a zero return is executed.



## 4.1.2 Absolute Mode

### (1) Position Command Setting

Absolute position is set as the position command.

	<p>For moving from current position <math>P_0</math> to <math>P_1</math>, sign is set in plus area and absolute position <math>P_1</math> is set as position command.</p>
	<p>For moving from current position <math>P_1</math> to <math>P_2</math>, sign is set in plus area and absolute position <math>P_2</math> is set as position command.</p>
	<p>For moving from current position <math>P_2</math> to <math>P_3</math>, sign is set in plus area and absolute position <math>P_3</math> is set as position command.</p>

### (2) Current Value Counting Operation

Fig. 4.2 shows a basic operation of the current value counter.

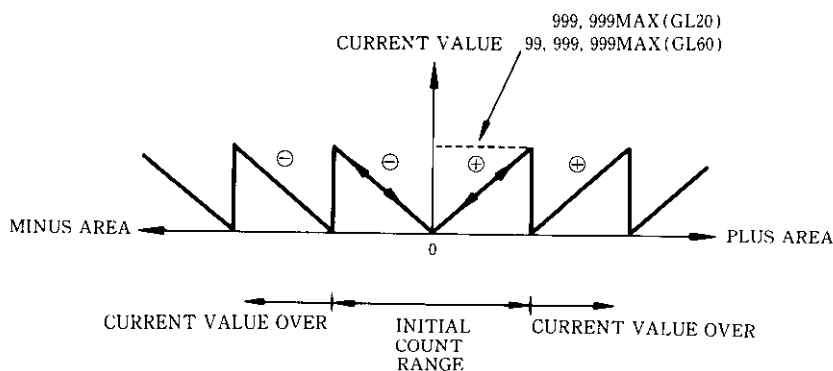
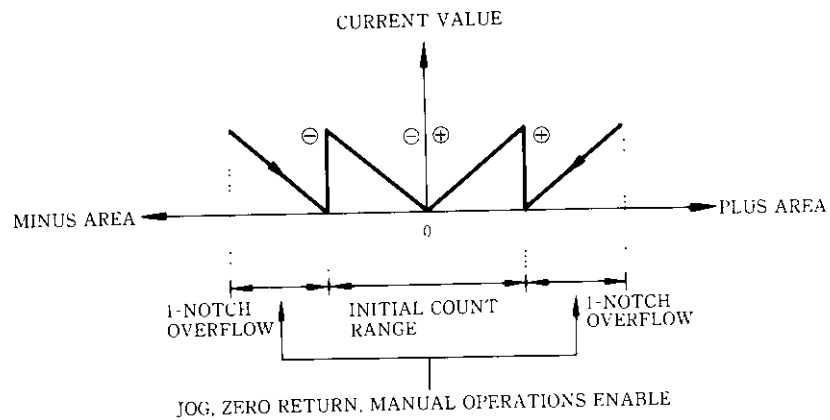


Fig. 4.2 Current Value Counter Operation

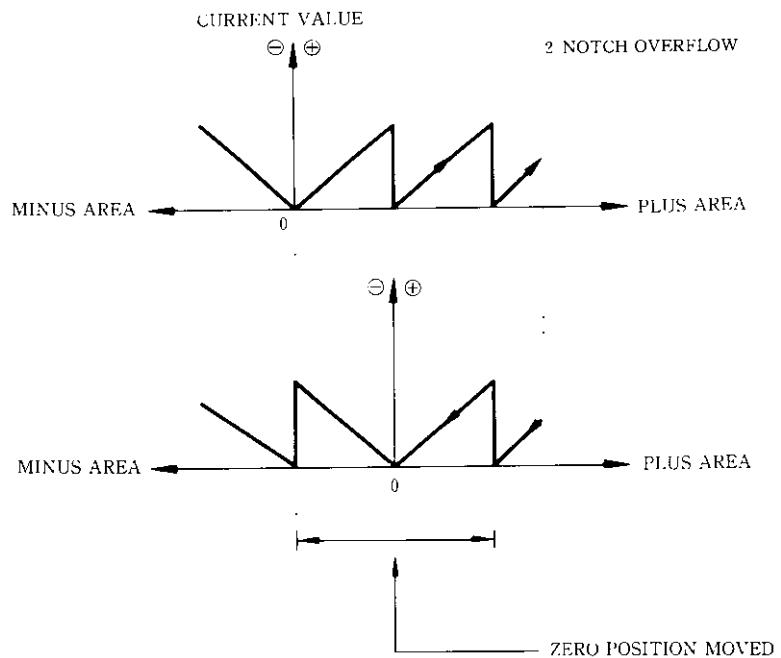
- (a) If the current value counter has exceeded the initial count range (initial absolute position range) 0 to  $\pm 999,999$  (0 to  $\pm 99,999,999$ ), "CURRENT VALUE OVER" input relay is turned on (error code 24 is issued). At this time, automatic operation is prohibited.

JOG, zero return and manual operations remain operational. On return to the initial count range, CURRENT VALUE OVER is released. CURRENT VALUE OVER cannot be released by current value setting. Even while CURRENT VALUE OVER is ON, the current value counter continues counting.

### 4.1.2 Absolute Mode (Cont'd)



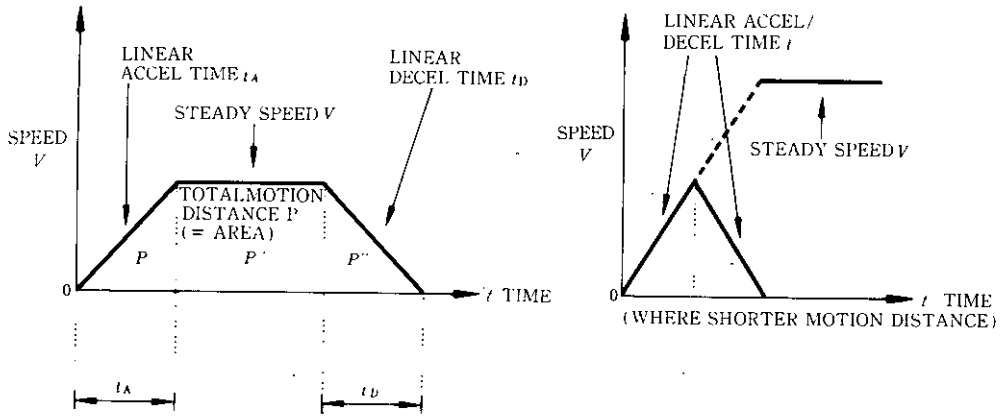
- (b) If the current value counter exceeds more than 2-notch overflow, the normal range cannot be restored even on returning to the initial count range by JOG, zero return, or manual operation. In this case, the zero position moves.



## 4.2 AUTOMATIC POSITIONING

### 4.2.1 Basic Function

#### (1) 1-Step Speed Basic Pattern



$$\left\{ \begin{array}{l} \text{Total Motion Distance } P (= \text{Area}) = P' + P'' + P''' \\ \text{Linear Accel/Decel Time} = \text{Linear Accel Time } t_A = \text{Linear Decel Time } t_D \end{array} \right.$$

Fig. 4.3 1-Step Speed Basic Operation

#### (a) Setting items

Motion distance  $P$ , steady speed  $V$  and linear accel/decel time  $t_A$  are set:

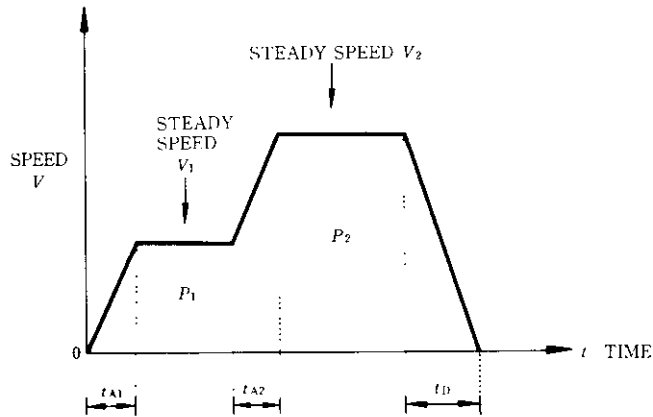
Setting Range	{	Total motion distance $P$	: 0 to $\pm 999,999$ pulses (GL20) 0 to $\pm 99,999,999$ pulses (GL60S)
		Steady speed $V$	: 10 to 99,990 pps (in 10 pps) 20 to 198,980 pps (in 20 pps)
		Linear accel/decel time $t_A$	: 10 to 990 ms (in 10 ms) 0.1 to 9.9 s (in 0.1 s)

### 4.2.1 Basic Function (Cont'd)

#### (2) 2-Step Speed Basic Pattern

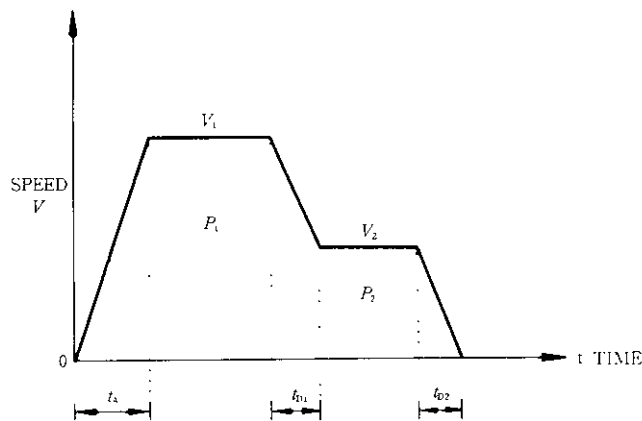
(a)  $V_1 < V_2$

$$\left( \begin{array}{l} \text{Total Motion Distance } P = P_1 + P_2 \\ \text{Accel Time } t_A = t_{A1} + t_{A2} = \text{Decel Time } t_D \end{array} \right)$$



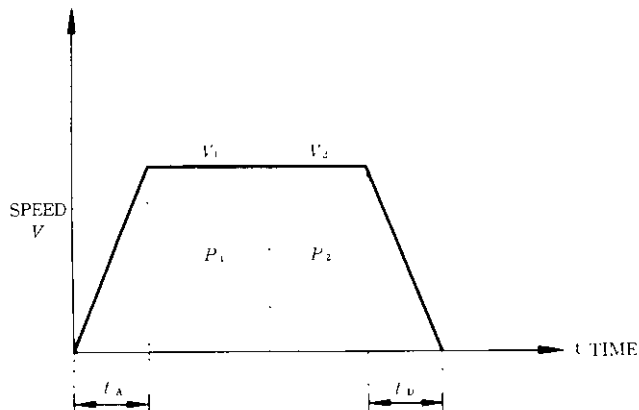
(b)  $V_1 > V_2$

$$\left( \begin{array}{l} \text{Total Motion Distance } P = P_1 + P_2 \\ \text{Accel Time } t_A = \text{Decel Time } t_D \\ = t_{D1} + t_{D2} \end{array} \right)$$



(c)  $V_1 = V_2$

$$\left( \begin{array}{l} \text{Total Motion Distance } P = P_1 + P_2 \\ \text{Accel Time } t_A = \text{Decel Time } t_D \end{array} \right)$$



(d) Setting items

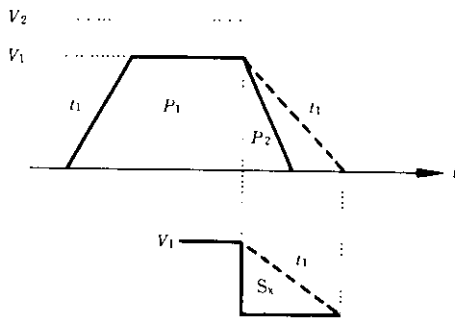
For 2-step speed pattern, motion distances  $P_1/P_2$ , steady speeds  $V_1/V_2$  and acceleration time  $t_A$  ( $t_{A1}$ ) need to be set. Linear accel/decel speed is effective on a single line.

Setting Range	Motion distances $P_1, P_2$	: 0 to $\pm 999,999$ (GL20) 0 to $\pm 99,999,999$ (GL60)
	Steady speed $V_1, V_2$	: 10 to 99,990 pps (in 10 pps) 20 to 198,980 pps (in 20 pps)
	Linear accel/decel time $t_A$ ( $t_{A1}$ )	: 10 to 990 ms (in 10 ms) 0.1 to 9.9 s (in 0.1 s)

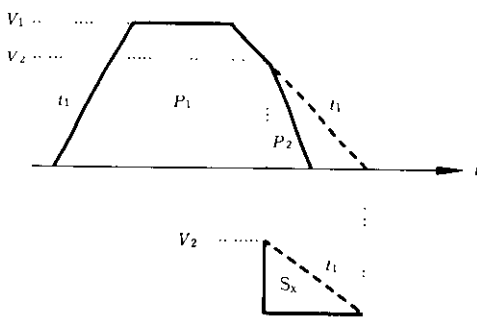
(e) Precaution on positioning

When  $P_2$  distance is short, 2-step speed pattern operation is impossible, causing a setting error.

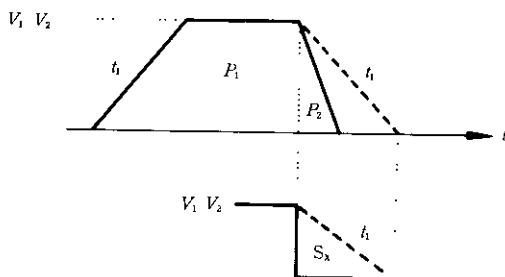
①  $V_1 < V_2$



②  $V_1 > V_2$



③  $V_1 = V_2$



Regardless of motion distance  $P_1$ , operation is impossible when motion distance  $P_2$  is small with respect to the motion distance ( $S_x$ ) required for deceleration and stop in  $t_1$  time.

## 4.2.2 Automatic Positioning Operation Patterns

Descriptions of automatic positioning operation patterns are listed in Table 4.1.

Table 4.1 Operation Patterns

Drawing No.	Contents of Operation Pattern	Drawing No.	Contents of Operation Pattern
Fig. 4.9	1-step speed pattern in incremental mode	Fig. 4.18	2-step speed pattern in incremental mode
	(1) Basic pattern		(1) Basic pattern
Fig. 4.10	(2) Omission of positioning setting	Fig. 4.19	(2) Omission of positioning setting
Fig. 4.11	(3) Start command during motion	Fig. 4.20	(3) Positioning setting and start command during motion
Fig. 4.12	(4) Positioning setting during motion	Fig. 4.21	(4) Temporary pausing in incremental mode
Fig. 4.13	(5) Temporary pausing in incremental mode	Fig. 4.22	2-step speed pattern in absolute mode
Fig. 4.14	1-step speed pattern in absolute mode		(1) Basic pattern
	(1) Basic pattern	Fig. 4.23	(2) Positioning setting during motion
Fig. 4.15	(2) Positioning setting and start command during motion	Fig. 4.24	(3) Temporary pausing in absolute mode
Fig. 4.16	(3) Temporary pausing in absolute mode		
Fig. 4.17	(4) Positioning setting after temporary pausing		



(1) 1-Step Speed Pattern in Incremental Mode

(a) Basic pattern

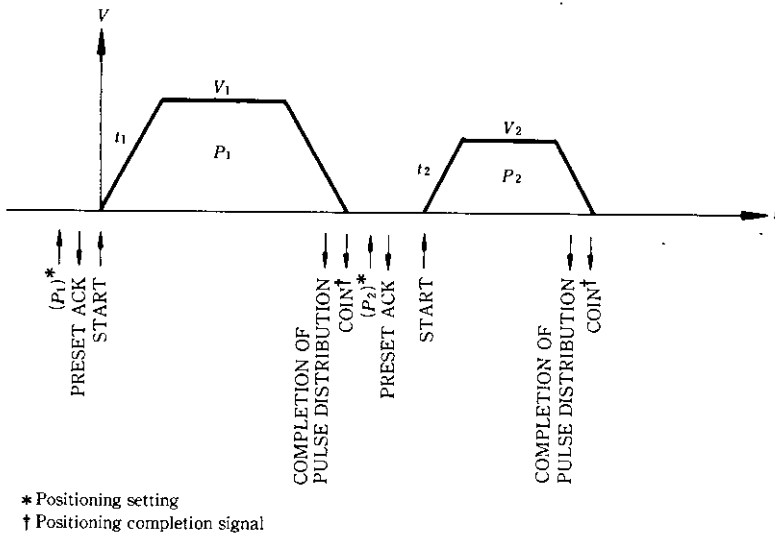


Fig. 4.7 Basic Pattern in Incremental Mode

(b) When the same operation is repeated, positioning setting is not required every time.

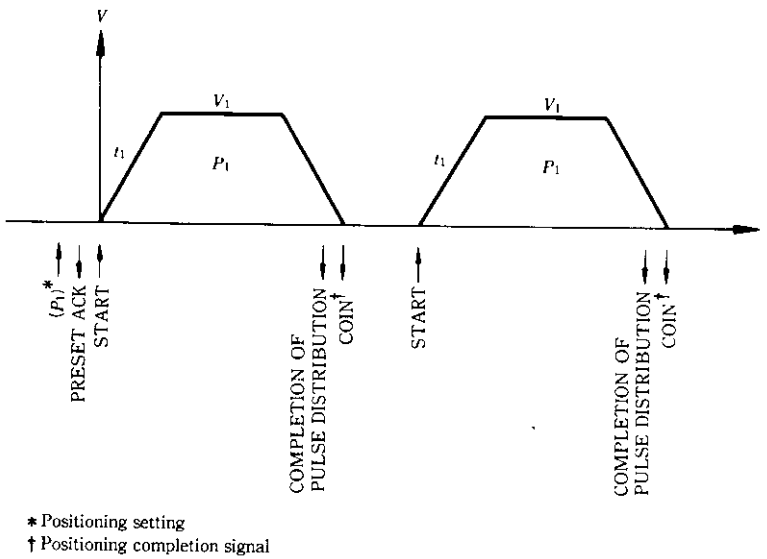
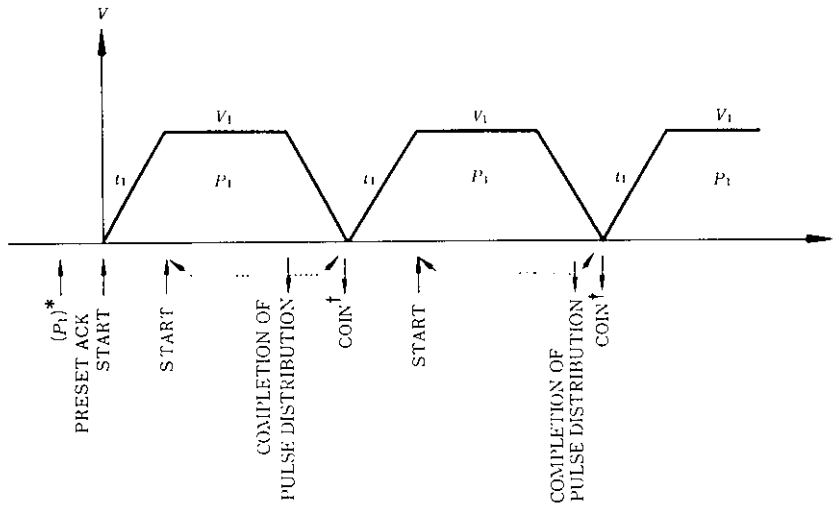


Fig. 4.8 Omission of Positioning Setting

## 4.2.2 Automatic Positioning Operation Patterns (Cont'd)

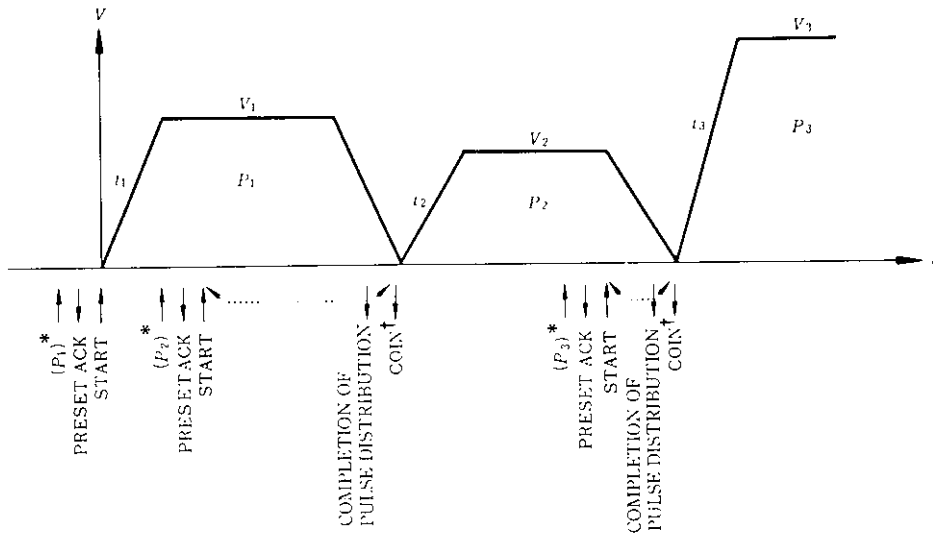
- (c) During motion, start of the next positioning can be commanded. In this case, the next positioning will start immediately after completion of the current positioning (COIN).



Note. In actuality, COIN ON is delayed slightly due to lag in the servo system.  
 \* Positioning setting  
 † Positioning completion signal

Fig. 4.9 Start Command during Operation

- (d) During motion, the next positioning can be set.

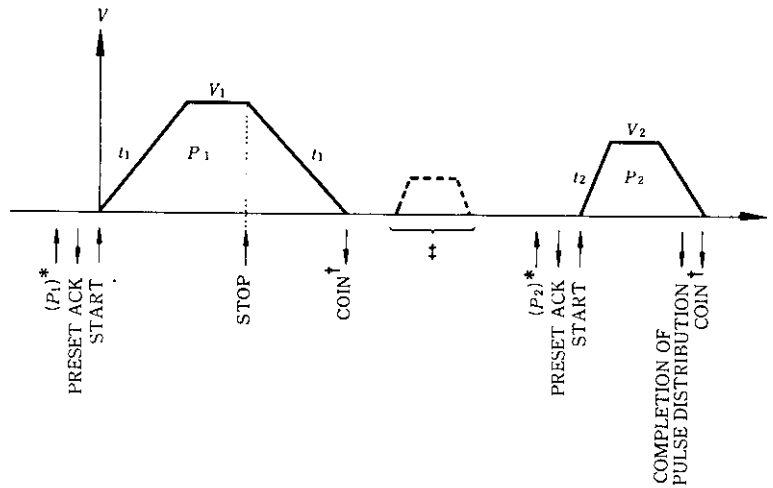


\* Positioning setting  
 † Positioning completion signal

Fig. 4.10 Positioning Setting during Motion

(e) Temporary pausing in incremental mode

When temporary pausing is effected in incremental mode, the remaining motion distance  $|P_1 - P'_1|$  is canceled. If trying restart without setting  $P_2$  position, movement recurs by  $P_1$ . Start command of the next positioning (start reservation) is canceled by STOP. In case  $P_2$  positioning is set during  $P_1$  motion, the setting (preset reservation) is not canceled even by STOP.

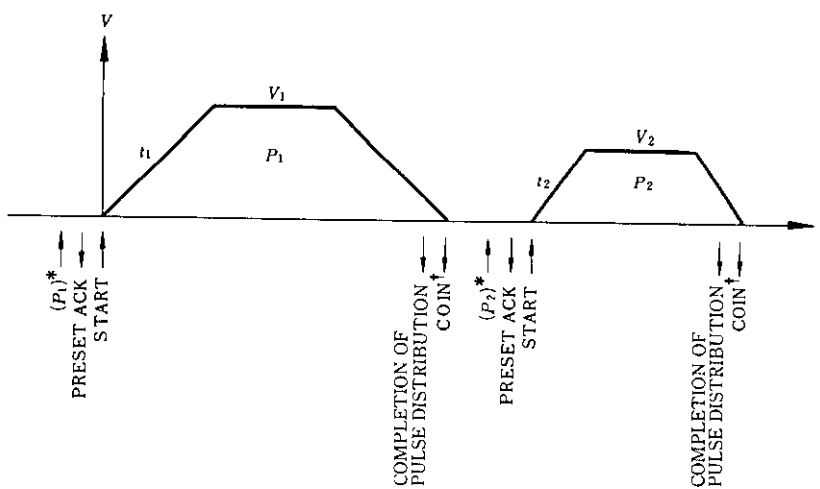


\* Positioning setting  
 † Positioning completion signal  
 ‡ During this time, JOG or EXTERNAL INPUT PULSE (MANUAL PULSE) can be input.

Fig. 4.11 Temporary Pausing in Incremental Mode

(2) 1-Step Speed Pattern in Absolute Mode

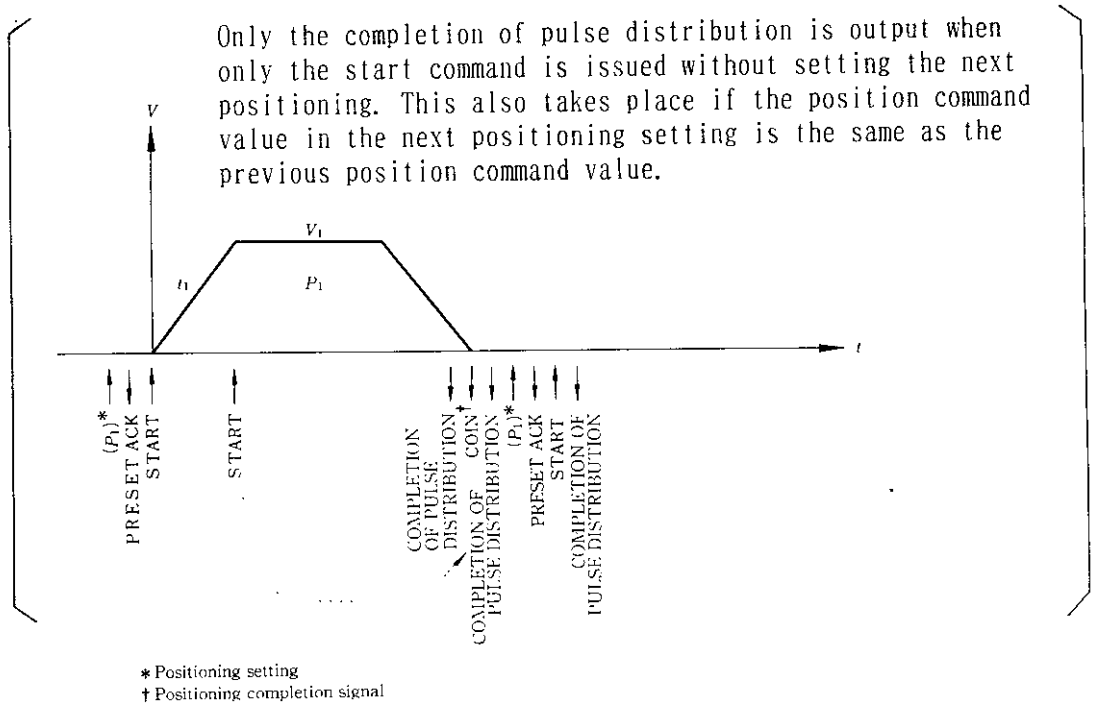
(a) Basic pattern



\* Positioning setting  
 † Positioning completion signal

Fig. 4.12 Basic Pattern in Absolute Mode

## 4.2.2 Automatic Positioning Operation Patterns (Cont'd)



(b) During motion, the next positioning operation can be set and its start can be commanded.

