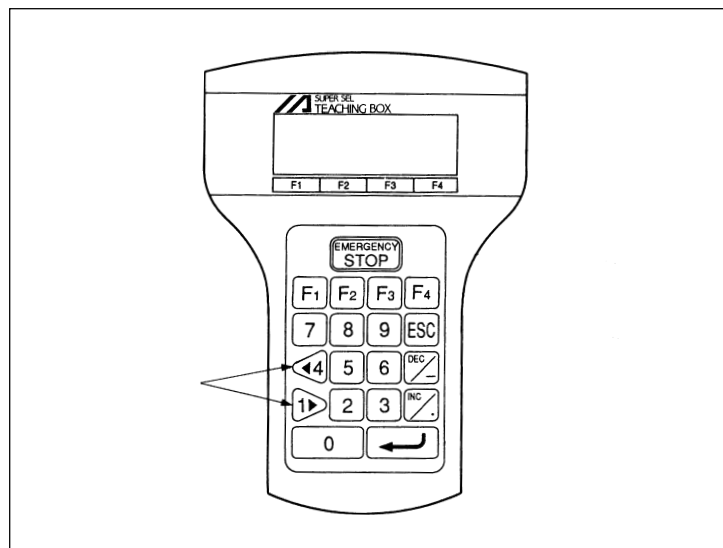


Teaching Pendant

(Super SEL • DS Controller Type)

Operating Manual



Intelligent Actuator, Inc.

This publication was written to assist you in better understanding this part of your IA system. If you require further assistance, please contact IA Technical Support. For Central and East Coast Time Zones, please call our Itasca, IL office at 1-800-944-0333 or FAX 630-467-9912. For Mountain and Pacific Time Zones, please call our Torrance, CA office at 1-800-736-1712 or FAX 310-891-0815; Monday thru Friday from 8:00 AM to 5:00PM.



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The information and technical data contained herein are subject to change without notice. Intelligent Actuator, Inc. assumes no responsibility for any errors or omissions regarding the accuracy of the information contained in this publication.

1. Foreword

Thank you very much for purchasing the Teaching Pendant for the IA Super SEL • DS Controller type. Without knowing beforehand how to correctly use or operate the controller, not only will the user be unable to take full advantage of all the functions built into this product but he might inadvertently cause damage to the controller or shorten its life. Please read this manual carefully to acquire an understanding of the proper method of handling and operating the controller. Keep the manual handy so that you can refer to the appropriate sections as the need arises.

*All precautions have been taken to ensure the accuracy of the contents of this manual. However, if you become aware of any inaccuracies or discrepancies, please contact your IAI sales representative or technical service department.

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2. Before You begin

! A Word of Caution

- ① Please read this manual carefully to operate the controller properly.
- ② You are not allowed to use or reproduce this manual or any portion thereof without permission.
- ③ We cannot accept any responsibility for possible damage resulting from the use of this manual.
- ④ We reserve the right to change the information contained in this manual without prior notice.

! Emergency Procedures

If hazardous conditions arise while using the controller, immediately turn OFF all power switches for the controller and any devices connected to it, or pull all the power plugs from the electric outlet. ("Hazardous condition" refers to excessive heat, smoke or flames coming from the controller or any conditions which might lead to fire or cause damage to the controller.)

3. Safety Precautions

Safety Precautions

Please follow the following safety precautions when operating your IA system:

- (1) Any operation not specifically addressed in this manual should not be attempted. If you have any questions, please contact your IA sales representative or contact IA technical support at: 1-800-736-1712.
- (2) Use only IA cables when connecting IA actuators and controllers. IA cables are matched for use with IA actuators and are specially designed to withstand repeated bending.
- (3) Stand clear of your IA system when operating or preparing to operate. Surround your IA system with safety partitions if there is any possibility that someone may become injured by an operating IA system.
- (4) Before assembling, adjusting, or performing maintenance on your IA system, please make sure that people around you are aware that the system is not to be powered up or turned on. You may want to disconnect the power cable completely, keep the power cable close to the operator, or use a safety plug to ensure that the power cable will not be plugged in inadvertently.
- (5) When more than one person is working on your IA system, use signs to inform everyone of the operating status of the equipment. Make sure that everyone stands clear prior to operation. Operate your system only after you are sure that everyone knows that you are initiating system start-up and that everyone is clear of the system.
- (6) In situations where the cables must be lengthened, be sure to double check all connections before powering up your IA system.

4. Warranty Period and Scope

Warranty Period and Scope

The Super SEL controller undergoes stringent testing before it is shipped from our factory. IAI provides the following warranty.

1. Warranty Period

The warranty period is 12 months from the date the unit is shipped to the customer.

2. Scope of Warranty

If within the period specified above, a breakdown occurs while operating the controller under normal conditions and is clearly the responsibility of the manufacturer, IAI will repair the unit at no cost. However, the following items are not covered by this warranty.

- Faded paint or other changes that occur naturally over time.
- Consumable components that wear out with use (battery, etc.).
- Unit seems to be noisy or similar impressions that do not affect machinery performance.
- Damage resulting from improper handling or use.
- Damage resulting from user error or failure to perform proper maintenance.
- Any alterations not authorized by IAI or its representatives.
- Damage caused by fire and other natural disasters or accidents.

The warranty pertains to the purchased product itself and does not cover any loss that might arise from a breakdown of the product. Any repairs will be done at our factory.

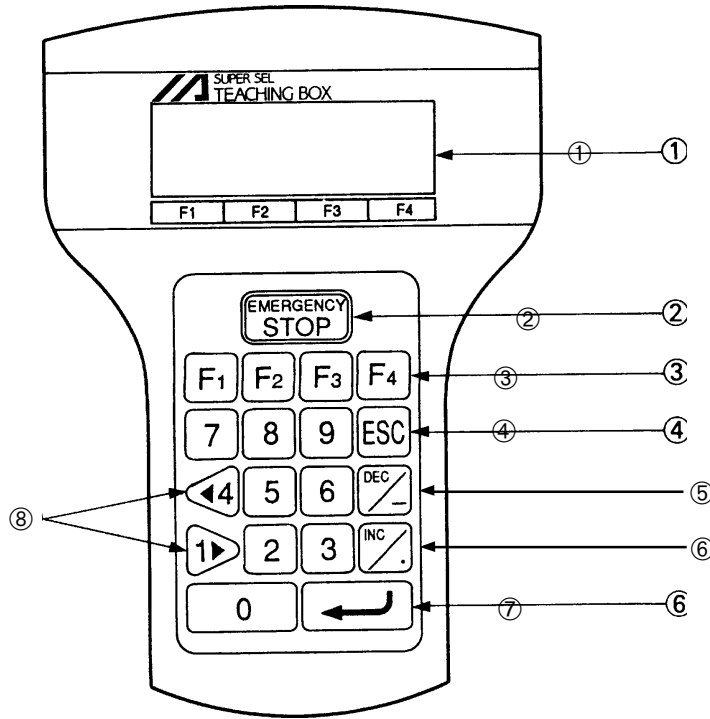
3. Service

The purchase price of the product does not include programming or expenses for sending technicians to the customer's site. Even if the product is still under the warranty period, separate charges will be assessed for the following services.

- Assistance with unit installation or trial operation.
- Inspection and maintenance.
- Technical instruction and training for controller operation and wiring.
- Writing programs or technical instruction and training for programming.
- Any other services or work for which IAI normally assesses separate charges.

5. Teaching Pendant Function and Specification

5.1 Main Operational Keys and Functions



- ① **LCD Display**
4 lines with a 20 character per line capacity display. Shows program and motion status.
- ② **EMERGENCY STOP**
When the emergency stop button is pressed, servos will disengage and all programmable outputs will be turned OFF. To release the emergency stop, press Restart (F1) on the LCD Display. When an emergency stop is pressed from a peripheral device while using the teaching pendant, you must also press the emergency stop from the teaching pendant. Otherwise, normal operation can not be executed (See Page 77 for reference).
- ③ **F1, F2, F3, F4 (Multi-function Key)**
Multi-function keys that correspond with the LCD Display.
- ④ **ESC (Escape)**
The Escape Key allows the operator to go backwards in one-step increments to previous displays to make corrections or to switch to different modes.
- ⑤ **DEC / - (Decrement / Minus Key)**
Dual function keys for use in data input and axis Jog functions.
- ⑥ **Inc / . (Increment / Point Number Key)**
This key increases the Step Number or Point Number.
- ⑦ **↵ (Return Key)**
Return Key is used to change operations and to move the cursor position.
- ⑧ **1 ▶ , ◀ 4 (Data Key, Jog Key)**
Dual function key for use in data input and axis Jog functions.

5. Teaching Pendant Function and Specification

5.2 Specification

Item	Description
Ambient Temperature & Humidity	Temperature: 0~40°C Humidity: 85% RH or less
Operating Environment	Free of corrosive gas, no excessive dust
Unit Weight	500G
Cable Length	2 m
Display	LCD Display with 20 X 4

5.3 RS232C Connector (D-Sub 25 DTE Special*) For the E • G Type

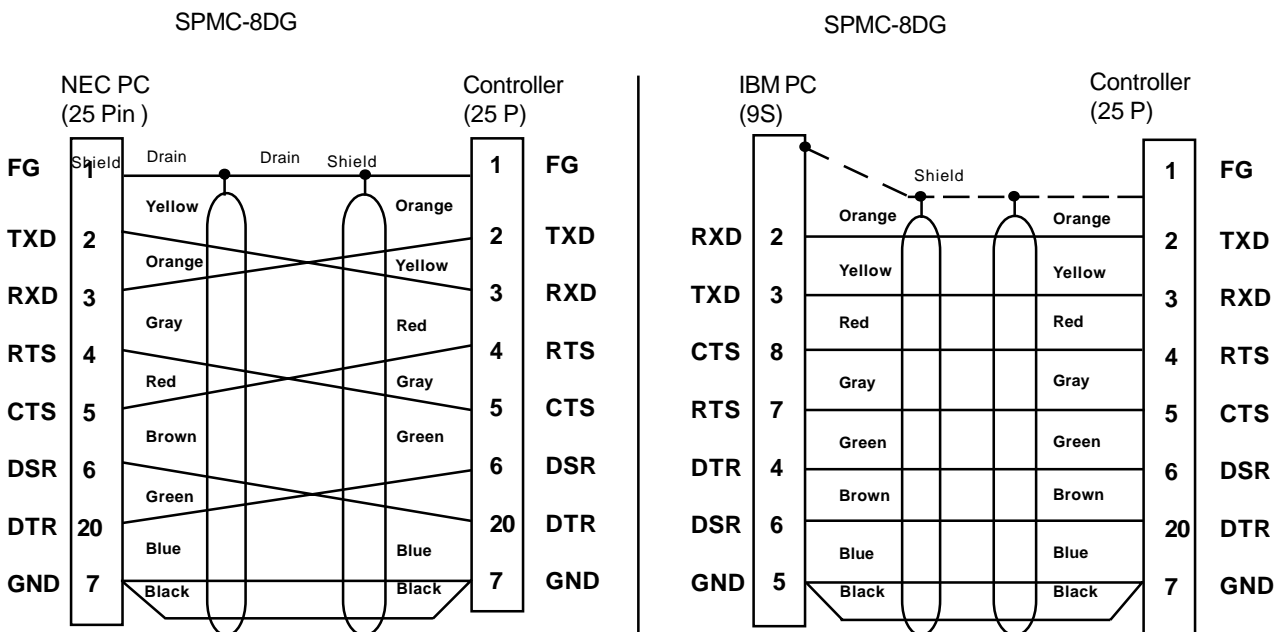
Pin No.	Signal Name
1	FG
2	TXD
3	RXD
4	(RTS)
5	(CTS)
6	DSR
7	SG
8	NC
9	NC
10	NC
11	NC
12	NC
13	NC

Pin No.	Signal Name
14	NC
15	NC
16	NC
17	NC
* 18	+6.2V Output
19	NC
20	DTR
21	NC
22	NC
* 23	EMG.SW Emergency Stop SW
24	NC
* 25	OV (+6.2)

* Pin numbers 18, 23, and 25 are for use with the teaching pendant signal. Do not connect these pins.

■ RS232C Cable

Please use RS232 cable pin configuration (between controller and computer serial port).



(The Shield line is connected to the shell clamp area)

Warning Please only use cables as specified in the charts above. Connection using other types of cables may cause breakdown in the PC interface area.

5. Teaching Pendant Function and Specification

5.4 RS232C Connector (D-Sub 25 DTE Special*) for the DS Type

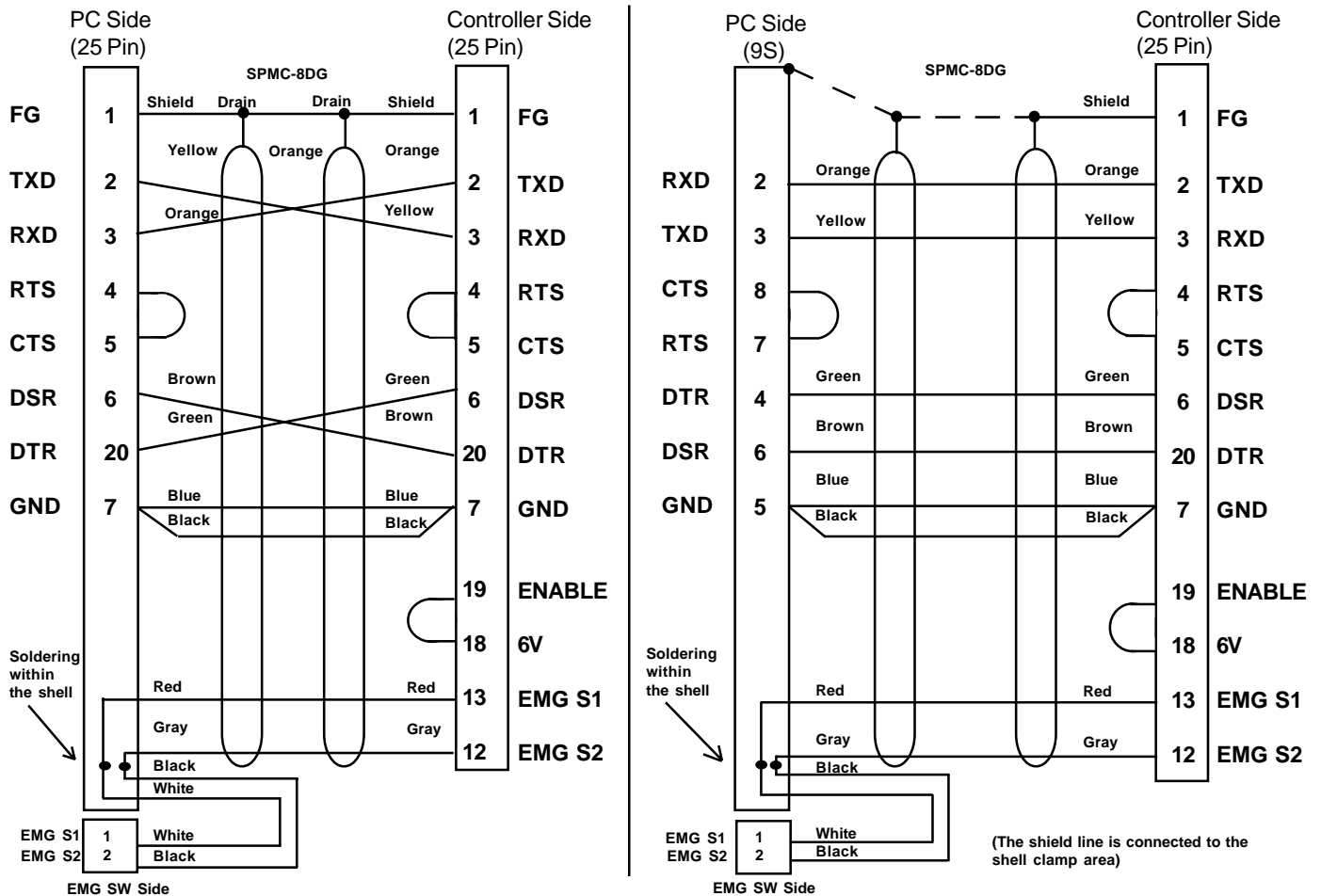
Pin No.	Signal Name
1	FG
2	TXD
3	RXD
4	(RTS)
5	(CTS)
6	DSR
7	SG
8	NC
9	NC
10	NC
11	NC
* 12	EMG S2
* 13	EMG S1

Pin No.	Signal Name
14	NC
15	NC
16	NC
17	NC
* 18	+6.2V Output
* 19	ENABLE
20	DTR
21	NC
22	NC
* 23	EMG.SW Emergency Stop SW
24	NC
* 25	OV (+6.2)

- Pin numbers 12, 13, 18, 19, 23, 25 are for use with the teaching pendant signal. Do not connect these pins for RS232C.
- Pin numbers 4 and 5 are short-circuited.
- Pin numbers 12 and 13 are connected for emergency stop (B contact).
- Pin numbers 18 and 19 are ENABLE SW connecting terminal.

■ RS232C Cable

Please use RS232 cable pin configuration (between controller and computer serial port).



Warning Please only use cables as specified in the charts above. Connection using other types of cables may cause breakdown in the PC interface area.

6. Main Function Keys Above the LCD Display

*Alphabetical order

Number	Key	Command Name	Command content
1	Acc	Acceleration	Acceleration
2	All	All	All
3	And	And	And (Logical product)
4	Aprg	Application Program	Program edit screen
5	Axis	Axis	Axis parameter mode screen
6	Axis +	Axis Plus	Add 1 from axis No.
7	Axis-	Axis Minus	Subtract 1 from axis No.
8	BS	Back Space	Clear input and move the cursor backwards
9	Can	Cancel	Cancel
10	Cir	Circle	System arc parameter mode screen
11	Clr	Clear	Clear
12	CLROK?	Clear Okay?	Is it okay to clear the data?
13	Copy	Copy	Copy
14	Dec	Decrement	Subtract 1 from No.
15	Del	Delete	Delete
16	Edit	Edit	Edit mode screen
17	Etc	Etc	Other menu selection
18	Flag	Flag	Flag variation display selection
19	Go	Go	Designate execution
20	Home	Home	Axis origin parameter mode /applicable axis Non-applicable axis set mode screen
21	H L T	Halt	Stop
22	Inc	Increment	Add No.
23	Ins	Insert	Insert
24	Jog	Jog	Jog mode screen
25	JVel	Jog Velocity	Jog velocity screen
26	Main	Main	Controller side main ROM version
27	Mdi	Manual Data Input	Position data direct input
28	Motr	Motor	Axis motor parameter mode screen
29	Name	Name	Axis name parameter screen
30	Name+	Name Plus	Add 1 to Axis name (1→9, A→Z)
31	Name-	Name Minus	Subtract 1 from Axis name (Z→A, 9→1)
32	Not	Not	Not (Deny)

6. Main Function Keys Above the LCD Display

Number	Key	Command Name	Command content
33	Or	Or	Or (Or operation)
34	Para	Parameter	System parameter clear
35	Parm	Parameter	Parameter mode
36	Play	Play	Execution mode
37	Pos	Position	Point parameter mode, position data area clear
38	Posi	Position	Position data edit screen
39	Prog	Program	Program mode screen, program area clear
40	RamCL	Ram Clear	Memory clear mode screen
41	Run	Run	Program being executed
42	Shift	Shift	Mode
43	Show	Show	Designate monitor
44	Sio	Serial I/O RS232C	Serial I/O Parameter mode screen
45	Stat	Status	Designate program execution condition
46	Step	Step	Position data step
47	Stop	Stop	Stop
48	Stp 1	Stop 1	Stop the program indicated by the cursor
49	Stp AL	Stop All	Stop all executing programs
50	Srvo	Servo	Servo parameter screen
51	Svof	Servo Off	Manual • direct teaching pendant
52	Sys	System	System parameter mode screen
53	Teac	Position Data Teaching, Teaching Pendant	Teaching, teaching pendant version display
54	Test	Test	Test mode
55	Vel	Velocity	Velocity • acceleration setting
56	Ver	Version	Current version display screen
57	Wrt	Write	Write in
58	0/1	0 or 1	Change the display to 0 or 1

Note: Depending on the operation, there are other function keys not listed in the chart above.

7. Programming

SEL Language Structure

The SEL programming consists of a position and application program (command) section.

7.1 Position Program

In the position section, we have coordinates, velocity and acceleration.

Position No.	Velocity	Acceleration	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	Axis 8
1										
2										
3										
4										
1997										
1998										
1999										
2000										

*1,2
1-1500 mm/sec

*2
Standard
0.3G

±9999.999mm

- *1 Varies according to the actuator model.
- *2 When velocity and acceleration are set in the position data, this has priority over the data set in the application program. To validate the application data, set x.xxx or 0 in the position data.

Note: The DS type is a single axis only. Also position numbers go up to 500.

7. Programming

7.2 Commands

The outstanding feature of the SEL language is the simplicity of its command structure which eliminates the need for a compiler and allows high speed operation with just an interpreter.

7.2-1 SEL Language Structure

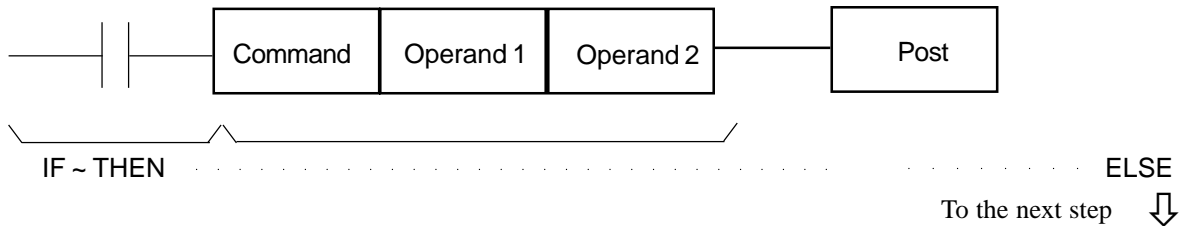
One step of the command has the following structure.

Expansion (AND · OR)	Input Condition (I/O · Flag)	Command			Post (Output port · Flag)
		Command	Operand 1	Operand 2	

Putting this in a ladder diagram,

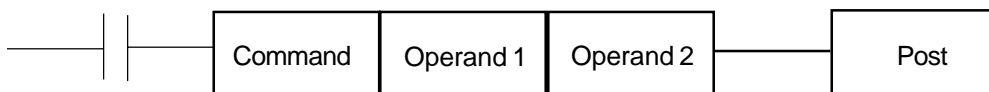


(1) The conditions before the commands are equivalent to "if ~ then" statements in BASIC language.



- ① Carry out a command when an input condition is established, and turn the output port ON, if output is designated. When not established, go on to the next step regardless of the next command (ex. WTON, WTOF). The designated output port remains the same, however it needs to be monitored carefully.
- ② If there is no conditioning set up, carry out command unconditionally.
- ③ If condition is used as "negative condition", then place an "N" (NOT).
- ④ Input/output port & flag can be used for condition.

(2) Output is set based on the result of the command execution.



- ① Actuators motion control commands: becomes OFF immediately after the command starts to be executed, and becomes ON when the command is completed.
Computation commands: when the result becomes a certain value, it turns ON, and it stays OFF otherwise.
- ② Output port and flag can be used for output section.

7. Programming

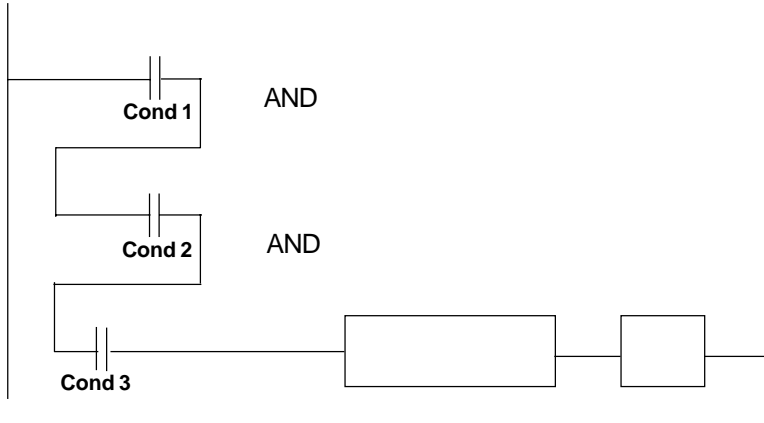
7.2-2 Expansion Condition

It is possible to combine conditions to make more complicated conditions as follows:

AND Expansion

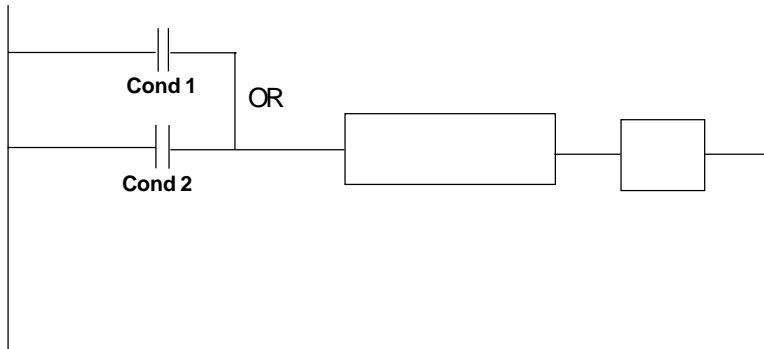
(Ladder Diagram display)

(SEL Language)



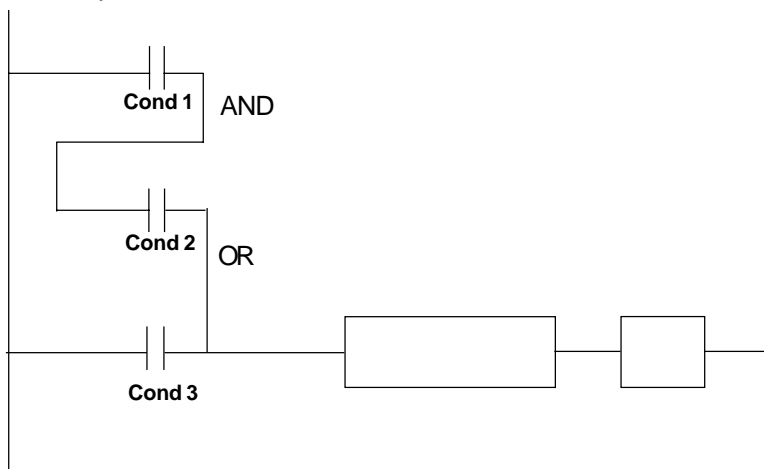
Explanation	Input	Commands			Output
		Command	Operand 1	Operand 2	
	Condition 1				
AND	Condition 2				
AND	Condition 3	Command	Operand 1	Operand 2	

OR Expansion



Explanation	Input	Commands			Output
		Command	Operand 1	Operand 2	
	Condition 1				
OR	Condition 2	Command	Operand 1	Operand 2	

AND/OR Expansion

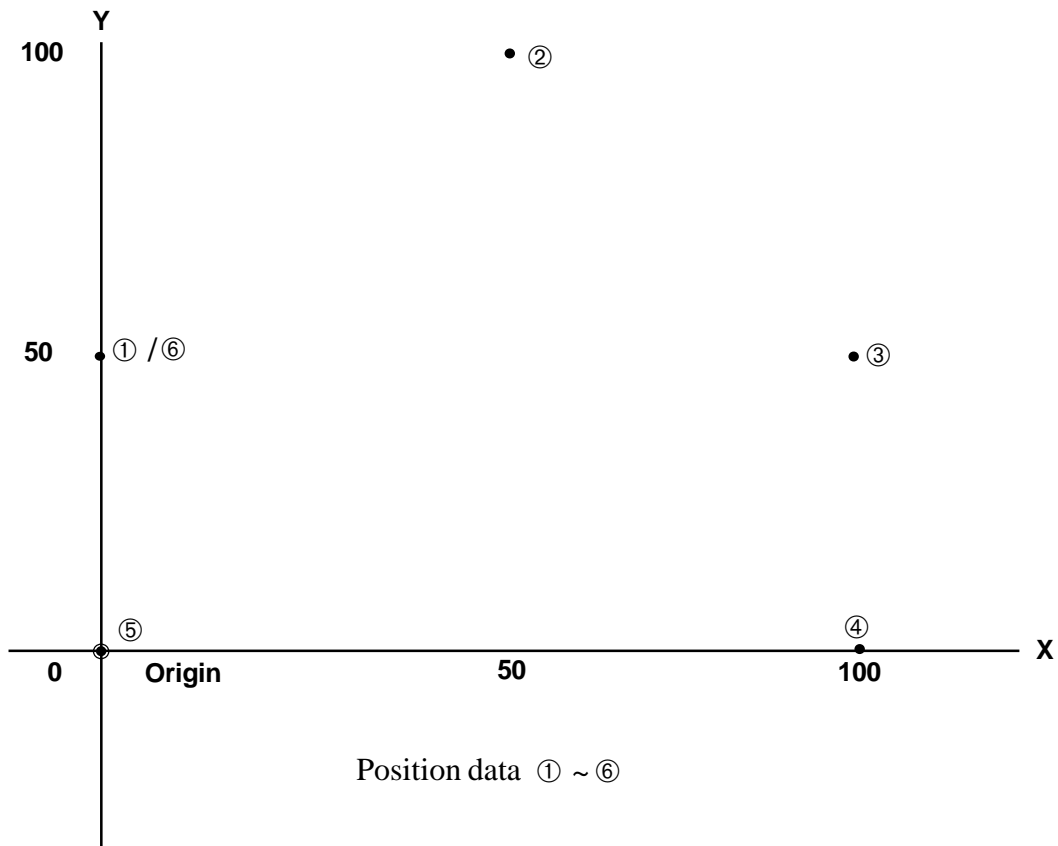


Explanation	Input	Commands			Output
		Command	Operand 1	Operand 2	
	Condition 1				
AND	Condition 2				
OR	Condition 3	Command	Operand 1	Operand 2	

Note: By convention, all "AND" operations are performed before the "OR" operations when they are used in conjunction.

8. Examples of Simple Operation Procedure

In this chapter, we will design a program which draws a 5 sided shape. It will pass through 6 points (① and ⑥ share the same position), taught by a 2-axes (X,Y) actuator.



* Please finish reading the rest of the operational procedure before moving ①~ ⑥.

8. Examples of Simple Operation Procedure

8.1 Creating a Position Data

First, we will input data for 6 points to draw a 5 sided shape, similar to the position data list shown below:

Position Data • list*

No.	Acc	Vel	Axis (1)	Axis (2)
1	x.xx	xxxx	0	50
2	x.xx	xxxx	50	100
3	x.xx	xxxx	100	50
4	x.xx	xxxx	100	0
5	x.xx	xxxx	0	0
6	x.xx	xxxx	0	50

*This is a printout of the controller position data which we will create in this section.

SEL Teaching			
Teach V2.00		09/01/97	
Start (Blinking)			
F1	F2	F3	F4

LCD Display:

Once the characters appears on the LCD display, you may advance to the next step by pressing the appropriate function Key located on the lower part of the screen.

First, press the **F1** Key (Start).

SEL Teaching			
Teach V2.00		09/01/97	
Main V2.50		07/14/95	
Start (Blinking)			
F1	F2	F3	F4

Controller ROM Version Display:

Press the **F1** Key (Start).

Mode Select			
Prog	Play	Parm	Test
F1	F2	F3	F4

Mode Selection Display:

This is the basic screen for all operation.

Press **F1** Key (Prog).

**Note* In case of a selection or input error, press the ESC key to return to the previous screen and then resume operation. For any operation, if you continue pressing the ESC Key, you will eventually return to the above basic screen.*

8. Examples of Simple Operation Procedure

Prog			
Posi		Aprg	
F1	F2	F3	F4

Program Mode Screen:

Press the **F1** Key (Posi).

Posi			
Mdi	Teac	Step	Etc
F1	F2	F3	F4

Position (Position Data) Edit Screen:

Press the **F1** Key (Mdi - manual data input).

Mdi		No		1 [1]		- 2	
XXXXX.XXX				XXXXX.XXX			
Inc	Dec	Clr	Del				
F1	F2	F3	F4				

Position data Axis 1 →

Axis 2 →

Position Number Input Mode:

The cursor is on the position number location. XXXXX.XXX will display if there is no data. Press the **Return** Key and match the cursor to the position data for Axis 1.

Screen explanation: Mdi - 1 No 1 [1] - 2

↓ ↓ ↓ ↓
 Position # Axis # Axis Name No. of axes connected

Note 1: For existing data, keep pressing the **F1** Key until reaching the screen which displays the XXXXX.XX. Then, execute data input, or do a substitution so that the previous data will disappear.

Note 2: This screen can only display up to a maximum of four axes. When the number of axes are over five, please refer to Page 50 for reference.

8. Examples of Simple Operation Procedure

Mdi -	<u>1</u> No	1 [1]	- 2
	XXXXX.XXX		XXXXX.XXX
Wrt	Can	Clr	Etc
F1	F2	F3	F4

① Data input for point 1

Input the number 0 and press the **Return** Key. 0.000 will display, and the axis number and name will change to 2. Then, the cursor position will move to the position data for the axis 2.

* It is possible to input position data up to for integer 4 digits before the decimal point and 3 digits after. The range depends on the type of the machine. Therefore, please verify the range according to the appropriate product catalog.

Mdi -	<u>1</u> No	2 [2]	- 2
	0.000		XXXXX.XXX
Wrt	Can	Clr	Etc
F1	F2	F3	F4

Input 50 into the position data for axis 2, then, press the **Return** Key.

*Since the cursor position moves every time the **Return** Key is pressed, input in sequence, first axis 1, then, axis 2. For input error, move the cursor to that location and do a substitution.

Mdi -	<u>1</u> No	2 [1]	- 2
	0.00 <u>0</u>		50.000
Wrt	Can	Clr	Etc
F1	F2	F3	F4

Using the **F1** Key (Wrt) to establish, the Position No. will advance by 1, turning into 2.

Mdi -	<u>2</u> No	1 [1]	- 2
	XXXXX.XXX		XXXXX.XXX
Wrt	Can	Clr	Etc
F1	F2	F3	F4

② Data input for point 2

Input 50 into the position data for axis 1, then press the **Return** Key.

8. Examples of Simple Operation Procedure

Mdi	-	2	No	2	[2]	-	2
							XXXXX.XXX
50.000							
Wrt		Can		Clr			Etc
F1		F2		F3			F4

Since the cursor position moves to the position data for the axis 2, input 100 and press the **Return** Key.

Mdi	-	2	No	1	[1]	-	2
							100.000
50.000							
Wrt		Can		Clr			Etc
F1		F2		F3			F4

Using the **F1** Key (Wrt) to establish, then, advance the Position No. to 3.

Mdi	-	3	No	2	[2]	-	2
							XXXXX.XXX
XXXXX.XXX							
Wrt		Can		Clr			Etc
F1		F2		F3			F4

③ Data input for point 3

Input 100 into the position data for axis 1, then press the **Return** Key.

Mdi	-	3	No	1	[1]	-	2
							XXXXX.XXX
100.000							
Wrt		Can		Clr			Etc
F1		F2		F3			F4

Input 50 into position data for axis 2, then press the **Return** Key.

Mdi	-	3	No	1	[1]	-	2
							50.000
100.000							
Wrt		Can		Clr			Etc
F1		F2		F3			F4

Press the **F1** Key (Wrt), then, advance Position No. to 4.

8. Examples of Simple Operation Procedure

Mdi	- 4 No	1 [1] - 2	
	XXXXX.XXX		XXXXX.XXX
Wrt	Can	Clr	Etc
F1	F2	F3	F4

④ Data input for point 4

Input 100 into the position data for axis 1, then press the **Return** Key.

Mdi	- 4 No	2 [2] - 2	
	100.000		XXXXX.XXX
Wrt	Can	Clr	Etc
F1	F2	F3	F4

Input 0 into the position data for the axis 2, then press the **Return** Key.

Mdi	- 4 No	1 [1] - 2	
	100.000		0.000
Wrt	Can	Clr	Etc
F1	F2	F3	F4

Press the **F1**Key (Wrt), and advance the Position No. to 5.

Mdi	- 5 No	1 [2] - 2	
	XXXXX.XXX		XXXXX.XXX
Wrt	Can	Clr	Etc
F1	F2	F3	F4

⑤ Data input for point 5.

Input 0 into the position data for axis 1, then push the **Return** Key.

Mdi	- 5 No	2 [2] - 2	
	0.000		XXXXX.XXX
Wrt	Can	lir	Etc
F1	F2	F3	F4

Input 0 into the position data for axis 2, then press the **Return** Key.