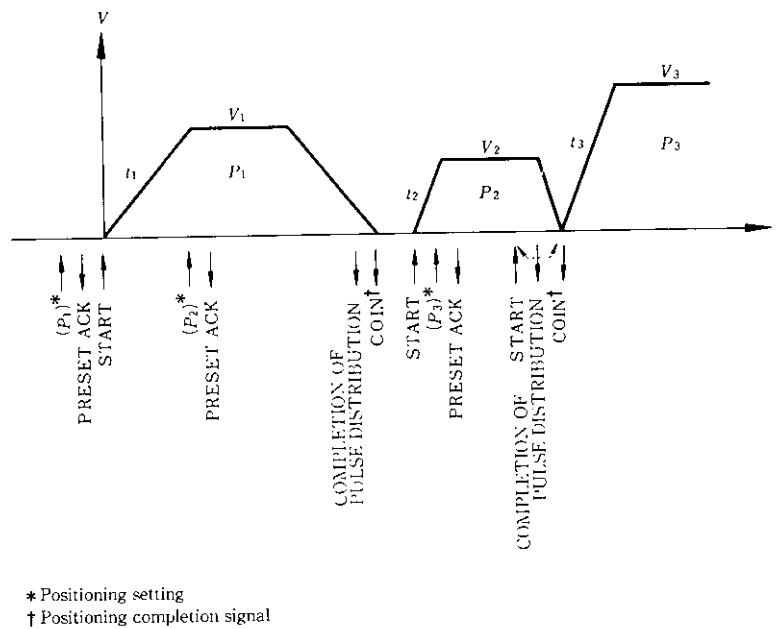
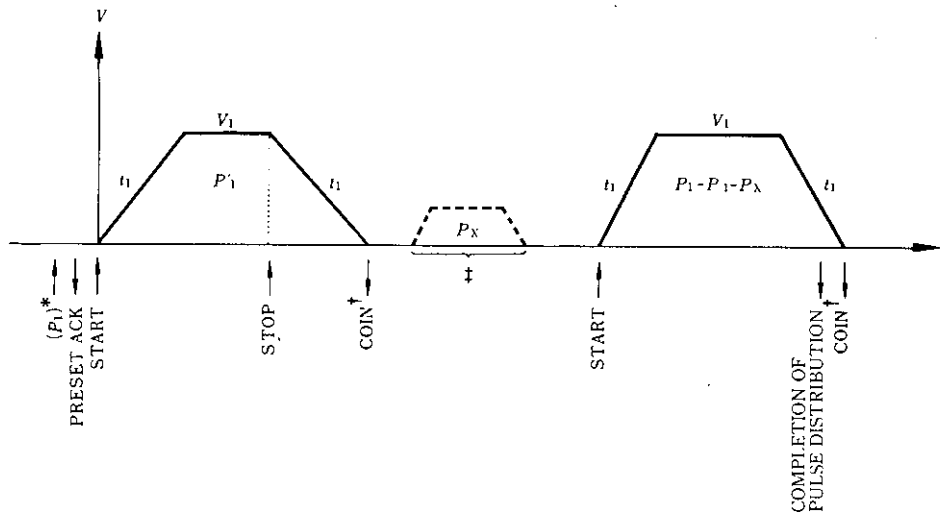


Fig. 4.13 Positioning Setting and its Start Command during Motion

(c) Temporary pausing in absolute mode and start command after pausing

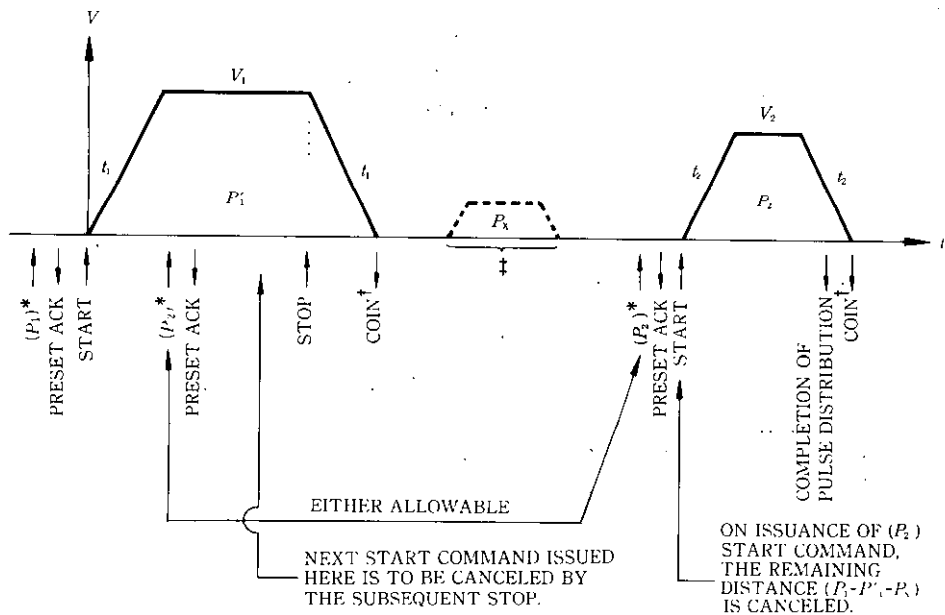
After temporary pausing, the machine moves over the remaining distance unless setting for the next positioning is made.



- \* Positioning setting
- † Positioning completion signal
- ‡ During this time, JOG or EXTERNAL INPUT PULSE (MANUAL PULSE) can be input.

Fig. 4.14 Temporary Pausing in Absolute Mode

If the next positioning is set, positioning action starts toward the commanded position.




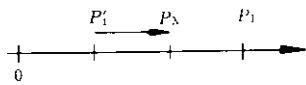
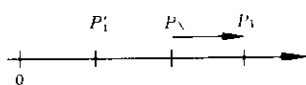
- \* Positioning setting
- † Positioning completion signal
- ‡ During this time, JOG or EXTERNAL INPUT PULSE (MANUAL PULSE) can be input.

Fig. 4.15 Positioning Setting after Temporary Pausing


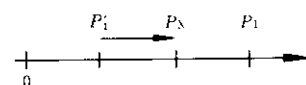
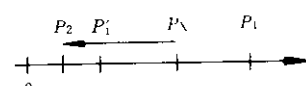
## 4.2.2 Automatic Positioning Operation Patterns (Cont'd)

(d) Action for JOG operation or handle operation (external command pulse input) after temporary pausing in absolute mode

- In case of start command without positioning setting after temporary pausing (Fig. 4.14)

	<p>Motion stops at absolute position <math>P'_1</math> according to STOP ON while positioning toward <math>P_1</math> position.</p>
	<p>Movement is effected from <math>P'_1</math> to <math>P_x</math> by JOG operation or handle operation (external command pulse input).</p>
	<p>Movement toward <math>P_1</math> occurs up on issuing the start command of positioning again.</p>

- In case of start command with positioning setting after temporary pausing (Fig. 4.15)

	<p>Motion stops at absolute position <math>P'_1</math> according to STOP ON while positioning toward <math>P_1</math> position.</p>
	<p>Movement is effected from <math>P'_1</math> to <math>P_x</math> by jog operation or handle operation (external pulse input).</p>
	<p>Operation starts toward <math>P_2</math> on distribution of start command with absolute position <math>P_2</math> set.</p>

(3) 2-Step Speed Pattern in Incremental Mode

(a) Basic pattern

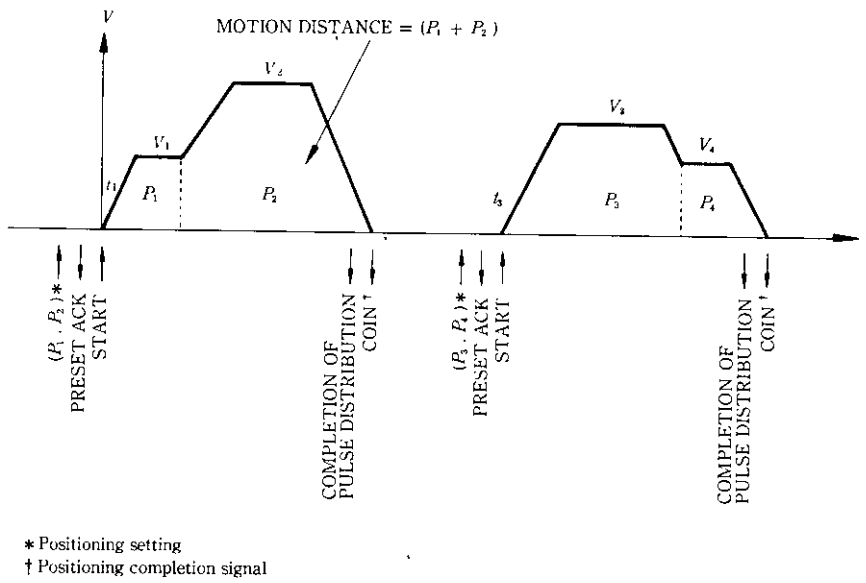


Fig 4.16 Basic Pattern in Incremental Mode

(b) Skipping the positioning setting

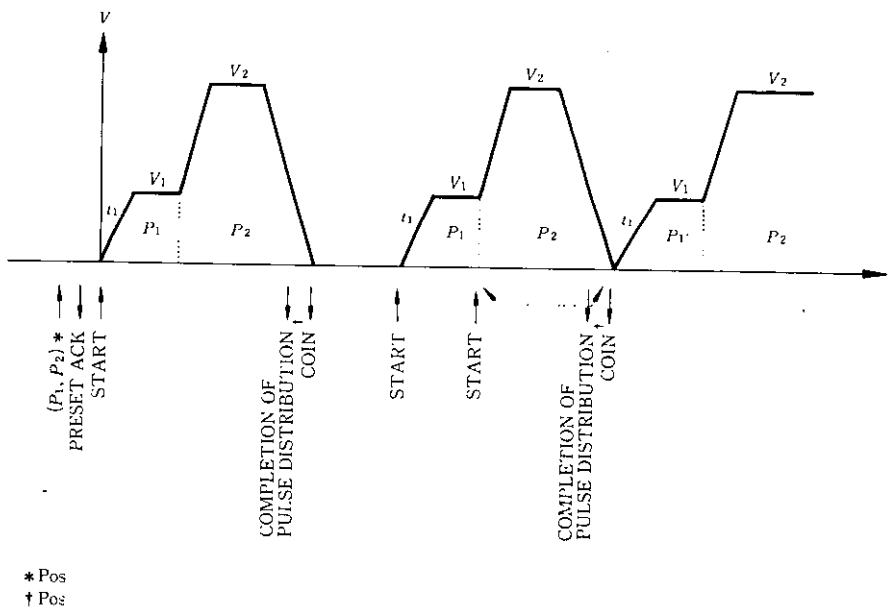


Fig. 4.17 Skipping the Positioning Setting

## 4.2.2 Automatic Positioning Operation Patterns (Cont'd)

### (c) Positioning setting during motion and start command

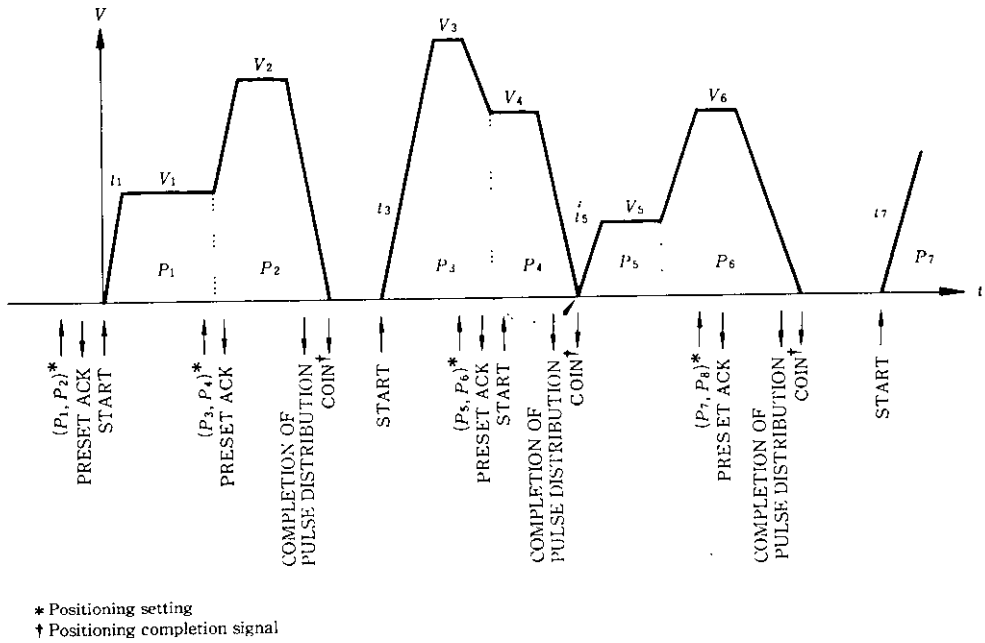


Fig. 4.18 Positioning Setting during Motion and Start Command

### (d) Temporary pausing in incremental mode

Temporary pausing in incremental mode cancels the remaining distance  $|P_2 - P'_2|$ . Within the asterisked (\*) range, the start command of the next positioning is canceled. Within the asterisked (\*) range, setting of the next positioning is not canceled.

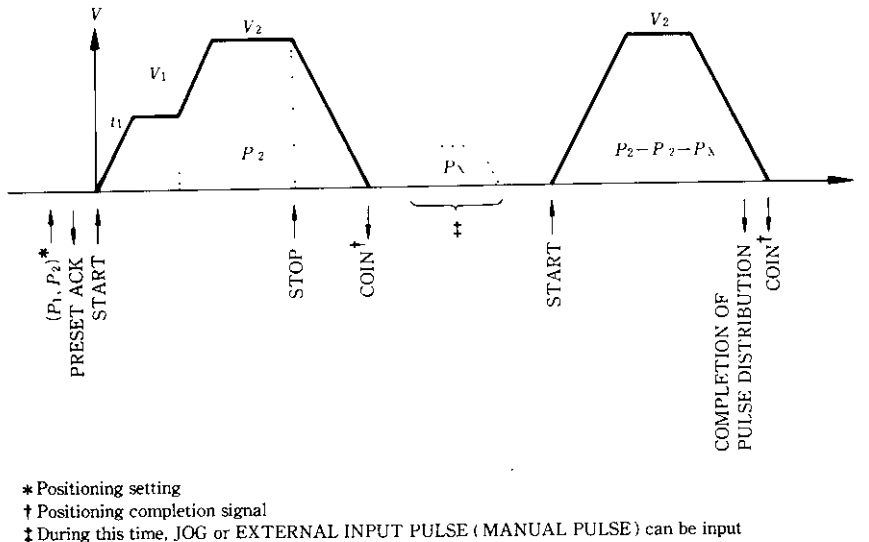


Fig. 4.19 Temporary Pausing in Incremental Mode



(4) 2-Step Speed Pattern in Absolute Mode

(a) Basic pattern

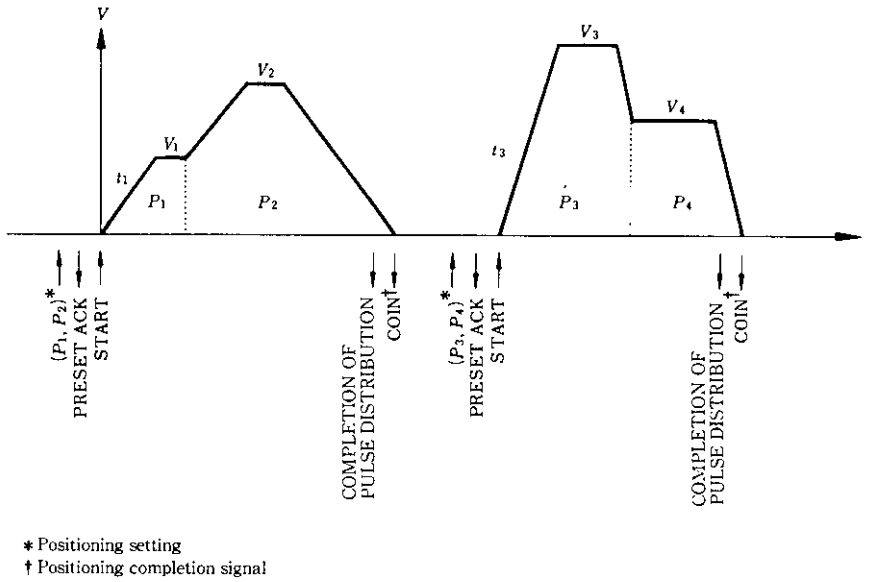
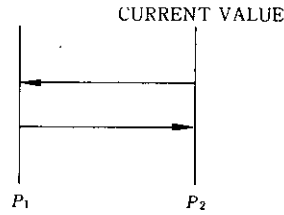


Fig. 4.20 Basic Pattern in Absolute Mode

When positioning setting is omitted, setting error may occur for the same position command value (this is because the operational direction is reversed between the first and second steps).



(b) Positioning setting during motion

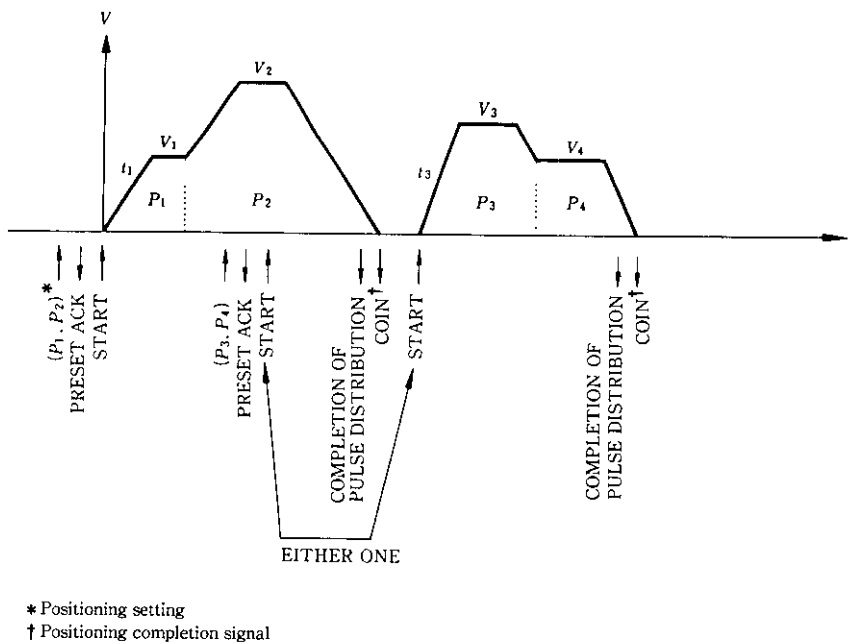


Fig. 4.21 Positioning Setting during Motion

## 4.2.2 Automatic Positioning Operation Patterns (Cont'd)

### (c) Temporary pausing in absolute mode

After temporary pause in absolute mode, restart completes remaining distance unless new positional setting (including that in the course of motion) is made.

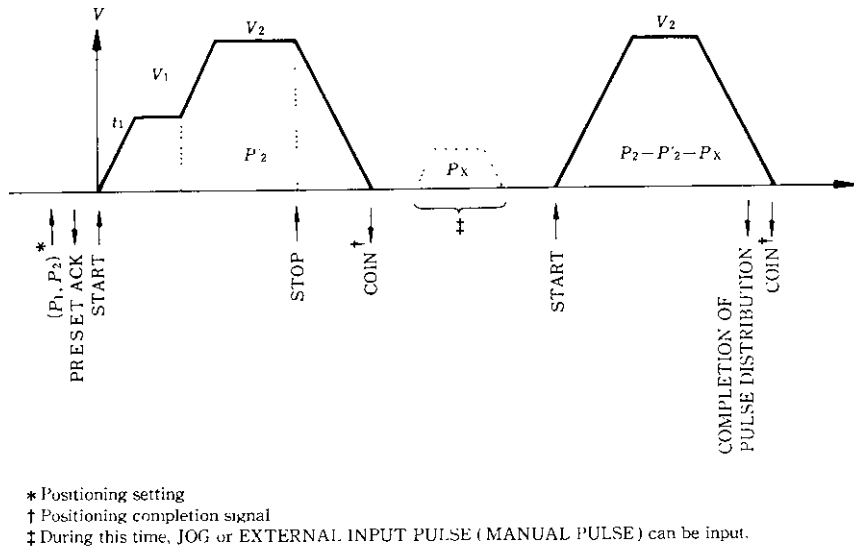
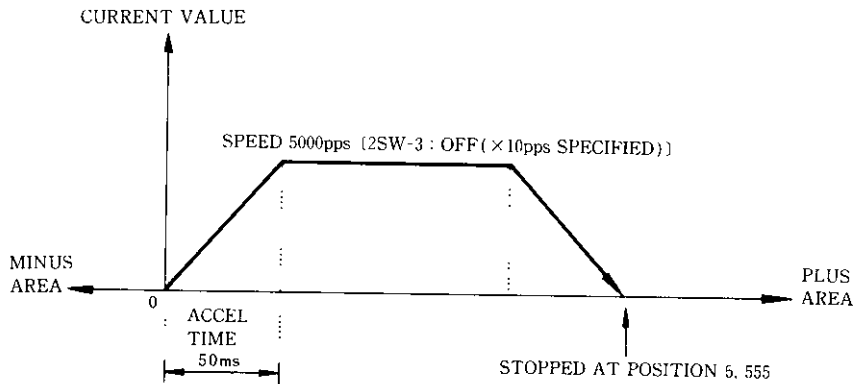


Fig. 4.22 Temporary Pausing in Absolute Mode

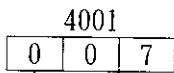
- (d) Precaution on 2-step speed pattern in absolute mode  $P_1/P_2$  setting is restricted in absolute mode. If setting causes a reversing motion during the operation, setting error is detected to disable operation.

Decision / Positioning	Enable	Disable
	FWD Run	
REV Run		

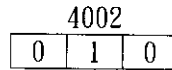
(e) Shown below is the execution of automatic positioning according to GL20. Stop is programmed under conditions: acceleration time 50 ms, speed 5,000 pps and distance 5,555 (pulses) toward the plus area (forward rotation).