8. Examples of Simple Operation Procedure

Mdi - 5 No 1 [1] - 2			
0.000		0.000	
Wrt	Can	Clr	Etc
F1	F2	F3	F4

Press the **F1** Key (Wrt), and advance the Position No. to 6.

Mdi - 6 No 1 [1] - 2			
XXXXX.XXX		XXXXX.XXX	
Wrt	Can	Clr	Etc
F1	F2	F3	F4

⑥Data input for point 6

Input 0 into the position data for axis 2, and then press the **Return** Key.

Mdi - 6 No 2 [2] - 2			
0.000		XXXXX.XXX	
Wrt	Can	Clr	Etc
F1	F2	F3	F4

Input 50 into the position data for axis 2, and then press the **Return** Key.

Mdi - 6 No 1 [1] - 2			
0.000		50.000	
Wrt	Can	Clr	Etc
F1	F2	F3	F4

Press the **F1**Key (Wrt) to establish, and then the Position No. screen will turn into 7.

Mdi - 7 No 1 [1] - 2			
XXXXX.XXX		XXXXX.XXX	
Wrt	Can	Clr	Etc
F1	F2	F3	F4

8. Examples of Simple Operation Procedure

Mdi	- <u>7</u> No	1 [1] - 2	
XXXXX.XXX		XXXXX.XXX	
Wrt	Can	Clr	Etc
F1	F2	F3	F4

Push the **ESC** key to return to the Position Edit Screen.

Posi			
Mdi	Teac	Step	Etc
F1	F2	F3	F4

Push the **ESC** key again to display the Program Mode Screen.

Prog			
Posi	Aprg		
F1	F2	F3	F4

Push the **ESC** key again to return to the Mode Selection Screen.

* Pressing the **ESC** key further will not change the screen.

Mode Select			
Prog	Play	Parm	Test
F1	F2	F3	F4

This concludes the basic position data input.

8. Examples of Simple Operation Procedure

8.2 Creating an application program

8.2-1 In this section, we will create an application program which will move the position data location that was created in the previous section.

Application program • list *

Line	A/O	N (1)	OP-CODE	OPERAND1	OPERAND2	POST COMMENT
1			HOME	11		
2			V EL	100		
3			MOVL	1		
4			MOVL	2		
5			MOVL	3		
6			MOVL	4		
7			MOVL	5		
8			MOVL	6		
9			EXIT			

* This is a printout of the application program which we will create (input) in this section.

The order of the application program input in the teaching pendant differs from the application program coding sheet (see diagram below). The order in the teaching pendant is as follows: command (OP-CODE), operand 1, 2 (OPRND 1, 2), output requirement (POST), expansion requirement (A/O) and continuous requirement (N).

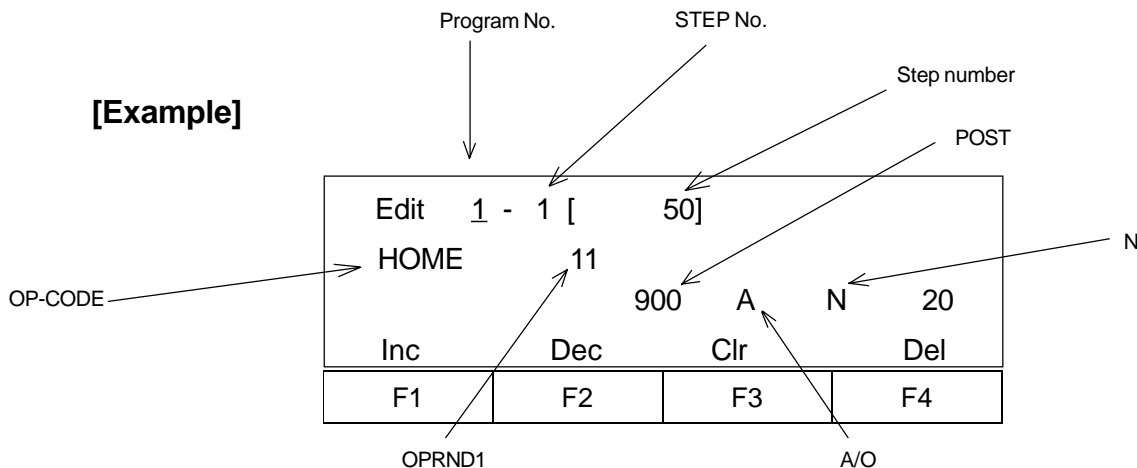
In the coding sheet:

[Example]

Step	A/O	N	OP-CODE	OPRND1	OPRND2	POST	COMMENT
1	AND	N20	HOME	11		900	



In the LCD screen:



8. Examples of Simple Operation Procedure

Mode Select			
Prog	Play	Parm	Test
F1	F2	F3	F4

Select the **F1** Key (PROG) from the Mode Selection Screen.

Prog			
Posi	Aprg		
F1	F2	F3	F4

Select the **F2** Key (Aprg) from the Program Mode Screen.

Aprg			
Edit	Copy		
F1	F2	F3	F4

Select the **F1** Key (Edit) from the Application Program Edit Screen.

Edit	1- 1	[	0]
ABPG	ACC	ADD	AND
F1	F2	F3	F4

After the screen changes to program No. Input Mode Screen, move the cursor location using the **Return** Key. Then, press the **Return** Key twice.

*For existing program data input, substitution will clear the previous data.

Edit	<u>1</u> - 1	[	0]
ABPG	ACC	ADD	AND
F1	F2	F3	F4

Edit command input mode:

Retrieve the HOME command (Homing). Pressing the **DEC /** - Key will place the alphabet of the command in a descending order. Pressing the **INC /.** Key will place the alphabet of the command in an ascending order.

8. Examples of Simple Operation Procedure

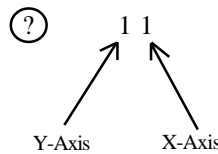
Edit 1 - 1 [0]			
-			
HOME	IN	INB	JBWF
F1	F2	F3	F4

Retrieval is performed either by the **DEC / -** Key or **INC / .** Key. Continue pressing either of the Keys until the target command displays. Since **HOME** is displayed in the display window, in this example, select the **F1 (HOME)** Key. **HOME** is displayed on the command input location.

[Note: In some cases, the displayed function key location (**F1 ~F4**) of Home will differ.

Edit 1 - 1 [0]			
Home			
HOME	IN	INB	JBWF
F1	F2	F3	F4

Since the cursor moves to the operand 1 input position when pressing the **Return** Key, input 11 so that both X and Y axes homes at the same time. Why 11?



0 • • Not used

1 • • Used.

Therefore, homing will be executed to both axes in this example (See Page 65 for Homing reference*1).

Edit 1 - 1 [0]			
Home 11_			
*	BS	Clr	
F1	F2	F3	F4

Press the **Return** Key.

Edit 1 - 1 [0]			
Home 11			
	BS	Clr	
F1	F2	F3	F4

Press the **Return** Key.

Edit 1- 1 [0]			
Home 11			
And	Or	Clr	Not
F1	F2	F3	F4

Press the **Return** Key.

8. Examples of Simple Operation Procedure

Edit 1- 1 [0]			
HOME 11			
			Clr
F1	F2	F3	F4

Select the **F4** Key (Wrt), and advance to Step No.2.

Edit 1- 2 [1]			
-			
HOME	IN	INB	JBWF
F1	F2	F3	F4

Continuously press either the **DEC / -** Key or **INC / .** Key, and retrieve VEL.

Edit 1- 2 [1]			
-			
TIMW	VEL	WTOF	WTON
F1	F2	F3	F4

In this example, select the **F2** Key (VEL).

[Note: In some cases, the displayed function key location (**F1~F4**) of VEL may differ.]

Edit 1- 2 [1]			
VEL			
TIMW	VEL	WTOF	WTON
F1	F2	F3	F4

Press the **Return** Key.

Edit 1- 2 [1]			
VEL			
-			
*	BS	Clr	
F1	F2	F3	F4

Here, we will input velocity as 100, then, press the **Return** Key.

[Note: To verify maximum velocity, please refer to the appropriate product catalog.]

8. Examples of Simple Operation Procedure

Edit 1- 2	[	1]	
VEL	100		
And	Or	Clr	Not
F1	F2	F3	F4

Press the **Return** Key.

Edit 1- 2	[	1]	
VEL	100		
		Clr	Not
F1	F2	F3	F4

Press the **F4** Key, and advance to Step No.3.

Edit 1- 3	[	2]	
-			
TIMW	VEL	WTOF	WTON
F1	F2	F3	F4

Continuously press the **DEC / -** Key until **MOVL** is displayed.

Edit 1 - 3	[	2]	
-			
MOD	MOVL	MOVP	MULT
F1	F2	F3	F4

In this example, select the **F2** Key (**MOVL**).

[Note: In some cases, the displayed function key location (**F1~F4**) of **MOVL** may differ.]

② The difference between **MOVL** and **MOVP**:

MOVP moves the actuator to the designated position number from point to point without interpolation.
MOVL moves the actuator to the designated point while using interpolation (not point to point).

Edit 1 - 3	[	2]	
<u>MOVL</u>			
MOD	MOVL	MOVP	MULT
F1	F2	F3	F4

Press the **Return** Key. Then, input 1 for Position No. into operand 1.

8. Examples of Simple Operation Procedure

Edit 1-	3	[	2]
MOVL	1_		
*	BS	Clr	
F1	F2	F3	F4

Press the **Return** Key 3 times.

Edit 1-	3	[	2]
MOVL	1		
		Clr	Wrt
F1	F2	F3	F4

Select the **F4** Key (Wrt). The screen will advanced to Step No. 4.

Edit 1-	4	[	3]
-			
MOD	MOVL	MOVP	MULT
F1	F2	F3	F4

In this example, select the **F2** Key (MOVL), and then press the **Return** Key. Input 2 for Position No. into operand 1.

[Note: In some cases, the displayed function key location (**F1 ~F4**) of MOVL may differ.]

Edit 1-	4	[	1]
MOVL		2_	
*	BS	Clr	
F1	F2	F3	F4

Press the **Return** Key 3 times, and select the **F4** Key (Wrt). The screen will advance to Step No.5.

Edit 1-	5	[	4]
-			
MOD	MOVL	MOVP	MULT
F1	F2	F3	F4

In this example, select the **F2** Key (MOVL), and then press the **Return** Key. Input 3 for position No. into operand 1.

[Note: In some cases, the displayed function key location (**F1 ~F4**) of MOVL may differ.]

8. Examples of Simple Operation Procedure

Edit 1-	5	[	4]
MOVL		3_	
*	BS	Clr	
F1	F2	F3	F4

Press the **Return** Key 3 times, and select the **F4** Key (Wrt).
The screen will advance to Step No. 6.

Edit 1-	6	[	5]
-			
MOD	MOVL	MOVP	MULT
F1	F2	F3	F4

In this example, select the **F2** Key (MOVL), and select the **Return** Key. Input 4 for position No. into operand 1.

[Note: In some cases, the displayed function key location (**F1 ~F4**) of the MOVL may differ.]

Edit 1-	6	[	5]
MOVL	4_		
*	BS	Clr	
F1	F2	F3	F4

Press the **Return** Key 3 times, and select the **F4** Key (Wrt).
The screen will advance to Step No. 7. In this example, select the **F2** Key (MOVL), and press the **Return** Key. Input 5 for position No. into operand 1.

[Note: In some cases, the displayed function key location (**F1 ~F4**) of MOVL may differ.]

Edit	1- 7	[	6]
MOVL	5_		
*	BS	Clr	
F1	F2	F3	F4

Press the **Return** Key 3 times, and select the **F4** Key (Wrt).
The screen will advance to Step No. 8. In this example, select the **F2** Key (MOVL), and press the **Return** Key. Input 6 for position No. into operand 1.

[Note: In some cases, the displayed function key location (**F1 ~F4**) of MOVL may differ.]

8. Examples of Simple Operation Procedure

Edit 1-	8	[	7]
MOVL	6_		
*	BS	Clr	
F1	F2	F3	F4

Press the **Return** Key 3 times, and select the **F4** Key (Wrt). The screen will advance to Step No. 9. Continuously press the **DEC/** - Key until EXIT displays. In this example, select the **F3** Key (EXIT) and then, press the Return Key.

[Note: In some cases, the displayed function key location (**F1 ~F4**) of the EXIT may differ.]

⑦ EXIT ends a program. In order to stop without inputting EXIT above a program, please refer to Page 39, section 9.2-2, entitled, "How to stop operation during or methods other than EXIT."

Edit 1-	9	[	8]
<u>EXIT</u>			
EDSR	EOR	EXIT	EXPG
F1	F2	F3	F4

Press the **Return** Key twice, and establish with the **F4** Key (Wrt).

Edit 1- 10	[	9]	
<u>EXIT</u>			
EDSR	EOR	EXIT	EXPG
F1	F2	F3	F4

* For this example, programming ends. To continue inputting another program, refer to Page 31.

After pressing the **ESC** Key several times, return the screen to the Mode Selection Screen.

Mode Select			
Prog	Play	Parm	Test
F1	F2	F3	F4

8. Examples of Simple Operation Procedure

8.2-2 How to input another program as a continuation

Edit	1-10	[	9]
-			
EDSR	EOR	EXIT	EXPG
F1	F2	F3	F4

[Continuation from P.30]

Press the **ESC** Key to execute Step No. Input Mode.

(To verify each step, either do a direct number input into Step No. during this screen. Or use the **F1** Key (Inc) and **F2** Key (DEC) to observe the Step No. you wish to verify.

Edit	1-1 <u>0</u>	[	9]
Inc	Dec	Clr	Etc
F1	F2	F3	F4

By pressing the **ESC** Key once more will change the screen into Program No. Input Mode Screen. Therefore, either do a direct number, or by pressing the **F1** Key (Inc), the Program No. will turn into 2, allowing you to create another program.

Edit	<u>2</u> -1	[	0]
Inc	Dec	Clr	Etc
F1	F2	F3	F4

The Mode Selection Screen will return by continuously pressing the **ESC** key.

Mode Select			
Prog	Play	Parm	Test
F1	F2	F3	F4

* To turn Mode Selection Screen into Program No. Input Mode Screen, please refer to Page 23 and on. Use the program No. Input Mode Screen to verify that the cursor is at the Program No. location. Then, either press the **F1** Key or do a direct number input. Make sure that other programs can be input into the screen so that new programs can be created.

9. Operation

9.1 Program Operation

In this section, we will operate the program which was created in the previous chapter.

Mode Select			
Prog	Play	Parm	Test
F1	F2	F3	F4

Select the **F2** Key (Play) from the Mode Selection Screen.

Play			
Prog	Posi		
F1	F2	F3	F4

Select the **F1** Key (Prog).

(Note: The left screen will only be displayed for the DS type. For the Super SEL type, the screen will shift directly to the screen below.)

Play <u>1</u> - 1		[	9]
HOME 11			
Inc	Dec	Clr	
F1	F2	F3	F4

After confirming that the Play Program Input Mode Program No. is 1, press the **Return** Key.

* If the Program No. 1 is not the program you input, then continue pressing the **F1** Key, and match your program with the Program No.

Play <u>1</u> - 1		[	9]
HOME 11			
Show	Go	Stat	HLT
F1	F2	F3	F4

When **F2** Key (Go) is selected, homing begins. When homing is completed, the program will move according to the created Position Data Program.

9. Operation

Play 1		[ProgStatus]	
ERR_STEP		[NONE]	[STOP]
Posi	Play	Stat	Etc
F1	F2	F3	F4

When the operation is done by EXIT, this screen will be displayed. Press the **ESC** Key.

Play 1-1		[9]	
HOME 11			
Inc	Dec	Clr	
F1	F2	F3	F4

By continuously pressing the **ESC** Key, the screen will display the Mode Selection Screen.

Mode Select			
Prog	Play	Parm	Test
F1	F2	F3	F4

9. Operation

9.2 Application Program Changes

9.2-1 Setting a continuous movement in a program (Ins: insert, Del: delete)

In this section, we will set a continuous movement in a program using commands TAG and GOTO.

① GOTO refers to jump. By setting TAG before jump, you can repeat and skip a program.

Mode Select			
Prog	Play	Parm	Test
F1	F2	F3	F4

Select the **F1** Key (Prog) from the Mode Selection Screen.

Prog			
Posi	Aprg		
F1	F2	F3	F4

Select the **F2** Key (Aprg) from the Program Mode Screen.

Aprg			
Edit	Copy		
F1	F2	F3	F4

Select the **F1** Key (Edit) from the Application Program Edit Screen.

9. Operation

Edit 1-	1	[	9]
HOME	11		
Inc	Dec	Clr	Etc
F1	F2	F3	F4

Since the screen changes to the Program Edit Mode Screen, press the **Return** Key once, and match the cursor location to the Step No. location.

Edit 1-	<u>1</u>	[	9]
HOME	11		
Inc	Dec	Clr	Etc
F1	F2	F3	F4

Input TAG between Step No. 2 of command VEL and Step No. 3 of command MOVL, by either directly inputting the number 3 or pressing the **F1** Key (Inc) twice until the number 3 is displayed.

Edit 1-	<u>3</u>	[	9]
MOVL	1		
Inc	Dec	Clr	Etc
F1	F2	F3	F4

Select the **F4** (Etc) Key.

Edit 1-	<u>3</u>	[	9]
MOVL	1		
Ins	Del		Etc
F1	F2	F3	F4

Select the **F1** Key (Ins). 1 of Insert will be displayed behind Step No.3.

Edit 1-	<u>3</u> |	[	9]
-			
EDSR	EOR	EXIT	EXPG
F1	F2	F3	F4

Continuously press either the **DEC/-** Key or the **INC /.** Key. In this example, select the **F2** Key (TAG), and press the **Return** Key.

[Note: In some cases, the displayed function key location (**F1~F4**) of TAG may differ.]

9. Operation

Edit	1- 3 |	[	9]
Tag		-	
	BS		Clr
F1	F2	F3	F4

Input number 1 into operand 1.

* When inputting a number into TAG operand 1, the number should be a convenient number that is under 64. However, please select a number that correspond to the number which will enter GOTO operand 1.

Edit	1 - 3 |	[	9]
TAG	1_		
	BS		Clr
F1	F2	F3	F4

Press the **Return** Key, and select the **F4** Key (Wrt).

Edit	1 - 4 |	[	10]
-			
SVON	TAG	TAN	TIMC
F1	F2	F3	F4

Press the **ESC** Key, and display the Step No. 4 Screen.