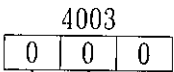
Initial settings are as follows :



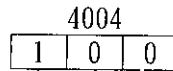
COIN WIDTH  
(7)  
OPERATION MODE  
(0 : 1-STEP SPEED PATTERN)



PULSE COUNT MODE  
(1 : 1 MULTIPLIER)



ACCEL/DECCEL TIME CHANGE  
(0 :  $\times 10$  ms)  
CURRENT VALUE RESET  
(0 : NOT RESET)  
POSITION COMMAND MODE  
(0 : INCREMENTAL MODE)



0 SETTING  
ZERO RETURN MODE  
(0 : MODE B)  
OPERATION START  
CONDITION  
(1 : NEXT START ENABLE AT  
COMPLETION OF PULSE  
DISTRIBUTION)

## 4.2.2 Automatic Positioning Operation Patterns (Cont'd)

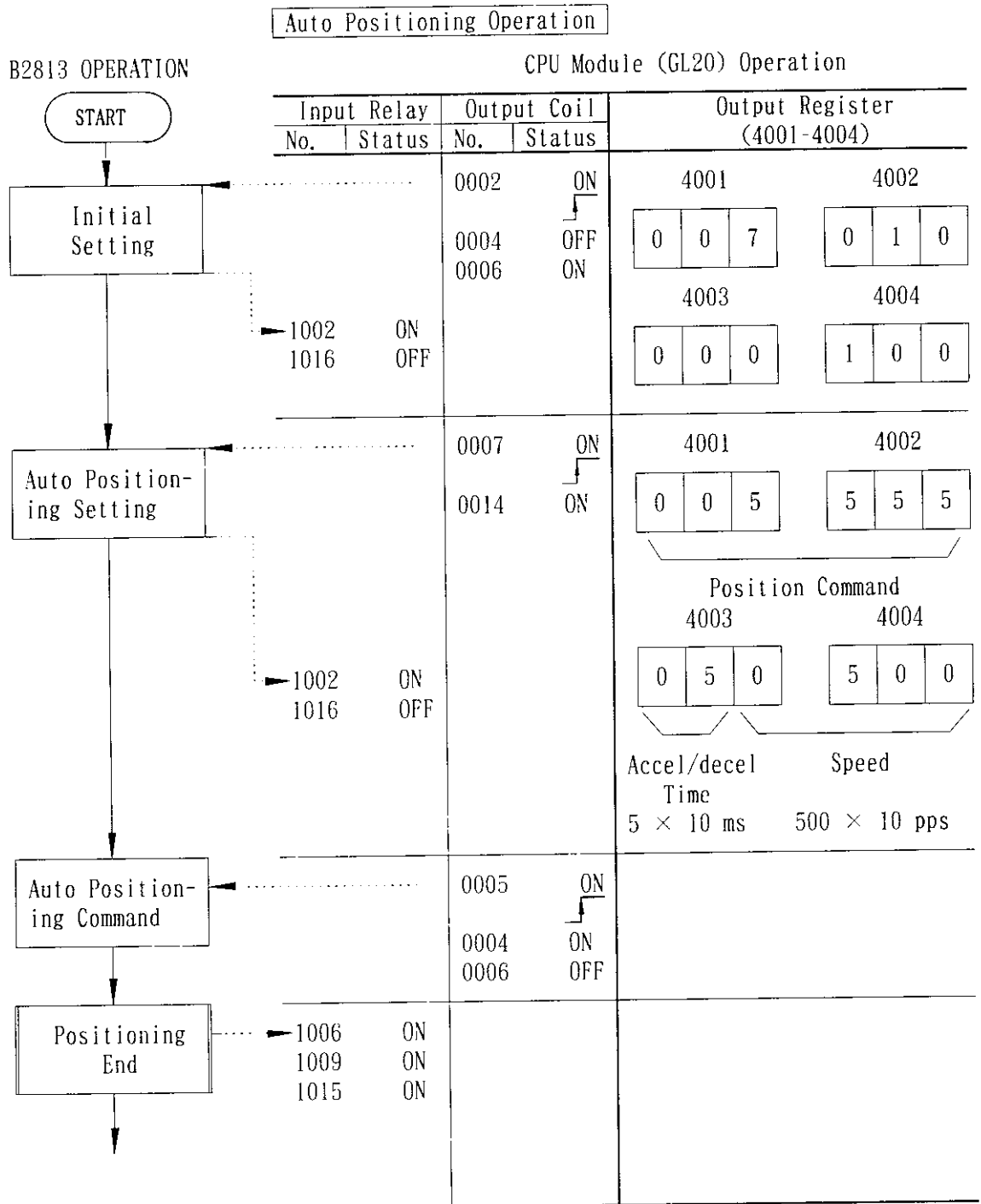
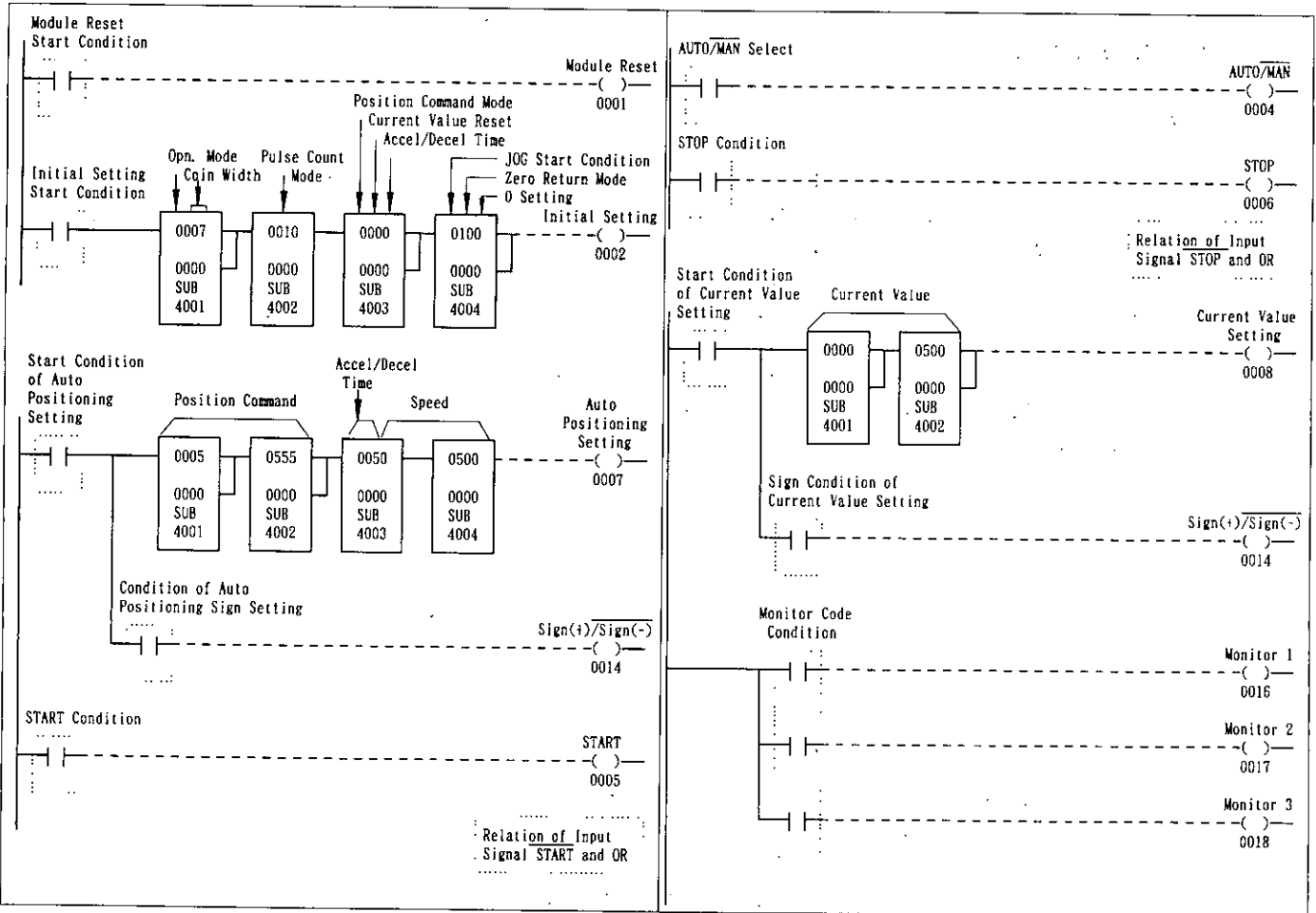


Fig 4.23 Execution of Auto Positioning Operation

GL20 Auto Positioning Action Diagram

GL20 Ladder Diagram for Other Settings



### 4.3 ZERO RETURN

Zero return is possible in either mode A or B, which must be selected in the initial setting. Operation is effective when the output coil "AUTO/MAN" is turned on.

#### (1) Zero Return in Mode A

##### (a) Operation

When zero return (FWD or RVS) command is turned on, the machine starts moving toward the zero position in the predetermined acceleration/deceleration time and at a pre-set speed. When the external input signal DECEL LS ON is detected, the machine decelerates down to creep speed ( $V_c$ ). The first phase-C pulse after arrival at creep speed becomes the zero point.

When the module detects the zero point, the current command value and the current feedback value are cleared, and the external output signal CLR is output. In addition, the input relay "zero return pulse distribution end" is turned on.

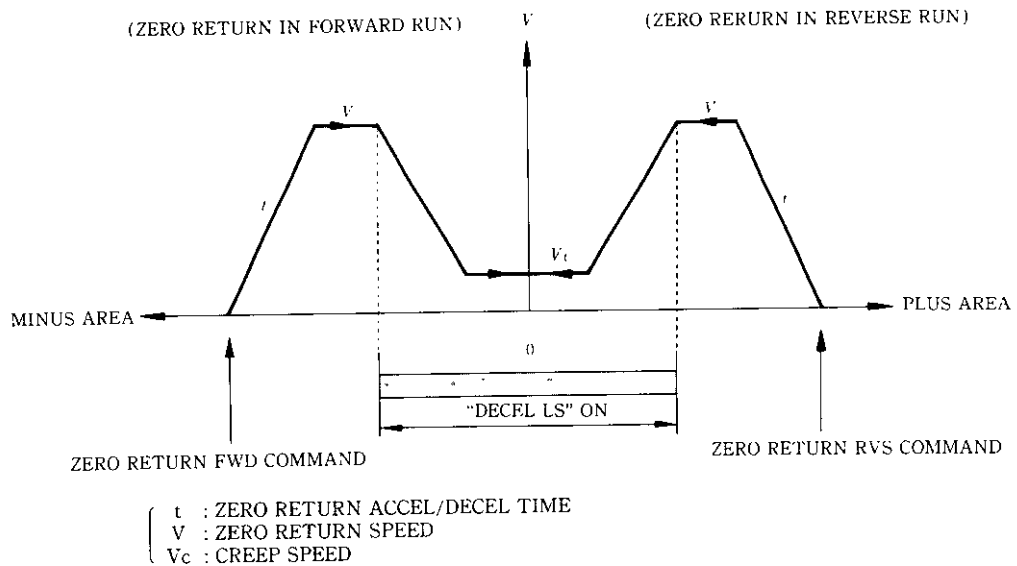


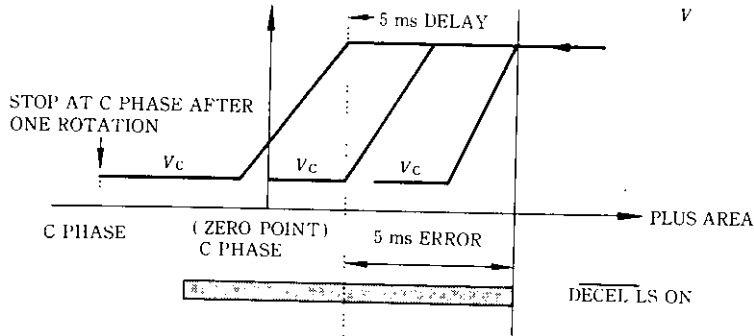
Fig 4.24 Zero Return in Mode A

##### (b) Setting items

Zero return speed  $V$ , zero return accel/decel time  $t$  and creep speed  $V_c$  need to be set.

(c) Zero return speed and stopping accuracy

If the zero return speed is too high, the creep speed achieving position varies due to deviation (5 ms max.) in DECEL LS signal detection time. Therefore, a stop position error corresponding to one rotation may occur if dog adjustment is poor.



(2) Zero Return in Mode B

(a) Operation

When turning on the zero return (FWD or RVS) command, the machine begins moving to the zero point in the predetermined accel/decel time and at the preset speed. On detection of the external input signal DECEL LS ON, speed is reduced down to the creep speed ( $V_c$ ). The first phase-C pulse after arrival at the creep speed becomes the zero point.

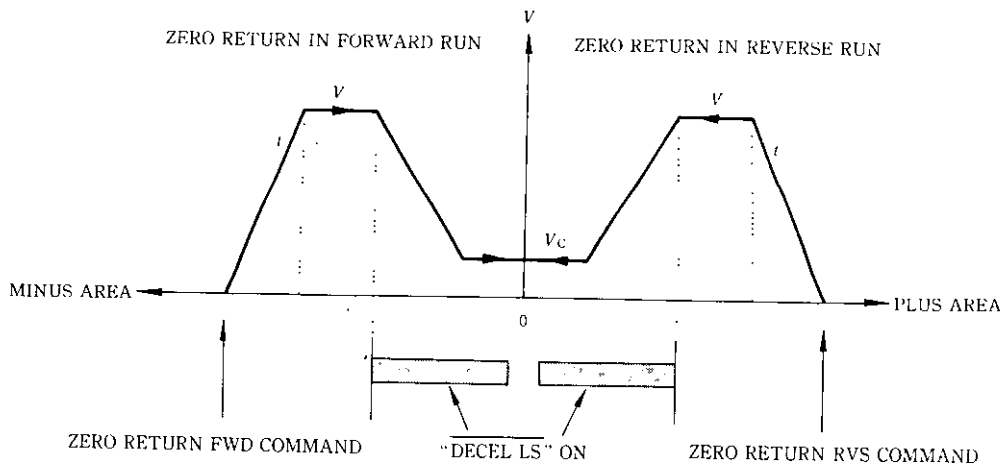


Fig. 4.25 Zero Return in Mode B

(b) Setting items

Zero return speed  $V$ , zero return accel/decel time  $t$  and creep speed  $V_c$  need to be set.

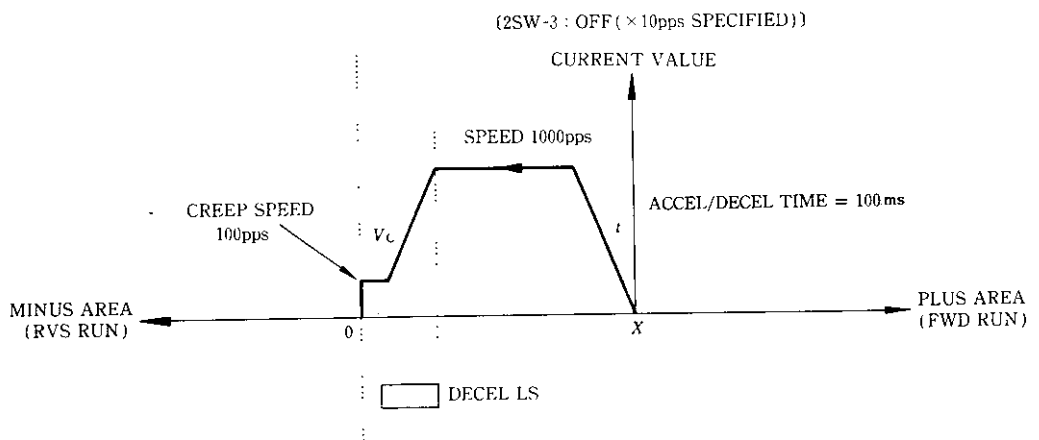
### 4.3 ZERO RETURN (Cont'd)

#### (3) Precautions Zero Return

- If zero return speed is equal to or smaller than creep speed, setting error occurs (error code : 20).
- Error is detected (error code : 21) if the zero return command is used without zero setting.
- Even though the zero return command is turned on, it is disregarded in other operations (automatic positioning or special positioning).
- When temporarily stopping operation at zero return speed, zero return operation will not be recovered unless the zero return command is turned on again.
- Zero return operation is disregarded immediately after completion of the previous zero return. It is possible again after any of automatic positioning, JOG or handle operations.
- When  $\overline{\text{DECEL LS}}$  is turned on, the zero return command is disregarded(error code:23).  
The command needs to be issued after movement to the  $\overline{\text{DECEL LS}}$  OFF position by any operation other than zero return.
- When temporarily pausing operation at zero return or creep speed, or turning off the output coil, the machine stops in the specified accel/decel time.

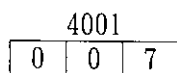
(4) Shown below is the zero return in mode B according to GL20.

The figure below corresponds to zero return from the X position in the plus area by reverse movement. Speed, accel/decel time and creep speed are assumed to be set at 1,000 pps, 100 ms and 100 pps, respectively.



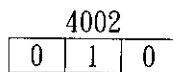


Initial settings are as follows :

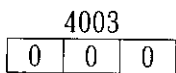


COIN WIDTH  
(7)

OPERATION MODE  
(0 : 1-STEP SPEED PATTERN)



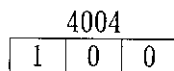
PULSE COUNT MODE  
(1 : 1 MULTIPLIER)



ACCEL/DECEL TIME CHANGE  
(0 :  $\times 10$  ms)

CURRENT VALUE RESET  
(0 : NOT RESET)

POSITION COMMAND MODE  
(0 : INCREMENTAL MODE)



0 SETTING

ZERO RETURN MODE  
(0 : MODE B)

OPERATION START  
CONDITION  
(1 : NEXT START ENABLE AT  
COMPLETION OF PULSE  
DISTRIBUTION)

### 4.3 ZERO RETURN (Cont'd)

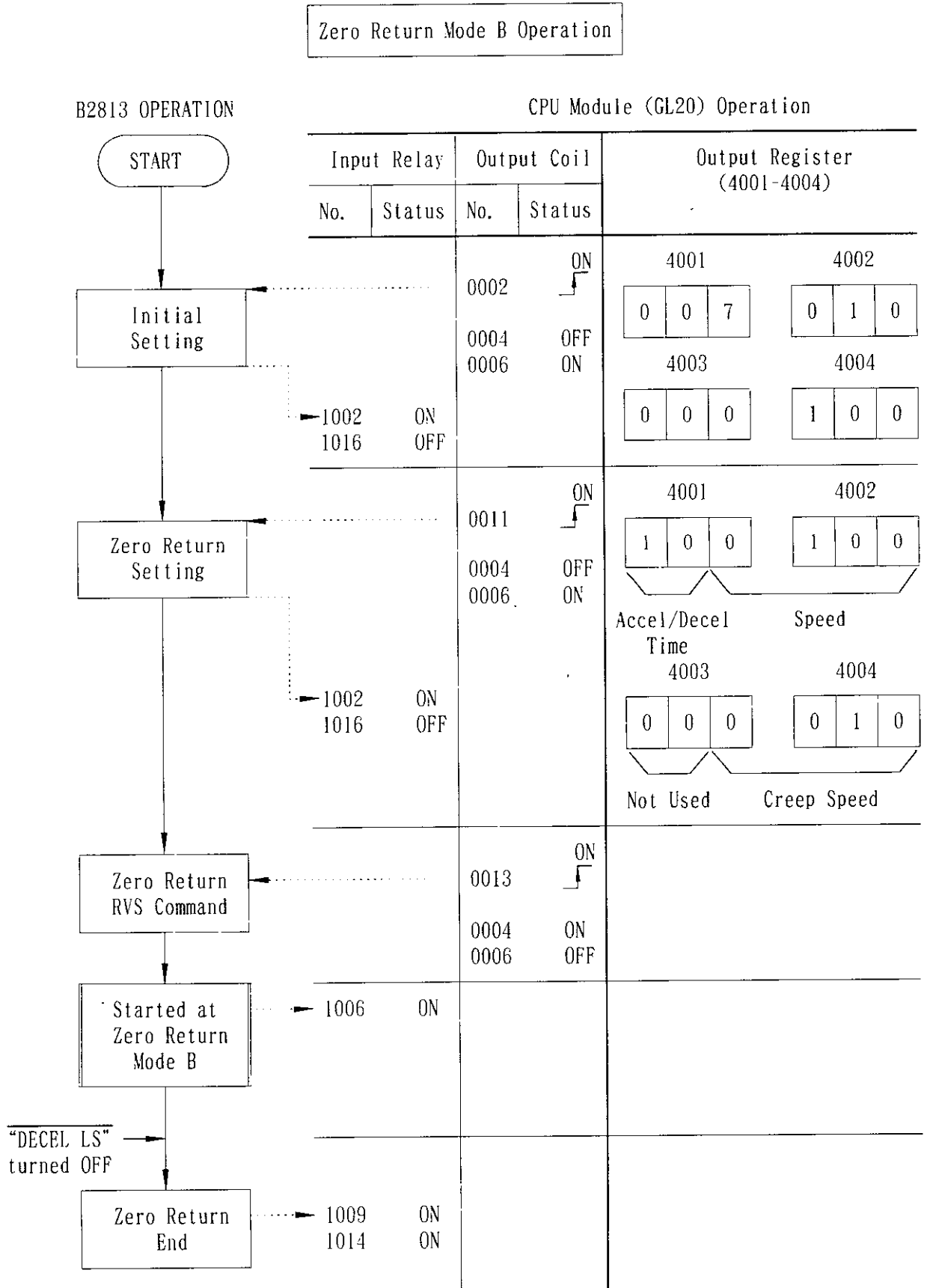
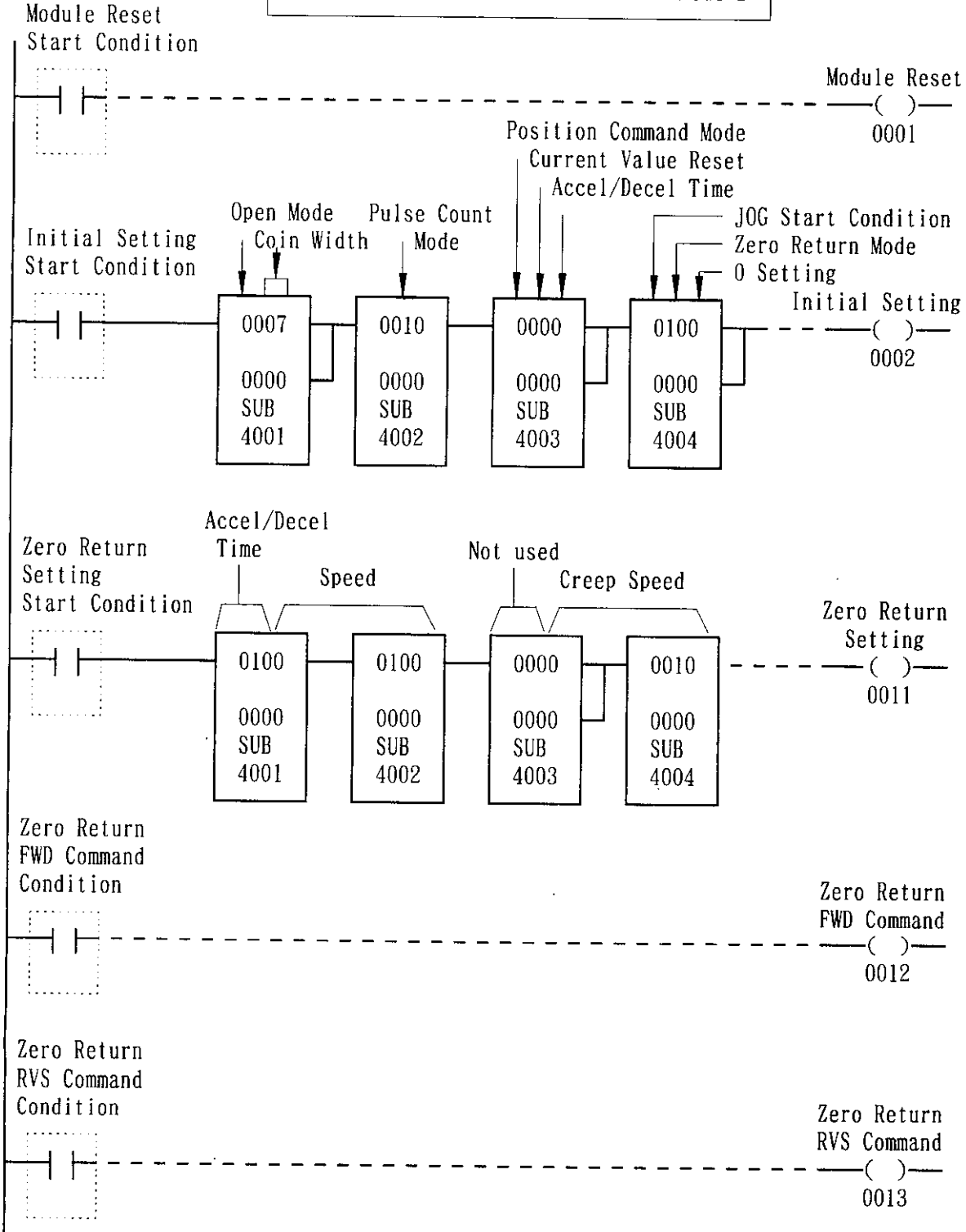


Fig 4.26 Execution of Zero Return Mode B Operation

# Action Diagram of GL20 Zero Return Mode B



## 4.4 JOG OPERATION

JOG operation is selectable between JOGL (low speed) and JOGH (high speed).

### (1) Operation

When turning on the JOGL or JOGH command, operation starts so as to meet the predetermined JOGL or JOGH accel/decel time and speed, and the machine decelerates and stops when the JOG command is turned off. Deceleration and stop also occur when the STOP command is turned on.

JOGL/JOGH is prior to call up operation. During JOGL operation, JOGH is disregarded, and JOGL is disregarded during the course of JOGH operation. In case JOGL and JOGH are turned on simultaneously, priority is given to JOGL. Attempt to change sign is disregarded during JOG operation. Decel/stop occurs when turning to the AUTO mode (turning on the output coil AUTO/MAN) during JOG operation.

JOG operation can be started in one of the two modes as selected in the initial setting.

- 0 : Enables the next start when the completion of pulse issuance and COIN are both satisfied.
  - 1 : Enables the next start on completion of pulse distribution.
- Modes 0 and 1 differ only in the presence or absence of starting condition COIN (see input relay COIN).

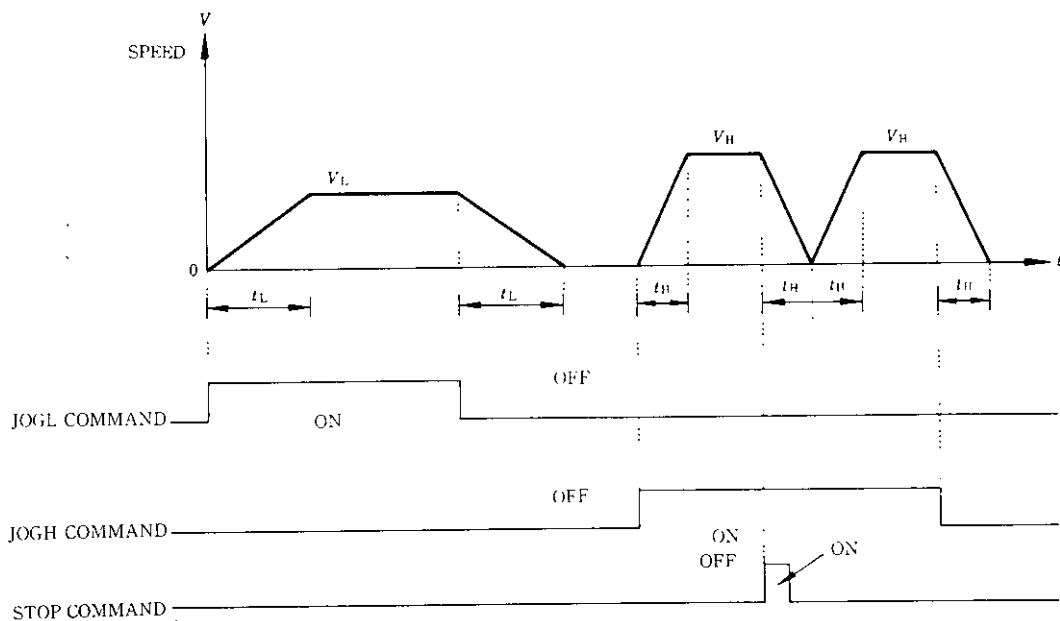
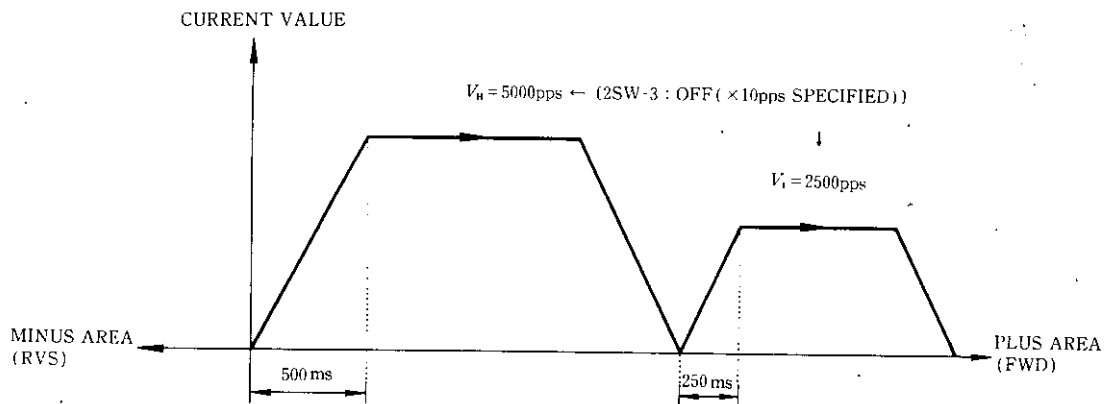


Fig. 4.27 JOG Action Time chart

### (2) Setting Items

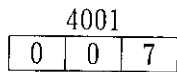
JOGH operation speed  $V_H$  and accel/decel time  $t_H$ , and JOGL operation speed  $V_L$  and accel/decel time  $t_L$  need to be set.