Edit	1 - 4	[	10]
MOVL	1		
Inc	Dec	Clr	Etc
F1	F2	F3	F4

Either input the number 3 or select the F2 (Dec) Key, and press the **Return** Key. Verify that Step 3 step number is changed from 9 to 10 in the TAG Command Screen.

9. Operation

Edit	1- 3	[	10]
T <u>A</u> G	1		
SVON	TAG	TAN	TIMC
F1	F2	F3	F4

Press the **ESC** Key, and match the cursor to the Step No. location.

Edit	1- <u>3</u>	[	10]
TAG	1		
Inc	Dec	Clr	Etc
F1	F2	F3	F4

Next, delete EXIT and insert GOTO, by either leaving the cursor location where it is and directly inputting the number 10, or pressing the **F1** Key (Inc) 7 times until the number 10 is displayed.

Edit	1 - 10_	[	10]
Exit			
Inc	Dec	Clr	Etc
F1	F2	F3	F4

Select the **F4** (Etc) Key.

Edit	1-1 <u>0</u>	[	9]
Ins	Del		Etc
F1	F2	F3	F4

Select the **F2** (Del) Key.

Edit	1-10	[	10]
EXIT			
Del (Blinking)			
F1	F2	F3	F4

Since Del is blinking, select the **F2** Key (Del) once again.

9. Operation

Edit 1 - 1 <u>0</u>		[	9]
Ins	Del	Etc	
F1	F2	F3	F4

Press the **Return** Key.

Edit 1 - 1 <u>0</u>		[	9]
-			
SVON	TAG	TAN	TIMC
F1	F2	F3	F4

Continuously press either the **DEC/ -** Key, or **INC / .** Key until GOTO is displayed. In this example, select the **F2** Key (GOTO).

[Note: In some cases, the displayed function key location (**F1~F4**) of GOTO may differ.]

Edit 1 - 1 <u>0</u>		[	9]
<u>GOTO</u>			
EXSR	GOTO	GRP	HOLD
F1	F2	F3	F4

Press the **Return** Key, and input the same number which was input in operand 1 of TAG operand 1. Here, 1 is input.

Edit 1- 1 <u>0</u>		[	9]
GOTO 1_			
*	BS	Clr	
F1	F2	F3	F4

Press the **Return** Key twice and establish with the **F4** Key (Wrt). Return to the Mode Selection Screen, and repeat the movement one more time (see Page 32 and on).

9. Operation

9.2-2 How to stop operation during or by other methods excluding EXIT

Select the STOP Key when executing a program, when the EXIT command is not input, or when you wish to force end a program.

Edit 1- 0 [9]			
MOVL 6			
Posi	Play	Stat	Etc-
F1	F2	F3	F4

While in execution, press the **F4** Key (Etc) twice until STOP is displayed.

Play [Run 1- 1]			
1-6			
Stop			Etc-
F1	F2	F3	F4

Press the **F1** Key (Stop). When several programs are being operated using the multi-task, the StpAL will stop all of the programs, while the Stp 1 will select and stop a Program No.

PlayStop [Run 1- 1]			
1-6			
		StpAL	Stp1
F1	F2	F3	F4

Here, you may select either the **F3** Key or the **F4** Key to stop.

PlayStop [Run 0- 0]			
Please press any key			
F1	F2	F3	F4

Use the **ESC** Key to return to the Mode Selection Screen.

Although the 01 will continue to be displayed on the controller code display, this is not a problem.

(For the DS type, P01 will be displayed).

* You may also use EMERGENCY STOP to force a stop (for reference, see Page 77).

9. Operation

9.2-3 Expansion Condition Input Procedure

In this section, we will learn the expansion condition input procedure using the Application Program List example below:

Application Program • List

Line	A/O	N (1)	OP-CODE	OPERAND 1	OPERAND 2	POST	COOMMENT
1		N22					
2	AND	N20	HOME	11		900	

Mode Select			
Prog	Play	Parm	Test
F1	F2	F3	F4

Select the **F1** Key from the Mode Selection Screen.

Prog			
Posi	Aprg		
F1	F2	F3	F4

Select the **F2** Key (Aprg) from the Program Mode Screen.

Aprg			
Edit	Copy		
F1	F2	F3	F4

Select the **F1** Key from the Application Program Edit Screen.

9. Operation

Edit <u>1</u> - 1 [10]			
HOME 11			
Inc	Dec	Clr	Del
F1	F2	F3	F4

The screen will change into the Program No. Input Mode Screen, while the screen condition will change into the Program No. 1 which was created in the Application Program. Either press the **F1** Key (Inc), or input the number 2 to turn the Program No. into 2.

Edit <u>2</u> - 1 [0]			
Inc	Dec	Clr	Del
F1	F2	F3	F4

Press the **Return** Key, and move the cursor to the Step No. position.

Edit 2 - <u>1</u> [0]			
Inc	Dec	Clr	Del
F1	F2	F3	F4

Press the **Return** Key once again, and move the cursor to the command input position.

Edit 2 - 1 [0]			
-			
EXSR	GOTO	GRP	HOLD
F1	F2	F3	F4

Here, we will not input a command. Instead, since this is only for a requirement input, press the **Return** Key once to change the screen into the Continuous Requirement Input Mode Screen.

Edit 2 - 1 [0]			
And	Or	Clr	Not
F1	F2	F3	F4

Select the **F4** Key (Not).

9. Operation

Edit 2- 1 [0]			
			N_
And	Or	Clr	Not
F1	F2	F3	F4

The screen will display N of NOT (A is for AND, and O is for OR). Here, we will input the number 22.

Edit 2- 1 [0]			
			N22_
And	Or	Clr	Not
F1	F2	F3	F4

Press the **Return** Key, and establish with the **F4** Key (Wrt). Then, advance to No.2.

Edit 2- 2 [1]			
-			
EXSR	GOTO	GRP	HOLD
F1	F2	F3	F4

In this example, press the **INC /**. Key once and display HOME. Then, select the **F1** Key (HOME).

[Note: In some cases, the displayed function key location (F1 ~F4) of the HOME may differ.]

Edit 2- 2 [1]			
HOME			
HOME	IN	INB	JBWF
F1	F2	F3	F4

Press the **Return** Key once, and input the number 11 into operand 1. Then, once again press the **Return** Key.

Edit 2- 2 [1]			
HOME 11			
-		Clr	
	BS		
F1	F2	F3	F4

Since the screen will display the Result Input Mode Screen, input 900 of result output. Then, press the **Return** Key.

9. Operation

Edit 2-	2	[	1]
HOME	11		
	900		-
And	Or	Clr	Not
F1	F2	F3	F4

Here, the screen will change into the Continuous Input Mode Screen. Select the **F1** Key (And).

Edit 2-	2	[	1]
HOME	11		
	900	A_	
And	Or	Clr	Not
F1	F2	F3	F4

The screen will display A of AND. Select the **F4** Key (Not) and input the number 20.

Edit 2-	2	[	1]
HOME	11		
	900	A	N20_
And	Or	Clr	Not
F1	F2	F3	F4

Press the **Return** Key.

Edit 2-	2	[	1]
HOME	11		
	900	A	N20_
		Clr	Wrt
F1	F2	F3	F4

Select the **F4** Key (Wrt).

Edit 2-	3	[	2]
HOME	IN	INB	JBWF
F1	F2	F3	F4

Use the **ESC** Key to return to the Program Mode Screen. This concludes the Expansion Condition Input Procedure.

9. Operation

9.3 Position Operation (DS type only)

There are two methods in Position Operation: One is “Moving One Step at a Time” Method, and the second is the “Consecutive Movement” Method.

9.3-1 Step Operation

Mode Select			
Prog	Play	Parm	Test
F1	F2	F3	F4

Select the **F2** Key (Play) from the Mode Selection Screen.

Play			
Prog	Posi		
F1	F2	F3	F4

Select the **F2** Key (Posi).

Play			
HOME			
F1	F2	F3	F4

Select the **F1** Key (HOME) to execute homing.

Play			
Moving now to Home			
F1	F2	F3	F4

This is the screen during homing.

9. Operation

Play - 2 No 1 [1] -1 200.000			
Inc		Dec	
F1	F2	F3	F4

Press either the **F1** Key (Inc) or **F2** Key (Dec), and select the first Position No. you wish to move. then, determine with the **Return Key** (↵).

(Here, select the Position No. 2)

* **F1** Key (Inc) will increase the No. while the **F2** Key (DEC) will decrease the No.

Press the **F1** Key (Step), and select the Step Operation.

Play - 2 No 1 [1] -1 200.000			
Step		Cont	
F1	F2	F3	F4

Play S - 2 No 1 [1] -1 200.000			
Go+		Go-	
F1	F2	F3	F4

When **F1** Key (Go+) is selected:

Press the **F1** Key (Go+) to move to Position No. 2.

When the move is completed, Position No.3 is displayed.

When the **F2** Key (Go-) is selected:

Press the **F2** Key (Go-) to move to Position No. 2.

When the move is completed, Position No.1 is displayed.

9. Operation

9.3-2 Consecutive Operation

Mode Select			
Prog	Play	Parm	Test
F1	F2	F3	F4

Select the **F2** Key (Play) from the Mode Selection Screen.

Play			
Prog	Posi		
F1	F2	F3	F4

Select the **F2** Key (Posi).

Play			
HOME			
F1	F2	F3	F4

Select the **F1** Key (HOME) to execute homing.

Play			
Moving now to Home			
F1	F2	F3	F4

This is the screen during homing.

9. Operation

Play - 2 No 1 [1] - 1 200.000			
Inc		Dec	
F1	F2	F3	F4

Press either the **F1** Key (Inc) or **F2** Key (Dec), and select the first Position No. you wish to move. Then, determine with the **Return Key** (↵).

(Here, select position No. 2)

* **F1** Key (Inc) will increase the No. while the **F2** Key (DEC) will decrease the No.

Play - 2 No 1 [1] - 1 200.000			
Step		Cont	
F1	F2	F3	F4

Press the **F2** Key (Cont), and select Step Operation.

Play C- 2 No 1 [1] - 1 200.000			
Go		Stop	
F1	F2	F3	F4

When **F1** Key (Go) is pressed, the moving position will execute Consecutive Operation while displaying in sequence. To stop, press the **F2** Key (Stop).

9. Operation

9.3-3 Consecutive Operation Sequence)

During a Consecutive Operation Movement, execute the set Position No. to the next Position No. in sequence. For an unregistered position, return to the next position No. in front of the previous unregistered Position No. Then, execute the set Position No. to the next Position No. in sequence.

	Position No.	Acceleration	Velocity	Position
	1	0.3	750	50.000
	2	0.3	750	200.000
	3	0.3	500	150.000
	4	0.3	500	200.000
	5	x.x	xxx	xxx.xxx
	6	0.3	750	100.000
Set Position No. →	7	0.3	600	200.000
	8	0.3	200	300.000
	9	0.3	750	250.000
	10	0.3	750	150.000
	11	x.x	xxx	xxx.xxx
	12	x.x	xxx	xxx.xxx
	13	0.3	500	100.000

④ ↓

⑤ ↓

① ↓

② ↓

③ ↓

←

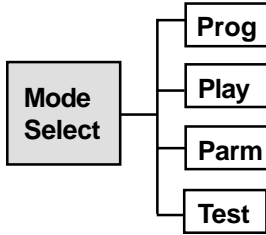
←

.... Unregistered position

.... Unregistered position

10. Explanation of Each Function Screen

Mode Selection Screen

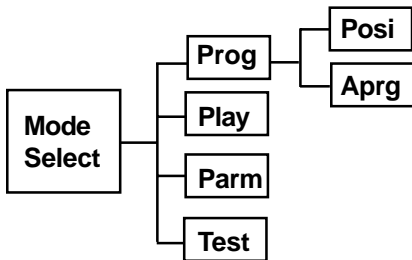


Mode Select			
Prog	Play	Parm	Test
F1	F2	F3	F4

This the basic screen for all operation.

Use the "ESC" Key to return to this screen.

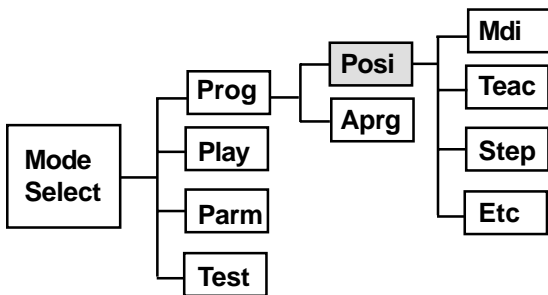
10.1 Prgram Mode Program Mode Screen



Prog			
Posi	Aprg		
F1	F2	F3	F4

Select the **F1** Key (Posi) to view the Position Edit Screen.

10.1-1 Position Edit Screen

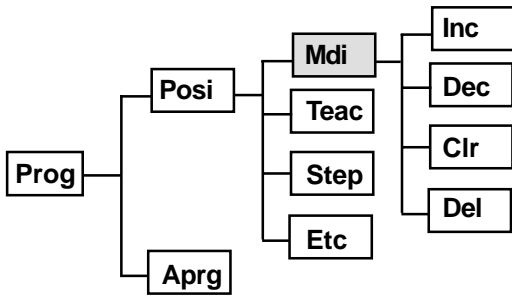


Posi			
Mdi	Teac	Step	Etc
F1	F2	F3	F4

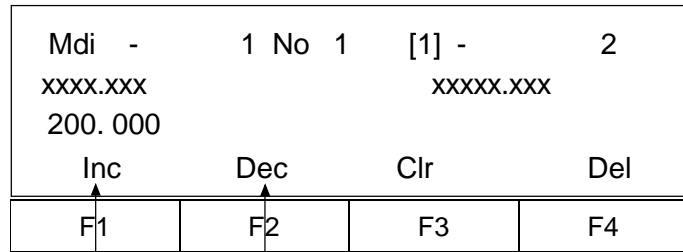
Select the **F1** Key (Mdi) to input position data number.

10. Explanation on Each Function Screen

Position Input Mode



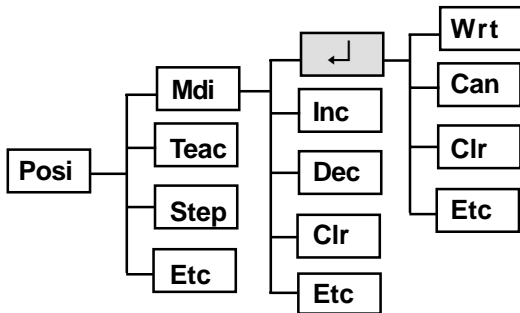
You may numerically input a position.



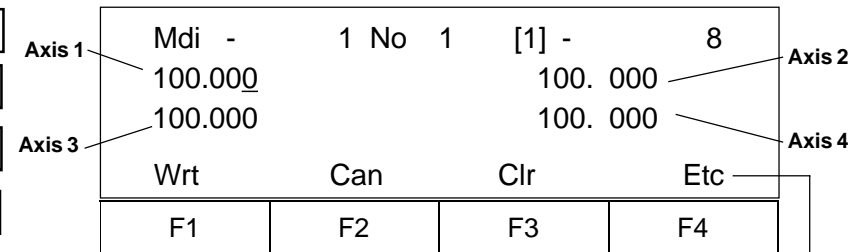
You may move Position No.1 through 2000, or input a number directly.

(For the DS type, you may move position No. 1 through 500.)
Please refer to Page 16, section 8.1, entitled, "Creating Position Data" for input procedure.

Position Input Mode Screen

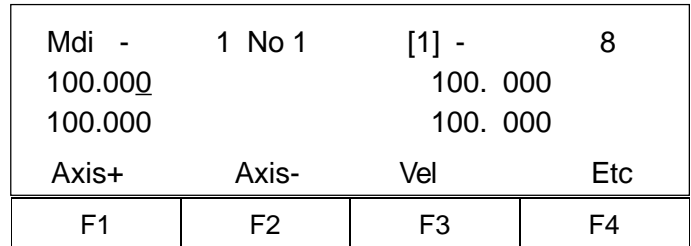


The screen has the following two methods:



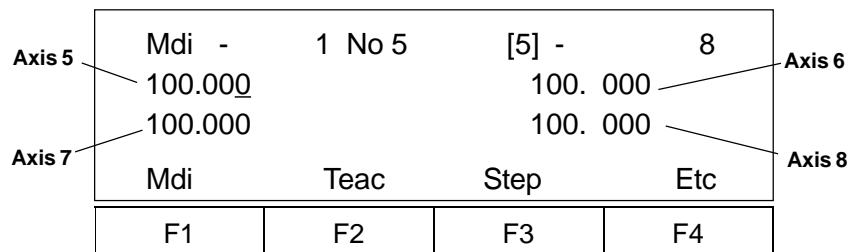
Continuously press the **Return** Key 4 times

When **Etc** is selected



When the number of actuator axes is over 5 axes, the next screen will appear.

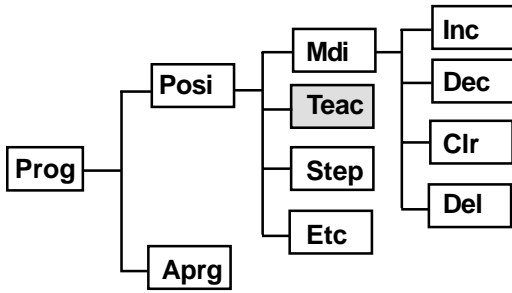
Use either the Axis+ or Axis- to move the cursor until it has reached Axis 5. Then, once again, select **Etc**.



The screen will change into the position input mode for Axis 5 through Axis 8.

10. Explanation on Each Function Screen

Teaching Mode



There are two methods in Position Teaching: One is the Direct Manual Actuator Move Method, and the other is the Teaching Using the ◀▶ Key Method.

Teac			
Display (Blinking)			
HOME	Teac	Step	Etc
F1	F2	F3	F4

Upon installing power and in teaching mode, the screen will change to the Homing Screen.

Press the **F1** Key (HOME).



Teac			
Moving now to Home			
F1	F2	F3	F4

This screen appears during homing. Unless the power is turned OFF thereafter, this screen will be skipped, and the screen below will first appear.

Upon homing



Teac -	1 No	1	[1] -	2
	0.000			50.000
Inc	Dec	Clr	Del	
F1	F2	F3	F4	



↵ (Return Key)



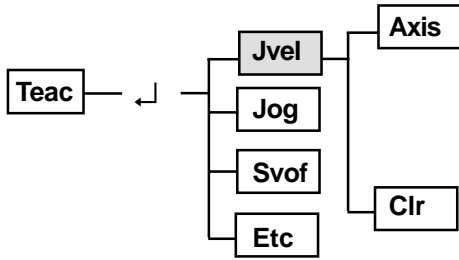
Mdi -	1 No	1	[1] -	2
	0.000			50.000
Jvel	Jog	Svof	Etc	
F1	F2	F3	F4	

Select either the **F2** Key (Jog) or the **F3** Key (Svof).

Jog ••• Allows you to move a position using ◀▶ key during Servo ON.
 Svof ••• Allows you to manually position the actuator during Servo OFF.

10. Explanation on Each Function Screen

Jog Speed Set Mode

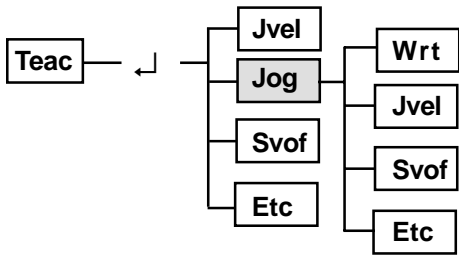


* The maximum value varies according to machine type. Therefore, please refer to the appropriate product catalog.

Teac	-	1	No	1	[1]	-	2
		0.000					50.000
Jvel	[	030	]	JAcc	[	0.30]
Axis				Clr			
F1		F2		F3		F4	

Initial set value using a parameter
(for reference, see Page 61).

Jog Mode



Jog	-	1	No	2	[2]	-	2
		0.000					0.000
Wrt		Jvel		Svof		Etc	
F1		F2		F3		F4	

Use the Key to move the actuator. The current position data displays on the screen.

Continue pressing the Key. The data will stop changing once you release the Key.



Jog	-	1	No	1	[1]	-	2
		18.625					0.000
Wrt		Jvel		Svof		Etc	
F1		F2		F3		F4	

To move the cursor to Axis 2, either press the **Return** Key or by selecting the **F4** Key, the Axis No. and Axis Name will change. By selecting the **F4** Key (Etc),



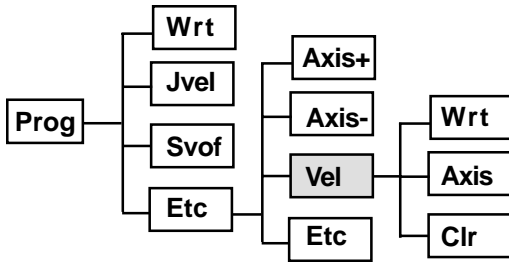
Velocity Set • Axis Change Mode

Jog	-	1	No	1	[1]	-	2
		18.625					0.000
Wrt		Jvel		Svof		Etc	
F1		F2		F3		F4	

Once the cursor position moves to Axis 2, use the Key to execute axis move.

10. Explanation on Each Function Screen

Teaching Velocity Set Mode



* The maximum value varies according to machine type. Therefore, please refer to the appropriate product catalog.

Jog	-	1	No	2	[2]	-	2
		18.625					7.510
Vel	[	0	]		ACC		[0.00]
Wrt			Axis			Clr	
F1	F2	F3	F4				

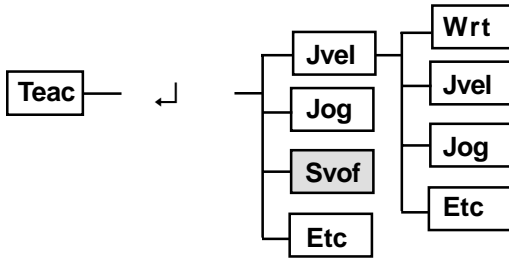
Set the velocity • acceleration, and press the **Return** Key.

F1 Key (Wrt): Writes to memory.

F2 Key (Axis): To Axis Change Mode Screen

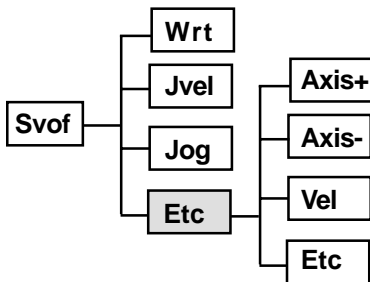
F3 Key (Clr): Clears the input number, and inputs the number once again.

Servo OFF Mode



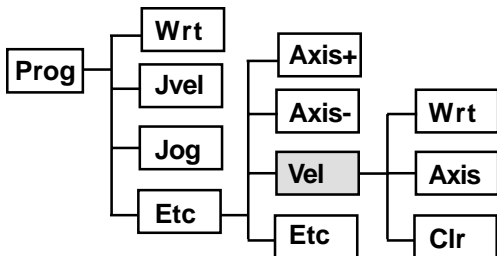
Svof	-	1	No	1	[1]	-	2
		59.729					99.625
Wrt			Jvel		Jog		Etc
F1	F2	F3	F4				

Manually operate the actuator to move the axis position, and then, write in using the **F1** Key (wrt). Each time the **F1** Key is pressed, the Position No. advances.



Svof	-	1	No	1	[1]	-	2
		48.593					99.625
Wrt			Jvel		Jog		Etc
F1	F2	F3	F4				

You may select the velocity set • axis No.



Svof	-	2	No	1	[1]	-	2
		48.593					99.625
Vel	[	0	]		Acc		[0.00]
Wrt			Axis			Clr	
F1	F2	F3	F4				

Set the velocity • acceleration, and press the Return Key.

F1 Key (Wrt): Writes to memory.

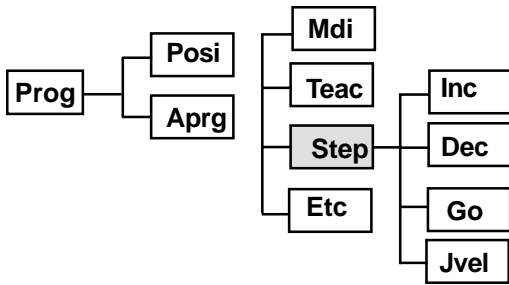
F2 Key (Axis): To Axis Change Mode Screen

F3 Key (Clr): Clears the input number, and inputs the number once again.

* The maximum value varies according to machine type. Therefore, please refer to the appropriate product catalog.

10. Explanation on Each Function Screen

Position Step Mode ... Verify position



Step -	1 No	1 [1] -	2
	48.593		99.625
Inc	Dec	Go	Jvel
F1	F2	F3	F4

Input the Position No. you wish to move.

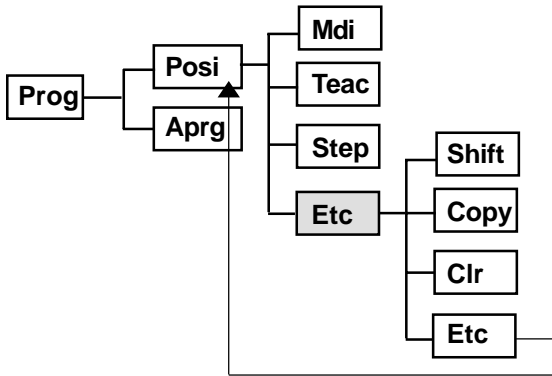
F1 Key: +1 to Position No.

F2 Key: -1 to Position No.

F3 Key: Move to the assigned Position No. (Data).

F4 Key: Assign move velocity.

Position Data Edit Screen 2



Posi			
Shift	Copy	Clr	Etc
F1	F2	F3	F4

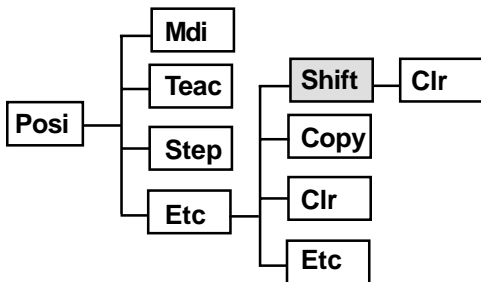
F1 Key: To Position Data Move Mode

F2 Key: To Position Data Copy Mode

F3 Key: To Position Data Clear Mode

F4 Key: To Position Edit Screen

Position Shift (Move) Mode



Moves the consecutive Position No. (data).

Posi	Shift		
From	St.	1 Ed.	3
To	St.	4 Ed.	6
		Clr	
F1	F2	F3	F4

Input (From) start of previous move Position No. to the end. Next, input (To) start of move ahead Position No. to the end.

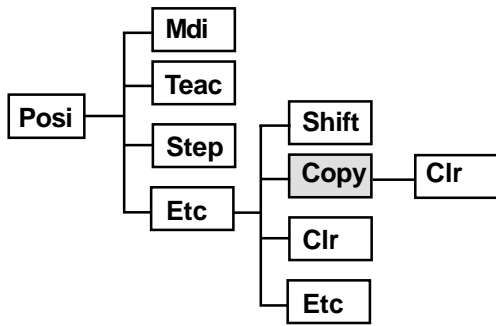


Posi	Shift		
From	St.	1 Ed.	3
To	St.	4 Ed.	6
Shift			
F1	F2	F3	F4

Press the **F1** Key (Shift) to complete move.

10. Explanation on Each Function Screen

Position Copy Mode

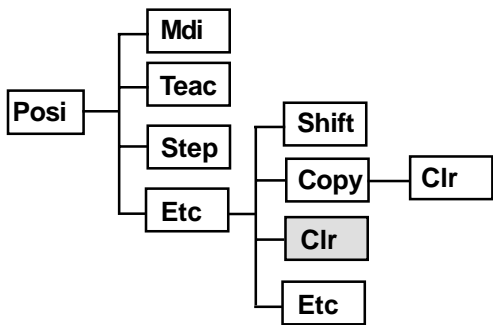


Copies the consecutive Position No. (data).

Posi		Copy	
From	St.	1	Ed.
To	St.		Ed.
			Clr
F1	F2	F3	F4

Operand is input in the same method as the Position Shift (move).

Position Clear Mode

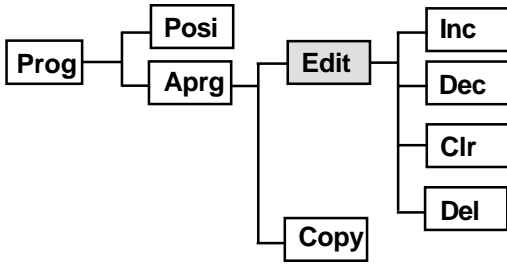


Clear All Position			
Clr			
F1	F2	F3	F4

Use the **F1** key to clear all positions.

10. Explanation on Each Function Screen

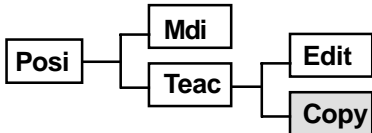
10.1-2 Program Edit Mode



Edit	1-	1 [13]	
Home		11	
		350	N350
Inc	Dec	Clr	Del
F1	F2	F3	F4

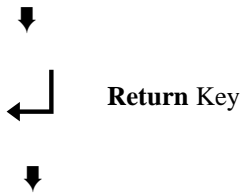
For operation method, please refer to the section 8.2, entitled, "Creating an Application Program."

Copy Mode



Prog	Copy		
From	1	[10]	
To	10	[20]	
		Clr	
F1	F2	F3	F4

Input (From) the Program No. you wish to copy, and then, input (To) the transfer ahead Program No. Use the Return Key to select Copy and Overwrite Selection Mode.



Copy and Overwrite Select Mode

Prog	Copy		
From	1		
To	10		
Copy	OWrt		
F1	F2	F3	F4

F1 Key (Copy) - Adds onto the end of the transfer ahead program

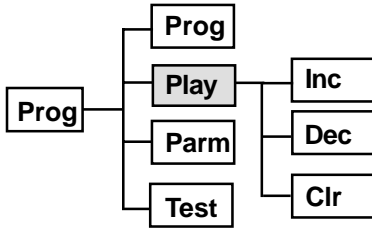
F2 Key (OWrt) - Overwrites to the transfer ahead program.

10. Explanation on Each Function Screen

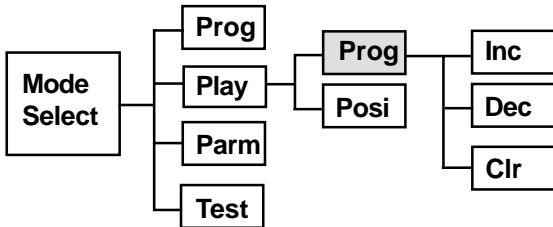
10.2 Play Mode

10.2-1 Play Program Input Mode

(Super SEL Type)



(DS Type)



Execute, Stop, Select Screen

Play	1	-	1	[10]
Home				11
Inc	Dec	Clr		
F1	F2	F3	F4	

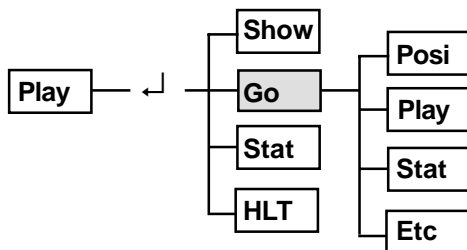


Return Key



Play	1	-	1	[10]
Home				11
Show	Go	Stat	HLT	
F1	F2	F3	F4	

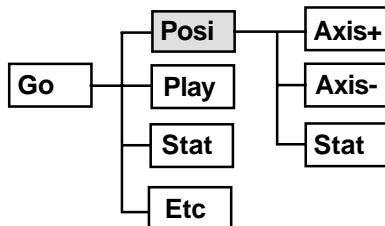
Execute Assign, Stop Condition Select Screen



Play	1	-	0	[10]
MOVL			2	
Posi	Play	Stat	Etc	
F1	F2	F3	F4	

Start Axis

Play Axis Condition Display Mode

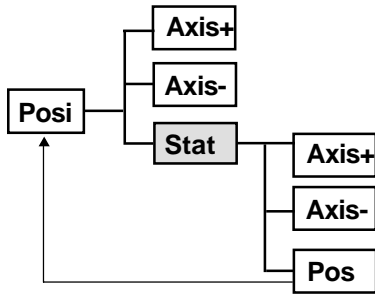


Play	1	-	No	1	[1] - 2
	99.256				51.328
Axis+	Axis-	Stat			
F1	F2	F3	F4		

Select the axes not displayed (5 axes or greater).

10. Explanation on Each Function Screen

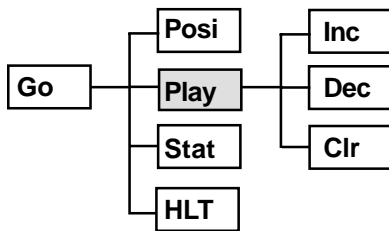
Status Display Mode



Play	1 - No	1 [1] - 2	
Home	[ON]	Servo [ON]	
Move	[OFF]	59.237	
Axis+	Axis-	Pos	
F1	F2	F3	F4

HOME	OFF / ON
SERVO	OFF / ON
MOVE	OFF / ON

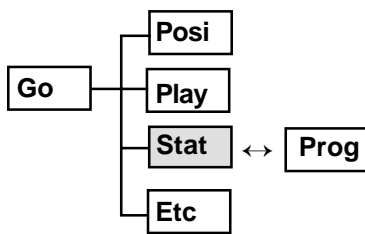
Rerun, Stop Assign Mode



Play	1 -	1 [10]	
HOME		11	
Inc	Dec	Clr	
F1	F2	F3	F4

* Multi-task ... You may simultaneously execute 16 programs
(For the DS type: 8 programs).

Execute Program Status Mode



Play	1 -	1 [Run -1]	
1-4			
Prog			
F1	F2	F3	F4

1: Execution condition
2: Execution allowable condition
4: Wait condition
8: Forced wait condition

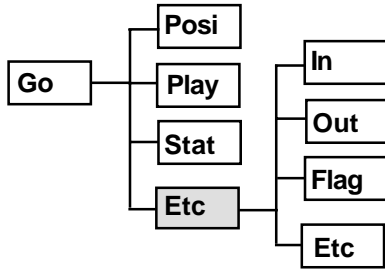
Execute Program No.



Play	1	[Prog Status]	
ERR - STEP		[NONE] [RUN]	
Stat			
F1	F2	F3	F4

10. Explanation on Each Function Screen

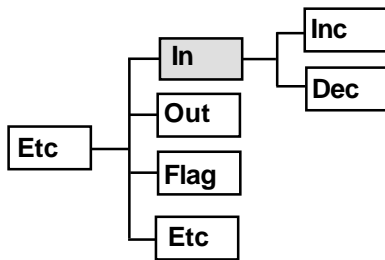
Input • Output Port, Flag Condition Selection Mode



Play	1 - 0 [10]		
MOVL	5		
In	Out	Flag	Etc
F1	F2	F3	F4

- F1 Key:** Input port changes display selection
- F2 Key:** Output port changes display selection
- F3 Key:** Flag changes display selection
- F4 Key:** Execute Assign, Status Selection Screen

Play Input Port Display Mode



Play	0123456789	(In)	
000 ->	0010000000	<- 009	
010 ->	0000000000	<- 019	
Inc	Dec		
F1	F2	F3	F4

Displays the condition when IN 002 is ON.

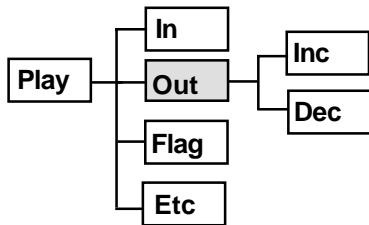
(Peripheral device operation)

```

0 0 1 0 0 0 0 0 0 0
  ↓ ↓ ↓
000 001 002 ..... 009 ← Port No.
  
```

- F1 Key:** +10 to input port
- F2 Key:** -10 to input port

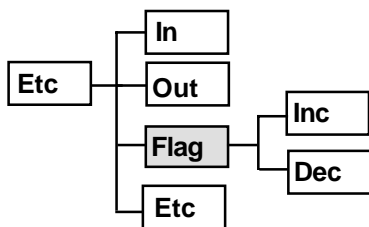
Play Output Port Display Mode



Play	0123456789	(Out)	
300 ->	0100000000	<- 309	
310 ->	0000000000	<- 319	
Inc	Dec		
F1	F2	F3	F4

- F1 Key:** +10 to output port
- F2 Key:** -10 to output port

Play Flag Display Mode

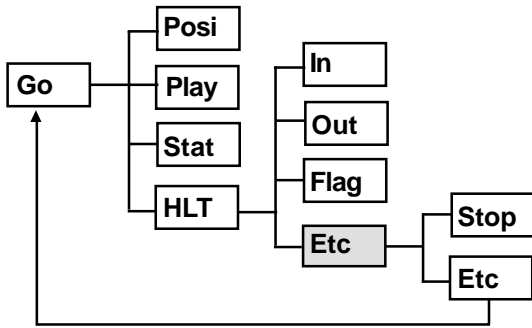


Play	0123456789 (Flg)		
600 ->	0000000000 <- 609		
610 ->	0000000000 <- 619		
Inc	Dec		
F1	F2	F3	F4

- F1 Key:** +10 to flag
- F2 Key:** -10 to flag

10. Explanation on Each Function Screen

Program Executing Display

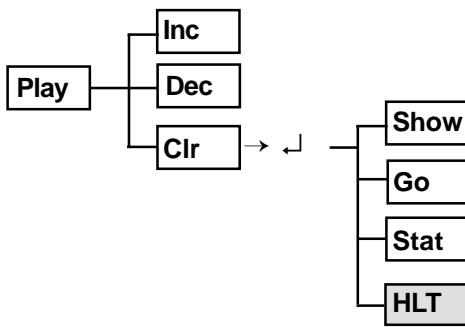


Play	[Run	1-	1]
1-	4		
Stop			Etc
F1	F2	F3	F4

Please refer to Page 39, section 9.2.2, entitled, "How to stop operation during, or by other methods excluding EXIT."