(3) Example of JOG Action Time Chart (GL20)



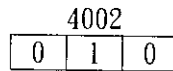
JOGH operation toward plus area first, then JOGL operation.  
 Where, JOGH speed = 5000 pps, accel/decel time = 500  
 JOGL speed = 2500 pps, accel/decel time = 250

Initial settings are as follows :

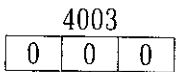


COIN WIDTH  
(7)

OPERATION MODE  
(0 : 1-STEP SPEED PATTERN)



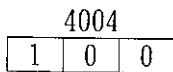
PULSE COUNT MODE  
(1 : 1 MULTIPLIER)



ACCEL/DECEL TIME CHANGE  
(0 : ×10 ms)

CURRENT VALUE RESET  
(0 : NOT RESET)

POSITION COMMAND MODE  
(0 : INCREMENTAL MODE)



0 SETTING  
(0 : 0)

ZERO RETURN MODE  
(0 : MODE B)

OPERATION START  
CONDITION

(1 : NEXT START ENABLE AT  
COMPLETION OF PULSE  
DISTRIBUTION)

# 4.4 JOG OPERATION (Cont'd)

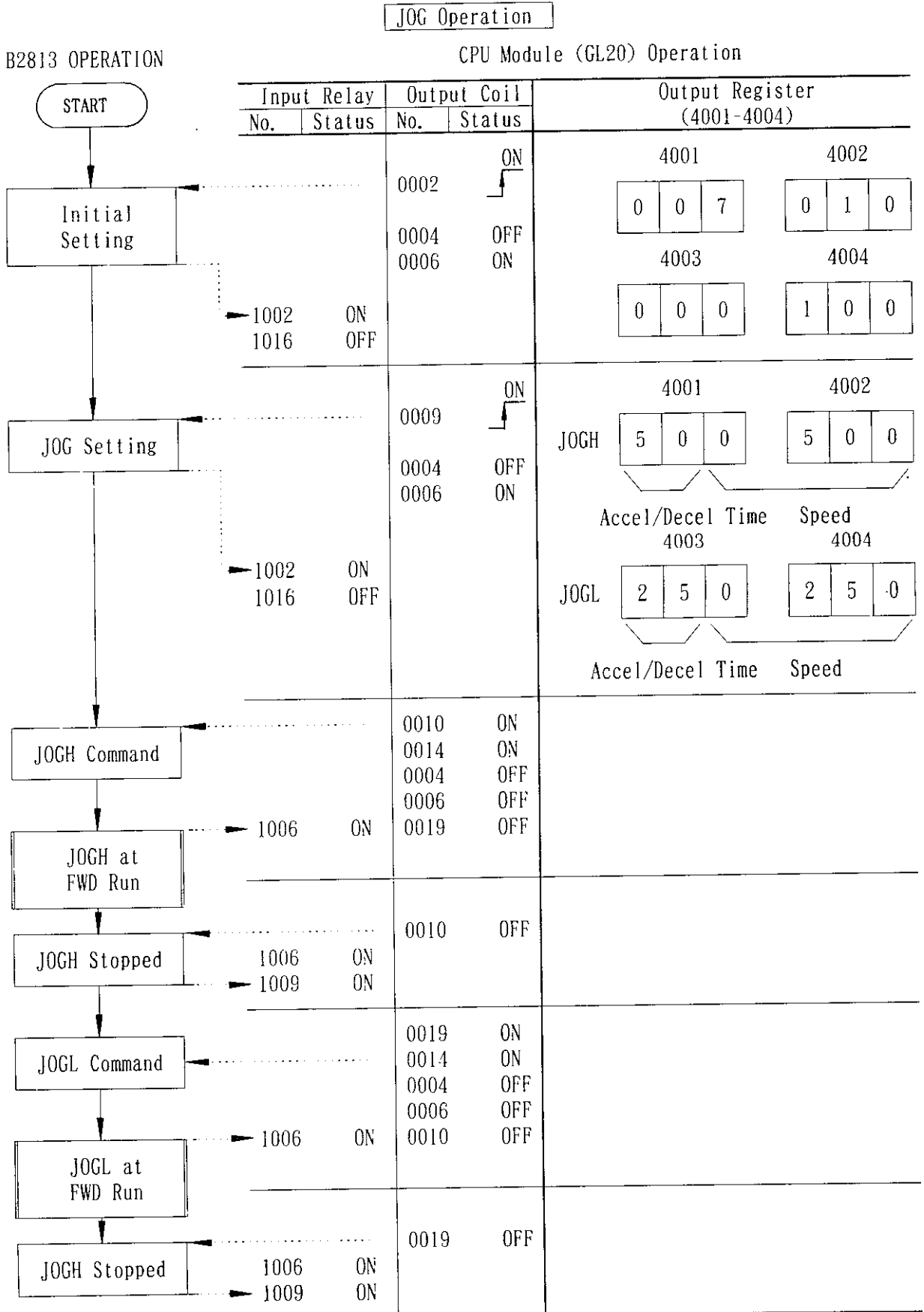
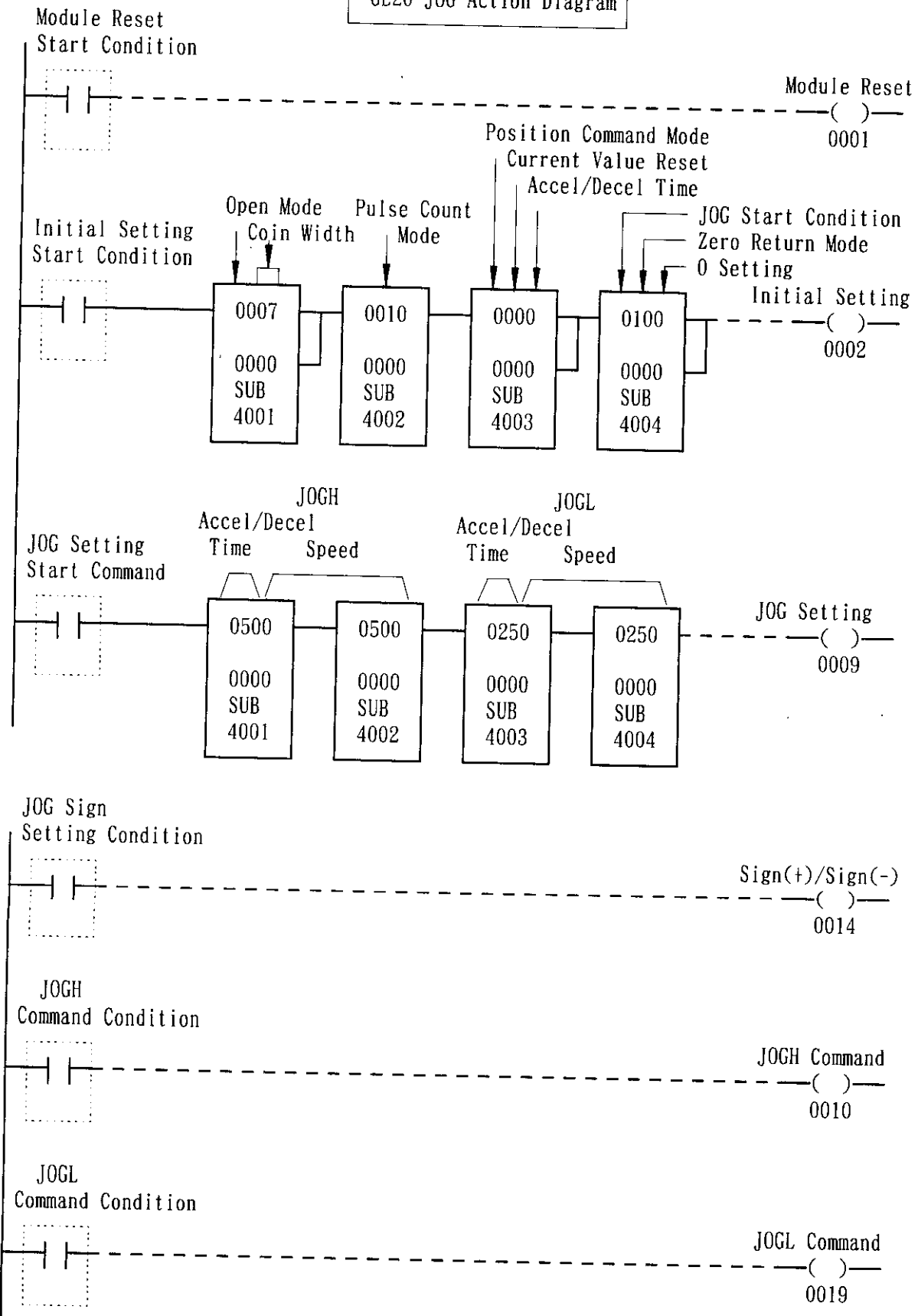


Fig 4.28 Execution of Zero Return Mode B Operation

# GL20 JOG Action Diagram



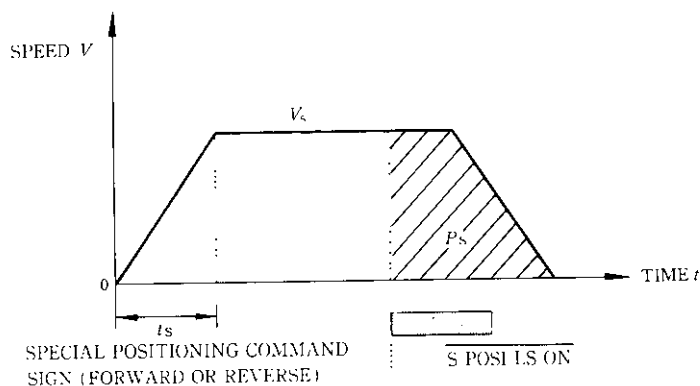
## 4.5 SPECIAL POSITIONING OPERATION

Possible only when the incremental mode is selected.

### (1) Basic Operation

When turning on the special positioning command, operation starts so as to meet the preset special positioning accel/decel time ( $t_s$ ) and speed ( $V_s$ ) in the + or - (forward or reverse) direction.

When the ON status of external input signal  $\overline{S\ POSI\ LS}$  (special positioning limit switch) is detected, the machine stops after distributing the set number of pulses ( $P_s$ ).



If  $\overline{S\ POSI\ LS}$  is already turned ON, the machine stops after distributing the set number of pulses.

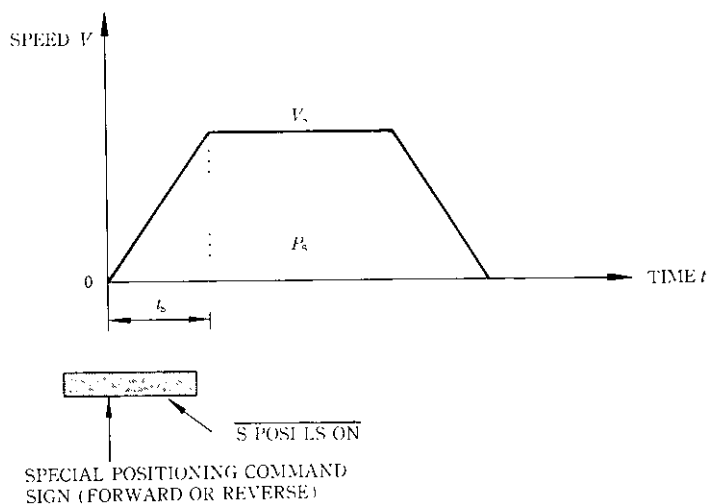


Fig. 4.29 Special Positioning Operation

### (2) Setting Items

Special positioning speed  $V_s$ , accel/decel time  $t_s$  and number of pulses issued  $P_s$  need to be set.

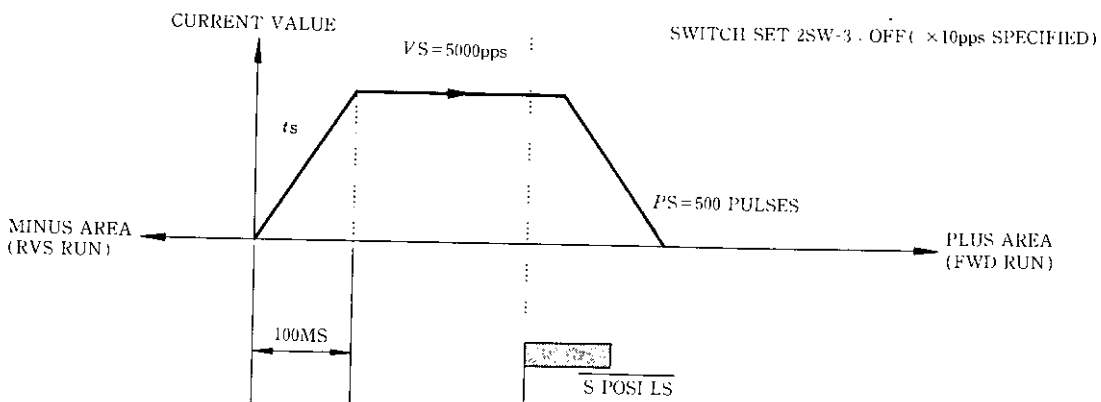


### (3) Special Positioning Precautions

- Special command will cause error without special positioning setting in incremental mode.
- Turning ON the special positioning command is disregarded except for special positioning.
- Once interrupted, special positioning operation requires turning on the special positioning command again for its restart.
- Turning  $\overline{S\ POSI\ LS}$  from OFF to ON in the course of special positioning operation is detected with a variation of 5 ms at maximum. This incurs positioning error.

(4) Shown below is action during special positioning operation.

The machine moves at a speed of 5,000 pps and in accel/decel time 100 ms in the plus direction. When  $\overline{S\ POSI\ LS}$  ON is detected, 500 pulses are distributed followed by a stoppage.



Initial settings are as follows :

4001  
0 0 7

COIN WIDTH  
(7)

OPERATION MODE  
(0 : 1-STEP SPEED PATTERN)

4002  
0 1 0

PULSE COUNT MODE  
(1 : 1 MULTIPLIER)

4003  
0 0 0

ACCEL/DECAL TIME CHANGE  
(0 : ×10 ms)  
CURRENT VALUE RESET  
(0 : NOT RESET)  
POSITION COMMAND MODE  
(0 : INCREMENTAL MODE)

4004  
1 0 0

0 SETTING  
ZERO RETURN MODE  
(0 : MODE B)  
OPERATION START  
CONDITION  
(1 : NEXT START POSSIBLE  
AT COMPLETION OF  
PULSE DISTRIBUTION)

## 4.5 SPECIAL POSITIONING OPERATION (Cont'd)

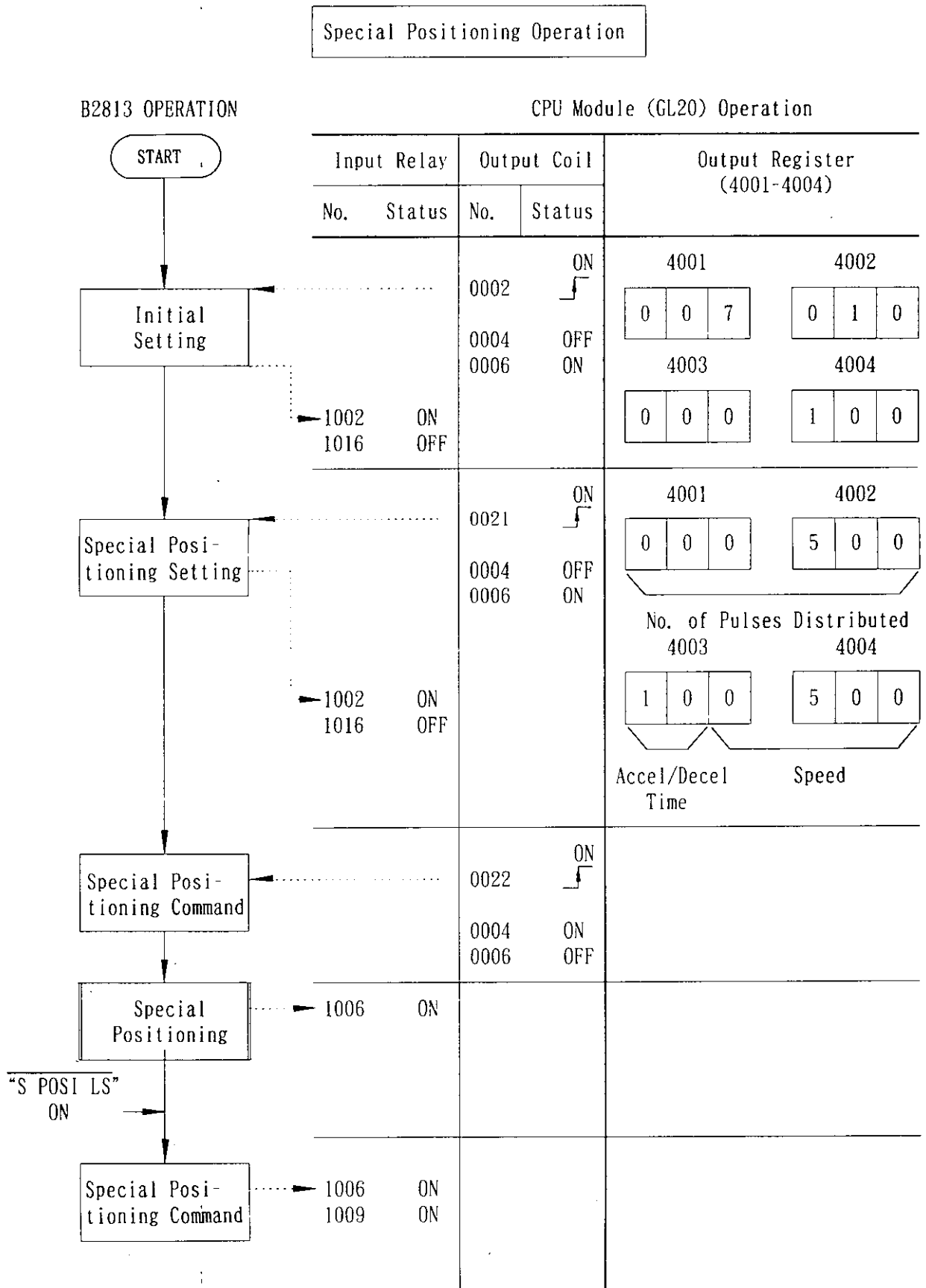
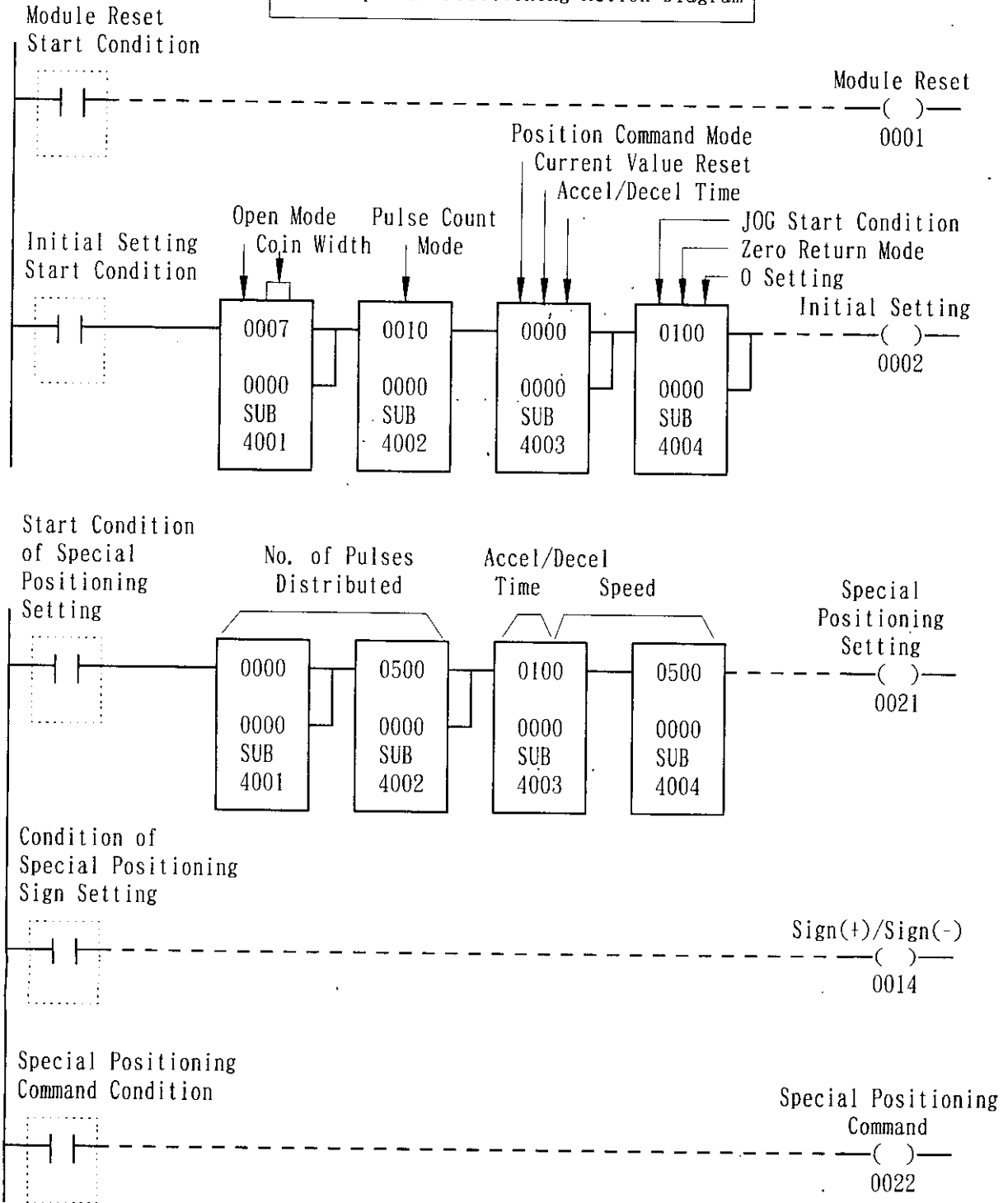


Fig 4.30 Execution of Special Positioning Operation

# GL20 Special Positioning Action Diagram



## 4.6 HANDLE OPERATION

Handle operation is enabled by external input of signals from the manual pulse generator. When turning the handle in the positive or negative direction, movement occurs in the relevant direction.

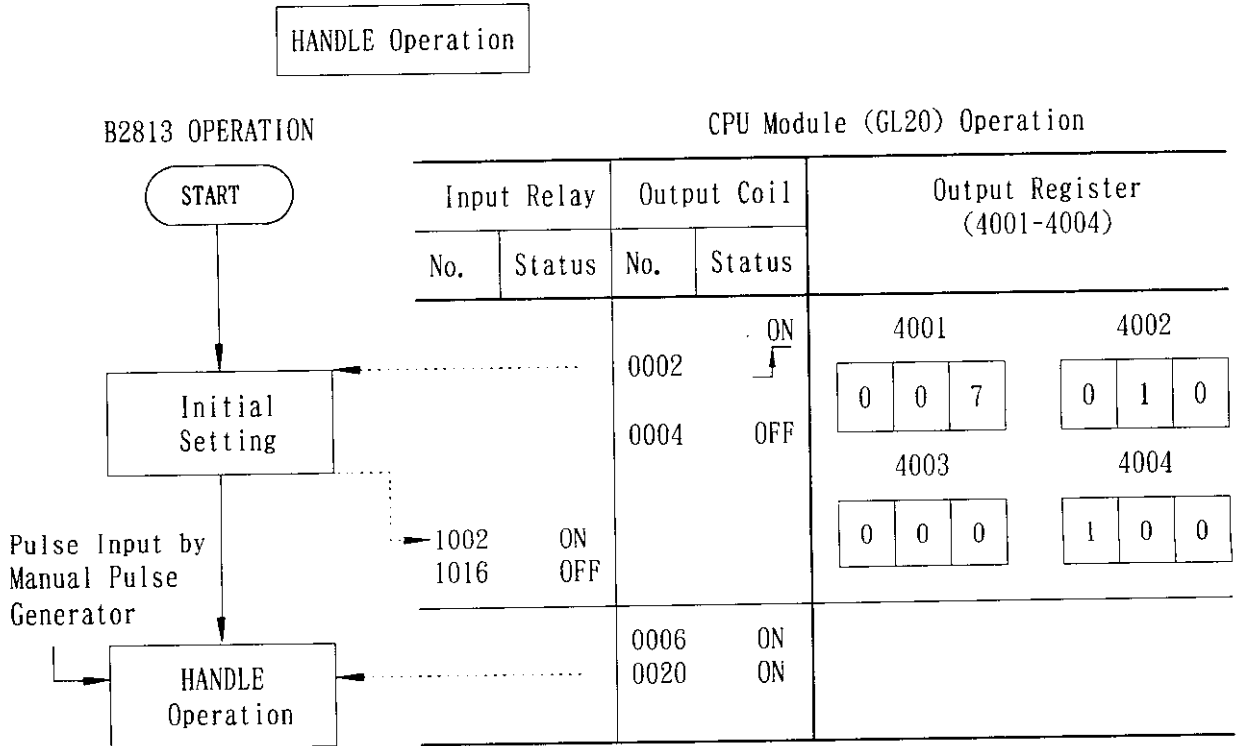
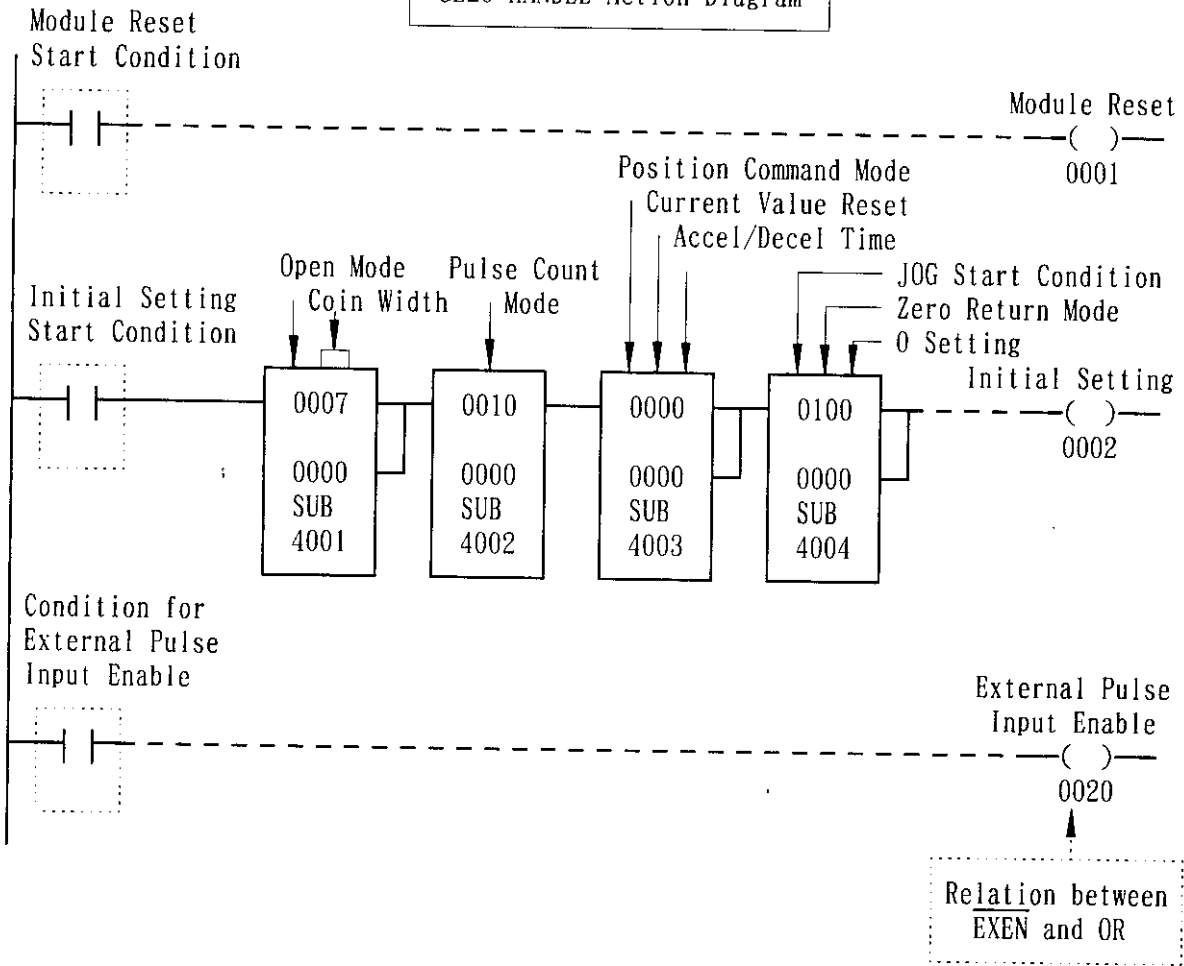


Fig 4.31 Execution of HANDLE Operation

# 4.6 HANDLE OPERATION (Cont'd)

GL20 HANDLE Action Diagram



## 5. INTERNAL INTERFACE

### 5.1 I/O ALLOCATION OF CPU MODULE

For interface between the CPU module and B2813, output coil, input relay, output register and input register are allocated. I/O allocation points of the CPU module are listed in Table 5.1. Binary specification is required for allocating the output and input registers.

Table 5.1 Number of I/O Allocations of CPU Module

I/O Allocation	Points/Registers	Signal Flow	
		CPU Module	B2813
Output	24 or 16 Points	→	←
Input Relay	16 Points	←	→
Output Register	4 Registers	→	←
Input Register	4 Registers	←	→

### 5.2 OUTPUT COIL (CONTROL SIGNAL) FROM CPU MODULE TO B2813

#### (1) List of Output Coils

24 (or 16) output coils are provided and used as the control signals from the CPU module to B2813. Table 5.2 lists the output coils.

Table 5.2 List of Output Coils

GL20	GL60S	Signal Name
0001 + 8n	00001 + 8n	Module reset
0002 + 8n	00002 + 8n	Initial setting
0003 + 8n	00003 + 8n	Not used
0004 + 8n	00004 + 8n	AUTO/ MAN
0005 + 8n	00005 + 8n	START
0006 + 8n	00006 + 8n	STOP
0007 + 8n	00007 + 8n	Auto positioning setting
0008 + 8n	00008 + 8n	Current value setting
0009 + 8n	00009 + 8n	JOG setting
0010 + 8n	00010 + 8n	JOCH command
0011 + 8n	00011 + 8n	Zero return setting
0012 + 8n	00012 + 8n	FWD command for zero return
0013 + 8n	00013 + 8n	RVS command for zero return
0014 + 8n	00014 + 8n	Sign(+)/Sign(-)
0015 + 8n	00015 + 8n	Error code reset
0016 + 8n	00016 + 8n	Monitor 1
0017 + 8n	00017 + 8n	Monitor 2
0018 + 8n	00018 + 8n	Monitor 3
0019 + 8n	00019 + 8n	JOGL command
0020 + 8n	00020 + 8n	External pulse input enable (Manual pulse input enable)
0021 + 8n	00021 + 8n	Special positioning setting
0022 + 8n	00022 + 8n	Special positioning command
0023 + 8n	00023 + 8n	Not used
0024 + 8n	00024 + 8n	Not used

At 16-point allocation, these signals are OFF in the module.

n = 0, 1, 2 . . . .

Show the reference No. at output coil allocation.

(2) Contents of Each Output Coil

24 output coils function as control signals which are detailed in Table 5.3. B2813 operates while confirming the ON/OFF condition of each output coil. (See Table 5.4 "Output Coil Conditions.")

Table 5.3 Output Coils and Their Contents

Signal Name	Description
Module Reset	Module reset command. Upon receiving module reset, B2813 initializes the internal RAM and external input signal, and resets various setpoints, current value and deviation counter to zero. Effective when turned from OFF to ON.
Initial Setting	Initial setting command of B2813 (initial value preset in output register). Effective when turned from OFF to ON. (B2813 clears various operational settings on reception of the initial setting command.)
AUTO/MAN	Selection of auto or manual operation. ON ... Selects auto operation (automatic positioning, zero return, special positioning) OFF .. Selects manual operation (JOG operation). Independent of handle operation.
START	Start command for automatic positioning. Effective when turned from OFF to ON.
STOP	Positioning stop command. Effective at ON. Stops the machine in linear accel/decel time.
Automatic Positioning	Position command automatic positioning and setting command for accel/decel time and speed. (Relevant values are preset in output register.) Effective when turned from OFF to ON. ON only for scan 1 in case of 1-step speed pattern and only for scan 2 in case of 2-step speed pattern (1-step speed pattern) "Positioning setting" Output coil <input type="checkbox"/> OFF <input type="checkbox"/> ON 1 Scan <input type="checkbox"/> Output register <input type="checkbox"/> P, t, V <input type="checkbox"/> (2-step speed pattern) "Positioning setting" Output coil <input type="checkbox"/> OFF <input type="checkbox"/> ON 1 Scan <input type="checkbox"/> 2 Scan <input type="checkbox"/> Output register <input type="checkbox"/> P <sub>1</sub> , t <sub>1</sub> , V <sub>1</sub> . P <sub>2</sub> , t <sub>2</sub> , V <input type="checkbox"/>

## 5.2 OUTPUT COIL (CONTROL SIGNAL) FROM CPU MODULE TO B2813 (Cont'd)

Table 5.3 Output Coils and Their Contents (Cont'd)

Signal Name	Description													
Current Value Setting	Command for updating current value (current value preset in output register). Effective when turned from OFF to ON.													
JOG Setting	Command for setting accel/decel time and speed in JOGH/JOGL operation. Effective when turned from OFF to ON.													
JOGH Command	Command of JOGH (high speed) operation. ON ... Starts operation. OFF .. Stops operation.													
Zero Return Setting	Command for setting accel/decel time, speed and creep speed in zero return. (Relevant values are preset in output register.) Values remain the same between FWD and RVS. Effective when turned from OFF to ON.													
Zero Return FWD Command	Start command for zero return in forward rotation. Effective when turned from OFF to ON.													
Zero Return RVS Command	Start command for zero return in reverse rotation. Effective when turned from OFF to ON.													
Sign(+)/Sign(-)	<p>Command for selecting plus/minus area or forward/reverse rotation linked with other settings or commands.</p> <p>(1) The following is effective when turning "current value setting" from OFF to ON.  ON : Commands plus area.  OFF : Commands minus area.</p> <p>(2) The following is effective when turning "positioning setting" from OFF to ON.</p> <table border="1"> <thead> <tr> <th>Operation Mode</th> <th>Sign(+)/Sign(-)</th> <th>Command</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Incremental Mode</td> <td>ON</td> <td>Forward</td> </tr> <tr> <td>OFF</td> <td>Reverse</td> </tr> <tr> <td rowspan="2">Absolute Mode</td> <td>ON</td> <td>Plus area</td> </tr> <tr> <td>OFF</td> <td>Minus area</td> </tr> </tbody> </table> <p>(3) The following is effective when JOG operation (JOGH or JOGL command) is activated.  ON : Commands forward rotation.  OFF : Commands reverse rotation.</p> <p>(4) The following is effective when special positioning command is turned from OFF to ON.  ON : Commands forward rotation.  OFF : Commands reverse rotation.</p>	Operation Mode	Sign(+)/Sign(-)	Command	Incremental Mode	ON	Forward	OFF	Reverse	Absolute Mode	ON	Plus area	OFF	Minus area
Operation Mode	Sign(+)/Sign(-)	Command												
Incremental Mode	ON	Forward												
	OFF	Reverse												
Absolute Mode	ON	Plus area												
	OFF	Minus area												
Error Code Reset	Command for resetting error code. Effective when turned from OFF to ON. (All error codes stored in memory are cleared.)													



Table 5.3 Output Coils and Their Contents (Cont'd)

Signal Name	Description																																																
Monitor 1 2 3	<p>Data to be monitored is specified by using these three output coils. (In case of allocating 16 output coils, monitors 2 and 3 remain OFF.)</p> <table border="1"> <thead> <tr> <th colspan="3">Monitor Code</th> <th colspan="2">Contents Monitor</th> </tr> <tr> <th>Mon-itor 1</th> <th>Mon-itor 2</th> <th>Mon-itor 3</th> <th>1st, 2nd Input Registers</th> <th>3rd, 4th Input Registers</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td rowspan="3">Current feedback value</td> <td>Current command value</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>Error code</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>Current value setting</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>No. of specially distributed pulses</td> <td>Special accel/decel time, speed</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>Auto position command value</td> <td>Auto accel/decel time, speed</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>JOGH accel/decel time, speed</td> <td>JOGL accel/decel time, speed</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>Accel/decel time, speed of zero return</td> <td>Creep speed</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td colspan="2">Initial setting</td> </tr> </tbody> </table> <p>0 : OFF    1 : ON</p> <p>Note : In case of 2-step speed pattern, (P1, T1, V1) and (P2, T2, V2) are alternately displayed about every 3 seconds.</p>	Monitor Code			Contents Monitor		Mon-itor 1	Mon-itor 2	Mon-itor 3	1st, 2nd Input Registers	3rd, 4th Input Registers	0	0	0	Current feedback value	Current command value	1	0	0	Error code	0	1	0	Current value setting	1	1	0	No. of specially distributed pulses	Special accel/decel time, speed	0	0	1	Auto position command value	Auto accel/decel time, speed	1	0	1	JOGH accel/decel time, speed	JOGL accel/decel time, speed	0	1	1	Accel/decel time, speed of zero return	Creep speed	1	1	1	Initial setting	
Monitor Code			Contents Monitor																																														
Mon-itor 1	Mon-itor 2	Mon-itor 3	1st, 2nd Input Registers	3rd, 4th Input Registers																																													
0	0	0	Current feedback value	Current command value																																													
1	0	0		Error code																																													
0	1	0		Current value setting																																													
1	1	0	No. of specially distributed pulses	Special accel/decel time, speed																																													
0	0	1	Auto position command value	Auto accel/decel time, speed																																													
1	0	1	JOGH accel/decel time, speed	JOGL accel/decel time, speed																																													
0	1	1	Accel/decel time, speed of zero return	Creep speed																																													
1	1	1	Initial setting																																														
JOGL Command	<p>Command for JOGL (low speed) operation</p> <p>ON : Starts operation.</p> <p>OFF : Stops operation.</p>																																																
External Pulse Input Enable	<p>Enables input of external pulse. Upon input of external command pulse (from manual pulse generator), handle operation is enabled. Effective at ON.</p>																																																
Special Positioning Setting	<p>Command for setting the number of pulses distributed, accel/decel time and speed in special positioning operation. (Possible only in incremental mode.) Effective when turned from OFF to ON.</p>																																																
Special Positioning Command	<p>Command for starting the special positioning (possible only in incremental mode). Effective when turned from OFF to ON.</p>																																																

## 5.2 OUTPUT COIL (CONTROL SIGNAL) FROM CPU MODULE TO B2813 (Cont'd)

### (3) List of Output Coil Conditions

Table 5.4 lists the output coil conditions. Any setting or command that does not meet the ON/OFF condition of output coil is judged as an error or disregarded according to the internal processing of B2813.

Table 5.4 Output Coils and B2813 Functions

Coil Name Module Function	Module Reset	AUTO/ MAN	STOP	Initial Setting	Current Value Setting	Auto Positioning Setting	Zero Return Setting	Special Positioning Setting	JOG Setting	START	Zero FWD Point	Zero RVS Point	Special Positioning Command	JOGH Command	JOGL Command	External Pulse Input Enable	Error Code Reset
Module Reset	Ⓜ																
STOP	—		①	—	—	—	—	—	—			—					
Initial	—	0	1	Ⓜ	—	—	—	—	—			—					
Current Value	—		1	—	Ⓜ	—	—	—	—								
Auto Positioning	—			—	—	Ⓜ	—	—	—								
Zero Return	—	0	1	—	—	—	Ⓜ	—	—								
Special Positioning	—	0	1	—	—	—	—	Ⓜ	—								
JOG	—	0	1	—	—	—	—	—	Ⓜ	—	—	—					
Auto Positioning Start	—	1	0			—	—	—	—	Ⓜ	—	—					
Zero Return Start at FWD Run	—	1	0			—	—	—	—	—	Ⓜ	—					
Zero Return Start at RVS Run	—	1	0			—	—	—	—	—	—	Ⓜ					
Special Positioning Start	—	1	0			—	—	—	—	—	—	—	Ⓜ				
JOGH	—	0	0			—	—	—	—	—	—	—		①	0		
JOGL	—	0	0			—	—	—	—	—	—	—		0	①		
HANDLE	—		1	—													①
Error Code Reset	—			—													Ⓜ

<Notes for Table 5.4>

1. 1 : ON, 0 : OFF, ① : OFF to ON, — : status remains unchanged, blank : not applicable.  
 ②, ③ : coil finally validated after conditions of other coils are arranged.
2. Priority is given to JOGH or JOGL operation depending on which is selected earlier, JOGH or JOGL command. At this time, the ON/OFF status of the later command is disregarded. If both commands are turned on simultaneously, priority is given to the JOGL command.
3. If two or more output coils are turned on simultaneously among START, zero return FWD command, RVS command or special positioning command, commands are invalidated with no error code assigned.

(1) For setting zero return in forward rotation

Output Coil	ON/OFF Condition
AUTO/ $\overline{\text{MAN}}$	OFF
STOP	ON
Module Reset	—
Other Various Settings	—

} Finally, zero return setting  
① : OFF to ON

(2) For starting zero return in forward rotation

Output Coil	ON/OFF Condition
AUTO/ $\overline{\text{MAN}}$	ON
STOP	OFF
Module Reset	—
Various other Operation Commands	—

} Finally, zero return FWD command  
① : OFF to ON

### 5.3 INPUT RELAY (CONTROL SIGNAL) FROM B2813 TO CPU MODULE

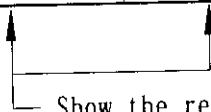
(1) List of Input Relays

16 input relays are provided and used as the control signals from B2813 to the CPU module. Table 5.5 lists the input relays.

Table 5.5 List of Input Relays

GL20	GL60S	Signal Name
1001+ 8n	10001+ 8n	READY
1002+ 8n	10002+ 8n	PRESET ACK
1003+ 8n	10003+ 8n	SIGN(+)/SIGN(-)
1004+ 8n	10004+ 8n	Multi-step speed monitor 1
1005+ 8n	10005+ 8n	Multi-step speed monitor 2
1006+ 8n	10006+ 8n	PULS/MINUS
1007+ 8n	10007+ 8n	Current value over
1008+ 8n	10008+ 8n	Not used
1009+ 8n	10009+ 8n	COIN
1010+ 8n	10010+ 8n	DECEL LS
1011+ 8n	10011+ 8n	ERROR
1012+ 8n	10012+ 8n	Fault
1013+ 8n	10013+ 8n	Not used
1014+ 8n	10014+ 8n	Zero return pulse output completion
1015+ 8n	10015+ 8n	Positioning pulse output completion
1016+ 8n	10016+ 8n	PRESET NAK

n=0, 1, 2 . . . . .



Show the reference No. at input relay allocation.

(2) Contents of Input Relay

16 input relays connect the control signals which are detailed in Table 5.6.

Table 5.6 Input Relays and Their Contents

Singal Name	Description													
READY	The result of B2813 self-diagnosis is indicated. Normally ON, but OFF in the event of malfunction (ROM total check error, RAM check error or WDT error). Turned OFF for about 0.5 sec on energization or module resetting.													
PRESET ACK	Turned ON for only one scan after normal completion of preset action (initial setting, current value setting, positioning setting, zero return setting, special positioning setting or jog setting) in B2813.													
Sign (+)/Sign (-)	Monitors sign (+)/sign (-) preset for monitoring "current value setting" and "auto position command value." (1) When monitor code (0101) is "current value setting" ON : Plus range OFF : Minus range (2) When monitor code (001) is "auto position command value" <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Operation Mode</th> <th>Sign (+)/Sign (-)</th> <th>Command</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Incremental Mode</td> <td>ON</td> <td>Forward run</td> </tr> <tr> <td>OFF</td> <td>Reverse run</td> </tr> <tr> <td rowspan="2">Absolute Mode</td> <td>ON</td> <td>Plus area</td> </tr> <tr> <td>OFF</td> <td>Minus area</td> </tr> </tbody> </table> <p>Note: In case of multi-step speed pattern, the sign is monitored about every 3 seconds.</p>	Operation Mode	Sign (+)/Sign (-)	Command	Incremental Mode	ON	Forward run	OFF	Reverse run	Absolute Mode	ON	Plus area	OFF	Minus area
Operation Mode	Sign (+)/Sign (-)	Command												
Incremental Mode	ON	Forward run												
	OFF	Reverse run												
Absolute Mode	ON	Plus area												
	OFF	Minus area												
Multi-step Speed Pattern Monitor 1 Multi-step Speed Pattern Monitor 2	Indicate which step of multi-step speed pattern the "auto position command value, accel/ decel time and speed" monitor is supervising. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Monitor</th> <th>Ist Step</th> <th>2nd Step</th> </tr> </thead> <tbody> <tr> <td>Multi-step Speed Pattern Monitor 1</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td>Multi-step Speed Pattern Monitor 2</td> <td>OFF</td> <td>OFF</td> </tr> </tbody> </table>	Monitor	Ist Step	2nd Step	Multi-step Speed Pattern Monitor 1	OFF	ON	Multi-step Speed Pattern Monitor 2	OFF	OFF				
Monitor	Ist Step	2nd Step												
Multi-step Speed Pattern Monitor 1	OFF	ON												
Multi-step Speed Pattern Monitor 2	OFF	OFF												
PLUS/MINUS	Indicates the area of current value counter. ON : Plus area OFF : Minus area													
Current Value Over	Control signal valid only in absolute mode. Turned ON when the current value counter in B2813 exceeds absolute position area. 													

Table 5.6 INPUT Relay and Their Contents (Cont'd)

Signal Name	Description
COIN	Effective only when 0 is selected in the initial setting of various operation start conditions. Turned ON when reading on the deviation counter is within the COIN detection width initially set.
DECEL LS	Indicates the input status of external input signal DECEL LS. Turned ON when DECEL LS comes ON.
ERROR	Turns ON if B2813 detects any error. For error codes, refer to Sect. 9 "TROUBLESHOOTING."
FAULT	Indicates that B2813 is outputting external "FAULT" signal. For error codes, refer to Sect. 9 "TROUBLESHOOTING."
Completion of Zero Return Pulse Output	Turns ON for only one scan upon completion of pulse output in zero return operation. Does not turn ON for temporary pausing.
Completion of Positioning Pulse Output	Turns ON for only one scan upon completion of pulse output in automatic positioning operation. Does not turn ON at the time of temporary pausing. Effective when AUTO/ $\overline{\text{MAN}}$ is ON.
PRESET NAK	Turns ON for only one scan if data preset action in B2813 is abnormal.

## 5.4 OUTPUT REGISTER (SETTING DATA) FROM CPU MODULE TO B2813

To preset various setting data from the CPU module to B2813, four consecutive output registers are used.

Table 5.7 Output Register Allocation

GL20	GL60S	Output Register No.
4001+n	40001+n	1ST
4002+n	40002+n	2ND
4003+n	40003+n	3RD
4004+n	40004+n	4TH

n=1, 2, 3, .....

Shows the reference No. at allocation of output registers.

## 5.4.1 Initial Setting

Initial setting of B2813 is to be made according to the "initial setting command" of output coil with an initial value set in output register.

### (1) Initial Setting Items

B2813 initial setting includes the items listed in Table 5.8.

Table 5.8 Initial Setting Items

Setting Items	Description
Setting of COIN Detection Width	Specifies the detection width of positioning end signal COIN. Settable within a range of ( $\pm 10$ to 99) pulses.
Setting of Operation Mode	Specifies either 1-step or 2-step speed pattern for automatic positioning operation. 0: 1-step speed pattern 1: 2-step speed pattern
Setting of Pulse Count Mode	Specifies count mode for feedback pulse phase A/B. 1: $\times 1$ multiplier 2: $\times 2$ multiplier 4: $\times 4$ multiplier
Scale Setting for Linear Accel/Decel Time	Specifies scale of linear accel/decel time for various operations. 0 : $\times 10$ ms $\rightarrow$ 10 to 990 ms 1 : $\times 0.1$ s $\rightarrow$ 0.1 to 9.9 s
Resetting of Current Value	Specifies selection or non-selection of resetting the current value on start of automatic positioning in incremental mode. 0 : Resetting not selected 1 : Selects resetting When selecting 1, automatic positioning always starts at current value 0. Selection is impossible in absolute mode (will cause a setting error.)
Setting of Position Command Mode	Specifies incremental or absolute mode. (Refer to Par. 4.1.) 0 : Selects incremental mode. 1 : Selects absolute mode.
Setting of Zero Return Mode	Specifies zero return mode. (Refer to Par. 4.3.) 0: Mode B 1: Mode A
Setting of Start Conditions for Various Operations	Specifies start conditions for automatic positioning, JOG or zero return operation. 0: Enables the next start when completion of pulse output and COIN are both satisfied. 1: Enables the next start when pulse output is completed.  For operation under "0" setting, PG feedback pulse must always be input. "1" setting does not require PG feedback pulse input.

### 5.4.1 Initial Setting (Cont'd)

#### (2) Setting of Initial Value

Table 5.9 shows the method of setting the initial Value in the output register.