Press the **F1** Key → to return to the Play Mode Screen.

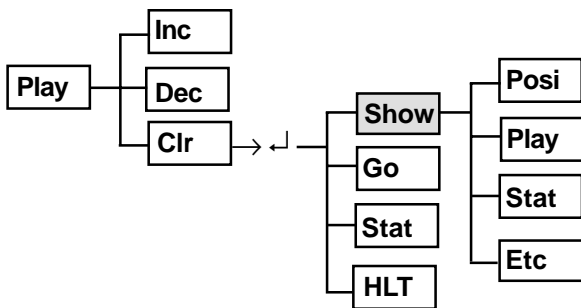
How to stop using **HLT**



Play	2	[Prog	Status]
ERR_	STEP	[NONE]	[STOP]
Posi	Play	Stat	Etc
F1	F2	F3	F4

Movement is same as during Stop.

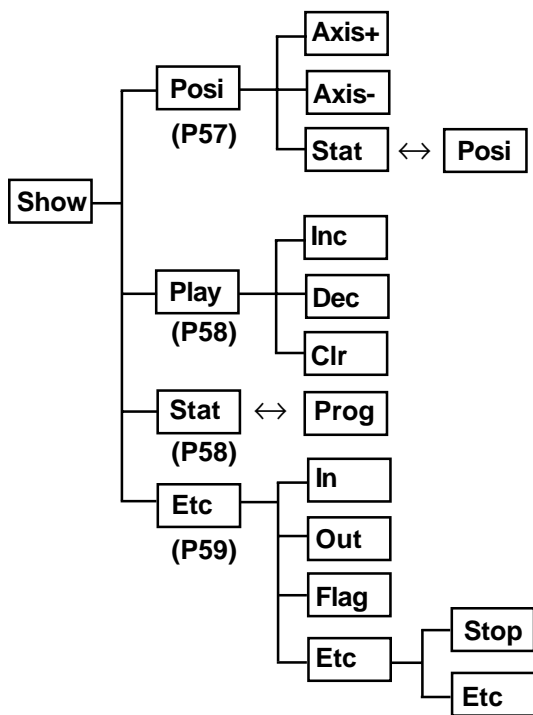
Show Mode ... Monitors program movement



Play	1-	0	[	10]
MOVL		3		
Posi	Play	Stat		Etc
F1	F2	F3		F4

10. Explanation on Each Function Screen

When program in not moving

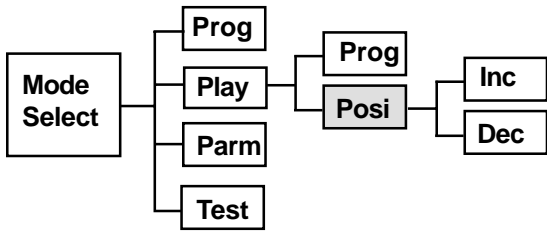


Play	1	[Prog	Status]
ERR_STEP		[NONE]	[STOP]
Posi	Play	Stat	Etc
F1	F2	F3	F4

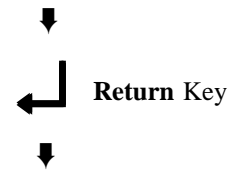
* For details on each screen, please refer to Page 57 ~ 59.

10. Explanation on Each Function Screen

10.2-2 Play Program Input Mode (DS type only)



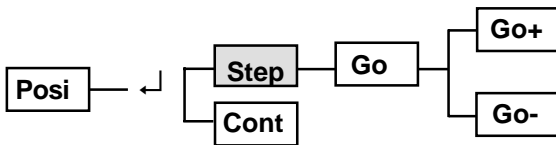
Play - 2 No 1 [1] - 1			
200.000			
Inc		Dec	
F1	F2	F3	F4



Operation Method Selection Screen

Play - 2 No 1 [1] - 1			
200.000			
Step		Cont	
F1	F2	F3	F4

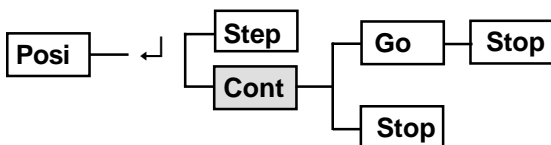
Step Operation Mode



Play S - 2 No 1 [1] - 1			
200.000			
Go+		Go-	
F1	F2	F3	F4

- F1 Key (Go+):** Displays the next position upon move.
- F2 Key (Go-):** Displays the previous position upon move.

Consecutive Operation Mode



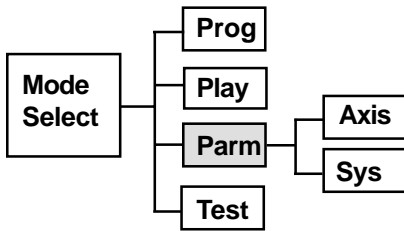
Play C -2 No 1 [1] - 2			
200.000			
Go		Stop	
F1	F2	F3	F4

- F1 Key (Go):** Executes sequence position move.
- F2 Key (Stop):** Stops.

10. Explanation on Each Function Screen

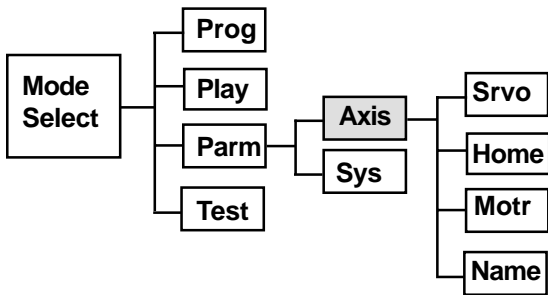
10.3 Parameter Mode

The system parameters are written into the controller accordingly prior to shipment. In general, the customer does not need to make modifications on his own. However, for customized system parameter changes, please contact IAI Service Department or Technical Support. Please do not attempt to make modifications on your own. Otherwise, IAI can not guarantee should abnormalities occur as a result of your modification. If you wish to modify the parameters, please save the parameter contents. The parameters will be effective once they are saved and the controller is reset. (Although an example initial value by the teaching pendant will be displayed, the actual shipment parameter will differ according to each actuator type.)



Parm			
Axis	Dec		
F1	F2	F3	F4

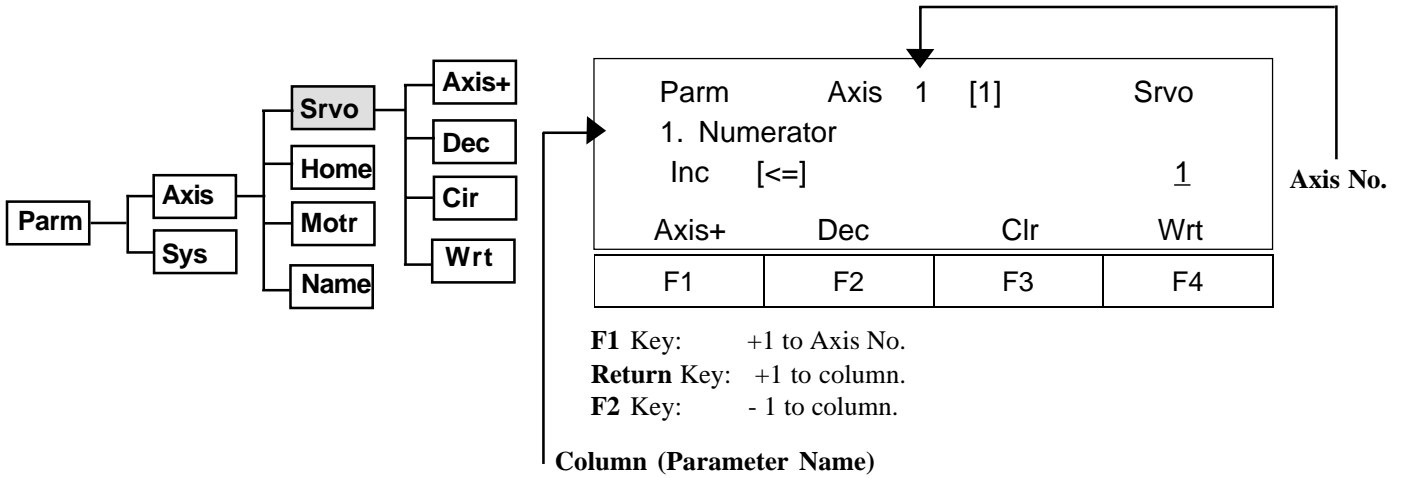
10.3-1 Axis Parameters



Parm		Axis	
Srvo	Home	Motr	Name
F1	F2	F3	F4

10. Explanation on Each Function Screen

Axis Servo Parameters



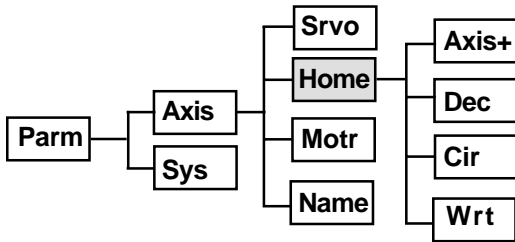
Servo Control Reference (Srv)

No	Parameter Name	Initial Setting Value	Content	Reference
1	Numerator	1	Numerator	Applicable
2	Denominator	1	Denominator	Applicable
3	Over ride (%)	100	Over ride	Non-applicable, setting done on a servo device
4	Acceler (G)	0.30	Acceler	
5	Jog Vel	30	Jog Velocity	Velocity during Teach mode
6	Pend Band	10	Pulse	
7	Soft Limit Off	2.00	Soft Limit Offset	
8	Soft Limit (+)	9999	Stroke Limit (+)	
9	Soft Limit (-)	0	Stroke Limit (-)	

* Since the common parameter is used, over ride is not effective at this time.

10. Explanation on Each Function Screen

Axis Home Parameter Mode / Usable Axis • Unusable Axis Setting Mode



Parm	Axis	1	[1]	Home
1. Home Dir	Inc	[<=]		1
Axis+	Dec		Clr	Wrt
F1	F2	F3	F4	

F1 Key: +1 to Axis No.

Return Key: +1 to column.

F2 Key: - 1 to column.

Homing reference (Home)

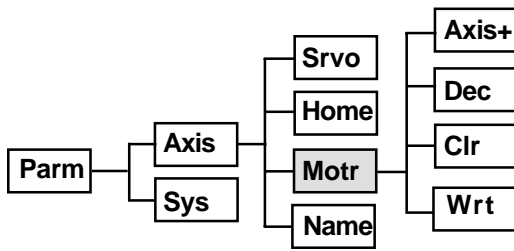
No	Parameter Name	Initial Setting Value	Content
1	Home Dir	0	Direction
2	Home Type	0	Method (L=Limit Switch)
*1	3 Home Sequence	0~9	Sequence Used Axis Unused Axis
4	Home Sw Pol	1	Limit Input Polarity
5	Home Z Edge	1	Z-Phase Detection Edge
*2	6 Home Creep Vel	0	Creep Velocity
7	Home Back Vel	10	Back Velocity
8	Home Z Vel	5	Z-Phase Search Velocity
9	Home Offset	0	Offset Move Amount
10	Home Deviation	667	Pulse
11	Home Current	60	Current Limit

*1 When a number from 1~9 is set, you may assign homing sequence of the applicable axis. When 0 is set, you may change the assigned axis to an unused axis (no connection). When set to an unused axis, jog movement and homing can not execute during teaching (The current position will be displayed as XXXXX.XXX).

*2 The creep function can only be used for systems that come with Limit Switch • Option. Please always set the value as 0. If you set the value to another number besides 0 on an actuator which does not come with a Limit Switch, correct homing can not be executed.

10. Explanation on Each Function Screen

Axis Motor Parameters



Parm	Axis	1	[1]	Home
1. Motor	RPM	Max		
Inc	[<=]	4000		
Axis+	Dec	Clr	Wrt	
F1	F2	F3	F4	

F1 Key: +1 to Axis No.

Return Key: +1 to column.

F2 Key: - 1 to column.

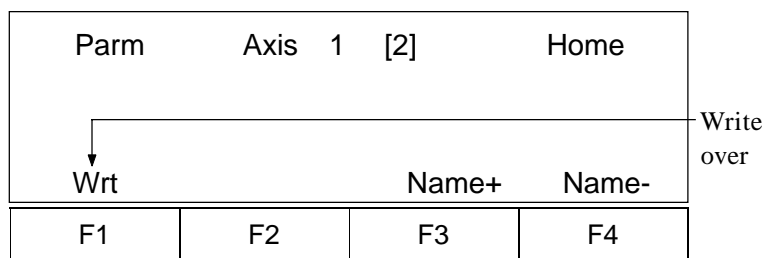
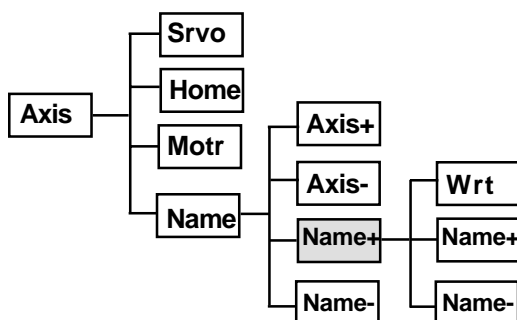
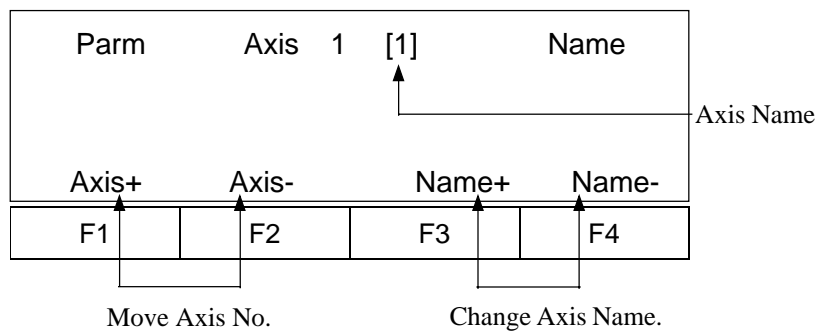
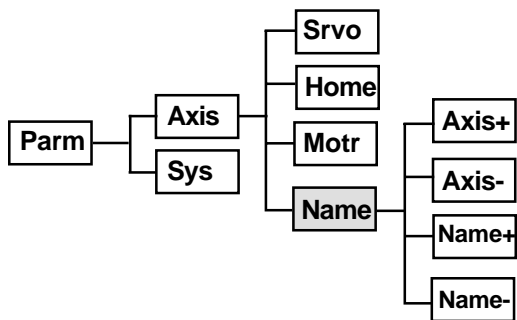
* Motor Reference (Motr)

No	Parameter Name	Initial Setting Value	Content
1	Motor RPM Max	4000	Motor Maximum Rotating Number
2	Encoder Pulse	400	Encoder Pulse Number
3	Screw Lead	8	Screw Lead (MM)
4	Multiple	4	Multiplicity
5	Brake Time	0.1	Brake Time
6	Position Gain	60	Position Gain
7	Speed Gain	80	Speed Gain
8	F/F Gain	0	Feed/Forward Gain
9	Integral Gain	30	Integral Gain
10	Total gain	150	Total Gain
11	Int. Vol. Limit	60	Integral Voltage Gain
12	Over Speed	410	Over Speed
13	Error Range	2666	Error Range
14	Motor Max Cur	90	Motor Maximum Current
15	Motor Over Load	16300	Motor Over Load

* The motor reference parameter varies according to the actuator type. When necessary, please contact your IAI representative.

10. Explanation on Each Function Screen

Axis Name Parameters



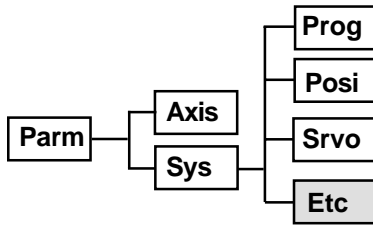
Axis Name Title

No	Parameter Name	Initial Setting Value	Content
1	Axis 1	1	Axis Title 0~9, AZ Setting
2	Axis 2	2	Axis Title 0~9, AZ Setting
3	Axis 3	3	Axis Title 0~9, AZ Setting
4	Axis 4	4	Axis Title 0~9, AZ Setting
5	Axis 5	5	Axis Title 0~9, AZ Setting
6	Axis 6	6	Axis Title 0~9, AZ Setting
7	Axis 7	7	Axis Title 0~9, AZ Setting
8	Axis 8	8	Axis Title 0~9, AZ Setting

(Display • Setting for usable axis only)

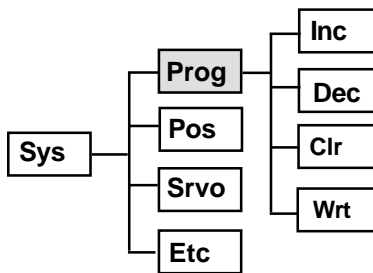
10. Explanation on Each Function Screen

10.3-2 System Parameters



Parm		System	
Prog	Pos	Srvo	Etc
F1	F2	F3	F4

System Program Parameter Mode



Parm	System	Prog	
1. Auto	Start	PRG	
Inc [<=]			<u>0</u>
Inc	Dec	Clr	Wrt
F1	F2	F3	F4

F1 Key: +1 to column.
Return Key: +1 to column.
F2 key: - 1 to column.

*Automatic Start

Set the program number you wish to auto start to the “Auto Start Program” column located on the controller parameter side. Upon completion, reset, emergency stop ON and install the power. Then, the set program will automatically start. This setting is possible either by the teaching pendant or a PC software.