Table 5.9 Setting of Initial Value in Output Register

( GL20 

--	--	--

 (3 digits)    GL60S 

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 (4 digits) )

<p style="text-align: center;">1ST</p> <div style="display: flex; align-items: center; justify-content: center;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td style="width: 15px; height: 15px;">0</td><td style="width: 15px; height: 15px;">0</td><td style="width: 15px; height: 15px;">0</td><td style="width: 15px; height: 15px;">7</td></tr> </table> </div> <p style="margin-left: 100px;">Setting of COIN detection width <math>\pm</math> (0 to 99)</p> <p style="margin-left: 100px;">Setting of operation mode (0: 1-step speed pattern, 1: 2-step speed pattern)</p>	0	0	0	7	<p style="text-align: center;">3RD</p> <div style="display: flex; align-items: center; justify-content: center;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td style="width: 15px; height: 15px;">0</td><td style="width: 15px; height: 15px;">0</td><td style="width: 15px; height: 15px;">0</td><td style="width: 15px; height: 15px;">0</td></tr> </table> </div> <p style="margin-left: 100px;">Setting of linear accel/ decel time scale (0: <math>\times 10</math> ms, 1: <math>\times 0.1</math> S)</p> <p style="margin-left: 100px;">Resetting of current value</p> <p style="margin-left: 100px;">Setting of position command mode changeover (0: Incremental mode, 1: Absolute mode)</p>	0	0	0	0
0	0	0	7						
0	0	0	0						
<p style="text-align: center;">2ND</p> <div style="display: flex; align-items: center; justify-content: center;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td style="width: 15px; height: 15px;">0</td><td style="width: 15px; height: 15px;">0</td><td style="width: 15px; height: 15px;">1</td><td style="width: 15px; height: 15px;">0</td></tr> </table> </div> <p style="margin-left: 100px;">0 to be set</p> <p style="margin-left: 100px;">Setting of pulse count mode</p> <p style="margin-left: 100px;">(1: <math>\times 1</math> multiplier, 2: <math>\times 2</math> multiplier, 4: <math>\times 4</math> multiplier)</p>	0	0	1	0	<p style="text-align: center;">4TH</p> <div style="display: flex; align-items: center; justify-content: center;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td style="width: 15px; height: 15px;">0</td><td style="width: 15px; height: 15px;">1</td><td style="width: 15px; height: 15px;">0</td><td style="width: 15px; height: 15px;">0</td></tr> </table> </div> <p style="margin-left: 100px;">0 Setting</p> <p style="margin-left: 100px;">Setting of zero return mode (0: mode B, 1: mode A)</p> <p style="margin-left: 100px;">Setting of various operation start condition</p> <p style="margin-left: 100px;">0: Enables the next start when pulse output is completed and COIN is detected</p> <p style="margin-left: 100px;">1: Enables the next start when pulse output is completed</p>	0	1	0	0
0	0	1	0						
0	1	0	0						

**Notes:**

1. The framed numerals are default values, which are automatically set upon energization or module resetting.
2. If malfunction occurs in updated initial setting data, the previous data are validated.

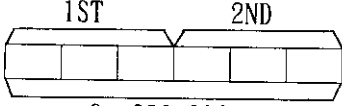
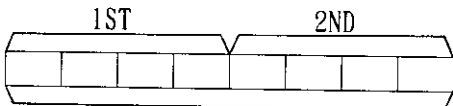
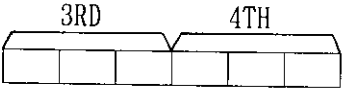
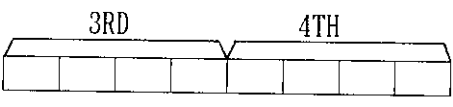
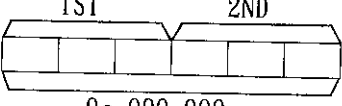
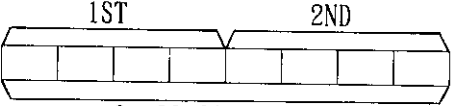


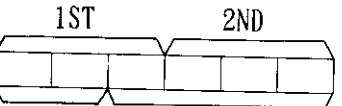
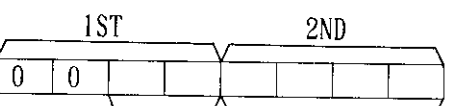
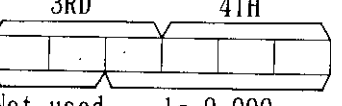
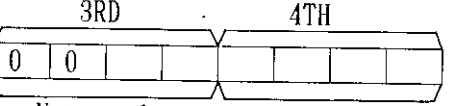


## 5.4.2 Data Set

(1) Setting Method to Output Register


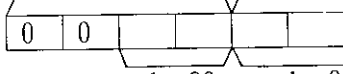

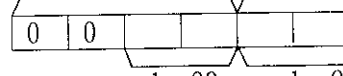
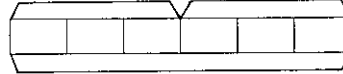
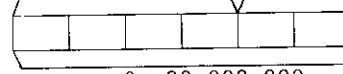
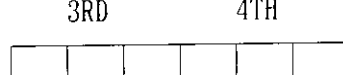
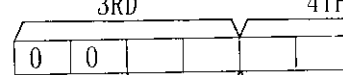
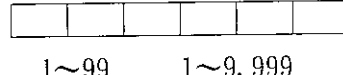
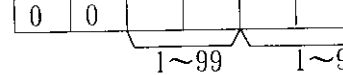
Table 5.10 shows how to set the data for output register.

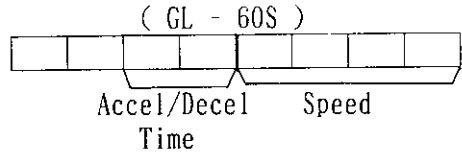
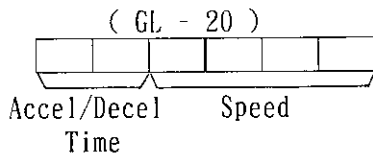
Table 5.10 Data Set

Setting Items	Output Registers	
	GL20	GL60S
Current Value	<p>1ST 2ND</p>  <p>Current Value 0~999,999</p>	<p>1ST 2ND</p>  <p>Current Value 0~99,999,999</p>
	<p>3RD 4TH</p>  <p>Not Used</p>	<p>3RD 4TH</p>  <p>Not Used</p>
Auto Positioning: • Position Command • Accel/Decel Time • Speed	<p>1ST 2ND</p>  <p>Position Command 0~999,999</p>	<p>1ST 2ND</p>  <p>Position Command 0~99,999,999</p>
	<p>3RD 4TH</p>  <p>1~99 1~9,999 Accel/Decel Time Speed Accel/Decel Time Speed</p>	<p>3RD 4TH</p>  <p>0 0 1~99 1~9,999 Accel/Decel Time Speed Accel/Decel Time Speed</p>
Zero Return Operation: • Accel/Decel Time • Speed • Creep Speed	<p>1ST 2ND</p>  <p>1~99 1~9,999 Accel/Decel Time Speed Accel/Decel Time Speed</p>	<p>1ST 2ND</p>  <p>0 0 1~99 1~9,999 Accel/Decel Time Speed Accel/Decel Time Speed</p>
	<p>3RD 4TH</p>  <p>Not used 1~9,999 Creep Speed Where speed ≤ creep speed, the setting is error.</p>	<p>3RD 4TH</p>  <p>0 0 Not used 1~9,999 Creep Speed Where speed ≤ creep speed, the setting is error.</p>

### 5.4.2 Data Set (Cont'd)

Table 5.10 Data Set (Cont'd)

JOG Opera- tion: • JOGH Accel/ Decel Time/ Speed • JOGL Accel/ Decel Time/ Speed	1ST  1~99      1~9,999 Accel/Decel      Speed Time      Speed	JOGH Accel/ Decel Time/ Speed	1ST  0 0      1~99      1~9,999 Accel/Decel      Speed Time      Speed	JOGH Accel/ Decel Time/ Speed
	3RD  1~99      1~9,999 Accel/Decel      Speed Time      Speed	JOGL Accel/ Decel Time/ Speed	3RD  0 0      1~99      1~9,999 Accel/Decel      Speed Time      Speed	JOGL Accel/ Decel Time/ Speed
Special Posi- tioning: • Number of Pulses Output • Accel/ Decel Time • Speed	1ST  0~999,999 Number of Pulses Output	1ST  0~99,999,999 Number of Pulses Output	2ND  1~99      1~9,999 Accel/Decel      Speed Time      Speed	2ND  1~99      1~9,999 Accel/Decel      Speed Time      Speed
	3RD  1~99      1~9,999 Accel/Decel      Speed Time      Speed	Accel/ Decel Time, Speed	3RD  0 0      1~99      1~9,999 Accel/Decel      Speed Time      Speed	Accel/ Decel Time, Speed



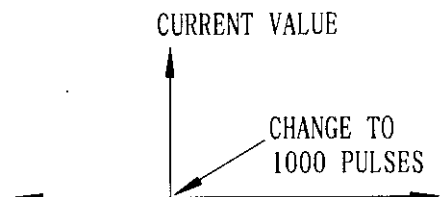
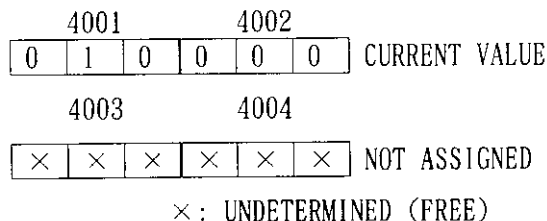
- Speed: PPS value is obtained by multiplying 1 to 9,999 ten times or twenty times. ( $\times 10$  PPS unit or  $\times 20$  PPS unit is selected by switch 2SW-3.)
- Accel/decel time:  
 Obtainable by multiplying 1 to 99 by 10 ms or 0.1 s.  
 (Either factor  $\times 10$  ms or  $\times 0.1$  s is to be selected in initial setting.)

(2) Examples of Various Settings --- When output registers 4001 to 4004 are used for GL 20

#### (a) Setting of current value

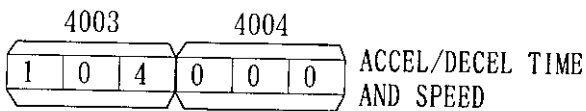
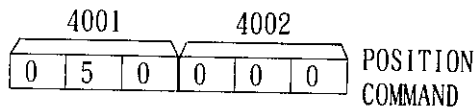
Current value is to be updated to 10,000 (pulses).

Set the output registers 4001 through 4004 as follows and turn the "current value change" output coil from OFF to ON. (In this case, the STOP output coil needs to be turned ON.)

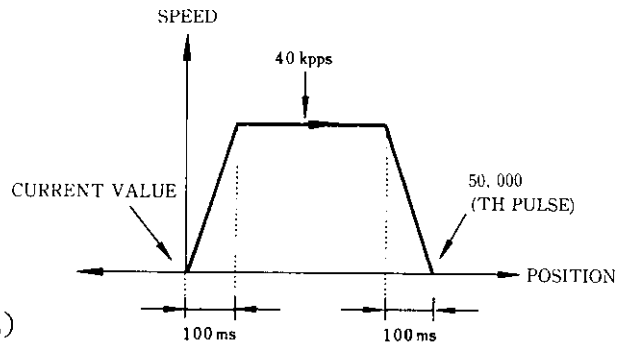


(b) Setting in automatic positioning operation (in case of 1-step speed pattern)

Automatic positioning is to be effected toward the targeted position (50,000th pulse) in a linear accel/decel time of 100 ms and at a steady speed of 40 kpps (in 1-step speed pattern and absolute mode). Set the output registers 4001 through 4004 as follows and turn the "automatic positioning setting" output coil from OFF to ON.

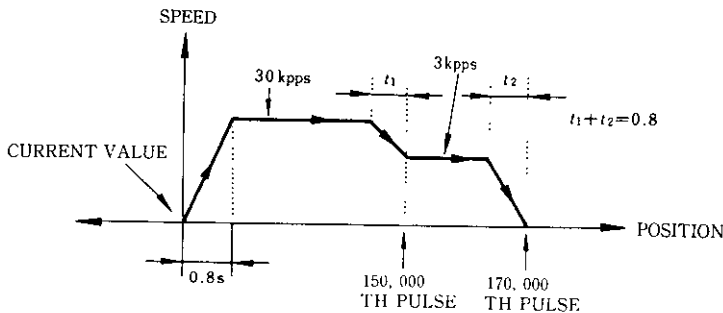


SPEED:  
 $4,000 \times 10 = 40,000 \text{ pps}$   
 (40 kpps)  
 (with 2SW-3 set at  $\times 10 \text{ pps}$ )  
 ACCEL/DECEL TIME:  
 $10 \times 10 = 100$   
 (with  $\times 10 \text{ ms}$  selected in initial setting)

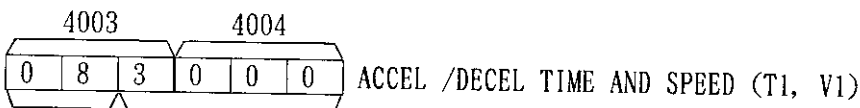
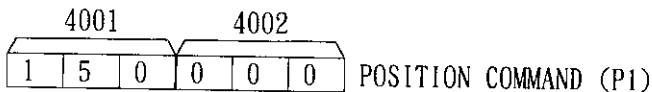


(c) Setting in automatic positioning operation (in case of 2-step speed pattern)

Automatic positioning is to be effected toward the targeted position (150,000th pulse) in acceleration time of 0.8 sec and at a steady speed of 30 kpps and from there to the final position 170,000th pulse at decelerated steady speed of 3 kpps (in 2-step speed pattern and absolute mode).



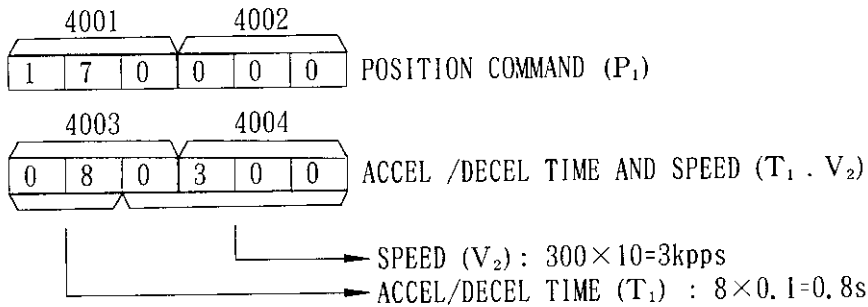
For the scan in which the "automatic positioning setting" output coil is turned from OFF to ON, set the output registers 4001 through 4004 as follows.



SPEED (V1):  $3,000 \times 10 = 30 \text{ kpps}$   
 (with 2SW-3 set at  $\times 10 \text{ pps}$ )  
 ACCEL/DECEL TIME:  $8 \times 0.1 = 0.8 \text{ s}$   
 (with  $\times 0.1 \text{ s}$  selected in initial setting)

### 5.4.2 Data Set (Cont'd)

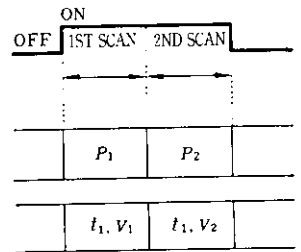
For the next scan, set the output registers 4001 through 4004 as shown below. The "positioning setting" output coil must be turned ON up to this scan. In other words, the output coil must be turned ON for only two scans.



The above explanation can be seen in the timing chart below.

"Automatic positioning setting" output coil

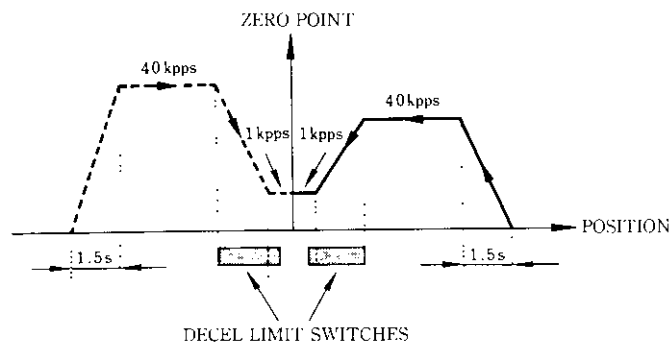
Output registers { 1st, 2nd registers (for position)  
3rd, 4th registers (for accel/decel time and speed)

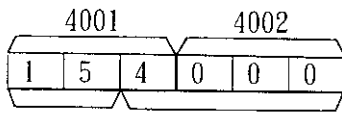


Note: Set the accel/decel time for the second scan the same as for the first scan.

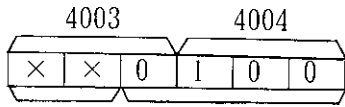
#### (d) Setting of zero return operation (in mode B)

Set the accel/decel time at 1.5 seconds, steady speed at 40 kpps, and creep speed at 1 kpps. Set the output registers 4001 through 4004 as shown below and turn the "zero return setting" output coil from OFF to ON. (At this time, the AUTO/MAN output coil and STOP output coil need to be at OFF and ON, respectively.)





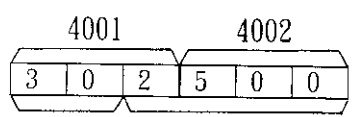
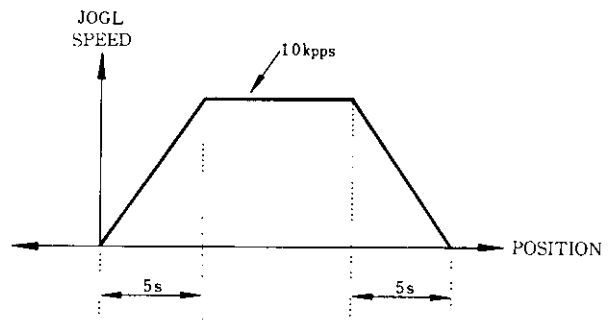
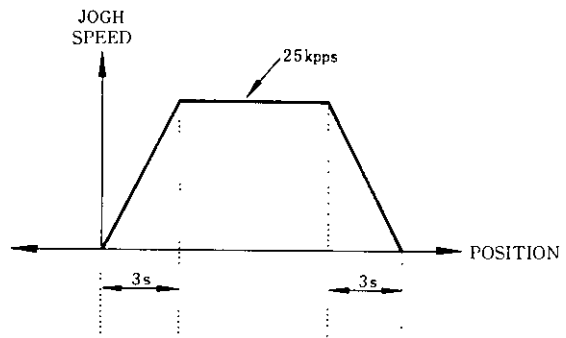
SPEED :  $4,000 \times 10 = 40,000\text{pps}$  (40kpps)  
 (with 2SW-3 set at  $\times 10\text{pps}$ )  
 ACCEL/DECEL TIME:  $15 \times 0.1 = 1.5\text{s}$   
 (with  $\times 0.1\text{s}$  selected in initial setting)



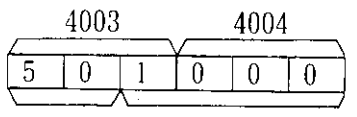
NOT USED  
 ×: UNDETERMINED  
 CREEP SPEED:  $100 \times 10 = 1,000\text{pps}$  (1kpps)  
 (with 2SW-3 set at  $\times 10\text{pps}$ )

(e) Setting of JOG operation

Set JOGH accel/decel time at 3 seconds, and steady speed at 25 kpps.  
 Set JOGL accel/decel time at 5 seconds, and steady speed at 10 kpps.  
 Set the output registers 4001 through 4004 as shown below and turn the "jog setting" coil from OFF to ON. (At this time, the AUTO/MAN output coil and STOP output coil need to be at OFF and ON, respectively.)



JOGH ACCEL/DECEL TIME AND SPEED  
 SPEED:  $2,500 \times 10 = 25,000\text{pps}$  (25kpps)  
 (with 2SW-3 set at  $\times 10\text{pps}$ )  
 ACCEL/DECEL TIME:  $30 \times 0.1 = 3\text{s}$   
 (with  $\times 0.1\text{s}$  selected in initial setting)

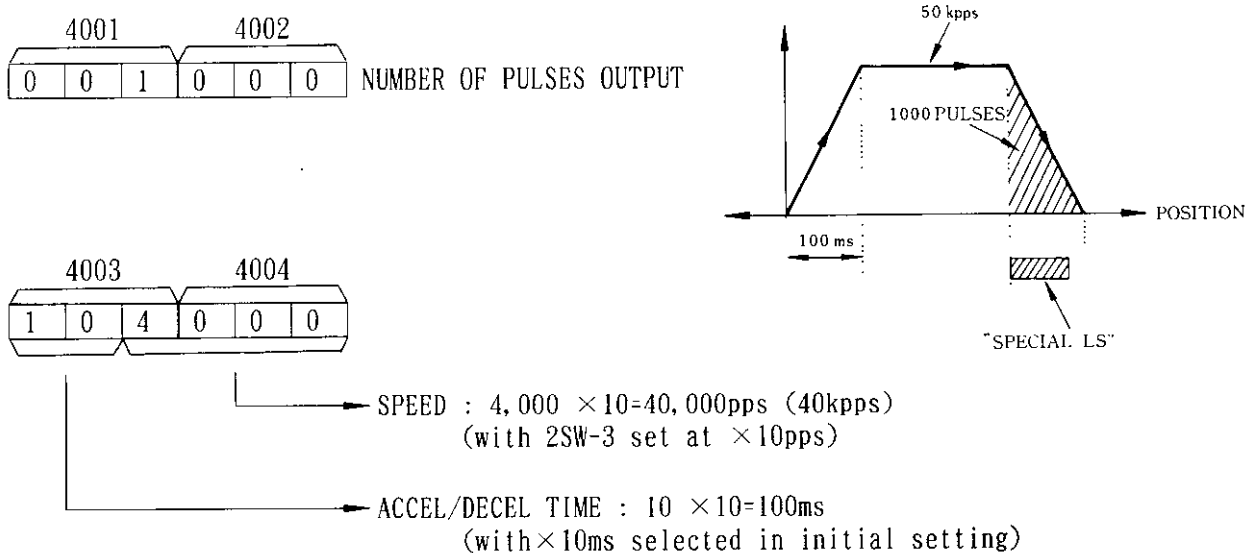


JOGL ACCEL/DECEL TIME AND SPEED  
 SPEED:  $1,000 \times 10 = 10,000\text{pps}$  (10kpps)  
 ACCEL/DECEL TIME:  $50 \times 0.1 = 5\text{s}$

## 5.4.2 Data Set (Cont'd)

### (f) Setting of special positioning

Set the linear accel/decel time at 100ms, speed at 50 kpps, and the number of pulse output at 1000 pulses after S POSI LS ON. Set output registers 4001 through 4004 as shown below and turn the "special positioning setting" output coil from OFF to ON. (At this time, the AUTO/MAN output coil and STOP output coil need to be at OFF and ON, respectively.)



## 5.5 INPUT REGISTER (MONITOR DATA) FROM B2813 TO CPU MODULE

To monitor various data in B2813 from the CPU module, four consecutive input registers are used. The contents of monitor data are varied depending on specification of monitor code (output coil: monitors 1 through 3).

Table 5.11 Input Register Allocation

GL20	G060S	Input Register No.
3001+n	30001 +n	1ST
3002+n	30002 +n	2ND
3003+n	30003 +n	3RD
3004+n	30004 +n	4TH

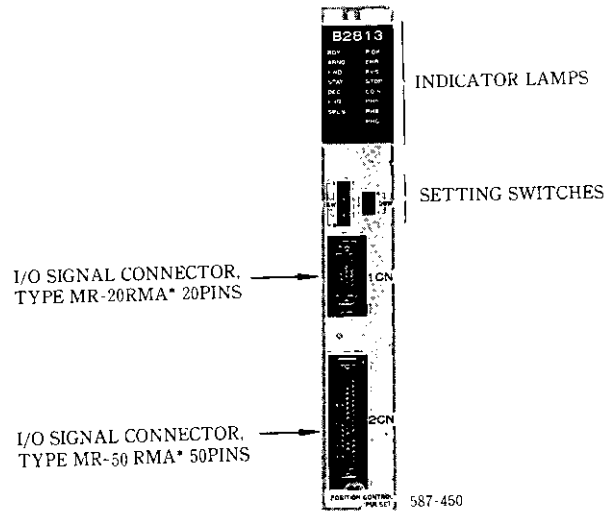
n=0, 1, 2 .....

Show the reference No. at allocation of input registers.



## 6.EXTERNAL INTERFACE

### 6.1 FRONT PANEL



\* Made by Honda Tsushin Co., Ltd.