Precautions when using an Auto Start Program:

The servo actuator will start automatically, immediately after the controller is reset which may startle the operator. To ensure safety, always use an interlock at the start of a program, such as having the actuator operate after receiving a confirmation signal. To start simultaneous multiple-programming, set all other programs into EXPG command, placing them ahead of the main auto program. As always, please take safety precautions when using an auto start program.

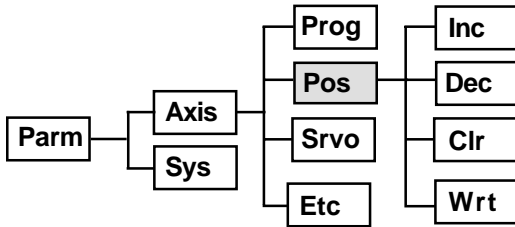
Application Program Reference

No	Parameter Name	Initial Setting Value	Content
1	Auto Start PRG	0	Auto Start Program No.
2	Emergency PRG	0	Emergency Stop Program No.
*	3	Program Size 64 (32)	Number of Programs
*	4	Task Size 16 (8)	Number of Multi-tasks
*	5	Step Size 3000 (1000)	Number of Program Steps
*	6	Time Slice 0.01	Time Slice Check Value (sec)

(* Reference only. Modification is not possible)

10. Explanation on Each Function Screen

System Parameters



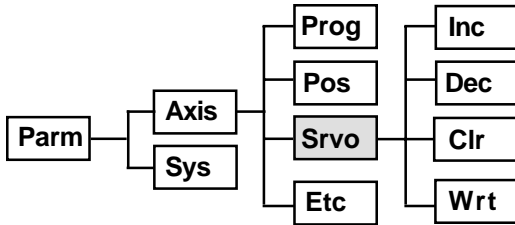
Parm	System	Pos	
1. Point		Size	
Inc [<=]		2000	
Inc	Dec	Clr	Wrt
F1	F2	F3	F4

Application Point Reference

No.	Parameter Name	Initial Setting Value	Content	Standard
* 1	Point Size	2000 (500)	Point Data Number	2000 (DS Type 500)

(* Reference only. Modification is not possible)

System Servo Parameter Mode



Parm	System	Srvo	
1. Axis		Size	
Inc [<=]		2	
Inc	Dec	Clr	Wrt
F1	F2	F3	F4

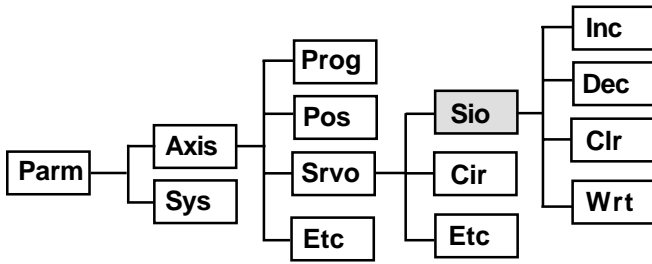
Application Device Reference

No	Parameter Name	Initial Setting Value	Content	Reference
1	Axis Size	2	Number of Axes	
2	Numerator	1	Numerator	Not usable Set according to axis
3	Denominator	1	Denominator	
4	Over ride (%)	100	Over ride (%)	
5	Acceler (0.0G)	0.30	Acceler (0.0G)	Usable
6	Acc Max (0.01G)	1.00	Acceler Maximum	
7	Drive Vel	100	Running Time	Velocity during Step
8	Drive Vel Max	1000	Maximum Running Time	

10. Explanation on Each Function Screen

System I/O Parameters

(Note: **Cir** (circular parameter) does not exist for the DS type.)



Parm	System	Sio
1. Terminal	IDS	
Inc [<=]		99
Inc	Dec	Clr
Wrt		
F1	F2	F3
		F4

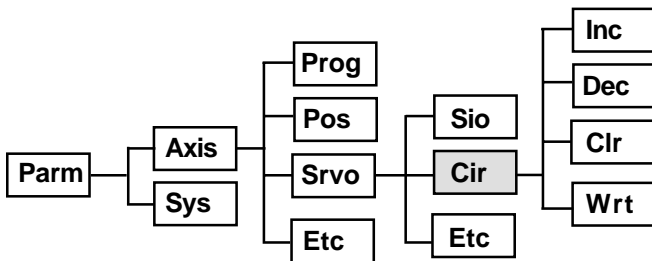
Communication Reference

No	Parameter Name	Initial Setting Value	Content
* 1	Terminal ID	99	Multi-Drop Terminal Code
* 2	Time Out (sec)	0	Time Out
Note 1 * 3	Baud Rate	3	Baud Rate
Note 1 * 4	Char Length	0	Character Length
Note 1 * 5	Parity	1	Parity
Note 1 * 6	Stop Bit	0	Stop Bit

(* Reference only. Modification is not possible.)

Note 1: The actual setting is fixed to "9600 Baud • 8 Bit • N Parity • 1 Stop."

System Circle, Circular Parameter Mode (This parameter does not exist with the DS type)



Parm	System	Cir
1. Circle Angle		
Inc [<=]		15.0
Inc	Dec	Clr
Wrt		
F1	F2	F3
		F4

Circular • Pass Reference

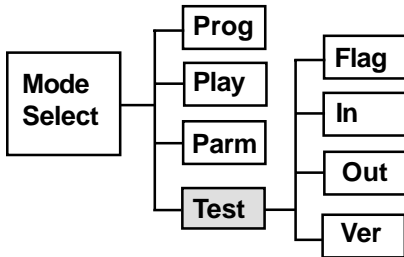
No	Parameter Name	Initial Setting Value	Content
* 1	Circle Angle	15.0	Slice Angle (15)

(* Fixed parameter).

10. Explanation on Each Function Screen

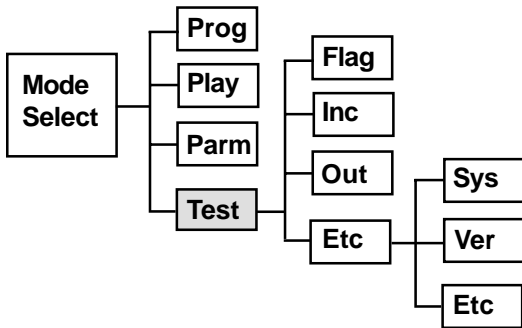
10.4 Test Mode

(Super SEL Type)



Test			
Flag	In	Out	Ver
F1	F2	F3	F4

(DS Type)



Test			
Flag	In	Out	Etc
F1	F2	F3	F4

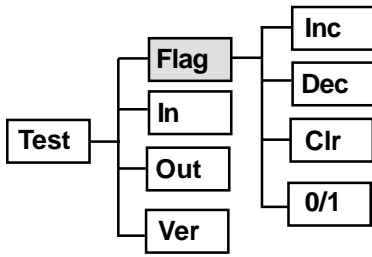
Select the **F4** Key.

Test			
Sys	Ver	Etc	
F1	F2	F3	F4

10. Explanation on Each Function Screen

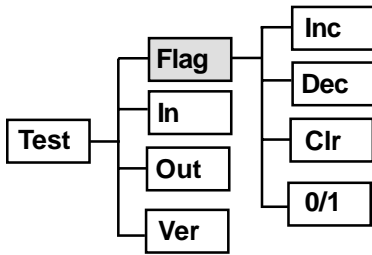
Test Flag Display

(Super SEL Type)



Test	0123456789	(Flg)	
600 ->	1100000000	<-	609
610 ->	0000000000	<-	619
Inc	Dec	Clr	Wrt
F1	F2	F3	F4

(DS Type)

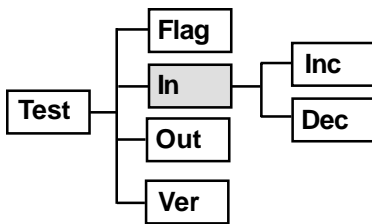


- F1** Key (Inc): +10 to Flag.
 - F2** Key (Dec): -10 to Flag.
 - F3** Key (Clr): Turns all displayed port to 0.
 - F4** Key (0/1): Changes → 0 ⇔ 1, 1 ⇔ 0
- Moves .(decimal point) , **Return** Key → Cursor location to the right.
 Moves -(minus) Key → Cursor location to the left.

Flag forced ON/OFF is possible with this screen. However, it does not monitor flag changes in realtime.

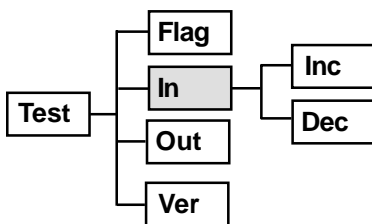
Test Input Port Display

(Super SEL type)



Test	0123456789	(In)	
000 ->	0010000000	<-	009
010 ->	0000000000	<-	019
Inc	Dec		-
F1	F2	F3	F4

(DS Type)



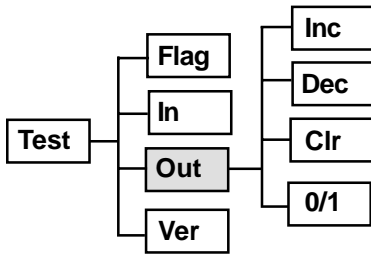
- F1** Key (Inc): +10 to Display Port.
- F2** Key (Dec): - 10 to Display Port.

You may display input port changes, and input the input port.
 As for the input port, you can execute the realtime • monitor,
 and turn it ON/OFF using a peripheral device. The standard for a
 Super SEL type is up to 023 while it is up to 015 for the DS type.

10. Explanation on Each Function Screen

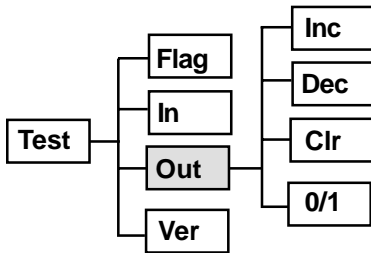
Test Output Port Display

(Super SEL Type)



Test	0123456789	(Out)	
300 ->	0000000000	<-	309
310 ->	0000001100	<-	319
Inc	Dec	Clr	Wrt
F1	F2	F3	F4

(DS Type)

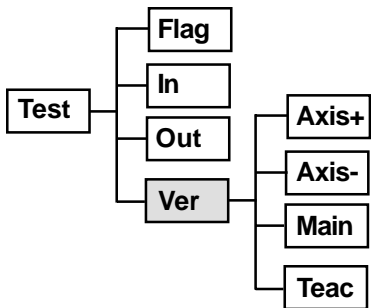


- F1** Key (Inc): +10 to Flag.
 - F2** Key (Dec): -10 to Flag.
 - F3** Key (Clr): Turns all displayed port to 0 output.
 - F4** Key (0/1): Outputs → 0 ⇔ 1, 1 ⇔ 0
- Moves .(decimal point), **Return** Key → Cursor location to the right.
 Moves -(minus) Key → Cursor location to the left.

Flag forced ON/OFF is possible with this screen. However, this does not monitor output changes in real time. The standard for the Super SEL type is up to 323 while it is up to 307 for the DS type.

Test Version Display

(Super SEL type)



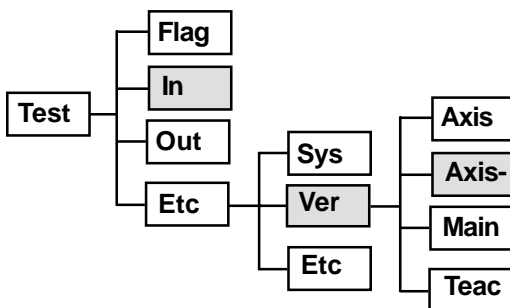
Test	Version	1 [1]	
Motr	V.200	12/05/94	
Main	V.1.00	07/14/95	
Axis+	Axis-	Main	Teac
F1	F2	F3	F4

F4 Key (Teac) → Teaching pendant version display

Version number ↓

Date of version upgrade ↗

(DS Type)



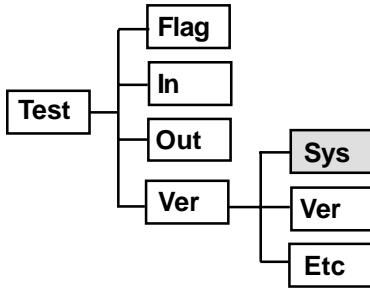
Test	Version	1 [1]	
Motr	V.200	12/05/94	
Main	V.2.50	07/14/95	
Axis+	Axis-	Main	Teac
F1	F2	F3	F4

F3 Key (Main) → Controller Main ROM version display

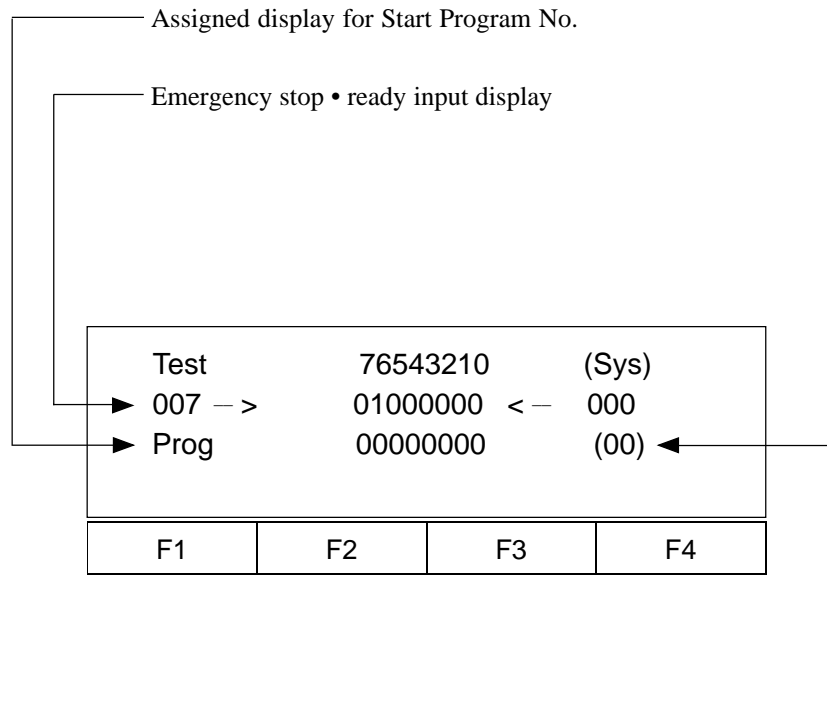
10. Explanation on Each Function Screen

Test Version Display

(DS Type)



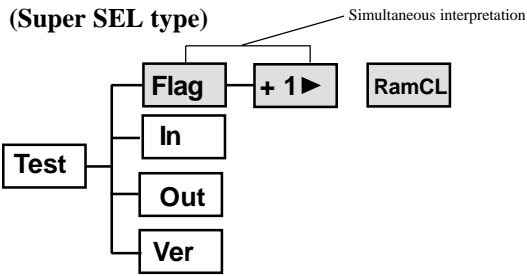
System Input Screen




Displays currently selected Program No.

10. Explanation on Each Function Screen

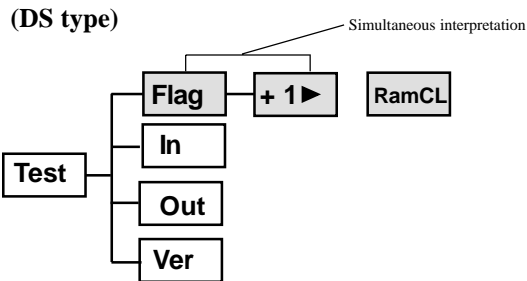
Memory Clear Mode




Test			
RamCL	In	Out	Ver
F1	F2	F3	F4

The above screen will appear when the F1 Key (Flag) and  Key are simultaneously pressed.

When the Keys are released, the screen below appears.



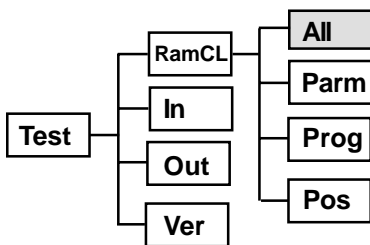
RamCL			
All	Parm	Prog	Pos
F1	F2	F3	F4

 Please be aware that the Memory Clear Operation will erase all data. Therefore, please backup your data. In particular, the initial set value will return when you clear the system parameter. Unless the correct data is input, normal movement can not be made.

*You may not do Clear during program execution. You will see the RUN display blinking.


- F1 Key:** Clears all system parameter, program and position territory.
- F2 Key:** Clears all system parameter.
- F3 Key:** Clears application program territory.
- F4 Key:** Clears position data territory.

(Super SEL type)

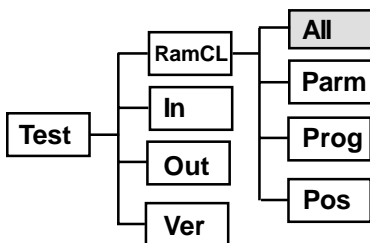


RamCL	All		
CLROK?			
F1	F2	F3	F4

Execute using the **F1** Key. All of the system parameters, program and position data will be cleared.

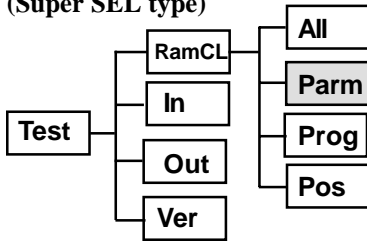
 Upon clear, same process as RESET will follow.

(DS type)



10. Explanation on Each Function Screen

(Super SEL type)

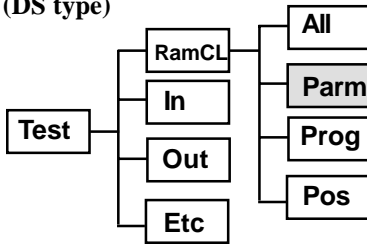


Test			
RamCL		Parm	
CLROK?			
F1	F2	F3	F4

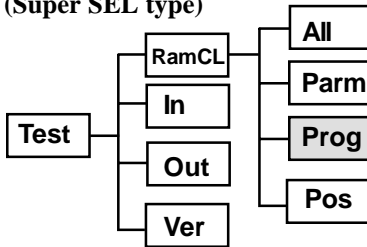
Execute using the **F1** Key. All of the system parameters will be cleared.

⚠ Upon clear, same process as RESET will follow.