### 6.2 CONNECTOR TERMINAL LAYOUT

#### (1) Connector (1CN) Terminal Layout

Table 6.1 Connector 1CN Terminal Layout for I/O Signals

1	2	3	4	5	6	7
0V	0V	0V	+ 5V	+ 5V	+ 5V	
PG Power Supply 0V			PG Power Supply + 5V			
8	9	10	11	12	13	
Not Used	Not Used	+ TG	- TG			
Must not be Used.		TG Signal Junction Input				
14	15	16	17	18	19	20
PC	* PC	PA	* PA	PB	* PB	FG
PG Signal Input Phase C		PG Signal Input Phase A		PG Signal Input Phase B		Frame Ground- ing



(2) Connector (2CN) Terminal Layout

Table 6.2 Connector 2CN Terminal for I/O Signals

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
$\frac{12}{24V}$	STOP	START	0V	0V	0V	0V	0V	0V	0V	0V	0V	-TG	+TG	FG	FG	FG	FG
Input Signal Power	External Stop Input	External Start Input	Fault Output 0V	Coin Clear Output 0V	Reference Pulse Output 0V		Manual Pulse Generator Power Supply 0V		External Power Supply 0V			TG Signal Junction Output		Frame Grounding			
		19	20	21	22	23	24	25	26	27	28	29	30	31	32		
		EXEN	SVOK	SIGN	SIGN	PULSE	PULSE	+5V	+5V	+12V	+12V						
		Pulse Input Enable (Manually)	Servo Normal Input	Ref. Sign Output (Line Driver)	Ref. Pulse Output (Line Driver)	Ext. Pulse Generator Power Supply +5V		Ext. Pulse Generator Power Supply +12V									
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
$\frac{12}{24V}$	SPLS	DEC	FAULT	COIN	CLR	SIGN	PULSE	CCW	CW	PBI	PAI	+12V	+12V	+12V	+5V	+5V	+5V
Input Signal Power	Special LS Input	Decel LS Input	Fault Output	Coin Output	Clear Output	Ref. Sign Output	Signal Pulse Output	FWD Ref Pulse Output	RVS Ref Pulse Output	Ext. Pulse Input Phase B	Ext. Pulse Input Phase A	+12V External Power Supply			+5V External Power Supply		

(3) Specifications of Applicable Receptacles for 1CN, 2CN

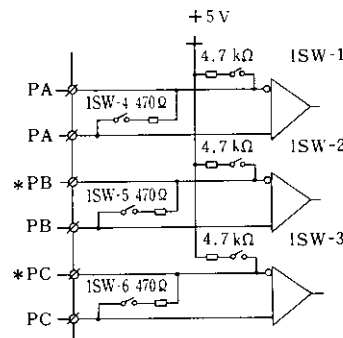
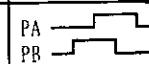

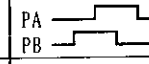

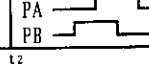
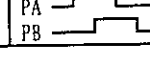
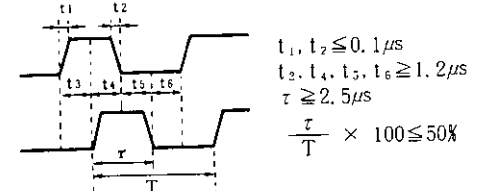
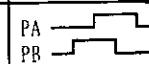

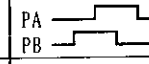

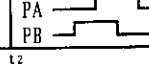
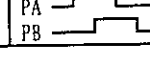
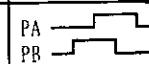

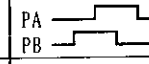

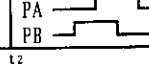
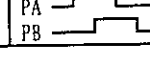
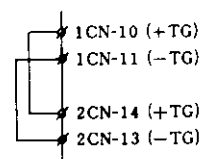
Table 6.3 Specifications of Applicable Receptacles for I/O Signals

Connector Type Used in B2813	Applicable Receptacle Specifications			
	Soldered Type	Caulking Type	Case	Manufacturer
1CN MR-20RMA, Right Angle 20P	MR-20F *	MRP-20F01	MR-20L *	Honda Tsushin Co., Ltd.
2CN MR-50RMA, Right Angle 50P	MR-50F *	MRP-50F01	MR-50L *	

## 6.3 1CN/2CN I/O SIGNALS

### (1) 1CN I/O Signals

Table 6.4 1CN Input Signals

Signal Name	1CN Pin No.	Contents												
PA * PA	16 17	<p>PG feedback pulse input terminal</p> <p>(1) Input circuit</p>  <p>(2) PG output form</p> <ul style="list-style-type: none"> <li>• Line driver (5V) : ISW-1,2,3 OFF ISW-4,5,6 ON</li> <li>• Emitter follower (12V) : ISW-1,2,3 ON ISW-4,5,6 OFF</li> </ul> <p style="text-align: right;">} Switchable</p> <p>(3) Input level (in emitter follower)</p> <ul style="list-style-type: none"> <li>• "H" level: +10V to +12V</li> <li>• "L" level: +0V to +1.2V</li> </ul> <p>(4) Max count frequency</p> <ul style="list-style-type: none"> <li>200 kpps (1-multiplier)</li> <li>400 kpps (2-multiplier)</li> <li>800 kpps (4-multiplier)</li> </ul> <p>(5) Pulse count timing</p> <table border="1"> <thead> <tr> <th>Count</th> <th>Addition</th> <th>Subtraction</th> </tr> </thead> <tbody> <tr> <td>1-multiplier</td> <td></td> <td></td> </tr> <tr> <td>2-multiplier</td> <td></td> <td></td> </tr> <tr> <td>4-multiplier</td> <td></td> <td></td> </tr> </tbody> </table> 	Count	Addition	Subtraction	1-multiplier			2-multiplier			4-multiplier		
Count	Addition		Subtraction											
1-multiplier														
2-multiplier														
4-multiplier														
+TG -TG	10 11		<p>TG pulse junction input terminal</p> 											

Note : Feedback pulse signal connection

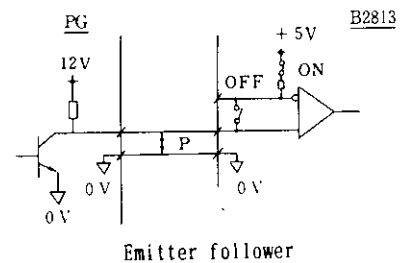
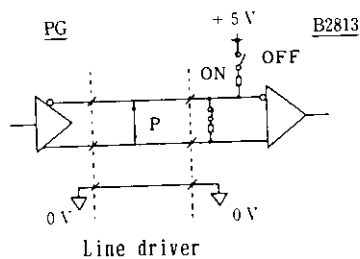
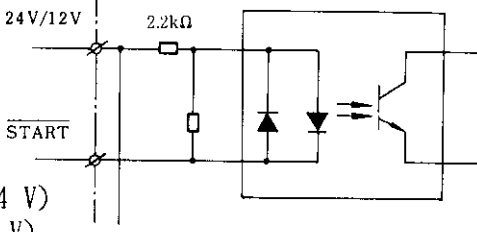


Table 6.5 1CN Output Signals

Signal Name	1CN Pin No.	Contents
Not Used Not Used	8 9	For +5V output, do not use.
+5V 0V	4, 5, 6 1, 2, 3	For +5V power supply for encoder Max. output current: 200 mA

## (2) 2CN I/O Signals

Table 6.6 2CN Input Signals

Signal Name	1CN Pin No.	Contents
START (Ext. Start)	3	<p>Inputs external start command. Provides the same function as of the output coil START and composes OR in B2813. Effective at ON.</p> <p>(1) Input circuit</p>  <p>(2) Input current About 10 mA (24 V) About 5 mA (12 V)</p>
STOP (Ext. Stop)	2	<p>Inputs external stop command. Provides the same function as of the output coil STOP and composes OR in B2813. Effective at ON.</p> <p>(1) Input circuit Same as in START.</p>
SVOK (Servo Normal)	20	<p>Makes L level connection when the servo system is normal.</p> <p>(2) Input circuit Same as in START.</p>
EXEN (Bxt. Pulse Input Enable)	19	<p>Enables pulse input from the manual pulse generator at L level.</p> <p>(1) Input circuit Same as in START.</p>
DEC (Decel LS)	35	<p>Makes L level connection when the deceleration limit switch is at ON. Input signal required for zero return.</p> <p>(1) Input circuit Same as in START.</p>

### 6.3 1CN/2CN I/O SIGNALS (Cont'd)

Table 6.6 2CN Input Signals (Cont'd)

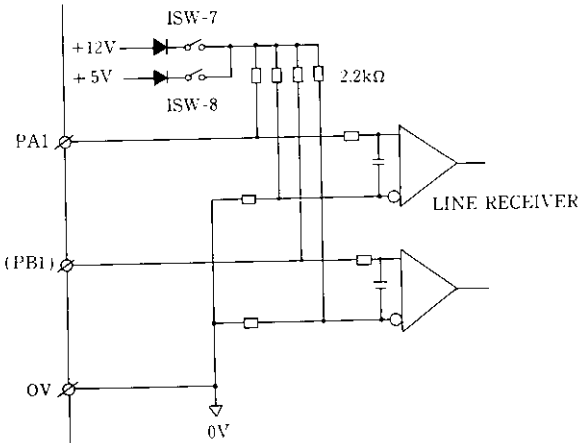
Signal Name	2CN Pin No.	Contents												
SPLS (Special LS)	34	Makes L level connection when the special positioning limit switch is turned ON. Signal necessary for special positioning operation. Output at ON. Stop occurs after output of the set number of pulses. (1) Input circuit Same as in START.												
12 / 24 V	1, 33	External power supply for 2CN-2, -3, -19, -20, -34, -35. Prepare 12 or 24 VDC power supply.												
+12 V + 5 V 0 V	45, 46, 47 48, 49, 50 10, 11, 12	+12 and +5 V external power supply inputs + 5V DC $\pm 5\%$ 0.8A +12V DC $\pm 5\%$ 0.3A (1.6A protective fuse built in)												
PAI(Phase A) PBI(Phase B)  0 V	44 43  8, 9	External pulse input from manual pulse generator (1) Input circuit    (2) Input voltage and current • 12V system H level: 10 to 12V ( 1SW-7 ON ) L level: 0 to 1.2V ( 1SW-8 OFF ) Input current: 5.5 mA (current flowing through input terminal with input at 0V) • 5V system H level: 3.5 to 5V ( 1SW-7 OFF ) L level: 0 to 1.2V ( 1SW-8 ON ) Input current: 2.3 mA (current flowing through input terminal with input at 0V)  (3) PG output form • Open collector • Pull-up type collector output (selection with +12V/+5V switch)  (4) Max. count frequency 100kpps  (5) Pulse count timing A/B phase 1 × frequency alone  <table border="1"> <thead> <tr> <th colspan="2">Addition</th> <th colspan="2">Subtraction</th> </tr> </thead> <tbody> <tr> <td>PA1</td> <td></td> <td>PA1</td> <td></td> </tr> <tr> <td>PB1</td> <td></td> <td>PB1</td> <td></td> </tr> </tbody> </table>	Addition		Subtraction		PA1		PA1		PB1		PB1	
Addition		Subtraction												
PA1		PA1												
PB1		PB1												

Table 6.7 2CN Output Signals

Signal Name	2CN Pin No.	Contents
(12V Output) PULSE SIGN	40 39	<p>Reference pulse output signal for sign + pulse. 2 types available for each of 12 V output and 5 V output (line driver)</p> <p>(1) Output circuit • 12 V output</p>
(5 V Output) PULSE * PULSE SIGN * SIGN	24 23 22	<p>• 5 V Output (Line driver)</p>
	21	<p>(2) Output voltage/current • 12 V Output Load voltage : 12 V Load current : 100 mA max. Output voltage at ON: 0.7 V or more</p>
OV	6.7	<p>(3) Max. output frequency • 100 kpps or 200 kpps (Switch selection)</p> <p>(4) Output wave form • For 100 kpps</p> <p>• FOR 200kpps</p>

### 6.3 1CN/2CN I/O SIGNALS (Cont'd)

Table 6.7 2CN Output Signals (Cont'd)

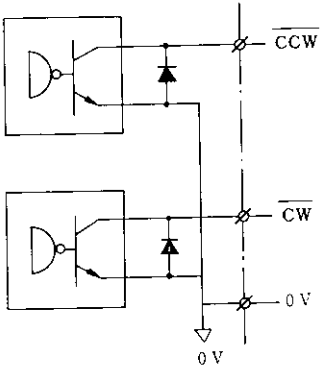
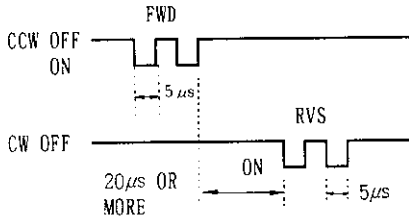
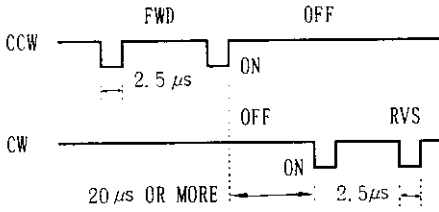
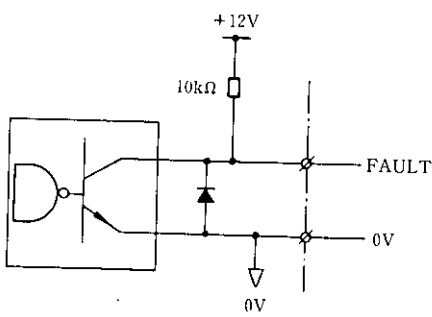
Signal Name	2CN Pin No.	Contents
CCW (FWD)	41	<p>Reference pulse output signal for forward run pulse + reverse run pulse</p> <p>(1) Output circuit</p> 
CW (RVS)	42	
0V	6.7	<p>(2) Output voltage/current            Load voltage : 12 V            Load current : 100 mA max.            Output voltage at ON: 0.7 V or more</p> <p>(3) Max. output frequency            • 100kpps or 200kpps (Switch selection)</p> <p>(4) Output wave form            • For 100 kpps</p>  <p>• For 200 kpps</p> 
+12 V 0 V	27, 28 8, 9	+12 V power supply for manual pulse generator Max output current : 200 mA
+5 V 0 V	25, 26 8, 9	+5 V power supply for manual pulse generator Max output current : 200 mA
+TG -TG	14 13	TG signal junction output

Table 6.7 2CN Output Signals (Cont'd)

Signal Name	2CN Pin No.	Contents
<p>FAULT (Fault Output)</p> <p>0V (Fault Output 0 V)</p>	<p>36</p> <p>4</p>	<p>Normally at L level. H level reached under the following conditions:</p> <ul style="list-style-type: none"> <li>• Hardware error is detected during self-diagnosis.</li> <li>• External input signal <math>\overline{SVOK}</math> is turned to H level.</li> <li>• External power supply is fault.</li> <li>• B2813 deviation counter is overshoot.</li> </ul> <p>(1) Output circuit</p>  <p>(2) Output voltage/current</p> <p>Load voltage : 12 V</p> <p>Load current : 100 mA max.</p> <p>Output voltage at ON : 0.7 V or more</p>
<p><math>\overline{COIN}</math> (Coin Output)</p> <p>0 V (Coin Output 0 V)</p>	<p>37</p> <p>5</p>	<p>Turns to L level when the number of lag pulses on the deviation counter enters the set range of COIN detection width.</p> <p>(1) Output circuit</p> <p>Same as in FAULT output.</p>
<p><math>\overline{CLR}</math> (Clear Output)</p> <p>0 V (Clear Output 0 V)</p>	<p>38</p> <p>5</p>	<p>Output signal for clearing the deviation counter. Turns to L level for 100 <math>\mu</math>s or more under the conditions below.</p> <ul style="list-style-type: none"> <li>• Upon turning on external power supply</li> <li>• Upon turning on internal power supply</li> <li>• Upon resetting module</li> <li>• Upon completion of zero return</li> <li>• On occurrence of hardware error</li> </ul> <p>(1) Output circuit</p> <p>Same as in FAULT output.</p>

## 6.4 LED INDICATOR LAMP

Table 6.8 LED Indicator Lamps

Name	Color	Description
RDY	R	Indicates the self-diagnosis result of module. Linked with input relay READY.
P. OK	R	Lit when external power supply input (+5 V, +12 V) is normal.
ABNO	R	Lit when FAULT signal is output. Linked with input relay FAULT.
ERR	R	Lit when the module detects any error. Linked with input relay ERROR.
FWD	R	Lit while forward run command is output.
RVS	R	Lit while reverse run command is output.
STAT	R	Lit when external input signal START is at L level.
STOP	R	Lit when external input signal STOP is at L level.
DEC	R	Lit when external input signal DEC is at L level. Linked with input relay DECEL LS.
ENB	R	Lit when B2813 is ready to input external pulse from the manual pulse generator.
SPLS	R	Lit when external input signal SPLS is at L level.
COIN	R	Lit while COIN signal is distributed. Linked with input relay COIN.
PHA	R	Lit when PA (phase A) signal is input.
PHB	R	Lit when PB (phase B) signal is input.
PHC	R	Lit when PC (phase C) signal is input.

## 6.5 SWITCH SET

(1) 1 SW Setting

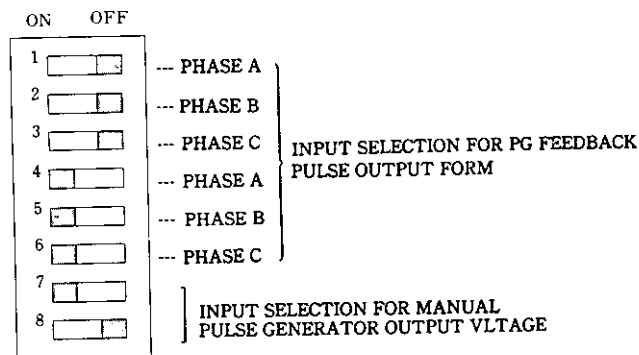


Fig 6.1 1SW

Table 6.9 PG Output Form Selection

	Phase A		Phase B		Phase C	
	1SW-1	1SW-4	1SW-2	1SW-5	1SW-3	1SW-6
+12 V Emitter Follower	ON	OFF	ON	OFF	ON	OFF
+5 V Line Driver	OFF	ON	OFF	ON	OFF	ON

Note: Turn ON one of the switch pairs below and turn off the other.  
Switch combinations: 1SW-1 and 1SW-4, 1SW-2 and 1SW-5, and 1SW-3 and 1SW-6.



Table 6.10 Manual Pulse Output Voltage Selection

	1SW-7	1SW-8
+ 12 V	ON	OFF
+ 5 V	OFF	ON

Note: Be sure to set either one of 1SW-7 or 1SW-8 to ON.

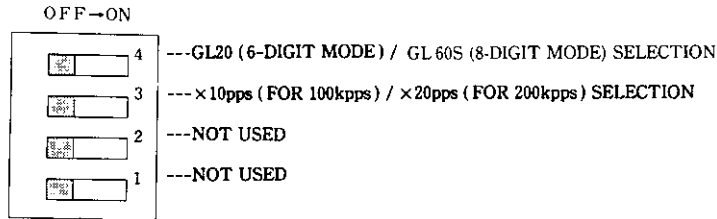


Fig. 6.2 2 SW

(2) 2 SW Setting

The contents of 2 SW setting is preset in B2813 when turning on power supply or resetting the module. For returning from the test mode to normal mode, power supply must be turned on again.

Table 6.11 2 SW Setting

2 SW	OFF	ON
2 SW-4	GL 20 (6-digit mode)	GL 60 (8-digit mode)
2 SW-3	×10pps(For 100kpps)	×20pps(For 200kpps)
2 SW-2	Not used	Not used
2 SW-1	Not used	Not used

(3) Factory Setting

1 SW

1 SW-1	OFF
1 SW-2	OFF
1 SW-3	OFF
1 SW-4	ON
1 SW-5	ON
1 SW-6	ON
1 SW-7	ON
1 SW-8	OFF

2 SW

2 SW-4	OFF
2 SW-3	OFF
2 SW-2	OFF
2 SW-1	OFF

## 7. TEST OPERATION ADJUSTMENT

### 7.1 CHECKS BEFORE TEST OPERATION

Before turning on the power supply, carefully check the wiring.

- (1) Incorrect connection of the power supply ( $\pm 12$  V, +5 V) to the B2813 may burn out or damage electrical parts in the B2813.
- (2) If the wires are connected in reverse polarity to the motor, TG, and PG, the motor runs out of control. Make sure that the feedback loops for TG and PG are constructed in the negative feedback mode.
- (3) To avoid unexpected mishaps, where the test operation must be started with the motor coupled to the driven machine, start the motor after preparing for an immediate emergency stop.

### 7.2 TURNING ON POWER SUPPLY

- (1) After B2813 setting and the wiring check have been completed, turn on the power supply. The following LEDs light to indicate the correctly energized state.
  - Servopack :  P for control,  MP for main circuit
  - B2813 :  P. OK
- (2) Run the motor by giving reference pulses of a low frequency.
  - When FB pulses phases A and B are input correctly,  PHA  PHB blinks, respectively.
  - With the reference for forward running, the motor runs CCW when viewed from the load side.
  - Check that the motor stops when the reference pulse is discontinued.

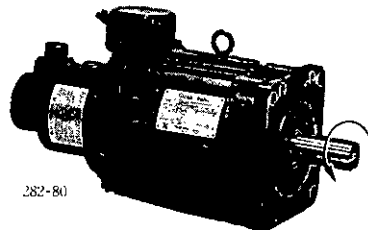


Fig 7.1 Direction of Motor Rotation at Forward Running Command

- Check that the motor stops when the reference pulse is discontinued.

# 8. CONNECTION

## 8.1 TYPICAL INTERCONNECTION DIAGRAM

(1) When Used with Servopack Type CACR-PR000BC300

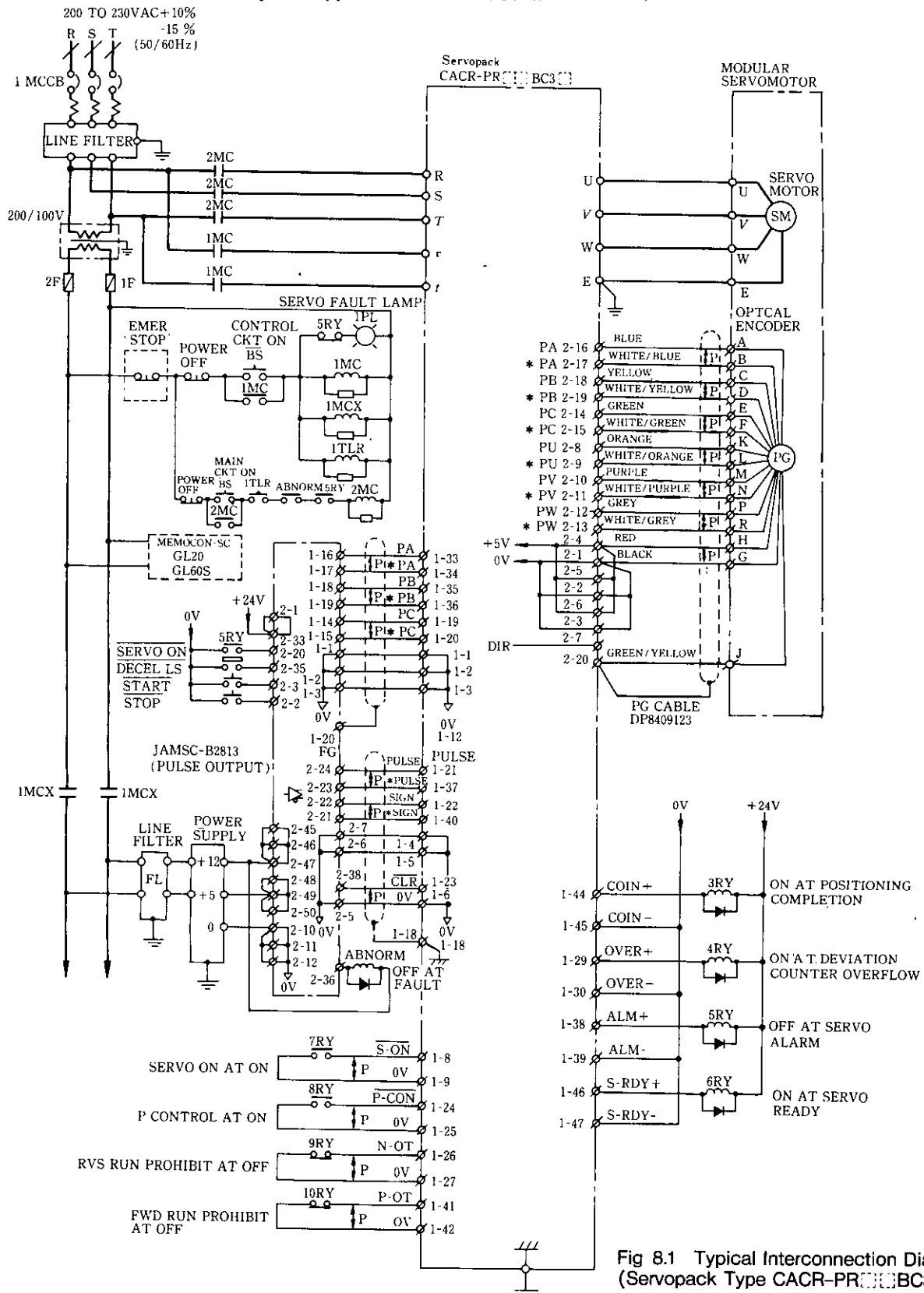


Fig 8.1 Typical Interconnection Diagram (Servopack Type CACR-PR000BC300)

(1) When Used with Servopack Type CACR-PR000BB300 (For Incremental Encoder)

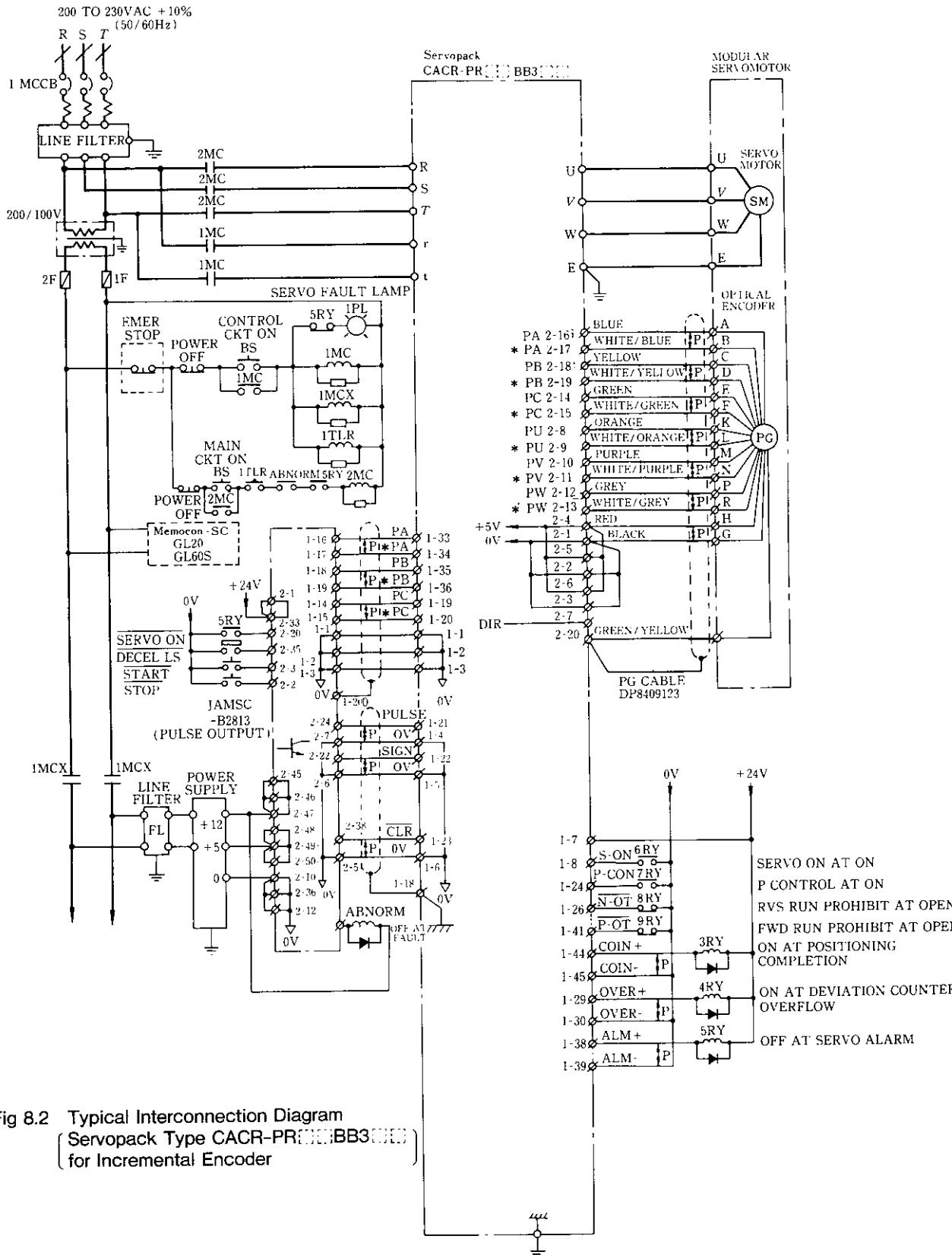


Fig 8.2 Typical Interconnection Diagram  
(Servopack Type CACR-PR000BB300)  
for Incremental Encoder

## 8.2 EXTERNAL I/O SIGNALS OF B2813

- (1) All the external I/O signals do not always need to be connected. I/O signals unused in the system may be left open. However, use of SERVO NORMAL input signal is mandatory. Whenever the SERVO NORMAL input signal is open, B2813 remains inactive. Zero return is possible in either mode A nor B when DECEL LS input signal is open. In case S POSI LS input signal is open, special positioning is impossible.
- (2) After turning on the internal power supply or resetting the module, B2813 waits until FAULT output is turned on (normally) once and SERVO NORMAL input is turned on. B2813 does not distribute pulse reference.