(DS type)



(Super SEL type)

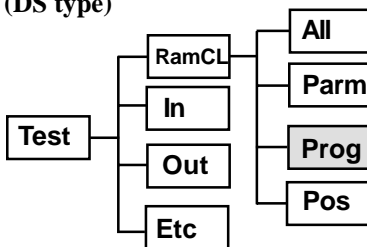


RamCL		Prog	
CLROK?			
F1	F2	F3	F4

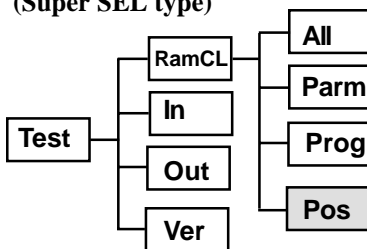
Execute using the **F1** Key. All of the programs will be cleared.

⚠ Upon clear, same process as RESET will follow.

(DS type)



(Super SEL type)

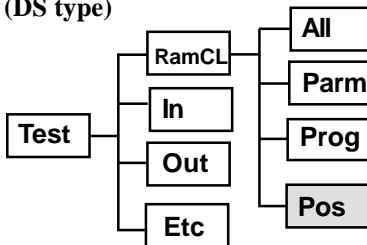


RamCL		Pos	
CLROK?			
F1	F2	F3	F4

Execute using **F1**Key.
All position data will be cleared.

⚠ Upon clear, same process as RESET will follow.

(DS type)



11. Supplement

11.1 Recovery From Emergency Stop

“Hard Reset” is used to recover from emergency stop for the Super SEL type, Table Top type (TT-300) and the DS Type. This operation is handled similar to power ON/OFF.

1. Emergency stop from the teaching pendant

- (1) Press the EMERGENCY STOP located on the teaching pendant. While the EMERGENCY STOP is continuously pressed, the following screen will appear:

[T-BOX LCD Display Screen]

EMG STOP.			
ReStart (Blinking)			
F1	F2	F3	F4

[Controller CODE Display Screen]

E G

(* ALARM is a red color light)

For the DS type: **ErG**

- (2) When you release the EMERGENCY STOP button located on the teaching pendant, “Hard Reset” will execute, and the following screen will appear:

[T-BOX LCD Display Screen]

EMG STOP.			
ReStart (Blinking)			
F1	F2	F3	F4

[Controller CODE Display Screen]

E G

(* ALARM is a red color light)

For the DS type: **ErG**

- (3) The initial screen display will return once you press the **F1**(Restart) located on the teaching pendant.

[T-BOX LCD Display Screen]

SEL	Teaching		
Teach	V2.00	09/01/97	
Start (Blinking)			
F1	F2	F3	F4

[Controller CODE Display Screen]

r d

(* READY is a green color light)

For the DS type: **rdy**

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2. **In case of pressing the controller emergency stop button or making an emergency stop due to an external signal:**

Upon pressing or releasing the EMERGENCY STOP red button (For A • B type only), you must do the above (1), (2) and (3) operations in order to do a teaching pendant reset. Teaching pendant operation can not be made if the controller front panel CODE display screen is at a

E G

 status.

 When using the “Auto Start PRG” function on the system program parameter:

Avoid sudden movement start upon releasing the EMERGENCY STOP during Program Auto Start.
Please program your controller so that it will start a movement upon an input requirement within a program.

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11.2 List of error codes

Error Code	Error Name	Explanation
A1	External Interrupt Error	1. Motor over current 2. Over regenerative current (over negative load) 3. Driver overheat
A2	Motor Overload Error	Mechanical overload of motor
A3	Deviation Error	Motor is unable to perform properly due to mechanical overload
A4	Software Limit Error	Exceeded software limit
A5	Pole Sense Error	Unable to sense pole
B0	No Program Error	Program does not exist
B1	Program Execution Error	Execution of a currently executing program
B2	Program Over Error	Number of tasks exceeds those set as parameters
B3	Double Subroutine Number Error	Two or more of the same subroutine number are used
B4	Double Tag Number Error	Two or more of the same tag number are used
B5	Undefined Subroutine Number	Subroutine number is not defined
B6	Undefined Tag Number	Tag number is not defined
B7	Subroutine Pair Error	BGSR and EDSR are not the same quantity
B8	Step 1 BGSR Error	Step 1 is a BGSR Error
B9	DO, EDDO Pair Error	DO and EDDO are not the same quantity
BA	DO Nest Over Error	DO was used more than 15 times
BB	IF Pair Error	IF and ELSE are not the same quantity
BC	ELSE Error	ELSE was used in a place which was not between IF and EDIF
C0	No Homing Error	Homing was not performed before running actuators
C1	Point Data Error	Attempt has been made to executed unregistered point data
C2	Axis Double Execution Error	Move command given to axis currently moving
C3	Software Limit Error	Software limit exceeded in program
CA	Column Error	Column number was set outside the range of 1 ~ 999
CB	Channel No. Error	Device was set outside the range of 1 ~ 2
CC	Terminator Error	Ending letter was not set
CD	Source No. Error	Source number was set outside the range of 1 ~ 9
CE	S Motion Percent Error	S motion percent ws set outside the range of 0 ~ 50%
CF	Arch Trigger Error	Trigger was set outside the range of 50 ~ 100%
D0	Acceleration Error	Acceleration exceeds limits
D1	No Velocity Error	Velocity has not been set
D2	Override Error	Override was set outside the range of 1 ~ 100%
D3	Angle Error	Angle was set outside the range of 0.1 ~ 120 degrees
D4	Axis Pattern Error	Axis pattern was not set correctly. Displays D4 also for C1 (point data error)
D5	Axis Number Error	Axis number was set outside the range of 1 ~ 8
D6	Axis Error	More than 3 axes are designated in circular/arc motion
D7	Program Number Error	Program number exceeds the limit
D8	Position Number Error	Position number exceeds the limit
D9	Point Number Error	Negative number was input in the point number
DA	Flag Number Error	Flag is not assigned correctly
DB	Variable Error	Variable is not assigned correctly
DC	Digits Over Error	Assigned number exceeds 8 digits (binary 32 bits)
DD	Division (0) Error	Result of the division is "0"
DE	Circular Motion Computation Error	Position data that cannot perform circular motion was input
DF	Task Level Error	Task level was set outside of the range of 1 ~ 5
E0	Undefined Command Error	Attempted to execute undefined command
E1	Subroutine Over Nesting Error	Nesting of more than 15 subroutines
E2	Subroutine Under Nesting Error	EXSR and EDSR are not making a pair
E3	Controlling Column Error	Use of condition is not correct
EG	EMG Error	Emergency (Emergency Stop) was asserted
F0	Interrupt Error	Motor CPU and Interrupt management do not match

* For the DS Type, E is attached in the front of the error code, displayed on the 1st column.

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11.3 How to investigate an axis error using the teaching pendant

- For A1 ~ A4 error:

Use the teaching pendant to investigate the error occurrence axis.

- How to investigate an external start error occurrence axis:

When an error occurs on connecting axis during teaching riser, the below screen will be displayed (Timing of the display is after control version display).

Axis Check	No	1 [A]	-8
Home	[ON]	Servo	[OFF]
A1: EXT	INT_	ERR	
Axis	Error	Occurs	(Blinking)
F1	F2	F3	F4

← Error occurrence axis No.
 ← Homing (servo) status ON or OFF is displayed
 ← All error occurrence axis may be confirmed using the **F1** Key
 (* Use the ESC Key to display the Mode Selection Screen)

- For teaching pendant start:

Play Mode: When an executing error stops due to an error occurrence, the screen will change from execution step display to the below screen

Play	1	[ProgStatus]	
ERR _ STEP	[1]	[STOP]	
A1: EXT	INT_	ERR	
Posi	Play	Stat	Etc
F1	F2	F3	F4

← Error Occurance Step No. Program execution status ([RUN] or [STOP])
 ← Error code column 2 display: Error message display

- How to observe axis status:

Select PLAY mode, and input either Program No. 1 or suitable number. Then, select either “Show” or “Go.” Next, select “Posi” as well as, “Stat.”

Play	1	No	1 [A]	_8
Home	[ON]	Servo	[ON]	
Move	[OFF]		9999.999	
Axis+	Axis-	Pos		
F1	F2	F3	F4	

← Axis No
 ← Homing (Servo) status ON or OFF is displayed
 ← Error code column 2 display: Error message display
 ← (Use the **F1 • F2** Key to verify all axes).

- For B0~E3 error:

use the teaching pendant to investigate error occurrence step.

- For teaching pendant start:

Play Mode: When an executing error stops due to an error occurrence, the screen will change from execution step display into the screen below.

Play	1	[ProgStatus]	
ERR_STEP	[]	[STOP]	
A1: EXT	INT_ERR		
Posi	Play	Stat	Etc
F1	F2	F3	F4

← Error Occurance Step No. Program execution status ([RUN] or [STOP])
 ← Error code column 2 display: Error message display

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What to do When an Error Code Occurs

Below we indicate what to do in case any of the error codes described on the preceding page appear in the 7-segment display on the face of the controller.

(1) A1 ~ A5 alarms related to the servo

When one of these alarms related to the axis appears, determining which axis is the cause of the error makes it easier to solve the problem. One of the ways to do this is to judge by the axis status or movement at the time the error was generated. After the error is generated, you can try moving the axis manually if it is a small system. If the axis (when there is no brake) moves without resistance, there is a good possibility that this is the axis causing the problem. When these errors occur, you should ascertain the status of the actuator such as whether it was in the middle of homing.

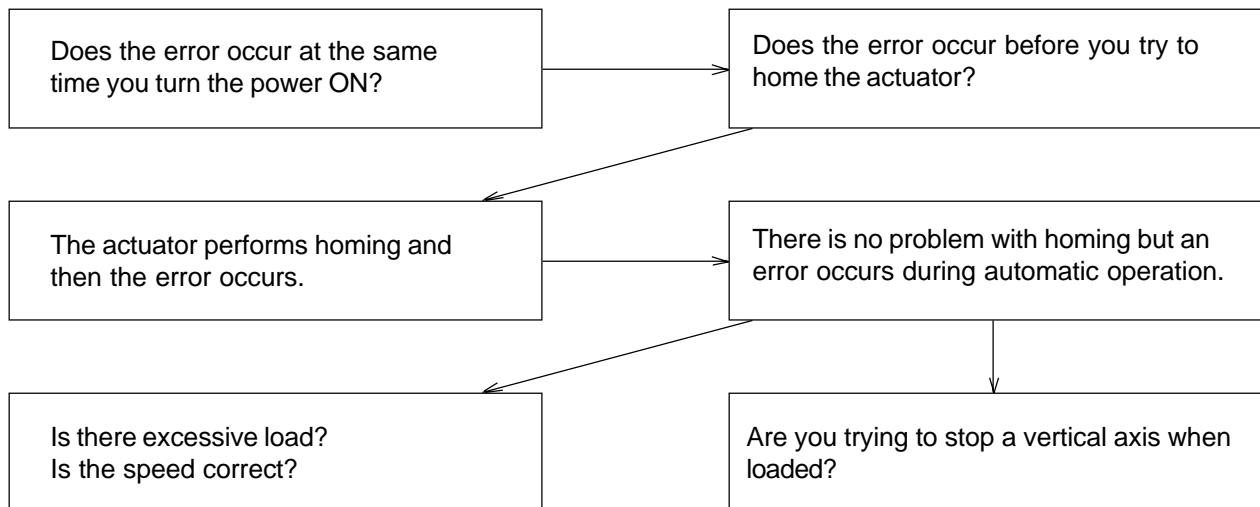
In the case of an A2 alarm where there is excessive load, the cause of the error must be corrected. If you are unsure of the cause, turn on the emergency stop or turn off the power and then after about 10 seconds, turn the power back on to see how the actuator runs. If you cannot find what the trouble is, please contact IAI or one of its agents.

When there is an A3 deviation error, it is possible that something is wrong with the connector cable.

When there is an A4 error, it is almost always caused by a programming error. Recheck the program to make sure that you are not trying to move the actuator beyond the stroke length.

When there is an A5 error, check to see how the axis is moving and then contact IAI. A5 errors can be caused by encoder breakdown, cable problems or driver problems.

Checklist



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(2) B0 - BC Programming Errors Group 1

An error will be displayed when there is a problem with the written program itself or the program that was started up. In this case, alarm output 300 will not be asserted.

D2	Override error	The override was spec 100%. Specify value w
D3	Angle error	The angle parameter fo was specified outside t angle within this range.
D4	Axis pattern error	The axis pattern design problem is the same as Correct the data setting
D5	Axis number error	An axis number outside an axis not supported b Set the correct axis nu
D6	Circular axis designation error	There are data settings ARC/CIR commands c dimensions. Correct th
D7	Program number error	Operator attempted to than 64. Only program
D8	Point number error	A point number higher point numbers, only the
D9	Point data error	Point data was specifie Position data must be a data can be stored as a
DA	Flag number error	The flag number assign use numbers 600 ~ 99
DB	Variable error	The variable number a and variables with * ind
DC	Digit over error	The value input in oper

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(3) C0 - CF programming errors Group 2/Command Error - 1

This group of errors is also related to programming, but primarily arises from the way the commands are used.

C0	Homing incomplete error	Tried to execute move command before homing. After the power emergency stop, homing
C1	Position designation error	Tried to move to a position without position data. Set position data.
C2	Axis-in-motion error	Commanded axis to move while in motion. Be careful when
C3	Soft limit error	Commanded axis to move beyond soft limit. Or, the soft limit is mistakenly changing the conditions and make necessary
CA	Column error	Specified a column number with respect to communication should be within 1 ~ 999.
CB	Channel number error	A channel device other than 1-2. Currently, only 1 - 2 can be used.
CC	Terminator error	The terminating character is not the terminating character used.
CD	Resource No. error (Reserve error - currently not used)	Resource no. outside of 1 (Currently, commands that are not supported).
CE	S motion percent error	An S motion percent other than 0. Reset using the range 0 ~ 100.
CF	Arch trigger error	Trigger setting outside of 0. Reset using the range 0 ~ 50.

(4) D0 - DF programming errors Group 3/Command Error - 2

Like Group 2 above, this group of errors primarily arises from the way the commands are used.

D0	Acceleration error	Commanded axis to accelerate beyond upper limit. Although acceleration is a fairly high value, 0.3G is guaranteed. If this error occurs, reset with the speed.
D1	No speed error	There is no speed setting necessary to specify a speed with the VEL command or using the

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D2	Override error	The override was spec 100%. Specify value w
D3	Angle error	The angle parameter fo was specified outside t angle within this range.
D4	Axis pattern error	The axis pattern design problem is the same as Correct the data setting
D5	Axis number error	An axis number outside an axis not supported b Set the correct axis nu
D6	Circular axis designation error	There are data settings ARC/CIR commands c dimensions. Correct th
D7	Program number error	Operator attempted to than 64. Only program
D8	Point number error	A point number higher point numbers, only the
D9	Point data error	Point data was specifie Position data must be a data can be stored as a
DA	Flag number error	The flag number assign use numbers 600 ~ 99
DB	Variable error	The variable number a and variables with * ind
DC	Digit over error	The value input in oper

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(5) E0 - E3 programming errors Group 4/Command error - 3

These errors, like those in sections 3 and 4 above, primarily arise from the way the commands are used.

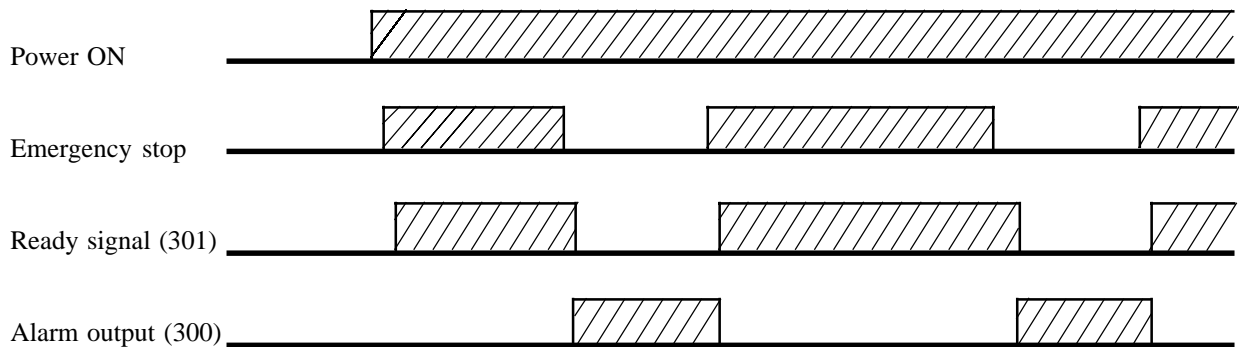
E0	Undefined command error	Attempted to execute an use the PC interface softw prevent this.
E1	Subroutine overnesting error	There are more than 15 s alarm occurs after trying t program so that the numb less than 15. Also note th use of the IF command, th error.
E2	Subroutine under nesting error	BGSR is not paired with E found before the EDSR.
E3	Controlling column error	The expansion condition i using the PC software, it w syntax error at the time of

(6) EG error - Emergency Stop

If an EG alarm occurs, consider the following.

① Emergency stop signal asserted

Determine what triggered the emergency stop and then release the emergency stop (press the button). During an emergency stop, the ready signal or output 301 is OFF and the alarm or output 300 is ON. However, if the emergency stop is asserted when the power is turned ON, alarm output 300 will not go ON. The 300 output functions after the ready signal is given.



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② Another thing to consider with an emergency stop

Usually, the emergency stop input is tied to a ground. In the case where you are using an external power supply, the power supply voltage can drop, causing an emergency stop to occur. The way the circuitry is designed, the 24V DC power supply must be turned on before the controller, and the power supply must not be turned OFF while the controller is in operation.

In addition, if there is a malfunction in the controller causing a part of the unit to break down, the EG condition will remain in effect and homing cannot be performed. If this happens, please contact IAI.

(7) Other Errors

The following errors occur only rarely under normal operating conditions.

F0	Interrupt error	Motor CPU and the interr This error could occur wh faulty controller operation the hardware. Homing is power OFF and then ON several times, contact IA
FF	CPU fault error	This indicates a fatal erro processing. In this case, working. You must perfo power OFF and then ON many digits were used in Make sure that calculatio produce a value within ± 3

Precautions when handling errors/alarms

When you need to turn the power OFF and then ON again, please make sure to wait approximately 15 seconds after turning the controller power OFF before turning it back ON.

If an error occurs in which you cannot perform homing, please contact a service representative after you have checked out the condition at the time the error occurred as thoroughly as possible. In some cases, the problem might be in the program itself and the representative may request a program list from you.

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