## 8.3 WIRING FOR POWER SUPPLY

- (1) Be sure to make sequence so that AC power is supplied to Servopack at 0.5 second and over after DC power supply unit (IPS) is energized. (Make sequence so that CLEAR signal will be applied to the digital control unit within the above period).
- (2) Disconnect the AC power supply to the Servopack at least 1 second before DC power supply unit (IPS) is de-energized.
- (3) If B1083C is applied for vertical axis control, avoid dropping of object at power-on or power-off.

## 8.4 WIRING OF PROTECTIVE DEVICES

- (1) Make sure that contacts of thermal relay, thermostat for detection of fin temperature and fuse alarm are connected to the coil circuits of relay and that the power supply to Servopack is interrupted if they should operate.
- (2) When a driven machine has limited traveling distance, be sure to provide a limit switch for protection of the machine and control units, and make following sequence.
  - Apply dynamic braking if alarm limit switch operates.
  - Disconnect all the power if overtravel limit switch operates.
- (3) Overrunning of the motor as a result of failed TG or PG (breakage and disconnection of coil, etc.) cannot be prevented, so protect the machine and control unit by using alarm and overtravel limit switch.

## 8.5 WRING PRECAUTIONS

- (1) Multi-core twisted shielded wire should be used as signal lead to Servopack.
- (2) Use a twisted shielded wire as feedback pulse signal lead from PG to Servopack.
- (3) For +5 V line receiver input, lead length should be 20 meters or less.  
For +12 V line receiver input, lead length should be 5 meters or less.
- (4) For pulse reference line grounding, connect the shielding to Servopack.  
For feedback line grounding, connect it to FG of B2813.
- (5) To avoid malfunction caused by noise.
  - Install an insulating transformer and line filter (LF) between DC power unit (1PS) and AC power supply.
  - Install the line filter, DC power unit, and B2813 as close as possible to each other.
  - Do not run connections to primary and secondary windings of the transformer and line filter together. Ground terminal should be connected to ground pole or the equivalent by ground conductor.
  - Connect surge-absorbing circuit to coils of relays, contactors and solenoids.
  - Make connection with a space of 30 cm between AC power lines and DC power lines or signal lines and do not run within the same bundle or duct.
- (6) Make one point ground connection (up to 100 $\Omega$  in accordance with Japanese standards, or refer to national local codes) and use a larger conductor (braided-copper wire or the equivalent). Refer to Fig. 8.8 Typical Wiring for Grounding.
- (7) If motor should be electrically insulated from machine by oil, etc., make a separate connection from motor base to ground.
- (8) Use leads over 2 mm<sup>2</sup> for DC power lines (+5 V, +12 V, -12 V). When two or more B1083C are used, they should be connected individually to DC power supply. Failure to do so may cause malfunction due to voltage drop. Branch directly from the DC power unit terminals to each unit using junction terminals. See Fig. 8.9.

## 9. TROUBLESHOOTING

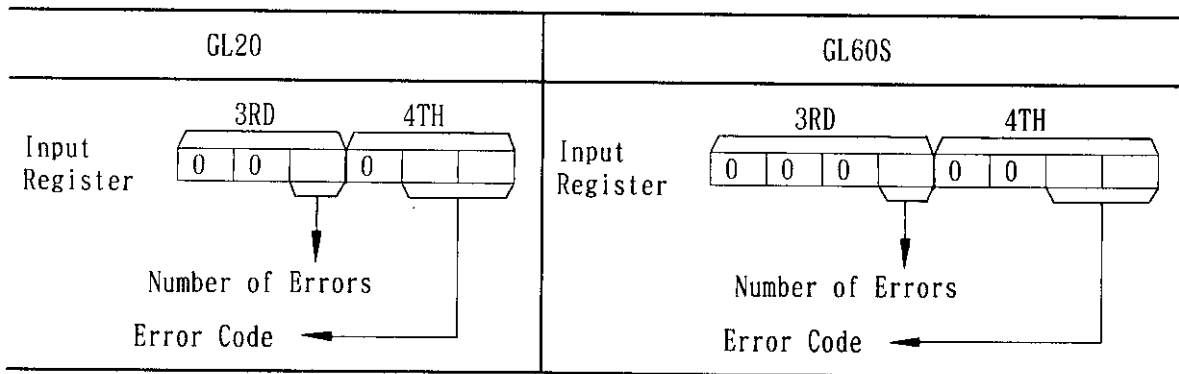
### 9.1 B2813 ERROR CODE

This subsection describes the contents of various errors occurring when using the B2813, error codes and measures to be taken in the event of error.

#### (1) Monitoring of Error Code

Error code can be monitored with the aid of the programming panel or RAP. For monitoring, implement the following procedures.

1. Error code monitor mode is assumed by turning output coil monitor 1 to ON, monitor 2 to OFF monitor 3 to OFF.
2. The error code the number of errors and can be checked with the third and fourth input registers.
3. The number of errors covers those classified according to error code. Therefore, even when multiple errors of the same error code occur, they are counted as 1. The smallest error code of those occurring is displayed as an error code.



## 9.1 B2813 ERROR CODE (Cont'd)

(2) Hardware Error

Table 9.1 Hardware Error

Error Code	Cause	Corrective Action
—	ROM total check error	self-diagnosis error. Module must be reset or internal power supply must be turned off and then on again. If the same error recurs, replace B2813.
—	RAM check error	
—	WDT error	
01	External power supply fault ( <u>P.OK</u> indicator lamp goes out.)	Check external power supply (+12V and +5V). On elimination of cause, error code disappears to enable continuing operation.
02	Servo fault External input signal SVOK (SERVO NORMAL) is at H level.	Check the SVOK input signal line. On elimination of cause, error code disappears to enable resuming operation.
03	—	Check initial setting (2ND of output register). For restoring the normal status, the module must be reset or the internal power supply must be turned off and then on again.
04	Feedback pulse fault Deviation counter has overflowed in COIN mode. (FFFFH)	Review the servo system. For restoring the normal status, the module must be reset or the internal power supply must be turned off and then on again.

Notes:

1. If a hardware error occurs during any B2813 operation, pulse output stops (with deceleration time 0) and CLR output remains ON.
2. When the external power supply or the servo system is faulty, eliminating the cause turns off the error code and restores the normal status.
3. Even if the operation of B2813 stops during positioning due to servo fault the current value remains correct so far as the feedback signal line is normally operating.
4. The internal power supply means the power supply for the CPU module.



## (3) Setting and Operational Errors

Table 9.2 Setting and Operational Errors

Error Code	Cause	Corrective Action
20	<ul style="list-style-type: none"> <li>(1) Set data range is not met.</li> <li>(2) Output coil condition is not satisfied at the time of setting.</li> <li>(3) Initial setting or current value setting was attempted at other than stop (before completion of pulse output).</li> <li>(4) When setting 2-step speed pattern positioning, "auto positioning setting" output coil turns on only for one scan.</li> <li>(5) When setting 2-step speed pattern positioning, the relative positions of P<sub>1</sub> and P<sub>2</sub> are not in the same turning direction.</li> <li>(6) When setting 2-step speed pattern positioning, distance P<sub>2</sub> is too short to secure an interval for speed V<sub>2</sub>.</li> <li>(7) Special positioning was attempted in absolute mode.</li> </ul>	Make correct setting again.
21	<ul style="list-style-type: none"> <li>(1) START is turned on without setting the automatic positioning.</li> <li>(2) Zero return FWD or RVS command is turned on without setting the zero return.</li> <li>(3) Special positioning command is turned on without setting the special positioning.</li> <li>(4) JOGH or JOGL is turned on without JOG setting.</li> </ul>	Each start command is disregarded. After selecting the required setting, distribute the start command.
22	Scan time of CPU module is too short.	May occur when the CPU module contains no ladder circuit. Save ladder circuit or assign dummy to prevent error.
23	Zero return was attempted when DECEL LS is turned on.	Move until DECEL LS OFF by JOG or handle operation, and then try zero return again.
24	Current value over When countable range is exceeded in absolute mode, "current value over" input relay is turned on.	Return to the countable range by JOG, handle or zero return operation.

## 9.1 B2813 ERROR CODE (Cont'd)

### (4) Status Indication at Error

Table 9.3 Status Indication at Error

Error Contents	Input Relay			Indicator Lamp			External Output
	"READY"	"FAULT"	"ERROR"	"RDY"	"ABNO"	"ERR"	"FAULT"
Hardware Error (Self-diagnosis Error)	OFF	ON	Undefined	OFF	ON	Undefined	Output
Hardware Error (Error Codes 01, 02, 03, 04)	ON	ON	ON	ON	ON	ON	Output
Set Error Operational Error	ON	OFF	ON	ON	OFF	ON	Not output

## 9.2 TROUBLESHOOTING FOR SYSTEM

If a malfunction occurs, checking must be started with the assumption that the failure was caused by either, erroneous operation of faulty equipment.

### 9.2.1 DC Power Supply

Faulty, or fluctuation of, DC power supply voltage exceeding limits shown below, may cause overrunning of the motor or inaccurate control. Voltage measured at the following terminals in BI083C should not exceed the limits given below.

Terminals No.

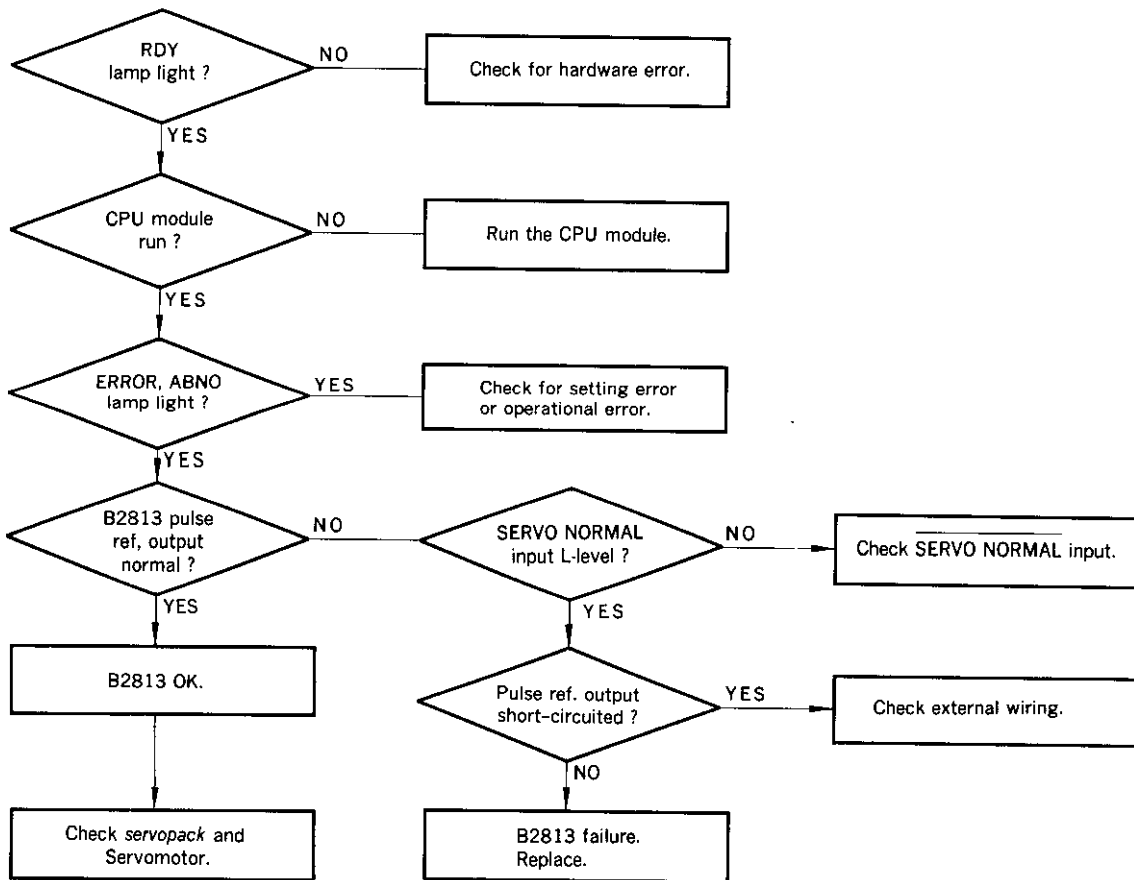
2CN-45, 46, 47: +12 V  $\pm$ 5%

2CN-48, 49, 50: +5 V  $\pm$ 5%

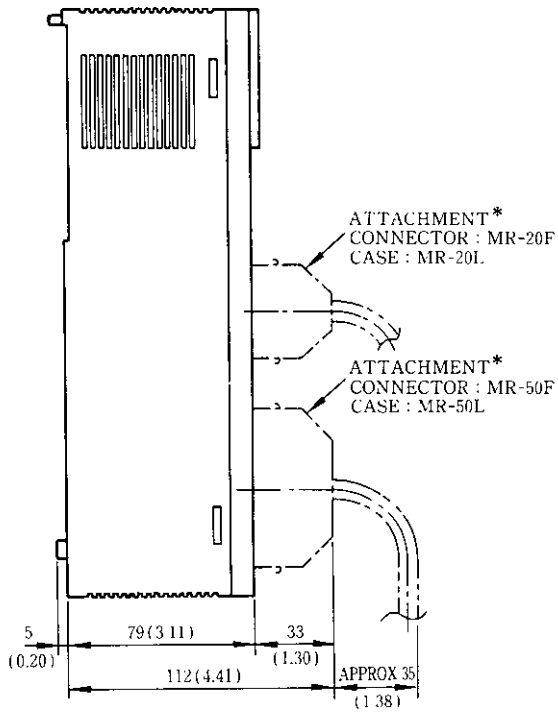
2CN-10, 11, 12: 0 V

If measured voltage exceeds the above limit, check the DC power supply unit and wiring. Wire size should be 2 mm<sup>2</sup> or above.

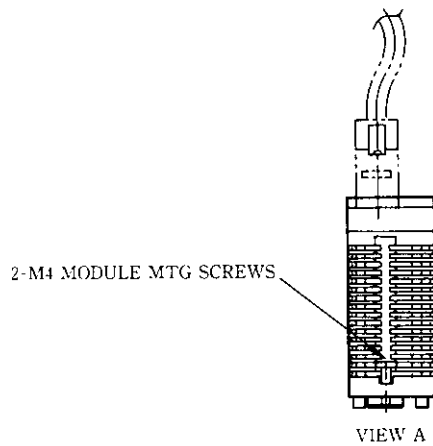
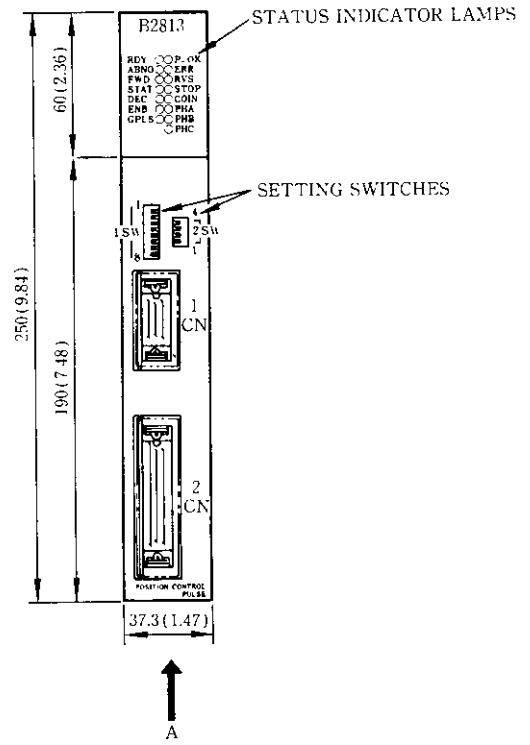
### 9.2.2 Motor does not Rotate



# 10. DIMENSIONS in mm (inches)



\*MADE BY HONDA TSUSHIN



## APPENDIX INTERNAL INTERFACE SIGNAL LIST

Table A-1 List of Output Coils

GL20	GL60S	Signal Name
0001 + 8n	00001 + 8n	Module reset
0002 + 8n	00002 + 8n	Initial setting
0003 + 8n	00003 + 8n	Not used
0004 + 8n	00004 + 8n	AUTO/ MAN
0005 + 8n	00005 + 8n	START
0006 + 8n	00006 + 8n	STOP
0007 + 8n	00007 + 8n	Auto positioning setting
0008 + 8n	00008 + 8n	Current value setting
0009 + 8n	00009 + 8n	JOG setting
0010 + 8n	00010 + 8n	JOGH command
0011 + 8n	00011 + 8n	Zero return setting
0012 + 8n	00012 + 8n	FWD command for zero return
0013 + 8n	00013 + 8n	RVS command for zero return
0014 + 8n	00014 + 8n	Sign(+)/Sign(-)
0015 + 8n	00015 + 8n	Error code reset
0016 + 8n	00016 + 8n	Monitor 1
0017 + 8n	00017 + 8n	Monitor 2
0018 + 8n	00018 + 8n	Monitor 3
0019 + 8n	00019 + 8n	JOGL command
0020 + 8n	00020 + 8n	External pulse input enable (Manual pulse input enable)
0021 + 8n	00021 + 8n	Special positioning setting
0022 + 8n	00022 + 8n	Special positioning command
0023 + 8n	00023 + 8n	Not used
0024 + 8n	00024 + 8n	Not used

n = 0, 1, 2 . . . .

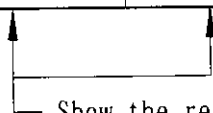
Show the reference No. at output coil allocation.

# APPENDIX INTERNAL INTERFACE SIGNAL LIST (Cont'd)

Table A-2 List of Input Coils

GL20	GL60S	Signal Name
1001+ 8n	10001+ 8n	READY
1002+ 8n	10002+ 8n	PRESET ACK
1003+ 8n	10003+ 8n	SIGN(+)/SIGN(-)
1004+ 8n	10004+ 8n	Multi-step speed monitor 1
1005+ 8n	10005+ 8n	Multi-step speed monitor 2
1006+ 8n	10006+ 8n	PULS/ $\overline{\text{MINUS}}$
1007+ 8n	10007+ 8n	Current value over
1008+ 8n	10008+ 8n	Not used
1009+ 8n	10009+ 8n	COIN
1010+ 8n	10010+ 8n	DECEL LS
1011+ 8n	10011+ 8n	ERROR
1012+ 8n	10012+ 8n	Fault
1013+ 8n	10013+ 8n	Not used
1014+ 8n	10014+ 8n	Zero return pulse output completion
1015+ 8n	10015+ 8n	Positioning pulse output completion
1016+ 8n	10016+ 8n	PRESET NAK

n=0, 1, 2 . . . . .



Show the reference No. at input relay allocation.

Table A-3 Output Register Allocation

GL20	GL60S	Output Register No.
4001+n	40001+n	1ST
4002+n	40002+n	2ND
4003+n	40003+n	3RD
4004+n	40004+n	4TH

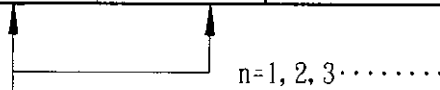
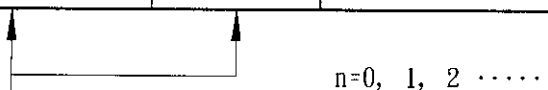

  
 $n=1, 2, 3, \dots$ 
  
 Shows the reference No. at allocation of output registers.

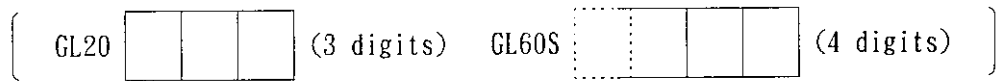
Table A-4 Input Register Allocation

GL20	G060S	Input Register No.
3001+n	30001 +n	1ST
3002+n	30002 +n	2ND
3003+n	30003 +n	3RD
3004+n	30004 +n	4TH


  
 $n=0, 1, 2, \dots$ 
  
 Show the reference No. at allocation of input registers.

# APPENDIX INTERNAL INTERFACE SIGNAL LIST (Cont'd)

Table A-5 Setting of Initial value in Output Register

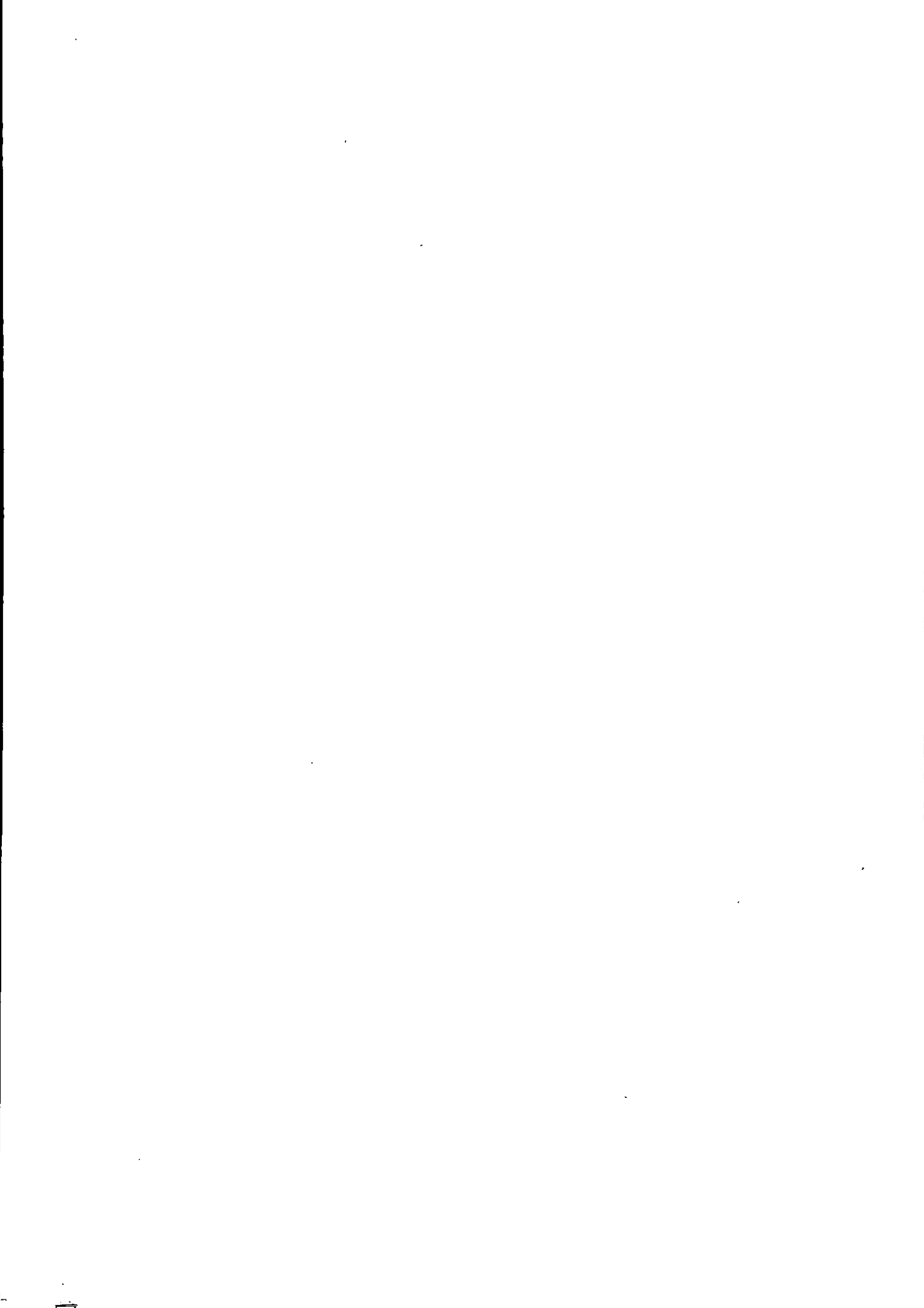


<p><b>1ST</b></p> <p>Setting of COIN detection width <math>\pm</math> (0 to 99)          Setting of operation mode (0: 1-step speed pattern, 1: 2-step speed pattern)</p>	<p><b>3RD</b></p> <p>Setting of linear accel/decel time scale (0: <math>\times 10</math> ms, 1: <math>\times 0.1</math> s)          Resetting of current value          ( 0: Avoids resetting          1: Selects resetting )          Setting of position command mode changeover          ( 0: Incremental mode          1: Absolute mode )</p>
<p><b>2ND</b></p> <p>0 to be set          Setting of pulse count mode          ( 1: <math>\times 1</math> multiplier          2: <math>\times 2</math> multiplier          4: <math>\times 4</math> multiplier )</p>	<p><b>4TH</b></p> <p>0 Setting          Setting of zero return mode (0: mode B, 1: mode A)          Setting of various operation start condition          ( 0: Enables the next start when pulse output is completed and COIN is detected          1: Enables the next start when pulse output is completed )</p>

**Notes:**

1. The framed numerals are default values, which are automatically set upon energization or module resetting.
2. If malfunction occurs in updated initial setting data, the previous data are validated.







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